DPR ON SEWERAGE SCHEME FOR ALAPPUZHA MUNICIPALITY– PHASE 1

PREPARED BY

KERALA WATER AUTHORITY

SEWERAGE CIRCLE, KOCHI

KERALA

A DETAILED PROJECT REPORT ON SEWERAGE SCHEME FOR ALAPPUZHA MUNICIPALITY– PHASE 1

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NOVEMBER 2022

EXECUTIVE SUMMARY

Kerala Water authority is a public sector undertaking under the Government of Kerala formulated for the development and regulation of water supply and wastewater collection and disposal in the state of Kerala and for matters connected therewith. The statutory autonomous body, established on 1st April 1984 by converting the erstwhile Public Health Engineering Department, is the key in the planning, execution, operation and maintaining water supply and sewerage schemes throughout Kerala.

During the last two decades during which urbanization increased, and the consumptive nature of society became more apparent, the State has been challenged by the second generation of issues: significant increase in the generation of solid and liquid wastes, contamination of sub-surface water flows impacting groundwater stocks and shallow drinking water sources like wells, and the decreased assimilative capacity of water resource stocks and flows. Hence a proper strategy for treating liquid waste generated is essential. Providing Sewerage network in major cities and towns is given utmost importance by Government of Kerala. In this limelight, Alappuzha local urban body (ULB) of Alappuzha district has been selected for implementation of sewerage scheme and the same is prepared by Sewerage Circle Kochi-11.

The Municipal area as a whole has been divided into four network zones and two septage zones. Out of the 52 wards in the municipality, wards 32 to 36& 43are fully and 37,38,42 & 44 are partially considered to have sewer network system as Alissery Zone in Zone 2 and thereby proposing 5 MLD STP at Alissery Store compound of KWA. The projected population of Alissery zone as on 2054 is 28686 in which network coverage covering an area of2.645 sq km and the estimated sewage load is 4.54 MLD including septage provision for the balance area. At present, ward 34 and 35 is only considered for the network implementation as Phase 1 which is covering 0.475 sqkm with network length of 9.79km.

The whole sewerage scheme is bifurcated into different phases for the ease of planning and execution. In phase 1 of Alappuzha sewerage scheme, a single subzone (subzone 1) of Alissery Zone in zone 2 is considered. Two wards were taken in Phase 1, mainly Town ward, Alissery ward and Lajaneth ward. The population for phase 1 (subzone 1 of Alissery

zone) is 8032 as on 2022 and projected to 8191for the year, 2054.

The treatment technology for the proposed STP adopted in this DPR is Moving Bed Bio Reactor (MBBR), as it is suitable for accepting shock loads and flexible in nature. Apart from sewage treatment plant, a co-treatment facility is also proposed to treat the septage to be collected from the non-network areas.

In phase 1 of the sewerage system sewer network of 9790m consisting of 384 manholes, and pumping main of 800m is taken into consideration. The proposed collection well1for subzone 1 is located at Alissery STP site. The treatment plant proposed having 5MLD capacity will be set up in Kerala Water Authority's (KWA) own land at Alissery. The sewer network lines proposed are HDPE PE100 PN8 and pumping mains HDPE PE100 PN10. As the sewerage connection to the households are to be provided in parallel with the construction of STP for the timely commissioning of the plant, provision for giving sewer connections to households are included in the estimate.

The sewage treatment plant is planned to provide eco-friendly units for the system with vertical garden. 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.

Total estimated cost is observed to be Rs. Sixty Eight crores only including 5 years operation maintenance expenses excluding power charges.

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ABSTRACT

Sl. No.	Item	Amount (Rs.)
1	Cost of STP including electro mechanical items	₹ 23,93,61,962
2	Cost of Sewer Network	₹ 30,55,27,323
3	O&M Charges For 5 Years (STP + Network)	₹ 2,66,75,037
	Total Cost	**₹ 57,15,64,322**
	GST @18% (1+2+3)	₹ 102881578
	Contingencies and unforeseen	₹ 55,54,100
	Grand Total	₹68,00,00,000
Sixty Eight Crores Only		

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PROJECT AT A GLANCE

Sl. No.	Item	Description
1	Name of the Project	Detailed Engineering Report for the Sewerage scheme in Alappuzha Municipality with STP – Phase 1
2	Name of District	Alappuzha
3	Name of Municipality	Alappuzha
4	Project area covered	0.473 Sq. Km (Subzone 1 of Alissery Zone)
5	Population benefitted from phase 1	8032Nos. (Year 2054 Projected)
6	STP Capacity	5 MLD
7	Total Network Length	9790m
8	Number of Wells	1
9	Number of Pumping Stations	1
10	Number of Manholes	384
11	Number of Connections	2048
12	O&M cost for 5 Years including 18% GST (including electricity charges)	Rs. 19,90,00,000
13	Electricity charge for one year	Rs 2,41,02,900
14	Amount required for Land acquisition for Phase 1	Nil
15	Total cost including 5 years O&M cost(excluding power charges)	Rs. 68,00,00,000
16	Implementation agency	Kerala Water Authority
17	Period of execution	2 years

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CHAPTER 1

INTRODUCTION

1.1. BACKGROUND OF THE PROJECT

Government of Kerala has launched the "Rebuild Kerala Initiative (RKI)" for infrastructure development of Kerala, providing Sewerage network in major cities and towns is given utmost importance considering the increasing pollution of water bodies due to lack of proper disposal of sewage. Correspondingly, The Honorable National Green Tribunal (NGT) have given directions to implement sewerage system for various cities of Kerala to control pollution of major water bodies. The KWA is the largest institutional entity in the field of water supply, and implemented thousands of small, medium and large urban and rural piped water supply schemes in Kerala. However, the presence of KWA in the field of sewerage schemes has been limited. Due to the growing needs of planning and design of systems which serves healthy environment, the role of sewerage systems with meticulous planning and design is a must. Moreover, there are NGT Interventions and guidelines for pollution abatement for natural water bodies and environment. All these factors paved the way for the proposal of sewerage schemes which can cover every human habitation for the entire State of Kerala in a scientific and systematic way. KWA as knowledge partner, service provider and central agency for coordinating the activities related to the planning and implementation of sewerage systems for LSGIs can contribute in many ways.

As per the vision of Kerala State Sanitation Strategy, all cities and towns in Kerala become totally clean, sanitized, healthy, habitable, 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.

On this prominence, as per the direction of KWA, a comprehensive sewerage plan has been developed in the year 2020 for Alappuzha District. As per the initiative, a pilot project for two local urban bodies (ULBs) of Alappuzha district has been selected for implementation of sewerage scheme and the groundwork for the same is conducted by Sewerage Circle, Kochi - 11. This project report is prepared for implementation of sewerage scheme planned in Alappuzha municipality.

1.2. EXISTING SCENARIO OF SEWERAGE SYSTEM IN ALAPPUZHA

As per the Socio-economic survey conducted by the Town and Country Planning Department (2016), for the preparation of master plan for Alappuzha it is inferred that 33.23% of houses have septic tank, 64.55% of houses have pit latrine. Most of the houses in the urban areas have on site sanitation system like septic tanks or leach pit which do not comply with standards in most cases.

The municipality has no facilities for the treatment and disposal of septage collected from the septic tank from the households which results in the open dumping of septage. Currently, most of the grey water generated in the core commercial area is drained off directly into the nearby lakes and lagoons without treatment causing serious water pollution. Hence a proper strategy for treating liquid waste generated in the city is essential. This has caused pollution of water posing a public health hazard. It is necessary to plan and implement proper sewerage scheme to the area for reducing water pollution.

1.3. NEED FOR THE PROJECT

The colossal volume of sewage is generated in the urban area as an outcome of the rapid growth of the society and industrialization in the past few decades. Most of the wastewater generated is left untreated or is thrown into the nearby water bodies resulting in their pollution. Despite the Environment Protection Act, 1986 forbidding disposal of waste into water bodies, septage and other types of liquid waste are being dumped everywhere, polluting water sources (both surface water and groundwater), leading to severe health

implications.

Alappuzha is a city and a municipality in Kerala with and urban population of 174, 164 (2011 census) and is one among the two municipalities from the state included in the List of cities having population 1 Lakh and above. In 2016, the Centre for Science and Environment rated Alappuzha city as the first among the cleanest cities in India on the basis of the Municipal solid waste management. Nevertheless, the town lacks underground sewerage network and sewage treatment facilities. The high population growth rate and fast development of the city results in the increased quantity of sewage generated.

Almost the entire household in the urban area has onsite sanitation systems which do not comply with the standards and as of now no Sewerage Treatment Plants (STPs) is working in the Alappuzha municipality. The conventional mode of disposal through septic tanks etc. often results in the suboptimal functioning of the treatment system and resulting in the improper disposal of grey water to the environment. The lack of a scientifically constructed sewerage system is evident in the area causing poor sanitation, pollution of surface and ground water resources, unhygienic environment ultimately leading to a threat to the society. By taking into account of the specific local contexts and the multi-dimensional nature of the problems, a systematic and scientific step wise approach is indispensable.

1.4. SCOPE OF THE PROJECT

The main objective of the present work is to design a comprehensive sewerage network and Sewage Treatment Plant (STP) for a portion of Alappuzha Municipality to treat the effluent (untreated wastewater) generated and to avoid its direct release into natural environment. 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 Alappuzha Municipality.
2. Treat all the wastewater generated from houses, commercial establishments and public institutions etc. as per the norms laid by KPCB and other regulations.
3. To design a proper network system for the conveyance of the wastewater generated in the municipal area.

1.5. LOCATION OF THE PROJECT

Alappuzha Municipality, established in 1919, is a Municipality governed under the Kerala Municipal Act 1994. The Municipality manages the civic activities of the Alappuzha town and also serves as the district headquarters for the Alappuzha district. It is one of the first planned towns in India. Alappuzha town is 28km from Changanassery, 46km from Kottayam and 53km from Kochi and 155km north of Thiruvananthapuram. The town is intertwined with a canal network of inland waterways and is near to the backwaters of Kerala, which is a major tourist destination. According to Census 2011, the city had a total population of 176,164 and an area of 46.77 sq km. Lord George Curzon, Viceroy of India, described Alappuzha as the "Venice of the East", a town with canals, backwaters, beaches and lagoons.

The economy of the town is depended on agricultural trading, marine products and tourism. The Alappuzha backwaters is one of the most popular tourist destination attracting millions of international and domestic tourists. It connects Kumarakom and Kochi to the North and Kollam to the South. It is also the access point of Nehru Trophy Boat race held on the Punnamada Lake near Alappuzha, which is the most competitive and popular boat race in Kerala.

The National Highway NH-47, the Main Central Road (M.C road) and the Delhi - Mumbai - Trivandrum broad-gauge railway line is passing through the district. There are 8 state highways goes through the Alappuzha district in which 3 of them originates from Alappuzha town. State Highway 11 starts from Kalarcode and ends at Perunnai, popularly known as AC road (Alappuzha - Changanassery Road) and it covers a distance of 24.2 km. AC Road is an important road connecting Alappuzha town with Kottayam district. State Highway 40 is an interstate Highway in Alappuzha district which connects Alappuzha town with Madurai in Tamil Nadu. Alappuzha Bypass is a part of NH 66 that bypasses the central business district of Alappuzha city. The 6.8 Km long bypass is the first elevated beach highway starting at Kalarcode in the south to Kommady in the north. The 44 Km long State Highway 66 originates from Alappuzha town and terminates at Thoppumpady. Alappuzha town is crisscrossed by navigable canals that are connected to Cochin in the north and other important towns in the east.

Alappuzha municipality comes under Ambalappuzha Taluk. The project area comes under Alappuzha parliament Constituency and in both Alappuzha (Alappuzha Municipalities ward no. 1 to19 and 45 to 52) and Ambalappuzha (Alappuzha Municipalities ward no. 20 to 44) legislative constituencies. The municipal town is divided into 52 municipal wards. The STP is designed for Alissery Zone encompassing 2.645 Sq. Km of the total municipal area and the network is planned for 0.473 Sq. Km as Phase 1 (Ward 34 and 35)

The Fig. 1 shows the location map of Alappuzha municipality (project area) and the ward wise map is illustrated in Fig. 2.

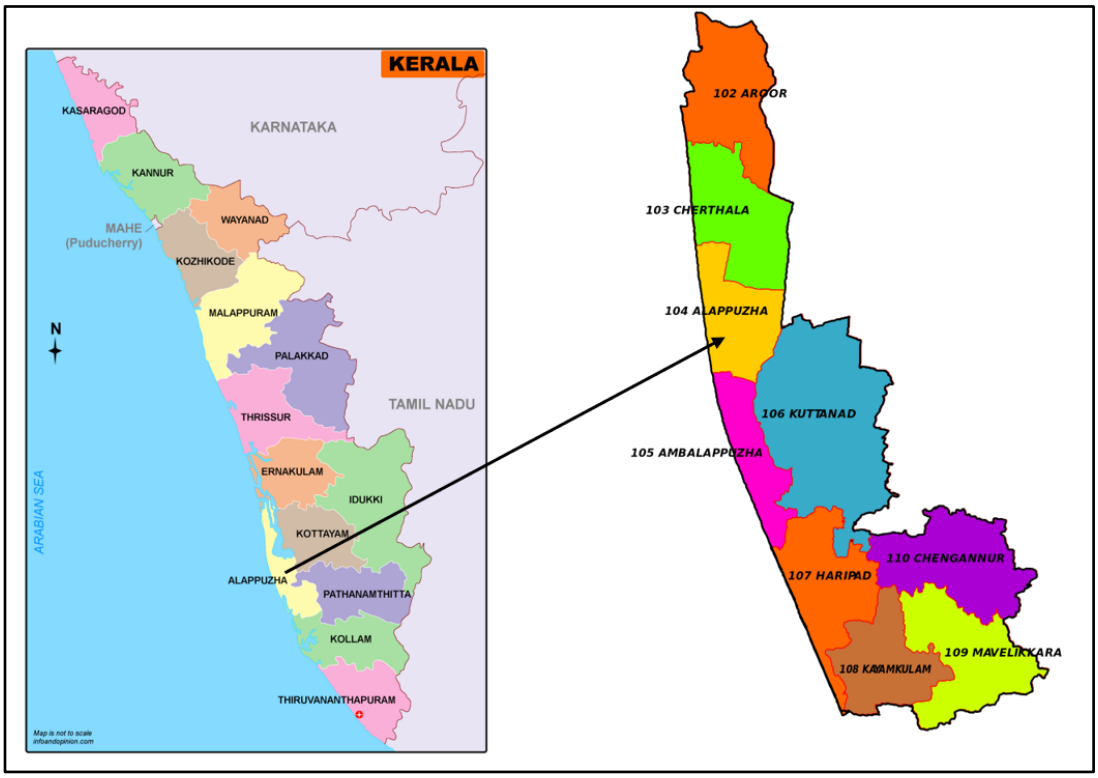


Fig. 1: Location map of Alappuzha Municipality

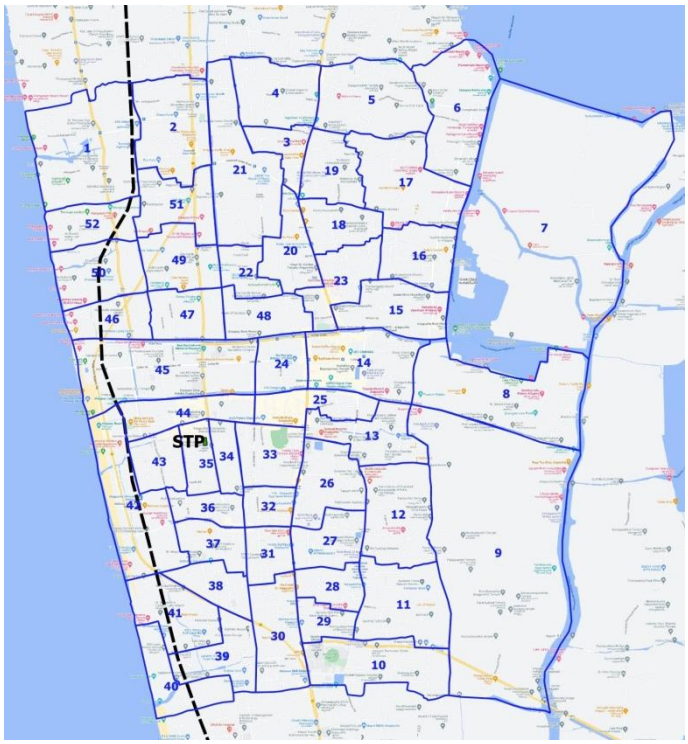


Fig. 2: Ward wise map of Alappuzha Municipality

1.6. SITE INVESTIGATION DETAILS

1.6.1. Topography

Alappuzha is a sandy strip of land bounded by the Lakshadweep Sea on its West and the municipal town is knotted by a network of canals, lagoons, rivers. The sector of water bodies (13% of the district) and paddy field constitute a major portion in the geographical area of the district, is more than that of any other districts in Kerala. Coastal region covers 80% of the district area and the rest is in midlands. The district is unique for its contiguous long coastal plains of 82 Km. Other than some scattered hillocks lying between Bharanicavu and Chengannur block panchayaths in the easter part of the district, there is no area under highland division. It is the only district in the state without public forest land.

1.6.2. Soil Properties

The Soil Survey Division of Department of Agriculture, Govt. of Kerala has categorized the soil types of the district into four based on the morphological and physio-chemical properties. They are (1) Coastal alluvium, (2) Riverine alluvium, (3) Brown hydromorphic soil and (4) Laterite soil. Coastal Alluvium are seen along the western parts of the district all along the coast and have been developed from recent marine and estuarine deposits. The

texture is dominated by sand fraction and low water holding capacity, is slightly acidic in nature (pH less than 6.5). Its texture varies from loamy sand to sandy loam. These soils have low content of organic matter and deficient in plant nutrients. The Riverine alluvium soils is distributed along the river valleys having a wide variation in their physio-chemical chemical properties depending on the nature of the alluvium that is deposited and the characteristics of the catchments area drained by the river. Its texture varies from sandy loam to clay loam and is known for its high water-retention capacity and high nutrients content. This soil type is supporting the cultivation of paddy in Alappuzha.

The Brown hydromorphic soil is mostly seen in the western low-lying areas along the district coast (wetlands). They are moderately rich in organic matter and other nutrients, but deficient in lime and phosphate. It is deep brownish in colour and its texture varies from sandy loam to clay. It is also acidic in reaction with pH of 5.2. It is formed due to the transportation and deposition of soil from adjoining hill slopes. Laterite soil formed as the result of intensive and prolonged weathering of the underlying parent rock under humid tropical conditions. The texture of the soil varies from gravelly loam to gravelly clay loam having a reddish brown to yellowish red colour. It is acidic in reaction (pH 4.3.) and poor in available nutrients, but it is well drained and supports the coconut cultivation in district with the proper application of fertilizers.

1.6.3. Geography

Alappuzha district, the smallest district according to the area located in the southwestern part of the state, bounded by the Lakshadweep Sea in the west, Kottayam and Pathanamthitta districts in the east, Ernakulam district in the north and Kollam district in the south. The district lies between North latitudes 9^0 05′ and 9^0 54′ and East longitude 76^0 17′ and 76^0 40′. The total geographical area of the district is 1414 sq. Km in which Alappuzha Municipal town is about 35.6 sq. Km, bounded by:

North – Aryad Panchayath

East – Pallathurathi River

South – Punnapra Panchayath

West – Lakshadweep (Arabian) sea.

1.6.4. Climate and Rainfall

A tropical humid climate with a domineering summers and plentiful seasonal rainfall are the characteristic climatic features of the district. The hot season extends for a period from March to the end of May with an average high temperature of 32^0C. The percentage of humidity is very high during summers.

Alappuzha experiences a long monsoon with heavy monsoon showers as both the south-west and north-east monsoons hits the coast. This is followed by the south-west monsoon season (Edavapathi), which continues till the end of September. The south-west monsoon retreats during October and major parts of November, followed by the north-east monsoon (Thulavarsham) is responsible for the rainfall up to December. The southwest monsoon season from June to September contributes nearly 60.3% of the annual rainfall. This is followed by the northeast monsoon season from October to December, which contributes about 20.9% of the annual rainfall, and the balance 18.8% is received during the period from January to May months. The region receives an average annual rainfall of 2965.4 mm.

1.6.5. Meteorological Parameters

Generally, March and April months are hottest and December and January months are coldest. At Alappuzha the maximum temperature ranges from 28.8^0C to 32.7^oC whereas the minimum temperature ranges from 22.6^0C to 25.5^oC. The average annual maximum temperature is 30.7^oC and the average annual minimum temperature is 23.9 ^{o}C. the diurnal variation of temperature seldom exceeds 10^0C.The region experiences a high humidity during the monsoon seasons and is 87% at Alappuzha. Humidity is high during morning time through the year. The climate is moist and hot in the coast and slightly cool and dry in the interior of the district. The wind is predominantly from east and northeast during morning hours and during the evening hours the predominant wind direction is from west and northwest. The wind speed is high during May (13.6 kmph) and is low in Kayamkulam.

1.6.6. Ground Water Potential

Ground water occurs in unconfined condition in the top alluvial zones and confined condition in the Tertiary sequences. Among the deeper confined aquifers of Tertiary group, Warkali and Vaikom aquifers are potential. The Quilon bed is a poor aquifer and is not being developed much. As Alleppey bed contains brackish formation water, this aquifer is also not being developed. Ground water is extracted from the Warkali aquifer having the most potential fresh water. The total groundwater potential available in the aquifer has been computed as about 36 MCM. Next to Warkali aquifer, Vaikom aquifer is highly potential. The total groundwater potential available in this aquifer is of the order of 10 MCM.

Alappuzha district consists of two hydrological zones, (i) moderate to low permeability zone and (ii) fairly good ground water potentiality zone. The Pamba river flows in the area forms a part of the deltaic region. As most of the area is underlain by Tertiary sediments, the ground water potential is fair to good. The entire area is an airable land, except the coastal tract where coconut plantation is predominant. The ground water is shallow in Haripad region and the available water is loaded with iron, fluoride, and saline content particularly in the open wells

1.6.7. Surface source

One of the Kerala's major rivers, the river Pamba flows through the eastern region of the Municipality. Pamba,the third longest river in Kerala is formed by several streams originating from Peerumedu plateau in Idukki district, enters Alappuzha district at Chengannur and flows through Pandanad, Veeyapuram, Thakazhy, and Champakulam through a distance about 177.08 Km and plunges into Vembanad lake through several branches such as PallathuruthiAr, NedumudiAr and Muttar. The river has a length of 117 Km and is navigable to a length of 73 Km. The catchment area of this river is 1987.17 Sq. Km

1.6.8. Demography

As of 2011 India census, Alappuzha district accommodates a population of 2,127,789 of which male and female 1,013,142 and 1,114,647 respectively. Alappuzha has a sex ratio of

1100 females for every 1000 males. The density of population is 1504 persons per sq. Km and the district is 29.46% urbanized.

1.6.9. Literacy

The average literacy rate of the district is 95.72% with male literacy 97.36% and female literacy rate 94.24%. The average literacy rate of the municipality is 97.02%. The educational status of the constituent areas was evaluated based on a survey conducted by the municipality, there is only negligible percentage of the population who are illiterate, about 3 % of the population.

1.6.10. Industries / Agriculture

There are no major industrial areas in the vicinity of the Haripad Municipality's administrative area. Paddy and tapioca are the major cultivations in the area.

1.6.11. Survey Details

Topographical Survey using DGPS*:* For ascertaining accurate reduced levels of all points in the 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. The DGPS survey in the project area has been conducted under RKI head.

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. The ward wise population demand is assessed and being distributed in the network considering the social survey pattern.

CHAPTER 2

APPROACH AND METHODOLOGY

Sewage is 99 % water carrying domestic wastes originating in kitchen, bathing, laundry, urine and night soil. It also contains salts used in cooking, sweat, bathing, laundry and urine. It also contains waterborne pathogenic organisms from the night soil of already infected persons. The wastewater from toilets is usually referred to as black water and the rest of the wastewater from all other activities is referred to as grey water.

2.1. WASTE WATER GENERATION AND CAPACITY DETERMINATION

2.1.1. Population Forecasting

The design population should be estimated by paying attention to all the factors governing the future growth and development of the project area in the industrial, commercial, educational, social, and administration spheres. The anticipated population, its density and its waste production are generally estimated for a specified planning period. The recommended planning period is 30 years. Water supply projects and sewerage projects are designed for 30 years. After 30 years the system needs renovation or to make a new system to accommodate load at that time. There are several methods developed for forecasting population but none of them are perfect. The population growth may change based on several factors such as attitude of community, social status, onset of pandemic diseases, war etc. which are unpredictable.

During the 2011 census, Alappuzha municipality has a population of 240,991. Normally owing to urbanization, the Municipality shows a positive trend in population growth, the district averagedecadal growth of 0.61% (2011 census of Alappuzha district) is considered in the population forecasting and the data calculated for Alissery zone is given in **Table 1**. The sewage treatment plant is designed based on this forecasting.

Table 1: Population Forecasting

Population of Alissery Zone of Alappuzha Municipality		
As per census 2011 Population(Alappuzha Municipality)	2011	240991
Total population to the year (Alissery Zone)	2022	28133
Total population to year	2039	28425
Total population to year	2054	28686

2.1.2. Estimation of Non-domestic Sewage

The industries and commercial buildings often use water other than the municipal supply and may discharge their liquid wastes into the sanitary sewers. Estimate of such flows has to be made separately as in **Table 2** for their potable water supply as per CPHEEO. However, in general the quantity of non-domestic sewage may be taken 80 to 90% of quantity of water supplied through public water supply system. Some units develop their own source of water supply and may discharge their liquid waste into sewers. This should be estimated separately for large units/ industries. It may, however, be stated that industrial sewage should be treated to the standards prescribed by the Pollution Control Boards before being discharged into sewers. This quantity is assessed to be 20% of the sewage load.

Table 2: Institutional needs of potable water

Sl.No.	Institutions	Water Supply (litres)
1	Hospital including laundry and beds exceeding 100	450 per bed
2	Hospital including laundry and beds not exceeding 100	340 per bed
3	Lodging houses / hotels	180 per bed
4	Hostels	135 lpcd
5	Nursing homes and medical quarters	135 lpcd
6	Boarding schools / colleges	135 lpcd
7	Restaurants	70 per seat
8	Airports and sea ports, duty staff	70 lpcd
9	Airports and sea ports, alighting and boarding persons	15 lpcd

10	Train and bus stations, duty staff	70 lpcd
11	Train and bus station, alighting and boarding persons	15 lpcd
12	Day schools / colleges	45 lpcd
13	Offices	45 lpcd
14	Factories, duty staff	45 lpcd
15	Cinema, concert halls and theatres	15 lpcd

Of all the industries, this shall strictly apply to the automobile service stations and machine shops from where the spent metal plating baths and oil & grease shall be prevented from entering the sewers as it comes under trade effluents.

2.1.3. Estimation of Sewage

Sanitary sewers are provided to carry the used water of the community with some ground water and fraction of storm run-off, to the point of treatment and disposal. The factors affecting sewage flow are

a. Per capita Sewage flow
b. Peak factor
c. Ground water infiltration
d. Unauthorized roof water connection.

2.1.3.1. Per capita Sewage flow

The entire used water of a community should normally contribute to the total flow in a sanitary sewer. However, the observed dry weather flow quantities usually are slightly less than the per capita water consumption, since some water is lost in evaporation, seepage into ground, leakage etc. As such 80% of quantity of water supply can be taken as sewage generation. The per capita water consumption of Alappuzha Municipality is considered as 150 lpcd. So, the per capita sewage flow is taken as 120 lpcd (DWF).

Table 3: Sewage generation in project area

Water consumption @ 150 lpcd		4.3	
Add 20% for Non-Domestic water demand		0.86	
Total water Consumption in the year	2054	5.16	
Sewerage generated (@ 80% of Water Consumption)		4.13	MLD
Add 10% infiltration		0.41	
Total sewage demand as on 2054		4.54	

2.1.3.2. Peak factor

The flow in sewers varies from hour to hour and seasonally. However, for the purpose of hydraulic design estimated peak flows are adopted. The peak factor or the ratio of maximum to average flows depends upon contributory population. The peak factor also depends upon the density of population, topography of the site, hours of water supply and the minimum flow may vary from 1/3 to 1/2 of average flow.

Table 4: Peak factor for the contributory population

Sl. no.	Population	Peak factor
1	Up to 20,000	3.00
2	Above 20,000 to 50,000	2.50
3	Above 50,000 to 7,50,000	2.25
4	Above 7,50,000	2.00

2.1.3.3. Ground Water Infiltration

Some quantity of ground water or subsoil water may infiltrate into sewers through defective joints, broken pipes etc. This is significant when water table is high and head of ground water is more than the head of sewage in sewers. Since sewers are designed for peak discharges, allowances for groundwater infiltration for the worst condition in the area should be made as in **Table 5**. Once the flow is estimated as the above criteria, the design infiltration value shall be limited to a maximum of 10% of the design value of sewage flow.

Table 5: Ground water infiltration

	Minimum	Maximum
Litres/ha/day	5,000	50,000
Litres/Km of sewer/day	500	5,000
Litres/day/manhole	250	500

A value of 5000 litres/ha/ day is adopted for design as per CPHEEO manual. However, a higher infiltration rate is expecting due to higher ground water table and proximity to the back waters.

2.1.3.4. Unauthorized roof water connection

The flows due to unauthorized roof water connection from the household also need to be considered. Whereas the CPHEEO is of opinion that with strict rules and regulations, this should be banned. Hence this flow is taken as zero Hence the flow through the sewer is calculated as shown in **Table 6**.

Table 6: Sewage calculation at peak flow

1.	Peak flow	PF × DWF + GW Infiltration
2.	Average flow	2 DWF + GW Infiltration
3.	Minimum flow	DWF + GW Infiltration

Expected sewer load for all wards for Alappuzha municipality is calculated in the total project area with forecasted population with the present population obtained from municipality and considering 0.61% decadal growth whose calculation is attached in Annexure I. This total load obtained is adopted for the STP design.

The population covered in the Alissery zone network area is forecasted to 28686 in 2054 and the sewage load estimated as 4.54 MLD. Septage facility is provided for the non-network area which comprises a load 13.01KLD and the plant is designed for a capacity of 5MLD. The network for subzone 1of Alissery Zone is designed for the area of 0.473 Sq. Kms accordingly in Phase 1 expecting a load of 1.3MLD.

2.2. DETAILED DESCRIPTION OF SEWERAGE NETWORK

2.2.1. Sewerage System

A sewerage system, or wastewater collection system, is a network of pipes, pumping stations, and appurtenances that convey sewage from its points of origin to a point of treatment and disposal. When this is operated correctly and the waste is treated in proper manner, sewerage system is an effective way of waste disposal. The advantage of the sewerage system is that it can remove large amount of waste water and it provides great user convenience. There are three types of sewerage system viz separate system, combined system and partially separate system. Separate system of sewerage is being proposed in the case of Alappuzha Municipality.

2.2.1.1. Separate Sewer System

In this system, two sets of sewers are provided for the separate collection of municipal wastewaters (black water from toilets, grey water and industrial wastewater) and surface run-off (rain water and storm water). The separate collection prevents the overflow of sewer systems and treatment stations during rainy periods and the mixing of the relatively little polluted surface run-off with chemical and microbial pollutants from the municipal wastewater. The design of the sewers and the treatment stations thus needs to consider the volume of the wastewater only and the surface run-off and rainwater can be reused (e.g., for landscaping or agriculture) after a simplified treatment. The layout of the system is as shown in **Fig. 3**.

Owing to the diversity in geographical features, the climatic condition in Kerala is diverse Four seasonal variations are experienced viz. the South West monsoon season from June to September, North East monsoon season from October to December, a cool and pleasant climate during January and February and summer season. Since the incessant rain occur in only for six months in a year, separate sewerage system is feasible for our climatic condition. Hence, only dry weather flow is considered for the proposed sewerage project.

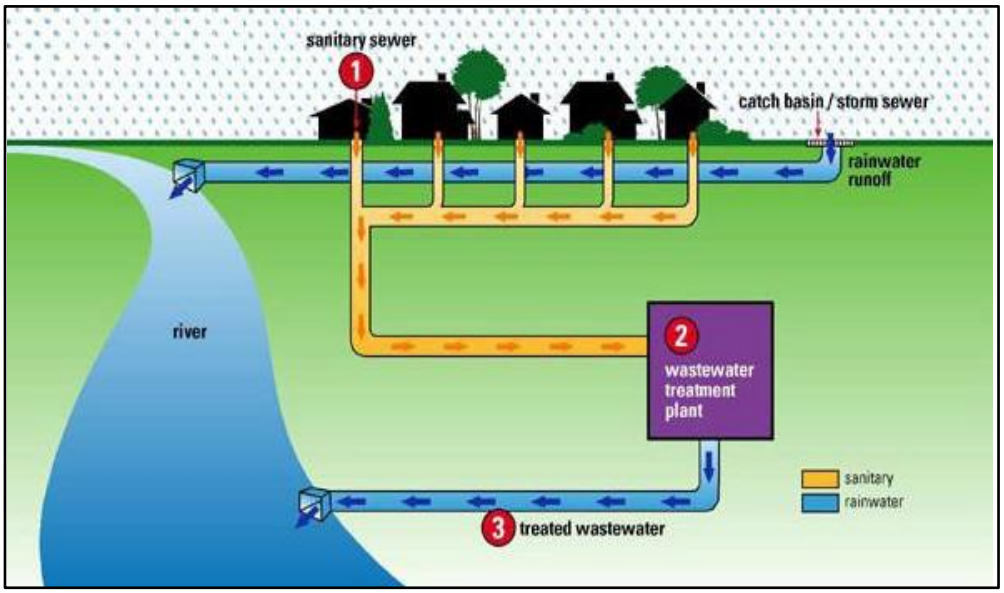


Fig. 3: Layout of separate sewerage system

2.2.2. Layout of Sanitary Sewer System

The sewer system layout involves the following steps:

a) Selection of an outlet or disposal point
b) Prescribing limits to the drainage valley or Zonal Boundaries
c) Location of Trunk and Main Sewers
d) Location of Pumping Stations if found necessary

In general, the sewers will slope in the same direction as the street or ground surface and will be connected to trunk sewers. The discharge point may be a treatment plant or a pumping station or a water course, a trunk sewer or intercepting sewer. It is desirable to have discharge boundaries following the property limits. The boundaries of sub zones are based on topography, economy or other practical consideration. Trunk and main sewers are located in the valleys. The most common location of sanitary sewer is in the center of the street. A single sewer serves both sides of the street with approximately same length for each house connection.

In very wide streets it may be economical to lay a sewer on each side. In such cases, the sewer may be adjacent to the road curb or under the footpath & interference with other utilities has to be avoided. Sewers as a rule are not located in proximity to water supplies.

When such situations are unavoidable the sewers may be encased in sleeve pipes or encased in concrete. A tentative layout is prepared by marking sewer lines along the streets or utilities. The direction of flow is shown using arrows.

The components of the sewage collection and carriage network consist of the following elements as given in **Table 7**. Manholes are provided at all sewer intersections, changes in horizontal direction, major change in slopes, change in size and at regular intervals. The depth of cut is dictated by the need to ensure a minimum cover and the desirability of mandatory cushion depending upon the pipe size and expected loads. It is the standard design practice to provide a minimum cover of 1 m at the starting point in the case of sanitary sewer network and 0.5 m for storm drainage system

Table 7: Components of sewerage network

Sl. No.	Type of element	Material	Function
1	Chambers	Reinforced concrete	Collection of sewage from individual units for transferring to manholes
2	Sewer pipelines	High Density Polyethylene (HDPE)	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.

2.3. SEWAGE TREATMENT PROCESSES

The composition of sewage is complex and the treatment processes is broadly classified as primary, secondary and tertiary treatments (**Table8**). Primary treatment refers to the physical unit operations which are based on physical forces like screening, mixing, flocculation, sedimentation, floatation, filtration. Secondary treatment refers to the chemical and biological unit processes. Treatment methods in which removal or conversion of contaminant is brought by addition of chemicals or by other chemical reaction are known as chemical unit

processes, for example, precipitation, gas transfer, adsorption, and disinfection. Treatment methods in which the removal of contaminants is brought about by biological activity are known as biological unit processes. Tertiary treatment refers to the any one or combination of chemical and biological processes used after secondary treatment.

Table 8: Unit operations and functions

Sl. No.	Unit	Function	Unit Operations /Phases
1	Primary	Removal of rags, floating matter, grit, oil and grease etc.	• Screening • Grit removal • Oil and grease trap
2	Secondary	Removal of Bio degradable organic matter and suspended solids. Also include nutrient removal (Nitrate and Phosphate) in advanced technologies	• Aerobic suspended growth (Aerobic and anaerobic) • Lagoon • Chemical oxidation process • Nitrate and phosphate removal • Chemical oxidation • Suspended growth • Nitrification/Denitrification • Air stripping • Ion exchange • Chemical treatment • Biological nutrient removal system
3	Tertiary	Polishing the effluent for reuse application	• Pathogen removal • Chlorine compounds • O_3,UV Radiation • Membrane filtration • Filtration variation • Carbon Adsorption • Iron exchange

Wastewater contains a lot of dirty substances that cause a foul smell over time. To ensure that the surrounding areas are free of the foul smell, odour treatment processes are also initiated at the treatment plant. All odour sources are contained and treated using chemicals to neutralize the foul smell producing elements before the treatment. The main contaminants in domestic sewage to be removed are biodegradable organics, as usually measured by BOD,

suspended solids and pathogens with the first two having been traditionally considered as the performance indicators for various treatment units. It is generally the objective of domestic sewage treatment plant to produce treated effluent having BOD_5 of 30 mg/1 or less and suspended solids of 50 mg/l or less for disposal into inland water bodies.

2.3.1 Primary Treatment Units

Primary treatment consists solely separating the floating materials and also the heavy settable organic and inorganic solids. It also helps in removing the oils and grease from the sewage. This treatment reduces the BOD of the wastewater by about 15 to 30%. The operations used are screening for removing floating papers, rages, cloths, etc., grit chambers or detritus tanks for removing grit and sand, and skimming tanks for removing oils and grease; and primary settling tank is provided for removal of residual suspended matter. The organic solids, which are separated out in the sedimentation tanks in primary treatment, are often stabilized by anaerobic decomposition in digestion tank or incinerated. After digestion the sludge can be used as manure after drying on sludge drying beds or by some other means. The influent passes through a bar screen to remove all large objects like cans, rags, sticks, plastic packets, etc. carried in the sewage stream. Bar screen is a set of inclined parallel bars, fixed at a certain distance apart in a channel. These are used for removing larger particles of floating and suspended matter. The wastewater entering the screening channel should have a minimum self-clearing velocity. Also, the velocity should not rise to such extent as to dislodge the screenings from the bars. This is most commonly done with an automated mechanically raked bar screen in modern plants serving large populations, while in smaller or less modern plants, a manually cleaned screen may be used. The slope of the hand-cleaned screens should be between 30^0 and 45^0 with the horizontal and that of mechanically cleaned screens may be between 45^0 and 80^0. The raking action of a mechanical bar screen is typically paced according to the accumulation on the bar screens and/or flow rate. The solids are collected and later disposed of in a landfill, or incinerated.

2.3.1.2. Grit Removal

Grit chambers are designed for the removal of grit consists of sand, gravel, cinders or other inert solid materials having specific gravity about 2.65, which is much greater than those of the organic solids present in sewage. Grit removal is necessary to

- Reduce formation of heavy deposits in aeration tanks, aerobic digesters, pipelines, channels, and conduits
- Reduce the frequency of digester cleaning caused by excess excessive accumulations of grit and
- Protect moving mechanical equipment from abrasion and accompanying abnormal wear.

In this chamber particles settle as individual entities and there is no significant interaction with the neighboring particles. This type of settling is referred as free settling or zone-I settling. For proper functioning of the grit chamber, the velocity through the grit chamber should not be allowed to change in spite of the change in flow. One of the most satisfactory types of automatic velocity control is achieved by providing a proportional weir at the outlet. Grit chambers come in 3 types: horizontal grit chambers, aerated grit chambers, and vortex grit chambers.The horizontal flow grit chambers should be designed in such a way that under the most adverse conditions, all the grit particles of size 0.20 mm or more in diameter should reach the bed of the channel prior to reaching outlet end. The length of the channel depends on the depth required which again depends on the settling velocity. A minimum allowance of approximately twice the maximum depth should be given for inlet and outlet zones.

2.3.1.3. Oil and Grease Removal

The floating solid materials such as soap, vegetables, debris, fruit skins, pieces of corks, etc. and oil and grease are removed from the wastewater in skimming tanks. A skimming tank is a chamber designed so that floating matter rises and remains on surface of the wastewater until removed, while the liquid flows continuously through outlet or partition below the water lines. The detention time in skimming tank is 3 minutes. To prevent heavy solids from settling at the bed, compressed air is blown through the diffusers placed in the floor of the

tank. Due to compress air supply, the oily matters rise upward and are collected in the side trough, from where they are removed. In conventional sewage treatment plant separate skimming tank is not used and these materials are removed by providing baffle ahead of the effluent end of the primary sedimentation tank.

2.3.1.4. Primary Sedimentation Tanks

The wastewater after grit removal in grit chamber mainly contains light weight organic matter is settled in the primary sedimentation tanks. The primary sedimentation tank (PST) generally removes 30 to 40% of the total BOD and 50 to 70% of suspended solids from the raw sewage. The flow through velocity of 1 cm/sec at average flow is used for design with detention period in the range of 90 to 150 minutes. This horizontal velocity will be generally effective for removal of organic suspended solids of size above 0.1 mm. Effluent weirs are provided at the effluent end of the rectangular tanks, and around the periphery in the circular tanks. The sludge collection hopper is provided near the centre in circular tank and near the influent end in rectangular tanks. A baffle is provided ahead of the effluent weir for removal of floating matter. This scum formed on the surface is periodically removed from the tank mechanically or manually.

Particles in relatively dilute concentration with smaller size sometimes will not act as discrete particles (as the grit particles behave in grit chamber) but these particles will coalesce during sedimentation. As flocculation occurs, the size of the particle increases and it settles faster. The magnitude of flocculation will depend upon the opportunity for contact between the particles, which depends upon overflow rate, temporal mean velocity gradient in the system (representing mixing) and concentration and size of the particles. Although, settling rate of particle is independent of depth of basin, the basin depth will decide liquid detention time in the tank and sufficient depth should be provided for settling to separate it from sludge settled zone. The effect of these variables on settling can only be determined by sedimentation tests, and classical laws of sedimentation are not applicable, due to change in characteristics of the particle during settling. Settling column studies are used to determine the settling characteristics of the suspension of flocculant particles.

Primary sedimentation tanks can be circular or rectangular tanks designed using average dry weather flow and checked for peak flow conditions.Inlets for both rectangular and circular tanks are to be designed to distribute the flow equally across the cross section. Scum removal arrangement is provided ahead of the effluent weir in all the PST. The detention time usually provided is between 1.5 and 2.5 h at average flow. To avoid resuspension (scouring) of settled particles, horizontal velocities through the PST should be kept sufficiently low.

2.3.1.5. Equalization

Equalization is a means of buffering or equalizing the characteristics of the wastewater prior to entering the treatment plant. Equalization tanks are provided to

- Balance fluctuating flows or concentrations
- Assist self-purification
- Even out the effect of a periodic slug discharge from a batch process

Industrial waste streams vary considerably in both level of contaminants (pH, total suspended solids, etc.) and flow rates. The equalization tanks are used to limit the effects of sudden and unexpected spikes in pollution loads (shock loads). During the peak hours sewage comes at high flow rate. The equalization tank stores this effluent and lets it out during the non-peak time when there is no /little incoming effluent. The tank is rectangular in shape to provide placement of air diffusers for full floor coverage. Diffusers are to be checked and cleaned at regular intervals to prevent from excessive odour and insufficient mixing/aeration. It is advised to keep the equalization tank nearly empty before the expected peak hours otherwise it will overflow and manually remove the sediments at least once a year. A part of recirculated sludge from secondary sedimentation, can be sent upstream to equalization tank. This operation gets a good pre-oxygenation and reduces odours.

Location of equalization basin after primary treatment and before biological treatment is appropriate. This arrangement considerably reduces problem of sludge and scum in the equalization basin. If the equalization basin is placed before primary treatment, it must be provided with sufficient mixing to prevent solids deposition and concentration variations, and aeration to prevent odour problem.

2.3.2. Secondary Treatment

Secondary treatment of the wastewater could be achieved by chemical unit processes such as chemical oxidation, coagulation-flocculation and sedimentation, chemical precipitation, etc. or by employing biological processes (aerobic or anaerobic) where bacteria are used as a catalyst for removal of pollutant. For removal of organic matter from the sewage, biological treatment processes are invariably used either in single stage or in multi stage as per the requirements to meet the discharge norms.

The objective of biological treatment is to remove organic matter which is present in soluble and colloidal form or to remove nutrients such as nitrogen and phosphorous from the wastewater. The microorganisms (principally bacteria) are used to convert the colloidal and dissolved carbonaceous organic matter into various gases and into cell tissue. Hence, the complete will not be achieved unless the cell tissues are ultimately removed. In the biological reactors under proper environmental conditions, the soluble organic substances of the wastewater are completely destroyed by biological oxidation; part of it is oxidized while rest is converted into biological mass. The end products of the metabolisms are either gas or liquid and on the other hand, the synthesized biological mass flocculates easily and it can be easily separated out in clarifiers. Therefore, the biological treatment system usually consists of (1) a biological reactor, and (2) a sedimentation tank, to remove the produced biomass called as sludge.

2.3.2.1. Types of Biological Reactors

Depending upon availability of oxygen or other terminal electron acceptor the biological reactors are classified as aerobic, anaerobic, anoxic or facultative process. Depending on how the bacteria are growing in the reactors they can be classified as

a) Suspended growth process: Bacteria are grown in suspension in the reactor without providing any media support (E.g., Activated sludge process)
b) Attached growth process: where microorganism growth occurs as a biofilm formed on the media surface provided in the reactor (E.g., Trickling filters)

The media surfaces provided for the growth of microorganisms could be made from rocks or synthetic plastic offering very high surface area per unit volume. The media could be stationary in the reactor, as in trickling filter, which is called as fixed film reactor or it could be moving media as used in moving bed biofilm reactor (MBBR).

One of the most challenging aspects of a sustainable sewage treatment system design is the analysis and selection of the treatment processes and technologies capable of meeting the requirements. The process is to be selected based on required quality of treated water. While treatment costs are important, other factors should also be given due consideration. For instance, effluent quality, process complexity, process reliability, environmental issues and land requirements should be evaluated and weighted against cost considerations. Among the various available technologies MBBR technology is found suitable in this project.

2.3.2.2. Secondary Clarifier with Plate Settler

Secondary clarifiers are to separate biological floc from the treated liquid waste stream. Plate settlers are also being proposed in the clarifier to get more clarified water. Clarifiers are settling tanks built with mechanical means for continuous removal of solids being deposited by sedimentation. A clarifier is generally used to remove solid particulates or suspended solids from liquid for clarification. Necessary coagulants are being added before feeding the clarifier.

2.3.3. Tertiary Treatment

Tertiary treatment refers to secondary treatment followed by a filtration step, such as media filtration, so that the turbidity and TOC concentrations are generally lower, and if coagulation with metal salts is used, then the phosphate concentration will also be reduced.

2.3.3.1. Pressure sand Filter

The Pressure Sand Filter consists of a multiple layer of sand with a variety in size and specific gravity. These Filters are designed to remove turbidity and suspended particles present in the feed water with minimum pressure drop. Raw water flows downwards through the filter

bed and as the suspended matter, which is treated by addition of a coagulant like alum or poly electrolyte, is retained on the sand surface and between the sand grains immediately below the surface. There is steady rise in the loss of head over a period of time and the flow reduces once the pressure drop across the filter is excessive. The filter is then taken out of service and cleaning of the filter media is affected by flow reversal also called as backwash. To assist in cleaning the bed, the backwash operation is sometimes preceded by air scouring by way of agitation through the under-drain system. The air scouring agitates the sand with a scrubbing action, which loosens the intercepted particles.

Fig. 4: Pressure Sand Filter

2.3.3.2. Activated Carbon Filter (ACF)

Filtered wastewater from Pressure sand filter is then passed through the Activated Carbon Filter. They are generally employed in the process of removing organic compounds and/or extracting free chlorine from water, thereby making the water suitable for discharge. Carbon filtering is a method of filtering that uses a bed of activated carbon to remove contaminants and impurities, using chemical adsorption. Each particle/granule of carbon provides a large surface area/pore structure, allowing contaminants the maximum possible exposure to the active sites within the filter media.

Fig. 5: Activated carbon filter

2.3.3.3. Chlorination

Chlorination is by far the most common method of wastewater disinfection and is used worldwide for the disinfection of pathogens before discharge into receiving streams, rivers or oceans. Chlorine is known to be effective in destroying a variety of bacteria, viruses and protozoa, including Salmonella, Shigella and Vibrio cholera. Disinfection is achieved at this facility through chlorination using chlorine gas. The purpose of the Chlorine Contact Tanks is to allow sufficient time for the chlorine to disinfect the water.

2.4. MOVING BED BIOFILM REACTOR TECHNOLOGY (MBBR): AN OVERVIEW

The moving bed biofilm (MBBR) technology has been applied to the treatment of wastewaters over the past 30 years, establishing itself as a simple, flexible and compact technology. It is proven to be successful in removing the BOD, COD, ammonia and nitrogen both in municipal and industrial wastewaters. The main difference between MBBR technology when compared to other biofilm systems is that it combines the advantages of the traditional activated sludge system with the advantages offered by biofilm systems while minimizing the disadvantages of both. Some of the inherent advantages of using MBBR includes,

- compact units with small size
- high volumetric efficiency

- enhanced process stability
- minimal head loss without requiring periodic backwashing
- flexibility and simplicity of operation
- compatibility with a variety of solid separation techniques
- reduced sludge production and no issues of sludge bulking
- not prone to clogging
- availability of spare parts
- no odour nuisance and other environmental hazards

The MBBR is based on the use of a biofilm that grows attached to the surface area of specifically designed carriers made of polyethylene or polypropylene with a density close to that of water. The carriers are designed to provide a large protected surface for bacterial growth. The reactor volume is filled with carriers up to a maximum value of 67%. Due to their density being close to that of water and the fact that only part of the reactor volume is filled with carriers, the packed bed is allowed to move freely in the reactor. In this system the biological mass grows both suspended flocs and also as attached biofilms. Hence, a higher biomass concentration is maintained in the reactor compared to the suspended processes such as Activated sludge. This increases the treatment capacity of the given reactor volume.

Fig. 6: Moving Bed Bio Reactor

In MBBR (**Fig. 6**), more than 90% of the biomass are likely to trapped and cultivated in the media and this can be associated with the facts that (i) the carriers are made to remain in suspensions within the reactors due to perforations or screen arrangement at the discharge; (ii) the carrier is deliberately designed with a small polyethylene cylinder- like materials with potentials to have a high specific surface area to accommodate biofilm growth. Furthermore, the increase of overall sludge age in the system leads to a favorable environment for the growth of nitrifying bacteria.

In general, the reactors are simple to install and maintain. The MBBR processes takes place in a tank similar to activated sludge serration tank. The carrier media are kept suspended by a diffused air aeration system for an aerobic process or by a mechanical system for an anoxic or anaerobic process as shown in **Fig. 7**. A sieve is used typically used at the exit of the tank to keep the carrier media in the tank. Primary clarification is normally used ahead of the MBBR tank. Secondary clarification is also typically used, but there is no activated sludge is recycled into the process. MBBR processes uses plastic media support carriers similar to those shown in **Fig. 8**.

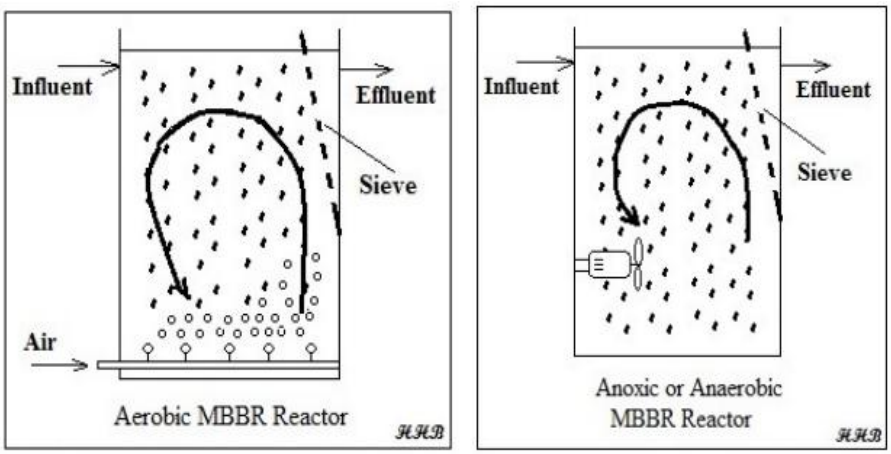


Fig. 7: Operating principle of the MBBR process with Aerobic reactors (left) and anoxic anaerobic reactors (right)

Fig. 8: Media support carriers used in MBBR

2.4.1. MBBR wastewater Treatment Process Alternatives

The MBBR wastewater treatment process is quite flexible and can be used in several different ways. The figure shows the flow diagram of the options adopted for the proposed treatment plant, with single stage BOD removal, nitrification, post anoxic denitrification with raw sewage feeding for carbon source and thereafter removing low grade BOD in the subsequent reactor.

2.4.1.1. Post Anoxic Denitrification Alternative

In order to carry out denitrification of a wastewater, it is necessary to nitrify the wastewater initially i.e., to convert the ammonia nitrogen present in the influent to nitrate. In an MBBR denitrification process three reactor are necessary, one 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. De-nitrification reactor is provided after the nitrification reactor as the post anoxic de-nitrification.

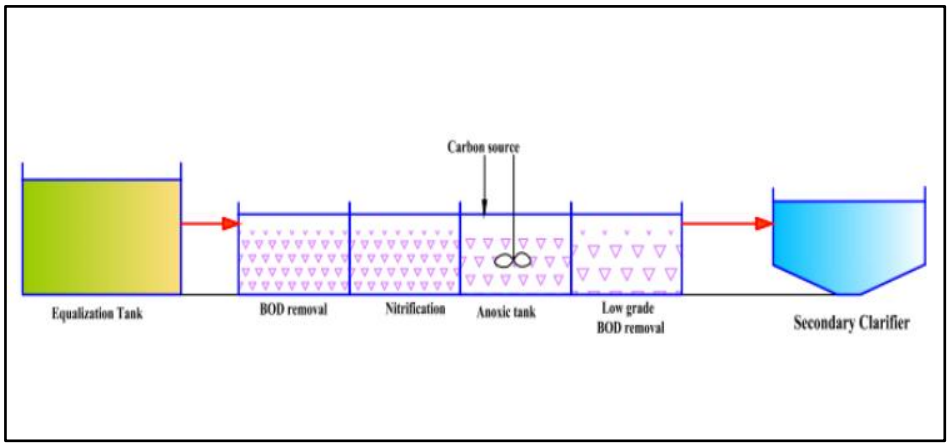


Fig. 9: Nitrification and De-nitrification reactors.

2.4.1.2. Nitrification Tank

Nitrification is the biological conversion of ammonium to nitrate nitrogen. It is autotrophic process i.e., energy for bacterial growth is derived by oxidation of nitrogen compounds such as ammonia. Nitrification isa two-step process. Two species of bacteria are involved in the process – Nitrosomonas and Nitrobacter. These bacteria are collectively known as nitrifiers and are autotrophic, i.e., they get their carbon source from inorganic carbon (carbonates, bicarbonates) or carbon dioxide. In first step, bacteria known as Nitrosomonas can convert ammonia and ammonium to nitrite and are strictly aerobes. This process is limited by the relatively slow growth rate of Nitrosomonas. Next, bacteria called Nitrobacter finish the conversion of nitrite to nitrate.

First step: $NH_4^+ + \frac{3}{2}O_2 \xrightarrow{\text{Nitrosomanas}} NO_2^-$ (Nitrite) $+ 2H^+ + H_2O$

Second step: $NO_2^- + \frac{1}{2}O_2 \xrightarrow{\text{Nitrobacter}} NO_3^-$(Nitrate)

Overall reaction: $NH_4^+ + 2O_2 \rightarrow NO_3^- + 2H^+ + H_2O$

Nitrosomonas and Nitrobacter use the energy derived from the reactions for cell growth and maintenance. Some of ammonium ions are assimilated into cell tissues. Neglecting the ammonium ion used in cell synthesis the O_2 required to oxidize ammonia to nitrate is 4.57 mgO_2/mg ammonium nitrogen. If the ammonium used in cell, O_2 required is considered it is 4.3 mgO_2/mg ammonium nitrogen and about 7.14 mg of alkalinity is needed to neutralize the H^+ produced.

2.5. FINAL ACHIEVABLE WASTEWATER CHARACTERISTICS

Sewer loads generated from individual households, commercial establishments, public institutions etc. in the project area of the Haripad municipality 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). The objective of sewage treatment is to reduce the polluting substances to (a) the standards laid down by the Ministry of Environment and Forests (MoEF) of the Government of India (GOI) and these cannot be relaxed by the State Pollution Control Boards (PCB), but they can prescribe more stringent standards specific to the discharge environment and (b) the specified limits of fecal coliforms laid down by the National River Conservation Directorate (NRCD). These standards are as mentioned as in **Table 9**.

Table 9: Effluent Discharge standards

No.	Characteristics	Standards			
		Inland surface water	Public sewers (A)	Land for irrigation	Marine coastal areas
1	Colour and odour	(B)		(B)	(B)
2	SS	100	600	200	(C), (D)
3	Particle size of SS	(E)	-	-	(F), (G)
4	pH value	5.5 to 9.0			
5	Temperature	(H)	-	-	(H)
6	Oil and grease	10	20	10	10
7	Total residual chlorine	1.0	-	-	1.0
8	Ammoniacal nitrogen (as N)	50	50	-	50
9	Total Kjeldahl Nitrogen, (TKN) (as N)	100	-	-	100
10	Free ammonia (as NH_3)	5.0	-	-	5.0
11	Biochemical Oxygen Demand	30	350	100	100
12	Chemical Oxygen Demand	250	-	-	250
13	Arsenic (as As)	0.2			
14	Mercury (as Hg)	0.01	0.01	-	0.01
15	Lead (as Pb)	0.1	1.0	-	2.0
16	Cadmium (as Cd)	2.0	1.0	-	2.0
17	Hexavalent Chromium (as Cr 6+)	0.1	2.0	-	1.0
18	Total Chromium (as Cr)	2.0	2.0	-	2.0
19	Copper (as Cu)	3.0	3.0	-	3.0

20	Zinc (as Zn)	5.0	15.0	-	15.0
21	Selenium (as Se)	0.05	0.05	-	0.05
22	Nickel (as Ni)	3.0	3.0	-	5.0
23	Cyanide (as CN)	0.2	2.0	0.2	0.2
24	Fluoride (as F)	2.0	15.0	-	15.0
25	Dissolved phosphates (as P)	5.0	-	-	-
26	Sulphide (as S)	2.0	-	-	5.0
27	Phenolic compounds (as C_6H_5OH)	1.0	5.0	-	5.0
	Radioactive materials				
28	Alpha emitters, micro curie/L	10^{-7}	10^{-7}	10^{-8}	10^{-7}
	Beta emitters, micro curie/L	10^{-6}	10^{-6}	10^{-7}	10^{-6}
29	Bio-assay test	(l)			
30	Manganese (as Mn),	2.0	2.0	-	2.0
31	Iron (as Fe),	3.0	3.0	-	3.0
32	Vanadium (as V),	0.2	0.2	-	0.2
33	Nitrate Nitrogen (as N),	10.0	-	-	20.0
34	Fecal Coliform, MPN/100ml for discharge	onto land		into water	
		(J)	(K)	(J)	(K)
		1,000	10,000	1,000	10,000

(A) These standards shall be applicable only if such sewer leads to a secondary treatment including biological treatment system; otherwise, the discharge into sewers shall be treated as discharge into inland surface waters. (B). All efforts should be made to remove colour& unpleasant odour as far as practicable. (C) For process wastewater 100 mg/l (D) For cooling water effluent 10% above total suspended matter of influent. (D) Shall pass 850 micron IS Sieve (E) Floatable solids max. 3mm (F) Settleable solids max. 850 microns (G) Shall not exceed 5°C above the receiving water temperature (H) 90 % survival of fish after 96 hours in 100 % effluent (J) Desirable (K) Maximum permissible

2.6. DISPOSAL OF WASTEWATER INTO STREAMS

In several cases streams are used for receiving waste waters. Under such a situation it is important to ensure that the receiving body of water does not become a source of public nuisance because of complete absence of oxygen. High degree of treatment would be needed in regions where sources of water are limited, stream flows are insufficient and loads of waste water are high. When waste waters are intended for reuse, the extent of treatment needed would depend upon the specific use for which they are intended.

2.6.1. Assimilative Capacity of Streams

Assimilative capacity is defined as the ability of the natural system to absorb various materials, including anthropogenic wastes, at certain concentrations without itself being

tainted. This term was particularly used to describe the use of water bodies like streams, lakes and oceans to process simple organic wastes and to determine the volume waste or sewage that may be discharged into the receiving water without lowering the ambient Dissolved oxygen (DO) level. The capability of the streams to assimilate the wastes and restore its own quality is termed as self-purification and is a complex process and involves physical, chemical and biological processes working simultaneously.

When organic water is discharged, the settleable solids, if present in settle at the bed of the river, near the outfall, thus helping in self-purification process. The organic matter undergoes biochemical processes of decay with the utilization of DO, provided by the natural aeration of the stream. Due to oxidation, the river DO depletion occurs and the rate of oxidation is faster at high temperature than at low temperature. DO is replenished primarily though the reaeration from the atmosphere. The quantity of dissolved oxygen available in stream water is higher at colder temperatures. The maximum value of DO in water at 0^0C is 14.6 mg/L and at 25^0C is 8.24 mg/L. However, the activity of microorganisms is higher at high temperature and the process of self-purification is carried out quickly in summers than in winters. Sunlight helps certain microorganisms to absorb CO_2 and give out oxygen, thus resulting in self- purification. Sunlight also acts as disinfectant and stimulates the growth of algae which produces oxygen during photosynthesis. Hence wherever there is algal growth, water contains more DO during day time.

Accordingly, the self-purification capacity depends on the dilution of the stream, time of passage down the stream, water temperature, characteristics of waste and microorganisms. Water assimilation capacity, controlled by self-purification processes, depends on the size and behavior of the receiving waterbody which in turn depends on the configuration of the drainage area and the physical characteristics of the channel along its course.

A river stream undergoing self-purification can be divided into four zones of pollution viz; zone of degradation, zone of active decomposition, zone of recovery and zone of clear water. As the influent wastewater travels through these 4 zones from the point of sewage outfall, the organic matter undergoes various decomposition process. At the end of clear

zone, the river attains its original state and the aquatic life prevails the DO level reaches its saturated value. Because of the mineralization occurred in the previous zones, water is now richer in nutrients than before the pollution and the production of algae is higher. There is the re-establishment of the normal food web. The ecosystem becomes stable and reaches its climax again. Thus, the assimilative capacity of the waterbody can be used up to a level that is acceptable and non-detrimental. Beyond this level no discharge could be allowed.

2.7. SLUDGE MANAGEMENT

The solids that are settled and separated during wastewater treatment referred as sludge should be treated properly. The sludge generated during the various stages of wastewater treatment like primary sedimentation, secondary sedimentation and sludge generated from advanced (tertiary) treatment, if any ought to be disposed efficiently and is essential to the overall success if the plant. The sludge generated during the wastewater treatment can be classified into three categories:

- ***Primary sludge***: Sludge settled in primary settling tanks comes under this category which contains 3% to 7% solids out of which approximately 60% to 80% are organic. Primary sludge solids are usually gray in color, slimy, fairly coarse, and with highly obnoxious odors.
- ***Secondary sludge***: This type of sludge from secondary settling tanks has commonly a brownish, flocculent appearance and an earthy odor. It consists mainly of microorganism containing 75% to 90% organic fraction and remaining inert materials. The organic matter may be assumed to have a specific gravity of 1.01 to 1.05, depending on its source, whereas the inorganic particles have high a specific gravity of about 2.5.
- ***Tertiary sludge***: The nature of sludge from the tertiary (advanced) treatment process depends on the unit process followed like membrane processes or chemical methods, etc.Tertiary sludge from biological nitrification and denitrification is similar to waste activated sludge.

The water content of the sludge is very high, and solids constitute very small part of it. Therefore, before final disposal further treatment is required for this sludge to reduce water content and oxygen demand. Sludge is stabilized to (i) reduce pathogens, (ii) eliminate

odours, (iii) inhibit, reduce, or eliminate the potential for decomposition, and (iv) improve dewatering characteristics of the sludge to reduce volume for disposal. There are four means to eliminate this nuisance condition through stabilization. They are (1) biological reduction of volatile solids, (2) chemical oxidation of volatile solids, (3) addition of chemicals to make conditions not suitable for bacterial growth, (4) application of heat to disinfect or sterile the sludge. In order to reduce the volume of sludge, dewatering process is done with the help of centrifuges, sludge thickening units and sludge press. After this process, it is converted in the form of cake. The sludge from sewage is rich with nitrogen, phosphorous, Sulphur and other minerals which are essential for the growth of plants. Hence it can be used as a manure. Further, researches are going on this field, to make this cake as a construction material but is in its infant stage.

CHAPTER 3

ENGINEERING DESIGN

3.1. SEWERAGE SYSYTEM OF ALAPPUZHA MUNICIPALITY

The sewerage scheme of Alappuzha Municipality is planned as the whole Municipal area has been divided into four network zones and two septage zones as shown in fig10. Out of the 52 wards in the municipality, wards 32 to 36 & 43 fully and 37, 38, 42 & 44 partially is now considered to have sewer network system as Alissery Zone in zone 2 and thereby proposing 5 MLD STP at Alissery Store compound of KWA as shown in fig11. At present, ward 34 and 35 is only considered for the network implementation as Phase 1 which is covering 0.475 sqkm with network length of 9.79km. For the planning and execution lenience, the total scheme is bifurcated into various phases. The network for the rest of the area can be implemented in different phase.As the decadal growth considered is 0.61% only which reflects the minor variation in the load calculation for 15 years design period and 30 years design period. Hence the entire system components are envisaged with design period of 30 years.

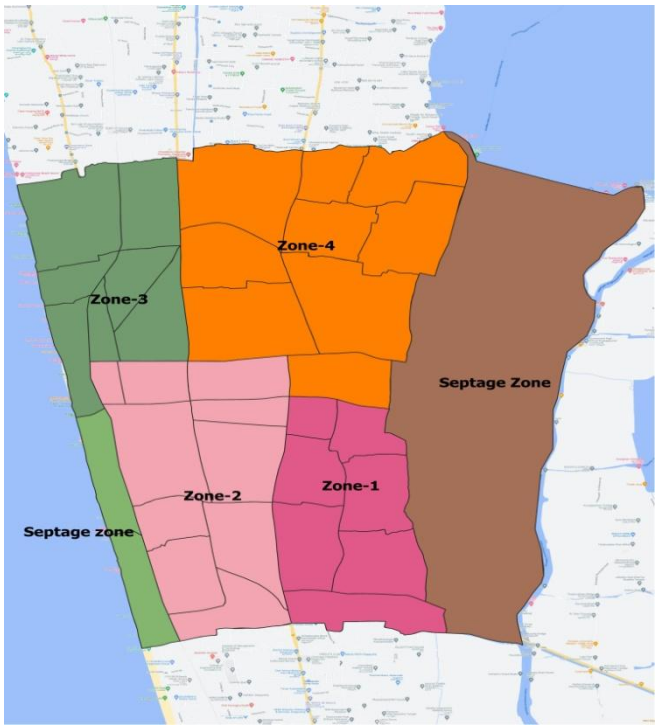


Fig.10: Sewage Network Zones of Alappuzha Municipality

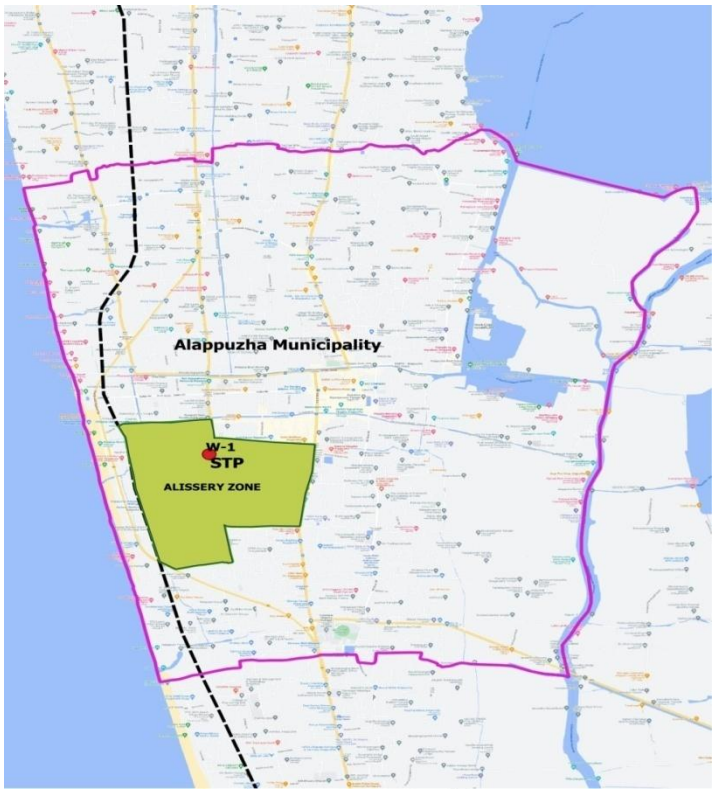


Fig.11: Alissery Zone and STP Location

The projected population of Alissery zone as on 2054 is 28686 in which network coverage covering an area of 2.645 sq km and the estimated sewage load is 4.54 MLD including septage provision for the balance area. Two wards were taken in Phase 1, mainly Town ward, Alissery ward and Lajaneth ward. The population for phase 1 (subzone 1 of Alissery zone in zone2) is 8032 as on 2022 and projected to 8191 for the year, 2054. In phase 1 of the sewerage system sewer network of 9790m consisting of 384 manholes, and pumping main of 800m is taken into consideration. The proposed collection well1 for subzone 1 is located at Alissery STP site. The treatment plant proposed having 5 MLD capacity will be set up in Kerala Water Authority's (KWA) own land at Alisserry. The sewer network lines proposed are HDPE PE100 PN8 and pumping mains HDPE PE100 PN10. As the sewerage connection to the households are to be provided in parallel with the construction of STP for the timely commissioning of the plant, provision for giving sewer connections to households are included in the project.

Co-treatment facility is also providing here to treat the septage waste in the treatment plant to cater non covered households. The septage load assessed to around 13 KLD is meant to

be treated at the proposed STP. For time being, in phase 1, the network coverage considered only for the subzone 1 and the sewage load expected from the network is only 1.3 MLD. Eventually, to deal more septage load additional dilution facility considered in this project.

3.2. DESIGN OF SEWERAGE NETWORK

For the design of sewage network, hydraulic analysis was performed and the pipelines are designed for gravity flow conditions except for lifting and collection points. Minimum outer diameter of the pipeline was taken as 200 mm for main lines along the roads and for carriage from chambers to manholes, it is taken as 160 mm with material as PE. The slope was taken as a minimum value of 1 in 250 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. The manholes are located at spacing around 30m and at all junctions, bend etc. All stipulations given by the relevant Indian Standard Codes of practice and CPHEEO Manual have been adopted in design

3.2.1. Pipes

The pipes proposed for the sewerage network is PE (Polyethylene) pipes with size ranging from 200 mm to 355 mm (outer diameter). The details of pipes used in the gravity flow and pressurized flow sewerage network of subzone I are given in **Table 10 and 11** respectively. When compared to other common wastewater piping system materials, such as PVC, ductile iron, or concrete, HDPE pipe offers significant benefits.

HDPE pipes are known for its light weight as compared to iron or concrete alternatives, hence, easy to install and transport. These pipes are joined by heat fusion. Butt, socket, sidewall fusion and electrofusion create a joint that is as strong as the pipe itself, and is virtually leak free. This unique joining method produces significant cost reductions compared to other materials. These flexible and highly durable pipes come with unmatched corrosion and chemical resistances. In addition, polyethylene is unaffected by bacteria, fungi, etc. and has smoother texture. Its superior chemical resistance and non-stick surface

combine to almost eliminate scaling and pitting and preserve the excellent hydraulic characteristics throughout the pipe service life.

Table 10: HDPE Pipes proposed for gravity flow sewerage network (Subzone I)

Sl. No.	Internal dia. (mm)	Outer dia. (mm)	Pressure rating	Total length (m)
1	168.5	200	PN8	9202
2	236.1	280	PN8	133
3	265.6	315	PN8	255
4	299.5	355	PN8	200

Table 11: HDPE Pipes proposed for pressurized flow sewerage network (Subzone I)

Sl. No.	Internal dia. (mm)	Outer dia. (mm)	Pressure rating	Total length (m)
1	254.5	315	PN10	150
2	286.9	355	PN10	650

3.2.2. 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 3 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 4.5 m and hence sewage lifting stations are provided making use of the manholes itself.

As per the CPHEEO Manual on Sewerage and Sewage Treatment Systems, a minimum slope is provided for all the pipelines to generate gravity flow. The invert levels are fixed with minimum cover 0.70 m above the sewer lines and zones to maintain the minimum slopes wherever natural slopes are not supporting. Keeping the maximum depth of cutting, the manholes are converted to lifting stations with 1 m storage below the invert levels of the

pipe. The model generated is being analyzed and corrected for designed flow with flow routing error below tolerance limit meeting velocity criteria between 0.6m/s and 3 m/s. The link capacity also checked and kept below 60%.

Considering the versatility in hydraulic modelling using dynamic flow routing conditions US Environmental Protection Agencies' (USEPA) Storm Water Management Model (SWMM) is adopted for hydraulic simulation of the sewage network comprising of pipelines, manholes and lifting stations. The SWMM is used throughout for planning, analysis, and design related to storm water runoff, combined and sanitary sewers, and other drainage systems. The map area plotted in SWMM model for the subzone I are given fromFig. 12 to 15.

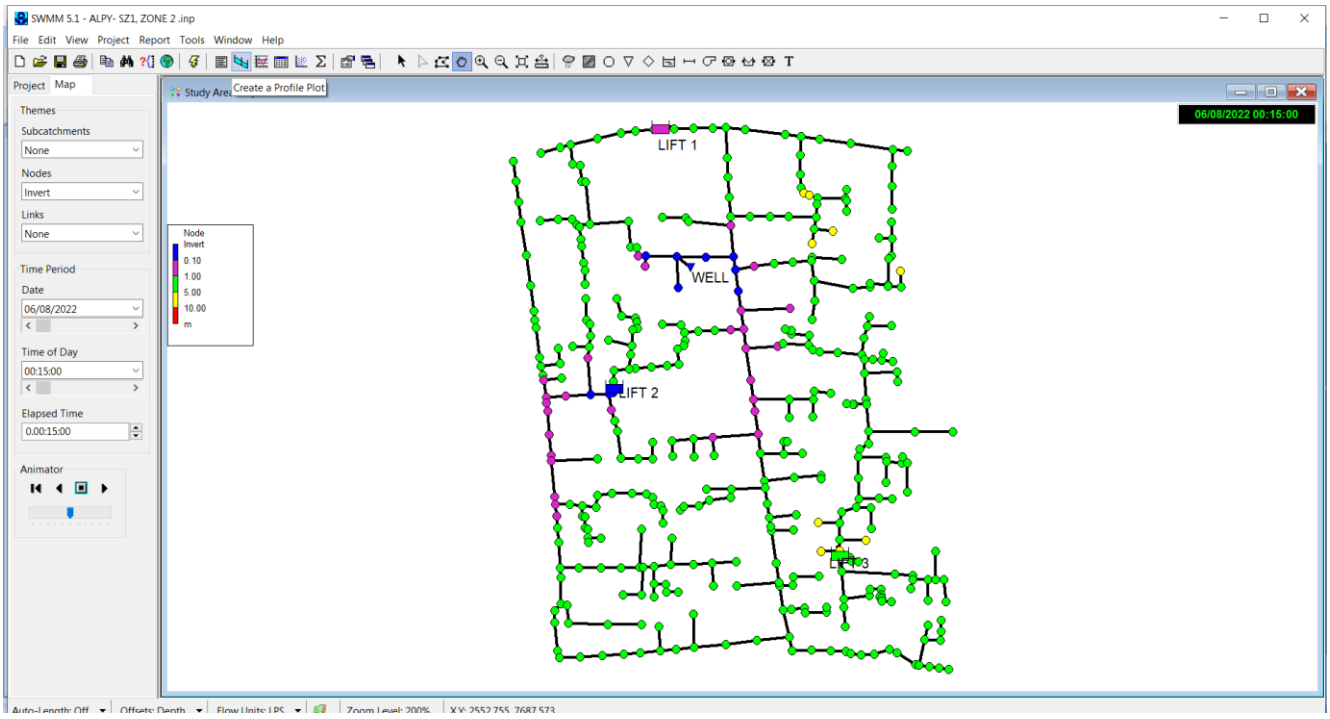


Fig. 12: Map area in SWMM model with invert levels of nodes in sub zone I

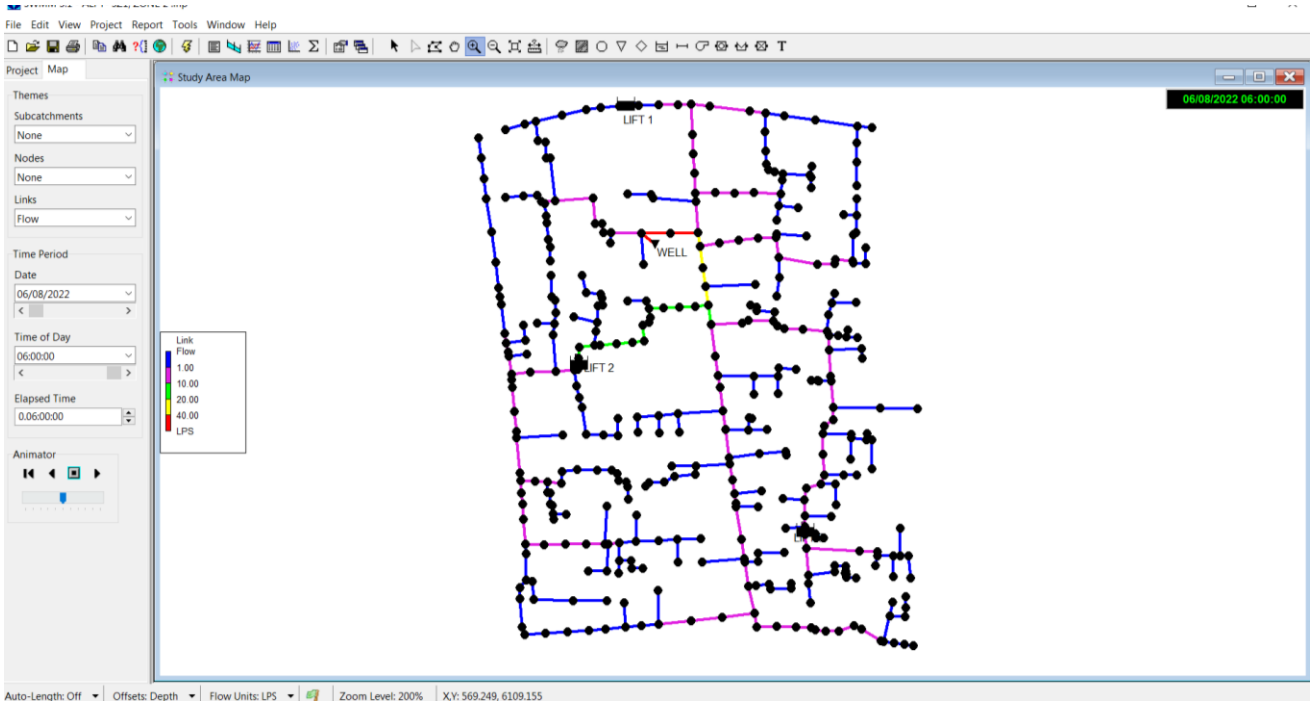


Fig. 13: Map area in SWMM model with flow routing in gradation towards outflow in sub zone I

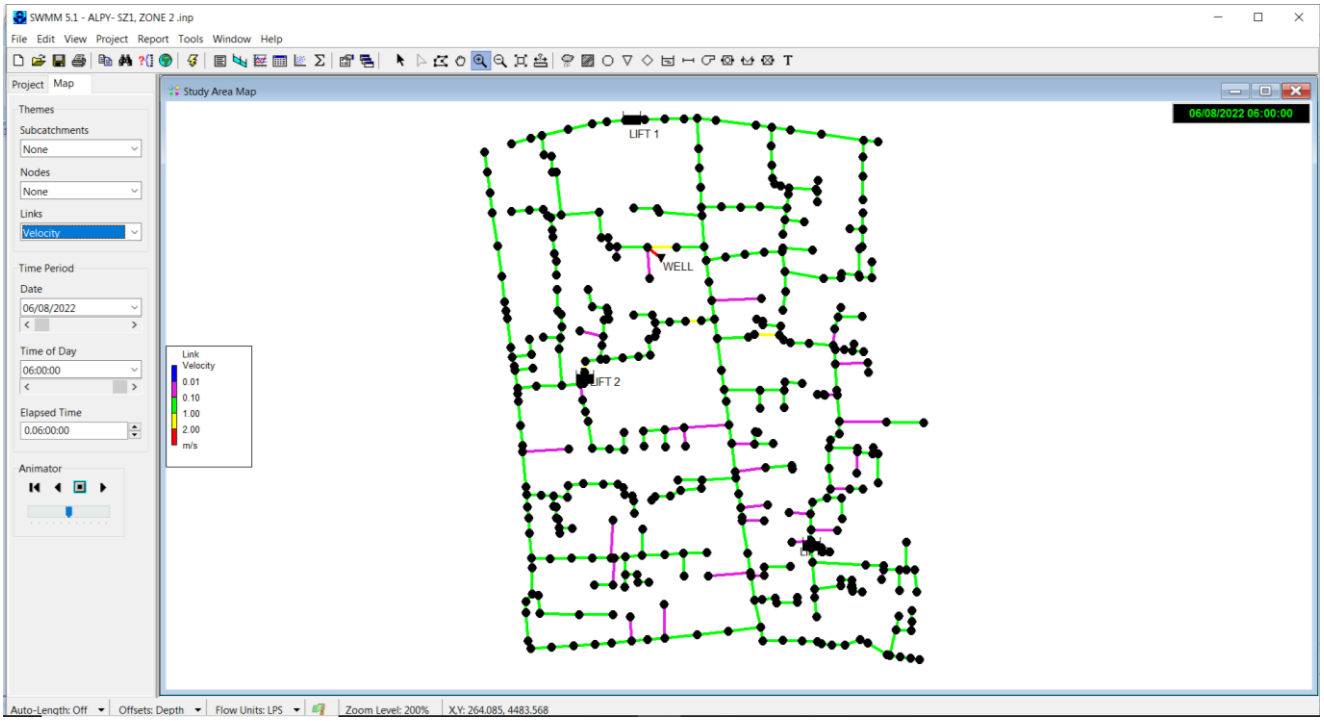


Fig.14: Map area in SWMM model with velocity profiles in sub zone I

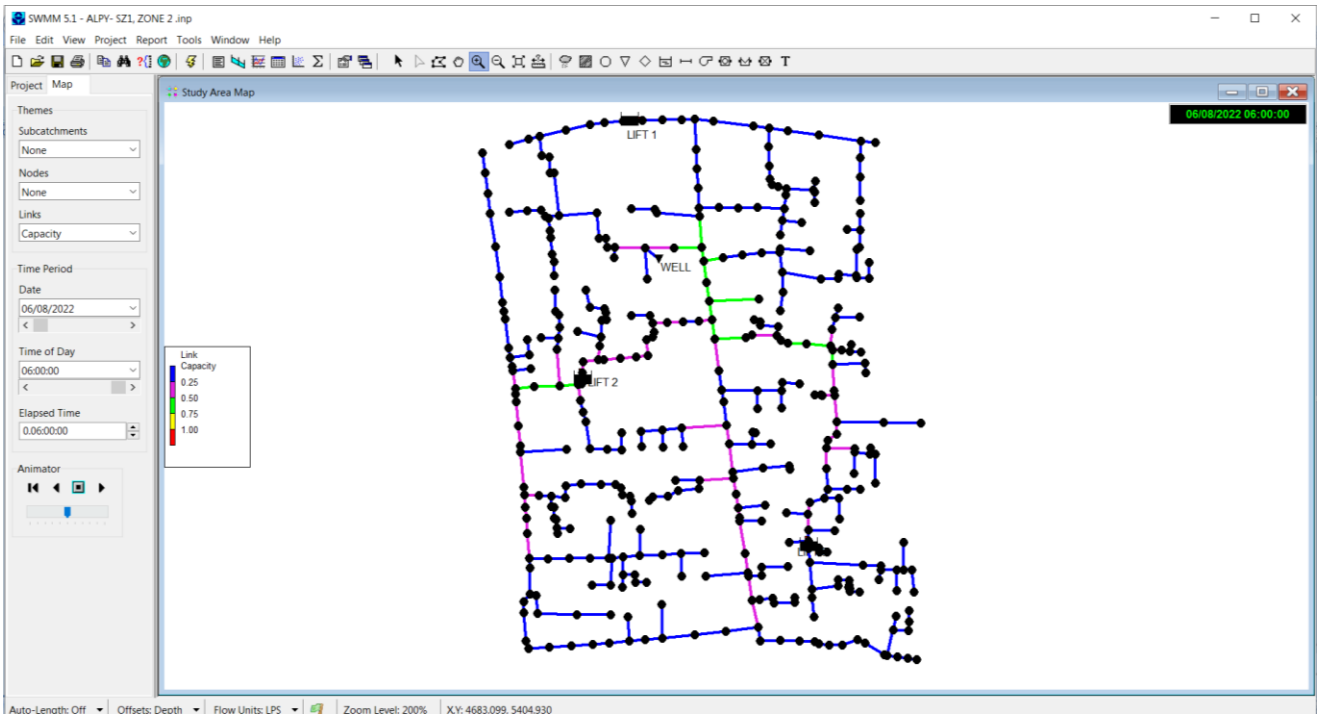


Fig. 15: Map area in SWMM model with capacities of pipe line during peak flow in sub zone I

3.2.3. Design of Manholes and Lifting Stations

A manhole, also known as inspection chambers, provides access to underground utilities in sewer systems fitted with a removable cover to withstand traffic load in sewers. It enables operatives to undertake inspections, make modifications, carry out cleaning and maintenance. 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 with 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 diameters of circular manholes for stated depths of sewers are shown in **Table 12**. There are 384 manholes in subzone 1.

Table 11: Classifications of manholes in subzone I

Sl. No.	Type of Manhole	Internal Dia. (m)	External Dia. (m)	No. of manholes	Average Depth (m)	Average Volume (m^3)	Total Volume (m^3)	% of Total No.
1	CLASS 1	0.9	1.4	183	1.132	1.022	187.14	47.66
2	CLASS 2	1.2	1.8	68	1.959	2.77	188.4	17.7
3	CLASS 3	1.5	2.2	133	3.195	6.5	864.48	34.64

Lift stations are hydraulic structures that are used to move waste water from a lower to higher elevation particularly where the elevation of the sources is not sufficient for the gravity flow and/or when the use of gravity conveyance will result in excessive excavation depths and high sewer construction costs. These 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. The details of lift manhole are given in **Table 13**. Three lift stations are provided in subzone 1

Table 12: Details of lift manholes pumping main for subzone 1

Description	Discharge (LPS)	Head (m)	Power (HP)
LIFT 1, Pump 1	0.84	5	0.5
LIFT 2, Pump 2	9.97	5	1.5
LIFT 3, Pump 3	3.03	5	0.5

3.2.4. Design of Collection Well

The location of the proposed collection well for subzone 1 is in the proposed STP compound and marked in Fig. 16.The sewage load is pumped from collection well 1 to STP. The collection well is designed to have adequate storage of 30 minutes during peak hours of flow. Submersible centrifugal pumps are provided to cater the peak hours of flow and the average

flow whenever the situation demands for it. The detailed design of the collection well is given below.

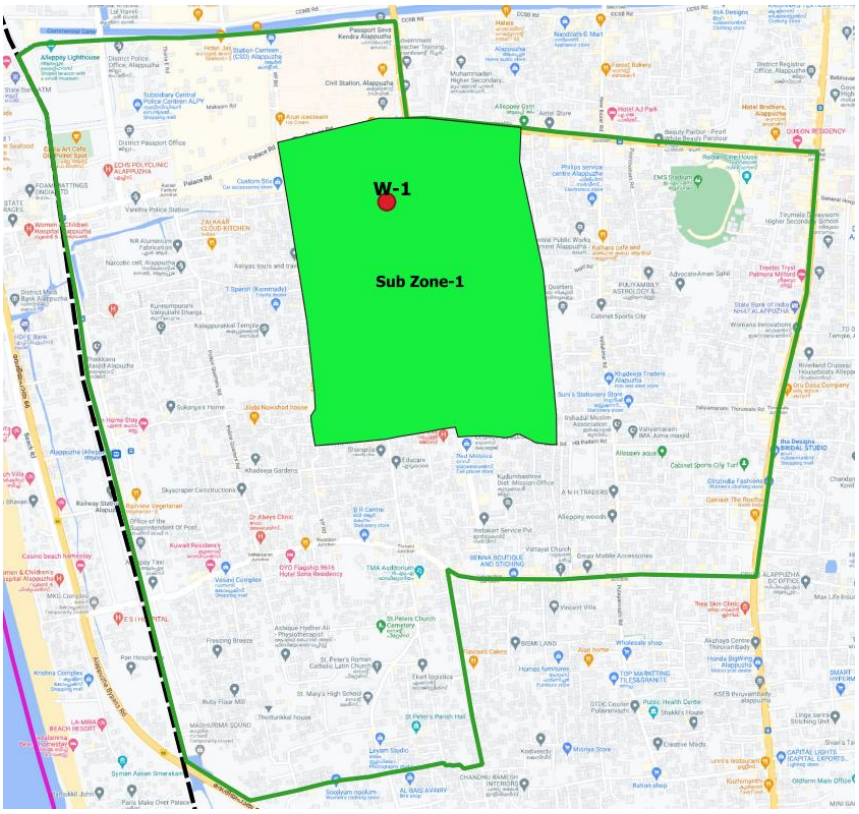


Fig. 16: Subzone I of Alissery zone with collection well marked

3.2.4.1. Design of Collection Well in Subzone I

DESIGN OF COLLECTION WELL No.1				
Average inflow into well from network	**14.97**	LPS		
Peak inflow into well from network	**44.72**	LPS	PF	2.99
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	14.97	LPS		
Total peak inflow into well from network+other well	44.72	LPS		
Peak hours	**4**			
Number of pumps operated in peak hours	**1**			
Rated outflow during peak hours/pump in parallel	44.72	LPS		
Total rated outflow in peak hours	44.72	LPS		
Rated outflow during non peak hours/pump in parallel	14.97	LPS		
Total rated outflow in non peak hours	14.97	LPS		
Rated outflow during non peak hours with lean flow	7.49	LPS		
Total rated outflow in non peak hours	7.49	LPS		
Intermittantpummping in hours	0.50			
Inflow converted into storage during peak hours due to intermittancy in pumping	22.36	LPS		

Volume of sewage to be stored in well	80.50	m^3		
Diameter of collection well-inner	**7**	m		
Depth of collection well for storage	**2.1**	m		
Volume of sewage actually stored in well	80.82	m^3	ok	
Wall thickness of collection well	**0.45**	m		
Base slab thickness	**0.45**	m		
Offset to base slab	**0.45**	m		
Outer dia of collection well	7.9	m		
Freeboard of collection well	0.5	m		
Distance of travel in pumping to next station	**100**	m		
Velocity of travel adopted	**1**	m/sec		
Diameter of pumping line required	238.62	mm	fix OD	**315**
		pressure rating		**PN 10**
Total head for the pump set	**12.5**	m		
Discharge for the pump set	44.72	LPS	efficiency	**0.5**
Power required for pump set/number	14.91	HP	fix HP	**15**
INCOMING MANHOLE DEPTH	4.923			
TOTAL DEPTH	7.023			

3.3. THE PROPOSED TREATMENT PLANT

The proposed treatment plant is designed for a capacity of 5MLD which is to cater 4.54 MLD of sewerage network load and a septage load of 13KLD. The major bottleneck while designing the Sewage treatment plant is the constraint in land availability. Hence, proposed for multi-tier sewage treatment plant. The major components incorporated as multilevel components are equalization tank, MBBR units and tertiary treatment units. In order to handle the septage treatment, septage receiving chamber and dilution tank are proposed. The diluted sludge is pumped into the receiving chamber of the STP in addition to the sewage load from the two streams of pumping mains from collection wells.

The primary treatment units such as receiving chamber, screens, oil and grease, grit separator is aligned above the underground equalization tank. The effluent from equalization tank will be pumped into the multitier MBBR units. The multitier MBBR units consist of different stages such as BOD removal (MBBR1), nitrification (MBBR2), post anoxic denitrification (MBBR3) and BOD removal for recycled raw sewage as carbon source(MBBR4). The MBBR 1 is placed in top level, MBBR2 in intermediate level and MBBR3 and MBBR 4 in bottom level. The effluent from equalization tank first reaches MBBR1 for BOD removal, subsequently for nitrification and post Denitrification. The effluent after

Denitrification will be fed into 4th MBBR tank if BOD is not within the limit. If it is within the limit unit can be bye passed to secondary clarifier with plate settlers.

The clarified effluent is collected in the filter feed tank. After that it will be pumped to tertiary units (PSF, ACF). The tertiary units PSF, ACF (2 units each) are arranged on the top of the underground treated water tank and chlorine contact tank which are separated by a wall. The treated water is proposed to dispose into the commercial canal near Kannan Varkey bridges by laying 355 mm PE Pipe for a length of 650m.

The sludge from the secondary clarifieris collected in the sludge sump which is fed into the sludge thickener. Thickened sludge is pumped into the centrifuge and squeezed into the cake form. The overflow from the thickener and the filtrate from the centrifuge is recycled into the equalization tank. The solid waste generated can be used as manure or otherwise it has to be managed by the solid waste management system of municipality.

According to the soil investigation report, the foundation of heavy load structures like multi-level MBBR unit and tertiary unit structures are proposed with group of piles. The rest units are given raft and beam foundations. The detailed flow diagram and the process layout of the proposed plant is as shown in Fig. 17 and 18 respectively.

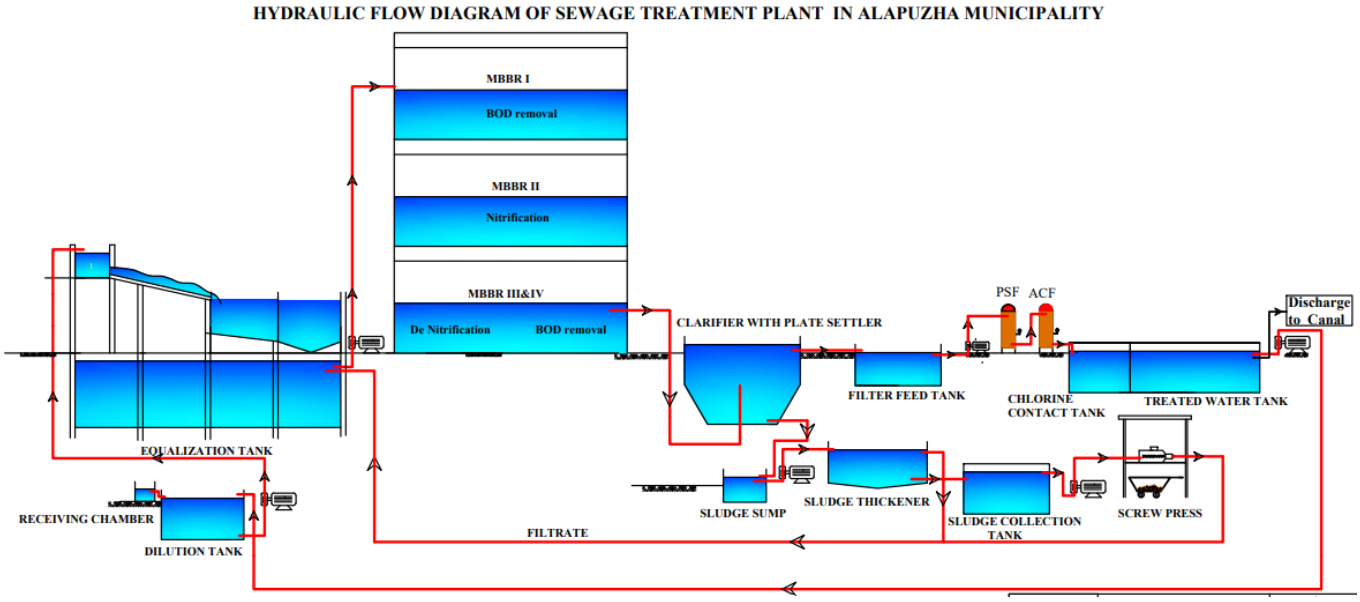


Fig. 17: Hydraulic flow diagram of the proposed STP plant

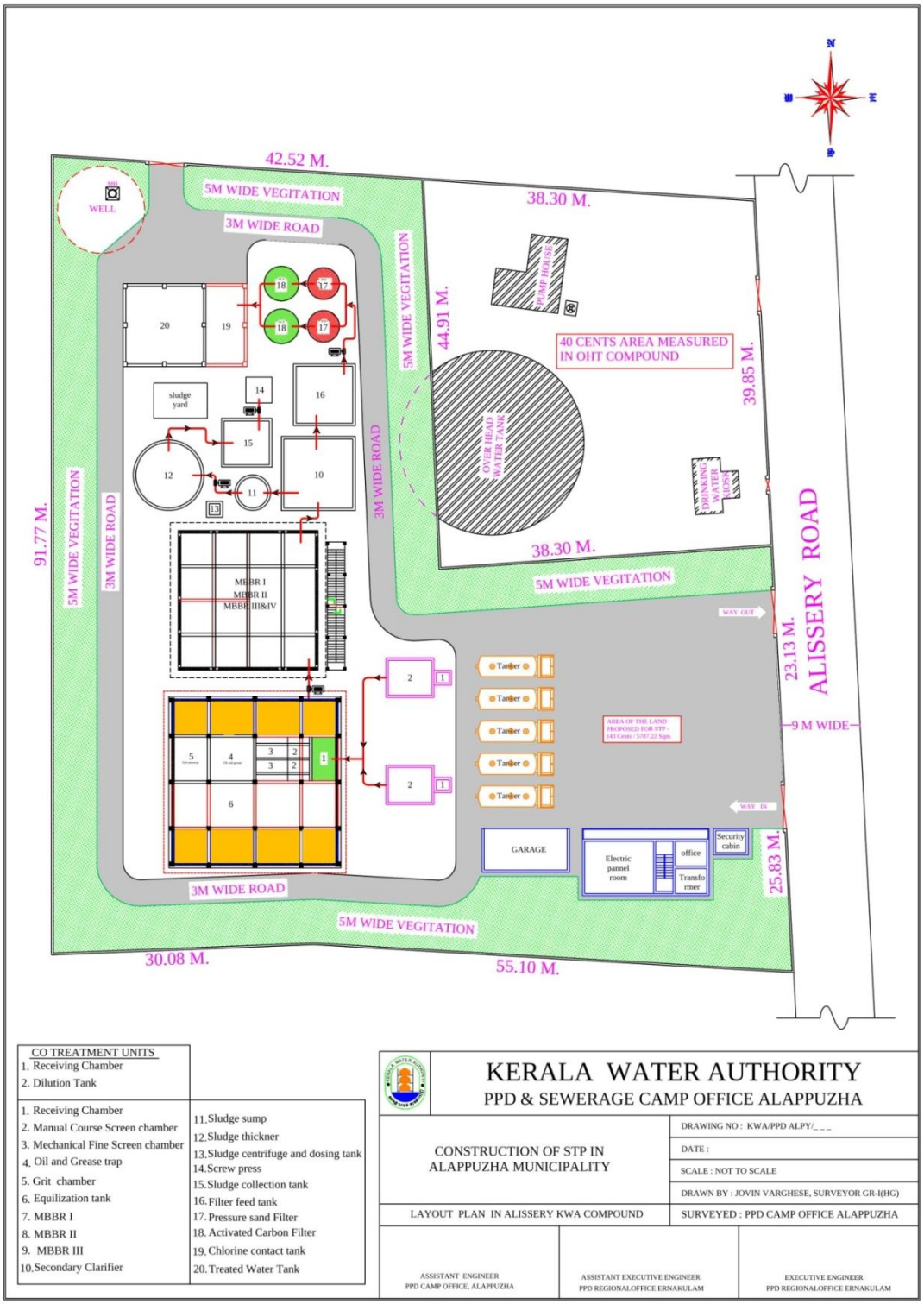


Fig. 18: Process layout of the proposed STP

3.4. ENGINEERING DESIGN OF THE UNITS

DESIGN OF STP WITH MOVING BED BIOFILM-REACTOR (MBBR)						
Average flow from network	**4.5**	MLD				
Working hours	**23**					
Flow from septage dilution tank	13.04	m^3/hour	0.31	MLD		
Design flow	**5.00**	MLD	5000000	LPD	5000	m^3/day
			5000	KLD	208.33	m^3/hour
Assumed peak factor	**2.25**					
Peak design flow	11.250	MLD	11250000	LPD	11250	m^3/day
					468.75	m^3/hour

3.4.1. Sewage Characteristics

Raw Sewage Characteristics		
Average sewage flow entering the STP	208.33	m^3/hour
Peak flow entering the STP	468.75	m^3/hour
COD	**500**	mg/l
Primary ST/ET effluent BOD	**250**	mg/l
Thickener overflow return as fraction of plant flow	**0.15**	
Thickener overflow return	0.750	MLD
Thickener overflow return BOD	**350**	mg/l
Centrate from sludge dewatering as fraction of plant flow	**0.006**	
Centrate from sludge dewatering return	0.03000	MLD
Centrate from sludge dewatering return BOD	**280**	mg/l
Influent BOD to aeration tank	263.1	mg/l
TSS	**400**	mg/l
Total Nitrogen (As N)	**40**	mg/l
Total Phosphorous (As P)	**7**	mg/l
Faecal Coliform	**30000000**	mpn/100 ml
E Coliform	**40000000**	mpn/100 ml
Chlorides as Cl	**125**	mg/l
pH	**6**	

Treated Sewage Characteristics (after filtration)		
COD	**50**	mg/l
BOD	**10**	mg/l
TSS	**20**	mg/l
Total Nitrogen (As N)	**10**	mg/l
Total Phosphorous (As P)	**1**	mg/l
E Coliform	**100**	mpn/100 ml
pH	**7**	

3.4.2. Oil and Grease Trap

Oil and Grease Trap						
Average quantity of flow	208.33	m^3/hour	grid panel	4.5	m	
Peak flow	468.75	m^3/hour	column	0.45	0.45	m
	0.1302	m^3/sec	beams	0.3	0.6	m
Average Retention Time for peak flow	**300**	sec	offset to wall	**0.15**	m	
Volume of the inlet chamber	39.06	m^3	free board	**0.5**	m	
Assumed depth of flow	**2**	m	total height	**2.5**	m	
Area required for inlet chamber	19.53	m^2	wall thickness	**0.25**	m	
Length of the tank	**4.5**	m	slab thickness	**0.3**	m	
Breadth of the tank	4.34	fix	**4.5**	m	area in m^2	**28.09**
Breadth of baffle wall inside	4.5	m				

3.4.3. Receiving Chamber

Receiving Chamber						
Average quantity of flow	208.33	m^3/hour				
Peak flow	468.75	m^3/hour				
	0.1302	m^3/sec				
Average Retention Time for peak flow	**120**	sec	offset to wall	**0.3**	m	
Volume of the inlet chember	15.63	m^3	free board	**0.5**	m	
Assumed depth of flow	**1.5**	m	total height	**2**	m	
Area required for inlet chamber	10.42	m^2	wall thickness	**0.25**	m	
Length of the tank	**4.5**	m	slab thickness	**0.3**	m	B56 is c/c
Breadth of the tank	2.31	fix	**2.5**	m	area in m^2	**20.16**

3.4.4. Manual Coarse Screen Channel

Manual Coarse Screen Channel					
Peak design flow	0.1302	m^3/sec			
Number of screen	**1**				
Peak flow rate per screen	0.1302	m^3/sec			
Velocity at peak flow	**1**	m/sec	assumed		
Velocity through clean bar	**1.10**	m/sec			

screen					
Length of channel U/S	**1**	m	wall thickness	**0.25**	m
Width of channel provided	**0.75**	m	offset to wall	**0.25**	m
Depth of flow	0.17	m	slab thickness	**0.30**	m
Area required for screen	0.13	sqm			
Headloss through bar screen	0.02	m	*assuming head loss coefficient = 0.7*		
Assumed depth of flow after inserting bar screen	**0.2**	m	0.19	(control value)	
Width of channel required	0.65	m	fix	**0.9**	m
Clear bar spacing	**20**	mm	*(20 to 50 mm)*		
Bar thickness	**12**	mm	*(5 to 15 mm)*		
Number of bars	**28**				
Clear bar spacing obtained	21	mm	OK		
Inside width of screen (openings)	0.564	m	area in m^2	**4.75**	
Full height of channel	**1**	m	fb	**0.5**	
Angle of inclination	**45**	degree	0.79	rad	
Actual velocity at peak flow	1.22	*(between 0.60 m/sec and 0.90 m/sec)*			
Length of channel required D/S	1.00	m	fix	**1.5**	m

3.4.5. Mechanical fine Screen Channel

Mechanical Fine Screen Channel						
Peak design flow	0.130	m^3/sec				
Number of screen	**1**					
Peak flow rate per screen	0.130	m^3/sec				
Velocity at peak flow	**0.8**	m/sec	assumed			
Velocity through clean bar screen	**0.85**	m/sec				
Length of channel U/S	**1**	m	wall thickness	**0.25**	m	
Width of channel provided	**0.75**	m	offset to wall	**0.25**	m	
Depth of flow	0.22	m	slab thickness	**0.30**	m	
Area required for screen	0.16	sqm				
Headloss through bar screen	0.01	m	*assuming head loss coefficient = 0.7*			
Assumed depth of flow after inserting bar screen	**0.3**	m	0.22	(control value)		
Width of channel required	0.54	m	fix	**0.9**	m	
Clear bar spacing	**6**	mm	*(up to 6 mm)*			
Bar thickness	**10**	mm	*(5 to 15 mm)*			
Number of bars	**56**					
Clear bar spacing obtained	6.2	mm				

Inside width of screen (openings)	0.34	m				
Full height of channel	**1**	m	fb	**0.5**		
Angle of inclination	**70**	degree	1.22	rad		
Actual velocity at peak flow	1.72	*(between 0.60 m/sec and 1.20 m/sec)*				
Length of channel required D/S	2.74	m	fix	**3**	m	**3.6**

Daily screening quantity				
Daily sewage quantity	5000.00	m^3/day		
Rate of screening quantity	**0.015**	m^3/1000 m^3		
Daily screening quantity	0.0750	m^3/day		

3.4.6. Grit Separator

Grit Separator						
Number of grit units	**1**	SB	**0**			
Peak flow	0.1302	m^3/sec				
Flow in one unit	0.1302	m^3/sec				
Grit particle size	**0.15**	mm				
HRT	**60**	sec	*(45 to 90 sec, typical 60)*			
Volume of grit chamber	7.81	m^3				
SOR	**900**	m^3/m^2/day	*(empirical, from observations)*			
	0.010	m^3/m^2/sec				
Area required	12.50	m^2	wall thickness	**0.25**	m	
SWD	**2.50**	m	slab thickness	**0.30**	m	
Side of square channel	3.54	m	offset to bottom slab	**0.3**	m	
Fix length	**4.5**	m	freeboard	**0.5**	m	
Fix width	**4.5**	m	area given	20.25	m^2	OK
Shape factor	**0.85**		volume given	50.6250	m^3	OK
Specific gravity of liquid	**2.65**					
Kinematic viscosity	**1E-06**	m^2/sec				
V_p in m/sec	0.020	*let Nr < 1, apply Stoke's law to get terminal velocity vp*				

N_r	3	*apply Newton's equation*				
assumed velocity in m/sec	**0.0146**					
Nr	2				area	**31.36**
drag coefficient Cd	15.47					
vp in m/sec	0.014					
Critical displacement velocity, Vc	0.0145	m/sec		R_t	1.8	
Horizontal velocity of flow, Vh	0.0116	m/sec	OK	R_v	1.25	

3.4.7. Equalization Tank

Equalization Tank						
Average design flow	208.33	m^3/hour				
Volume of tank required	**1271.61**	m^3	*from detailed analysis*			
HRT	6.10	hours	inner column	0.45	0.45	
SWD	**4**	m	outer column	0.45	0.6	
Area required for equalization tank	317.90	m^2	free board	**0.50**	m	
Number of tanks proposed	**1**		offset to wall	**1**	m	
Area required for each tank	317.90	m^2	wall thickness	**0.3**	m	
Diameter of circular tank	20.12	m	fix	**20.5**	m	
Side if square tank	17.83	m	fix length	**18**	m	
Thickness of foundation slab	**0.45**	m	fix breadth	**18**	m	
Actual capacity provided	1320.3	m^3	circular	OK		
	1296	m^3	rectangular	OK	area in m^2	**424.36**

3.4.8. Sewage Pump – for Pumping to MBBR

Sewage pump- for pumping to MBBR tank						
Number of pumps	**1**	SB	**1**			
Type of pump set	submersible centrifugal sewage transfer-non clog					
Average flow	5000.00	m^3/day				
Peak design flow	11250.00	m^3/day				
Working hours	**23**					
Flow capacity of each pump	217.39	m^3/hour				
Peak factor	**1.20**					
Discharge	72.46	LPS	0.0725	m^3/sec		
Head required	**32**	m				

Efficiency	**50%**					
Power required	61.84	HP	fix	**62**	HP	
Energy	1060.98	kwh				

3.4.9. Moving Bed Bio Reactor (MBBR) – Single Stage

Moving Bed Bio-Reactor (MBBR)-Single Stage						
Average design flow	5000.00	m^3/day				
Number of streams	**1**					
BOD of incoming sewage	263.13	mg/l				
TSS of incoming sewage	400	mg/l				
BOD expected after treatment	10	mg/l				
BOD to be removed	253.13	mg/l				
BOD removal % expected	96.20					
Number of tanks proposed	**1**					
BOD loading rate/volume	**4**	kg/m^3/day	*4-7 kg/m^3/day as per M&E*			
Actual BOD loading rate	1315.66	kg/day				
Quantity of BOD to be removed per day	1265.66	kg/day				
Volume of reactor required	328.91	m^3				
Surface area loading rate (SALR) for BOD removal	**7.50**	g/m^2/day				
Required carrier surface area	175420.99	m^2				
Specific surface area of carrier	**600.00**	m^2/m^3				
Required carrier volume	292.37	m^3				
Volume of media required	**40%**		c/c	**16**	16	
	131.57	m^3	depth of base	**0.6**	m	
Volume of tank required-BOD loading rate/volume method	460.48	m^3	slab thickness	**0.45**	m	
Volume of tank required- SALR method	730.92	m^3	offset to wall	**0.45**	m	
Volume of each tank	730.92	m^3	total height	**3.50**	m	
SWD	**3**	m	wall thickness	**0.30**	m	
Area of each tank	243.64	m^2	fix dia	**17.7**	m	
Diameter of circular tank	17.61	m	length	**16**	m	
Side of square tank	15.61	m	breadth	**16**	m	
Actual capacity provided-circular	738.17	m^3	OK			
Actual capacity provided-rectangular	768.00	m^3	OK			
Fix capacity	**768.00**	m^3				
Actual volume of media obtained	307.20	m^3				

Actual carrier surface area	184320.0	m^2				
Volume of liquid in the tank	645.12	m^3				
Hydraulic Retension Time at design average flow	3.10	hours	185.8	minutes		
Hydraulic Retension Time at peak flow	1.38	hours	82.6	minutes		
SARR for the given SALR	6.94	$g/m^2/day$			area m^2	**306.25**
Estimated BOD removal rate	1278.72	kg/day				
Actual BOD removal rate %	97.19	BOD of effluent		7.39	mg/l	ok

3.4.10. MBBR Single Stage Nitrification

Moving Bed Bio-Reactor (MBBR)-Single Stage Nitrification						
Average design flow	5000.00	m^3/day				
Number of streams	**1**					
BOD of incoming sewage	**20.00**	mg/l				
NH_4-N of incoming sewage	**40.00**	mg/l				
Alkalinity as $CaCO_3$	**140.00**	mg/l				
Target effluent NH_3-N	**3.30**	mg/l	% removal	91.75		
DL level to be maintained in tank	**2.00**	mg/l				
Design minimum waste water temperature	**20.00**	^oC				
$SARR_{max}$	0.61		SARR temp coefft. ϴ		1.058	
Minimum NH_3-N at $SARR_{max}$	0.50		$SARR_T$	0.81	$g/m^2/day$	
Design value of SALR	0.88	$g/m^2/day$				
NH_3-N loading rate	200.00	kg/day				
Required carrier surface area	226922.68	m^2/day				
Specific surface area of carrier	**750.00**	m^2/m^3				
Required carrier volume	302.56	m^3/day	depth of base	**0.60**	m	
Volume of media required	**40%**		slab thickness	**0.45**	m	

Volume of tank required- SALR method	756.41	m^3	offset to wall	**0.45**	m	
Volume of each tank	756.41	m^3	total height	**3.50**	m	
SWD	**3**	m	wall thickness	**0.30**	m	
Area of each tank	252.14	m^2	fix dia	**18**	m	
Diameter of circular tank	17.92	m	length	**16**	m	
Side of square tank	15.88	m	breadth	**16**	m	
Actual capacity provided-circular	763.41	m^3	OK			
Actual capacity provided-rectangular	768.00	m^3	OK			
Fix capacity	**768.00**	m^3				
Actual volume of media obtained	307.20	m^3				
Actual carrier surface area	230400.00	m^2			area in m^2	**306.25**
Volume of liquid in the tank	645.12	m^3				
Hydraulic Retension Time at design average flow	3.10	hours	185.79	minutes		
Hydraulic Retension Time at peak flow	1.38	hours	82.58	minutes		
BOD SALR	0.43	$g/m^2/day$	*should be < 0.5 to achieve good nitrification*			
Using the equivalent weight of $CaCO_3$ as 50, the equivalent weight of $NaHCO_3$ as 84, the alkalinity use for nitrification as 7.14 g $CaCO_3$/g NH_3-N and the target effluent alkalinity as 80 mg/L as $CaCO_3$, give the calculated alkalinity requirement as 118.5 mg/L as $CaCO_3$.						
Influent alkalinity	**140.00**	mg/l				
Target effluent alkalinity	**80.00**	mg/l				
Alkalinity used for Nitrification	**7.14**	g $CaCO_3$/g NH_3-N				
Alkalinity to be added	202.04	mg/l				
Rate of alkalinity addition needed as $CaCO_3$	1010.19	kg/day				
Equiv wt. of $CaCO_3$	50.00	g/equivalent				
Equiv wt. of $NaHCO_3$	84.00	g/equivalent				
Daily $NaHCO_3$ requirement	1697.12	kg/day $NaHCO_3$				

3.4.11. MBBR Post Anoxic Denitrification

Moving Bed Bio Reactor (MBBR)-post-anoxic denitrification						
Carbon:Nitrogen ratio (C/N)	6.58					
Average design flow	5000	m^3/day				
Number of post-anoxic tanks	**1.00**					
Target effluent NO_3-N concentration	**4.00**	mg/l				
SALR for post-anoxic stage	**2.00**	g NO_3 N /m^2/day				
Estimate of SARR/SALR ratio	0.886	mg/l				
Target % N removal	91.75					
Specific surface area of carrier	**750.00**	m^2/m^3				
NO_3-N daily loading rate	183.50	kg/day				
Required carrier surface area	91750	m^2				
Required carrier volume	122.33	m^3				
Volume of media required	**35%**		depth of base	**0.60**	m	
Volume of tank required- SALR method	349.52	m^3	slab thickness	**0.45**	m	
Volume of each tank	349.5	m^3	offset to wall	**0.45**	m	
SWD	**3**	m	total height	**3.50**	m	
Area of each tank	116.51	m^2	wall thickness	**0.30**	m	
Diameter of circular tank	12.18	m	fix dia	**12.2**	m	
Side of square tank	10.79	m	length	**16**	m	
Actual capacity provided-circular	350.70	m^3	breadth	**8**	m	
Actual capacity provided-rectangular	384.00	m^3	OK			
Fix capacity	**384.00**	m^3	OK			
Actual volume of media obtained	134.40	m^3				
Actual carrier surface area	100800.00	m^2				
Volume of liquid in the tank	330.24	m^3			area in m^2	**166.25**
Hydraulic Retension Time at design average flow	1.59	hours	95.11	hours		
Hydraulic Retension Time at peak flow	0.70	hours	42.27	hours		
SARR	1.77	g/m^2/day				
Estimated NO_3-N removal rate	178.64	kg/day				

NO_3-N of effluent	0.97	mg/l				
Alkalinity produced by denitrification	**3.57**	g $CaCO_3$/g NO_3-N removed				
Actual alkalinity to be added	74.49	mg/l				
Rate of alkalinity addition needed as $CaCO_3$	372.45	kg/day				
Equiv wt. of $CaCO_3$	50.00	g/equivalent				
Equiv wt. of $NaHCO_3$	84.00	g/equivalent				
Daily $NaHCO_3$ requirement	625.71	kg/day $NaHCO_3$				
4.6 lb COD/lb NO_3-N removed and 1.5 lb COD/lb Methanol. The required methanol dosage is then calculated as: 4.6/1.5 = 3.1 lb methanol /lb NO_3-N removed. The methanol requirement in lb/day is then equal to 3.1 times the previously calculated NO_3-N removal rate						
Methanol requirement in kg/day	568.85	kg/day				
Considering toxicity, economy and safety considerations it is better to adopt retrun activated sludge feed into anoxic tank for carbon source. Alkaline fermentation can be adopted for better results.						

3.4.12. MBBR Chamber After Denitrification

Moving Bed Bio-Reactor (MBBR) chamber after de-nitrification						
Average design flow	5000.00	m^3/day				
Number of streams	**1**					
BOD of incoming sewage	**87.71**	mg/l				
TSS of incoming sewage	**50**	mg/l				
BOD expected after treatment	**7**	mg/l				
BOD to be removed	80.71	mg/l				
BOD removal % expected	92.02					
Number of tanks proposed	**1**					
BOD loading rate/volume	**4**	kg/m^3/day	*4-7 kg/m^3/day as per M&E*			
Actual BOD loading rate	438.55	kg/day				
Quantity of BOD to be removed per day	403.55	kg/day				
Volume of reactor required	109.64	m^3				
Surface area loading rate (SALR) for BOD removal	**15.00**	g/m^2/day				
Required carrier surface area	29236.83	m^2				
Specific surface area of carrier	**600.00**	m^2/m^3				
Required carrier volume	48.73	m^3				
Volume of media required	**27%**					
	29.60	m^3	depth of base	**0.6**	m	
Volume of tank required-BOD loading rate/volume method	139.24	m^3	slab thickness	**0.45**	m	

Volume of tank required- SALR method	180.47	m^3	offset to wall	**0.45**	m	
Volume of each tank	180.47	m^3	total height	**3.50**	m	
SWD	**3**	m	wall thickness	**0.30**	m	
Area of each tank	60.16	m^2	fix dia	**8.8**	m	
Diameter of circular tank	8.75	m	length	**8**	m	
Side of square tank	7.76	m	breadth	**8**	m	
Actual capacity provided-circular	182.46	m^3	OK			
Actual capacity provided-rectangular	192.00	m^3	OK			
Fix capacity	**192.00**	m^3				
Actual volume of media obtained	51.84	m^3				
Actual carrier surface area	31104.00	m^2				
Volume of liquid in the tank	171.26	m^3				
Hydraulic Retension Time at design average flow	0.82	hours	49.3	minutes		
Hydraulic Retension Time at peak flow	0.37	hours	21.9	minutes		
SARR for the given SALR	13.13	$g/m^2/day$			area in m^2	**90.25**
Estimated BOD removal rate	408.24	kg/day				
Actual BOD removal rate %	93.09	BOD of effluent		6.06	mg/l	ok

3.4.13. Blower Air Requirement

Blower air requirement MBBR BOD removal IV stage, Equalisation tank, Sludge tank				
BOD loading	438.55	kg/day		
NH_3-N loading rate	0.00	kg/day		
Oxygen uptake ratio-BOD	**1.50**	kg of O_2/kg of BOD		
Oxygen uptake ratio-NH_3-N	**4.57**	kg of O_2/kg of NH_3-N		
Oxygen required for BOD loading	657.83	kg/day		
Oxygen required for NH_3-N loading	0.00	kg/day		
Percentage of O_2 in air	**21.00**			
Weight of air required-BOD loading	3132.52	kg/day		
Weight of air required-NH_3-N loading	0.00	kg/day		
Density of air	**1.225**	kg/m^3		
Volume of air-BOD loading	2557.16	m^3/day		
Volume of air-NH_3-N loading	0.00	m^3/day		
Air transfer efficiency of diffuser	**0.075**			
Quantity of air required-BOD loading	34095.43	m^3/day		
Quantity of air required-NH_3-N loading	0.00	m^3/day		
Factor of saftey	**1.20**			

Volume of air required-BOD loading	1704.77	m^3/hour		
Volume of air required-NH_3-N loading	0.00	m^3/hour		
Volume of equalisation tank	1271.61	m^3		
Normal inflow	0.058	m^3/sec		
Air requirement for equalisation tank	**1.25**	m^3/m^3/hour		
Air requirement for sludge tank	**3.00**	m^3/m^3/hour		
Volume of ET	1271.61	m^3		
Volume of air required for ET	1589.51	m^3/hour		
Volume of air required for ST	29.75	m^3		
Total air required	3324.04	m^3/hour		
Capacity of blower	3324.00	m^3/hour		
Number of blowers working	**3.00**	SB	**2**	
Air required per blower	1108.00	m^3/hour		
Pressure given	**0.60**	kg/cm^2	5.89	m
Volumetric efficiency	**50%**			
Power required for blower motor	48.65	HP	36.29	kw
Fix power of blower motor	**49.00**	HP		
Energy	2631.89	kwh		

Blower air requirement MBBR Nitrification IInd stage				
BOD loading	0.00	kg/day		
NH_3-N loading rate	200.00	kg/day		
Oxygen uptake ratio-BOD	**1.50**	kg of O_2/kg of BOD		
Oxygen uptake ratio-NH_3-N	**4.57**	kg of O_2/kg of NH_3-N		
Oxygen required for BOD loading	0.00	kg/day		
Oxygen required for NH_3-N loading	914.00	kg/day		
Percentage of O_2 in air	**21.00**			
Weight of air required-BOD loading	0.00	kg/day		
Weight of air required-NH_3-N loading	4352.38	kg/day		
Density of air	**1.225**	kg/m^3		
Volume of air-BOD loading	0.00	m^3/day		
Volume of air-NH_3-N loading	3552.96	m^3/day		
Air transfer efficiency of diffuser	**0.075**			
Quantity of air required-BOD loading	0.00	m^3/day		
Quantity of air required-NH_3-N loading	47372.85	m^3/day		
Factor of saftey	**1.20**			
Volume of air required-BOD loading	0.00	m^3/hour		
Volume of air required-NH_3-N loading	2368.64	m^3/hour		
Volume of equalisation tank	0.00	m^3		
Normal inflow	0.000	m^3/sec		
Air requirement for equalisation tank	**1.25**	m^3/m^3/hour		

Air requirement for sludge tank	**3.00**	m^3/m^3/hour		
Volume of ET	0.00	m^3		
Volume of air required for ET	0.00	m^3/hour		
Volume of air required for ST	0.00	m^3		
Total air required	2368.64	m^3/hour		
Capacity of blower	2369.00	m^3/hour		
Number of blowers working	**2.00**	SB	**1**	
Air required per blower	1184.50	m^3/hour		
Pressure given	**0.80**	kg/cm^2	7.85	m
Volumetric efficiency	**50%**			
Power required for blower motor	69.34	HP	51.73	kw
Fix power of blower motor	**70.00**	HP		
Energy	2506.56	kwh		

Blower air requirement MBBR BOD removal Ist stage				
BOD loading	1315.66	kg/day		
NH_3-N loading rate	0.00	kg/day		
Oxygen uptake ratio-BOD	**1.50**	kg of O_2/kg of BOD		
Oxygen uptake ratio-NH_3-N	**4.57**	kg of O_2/kg of NH_3-N		
Oxygen required for BOD loading	1973.49	kg/day		
Oxygen required for NH_3-N loading	0.00	kg/day		
Percentage of O_2 in air	**21.00**			
Weight of air required-BOD loading	9397.55	kg/day		
Weight of air required-NH_3-N loading	0.00	kg/day		
Density of air	**1.225**	kg/m^3		
Volume of air-BOD loading	7671.47	m^3/day		
Volume of air-NH_3-N loading	0.00	m^3/day		
Air transfer efficiency of diffuser	**0.075**			
Quantity of air required-BOD loading	102286.29	m^3/day		
Quantity of air required-NH_3-N loading	0.00	m^3/day		
Factor of saftey	**1.20**			
Volume of air required-BOD loading	5114.31	m^3/hour		
Volume of air required-NH_3-N loading	0.00	m^3/hour		
Volume of equalisation tank	0.00	m^3		
Normal inflow	0.000	m^3/sec		
Air requirement for equalisation tank	**1.25**	m^3/m^3/hour		
Air requirement for sludge tank	**3.00**	m^3/m^3/hour		
Volume of ET	0.00	m^3		
Volume of air required for ET	0.00	m^3/hour		
Volume of air required for ST	0.00	m^3		
Total air required	5114.31	m^3/hour		

Capacity of blower	5114.00	m^3/hour		
Number of blowers working	**4.00**	SB	**3**	
Air required per blower	1278.50	m^3/hour		
Pressure given	**0.80**	kg/cm^2	7.85	m
Volumetric efficiency	**50%**			
Power required for blower motor	74.84	HP	55.83	kw
Fix power of blower motor	**75.00**	HP		
Energy	5371.20	kwh		

3.4.14. Alum and Lime Solution Tanks

Alum solution tank			
number of units	**1**		
dosage of alum	**25**	ppm	
requirement for 8 hours	41.670	kg	
volume of solution at 10% strength/unit	0.38	m^3	
length of tank	**0.6**	m	
breadth of tank	**0.6**	m	
liquid depth	1.06	m	
total depth	**1.2**	m	
solution flow rate	0.0475	m^3/hour	

Lime solution tank			
number of units	**1**		
dosage of lime	**15**	ppm	
requirement for 8 hours	25	kg	
volume of solution at 10% strength/unit	0.23	m3	
length of tank	**0.6**	m	
breadth of tank	**0.6**	m	
liquid depth	0.64	m	
total depth	**1**	m	
solution flow rate	0.02875	m^3/hour	

3.4.15. Secondary Clarifier with Plate settler

Secondary Clarifier with Plate/Tube Settler					
Average output required from tube settler in MLD	5.000	208.33	m^3/hour	57.87	LPS
Number of batteries	**1**				
Average design flow as input in MLD/unit	5.00	208.33	m^3/hour	57.87	LPS
Width of plates in mm	**900**	space between plates		**20**	mm
Length of plates adopted in m	**0.75**				23.10
Angle of inclination of tubes adopted in deg.	**60**	1.05	rad		
Relative length of settler (dimensionless) Lr = L/d	37.5		wall thickness	**0.3**	m
Relative length is changed by L' = 0.058 x [Vo x d/v]			column size	**0.35**	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	**0.35**	m
Kinematic viscosity of water in m/day	0.087264		r-beam depth	**0.45**	m
Effective relative length of tube/plate , L	37.5	(-)	0.013	Vo	
	31.36				
desirable value of relative length =	*around 20 but below 40*				
for one unit:			freeboard	**0.5**	m
Vertical water height in chamber in m	**2.4**		t-beam width	**0.35**	m
Height of chamber in hopper portion in m	**3.1**		t-beam depth	**0.45**	m
Side of large square in m	**8**		r-beam width	**0.35**	m
Side of small square in m	**4.5**		inlet pipe dia	**0.2**	m
h_3 in m (height of the truncated cone)	3.99				
Angle of inclination of hopper side to vertical	0.514	29.46	degree	60.54	*deg. with hor.*
Larger inclined length L_i of slanting slab in m	8.14	area in m^2	32.55		
Smaller inclined length l_i of slanting slab in m	4.58	area in m^2	10.30		
Contact area in m^2	89.00				
SOR in m^3/m^2/day for upflow clarifier	**56.18**	<	**50**		
Trial volume in m^3 of one unit	276.62	volume of hopper in m^3			123.02
Detention time in hours	1.33	in square	0.74	in hopper	0.59
Fix volume	**276.62**	m^3			

Performance parameter of tube settler S = Vs/Vo x [sinθ + L x cosθ]					
For laminar flow regime, critical performance parameter value for complete removal of particle,					
Critical value of performance parameter, Sc =	1.333	circular			
	1.375	square			
	1	parallel plates			
Particle size in mm	**0.025**				
Settling velocity of particle in m/sec, V_s (laminar)	0.0006	m/sec	48.08	m/d	
Reynolds number, Nr	0.014				
Trial value of flow along plate settler V_o in m/day	**462**				
Shape of cross section of tubes	**plates**	(square, circular, or plates)			
Critical of performance parameter obtained, Sc	[(Vs/Vo) x (sinθ+Lcosθ)				
	1.72				
Plate entrance area/one unit	10.37	m^2			
Number of modules of plates	**3**				
Number of plates required/module	192.07				
Fix number of plates required/module	**192**				
Length/module of tray holding plates	**4700**	mm			
Thickness of plate	**1.5**	mm			
Number of plates configured in one module	192.05	OK			
Height of plate module for 1m length of tubes inclined:	0.87				
Hence height of tube module	0.65	m			
Fix length of plate module	**0.75**	m			
Fix height of plate module	**0.65**	m			
Fix number of plates required per module	**192**				
Angle of inclination	60	degree to horizontal			
Contact area	388.8	m^2		area in m^2	**96.04**
SOR in m^3/m^2/day for plate settler	**12.32**	<	**40**		
Total plate entrance area	10.37	m^2			
Actual velocity of flow in m/day	462.16	***now correct velocity***			

3.4.16. Design of Sludge Treatment Facilities

Sludge Sump						
Average flow	5000.00	m^3/day				
TSS	400	mg/l				
BOD	350.84	mg/l				
Assumed TSS Sludge	**30%**					
Assumed BOD Sludge	**35%**					
Sludge generated-TSS	600.0	kg/day				
Sludge generated-BOD	614.0	kg/day				
Total sludge	1213.9	kg/day				

	7					
% sludge with 1.02 specific gravity	**10%**					
Sludge volume per day	119.02	m^3/day				
	4.96	m^3/hour				
Assumed HRT	**2**	hours	freeboard	**1.2**	m	
Volume of tank	9.92	m^3	slab thickness	**0.3**	m	
Assumed SWD	**1.5**	m	offset to wall	**0.3**	m	
Area of the tank	6.61	m^2	wall thickness	**0.25**	m	
Diameter of circular tank	2.90	m	fix	**3**	m	
Actual capacity provided	10.60	m^3			area in m^2	**4.10**

Pump for Sludge transfer to Thickner						
Number of pumps	**1.00**	W	**1**	SB		
Specific gravity of liquid	**1.03**					
Tipe of pump set	submersible centrifugal sewage transfer-non clog					
Working hours	**5.00**	hours				
Discharge required	23.80	m^3/hour	0.006612	m^3/sec		
Required head	**15.00**	m				
Velocity in sludge transfer pipe adopted	**0.70**	m/sec				
Pipe diameter required	109.67	mm	fix	**120**	mm	
Efficiency	**50%**					
Power required	2.64	HP	fix	**2.70**	HP	
Energy	9.87	kwh				

Sludge Thickener						
Number of units	**1**					
Total sludge	1213.97	kg/day				
Solids Loading Rate	**40**	kg/m^2/day				
Thickening area required	30.35	m^2				
Surface Loading Rate	**12**	m^3/m^2/day				
Thickening area required	9.92	m^2	freeboard	**0.5**	m	
Maximum area	30.35	m^2	slab thickness	**0.35**	m	
Area of distribution chamber	**20%**		offset to wall	**0.35**	m	
Total area required	36.42	m^2	wall thickness	**0.3**	m	
Diameter of circular tank	6.81	m	fix	**6.9**	m	
Thickening area available	37.39	m^2				

SWD	**2**	m				
Actual volume provided	74.79	m^3				
Thickened sludge consistency	**3%**	of total sludge volume				
Thickened sludge volume	36.42	m^3/day			area in m^2	**8.2**

Pump for Sludge transfer to Centrifuge						
Type of pump set	Screw pump					
Number of pumps	1.00	W	1	SB		
Volume of thickened sludge to be pumped	36.42	m^3/day				
Working hours of centrifuge	**5.00**	hours				
Discharge required	7.28	m^3/hour	2.0E-03	m^3/sec		
Head required	**15.00**	m				
Efficiency	**50%**					
Power required	0.809	fix	**1.00**	HP		
Energy	3.019	kwh				

Sludge Centrifuge and Dosing Tanks						
Number of centrifuges	**1**	SB	**1**			
Capacity of centrifuge	**0.25**	m^3/hour				
Poly electrolyte dozing for centrifuge & thickener	**10%**					
Sludge volume	1213.97	kg/day				
Dose	**2**	kg/1000 kg				
Quantity of Poly Electrolyte	2.43	kg/day				
Concentration	**0.1**					
Volume of tanks @ 24 hour	2.43	m^3				
	2427.95	litres				
Volume	101.16	litres/hour				
Volume required for 8 hours	0.81	m^3				
Liquid depth of tank	**1**	m				
Area required	0.81	m^2				
side of square tank	0.90	m	fix	**1**	area in m^2	2

3.4.17. Tertiary Treatment Facilities

Filter feed tank						
HRT	**20**	minutes	offset to wall	**0.3**	m	
Average flow	208.33	m^3/hour	wall thickness	**0.25**	m	
Volume of tank	69.44	m^3	slab thickness	**0.3**	m	
Assumed liquid depth	**2**	m	freeboard	**0.5**	m	
Area of the tank	34.72	m^2				
side of square tank	5.89	m	fix length	**6**	m	
			fix breadth	**6**	m	
Volume provided	72.00	OK			area in m^2	**50.41**

Pressure Sand Filter						
Average flow	5000.00	m^3/day				
Filter operating hours	**20**	hours				
Operating flow	250.00	m^3/hour				
Filter Loading Rate	12	m^3/m^2/hour				
Area of the filter required	20.83	m^2				
Number of filters	**2**					
Area of each filter	10.42	sqm				
Diameter of filter required	3.64	m	fix	**3.65**	m	
Height of the filter	**2.5**	m	offset to wall	**0.5**	m	
Operating pressure	**3.5**	Bar				
Filter media	Sand				area in m^2	**43.25**

Activated Carbon Filter						
Average flow	5000.00	m^3/day				
Filter operating hours	**20**	hours				
Operating flow	250.00	m^3/hour				
Filter Loading Rate	10	m^3/m^2/hour				
Area of the filter required	25.00	m^2				
Number of filters	**2**					
Area of each filter	12.50	sqm				
Diameter of filter required	3.99	m	fix	**4**	m	
Height of the filter	**2.5**	m	offset to wall	**0.5**	m	
Operating pressure	**3.5**	Bar				
Filter media	Activated Carbon				area in m^2	**50.00**

Pump for clarified water to PSF and ACF						
Type of pump set	CF					
Number of pumps	**1.00**	W	**1**	SB	**1**	
Discharge of clarified water required	208.33	m^3/hour				
Working hours of pumps	**20.00**	hours				
Discharge required	250.00	m^3/hour	6.9E-02	m^3/sec		
Head required	**35.00**	m				
Efficiency	**50%**					
Power required	64.81	fix	**65.00**	HP		
Energy	967.04	kwh				

Chlorine contact tank						
HRT	**30**	minutes	offset to wall	**0.3**	m	
Average flow	208.33	m^3/hour	wall thickness	**0.25**	m	
Volume of tank	104.17	m^3	slab thickness	**0.3**	m	
Assumed liquid depth	**3**	m	freeboard	**0.5**	m	
Area of the tank	34.72	m^2			area in m^2	**50.35**
side of square tank	5.89	m	fix length	**8.4**	m	
			fix breadth	**4.2**	m	

Treated Water Tank						
HRT	**60**	minutes	offset to wall	**0.3**	m	
Average flow	208.33	m^3/hour	wall thickness	**0.25**	m	
Volume of the tank	208.3	m^3	slab thickness	**0.3**	m	
Assumed liquid depth	**3**	m	freeboard	**0.5**	m	
Area of the tank	69.44	m^2				
Number of tanks	**1**		fix length	**8.4**	m	
Area of one tank	69.44	m^2	fix breadth	**8.4**	m	
Side of square tank	8.33	m				
Volume provided	211.68	m^3	OK		area in m^2	**90.25**
Administrative bldg, lab, chemical store etc(30*25)	750.00					
Transformer yard (15*15)	225.00					
Total area of units	2929.99	m^2				
Movement space factor	**1.6**					
Total area rquired	4687.99	m^2	**1.16**	**Acre**		

3.5. DESIGN OF CO-TREATMENT UNIT FOR SEPTAGE WITH MOVING BED BIOFILM-REACTOR (MBBR)

DESIGN OF CO-TREATMENT UNIT FOR SEPTAGE WITH MOVING BED BIOFILM-REACTOR (MBBR)						
Design population	**50000**					
Sludge deposit coefficient	**95**	litres/person/year				
Sludge deposit	13.01	KLD				
Average septage flow	**13.01**	KLD				
Working hours	**24**					
Design flow	13.01	KLD	13010	LPD	13.0	m^3/day
Assumed peak factor	**1.5**		13	KLD	0.54	m^3/hour
Peak design flow	19.52	KLD	19515	LPD	20	m^3/day
					0.81	m^3/hour
Number of trips/day	**10**				0.00023	cum/sec
Quantity of septage obtained in single trip with peak factor	1.95	m^3	Tanker capacity	3000	litres	
Raw Septage Characteristics						
COD	**25000**	mg/l				
BOD	**5000**	mg/l				
TSS	**7000**	mg/l				
Treated Sewage Characteristics (after filtration)						
COD	**50**	mg/l				
BOD	**10**	mg/l				
TSS	**20**	mg/l				
Receiving Chamber						
Average quantity of flow	0.54	m^3/hour				
Peak flow	0.81	m^3/hour				
Tanker disposing quantity with in 10 minutes	0.00217	m^3/sec				
Average Retention Time for peak flow	**600**	sec	offset to wall	**0.3**	m	
Volume of the inlet chember	1.3010	m^3	free board	**0.45**	m	
Assumed depth of flow	**0.75**	m	total height	**1.2**	m	
Area required for inlet chamber	1.73	m^2	wall thickness	**0.25**	m	

Length of the tank	**1.5**	m	slab thickness	**0.3**	m	
Breadth of the tank	1.16	fix	**1.2**	m	area in m^2	**5.98**
Design of Dilution Chamber from Mass-balance Principle						
Target outflow BOD (actual incoming BOD to STP)	**265**	mg/l				
Target outflow TSS (actual incoming TSS to STP)	**400**	mg/l				
Volume of recycled water used for dilution	**45000**	litres				
Quantity of septage obtained as above	1.95	m^3	ratio of dilution		23.06	
BOD of diluted septage	217.41	mg/l	**ok**			
TSS of diluted septage	310.12	mg/l	**ok**			
Total volume of dilution tank	46.95	m^3				
Liquid depth adopted inside dilution tank	**2.50**	m	side of square tank		4.33	m
Length of dilution tank adopted	**5.00**	m				
Breadth of dilution tank adopted	**4.00**	m	volume	50.00	m^3	ok
Average outflow from dilution tank	13.04	m^3/hour				
Average sewage flow entering the STP with diluted septage	208.33	m^3/hour	% of diluted sepatge to sewage			6.26
Sewage pump- for pumping to STP						
Number of pumps	**1**	SB	**1**			
Type of pump set	submersible centrifugal sewage transfer-non clog					
Average flow	13.04	m^3/hour				
Peak design flow	19.56	m^3/hour				
Working hours	**23**					
Flow capacity of each pump	20.41	m^3/hour				
Peak factor	**1.20**					
Discharge	6.80	LPS	0.0068	m^3/sec		
Head required	**18**	m				
Efficiency	**50%**					
Power required	3.27	HP	fix	**3.5**	HP	
Energy	56.04	kwh				

Recycled water pump- for pumping to dilution tank						
Number of pumps	**1**	SB	**1**			
Type of pump set	submersible centrifugal sewage transfer-non clog					
Average flow	12.50	m^3/hour				
Peak design flow	18.75	m^3/hour				
Working hours	**23**					
Flow capacity of each pump	19.57	m^3/hour				
Peak factor	**1.20**					
Discharge	6.52	LPS	0.0065	m^3/sec		
Head required	**20**	m				
Efficiency	**50%**					
Power required	3.48	HP	fix	**3.5**	HP	
Energy	59.68	kwh				

3.6. SIZING OF THE TREATMENT UNITS

SIZING OF STP UNITS				
Sl. No.	**COMPONENT**	**SIZING (m)**	**Nos.**	**METHOD OF CONSTRUCTION**
	CIVIL CONSTRUCTION UNITS			
	Co Treatment units			
1	Receiving Chamber	1.2 x 0.9 x 1.2	1	RCC
2	Dilution Tank	5 x 4 x 3	1	RCC
	STP units			
1	Receiving Chamber	4.5 x 2.5 x 2	1	RCC
2	Manual Coarse Screen Channel	2.5 x 0.75x 1.5	1	RCC
3	Mechanical Fine Screen Channel	4 x 0.75 x 1.5	1	RCC
4	Oil and Grease Trap	4.5 x 4.5 x 2.5	1	RCC
5	Grit Separator	4.5 x 4.5 x 3	1	RCC
6	Equalisation Tank	18 x 18 x 4.5	1	RCC
7	Moving Bed Biofilm Reactor-1	16 x 16 x 3.5	1	RCC
8	Moving Bed Biofilm Reactor-2	16 x 16 x 3.5	1	RCC
9	Moving Bed Biofilm Reactor-3	16 x 8 x 3.5	1	RCC
10	Moving Bed Biofilm Reactor-4	8 x 8 x 3.5	1	RCC
11	Clarifier with Plate Settler	8 x 8 x 6	2	RCC
12	Sludge Sump	3 m dia x 2.7	1	RCC
13	Sludge Thickener	6.9m dia x 2.5	1	RCC
14	Chlorine contact Tank	8.4 x 4.2 x 3.5	1	RCC

15	Filter Feed Tank	6 x 6 x 2.5	1	RCC
16	Pressure Sand Filter	3.65m dia x 2.5	1	Pre-Fabricated
17	Activated Carbon Filter	4m dia x 2.5	1	Pre-Fabricated
18	Treated Water Tank	8.4 x 8.4 x 3.5	1	RCC
19	Sludge Centrifuge	1 x 1 x 1	1	RCC/FRP
20	Administrative building, indoor transformer, control panel room, lab, office space etc	Common Space		
	ELECTRO-MECHANICAL UNITS			
1	Sewage pump set to MBBR	62 HP (1 W+ 1 SB)	2	Submersible Centrifugal
2	Manual Coarse Screen	Compatible to channel, 0.462 m wide	1	SS 304, Clear Spacing 20 mm
3	Air Grid and Diffused aeration system for ET, MBBR Tanks and Sludge Tank	As per design		PVC
4	MBBR carrier	As per design		PVC/HDPE
5	Air Blowers for MBBR IV, ET and Sludge Tank	1108 m^3/hour,49 HP	2 +1 SB	
6	Air Blowers for MBBR Nitrification Second stage	1184 m^3/hour,70 HP	2+1 SB	
7	Air Blowers for MBBR stage I BOD removal	1278.5 m^3/hour, 75 HP	3 + 2 SB	Positive displacement
8	Plate Settlers	0.90 m wide, 2 module and 210 Nos./module	1	PVC
9	Sludge transfer pump to thickener	2.7 HP (1 W+ 1 SB)	2	Submersible Centrifugal
10	Sludge transfer pump to centrifuge	1 HP (1 W+ 1 SB)	2	Submersible Centrifugal
11	Sludge Centrifuge	0.25 m^3/hour (1 W+ 1 SB)	1	
12	Pump set for clarified water to PSF and ACF	65 HP (1 W+ 1 SB)	2	Centrifugal
13	Pressure Sand Filter (Dual media)	12 m^3/m^2/hour, sand	2	MS with all specials
14	Activated Carbon Filter	10 m^3/m^2/hour, Activated Carbon	1	MS with all specials
15	Jetting/Cleaning machine		1	High pressure

				pump
16	Generator		1	
17	Chlorinator	Electro type of similar		
18	IoT based sensors	BOD, DO, TSS, ph sensors		

3.7. REUSE PROPOSAL OF TREATED SEWAGE

A portion of the treated water will be used for diluting the septage collected from the non-network area. The treated water is proposed to be discharged into the commercial canal near Kannan Varkey bridges in turn can be utilized for the canal rejuvenation. The treated water can be used for irrigation purpose, gardening, construction purpose, road washing, firefighting, etc. If required the treated water can be supplied for industrial purposes of NTPCL Kayamkulam or any industries nearby.

Note: -Detailed structural design has not been done in this DPR and it is advisable to conduct detailed structural design, proto type construction of STP before actual execution of the work. The technology adopted in the proposed project shall be modified with suitable advanced compact versions if available.

CHAPTER 4

COST ESTIMATION

4.1. DETAILED ESTIMATE OF THE COMPONENTS

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 rates adopted in the estimate are based on DSR 2018 and market rates. In following sections, the detailed estimates are illustrated.

In civil construction all basins for the unit operation of the treatment plant are considered. All allied works for treatment other than electrical and mechanical is considered under this head. The treatment plant is given a provision for administrative block including lab facilities, chemical store, sludge handling units of which rate is catered. The sewer network estimate including wells provided is also included in the same. The road restoration provisions also catered. The amount for sewer connections to the households is also included. The plant is given provision for eco-friendly items like vegetation, odour mitigation measures etc. The compound wall as well as road provision is also considered.

In mechanical works considered screens, pumps, blower arrangements for aeration, media for MBBR, Pressure sand filter, activated carbon filter, centrifuge, chemical dosing provisions and other movable or immovable mechanical items.

In electrical works all electrical items, gen set, automatic control systems, all instrumentation, solar power, transformer provisions etc. are considered. The detailed estimate of all the components of the treatment plants is given as Annexure II and that of the sewer network is given in Annexure III.

4.2. ABSTRACT ESTIMATE

Sl. No.	ITEM	AMOUNT
CIVIL ITEMS		
1	Receiving Chamber	₹ 10,72,623
2	Screen channel	₹ 5,67,350
3	Oil and Grease trap	₹ 9,90,743
4	Grit separator	₹ 9,89,579
5	Equalisation Tank	₹ 1,74,22,699
6	Dilution tank for co treatment	₹ 28,22,975
7	MBBR Tank	₹ 8,03,57,063
8	Clarifier with Tube/Plate Settler	₹ 39,67,888
9	Sludge Sump and Thickener	₹ 5,60,789
10	Sludge Thickener	₹ 17,34,849
11	Filter feed tank	₹ 13,81,773
12	Chlorine Contact Tank and Treated Water Tank	₹ 1,64,04,495
13	Ecofriendly and administrative units	₹ 2,83,50,737
14	Compound wall and internal road for STP	₹ 40,00,000
15	Site clearance	₹ 25,00,000
16	Statutory charges	₹ 15,00,000
17	Sewer network with pipelines, chambers and wells Zone1	₹ 30,2729435
	TOTAL OF CIVIL ITEMS	**₹ 46,73,52,998**
MECHANICAL ITEMS		
1	Bar Screens	₹ 13,16,150
2	Pump sets	₹ 2,19,96,436
3	PSF & ACF	₹ 96,53,355
4	Centrifuge	₹ 3,44,382
5	Bypass arrangements, steel ladder,piping and valves	₹ 8,11,116
6	MBBR Carrier and other items	₹ 1,98,58,570
7	Tube settler media	₹ 1,33,928
8	Alum, Lime and hypo dosing systems	₹ 8,50,000
9	Odor control unit	₹ 52,267
10	Aeration system	₹ 4,82,141
11	Mechanical arrangement for oil & grease trap, sludge thickner	₹ 5,25,000
12	Electro magnetic flow meter	₹ 1,03,705
13	Mechanical arrangement for cleaning & flushing manhole	₹ 40,00,000
15	Mechanical arrangement for network and collection wells	₹ 23,04,968
	TOTAL OF MECHANICAL ITEMS	**₹ 6,24,32,018**
ELECTRICAL ITEMS		
1	Diesel Generator	₹ 45,61,349
2	Electrical works, IoT based sensor, control and transformer unit	₹ 90,50,000
3	Solar units	₹ 10,00,000
4	Electrical arrangement for network and collection wells	₹ 4,92,920
	TOTAL OF ELECTRICAL ITEMS	**₹ 1,51,04,269**

4.3. ACTION PLAN FOR IMPLEMENTATION

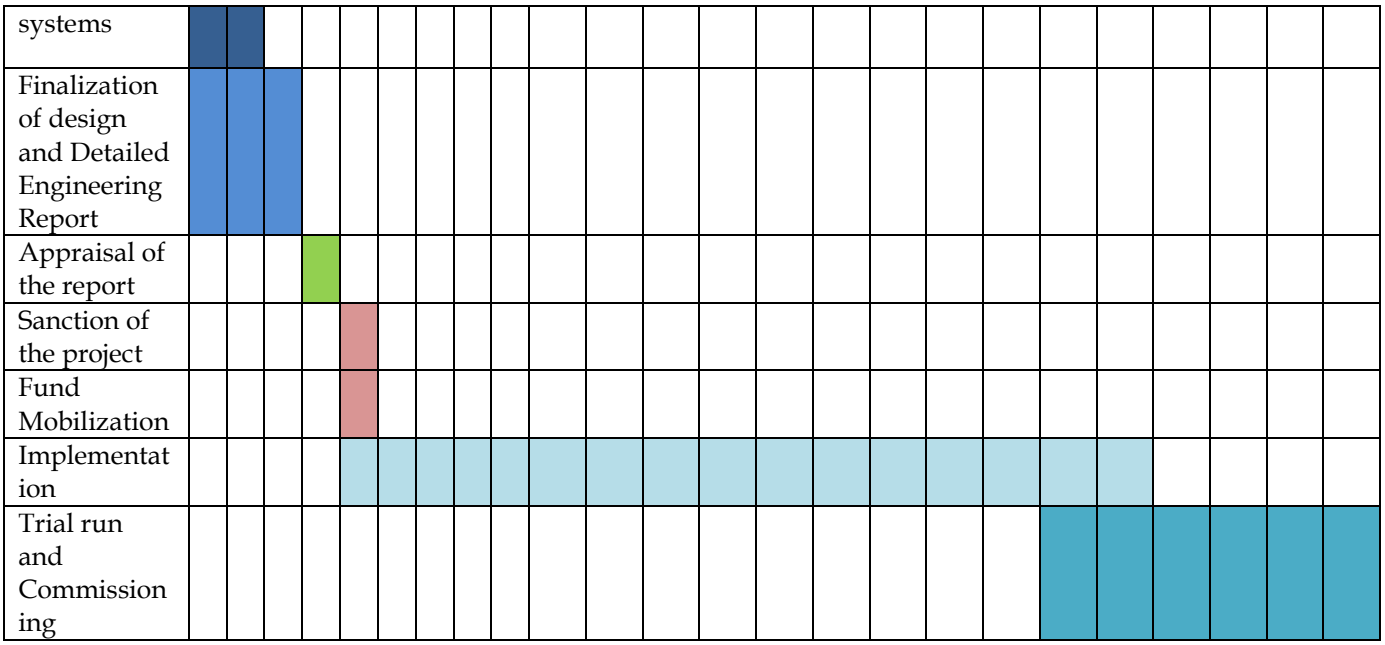
The following sequence of implementation plan for the institution may be more effective in realizing the goals of providing the sewerage system.

Priority	Plan
I.	Preparation of detailed engineering report
II.	Appraisal of the report
III.	Sanction of the project
IV.	Fund Mobilization
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

4.3.1. Time schedule

Gantt chart showing construction and commissioning of treatment plant

	TIME IN MONTHS																							
ACTIVITY	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Basic planning and discussions with government departments																								
Survey on related plans																								
Survey on Existing facilities																								
Survey on Resources of Sewerage																								


systems
Finalization of design and Detailed Engineering Report
Appraisal of the report
Sanction of the project
Fund Mobilization
Implementation
Trial run and Commissioning

CHAPTER 5

OPERATION AND MAINTENANCE PLAN

5.1. POWER REQUIREMENT OF THE TREATMENT PLANT

The hydraulic flow of effluent through the units in STP is proposed mainly by pumping with suitable pump sets which are electrically operated. As the main treatment process involved in the STP is MBBR which is aerobic in nature, and providing more retention time in the equalization tank leads to usage of more air blowers. Also, most of the instrumentation equipment is pneumatically operated, instrument air compressors are required. Plant lighting, draft fans, room fans, air conditioners etc. also require considerable electric power.

The total power requirement for running STP is 756.7 HP/564.45 kW and the installed capacity is 756.7 HP/564.45 kW. The single largest motor capacity is 75HP (Air blower). As per the rules of Kerala State Electrical Inspectorate, HT connection and an indoor type 3 phase transformer having a capacity of 1000 kVA and for making uninterrupted power supply, a Diesel-Generator set having 550 KVA capacity is proposed.

a. Transformer: 1000kVA
b. Generator :550 kVA

The power requirement at the well site in subzone III is for the pump set and to maintain control unit of 3 lifting manholes with power of 27.5HP/20.515 KW at peak flow and 7.5 HP/5.595 KW at average flow. Solar panel provision also included at both well site and STP.

5.2. COST ESTIMATE FOR O&M CHARGES FOR FIRST YEAR

OPERATION & MAINTENANCE COSTS					
Sl. No.	Item		Unit		Expenditure
1	Power Charges for STP @ Rs.5 for kwh @	396120		kwh/month	1980600
2	Power Charges for network @ Rs.5 for kwh @	5595		kwh/month	27975
3	Operators rate/month	25000	3	Nos.	75000
4	Unskilled Worker	8000	3	Nos.	24000
5	Chemist	20000	1	Nos.	20000
6	Driver	15000	1	Nos.	15000
7	Fuel for generator/month				6000
8	Gas Chlorine/month				3500
9	Alum and Lime ,polyelectrolyte dosing/month				154729
10	Spares and replacements/month				5000
11	Network routine inspection, flushing, cleaning including for manholes/month@	0.3% of cost of network/yr			75682
12	Total per month				2387486
13	Total per month excluding power charges				378911
14	Annual Operation & Maintenance Charge				28649832
15	Annual Operation & Maintenance Charge excluding power charges				4546932
16	Treatment Cost per Day				78493
17	Unit Cost of Treatment per Kilo Litre				16

5.3. OPERATION AND MAINTENANCE COST FOR 5 YEARS

5 YEAR ANNUAL O&M COST CONSIDERING 8% ANNUAL INCREASE EVERY YEAR					
Excluding power charges					
1	1st year				4546932
2	2nd year				4910687
3	3rd year				5303542
4	4th year				5727825
5	5th year				6186051
	Total O&M cost for 5 years				26675037
	GST @ 18%				4801507
	Unforseen				523456
	Total O&M cost for 5 years including GST				32000000

5.4. ABSTRACT OF COST

ABSTRACT OF COST		
Sl. No.	**ITEM**	**AMOUNT**
1	Civil Works	₹ 46,73,52,998
2	Mechanical Works	₹ 6,24,32,018
3	Electrical Works	₹ 1,51,04,269
4	Total O&M cost for 5 years	₹ 2,66,75,037
	GST Component (18%)	₹ 10,28,81,578
	Contingency and unforeseen	₹ 55,54,100
	GRAND TOTAL	**₹ 68,00,00,000**
	Rupees Sixty Eight Crores only	

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CHAPTER 6

ENVIRONMENTAL IMPACT ASSESSMENT

6.1. INTRODUCTION

In Alappuzha Municipality, wastewater disposal is the main environmental issue that has created unsanitary conditions, odour and pollution to the nearby water bodies like canals, rivers as the wastes are disposed of directly, which causes nuisance to the residents and affects their health. Hence a proper strategy for treating liquid waste generated in the city is essential. Therefore, it is planned for the construction of new Sewage Treatment Plant (STP).

The project involves the planning, designing, constructing, erection, commissioning, operation and maintenance of 5MLD capacity STP at Kerala Water Authority's (KWA) own land at Alisserry.

6.2. BRIEF DESCRIPTION OF PROPOSED PROJECT

Wastewater from each house will collect in proposed collection wells cum pump houses by gravity and thereafter by pumping up to the new STP at various locations. The wastewater treatment technology to be used at the newly constructing STP is envisaged as MBBR Technology. It significantly reduces the BOD, nitrogen, phosphorous, toxic substances and other pollutants found in the wastewater. The technology adopted is very compact and required fewer footprints. The lack of awareness of human use is also major bottle neck of the project which may leads to the public protest for the project which needs to be properly addressed. The treated water can be reused for agriculture purpose as per the need.

6.3. FEATURES OF THE PROPOSED PROJECT SITE

The project area comes under Alappuzha parliament Constituency and in both Alappuzha and Ambalapuzha legislative constituencies. The municipal town is divided into 52 municipal wards. The STP is designed for Alissery Zone encompassing 2.645 Sq. Km of the total municipal area and the network is planned for 0.473 Sq. Km as Phase 1 (Ward 34 and 35). The nearby establishments of the site are market, small shops, National Highway and

some houses. There are no notable industrial activities in the project area. The wastewater generates from these places will not affect wastewater characteristics arriving to the STP. Farming activities near the site are nil.

Mandatory Clearance

The project would need the clearances from GoK and PCB Clearance from the Kerala State Pollution Control Board under the Air Act, the Water Act and the Cess Act, if stipulated by the State Pollution Control Board (PCB) while giving the NOC.

6.4. ENVIRONMENTAL SETTLLING

The ecologically significant systems within the study area of the project site like archaeological monuments, national parks, wild life sanctuary, core zone of biosphere reserve/ habitat for migratory birds, estuary and mangroves etc. are absent in the nearby 10 Km radius. There is no defence installation nearby the project site.

6.5. ASSESSMENT OF ANTICIPATED IMPACTS

Based on the magnitude and duration of the project activities and the environmental attributes of the receiving environment presented earlier in this DPR on environmental setting, the nature, duration and extent of impact are assessed. Minor project impacts have also been identified and basis for their insignificance has been provided. Where relevant, the EIA also addresses the minor impacts and provides environmental mitigation or environmental enhancement measures.

6.5.1. Impact During Construction and Operation of Networks

During the construction phase of the project, moderate quantities of earth will be excavated and soil disturbance will take place. There will be chances of sliding earth when the earthwork excavation takes place for networks and minor damages can be expected to compound walls and drains. To avoid such situations adequate measures will be taken for side protections. The traffic diversions cause inconvenience to pedestrians and nearby inhabitants for taking own vehicles during those days, dust and noise also to bear during earthwork excavation for pipe laying. But maximum care is to be taken to avoid damages

and disruptions to the utilities are planned and minimum diversions and inconvenience will help to achieve the goal.

6.5.2. Impact on Physical Resources

6.5.2.1. Impact on topography

The proposed construction is planned on flat terrain. There are a few public toilets and a temporary market is now present in the site. The municipality has already planned to relocate the market and the unauthorized businesses running in the proposed site. The project will not alter the topography of the site if planned and executed aesthetically will improve the visual appeal of the area.

6.5.2.2. Impact on climate

The proposed site is already a part of the developed area. Other than a few trees present in the boundary of the site, there are no vegetation present which needs clearance. The project therefore, is unlikely to have any micro-climatic impacts.

6.5.23. Impact on Geology, Soil and Mineral Resources

As no new quarries are envisaged for the project the environmental impacts due to procurement of construction material for the project are insignificant.

6.5.2.4. Impact on Air quality

The project entails movement of significant quantities of the construction material and operation of construction machinery at the site. The project therefore has potential for construction phase negative impacts on air quality. During the operation phase, however decrease movement of vehicular traffic to the site.

Construction phase impacts: During the construction phase, operation of construction machinery at the site and use of vehicles for transporting the construction material are the primary sources of air pollution. Combustion of diesel will be the principal cause of air pollution during the construction phase.

6.5.2.5. Impact on Noise Levels

During the construction phase, the major sources of noise pollution are movement of vehicles transporting the construction material to the project site and the noise generating activities at the site. Primary noise generating activities during the construction are concreting, mixing, casting and materials handling. The noise likely to be generated during excavation, loading and transportation of material. The construction equipment that has high noise emissions levels can affect the personnel operating the machines. Use of proper personal protective equipment will mitigate any adverse impact of the noise generated by such equipment.

Noise generated during operation phase will not be significant. It is, however, required that adequate green cover to the site is provided.

6.5.2.6. Impact on Water Resources

Water requirement during the construction phase has been met by procuring water through tankers. The water demand during the operation phase will be mainly to provide water to the employees involved in the administration, operation and maintenance of the STP.

6.5.2.7. Impact on Water Quality

The project therefore will not have any adverse impact on local ground water and/or surface water resources. Few of the options where treated sewage may be put to beneficial uses include:

- Sale to industries requiring huge quantity of water to meet the cooling water need. Tertiary treatment may be done to meet standards.
- To be made use by various government departments for the development of social farm forest thus achieving afforestation goals.
- Irrigation of traffic islands using treated sewage

Since the treated sewage is not let out to reach the soil and underground aquifer, there will not be negative impact on the water resources. On the contrary, due to structured collection

of household sewage and treatment indiscriminate mixing of sewage in many water bodies are eliminated.

6.5.2.8. Impact on Land Environment

The land identified for the project development falls under Alappuzha Municipality in Alappuzha District. Since, the entire land area for the project is part of government lands, acquisition of private lands is not entailed for the project.

Surrounding areas are already in commercial area. Hence, no disturbance to the local ecology is expected. There will not be any change in the topography of the region, as the land coverage area of STP units will be of small area.

6.5.2.9. Impact on Ecological Resources

As there are no endangered/ threatened species in the vicinity of the proposed project site, there will not be any concern for the loss of important species that needs conservation.

6.5.2.10. Impact on Socio-Economic Environment

Local people would also get job opportunities during construction phase of the project. Thus, the project is expected to contribute to the overall development of the area. There is no issue of resettlement or rehabilitation as the proposed site belongs to the municipality.

6.6. MITIGATION MEASURES

It is observed that most of the project impacts are related to construction phase activities and are minor and transient in nature. All of these impacts can be mitigated following good construction practices.

6.6.1. Impact on Air Quality

Impact on the air quality at the construction site and its adjoining areas during the construction phase would be mainly due to the operation of construction machinery at the site and use of vehicles for transporting the construction material. The following measures are suggested for the mitigation of these impacts.

- Vehicles used for transportation of construction material, will be covered to avoid fugitive emission.
- Idling of delivery trucks or other equipment will not be done during loading and unloading of materials.
- All construction vehicles will be maintained in such a way so as to comply with air emission standards.
- Dust suppression measures such as sprinkling of water will be carried out regularly.

6.6.2. Impact on Noise Levels

The generation of noise during the construction phase would be mainly due to movement of vehicles transporting the construction materials and also due to the noise generating activities in the site itself. To mitigate these impacts during this phase the following measures are suggested.

- Restriction on the usage of noise generating activities and traffic movement in the residential areas to day light hours. Contracts should specify that the construction equipment should meet the noise and air emission levels as per EPA Rules, 1986.
- Generator sets should be enclosed with noise shields.
- Vehicles used for the transportation of construction materials should be well maintained.
- The workers operating high noise machinery or operating near it should be provided with ear plugs.

6.6.3. Impact on Micro Climate

The project area is a part of an already developed area of the municipality. On site planting of shading trees and vegetation along the designated open spaces is envisioned, to ensure the improvement of microclimatic condition of the project site.

6.6.4. Impact on Water Resources

Wastewater discharges from construction site should not be directly let into the nearby water body .It has been proposed to procure water through bore wells or the well already

present in the site to meet the requirement during construction. The impact on water resources due to the operation of sewage treatment plant is insignificant due to the reason that, in the absence of the STP plant, at present the sewage generated in the Alappuzha Municipal area is discharged haphazardly without any treatment.

6.6.5. Health, Safety and Sanitation

- During the construction and operational phase, safety precautions will be practiced in order to prevent any possible occurrence of accident. For this, it will be ensured that all machines used shall confirm to the relevant Indian standards Code and undergo regular inspection.
- During construction phase, Personal Protective Equipment (PPE) such as Protective footwear and protective goggles, Welder's protective eye-shields shall be provided to workers who are engaged in welding works, earplugs shall be provided to workers exposed to loud noise, and workers working in crushing, compaction, or concrete mixing operation.
- The workers will also be provided all necessary safety appliances such as helmets, safety belts, earplugs, mask etc.
- A well-maintained first aid kit including an adequate supply of sterilized dressing materials and appliances will be made available.
- Only the working staff and authorized personnel will only be allowed inside the STP premises.
- Drinking water facility will be made available. Also, Adequate ablutions and change facilities to promote appropriate occupational health and safety (OHS) will be provided.

6.6.6. Plant Operation and Maintenance

- The manuals grading Operations and maintenance procedures will be developed and maintained to ensure optimum environmental management of the activity will be produced.
- The workers involved in O& M will be adequately trained to operate the plant and also trained in environmental management requirements of the plant.

6.6.7. Odour Control Measures

The STP consists of raw sewage pumping, screening, grit chamber, MBBR reactor, sedimentation tanks, filter press etc. The planned secondary treatment system is MBBR has been proposed in view of its advantages of land requirement, low odour, high effluent quality, ease of operation etc. Therefore, apart from the preliminary treatment consisting of screening and grit removal, the treatment system is purely aerobic thus resulting in minimal offensive odour. The need therefore is to minimize any offensive odour in and near the preliminary treatment structures. This is proposed by taking the following measures:

- The odour produced in the primary treatment units due to inlet sump, pump house, screens, approach channels, grit chamber etc. would be maintained on a regular basis by regular cleaning and proper housekeeping to be done.
- All screenings and grit would be properly collected through chutes into trolleys and disposed off as per laid down procedures.
- A green belt with suitable plantation would be provided in the area between treatment units and public to control and reduce odour.

6.6.8. Safety Measures

A detailed precautionary measure has been planned in the various process stages in case of any emergencies. Solids are generated by microorganism growth and reproduction. The influent BOD Supplies the food for the growth and reproduction. As microorganisms' population multiply, excess solids must be removed. If excess solids are not removed, the mixed liquor suspended solids (MLSS) and sludge age will increase and process efficiency will be lowered. Sludge settling rates are affected. Eventually, if excess solids do not get wasted, they can overflow the clarifier weirs and into the receiving water. These operating parameters are widely used and the details of the operating procedure will vary accordingly.

Other precautions will also be carried out as follows:

- Sufficient aeration will be provided throughout the aeration tanks of at least 2 mg/l to maintain the dissolved oxygen concentration.
- Dissolved oxygen will be present at all times in the treated wastewater in the final settling tanks.

The quality of the treated water will be continuously monitored as this is the basic indicator of the normal plant operation.

6.7. PROJECT BENEFITS

6.7.1. Effective Technology

The project uses MBBR technology which is a space saving and is better alternative to conventional treatment plants that are large sized, power intensive and require a lot of monitoring. It has odorless operations, with a self-regulating system, reduced power consumption, simple to operate, low maintenance requirements and removes pathogenic coli forms.

6.7.2. Improvement of Environmental Status

The project will contribute to the substantial decrease of pollution caused by the discharge of untreated sewage into the environment. This in turn would improve the quality of water resources such as ground as well as surface water. The contamination of the region's soil is also prevented by the proper collection and disposal of waste water.

6.7.3. Health Benefits

The proposed project which would ensure the efficient disposal of the waste generation will ultimately bring about social, economic and health benefits to the community. The allied benefits include reduction in health-care costs related with waterborne and related diseases.

6.7.4. Generation of Employment

During the construction phase of the project, service of local sub-contractors will be used which will generate job opportunities for skilled and unskilled workers in addition to professional engineers and others.

6.7.5. Socio-economic Benefits

The project will help in maintaining the sustainability of water and wastewater infrastructure through high standards of O & M and environmental mitigation and management. The project aids to the proper wastewater collection and disposal enriching the aesthetic appearance of the overall region. The project will promote domestic wastewater management, as a result of discharge their wastewater into the proposed sewer systems.

6.7.6. Reuse of treated effluent

The project will promote water conservation measures such as water reuse that will reduce future increases in water demand. The proposed STP project will ensure beneficial reuse of treated sewage for various uses of industry and agricultural activities in and around the project site. The treated sewage sludge which is rich in organic content would serve as low-cost organic manure.

6.8. PUBLIC CONSULTATION

Public hearing with public and various stakeholders should be conducted and the details about the proposed STP in Alissery should be explained. The matters of concern like rehabilitation or resettlement and monetary compensation for the land acquirement for the well site should be discussed in the meetings under the supervisory of Municipal council and KWA officials. The details of public consultation and the notices issued, venue details and list of participants and minutes of meeting should be recorded.

CHAPTER 6

CONCLUSION

6.1. CONCLUSION

Safe water supply and hygienic sanitation facilities are the two basic essential amenities the community needs on a top priority for healthy living. 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 Alappuzha Municipality currently lacks a proper wastewater management system. The Municipal area as a whole has been divided into four network zones and two septage zones. Out of the 52 wards in the municipality, wards 32 to 36 & 43 is fully and 37,38,42 & 44 is partially considered to have sewer network system as Alissery Zone in Zone 2.At present, ward 34 and 35 is only considered for the network implementation as Phase 1 which is covering 0.475 sqkm with network length of 9.79km. Subzone 1 of Alissery zone includes two town wards namely, Alissery ward and Lajaneth ward. The STP design for Alissery zone of 5 MLD capacity and for a design period of 30 years is considered. The treatment plant proposed having 5 MLD capacity will be set up in Kerala Water Authority's (KWA) own land at Alisserry. The estimated sewage load from the project area of 2.645 Sq. km is 4.54 MLD and balance for the septage provision .The treatment technology for the proposed STP adopted in this DPR is Moving Bed Bio Reactor, as this technology is suitable for adopting shock loads and flexible in nature. Apart from sewage treatment plant, a co-treatment facility is also proposed to treat the septage to be collected from the non-network areas. Due to the space constraints components, it is designed as multi-tier STP. The main advantage of multitier STP is minimal use of land area; capital cost can be reduced to a great extent by avoiding individual foundations. But the O&M cost will be more as more energy will be required for pumping the influents to various components at different heights from the ground level. The sewer network lines proposed are HDPE PE100 PN8 and pumping mains HDPE PE100 PN10. As the sewerage connection to the households are to be provided in parallel with the network implementation and the construction of STP for the timely commissioning of the plant, provision for giving sewer connections to households are included in the estimate.

Total estimated cost is Rs.**68,00,00,000** (Rupees Sixty Eight crores only) including 5 years operation maintenance expenses excluding power charges.

6.2. RECOMMENDATIONS

The awareness program of the project is the first step needed. The environment impact study needs to be properly dealt with. The detailed structural design needs to be carried out before implementation. The technology adopted in the proposed project shall be modified with suitable advanced compact versions if available. The necessary mandatory permissions may be taken in prior. The proper co-ordination with all departments needed to be dealt with to avoid undue delay in the project.

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ANNEXURES

ANNEXURE I

POPULATION LOAD CALCULATION

Ward No	Ward Name	Total Population (2011 census)	Population as on 2022	Network coverage in wards	Population in Alissery zone as on 2022	Population Projected as on 2039	Domestic water demand
Increase in population adopted		**0.61%**	**district growth rate**				
32	Valiya Maram	3474	3497	100	3497	3533.00	0.53
33	Municipal Stadium	3357	3380	100	3380	3415.00	0.51
34	Alissery	3606	3630	100	3630	3668.00	0.55
35	Lajaneth	4373	4402	100	4402	4448.00	0.67
36	Valiyakulam	2443	2459	100	2459	2485.00	0.37
37	Vattayal	3331	3353	60	2012	2033.00	0.30
38	Kuthirapanthi	3936	3962	25	991	1001.00	0.15
42	Railway Station	3175	3196	40	1278	1291.00	0.19
43	Zacharia Bazar	4401	4431	100	4431	4477.00	0.67
44	Civil Station	3399	3422	60	2053	2074.00	0.31
		35495	**35732**		**28133**	**28425.00**	**4.26**

Ward No	Ward Name	Population Projected as on 2054	Domestic water demand	Non domestic water demand	Total water demand	Sewage load DWF (MLD)	Infiltration
32	Valiya Maram	3565.00	0.53	0.11	0.64	0.51	0.05
33	Municipal Stadium	3446.00	0.52	0.10	0.62	0.50	0.05
34	Alissery	3702.00	0.56	0.11	0.67	0.53	0.05
35	Lajaneth	4489.00	0.67	0.13	0.81	0.65	0.06
36	Valiyakulam	2508.00	0.38	0.08	0.45	0.36	0.04
37	Vattayal	2052.00	0.31	0.06	0.37	0.30	0.03
38	Kuthirapanthi	1010.00	0.15	0.03	0.18	0.15	0.01
42	Railway Station	1303.00	0.20	0.04	0.23	0.19	0.02
43	Zacharia Bazar	4518.00	0.68	0.14	0.81	0.65	0.07
44	Civil Station	2093.00	0.31	0.06	0.38	0.30	0.03
		28686.00	**4.30**	**0.86**	**5.16**	**4.13**	**0.41**

Sub Zone	Ward included	Calculated total Sewage load in each ward	% of ward in each Zone	% of ward in each Zone	Total Sewage load in each Sub Zone in MLD
1	34	0.59	100	0.59	**1.30**
	35	0.71	100	0.71	
2	44	0.33	100	0.33	**1.42**
	43	0.72	100	0.72	
	42	0.21	45	0.09	
	36	0.40	70	0.28	
3	32	0.56	100	0.56	**1.23**
	33	0.55	100	0.55	
	36	0.40	30	0.12	
4	37	0.33	100	0.33	**0.60**
	38	0.16	100	0.16	
	42	0.21	55	0.11	
Total-					**4.54**

GENERAL ABSTRACT

Others-DPR PREPARATION OF ALAPPUZHA MUNICIPALITY SEWERAGE SCHEME-Detailed estimate of Sewage treatment plant and co-treatment unit-phase 1 Alappuzha municipality-DPR Preparation Work

Sl No	Head Description		Amount
1	RECEIVING CHAMBER		1072622.59
2	SCREEN CHANNEL		567350.38
3	OIL AND GREASE TRAP		990743.23
4	GRIT SEPERATOR		989579.23
5	EQUALISATION TANK		17422698.85
6	DILUTION TANK FOR CO TREATMENT-rectangular		2822974.64
7	MOVING BED BIOFILM REACTOR TANK-BOD REMOVAL		80357063.19
8	SECONDARY CLARIFIER WITH PLATE SETTLER		3967888.21
9	SLUDGE SUMP		560788.54
10	SLUDGE THICKENER-Circular		1734849.20
11	FILTER FEED TANK-Rectangular		1381773.18
12	TREATED WATER TANK-CHLORINE CONTACT TANK Rectangular		16404495.19
13	ECO-FRIENDLY AND ADMINISTRATIVE UNITS		28350736.95
14	MECHANICAL ITEMS-STP		60127051.50
15	ELECTRICAL WORKS-STP		14611348.74
16	COMPOUND WALL FOR STP SITEA AND WELL SITE		4000000.06
17	SITE CLEARANCE		2500000.00
18	SATUATORY CHARGES		1499999.99
	Total Estimation PAC		239361963.67
C	**Extra Charges**		
C.001	Provision for GST		
	239361963.67	18.00%	43085153.46
	Grand Total		0.00
	Round off		0.00
	Rounded Total(Rs)		282447117.13
	Rupees Twenty Eight Crore Twenty Four Lakh Forty Seven Thousand One Hundred and Seventeen		

DETAILED ESTIMATE

Others-DPR PREPARATION OF ALAPPUZHA MUNICIPALITY SEWERAGE SCHEME-

Detailed estimate of Sewage treatment plant and co-treatment unit-phase 1 Alappuzha municipality-DPR Preparation Work

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
1	RECEIVING CHAMBER						
1.001	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						
	RECEIVING CHAMBER						
	For receiving chamber-CTU	2	2.600	2.300	0.450		5.382
	Total						**5.382**
						Total Quantity in cum	**5.382**
1.002	4.1.6						
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 40 mm nominal size)						
	RECEIVING CHAMBER						
	For receiving chamber -CTU	2	2.600	2.300	0.150		1.794
	Total						**1.794**
						Total Quantity in cum	**1.794**
1.003	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						
	RECEIVING CHAMBER-STP						
	Columns(outer)	2	0.450	0.600	3.800		2.052
	Inner columns	2	0.450	0.450	3.800		1.539
	Beams	2	4.050	0.300	0.750		1.823

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
		2	4.050	0.300	0.600		1.458
	Bottom slab	1	5.400	3.700	0.300		5.994
	Long wall	2	4.750	0.250	2.000		4.750
	Short wall	2	2.500	0.250	2.000		2.500
	Total						**20.116**
	RECEIVING CHAMBER-CTU						
	Bottom slab	2	2.000	1.700	0.300		2.040
	Long wall	4	2.000	0.250	1.200		2.400
	Short wall	4	1.200	0.250	1.200		1.440
	Total						**5.880**
						Total Quantity in cum	**25.996**
1.004	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).						
	FOR RECEIVING CHAMBER-CTU						
	QTY as per item code5.37.1	1				2.940000	2.940
	Quantity as per item No. 5.37.2	1				3.509000	3.509
	Total						**6.449**
	FOR RECEIVING CHAMBER-STP						
	QTY AS PER ITEM NO.5.37.1	1				20.116000	20.116
	Quantity as per item No. 5.37.2	1			1.000	3.509000	3.509
	Total						**23.625**
						Total Quantity in cum	**30.074**
1.005	OD53391/2022-2023						
	Extra for providing sulphate resistant cement for the structures						
	FOR RECEIVING CHAMBER-CTU						
	QTY AS PER ITEM NO.5.37.1	1				2.940000	2.940
	Quantity as per item No. 5.37.2	1				3.509000	3.509
	Total						**6.449**
	FOR RECEIVING CHAMBER -STP						
	QTY AS PER ITEM NO.5.37.1	1				20.116000	20.116

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	QTY AS PER ITEM NO.5.37.2	1				3.509000	3.509
	Total						**23.625**
						Total Quantity in cum	**30.074**
1.006	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						
	RECEIVING CHAMBER						
	Top slab-STP	1	4.950	3.200	0.150		2.376
	Top slab-CTU	2	2.200	1.900	0.150		1.254
	Total						**3.630**
	DEDUCTION						
	Manhole	-3	0.600	0.450	0.150		-0.121
	Total						**-0.121**
						Total Quantity in cum	**3.509**
1.007	5.22.6						
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more						
	RECEIVING CHAMBER						
	QTY.AS PER ITEM NO.5.37.1	1			25.996	120.000000	3119.520
	QTY. AS PER ITEM NO.5.37.2	1			3.509	100.000000	350.900
	Total						**3470.420**
						Total Quantity in kilogram	**3470.420**
1.008	OD53791/2022-2023						
	Extra for providing epoxy coating for reinforcement bar						
	FOR MBBR						
	QTY AS PER ITEM NO.5.37.1	1	25.996			120.000000	3119.520

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	QTY. AS PER ITEM NO.5.37.2	1	3.509			100.000000	350.900
	Total						**3470.420**
						Total Quantity in kg	**3470.420**
1.009	4.12						
	Extra for providing and mixing water proofing material in cement concrete work in doses by weight of cement as per manufacturer's specification .						
	RECEIVING CHAMBER						
	QTY AS PER ITEM NO.5.37.1	1			25.996	340.000000	8838.640
	QTY. AS PER ITEM NO.5.37.2	1			3.509	340.000000	1193.060
	Total						**10031.700**
						Total Quantity in kg	**10031.700**
1.010	5.9.1						
	Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete						
	RECEIVING CHAMBER						
	Bottom slab - CTU	4	4.900		0.300		5.880
	Total						**5.880**
						Total Quantity in sqm	**5.880**
1.011	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.						
	RECEIVING CHAMBER						
	Columns	2	2.100		3.800		15.960
		2	1.800		3.800		13.680
	Beams	2	4.050		1.800		14.580
		2	4.050		1.500		12.150
	For walls outside -STP	2	7.500		2.000		30.000
	For walls inside-STP	2	6.750		2.000		27.000
	For walls outside -CTU	4	3.700		1.200		17.760
	For walls inside - CTU	4	2.700		1.200		12.960
	Total						**144.090**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
						Total Quantity in sqm	**144.090**
1.012	5.9.3						
	Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform						
	FOR CTU						
	tOP SLAB	4	3.700		0.150		2.220
	Bottom portion	2	1.500	1.200			3.600
	Total						**5.820**
	FOR STP						
	Top slab	2	7.900		0.150		2.370
	Bottom portion	1	4.250	2.500			10.625
	Total						**12.995**
						Total Quantity in sqm	**18.815**
1.013	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.						
	DEDUCTION						
	PCC	-1			1.794		-1.794
	bottom slab	-1			2.040		-2.040
	Total						**-3.834**
	RECEIVING CHAMBER						
	QTY AS PER ITEM NO. 2.6.1	1			5.382		5.382
	Total						**5.382**
						Total Quantity in cum	**1.548**
1.014	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						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	RECEIVING CHAMBER						
	Inside of walls - STP	2	6.750		2.000		27.000
	Inside of walls - CTU	4	2.700		1.200		12.960
	Total						**39.960**
						Total Quantity in sqm	**39.960**
1.015	22.23.2						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin-charge. The product performance shall carry guarantee for 10 years against any leakage.For horizontal surface one coat @1.10 kg per sqm.						
	FOR CTU						
	Bottom slab inside	2	1.500	1.200			3.600
	Total						**3.600**
	FOR STP						
	Bottom slab inside	1	4.250	2.500			10.625
	Total						**10.625**
						Total Quantity in sqm	**14.225**
1.016	13.7.1						
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)						
	FOR STP						
	Columns	2	2.100		3.800		15.960
		2	1.800		3.800		13.680
	Beams	2	4.050		1.800		14.580
		2	4.050		1.500		12.150
	Inside of walls	2	6.750		2.000		27.000
	Outside of walls	2	7.500		2.000		30.000

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Base slab inside and botom of top slab	1	4.200	2.200			9.240
		1	4.800	2.800			13.440
	Top and bottom slab	2	4.950	3.200			31.680
	Total						**167.730**
	FOR CTU						
	Inside of walls	4	2.700		1.200		12.960
	Outside of walls	4	3.700	1.200			17.760
	Base slab inside and bottom oftop slab	4	1.500	1.200			7.200
	Top slab	2	2.000	1.700			6.800
	Total						**44.720**
	DEDUCTION						
	Manhole	-4	0.600	0.450			-1.080
	Total						**-1.080**
						Total Quantity in sqm	**211.370**
1.017	19.18.1						
	Supplying and fixing C.I with out frame for manholes:455 x 610 mm rectangular C.I cover (light duty) the weight of the cover to be no less than 23 kg						
	RECEIVING CHAMBER						
		4	1.000				4.000
	Total						**4.000**
						Total Quantity in each	**4.000**
1.018	OD53942/2022-2023						
	Supply of uPVC Pipe, IS 4985:2000,10Kg/cm2,110mmDia.-and fixing						
	RECEIVING CHAMBER						
	STP	1	0.450				0.450
	CTU	2	0.450				0.900
	Total						**1.350**
						Total Quantity in metre	**1.350**
1.019	19.16						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786, having minimum cross section as 23 mm x 25 mm and over all minimum length 263 mm and width as 165 mm with minimum 112 mm space between protruded legs having 2 mm tread on top surface by ribbing or chequering besides necessary and adequate anchoring projections on tail length on 138 mm as per standard drawing and suitable to with stand the bend test and chemical resistance test as per specifications and having manufactures permanent identification mark to be visible even after fixing including fixing in manholes with 30x20x15 cm cement concrete block 1:3:6 (1cement: 3 coarse sand: 6 graded stone aggregate 20 mm nominal size) Complete as per design						
	RECEIVING CHAMBER						
	For STP	6					6.000
	For CTU	6					6.000
	Total						**12.000**
						Total Quantity in each	**12.000**
1.020	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.						
	RECEIVING CHAMBER						
	For STP	1	4.500	2.500	2.000		22.500
	For CTU	2	1.500	1.200	1.200		4.320
	Total						**26.820**
						Total Quantity in Kilo litre	**26.820**
1.021	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						
	RECEIVING CHAMBER						
	QTY AS PER ITEM NO.13.7.1R	1	211.370				211.370
	Total						**211.370**
						Total Quantity in sqm	**211.370**
2	SCREEN CHANNEL						
2.001	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						
	For coarse screen channel						
	Bottom slab	1	2.500	3.750	0.300		2.813
	Wall	3	2.500	0.250	1.500		2.813
	beams	1	4.050	0.300	0.600		0.729
	Total						**6.355**
	For fine screen channel						
	Bottom slab STP	1	4.000	3.750	0.300		4.500
	Wal-lSTP	3	4.000	0.250	1.500		4.500
	Total						**9.000**
						Total Quantity in cum	**15.355**
2.002	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).						
	FOR SCREEN CHANNEL						
	QTY AS PER ITEM NO.5.37.1	1				15.350 000	15.350
	Total						**15.350**
						Total Quantity in cum	**15.350**
2.003	OD54060/2022-2023						
	Extra for providing sulphate resistant cement for the structures						
	FOR SCREEN CHANNEL						
	QTY AS PER ITEM NO.5.37.1	1				15.350 000	15.350
	Total						**15.350**
						Total Quantity in cum	**15.350**
2.004	5.22.6						
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	FOR SCREEN CHANNEL						
	QTY AS PER ITEM NO.5.37.1	1		15.350		120.000000	1842.000
	Total						**1842.000**
						Total Quantity in kilogram	**1842.000**
2.005	OD54067/2022-2023						
	Extra for providing epoxy coating for reinforcement bar						
	FOR SCREEN CHANNEL						
	QTY AS PER ITEM NO.5.37.1	1			15.350	120.000000	1842.000
	Total						**1842.000**
						Total Quantity in kg	**1842.000**
2.006	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 .						
	FOR SCREEN CHANNEL						
	QTY AS PER ITEM NO.5.37.1	1	15.350			340.000000	5219.000
	Total						**5219.000**
						Total Quantity in kg	**5219.000**
2.007	5.9.2						
	Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.						
	FOR SCREEN CHANNEL						
	Beams	1	4.050		1.500		6.075
	For walls inside coarse channel	4	2.500		1.500		15.000
	For walls outside coarse channel	2	2.500		1.800		9.000
	For walls outside fine channel	2	4.000		1.800		14.400
	For walls inside fine channel	4	4.000		1.500		24.000
	Total						**68.475**
						Total Quantity in sqm	**68.475**
2.008	5.9.3						
	Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform						
	FOR SCREEN CHANNEL						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	STP Bottom slab coarse screen channel	1	2.500		3.750		9.375
	STP Bottom slab fine screen channel	1	4.000		3.750		15.000
	Bottom slab-course screen channels STP	2	2.500		0.150		0.750
	Bottom slab-fine screen channels STP	2	4.000		0.150		1.200
	Total						**26.325**
						Total Quantity in sqm	**26.325**
2.009	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						
	FOR SCREEN CHANNEL						
	Inside of walls-course screen channels STP	2	3.000		2.500		15.000
	Inside of walls - fine screen channels STP	2	3.000	4.000			24.000
	Total						**39.000**
						Total Quantity in sqm	**39.000**
2.010	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.						
	FOR SCREEN CHANNEL						
	Bottom slab inside-channels STP	1	2.500	2.550			6.375
		1	4.000	2.550			10.200
	Total						**16.575**
						Total Quantity in sqm	**16.575**
2.011	13.7.1						
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)						
	FOR STP						
	Outside of walls-coarse channel	2	2.500		1.800		9.000
	Inside of walls-coarse channels	2	3.000		2.500		15.000
	Base slab inside-coarse channel	2	2.500	0.900			4.500
	Bottom - coarsechannels	1	2.500	3.750			9.375
	Slab projection-top	2	2.500	0.600			3.000
	Outside of walls - fine channel	2	4.000		1.800		14.400
	Inside of walls-fine screen channel	2	3.000		4.000		24.000
	Base slab inside-fine channels	2	4.000	0.900			7.200
	Bottom-fine channel	1	4.000	3.750			15.000

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Slab projection-top	2	4.000	0.600			4.800
	Total						**106.275**
						Total Quantity in sqm	**106.275**
2.012	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						
	FOR SCREEN CHANNEL						
	Coarse screen	4					4.000
	Fine screen	4					4.000
	Total						**8.000**
						Total Quantity in each	**8.000**
2.013	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.						
	FOR SCREEN CHANNEL						
		1	2.500	0.900	1.500		3.375
		1	4.000	0.900	1.500		5.400
	Total						**8.775**
						Total Quantity in Kilo litre	**8.775**
2.014	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						
	FOR SCREEN CHANNEL						
	QTY AS PER ITEM NO.5.37.1	1				106.280000	106.280
	Total						**106.280**
						Total Quantity in sqm	**106.280**
3	OIL AND GREASE TRAP						
3.001	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						
	FOR OIL AND GREASE TRAP-STP						
	Bottom slab	1	4.200	4.200	0.300		5.292
	Long wall	2	4.750	0.250	2.500		5.938
	Short wall	2	4.250	0.250	2.500		5.313
	Cloumns	4	0.450	0.450	2.000		1.620
	Beams	4	4.050	0.300	0.600		2.916
	Total						**21.079**
						Total Quantity in cum	**21.079**
3.002	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).						
	FOR OIL AND GREASE TRAP						
	QTY AS PER ITEM NO.5.37.1	1				21.080000	21.080
	QTY AS PER ITEM NO5.37.2	1				3.024000	3.024
	Total						**24.104**
						Total Quantity in cum	**24.104**
3.003	OD54273/2022-2023						
	Extra for providing sulphate resistant cement for the structures						
	FOR OIL AND GREASE TRAP						
	QTY AS PER ITEM NO.5.37.1	1				21.080000	21.080
	Quantity as per item No. 5.37.2	1				3.024000	3.024
	Total						**24.104**
						Total Quantity in cum	**24.104**
3.004	5.37.2						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Providing and laying in position ready mixed M-25 grade concrete for reinforced cement concrete work, using cement content as per approved design mix, manufactured in fully automatic batching plant and transported to site of work in transit mixer for all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding the cost of centering, shuttering finishing and reinforcement including cost of admixtures in recommended proportions as per IS: 9103 to accelerate/ retard setting of concrete, improve workability without impairing strength and durability as per direction of the Engineer - in -charge. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All work above plinth level upto floor V level						
	FOR OIL AND GREASE TRAP						
	Top slab -STP	1	4.550	4.550	0.150		3.105
	Total						**3.105**
	DEDUCTION						
	Manhole	-2	0.600	0.450	0.150		-0.081
	Total						**-0.081**
						Total Quantity in cum	**3.024**
3.005	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						
	FOR OIL AND GREASE TRAP						
	QTY AS PER ITEM NO.5.37.1	1		21.080		120.000000	2529.600
	QTY. AS PER ITEM NO.5.37.2	1		3.030		100.000000	303.000
	Total						**2832.600**
						Total Quantity in kilogram	**2832.600**
3.006	OD54277/2022-2023						
	Extra for providing epoxy coating for reinforcement bar						
	FOR OIL AND GREASE TRAP						
	QTY AS PER ITEM NO.5.37.1	1	21.080			120.000000	2529.600
	QTY. AS PER ITEM NO.5.37.2	1	3.030			100.000000	303.000
	Total						**2832.600**
						Total Quantity in kg	**2832.600**
3.007	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 .						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	FOR OIL AND GREASE TRAP						
	QTY AS PER ITEM NO.5.37.1	1		21.080		340.000000	7167.200
	QTY. AS PER ITEM NO.5.37.2	1		3.030		340.000000	1030.200
	Total						**8197.400**
						Total Quantity in kg	**8197.400**
3.008	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.						
	FOR OIL AND GREASE TRAP						
	For walls outside-STP	4	4.750		2.500		47.500
	For walls inside-STP	4	4.250		2.500		42.500
	For columns	4	1.800		2.000		14.400
	Total						**104.400**
						Total Quantity in sqm	**104.400**
3.009	5.9.3						
	Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform						
	FOR OIL AND GREASE TRAP						
	Top slab-STP	2	9.100		0.150		2.730
	Top slab bottom portion-STP	1	4.550	4.550			20.703
	Bottom slab	2	10.800		0.150		3.240
	Bottom portion	1	4.200	4.200			17.640
	Total						**44.313**
						Total Quantity in sqm	**44.313**
3.010	22.23.1						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin-charge. The product performance shall carry guarantee for 10 years against any leakage.For vertical surface two coats @0.70 kg per sqm						
	FOR OIL AND GREASE TRAP						
	Inside of walls-STP	4	4.250		2.500		42.500
	Total						**42.500**
						Total Quantity in sqm	**42.500**
3.011	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.						
	FOR OIL AND GREASE TRAP						
	Bottom slab inside -STP	1	4.250	4.250			18.063
	Total						**18.063**
						Total Quantity in sqm	**18.063**
3.012	13.7.1						
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)						
	FOR STP						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Inside of walls	1	17.500		2.500		43.750
	Outside of walls	2	9.500		2.650		50.350
	Base slab inside&top	2	4.550	4.550			41.405
	Base slab inside &bottom portion	2	4.200	4.200			35.280
	Columns	4	1.800		2.000		14.400
	Total						**185.185**
	DEDUCTION						
	Manhole	-2	0.600	0.450			-0.540
	Total						**-0.540**
						Total Quantity in sqm	**184.645**
3.013	19.18.1						
	Supplying and fixing C.I with out frame for manholes:455 x 610 mm rectangular C.I cover (light duty) the weight of the cover to be no less than 23 kg						
	FOR OIL AND GREASE TRAP						
		2	1.000				2.000
	Total						**2.000**
						Total Quantity in each	**2.000**
3.014	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						
	FOR OIL AND GREASE TRAP						
	For STP	7					7.000
	Total						**7.000**
						Total Quantity in each	**7.000**
3.015	OD54332/2022-2023						
	Supply of uPVC Pipe, IS 4985:2000,10Kg/cm2,110mmDia.-and fixing						
	FOR OIL AND GREASE TRAP						
	STP	1	0.450				0.450
	Total						**0.450**
						Total Quantity in metre	**0.450**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
3.016	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.						
	FOR OIL AND GREASE TRAP						
	For STP	1	4.500	4.500	2.500		50.625
	Total						**50.625**
						Total Quantity in Kilo litre	**50.625**
3.017	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						
	FOR OIL AND GREASE TRAP						
	QTY AS PER ITEM NO.13.7.1	1				184.650000	184.650
	Total						**184.650**
						Total Quantity in sqm	**184.650**
3.018	10.26.3						
	Providing and fixing hand rail of approved size by welding etc. to steel ladder railing, balcony railing, staircase railing and similar works, including applying priming coat of approves steel primer.G.I. pipes						
	50mm DIA GI 5.17Kg/m.32mm DIA GI -317 Kg/m						
	1m c/c vertical 50mm dia	36			0.750	5.170000	139.590
	HORIZONTAL .25m c/c 32mm dia	3	36.400			3.170000	346.164
	Total						**485.754**
						Total Quantity in kg	**485.754**
3.019	13.48.3						
	Finishing with Deluxe Multi surface paint system for interiors and exteriors using primer as per manufacturers specifications:Painting Steel work with Deluxe Multi Surface Paint to give an even shade. Two or more coat applied @ 0.90 ltr/10 sqm over an under coat of primer applied @ 0.80 ltr/10 sqm of approved brand and manufacture						
	FOR OIL AND GREASE TRAP						
	Vertical pipe	36	0.750		0.160		4.320
	Horizontal pipe	3	36.400		0.100		10.920
	Total						**15.240**
						Total Quantity in sqm	**15.240**
4	GRIT SEPERATOR						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
4.001	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						
	DEDUCTION						
	Manhole	-2	0.600	0.450	0.150		-0.081
	Total						**-0.081**
	FOR GRIT SEPERATOR						
	Walls	4	4.500	3.000	0.250		13.500
	Walls (inclined)	4	3.000	1.580	0.250		4.740
	Columns(outer)	2	0.450	0.600	1.000		0.540
	Column(inner)	2	0.450	0.450	1.000		0.405
	Column(bottom)	4	0.300	0.300	0.500		0.180
	Beams(outer)	4	3.900	0.300	0.600		2.808
	Beams(inner)	4	1.200	0.300	0.300		0.432
	Beams(inclined)	4	2.180	0.300	0.300		0.785
	Top slab	1	4.950	4.950	0.150		3.675
	Total						**27.065**
						Total Quantity in cum	**26.984**
4.002	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).						
	FOR GRIT SEPERATOR						
	QTY AS PER ITEM NO.5.37.1	1				26.990 000	26.990
	Total						**26.990**
						Total Quantity in cum	**26.990**
4.003	OD54408/2022-2023						
	Extra for providing sulphate resistant cement for the structures						
	FOR GRIT SEPERATOR						
	QTY AS PER ITEM NO.5.37.1	1				26.990 000	26.990

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Total						**26.990**
						Total Quantity in cum	**26.990**
4.004	5.22.6						
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more						
	FOR GRIT SEPERATOR						
	QTY AS PER ITEM NO.5.37.1	1	26.990			120.000000	3238.800
	Total						**3238.800**
						Total Quantity in kilogram	**3238.800**
4.005	OD71095/2022-2023						
	Extra for providing epoxy coating for reinforcement bar						
	FOR GRIT SEPERATOR						
	Qty as per item 5.37.1	1	26.984			120.000000	3238.080
	Total						**3238.080**
						Total Quantity in kg	**3238.080**
4.006	4.12						
	Extra for providing and mixing water proofing material in cement concrete work in doses by weight of cement as per manufacturer's specification .						
	FOR GRIT SEPERATOR						
	QTY AS PER ITEM NO.5.37.1	1		26.990		340.000000	9176.600
	Total						**9176.600**
						Total Quantity in kg	**9176.600**
4.007	5.9.2						
	Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.						
	FOR GRIT SEPERATOR						
	For walls outside-grit seperator	4	4.500		3.000		54.000
	Wall(inclined)	4	3.000		1.580		18.960
	For walls inside-grit seperator	4	4.250		3.000		51.000
	Wall(inclined)	4	2.750		1.580		17.380
	Total						**141.340**
						Total Quantity in sqm	**141.340**
4.008	5.9.3						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform						
	FOR GRIT SEPERATOR						
	Top slab -grit seperator	2	9.900	0.150			2.970
	Total						**2.970**
						Total Quantity in sqm	**2.970**
4.009	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						
	FOR GRIT SEPERATOR						
	Inside of walls-grit seperator	2	8.500		3.000		51.000
	Inside of inclined walls-grit seperator	4	3.000		1.580		18.960
	Total						**69.960**
						Total Quantity in sqm	**69.960**
4.010	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.						
	FOR GRIT SEPERATOR						
	Bottom slab inside -grit box	1	4.500	4.500			20.250
	Total						**20.250**
						Total Quantity in sqm	**20.250**
4.011	13.7.1						
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)						
	FOR GRIT SEPERATOR						
	For walls outside-grit seperator	4	4.500		3.000		54.000
	Wall(inclined)	4	3.000		1.580		18.960
	For walls inside -grit seperator	4	4.250		3.000		51.000
	Wall(inclined)	4	2.750		1.580		17.380
	Base slab inside-grit seperator	1	4.250	4.250			18.063
	Top slabbottom-grit box	1	4.250	4.250			18.063
	Top slab top -grit box	1	4.950	4.950			24.503
	Total						**201.969**
	DEDUCTION						
	Manhole	-2	0.600	0.450			-0.540
	Total						**-0.540**
						Total Quantity in sqm	**201.429**
4.012	19.18.1						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Supplying and fixing C.I with out frame for manholes:455 x 610 mm rectangular C.I cover (light duty) the weight of the cover to be no less than 23 kg						
	FOR GRIT SEPERATOR						
	STP	2					2.000
	Total						**2.000**
						Total Quantity in each	**2.000**
4.013	OD54500/2022-2023						
	Supply of uPVC Pipe, IS 4985:2000,10Kg/cm2,110mmDia.-and fixing						
	FOR GRIT SEPERATOR						
	STP	1	0.450				0.450
	Total						**0.450**
						Total Quantity in metre	**0.450**
4.014	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						
	FOR GRIT SEPERATOR						
	For STP	9					9.000
	Total						**9.000**
						Total Quantity in each	**9.000**
4.015	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.						
	FOR GRIT SEPERATOR						
	For STP-top portion	1	4.250	4.250	2.500		45.156
	Hopper portion	1	8.896		0.500		4.448
	Total						**49.604**
						Total Quantity in Kilo litre	**49.604**
4.016	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						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	FOR GRIT SEPERATOR						
	QTY AS PER ITEM NO.13.7.1	1	201.450				201.450
	Total						**201.450**
						Total Quantity in sqm	**201.450**
5	EQUALISATION TANK						
5.001	2.6.1						
	Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed.All kinds of soil						
	Shape of Tank 1(Put 1 for rectangular and 2 for circular)						
	Equalisation Tank	1	21.400	21.400	1.500		686.940
	Total						**686.940**
						Total Quantity in cum	**686.940**
5.002	OD54720/2022-2023						
	Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30cm in depth,1.5m in width aswell as 10 sqm on plan)including disposal of excavated earth ,lead up to 50m and lift up to 1.5 m ,disposed earth to be levelled and neatly dressed .All kind of soil-additional lift 1.5to 3m						
	Equalisation Tank						
	Equalisation Tank	1	21.400	21.400	1.500		686.940
	Total						**686.940**
						Total Quantity in cum	**686.940**
5.003	OD54726/2022-2023						
	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 - additional depth 3.0 to 4.5 m.						
	Equalisation Tank						
	Equalisation Tank	1	21.400	21.400	1.500		686.940
	Total						**686.940**
						Total Quantity in cum	**686.940**
5.004	OD54733/2022-2023						
	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 - additional depth 4.5 to 6m.						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Equalisation Tank						
	Equalisation Tank	1	21.400	21.400	1.050		480.858
	Total						**480.858**
						Total Quantity in cum	**480.858**
5.005	4.1.6						
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 40 mm nominal size)						
	Eualisation Tank						
	Equalisation Tank	1	21.400	21.400	0.150		68.694
	Total						**68.694**
						Total Quantity in cum	**68.694**
5.006	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						
	Equalisation Tank						
	Inverted beam	5	21.200	0.300	0.450		14.310
		4	19.700	0.300	0.450		10.638
	Bottom slab cum raft	1	21.200	21.200	0.450		202.248
	Haunge	8	4.050	0.300	0.600		5.832
	Total						**233.028**
						Total Quantity in cum	**233.028**
5.007	OD54757/2022-2023						
	Extra for providing sulphate resistant cement for the structures						
	Equalisation Tank						
	QTY as per item code 5.37.1&5.37.2	1	463.720				463.720
	Total						**463.720**
						Total Quantity in cum	**463.720**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
5.008	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).						
	Equalisation Tank						
	Quantity as per item code no 5.37.1&5.37.2ed beam	1	463.720				463.720
	Total						**463.720**
						Total Quantity in cum	**463.720**
5.009	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						
	Equalisation Tank						
	Outer Columns	16	0.450	0.600	5.400		23.328
	Inner Columns	9	0.450	0.450	5.400		9.842
	Beams (inside)	3	16.650	0.300	0.650		9.740
		12	4.050	0.300	0.650		9.477
	Out side	2	16.650	0.300	0.900		8.991
		8	4.050	0.300	0.900		8.748
	Long Wall	2	16.650	0.300	4.500		44.955
	Short Wall	2	16.650	0.300	4.500		44.955
	Cover slab	1	19.800	9.450	0.200		37.422
		4	5.550	5.550	0.150		18.482
		4	5.550	4.950	0.150		16.484
	M H Grating	-8	1.200	1.200	0.150		-1.728
	Total						**230.696**
						Total Quantity in cum	**230.696**
5.010	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						
	Equalisation Tank						
	QTY AS PER ITEM NO.5.37.1	1	233.028	120.000			27963.360
	QTY AS PER ITEM NO.5.37.2	1	230.696	120.000			27683.520
	Total						**55646.880**
						Total Quantity in kilogram	**55646.880**
5.011	OD56162/2022-2023						
	Extra for providing epoxy coating for reinforcement bar						
	Equalisation Tank						
	QTY as per item Code 5.22.6	1	55646.880				55646.880
	Total						**55646.880**
						Total Quantity in kg	**55646.880**
5.012	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 .						
	Equalisation Tank						
	QTY as per code no.5.37.1&5.37.2	1	463.720			340.000000	157664.800
	Total						**157664.800**
						Total Quantity in kg	**157664.800**
5.013	5.9.1						
	Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete						
	Equalisation Tank						
	Bottom Slab	2	42.400		0.450		38.160
	Beam side	5	21.200		1.200		127.200
		4	19.700		1.200		94.560
	Total						**259.920**
						Total Quantity in sqm	**259.920**
5.014	5.9.2						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.						
	Equalisation Tank						
	Outer Columns	16	1.500		5.400		129.600
	Inner Columns	9	1.800		5.400		87.480
	Beams (Inside)	3	16.650	1.600			79.920
	Inside	12	4.050	1.600			77.760
	Beam(Outer)	2	16.650	2.100			69.930
	Outer	8	4.050	2.100			68.040
	For Walls Out side	2	33.300		4.500		299.700
	For Walls inside	2	32.700		4.500		294.300
	Total						**1106.730**
						Total Quantity in sqm	**1106.730**
5.015	5.9.3						
	Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform						
	Equalisation Tank						
	Bottom Portion top slab	1	19.800	9.450			187.110
		4	5.550	5.550			123.210
		4	5.550	4.950			109.890
	Total						**420.210**
						Total Quantity in sqm	**420.210**
5.016	22.23.1						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin-charge. The product performance shall carry guarantee for 10 years against any leakage.For vertical surface two coats @0.70 kg per sqm						
	Equalisation Tank						
	Inside Walls	2	36.000		4.500		324.000

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Total						**324.000**
						Total Quantity in sqm	**324.000**
5.017	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.						
	Equalisation Tank						
	Bottom slab inside	1	18.000	18.000			324.000
	Total						**324.000**
						Total Quantity in sqm	**324.000**
5.018	13.7.1						
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)						
	Equalisation Tank						
	Out side Walls	2	37.200		5.400		401.760
	In side of Walls	2	36.000		5.400		388.800
	Base slab InsideIn side of Walls	1	18.000	18.000			324.000
	Top slab	1	19.800	9.300			184.140
		8	5.550	5.550			246.420
	Outer Column	16	1.500		5.400		129.600
	Inner Columns	9	1.800		5.400		87.480
	Beams	3	16.650	1.600			79.920
		12	4.050	1.600			77.760
		2	16.650	2.100			69.930
		8	4.050	2.100			68.040
	MH Grating	-8	1.200	1.200			-11.520
	Total						**2046.330**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
						Total Quantity in sqm	**2046.330**
5.019	2.25						
	Filling available excavated earth (excluding rock) in trenches, plinth, sides of foundation etc. in layers not exceeding 20 cm in depth, consolidating each deposited layer by ramming and watering, lead up to 50 m and lift up to 1.5 m.						
	Equalisation Tank						
	QTY as per item No 1	1	2541.680				2541.680
	Deduction for PCC	-1	68.690				-68.690
	Bottom Slab and Beams	-1	233.028				-233.028
	Tank	-1	18.600	18.600	3.550		-1228.158
	Total						**1011.804**
						Total Quantity in cum	**1011.804**
5.020	19.16						
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786, having minimum cross section as 23 mm x 25 mm and over all minimum length 263 mm and width as 165 mm with minimum 112 mm space between protruded legs having 2 mm tread on top surface by ribbing or chequering besides necessary and adequate anchoring projections on tail length on 138 mm as per standard drawing and suitable to with stand the bend test and chemical resistance test as per specifications and having manufactures permanent identification mark to be visible even after fixing including fixing in manholes with 30x20x15 cm cement concrete block 1:3:6 (1cement: 3 coarse sand: 6 graded stone aggregate 20 mm nominal size) Complete as per design						
	Equalisation Tank						
		14					14.000
	Total						**14.000**
						Total Quantity in each	**14.000**
5.021	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.						
	Equalisation Tank						
	For STP	1	17.700	17.700	4.500		1409.805
	Total						**1409.805**
						Total Quantity in Kilo litre	**1409.805**
5.022	10.26.3						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Providing and fixing hand rail of approved size by welding etc. to steel ladder railing, balcony railing, staircase railing and similar works, including applying priming coat of approves steel primer.G.I. pipes						
	50mm dia GI 5.17KG/M ,32mm dis GI3.17kg/m						
	1m c/c vertical 50mm dia	76			0.750	5.170000	294.690
	Horizontal.25mc/c-32mmdia	3	75.600			3.170000	718.956
	50mm dia GI @.075mc/c	8	4.800			5.170000	198.528
		112	1.200			5.170000	694.848
	Total						**1907.022**
						Total Quantity in kg	**1907.022**
5.023	13.48.3						
	Finishing with Deluxe Multi surface paint system for interiors and exteriors using primer as per manufacturers specifications:Painting Steel work with Deluxe Multi Surface Paint to give an even shade. Two or more coat applied @ 0.90 ltr/10 sqm over an under coat of primer applied @ 0.80 ltr/10 sqm of approved brand and manufacture						
	Equalisation Tank						
	Vertical Pipe	76	0.750		0.157		8.949
	Horizontal Pipe	3	75.600		0.100		22.680
	Grating	8	4.800		0.160		6.144
		112	1.200		0.160		21.504
	Total						**59.277**
						Total Quantity in sqm	**59.277**
5.024	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						
	Equalisation Tank						
	QTY as per item code no.13.7.1	1	2057.850				2057.850
	Deduct area below earth	-1	37.200		3.900		-145.080
	Total						**1912.770**
						Total Quantity in sqm	**1912.770**
6	DILUTION TANK FOR CO TREATMENT-rectangular						
6.001	2.6.1						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed.All kinds of soil						
	FOR DILUTION TANK-RECTANGULAR						
		2	6.400	5.400	1.500		103.680
	Total						**103.680**
						Total Quantity in cum	**103.680**
6.002	OD55372/2022-2023						
	Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30cm in depth,1.5m in width aswell as 10 sqm on plan)including disposal of excavated earth ,lead up to 50m and lift up to 1.5 m ,disposed earth to be levelled and neatly dressed .All kind of soil-additional lift 1.5to 3m						
	FOR DILUTION TANK-RECTANGULAR						
		2	6.400	5.400	1.650		114.048
	Total						**114.048**
						Total Quantity in cum	**114.048**
6.003	4.1.6						
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 40 mm nominal size)						
	FOR DILUTION TANK-RECTANGULAR						
		2	6.400	5.400	0.150		10.368
	Total						**10.368**
						Total Quantity in cum	**10.368**
6.004	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						
	FOR DILUTION TANK-RECTANGULAR						
	Inverted beam	4	6.400	0.350	0.350		3.136
		4	4.700	0.350	0.350		2.303
	Bottom slab cum raft	2	6.400	5.400	0.450		31.104

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Long wall	4	5.500	0.250	3.000		16.500
	Shortwall	4	4.000	0.250	3.000		12.000
	Total						**65.043**
						Total Quantity in cum	**65.043**
6.005	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						
	FOR DILUTION TANK-RECTANGULAR						
	Top slab	2	5.500	4.500	0.150		7.425
	Walkway	4	11.200	0.600	0.100		2.688
	Total						**10.113**
	DEDUCTION						
	Manhole	-4	0.600	0.450	0.150		-0.162
	Total						**-0.162**
						Total Quantity in cum	**9.951**
6.006	5.34.1						
	Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).						
	FOR DILUTION TANK-RECTANGULAR						
	QTY AS PER ITEM NO.5.37.1	1	65.043				65.043
	QTY AS PER ITEM NO.5.37.2	1	9.951				9.951
	Total						**74.994**
						Total Quantity in cum	**74.994**
6.007	OD55377/2022-2023						
	Extra for providing sulphate resistant cement for the structures						
	FOR DILUTION TANK-RECTANGULAR						
	QTY AS PER ITEM NO.5.37.1	1	65.043				65.043

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	QTY AS PER ITEM NO.5.37.2	1	9.951				9.951
	Total						**74.994**
						Total Quantity in cum	**74.994**
6.008	5.22.6						
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more						
	FOR DILUTION TANK-RECTANGULAR						
	QTY AS PER ITEM NO.5.37.1	1	65.043			120.000000	7805.160
	QTY AS PER ITEM NO.5.37.2	1	9.951			120.000000	1194.120
	Total						**8999.280**
						Total Quantity in kilogram	**8999.280**
6.009	OD55381/2022-2023						
	Extra for providing epoxy coating for reinforcement bar						
	FOR DILUTION TANK-RECTANGULAR						
	QTY AS PER ITEM NO.5.37.1	1	65.043			120.000000	7805.160
	QTY AS PER ITEM NO.5.37.2	1	9.951			120.000000	1194.120
	Total						**8999.280**
						Total Quantity in kg	**8999.280**
6.010	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 .						
	FOR DILUTION TANK-RECTANGULAR						
	QTY AS PER ITEM NO.5.37.1	1	65.043			340.000000	22114.620
	QTY AS PER ITEM NO.5.37.2	1	9.951			330.000000	3283.830
	Total						**25398.450**
						Total Quantity in kg	**25398.450**
6.011	5.9.1						
	Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete						
	FOR DILUTION TANK-RECTANGULAR						
	Bottom slab	4	11.800		0.450		21.240

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Beam side	4	6.400		0.700		17.920
		4	5.500		0.700		15.400
	Total						**54.560**
						Total Quantity in sqm	**54.560**
6.012	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.						
	FOR DILUTION TANK-RECTANGULAR						
	For walls outside	4	10.000		3.000		120.000
	For walls inside	4	9.000		3.000		108.000
	Total						**228.000**
						Total Quantity in sqm	**228.000**
6.013	5.9.3						
	Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform						
	FOR DILUTION TANK-RECTANGULAR						
	Walkway	4	11.200	0.600			26.880
	Top slab	2	24.800		0.150		7.440
	Bottom portion	2	5.500	4.500			49.500
	Total						**83.820**
						Total Quantity in sqm	**83.820**
6.014	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						
	FOR DILUTION TANK-RECTANGULAR						
	Inside of walls	4	9.000		3.000		108.000
	Total						**108.000**
						Total Quantity in sqm	**108.000**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
6.015	22.23.2						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin-charge. The product performance shall carry guarantee for 10 years against any leakage.For horizontal surface one coat @1.10 kg per sqm.						
	FOR DILUTION TANK-RECTANGULAR						
	Bottom slab inside	2	5.000	4.000			40.000
	Total						**40.000**
						Total Quantity in sqm	**40.000**
6.016	13.7.1						
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)						
	FOR DILUTION TANK-RECTANGULAR						
	Inside of walls	4	9.000		3.000		108.000
	Outside walls	4	10.000		3.000		120.000
	Baseslab inside and top slab	6	5.000	4.000			120.000
	Walkway	4	11.200	1.300			58.240
	Total						**406.240**
						Total Quantity in sqm	**406.240**
6.017	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.						
	FOR DILUTION TANK-RECTANGULAR						
	Quantity as per item no.1 &2	1	217.728				217.728
	Total						**217.728**
	DEDUCTION						
	PCC	-1				10.368 000	-10.368

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Bottom slab cum raft (as per item no.5.37.1)	-1				18.270000	-18.270
	Tank	-2	5.500	4.500	2.550		-126.225
	Total						**-154.863**
						Total Quantity in cum	**62.865**
6.018	19.18.1						
	Supplying and fixing C.I with out frame for manholes:455 x 610 mm rectangular C.I cover (light duty) the weight of the cover to be no less than 23 kg						
	FOR DILUTION TANK-RECTANGULAR						
		4					4.000
	Total						**4.000**
						Total Quantity in each	**4.000**
6.019	OD55499/2022-2023						
	Supply of uPVC Pipe, IS 4985:2000,10Kg/cm2,110mmDia.-and fixing						
	FOR DILUTION TANK-RECTANGULAR						
		2	0.450				0.900
	Total						**0.900**
						Total Quantity in metre	**0.900**
6.020	19.16						
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786, having minimum cross section as 23 mm x 25 mm and over all minimum length 263 mm and width as 165 mm with minimum 112 mm space between protruded legs having 2 mm tread on top surface by ribbing or chequering besides necessary and adequate anchoring projections on tail length on 138 mm as per standard drawing and suitable to with stand the bend test and chemical resistance test as per specifications and having manufactures permanent identification mark to be visible even after fixing including fixing in manholes with 30x20x15 cm cement concrete block 1:3:6 (1cement: 3 coarse sand: 6 graded stone aggregate 20 mm nominal size) Complete as per design						
	FOR DILUTION TANK-RECTANGULAR						
		2	9.000				18.000
	Total						**18.000**
						Total Quantity in each	**18.000**
6.021	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.						
	FOR DILUTION TANK-RECTANGULAR						
		2	5.000	4.000	3.000		120.000

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Total						**120.000**
						Total Quantity in Kilo litre	**120.000**
6.022	10.26.3						
	Providing and fixing hand rail of approved size by welding etc. to steel ladder railing, balcony railing, staircase railing and similar works, including applying priming coat of approves steel primer.G.I. pipes						
	50mm dia G.I.-5.17Kg/m,32mmdia G.I.-3.17Kg/m						
	Outer total - 20m/1m/c/c vertical 50mm dia	50			0.750	5.170000	193.875
	Horizontal 0.25m c/c -32mmdia	6	24.800			3.170000	471.696
	Total						**665.571**
						Total Quantity in kg	**665.571**
6.023	13.48.3						
	Finishing with Deluxe Multi surface paint system for interiors and exteriors using primer as per manufacturers specifications:Painting Steel work with Deluxe Multi Surface Paint to give an even shade. Two or more coat applied @ 0.90 ltr/10 sqm over an under coat of primer applied @ 0.80 ltr/10 sqm of approved brand and manufacture						
	FOR DILUTION TANK-RECTANGULAR						
	Vertical pipe	50	0.750		0.157		5.888
	Horizontal pipe	6	24.800		0.100		14.880
	Total						**20.768**
						Total Quantity in sqm	**20.768**
6.024	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						
	FOR DILUTION TANK-RECTANGULAR						
	Qty as per item no.13.7.1	2	203.120				406.240
	Total						**406.240**
	DEDUCTION						
	Face to earth	-2	20.000		2.550		-102.000
	Total						**-102.000**
						Total Quantity in sqm	**304.240**
7	MOVING BED BIOFILM REACTOR TANK-BOD REMOVAL						
7.001	2.6.1						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed.All kinds of soil						
	FOR MBBR						
	MBBR Tank - base	1	17.650	17.650	0.300		93.457
	Columns of staircase	15	1.400	1.400	0.900		26.460
	Total						**119.917**
						Total Quantity in cum	**119.917**
7.002	4.1.6						
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 40 mm nominal size)						
	FOR MBBR						
	MBBR tank-base	1	17.650	17.650	0.150		46.728
	Columns of staircase	15	1.400	1.400	0.150		4.410
	Total						**51.138**
						Total Quantity in cum	**51.138**
7.003	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						
	FOR MBBR						
	Base slab	1	17.650	17.650	0.300		93.457
	Beam	5	17.050	0.350	0.600		17.903
		5	15.300	0.350	0.600		16.065
	Pile cap	9	1.750	1.750	0.600		16.538
		12	2.000	0.950	0.600		13.680
		4	1.500	0.750	0.600		2.700
	Column footing	15	1.200	1.200	0.300		6.480
	pedestral	15	0.600	0.600	0.450		2.430

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Columns of staircase	15	0.450	0.450	0.450		1.367
	plinth of beam	5	1.500	0.300	0.450		1.013
		3	13.350	0.300	0.450		5.407
	Total						**177.040**
						Total Quantity in cum	**177.040**
7.004	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						
	SECOND FLOOR						
	Tank walls	2	32.000	0.300	3.500		67.200
	Beams alround	4	14.600	0.350	0.750		15.330
	Candileverbeam	20	1.200	0.350	0.530		4.452
	Walkway	2	34.400	1.200	0.150		12.384
	Columns	16	0.350	0.750	6.450		27.090
		9	0.350	0.350	6.450		7.111
	Beams	5	14.200	0.300	0.450		9.585
		5	14.200	0.450	0.600		19.170
	Haunge	2	14.600	0.300	0.600		5.256
	Roof slab	1	19.150	19.150	0.200		73.345
	Total						**240.923**
	STAIRCASE						
	Columns of staircasef staircase	15	0.450	0.450	6.450		19.592
	Tie beam	6	13.350	0.300	0.450		10.814
		10	1.500	0.300	0.450		2.025
	Landing	2	2.400	1.200	0.150		0.864
	Inclined portion	22	0.336	1.200	0.150		1.331
		11	1.200	0.300	0.150		0.594
	Inclined portion	18	0.338	1.200	0.150		1.095

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
		9	1.200	0.300	0.160		0.518
	Total						**36.833**
	STAIRCASE						
	Columns of staircase	15	0.450	0.450	6.450		19.592
	Tie beam	6	13.350	0.300	0.450		10.814
		10	1.500	0.300	0.450		2.025
	Landing	2	2.400	1.200	0.150		0.864
	Inclined portion	22	0.336	1.200	0.150		1.331
		11	1.200	0.300	0.150		0.594
	Inclined portion	18	0.338	1.200	0.150		1.095
		9	1.200	0.300	0.160		0.518
	Total						**36.833**
	FRIST FLOOR						
	Tank walls	2	32.000	0.300	3.500		67.200
	Beams alround	4	14.200	0.350	0.750		14.910
	Cantilever beams	20	1.200	0.350	0.530		4.452
	Walkway	2	34.400	1.200	0.150		12.384
	Columns	16	0.450	0.750	6.450		34.830
		9	0.450	0.450	6.450		11.755
	Beams	5	13.900	0.450	0.600		18.765
		5	13.900	0.450	0.600		18.765
	Haunge	2	14.200	0.450	0.600		7.668
	Floor slab	1	16.750	16.750	0.300		84.169
	Total						**274.898**
	GROUND FLOOR						
	Tank walls	2	27.200	0.300	3.500		57.120
	Additional wall in GF	1	6.800	0.300	3.500		7.140
	Beam airound	4	13.600	0.350	0.750		14.280
	Cantilever beam	16	1.200	0.350	0.530		3.562
	Walkway	1	51.600	1.200	0.150		9.288
	Columns	16	0.600	0.750	6.450		46.440
		9	0.600	0.600	6.450		20.898
	Beams	5	13.450	0.350	0.600		14.123
		5	13.450	0.350	0.600		14.123
	Haunge	2	13.600	0.450	0.600		7.344

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Anoxic tank beam	1	13.450	0.350	0.450		2.118
		3	6.800	0.350	0.450		3.213
	Anoxic tank slab	1	16.000	8.000	0.150		19.200
	Tie beam of blower room	2	6.800	0.350	0.450		2.142
	Floor slab	1	16.750	16.750	0.300		84.169
	Total						**305.160**
	STAIRCASE						
	Columns of staircase	15	0.450	0.450	6.450		19.592
	Tie beam	6	13.350	0.300	0.450		10.814
		10	1.500	0.300	0.450		2.025
	Landing	2	2.400	1.200	0.150		0.864
	Inclined portion	22	0.336	1.200	0.150		1.331
		11	1.200	0.300	0.150		0.594
	Inclined portion	18	0.338	1.200	0.150		1.095
		9	1.200	0.300	0.160		0.518
	Columns of staircase to roof	15	0.300	0.300	3.200		4.320
	item beam	3	14.800	0.300	0.450		5.994
		5	1.800	0.300	0.450		1.215
	Inclined portion	22	0.336	1.200	0.150		1.331
		11	0.450	0.750	6.450		23.946
	Inclined portion	18	0.338	1.200	0.150		1.095
		9	1.200	0.300	0.160		0.518
	Roof	2	1.200	1.200	0.150		0.432
	Total						**75.684**
						Total Quantity in cum	**970.331**
7.005	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).						
	FOR MBBR						
	QTY AS PER ITEM NO.5.37.1	1	177.038				177.038
	QTY AS PER ITEM NO.5.37.2	1	970.170				970.170
	Total						**1147.208**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
						Total Quantity in cum	**1147.208**
7.006	OD55694/2022-2023						
	Extra for providing sulphate resistant cement for the structures						
	FOR MBBR						
	QTY AS PER ITEM NO.5.37.1	1	177.038				177.038
	QTY AS PER ITEM NO.5.37.2	1	970.170				970.170
	Total						**1147.208**
						Total Quantity in cum	**1147.208**
7.007	5.22.6						
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more						
	PILE REINFORCEMENT 150Kg/m3						
	500mm	8	0.196		45.000	150.000000	10584.000
	750mm	24	0.442		45.000	150.000000	71604.000
	600mm	36	0.283		45.000	150.000000	68769.000
	Total						**150957.000**
	FOR MBBR						
	QTY AS PER ITEM NO.5.37.1	1	177.038			120.000000	21244.560
	QTY AS PER ITEM NO.5.37.2	1	970.170			120.000000	116420.400
	Total						**137664.960**
						Total Quantity in kilogram	**288621.960**
7.008	OD55693/2022-2023						
	Extra for providing epoxy coating for reinforcement bar						
	FOR MBBR						
	QTY AS PER ITEM NO.5.22.6	1	288621.960				288621.960
	Total						**288621.960**
						Total Quantity in kg	**288621.960**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
7.009	4.12						
	Extra for providing and mixing water proofing material in cement concrete work in doses by weight of cement as per manufacturer's specification .						
	FOR MBBR						
	QTY AS PER ITEM NO.5.37.1	1	177.038			340.000000	60192.920
	QTY AS PER ITEM NO.5.37.2	1	970.170			340.000000	329857.800
	Total						**390050.720**
						Total Quantity in kg	**390050.720**
7.010	5.9.1						
	Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete						
	FOR MBBR						
	Bottom slab	2	35.300		0.300		21.180
	Beam	5	17.050		1.200		102.300
		5	15.300		1.200		91.800
	Pile cap	9	7.000		0.600		37.800
		12	5.900		0.600		42.480
		4	4.500		0.600		10.800
	Columns footing	15	4.800		0.300		21.600
	Pedestral	15	2.400		0.600		21.600
	Columns of staircase	15	1.800		0.450		12.150
	Plinth beam	3	13.350		1.200		48.060
		5	1.500		1.200		9.000
	Total						**418.770**
						Total Quantity in sqm	**418.770**
7.011	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.						
	GROUND FLOOR						
	For walls outside	2	27.500		3.500		192.500
	For walls inside	2	26.300		3.500		184.100
		2	6.800		3.500		47.600
	Walk way	1	51.600	1.200			61.920
	Cantilever beams	16	1.200	1.410			27.072

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Columns	16	2.700		6.450		278.640
		9	2.400		6.450		139.320
	Beams	5	13.450		1.550		104.238
		5	13.450		1.550		104.238
	Anoxic tank beam	1	13.450		0.450		6.053
		3	6.800		0.450		9.180
	Anoxic tank slab	1	16.000	8.000			128.000
	Tie beam of blower room	4	6.800		0.450		12.240
	Floor slab	1	16.750	16.750			280.563
	Total						**1575.664**
	STAIRCASE						
	Columns of staircase	15	1.800		6.450		174.150
	Tie beam	6	13.350		1.200		96.120
		10	1.500		1.200		18.000
	Landing	2	2.400	1.200			5.760
	Inclined portion	22	0.336	1.200			8.870
		22	0.336		0.150		1.109
		11	1.200		0.150		1.980
		22		0.300	0.150		0.990
	Inclined portion	18	0.338	1.200			7.301
		18	0.338		0.150		0.913
		9	1.200		0.160		1.728
		18		0.300	0.160		0.864
	Total						**317.785**
	STAIRCASE						
	Columns of staircase	15	1.800		6.450		174.150
	Tie beam	6	13.350		1.200		96.120
		10	1.500		1.200		18.000
	Landing	2	2.400	1.200			5.760
	Inclined portion	22	0.336	1.200			8.870
		22	0.337		0.150		1.112
		11	1.200		0.150		1.980
		22		0.300	0.150		0.990
	Inclined portion	18	0.338	1.200			7.301
		18	0.338		0.150		0.913

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
		9	1.200		0.160		1.728
		18		0.300	0.160		0.864
	Total						**317.788**
	SECOND FLOOR						
	Tank walls outside	2	32.000		3.500		224.000
	Tankwalls inside	2	30.800		3.500		215.600
	Candilever beam	20	1.200	1.410			33.840
	Walkway	2	34.400	1.200			82.560
	Columns	16	2.200		6.450		227.040
		9	1.400		6.450		81.270
	Beams	10	14.200		0.450		63.900
		10	14.200		0.600		85.200
	Roof slab	1	19.150	19.150			366.723
	Total						**1380.133**
	FRIST FLOOR						
	Tank walls outside	2	27.500		3.500		192.500
	Tank walls inside	2	26.300		3.500		184.100
	Cantilever beam	20	1.200	1.410			33.840
	Walkway	2	34.400	1.200			82.560
	Columns	16	2.400		6.450		247.680
		9	1.800		6.450		104.490
	Beams	5	13.900		0.600		41.700
		10	13.900		1.550		215.450
	floor slab	1	16.750	16.750			280.563
	Total						**1382.883**
	STAIRCASE						
	Columns of staircase	15	1.800		6.450		174.150
	tie beam	6	13.350		1.200		96.120
		10	1.500		1.200		18.000
	Landing	2	2.400	1.200			5.760
	Inclined portion	22	0.336	1.200			8.870
		22	0.336		0.150		1.109
		11	1.200		0.150		1.980
		22		0.300	0.150		0.990
	Inclined portion	18	0.338	1.200			7.301

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
		18	0.338		0.150		0.913
		9	1.200		0.160		1.728
		18		0.300	0.160		0.864
	Columns of staircase to roof	15	1.200		3.200		57.600
	Tie beam	3	14.800		1.200		53.280
		5	1.800		1.200		10.800
	Roof	2	1.200	1.200			2.880
	Inclined portion	22	0.336	1.200			8.870
		22	0.336		0.150		1.109
		11	1.200		0.150		1.980
		22		0.300	0.150		0.990
	Inclined portion	18	0.338	1.200			7.301
		18	0.338		0.150		0.913
		9	1.200		0.160		1.728
		18		0.300	0.160		0.864
	Total						**466.100**
						Total Quantity in sqm	**5440.353**
7.012	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						
	FOR MBBR						
	Inside of walls	2	26.900		3.500		188.300
		2	6.800		3.500		47.600
	Tank wall inside FF	2	26.300		3.500		184.100
	Tankwalls inside SF	2	26.300		3.500		184.100
	Total						**604.100**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
						Total Quantity in sqm	**604.100**
7.013	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.						
	FOR MBBR						
	Bottom slab inside SF	1	15.650	15.650			244.923
	Bottom slab inside FF	1	15.550	15.550			241.803
	Bottom slab inside GF	1	15.400	7.400			113.960
		1	7.400	7.400			54.760
	Total						**655.446**
						Total Quantity in sqm	**655.446**
7.014	6.31.2						
	Brick work with common burnt clay machine moulded perforated modular bricks of class designation 12.5 conforming to IS : 2222 in exposed brick work including making horizontal and vertical grooves 10 mm wide 12 mm deep complete in cement mortar 1:6 (1 cement : 6 coarse sand)Above plinth level and upto floor V level						
	DEDUCTION						
	Openings rolling shutter	-2	2.400	0.230	2.400		-2.650
	Total						**-2.650**
	FOR MBBR						
	Blower room	1	13.600	0.230	3.050		9.540
	Total						**9.540**
						Total Quantity in cum	**6.890**
7.015	10.6.1						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Supplying and fixing rolling shutters of approved make, made of required size M.S. laths, interlocked together through their entire length and jointed together at the end by end locks, mounted on specially designed pipe shaft with brackets, side guides and arrangements for inside and outside locking with push and pull operation complete, including the cost of providing and fixing necessary 27.5 cm long wire springs manufactured from high tensile steel wire of adequate strength conforming to IS: 4454 - part 1 and M.S. top cover of required thickness for rolling shutters.80x1.25 mm M.S. laths with 1.25 mm thick top cover						
	FOR MBBR						
	Blower room	2	2.400	2.400			11.520
	Total						**11.520**
						Total Quantity in sqm	**11.520**
7.016	10.9						
	Extra for providing grilled rolling shutters manufactured out of 8 mm dia M.S. bar instead of laths as per design approved by Engineer -in-Charges, (area of grill to be measured).						
	FOR MBBR						
	Blower room	2	2.400	2.400			11.520
	Total						**11.520**
						Total Quantity in sqm	**11.520**
7.017	5.21						
	Extra for providing and fixing expanded metal mesh of size 20x60 mm and strands 3.25 mm wide 1.6 mm thick weighing 3.64 kg per sqm for encasing or rolled steel sections in beams, columns and grillages excluding cost of hangers.						
	FOR MBBR						
	Blower room	1	13.600		2.050		27.880
	Total						**27.880**
						Total Quantity in sqm	**27.880**
7.018	13.7.1						
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)						
	SECOND FLOOR						
	Tankwalls outside	2	32.000		3.500		224.000
	Tankwalls inside	2	30.800		3.500		215.600
	Cantilever beam	20	1.200	1.410			33.840
	Walkway	4	34.400	1.200			165.120
	Columns	16	2.200		6.450		227.040
		9	1.400		6.450		81.270
	Beams	10	14.200		0.450		63.900
		10	14.200		0.600		85.200

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Roof slab	2	19.150	19.150			733.445
	Total						**1829.415**
	STAIRCASE						
	Columns of staircase	15	1.800		6.450		174.150
	Tie beam	6	13.350		1.200		96.120
		10	1.500		1.200		18.000
	Landing	2	2.400	1.200			5.760
	Inclined portion	22	0.336	1.200			8.870
		44	0.336		0.150		2.218
		11	1.200		0.150		1.980
		22		0.300	0.150		0.990
	Inclined portion	18	0.338	1.200			7.301
		36	0.338		0.150		1.825
		9	1.200		0.160		1.728
		18		0.300	0.160		0.864
	Total						**319.806**
	STAIRCASE						
	Columns of staircase	15	1.800		6.450		174.150
	Tiebeam	6	13.350		1.200		96.120
		10	1.500		1.200		18.000
	Landing	2	2.400	1.200			5.760
	Inclined portion	22	0.336	1.200			8.870
		44	0.336		0.150		2.218
		11	1.200		0.150		1.980
		22		0.300	0.150		0.990
	Inclined portion	18	0.338	1.200			7.301
		36	0.338		0.150		1.825
		9	1.200		0.160		1.728
		18		0.300	0.160		0.864
	Total						**319.806**
	GROUND FLOOR						
	For walls outside	2	27.500		3.500		192.500
	For walls inside	2	26.300		3.500		184.100
		2	6.800		3.500		47.600
	Base slab	1	15.400	7.400			113.960
		1	7.400	7.400			54.760

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Walkway	2	51.600	1.200			123.840
	Cantilever beam	16	1.200	1.410			27.072
	Columns	16	2.700		6.450		278.640
		9	2.400		6.450		139.320
	Beams	5	13.450		1.550		104.238
		5	13.450		1.550		104.238
	Anoxic tank beam	1	13.450		0.450		6.053
		3	6.800		0.450		9.180
	Anoxic tank slab	1	16.000	8.000			128.000
	Tie beam of blower room	4	6.800		0.450		12.240
	Blower room	2	13.600		3.050		82.960
	Floor slab	1	16.750	16.750			280.563
	Total						**1889.264**
	DEDUCTION						
	Opening rolling shutter	-2	2.400		2.400		-11.520
	Total						**-11.520**
	STAIRCASE						
	Columns of staircase	15	1.800		6.450		174.150
	Tie beam	6	13.350		1.200		96.120
		10	1.500		1.200		18.000
	Landing	2	2.400	1.200			5.760
	Inclined portion	22	0.336	1.200			8.870
		44	0.336		0.150		2.218
		11	1.200		0.150		1.980
		22		0.300	0.150		0.990
	Inclined portion	18	0.338	1.200			7.301
		36	0.338		0.150		1.825
		9	1.200		0.160		1.728
		18		0.300	0.160		0.864
	Columns of staircase to roof	15	1.200		3.200		57.600
	Tie beam	3	14.800		1.200		53.280
		5	1.800		1.200		10.800
	Roof	2	1.200	1.200			2.880
	Total						**444.366**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	FIRST FLOOR						
	Tank walls outside	2	27.500		3.500		192.500
	Tank walls inside	2	26.300		3.500		184.100
	Cantilever beam	20	1.200	1.410			33.840
	Walkway	2	34.400	1.200			82.560
	Columns	16	2.400		6.450		247.680
		9	1.800		6.450		104.490
	Beams	5	13.900		0.600		41.700
		10	13.900		1.550		215.450
	Foor slab	1	16.750	16.750			280.563
	Total						**1382.883**
						Total Quantity in sqm	**6174.020**
7.019	19.16						
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786, having minimum cross section as 23 mm x 25 mm and over all minimum length 263 mm and width as 165 mm with minimum 112 mm space between protruded legs having 2 mm tread on top surface by ribbing or chequering besides necessary and adequate anchoring projections on tail length on 138 mm as per standard drawing and suitable to with stand the bend test and chemical resistance test as per specifications and having manufactures permanent identification mark to be visible even after fixing including fixing in manholes with 30x20x15 cm cement concrete block 1:3:6 (1cement: 3 coarse sand: 6 graded stone aggregate 20 mm nominal size) Complete as per design						
	FOR MBBR						
		44					44.000
	Total						**44.000**
						Total Quantity in each	**44.000**
7.020	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.						
	FOR MBBR						
		2	16.000	16.000	3.500		1792.000
		1	15.400	7.400	3.500		398.860
		1	7.400	7.400	3.500		191.660
	Total						**2382.520**
						Total Quantity in Kilo litre	**2382.520**
7.021	10.26.3						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Providing and fixing hand rail of approved size by welding etc. to steel ladder railing, balcony railing, staircase railing and similar works, including applying priming coat of approves steel primer.G.I. pipes						
	50mm DIA GI 5.17KG/M.32mm DIA GI -317 KG/M						
	Outer total /1m/c/c vertical 50mm dia	304			0.750	5.170000	1178.760
	Horizontal 0.25m/c/c -32mm dia	12	76.000			3.170000	2891.040
	Total						**4069.800**
						Total Quantity in kg	**4069.800**
7.022	13.48.3						
	Finishing with Deluxe Multi surface paint system for interiors and exteriors using primer as per manufacturers specifications:Painting Steel work with Deluxe Multi Surface Paint to give an even shade. Two or more coat applied @ 0.90 ltr/10 sqm over an under coat of primer applied @ 0.80 ltr/10 sqm of approved brand and manufacture						
	FOR MBBR						
	Vertical pipe	304	0.750		0.160		36.480
	Horizontal pipe	12	76.000		0.100		91.200
	Rilling shutters	2	2.400		2.400		11.520
	Fixed grills	1	13.600		2.050		27.880
	Total						**167.080**
						Total Quantity in sqm	**167.080**
7.023	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						
	FOR MBBR						
		1	6173.910				6173.910
	Total						**6173.910**
						Total Quantity in sqm	**6173.910**
7.024	20.5.3						
	Providing, driving and installing driven Pre-cast reinforced cement concrete piles of specified diameter and length below the pile cap in M-25 cement concrete to carry safe working load not less than specified. With a central through preformed hole with M.S. black pipe of dia, 40 mm for grouting with cement sand grouting of mix 1:2 (1 cement : 2 coarse sand) under sufficient positive pressure to ensure complete filling including centering, shuttering, driving and removing the steel casing pipe and lifting casing etc. complete but excluding the cost of steel reinforcement. (Length of pile for payment shall be measured from top of the shoe to the bottom of pile cap).500 mm dia piles						
	FOR MBBR						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
		8			45.000		360.000
	Total						**360.000**
						Total Quantity in metre	**360.000**
7.025	20.2A.1						
	Boring, providing and installation bored cast-in-situ reinforced cement concrete piles of garde M-25 of specified diameter and length below 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. by Crawler mounted, telescopic boom hydraulic pilling Rig all complete, including removal of excavated earth with all its lifts and leads (length of pile for payment shall be measured up to bottom of pile cap). Note: Truck Mounted rotary/TMR/Tube well boring machine shall not be used.600 mm dia piles						
	FOR MBBR						
		36			45.000		1620.000
	Total						**1620.000**
						Total Quantity in metre	**1620.000**
7.026	20.5.5						
	Providing, driving and installing driven Pre-cast reinforced cement concrete piles of specified diameter and length below the pile cap in M-25 cement concrete to carry safe working load not less than specified. With a central through preformed hole with M.S. black pipe of dia, 40 mm for grouting with cement sand grouting of mix 1:2 (1 cement : 2 coarse sand) under sufficient positive pressure to ensure complete filling including centering, shuttering, driving and removing the steel casing pipe and lifting casing etc. complete but excluding the cost of steel reinforcement. (Length of pile for payment shall be measured from top of the shoe to the bottom of pile cap).750 mm dia piles						
	FOR MBBR						
		24			45.000		1080.000
	Total						**1080.000**
						Total Quantity in metre	**1080.000**
7.027	20.6.3.1						
	Vertical load testing of piles in accordance with IS 2911(Part IV) including installation of loading platform and preparation of pile head or construction of test cap and dismantling of test cap after test etc. complete as per specification & the direction of engineer -in-Charge. Group of two or more piles upto 50 tonne capacityInitial test						
	FOR MBBR						
	500mm	2					2.000

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	750mm	2					2.000
	600mm	4					4.000
	Total						**8.000**
						Total Quantity in per test	**8.000**
7.028	20.6.3.2						
	Vertical load testing of piles in accordance with IS 2911(Part IV) including installation of loading platform and preparation of pile head or construction of test cap and dismantling of test cap after test etc. complete as per specification & the direction of engineer -in-Charge. Group of two or more piles upto 50 tonne capacityRoutine test						
	FOR MBBR						
	500mm	2					2.000
	750mm	4					4.000
	600mm	8					8.000
	Total						**14.000**
						Total Quantity in per test	**14.000**
8	SECONDARY CLARIFIER WITH PLATE SETTLER						
8.001	2.6.1						
	Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed.All kinds of soil						
	FOR SECONDARY CLARIFIER WITH PLATE SETTLER						
	For clarifier	1	9.800	9.800	0.900		86.436
	Total						**86.436**
						Total Quantity in cum	**86.436**
8.002	4.1.6						
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 40 mm nominal size)						
	FOR SECONDARY CLARIFIER WITH PLATE SETTLER						
	For clarifier foundation	1	9.800	9.800	0.150		14.406
	Total						**14.406**
						Total Quantity in cum	**14.406**
8.003	5.37.1						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Providing and laying in position ready mixed M-25 grade concrete for reinforced cement concrete work, using cement content as per approved design mix, manufactured in fully automatic batching plant and transported to site of work in transit mixer for all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding the cost of centering, shuttering finishing and reinforcement including cost of admixtures in recommended proportions as per IS: 9103 to accelerate/ retard setting of concrete, improve workability without impairing strength and durability as per direction of the Engineer - in -charge. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All wiork upto plinth level						
	FOR SECONDARY CLARIFIER WITH PLATE SETTLER						
	Base slab-raft beam slab type	1	9.800	9.800	0.350		33.614
	Base slab inverted beams	4	8.250	0.350	0.550		6.353
	Total						**39.967**
						Total Quantity in cum	**39.967**
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						
	FOR SECONDARY CLARIFIER WITH PLATE SETTLER						
	Columns -long	8	0.350	0.350	5.900		5.782
	Columns -short	4	0.350	0.350	0.400		0.196
	Clarifier square container	4	8.300	0.300	2.900		28.884
	Clarifier hopper container	4	6.550	0.300	3.560		27.982
	Top beams	4	8.250	0.350	0.450		5.198
	Walkways	4	9.200	0.600	0.100		2.208
	Total						**70.250**
	DEDUCTION						
	Inlet pipe	-1	0.031	0.300		0.010000	0.000
	Total						**0.000**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
						Total Quantity in cum	**70.250**
8.005	5.34.1						
	Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).						
	FOR SECONDARY CLARIFIER WITH PLATE SETTLER						
	QTY AS PER ITEM NO.5.37.1	1	39.970				39.970
	QTY. AS PER ITEM NO.5.37.2	1	70.240				70.240
	Total						**110.210**
						Total Quantity in cum	**110.210**
8.006	OD57007/2022-2023						
	Extra for providing sulphate resistant cement for the structures						
	FOR SECONDARY CLARIFIER WITH PLATE SETTLER						
	QTY AS PER ITEM NO.5.37.1	1	39.970				39.970
	QTY. AS PER ITEM NO.5.37.2	1	70.240				70.240
	Total						**110.210**
						Total Quantity in cum	**110.210**
8.007	5.22.6						
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more						
	SECONDARY CLARIFIER WITH PLATE SETTLER						
	QTY AS PER ITEM NO.5.37.1	1	39.970			120.000000	4796.400
	QTY. AS PER ITEM NO.5.37.2	1	70.240			120.000000	8428.800
	Total						**13225.200**
						Total Quantity in kilogram	**13225.200**
8.008	OD57006/2022-2023						
	Extra for providing epoxy coating for reinforcement bar						
	FOR SECONDARY CLARIFIER WITH PLATE SETTLER						
	QTY AS PER ITEM NO.5.37.1	1	39.970			120.000000	4796.400
	QTY. AS PER ITEM NO.5.37.2	1	70.240			120.000000	8428.800

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Total						**13225.200**
						Total Quantity in kg	**13225.200**
8.009	4.12						
	Extra for providing and mixing water proofing material in cement concrete work in doses by weight of cement as per manufacturer's specification .						
	FOR SECONDARY CLARIFIER WITH PLATE SETTLER						
	QTY AS PER ITEM NO.5.37.1	1	39.970			340.000000	13589.800
	QTY. AS PER ITEM NO.5.37.2	1	70.240			340.000000	23881.600
	Total						**37471.400**
						Total Quantity in kg	**37471.400**
8.010	5.9.1						
	Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete						
	FOR SECONDARY CLARIFIER WITH PLATE SETTLER						
	Base slab-raft beam slab type	4	9.800		0.350		13.720
	Base slab inverted beams	4	8.600		0.450		15.480
	Base slab inverted beam	4	7.900		0.450		14.220
	Total						**43.420**
						Total Quantity in sqm	**43.420**
8.011	5.9.2						
	Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.						
	FOR SECONDARY CLARIFIER WITH PLATE SETTLER						
	Columns -long	8	1.400		5.900		66.080
	Columns -short	4	1.400		0.400		2.240
	Clarifier-squarecontainer	8	8.300		2.900		192.560
	Clarifier-hopper container	8	6.550		3.560		186.544
	top beams	4	8.250		1.250		41.250
	Walkways	4	9.200		0.600		22.080
	Total						**510.754**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
						Total Quantity in sqm	**510.754**
8.012	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						
	FOR SECONDARY CLARIFIER WITH PLATE SETTLER						
	Inide of walls-upper	4	8.000		2.900		92.800
	Inside of walls-lower	4	6.250		3.560		89.000
	Total						**181.800**
						Total Quantity in sqm	**181.800**
8.013	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.						
	FOR SECONDARY CLARIFIER WITH PLATE SETTLER						
	Bottom slab inside	1	4.500	4.500			20.250
	Total						**20.250**
						Total Quantity in sqm	**20.250**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
8.014	13.7.1						
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)						
	FOR SECONDARY CLARIFIER WITH PLATE SETTLER						
	Inside of walls-upper	4	8.000		2.900		92.800
	Inside of walls	4	6.250		3.560		89.000
	Base slab inside	1	4.500	4.500			20.250
	Outer of walls-upper	4	8.600		2.900		99.760
	Outer of walls-lower	4	5.100		3.100		63.240
	Walkways	4	9.200		1.200		44.160
	Total						**409.210**
						Total Quantity in sqm	**409.210**
8.015	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						
	FOR SECONDARY CLARIFIER WITH PLATE SETTLER						
		19					19.000
	Total						**19.000**
						Total Quantity in each	**19.000**
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.						
	FOR SECONDARY CLARIFIER WITH PLATE SETTLER						
		1	8.000	8.000	2.900		185.600
		1	4.500	4.500	3.100		62.775
	Total						**248.375**
						Total Quantity in Kilo litre	**248.375**
8.017	10.26.3						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Providing and fixing hand rail of approved size by welding etc. to steel ladder railing, balcony railing, staircase railing and similar works, including applying priming coat of approves steel primer.G.I. pipes						
	50mm DIA GI 5.17Kg/m.32mm DIA GI -317 Kg/m						
	Outer total /1m/ c/c vertical 50mm dia	37			0.750	5.170000	143.468
	Horizontal 0.25m/c/c -32mm dia	3	36.800			3.170000	349.968
	Total						**493.436**
						Total Quantity in kg	**493.436**
8.018	13.48.3						
	Finishing with Deluxe Multi surface paint system for interiors and exteriors using primer as per manufacturers specifications:Painting Steel work with Deluxe Multi Surface Paint to give an even shade. Two or more coat applied @ 0.90 ltr/10 sqm over an under coat of primer applied @ 0.80 ltr/10 sqm of approved brand and manufacture						
	FOR SECONDARY CLARIFIER WITH PLATE SETTLER						
	Vertical pipe	37	0.750		0.160		4.440
	Horizontal pipe	3	36.800		0.100		11.040
	Total						**15.480**
						Total Quantity in sqm	**15.480**
8.019	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						
	FOR SECONDARY CLARIFIER WITH PLATE SETTLER						
		1	409.210				409.210
	Total						**409.210**
						Total Quantity in sqm	**409.210**
9	SLUDGE SUMP						
9.001	2.6.1						
	Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed.All kinds of soil						
	SLUDGE SUMP-Circular						
	For Sludge sump	1	4.100	4.100	1.000		16.810
	Total						**16.810**
						Total Quantity in cum	**16.810**
9.002	4.1.6						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 40 mm nominal size)						
	SLUDGE SUMP-Circular						
	For Sludge sump	1	4.100	4.100	0.150		2.522
	Total						**2.522**
						Total Quantity in cum	**2.522**
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						
	SLUDGE SUMP-Circular						
	Base slab	1	4.100	4.100	0.300		5.043
		4	2.900	0.300	0.600		2.088
	Tank Walls	1	10.210	0.250	2.700		6.892
	Walk Way	1	16.400	0.600	0.100		0.984
	Total						**15.007**
						Total Quantity in cum	**15.007**
9.004	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).						
	SLUDGE SUMP-Circular						
	QTY as per item code no5.37.1	15.007					15.007
	Total						**15.007**
						Total Quantity in cum	**15.007**
9.005	OD57071/2022-2023						
	Extra for providing sulphate resistant cement for the structures						
	SLUDGE SUMP-Circular						
	QTY as per item code no.5.37.1	1	15.007				15.007
	Total						**15.007**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
						Total Quantity in cum	**15.007**
9.006	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						
	SLUDGE SUMP-Circular						
	QTY as per item code5.37.1	1		15.000		120.000000	1800.000
	Total						**1800.000**
						Total Quantity in kilogram	**1800.000**
9.007	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 .						
	FOR SLUDGE SUMP						
	QTY as per item code5.37.1	1	15.000			340.000000	5100.000
	Total						**5100.000**
						Total Quantity in kg	**5100.000**
9.008	OD57082/2022-2023						
	Extra for providing epoxy coating for reinforcement bar						
	SLUDGE SUMP-Circular						
	QTY same as per item code no.5.22.6	1	1800.000				1800.000
	Total						**1800.000**
						Total Quantity in kg	**1800.000**
9.009	5.9.1						
	Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete						
	SLUDGE SUMP-Circular						
	Bottom slab	4	4.100		0.300		4.920
		4	2.900		1.200		13.920
	Total						**18.840**
						Total Quantity in sqm	**18.840**
9.010	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.						
	SLUDGE SUMP-Circular						
	For Walls Out side	1	10.990		2.700		29.673

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	For Walls Inside	1	9.420		2.700		25.434
	Walk Way	1	16.400		0.600		9.840
	Total						**64.947**
						Total Quantity in sqm	**64.947**
9.011	22.23.1						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin-charge. The product performance shall carry guarantee for 10 years against any leakage.For vertical surface two coats @0.70 kg per sqm						
	SLUDGE SUMP-Circular						
	Inside of Walls	1	9.420		2.700		25.434
	Total						**25.434**
						Total Quantity in sqm	**25.434**
9.012	22.23.2						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin-charge. The product performance shall carry guarantee for 10 years against any leakage.For horizontal surface one coat @1.10 kg per sqm.						
	SLUDGE SUMP- Circular						
	Bottom slab inside	1	7.070				7.070
	Total						**7.070**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
						Total Quantity in sqm	**7.070**
9.013	13.7.1						
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)						
	SLUDGE SUMP-Circular						
	Inside of Walls	1	9.420		2.700		25.434
	Base slab inside	1	7.070				7.070
	Out Side Wall	1	7.070		3.000		21.210
	Walk Way	1	16.400		1.200		19.680
	Total						**73.394**
						Total Quantity in sqm	**73.394**
9.014	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						
	SLUDGE SUMP-Circular						
		8					8.000
	Total						**8.000**
						Total Quantity in each	**8.000**
9.015	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.						
	SLUDGE SUMP-Circular						
		1	7.070		2.700		19.089
	Total						**19.089**
						Total Quantity in Kilo litre	**19.089**
9.016	10.26.3						
	Providing and fixing hand rail of approved size by welding etc. to steel ladder railing, balcony railing, staircase railing and similar works, including applying priming coat of approves steel primer.G.I. pipes						
	50mm dia GI-5.17kg/m,32mmdiaGI -3.17kg/m						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Outer total /1m c/c vertical 50mm dia	11			0.750	5.170000	42.653
	Horizontal.25mc/c-32mm dia	3	10.990			3.170000	104.515
	Total						**147.168**
						Total Quantity in kg	**147.168**
9.017	13.48.3						
	Finishing with Deluxe Multi surface paint system for interiors and exteriors using primer as per manufacturers specifications:Painting Steel work with Deluxe Multi Surface Paint to give an even shade. Two or more coat applied @ 0.90 ltr/10 sqm over an under coat of primer applied @ 0.80 ltr/10 sqm of approved brand and manufacture						
	SLUDGE SUMP-Circular						
	Vertical Pipe	11	0.750		0.160		1.320
	Horizontal Pipe	3	10.990		0.100		3.297
	Total						**4.617**
						Total Quantity in sqm	**4.617**
9.018	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						
	SLUDGE SUMP-Circular						
	1	73.38					73.380
	Total						**73.380**
						Total Quantity in sqm	**73.380**
10	SLUDGE THICKENER-Circular						
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						
	FOR SLUDGE THICKENER						
		1	8.200	8.200	1.200		80.688
	Total						**80.688**
						Total Quantity in cum	**80.688**
10.002	4.1.6						
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 40 mm nominal size)						
	FOR SLUDGE THICKENER						
		1	8.200	8.200	0.150		10.086

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Total						**10.086**
						Total Quantity in cum	**10.086**
10.003	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						
	FOR SLUDGE THICKENER						
	Base slab	1	8.200	8.200	0.350		23.534
		4	7.200	0.300	0.600		5.184
	Tankwalls	1	22.610	0.300	2.500		16.958
	Walk way	1	51.500	0.600	0.100		3.090
	Total						**48.766**
						Total Quantity in cum	**48.766**
10.004	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).						
	FOR SLUDGE THICKENER						
	QTY AS PER ITEM NO.5.37.1	1	48.760				48.760
	Total						**48.760**
						Total Quantity in cum	**48.760**
10.005	OD57321/2022-2023						
	Extra for providing sulphate resistant cement for the structures						
	FOR SLUDGE THICKENER						
	QTY AS PER ITEM NO.5.37.1	1	48.760				48.760
	Total						**48.760**
						Total Quantity in cum	**48.760**
10.006	5.22.6						
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	FOR SLUDGE THICKENER						
	QTY AS PER ITEM NO.5.37.1	1	48.760			120.000000	5851.200
	Total						**5851.200**
						Total Quantity in kilogram	**5851.200**
10.007	OD57320/2022-2023						
	Extra for providing epoxy coating for reinforcement bar						
	FOR SLUDGE THICKENER						
	QTY AS PER ITEM NO.5.37.1	1	48.760			120.000000	5851.200
	Total						**5851.200**
						Total Quantity in kg	**5851.200**
10.008	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 .						
	FOR SLUDGE THICKENER						
	QTY AS PER ITEM NO.5.37.1	1		48.760		340.000000	16578.400
	Total						**16578.400**
						Total Quantity in kg	**16578.400**
10.009	5.9.1						
	Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete						
	FOR SLUDGE THICKENER						
	Bottom slab	4	8.200		0.350		11.480
		8	7.200		0.600		34.560
	Total						**46.040**
						Total Quantity in sqm	**46.040**
10.010	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.						
	FOR SLUDGE THICKENER						
	For walls outside	1	23.550		2.500		58.875
	For walls inside	1	21.670		2.500		54.175
	For walkways	1	51.500		0.600		30.900
	Total						**143.950**
						Total Quantity in sqm	**143.950**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
10.011	22.23.1						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin-charge. The product performance shall carry guarantee for 10 years against any leakage.For vertical surface two coats @0.70 kg per sqm						
	FOR SLUDGE THICKENER						
	Inside of walls	1	21.670		2.500		54.175
	Total						**54.175**
						Total Quantity in sqm	**54.175**
10.012	22.23.2						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin-charge. The product performance shall carry guarantee for 10 years against any leakage.For horizontal surface one coat @1.10 kg per sqm.						
	FOR SLUDGE THICKENER						
	Bottom slab inside	1	37.390				37.390
	Total						**37.390**
						Total Quantity in sqm	**37.390**
10.013	13.7.1						
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	FOR SLUDGE THICKENER						
	Inside of walls	1	21.670		2.500		54.175
	Outside of walls	1	23.550		2.800		65.940
	Base slab inside	1	37.390				37.390
	Walkways	1	51.500		1.200		61.800
	Total						**219.305**
						Total Quantity in sqm	**219.305**
10.014	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						
	FOR SLUDGE THICKENER						
		7					7.000
	Total						**7.000**
						Total Quantity in each	**7.000**
10.015	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.						
	FOR SLUDGE THICKENER						
		1	37.370		2.500		93.425
	Total						**93.425**
						Total Quantity in Kilo litre	**93.425**
10.016	10.26.3						
	Providing and fixing hand rail of approved size by welding etc. to steel ladder railing, balcony railing, staircase railing and similar works, including applying priming coat of approves steel primer.G.I. pipes						
	50mm DIA GI 5.17Kg/m.32mm DIA GI -317 Kg/m						
	Outer total/1m/c/c vertical 50mm dia	27			0.750	5.170000	104.693
	Horizontal 0.25m/c/c -32mm dia	3	27.318			3.170000	259.794

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Total						**364.487**
						Total Quantity in kg	**364.487**
10.017	13.48.3						
	Finishing with Deluxe Multi surface paint system for interiors and exteriors using primer as per manufacturers specifications:Painting Steel work with Deluxe Multi Surface Paint to give an even shade. Two or more coat applied @ 0.90 ltr/10 sqm over an under coat of primer applied @ 0.80 ltr/10 sqm of approved brand and manufacture						
	FOR SLUDGE THICKENER						
	Vertical pipe	27	0.750			0.160000	3.240
	Horizontal pipe	3	27.318			0.100000	8.195
	Total						**11.435**
						Total Quantity in sqm	**11.435**
10.018	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						
	FOR SLUDGE THICKENER						
	Base slab &inside walls	1	219.300				219.300
	Total						**219.300**
						Total Quantity in sqm	**219.300**
11	FILTER FEED TANK-Rectangular						
11.001	2.6.1						
	Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed.All kinds of soil						
	Filter Feed Tank						
	For Filter feed Tank	1	7.100	7.100	0.500		25.205
	Total						**25.205**
						Total Quantity in cum	**25.205**
11.002	4.1.6						
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 40 mm nominal size)						
	Filter Feed Tank						
	For Filter feed Tank	1	7.100	7.100	0.150		7.562

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Total						**7.562**
						Total Quantity in cum	**7.562**
11.003	5.37.1						
	Providing and laying in position ready mixed M-25 grade concrete for reinforced cement concrete work, using cement content as per approved design mix, manufactured in fully automatic batching plant and transported to site of work in transit mixer for all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding the cost of centering, shuttering finishing and reinforcement including cost of admixtures in recommended proportions as per IS: 9103 to accelerate/ retard setting of concrete, improve workability without impairing strength and durability as per direction of the Engineer - in -charge. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All wiork upto plinth level						
	Filter Feed Tank						
	Base Slab	1	7.100	7.100	0.300		15.123
		4	7.100	0.300	0.600		5.112
	Tank Walls	2	12.500	0.250	2.500		15.625
	Walk Way	4	7.100	0.600	0.100		1.704
	Total						**37.564**
						Total Quantity in cum	**37.564**
11.004	OD57371/2022-2023						
	Extra for providing sulphate resistant cement for the structures						
	Filter Feed Tank						
	QTY as per item code5.37.1	1	37.564				37.564
	Total						**37.564**
						Total Quantity in cum	**37.564**
11.005	5.34.1						
	Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).						
	Filter Feed Tank						
	QTY as per item code5.37.1	37.564					37.564
	Total						**37.564**
						Total Quantity in cum	**37.564**
11.006	5.22.6						
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Filter Feed Tank						
	QTY as per item code5.37.1	1	37.564			120.000000	4507.680
	Total						**4507.680**
						Total Quantity in kilogram	**4507.680**
11.007	OD57425/2022-2023						
	Extra for providing epoxy coating for reinforcement bar						
	Filter Feed Tank						
	QTY as per item code5.37.1	1	37.564				37.564
	Total						**37.564**
						Total Quantity in kg	**37.564**
11.008	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 .						
	Filter Feed Tank						
	QTY as per item code5.37.1	1	37.564			340.000000	12771.760
	Total						**12771.760**
						Total Quantity in kg	**12771.760**
11.009	5.9.1						
	Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete						
	Filter Feed Tank						
	Bottom slab	2	14.200		0.300		8.520
		8	7.100		0.600		34.080
	Total						**42.600**
						Total Quantity in sqm	**42.600**
11.010	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.						
	Filter Feed Tank						
	For walls outside	2	13.000	2.500			65.000
	For walls inside	2	12.000	2.500			60.000
	Walkway	4	7.100	0.600			17.040
	Total						**142.040**
						Total Quantity in sqm	**142.040**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
11.011	22.23.1						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin-charge. The product performance shall carry guarantee for 10 years against any leakage.For vertical surface two coats @0.70 kg per sqm						
	Filter Feed Tank						
	Inside of Walls	2	12.000		2.500		60.000
	Total						**60.000**
						Total Quantity in sqm	**60.000**
11.012	22.23.2						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin-charge. The product performance shall carry guarantee for 10 years against any leakage.For horizontal surface one coat @1.10 kg per sqm.						
	Filter Feed Tank						
	Bottom slab inside	1	6.000	6.000			36.000
	Total						**36.000**
						Total Quantity in sqm	**36.000**
11.013	13.7.1						
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Filter Feed Tank						
	Inside of walls	2	12.000		2.500		60.000
	Base Slab inside	1	6.000	6.000			36.000
	Outside wall	2	13.000		2.500		65.000
	Total						**161.000**
						Total Quantity in sqm	**161.000**
11.014	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						
	Filter Feed Tank						
		7					7.000
	Total						**7.000**
						Total Quantity in each	**7.000**
11.015	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.						
	Filter Feed Tank						
		1	6.000	6.000	2.500		90.000
	Total						**90.000**
						Total Quantity in Kilo litre	**90.000**
11.016	10.26.3						
	Providing and fixing hand rail of approved size by welding etc. to steel ladder railing, balcony railing, staircase railing and similar works, including applying priming coat of approves steel primer.G.I. pipes						
	50mm dia GI-5.17kg/m ,32mm dia GI-3.17kg/m						
	Outer Total 1m c/c vertical 50mm dia.	31			0.750	5.170000	120.203
	Horizontal.25m c/c-32	3	30.800			3.170000	292.908
	Total						**413.111**
						Total Quantity in kg	**413.111**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
11.017	13.48.3						
	Finishing with Deluxe Multi surface paint system for interiors and exteriors using primer as per manufacturers specifications:Painting Steel work with Deluxe Multi Surface Paint to give an even shade. Two or more coat applied @ 0.90 ltr/10 sqm over an under coat of primer applied @ 0.80 ltr/10 sqm of approved brand and manufacture						
	Filter Feed Tank						
	Vertical pipe	31	0.750			0.050000	1.163
	Horizontal Pipe	3	30.800			0.030000	2.772
	Total						**3.935**
						Total Quantity in sqm	**3.935**
11.018	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						
	Filter Feed Tank						
		1	161.000				161.000
	Total						**161.000**
						Total Quantity in sqm	**161.000**
12	TREATED WATER TANK-CHLORINE CONTACT TANK Rectangular						
12.001	2.6.1						
	Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed.All kinds of soil						
	FOR TREATED WATER TANK						
		1	13.650	9.450	1.500		193.489
	Total						**193.489**
						Total Quantity in cum	**193.489**
12.002	OD57489/2022-2023						
	Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30cm in depth,1.5m in width aswell as 10 sqm on plan)including disposal of excavated earth ,lead up to 50m and lift up to 1.5 m ,disposed earth to be levelled and neatly dressed .All kind of soil-additional lift 1.5to 3m						
	FOR TREATED WATER TANK						
		1	13.650	9.450	1.500		193.489
	Total						**193.489**
						Total Quantity in cum	**193.489**
12.00	OD57488/2022-2023						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed. All kinds of soil - additional depth 3.0 to 4.5 m.						
	FOR TREATED WATER TANK						
		1	13.650	9.450	0.450		58.047
	Total						**58.047**
						Total Quantity in cum	**58.047**
12.004	4.1.6						
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 40 mm nominal size)						
	FOR TREATED WATER TANK						
		1	13.650	9.450	0.150		19.349
	Total						**19.349**
						Total Quantity in cum	**19.349**
12.005	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						
	FOR TREATED WATER TANK						
	Base slab	1	13.650	9.450	0.300		38.698
	Raft beam	3	11.250	0.350	0.600		7.088
		4	7.500	0.350	0.600		6.300
	Pile cap	2	2.000	0.950	0.600		2.280
		10	1.500	0.750	0.600		6.750
	Tankwalls	2	11.800	0.250	3.500		20.650
		3	8.050	0.250	3.500		21.131
	Roof beam	3	11.250	0.350	0.650		7.678
		4	7.500	0.350	0.650		6.825
	Cover slab	1	13.050	8.850	0.150		17.324
	Walkway	2	13.650	0.600	0.150		2.457
		2	9.450	0.600	0.150		1.701

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Total						**138.882**
						Total Quantity in cum	**138.882**
12.006	5.34.1						
	Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).						
	FOR TREATED WATER TANK						
	QTY AS PER ITEM NO.5.37.1	1	138.880				138.880
	Total						**138.880**
						Total Quantity in cum	**138.880**
12.007	OD57637/2022-2023						
	Extra for providing sulphate resistant cement for the structures						
	FOR TREATED WATER TANK						
	QTY AS PER ITEM NO.5.37.1	1	138.880				138.880
	Total						**138.880**
						Total Quantity in cum	**138.880**
12.008	5.22.6						
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more						
	FOR TREATED WATER TANK						
	QTY AS PER ITEM NO.5.37.1	1	138.880			120.000000	16665.600
	Total						**16665.600**
	PILE REINFORCEMENT 150Kg/m3						
	500mm	20	0.196		45.000	150.000000	26460.000
	750mm	4	0.442		45.000	150.000000	11934.000
	Total						**38394.000**
						Total Quantity in kilogram	**55059.600**
12.009	OD57636/2022-2023						
	Extra for providing epoxy coating for reinforcement bar						
	FOR TREATED WATER TANK						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	QTY AS PER ITEM NO.5.37.1	1				55059.600000	55059.600
	Total						**55059.600**
						Total Quantity in kg	**55059.600**
12.010	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 .						
	FOR TREATED WATER TANK						
	QTY AS PER ITEM NO.5.37.1	1	138.880			340.000000	47219.200
	Total						**47219.200**
						Total Quantity in kg	**47219.200**
12.011	5.9.1						
	Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete						
	FOR TREATED WATER TANK						
	Base slab	2	21.900		0.300		13.140
	Raft beam	6	11.250		0.600		40.500
		8	7.500		0.600		36.000
	Pilecap	4	2.950		0.600		7.080
		20	2.250		0.600		27.000
	Total						**123.720**
						Total Quantity in sqm	**123.720**
12.012	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.						
	FOR TREATED WATER TANK						
	Tank walls	4	11.800		3.500		165.200
		6	8.050		3.500		169.050
	Roof beam	6	11.250		0.650		43.875
		8	7.500		0.650		39.000
	Cover slab	1	13.050	8.850			115.493
		2	21.900		0.150		6.570
	Walkway	2	13.650	0.600			16.380
		2	9.450	0.600			11.340

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Total						**566.908**
						Total Quantity in sqm	**566.908**
12.013	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						
	FOR TREATED WATER TANK						
	Inside of walls	2	29.250		3.500		204.750
	Total						**204.750**
						Total Quantity in sqm	**204.750**
12.014	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.						
	FOR TREATED WATER TANK						
	Bottom slab inside	1	8.350	8.350			69.723
		1	8.350	4.150			34.653
	Total						**104.376**
						Total Quantity in sqm	**104.376**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
12.015	13.7.1						
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)						
	FOR TREATED WATER TANK						
	Inside of walls	2	16.700		3.500		116.900
		2	12.500		3.500		87.500
	Outside of walls	2	21.900		3.500		153.300
	Base slab inside and roof	2	8.350	8.350			139.445
		2	8.350	4.150			69.305
	Walkways	2	13.650		0.600		16.380
		2	9.450		0.600		11.340
	Total						**594.170**
						Total Quantity in sqm	**594.170**
12.016	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						
	FOR TREATED WATER TANK						
		26					26.000
	Total						**26.000**
						Total Quantity in each	**26.000**
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.						
	FOR TREATED WATER TANK						
		1	8.350	8.350	3.500		244.029
		1	8.350	4.150	3.500		121.284
	Total						**365.313**
						Total Quantity in Kilo litre	**365.313**
12.01	10.26.3						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Providing and fixing hand rail of approved size by welding etc. to steel ladder railing, balcony railing, staircase railing and similar works, including applying priming coat of approves steel primer.G.I. pipes						
	50mm DIA GI 5.17KG/M.32mm DIA GI -317 KG/M						
	Outer total/1m/c/c vertical 50mm dia	47			0.750	5.170000	182.243
	Horizontal 0.25m/c/c -32mm dia	3	46.600			3.170000	443.166
	Total						**625.409**
						Total Quantity in kg	**625.409**
12.019	13.48.3						
	Finishing with Deluxe Multi surface paint system for interiors and exteriors using primer as per manufacturers specifications:Painting Steel work with Deluxe Multi Surface Paint to give an even shade. Two or more coat applied @ 0.90 ltr/10 sqm over an under coat of primer applied @ 0.80 ltr/10 sqm of approved brand and manufacture						
	FOR TREATED WATER TANK						
	Vertical pipe	47	0.750		0.160		5.640
	Horizontal pipe	3	46.600		0.100		13.980
	Total						**19.620**
						Total Quantity in sqm	**19.620**
12.020	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						
	FOR TREATED WATER TANK						
		1	594.170				594.170
	Total						**594.170**
						Total Quantity in sqm	**594.170**
12.021	20.5.3						
	Providing, driving and installing driven Pre-cast reinforced cement concrete piles of specified diameter and length below the pile cap in M-25 cement concrete to carry safe working load not less than specified. With a central through preformed hole with M.S. black pipe of dia, 40 mm for grouting with cement sand grouting of mix 1:2 (1 cement : 2 coarse sand) under sufficient positive pressure to ensure complete filling including centering, shuttering, driving and removing the steel casing pipe and lifting casing etc. complete but excluding the cost of steel reinforcement. (Length of pile for payment shall be measured from top of the shoe to the bottom of pile cap).500 mm dia piles						
	FOR TREATED WATER TANK						
		20			45.000		900.000
	Total						**900.000**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
						Total Quantity in metre	**900.000**
12.022	20.5.5						
	Providing, driving and installing driven Pre-cast reinforced cement concrete piles of specified diameter and length below the pile cap in M-25 cement concrete to carry safe working load not less than specified. With a central through preformed hole with M.S. black pipe of dia, 40 mm for grouting with cement sand grouting of mix 1:2 (1 cement : 2 coarse sand) under sufficient positive pressure to ensure complete filling including centering, shuttering, driving and removing the steel casing pipe and lifting casing etc. complete but excluding the cost of steel reinforcement. (Length of pile for payment shall be measured from top of the shoe to the bottom of pile cap).750 mm dia piles						
	FOR TREATED WATER TANK						
		4			45.000		180.000
	Total						**180.000**
						Total Quantity in metre	**180.000**
12.023	20.6.3.1						
	Vertical load testing of piles in accordance with IS 2911(Part IV) including installation of loading platform and preparation of pile head or construction of test cap and dismantling of test cap after test etc. complete as per specification & the direction of engineer -in-Charge. Group of two or more piles upto 50 tonne capacityInitial test						
	FOR TREATED WATER TANK						
	500mm	4					4.000
	750mm	2					2.000
	Total						**6.000**
						Total Quantity in per test	**6.000**
12.024	20.6.3.2						
	Vertical load testing of piles in accordance with IS 2911(Part IV) including installation of loading platform and preparation of pile head or construction of test cap and dismantling of test cap after test etc. complete as per specification & the direction of engineer -in-Charge. Group of two or more piles upto 50 tonne capacityRoutine test						
	FOR TREATED WATER TANK						
	500 mm	4					4.000
	750 mm	2					2.000
	Total						**6.000**
						Total Quantity in per test	**6.000**
13	ECO-FRIENDLY AND ADMINISTRATIVE UNITS						
13.001	OD68432/2022-2023						
	Construction of administrative cum laboratary building						
	FOR ADMINISTRATIVE CUM LABORATORY BUILDING						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
		1				300.000000	300.000
	Total						**300.000**
						Total Quantity in sqm	**300.000**
13.002	OD68444/2022-2023						
	Construction of blower room on roof top of MBBR with Truss roof						
	FOR BLOWER ROOM						
		1				196.000000	196.000
	Total						**196.000**
						Total Quantity in sqm	**196.000**
13.003	OD68445/2022-2023						
	Equipment, laboratory items , furniture and computer system for CIPS of IoT						
	FOR EQUIPMENTS,AND LABORATORY ITEMS						
		1					1.000
	Total						**1.000**
						Total Quantity in each	**1.000**
13.004	OD68446/2022-2023						
	Facility for Recycling purpose						
	FOR RECYCLING PURPOSE						
		1					1.000
	Total						**1.000**
						Total Quantity in each	**1.000**
13.005	OD68521/2022-2023						
	Green Belt, Special Exterior Wall Garden and Landscaping, 3 layer buffer vegetation in the outer periphery with provision for landscape and internal roads, etc at STP site						
	FOR GREEN BELT						
	Landscaping	1					1.000
	Total						**1.000**
						Total Quantity in each	**1.000**
13.006	OD82214/2022-2023						
	Providing and installing acoustics services for necessary sound insulation standards.						
	For acoustic services						
	Acoustic services	1					1.000
	Total						**1.000**
						Total Quantity in each	**1.000**
14	MECHANICAL ITEMS-STP						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
14.001	OD67391/2022-2023						
	Supply, erection, testing, and commissioning of new generation non clog motor pump set having suitable discharge and head, including all accessories such as cost of the panel board with an ammeter, voltmeter, phase indicating lamps, change over switch, main switch, cost of soft starter, cable from panel board to starter, starter to motor, capacitors suction pipe, foot valve, Non return valve, suction and delivery pipes of required length, pressure gauge, earthing and wiring materials, cables etc. complete. - As per KWA/HO/SP-333/2014 Dtd.18-03-2016 of The Managing Director - for Centrifugal Pump sets						
	RAW EFFLUENT TRANSFER PUMP-62HP						
	72.46LPS,H-32	2	62.000				124.000
	Total						**124.000**
						Total Quantity in HP (Horse power)	**124.000**
14.002	OD67442/2022-2023						
	MBBR media- Supplying and fixing of non-clogging freely moving biomass media of polypropylene construction Sp.Gravity 0.93 for MBBR reactor with required specific surface area, length 10-20 mm, dia 20-25 mm complete as per technical specification or as directed by Engineer in Charge						
	FOR MBBR CARRIER MEDIA						
	Specific surface area=600m2/m3	1				359.040000	359.040
	Specific surface area=750m2/m3	1				441.600000	441.600
	Total						**800.640**
						Total Quantity in each	**800.640**
14.003	OD67510/2022-2023						
	Air Blower Supply, erection, testing and commissioning of twin lobe air blower for indoor application complete with acoustic canopy, air filter, motor of 1500 rpm , pulleys, pressure gauges, pressure relief valve, acoustic hood, suction silencer with suitable flanges, common motor and compressor base frame with motor belt tightening arrangement interconnecting line with flanges including all accessories complete as per technical specification or as Directed by Engineer in Charge. - 50-99HP, head 20-50m						
	FOR AIR BLOWER						
	Capacity of blower-3324m3/hr,HP=49	5	49.000				245.000
	Capacity of blower 2369m3/hr,HP-70	3	70.000				210.000

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Capacity of blower-5114m3/hr,HP-75	7	75.000				525.000
	Total						**980.000**
						Total Quantity in HP (Horse power)	**980.000**
14.004	OD67546/2022-2023						
	Bubble Diffuser for MBBR- Fine Bubble Diffuser Supplying and fixing of retrievable type fine bubble diffusers of 90mm dia,1500mm length, Ethylene Propylene Diene Monomer (EPDM) make with SStee1"x1",,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 hos clamp, RCC block complete as per technical specification compatible for specified air flow						
	BUBBLE DIFFUSER FOR MBBR						
		4					4.000
	Total						**4.000**
						Total Quantity in each	**4.000**
14.005	OD67563/2022-2023						
	Air Grid Pipe Supply and installation of air pipes (HDPE) assembly into valves and other accessories as required for the blowers to various tanks as a complete unit.						
	FOR AIR GRID PIPE						
		4					4.000
	Total						**4.000**
						Total Quantity in each	**4.000**
14.006	OD67571/2022-2023						
	Tube settler media- Media to be of UV stabilized PVC material, hexagonal chevron shaped, 750mm height and about 1.0mm thick and with tongue and groove tube fitting. The plan settling area should be between 10 – 12 m2/m3 /day minimum at 60o slope. The media is to be provided along with lock nuts as required.						
	FOR TUBE SETTLER MEDIA						
	Total contact area-388.8m2	1					1.000
	Total						**1.000**
						Total Quantity in each	**1.000**
14.007	OD67584/2022-2023						
	"Supply, erection, testing, and commissioning of new generation non clog motor pump set having suitable discharge and head, including all accessories such as cost of the panel board with an ammeter, voltmeter, phase indicating lamps, change over switch, main switch, cost of soft starter, cable from panel board to starter, starter to motor, capacitors suction pipe, foot valve, Non return valve, suction and delivery pipes of required length, pressure gauge, earthing and wiring materials, cables etc. complete. - As per KWA/HO/SP-333/2014 Dtd.18-03-2016 of The Managing Director - for Centrifugal Pump sets.						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	FOR FILTER FEED PUMP						
	P=65HP,Q=69.44 LPS,H=35	2	65.000				130.000
	Total						**130.000**
						Total Quantity in HP (Horse power)	**130.000**
14.008	OD67604/2022-2023						
	Pressure Sand Filter- Supply, installation and erection, testing and commissioning of of Pressure Sand Filter - MS vessel construction. Filter to be of MS construction with multiport valve for operations. Suitable stand / support should be provided along with the filter. Filtration rate should not be greater than 12 m3/hour/m2 of the filtration area. Dirt loading capacity to be sufficient to initiate backwash once in 8 hours i.e. once / shift. Filter to have inlet and outlet piping, inlet and outlet for backwash and air vent. Sand filter to be fitted with pressure guage at inlet and outlet. Sand filter main header is to be fitted with flow meter – turbine type / rotameter type with range up to minimum of 125% of the rated flow through the pipe line. Media to consist of graded pebble, coarse and fine sand. Depth of media to be as per recommendations provided in CPHEEO manual and all relevant IS Codes of prectice. Cost includes supporting foundation.						
	FOR PRESSURE SAND FILTER						
	Flow250m3/hr,Dia=3.65m	2					2.000
	Total						**2.000**
						Total Quantity in each	**2.000**
14.009	OD67645/2022-2023						
	Carbon Filter- Supply, Installation and erection, testing and commissioning of Activated Carbon Filter - MS composite vessel construction. Filter to be of MS construction with multiport valve for operations. Suitable stand / support should be provided along with the filter. Filtration rate should not be greater than 10 m3/hour/m2 of the filtration area. Filter to have inlet and outlet piping, inlet and outlet for backwash and air vent. Carbon filter to be fitted with pressure guage at outlet. Media to consist of graded pebble, coarse, fine sand and activated carbon. Depth of media to be as per recommendations provided in CPHEEO manual. Activated carbon should be of high quality for removal of impurities and to be used for waste water purification. Cost includes for foundation also.						
	FOR CARBON FILTER						
	Flow 250m3/hr, Dia=4m,H=2.5	2					2.000
	Total						**2.000**
						Total Quantity in each	**2.000**
14.010	OD67666/2022-2023						
	Alum and Lime Dosing System- Supply, installation, commissioning and testing of Alum dosing tank having capacity 50 litre in LLDPE/ FRP/PP material and alum dosing electronic metering type pump of 1-3 LPH range with 2.5 bar working pressure.						
	FOR ALUM AND LIME DOSING SYSTEM						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
		2					2.000
	Total						**2.000**
						Total Quantity in each	**2.000**
14.011	OD67702/2022-2023						
	Hypo Dosing System - Supply, installation, commissioning 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.						
	FOR HYPODOSING SYSTEM						
		2					2.000
	Total						**2.000**
						Total Quantity in each	**2.000**
14.012	OD67713/2022-2023						
	Odour control unit for co-treatment unit and STP.						
	FOR ODOUR CONTROL UNIT						
		1					1.000
	Total						**1.000**
						Total Quantity in each	**1.000**
14.013	OD67725/2022-2023						
	Supply, erection, testing, and commissioning of new generation non clog motor pump set having suitable discharge and head, including all accessories such as cost of the panel board with an ammeter, voltmeter, phase indicating lamps, change over switch, main switch, cost of soft starter, cable from panel board to starter, starter to motor, capacitors suction pipe, foot valve, Non return valve, suction and delivery pipes of required length, pressure gauge, earthing and wiring materials, cables etc. complete.- centrifuge pump of screw type-- As per KWA/HO/SP-333/2014 Dtd.18-03-2016 of The Managing Director - centrifuge pump of screw type						
	FOR SLUDGE TRANSFER TO CENTRIFUGE PUMP OF SREW TYPE						
	Power of pump-1HP ,2.02lps ,H-15	2	1.000				2.000
	Total						**2.000**
						Total Quantity in HP (Horse power)	**2.000**
14.014	OD67748/2022-2023						
	Supply, erection, testing, and commissioning of new generation non clog motor pump set having suitable discharge and head, including all accessories such as cost of the panel board with an ammeter, voltmeter, phase indicating lamps, change over switch, main switch, cost of soft starter, cable from panel board to starter, starter to motor, capacitors suction pipe, foot valve, Non return valve, suction and delivery pipes of required length, pressure gauge, earthing and wiring materials, cables etc. complete. - As per KWA/HO/SP-333/2014 Dtd.18-03-2016 of The Managing Director - for Centrifugal Pump sets.						
	RECYCLED WATER TRANSFER PUMP						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Power of pump - 3.5 HP	4	3.500				14.000
	Total						**14.000**
	SLUDGE TRANSFER TO THICKENER PUMP						
	Power-2.7HP, Q-6.61lps, H-15	2	2.700				5.400
	Total						**5.400**
	DILUTED SEPTAGE TRANSFER PUMP						
	Power of pump=3.5HP	4	3.500				14.000
	Total						**14.000**
	FILTRATE CUM DILUTION PUMP						
	Power of pump 2HP	2	2.000				4.000
	Total						**4.000**
	FILTER BACKWASH PUMPS						
	Power-2HP	2	2.000				4.000
	Total						**4.000**
						Total Quantity in HP (Horse power)	**41.400**
14.015	OD67824/2022-2023						
	Mechanical arrangement for Oil and Grease trap						
	FOR OIL AND GREASE TRAP						
		1					1.000
	Total						**1.000**
						Total Quantity in each	**1.000**
14.016	OD67825/2022-2023						
	Mechanical arrangements for screens and grit removals						
	FOR SCREEN AND GRIT REMOVALS						
		4					4.000
	Total						**4.000**
						Total Quantity in each	**4.000**
14.017	OD67826/2022-2023						
	Mechanical arrangement for anoxic tank						
	FOR ANOXIC TANK						
		1					1.000
	Total						**1.000**
						Total Quantity in each	**1.000**
14.01	OD67827/2022-2023						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Mechanical arrangement for sludge thickner						
	FOR SLUDGE THICKNER						
		1					1.000
	Total						**1.000**
						Total Quantity in each	**1.000**
14.019	OD67967/2022-2023						
	Supply and installation of centrifuge.						
	FOR CENTRIFUGE						
		2					2.000
	Total						**2.000**
						Total Quantity in each	**2.000**
14.020	OD67969/2022-2023						
	Piping, initial channel arrangements, bypass arrangements, steel ladder, framework and fire fighting arrangements						
	FOR PIPING ,INITIAL CHANNEL ARRANGEMENTS						
		1					1.000
	Total						**1.000**
						Total Quantity in each	**1.000**
14.021	OD67970/2022-2023						
	Interconnecting piping system: • All process piping is to be in uPVC of approved ISI make, Class 2 minimum • All process valves to be in PP/PVC of Ball / Globe type• For valves in piping of ID > 150 mm, Butterfly valves are preferred • NRV should be provided at the common discharge header of all process pumps • Dosing lines to be in flexible Teflon / rigid PVC / HDPE. Detailed hydraulic analysis must be done for the system before supply and installation.						
	FOR INTERCONNECTING PIPING SYSTEM						
		1					1.000
	Total						**1.000**
						Total Quantity in each	**1.000**
14.022	OD67968/2022-2023						
	Providing Mechanical arrangement for cleaning and flushing manholes, Collection of septic waste						
	FOR CLEANING AND FLUSHING MANHOLES						
		1					1.000
	Total						**1.000**
						Total Quantity in each	**1.000**
14.02	OD85408/2022-2023						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Bar Screen-fine- Supply and installation, of manual bar screen, MS – epoxy frame to be fitted in bar screen chamber of specified width, with MS flat bars and 20 mm c/c gap between bars. The frame to be mounted on the chamber and provided with MS rake arm with racks for removal of collected solids and trough to be provided for transfer of the collected solids. Flow Rate and height should be as specified. Angle of Inclination: 45 Degree, Spacing: 6mm						
	Bar Screen-Fine						
		2					2.000
	Total						**2.000**
						Total Quantity in each	**2.000**
14.024	OD85412/2022-2023						
	Electromagnetic Flow meter, pressure and quality sensors- Supply and erection of electromagnetic flow meter, pressure and quality sensors compatible to IoT and central control system with flow recorder, digital flow/quality/pressure indicator, flow/quality/pressure integrator with sensors, totaliser, transmittal and display arrangements and all accessories including housing arrangements, etc. complete to fix in the incoming pipeline to STP or at the Screen channel as directed by the Engineer in Charge.						
	Electro magnetic flow meter						
		2					2.000
	Total						**2.000**
						Total Quantity in each	**2.000**
14.025	OD85414/2022-2023						
	Bar Screen- Supply and installation, of manual bar screen, MS – epoxy frame to be fitted in bar screen chamber of specified width, with MS flat bars and 20 mm c/c gap between bars. The frame to be mounted on the chamber and provided with MS rake arm with racks for removal of collected solids and trough to be provided for transfer of the collected solids. Flow Rate and height should be as specified. Angle of Inclination: 45 Degree, Spacing: 20mm, Bar Size: 50x10 mm						
	Bar screen - Course						
		2					2.000
	Total						**2.000**
						Total Quantity in each	**2.000**
15	ELECTRICAL WORKS-STP						
15.001	OD68682/2022-2023						
	Supply Installation and commissioning of Diesel Generator at STP 5 MLD						
	FOR DIESEL GENERATOR IN STP						
		1					1.000
	Total						**1.000**
						Total Quantity in each	**1.000**
15.00	OD68680/2022-2023						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	ELECTRICAL & INSTRUMENTATION-Instrumentation items consisting of pressure guages, level switches, electro magnetic flow meter, normal flow meter , pressure gauges, IoT based sensors, electrical panels – Powder coated MCC Panel shall be Non compartmentalized free standing floor mounted, dust and vermin proof, with reinforcement of suitable size angle iron, channel, T -iron flats as required. Panel shall be suitable for 415V, 3-Phase,50 Hz incomer. Switchgear components to include, but not limited to, MCCB for incomer and for each switchgear, suitable OLR and contactor provisions to be given as per guidelines of the Electrical authority. Panel to be fabricated based on the Motor Load List as given in the technical specifications AC: MS powder coated panel with switchgear components as per motor load list, fixed, floor mounted and non compartmentalized pane.INTERCONNECTING CABLING – Outgoing feeders from AC panel to each prime mover will be based on CEIG guidelines. Cables to be suitably protected either through (a) PVC conduit or (b) armored cables as appropriate Cabling includes glanding and termination for each prime mover. Cables should not be run on the ground or directly on the walls. Cables to be mounted on suitable runners / cable trays / PVC conduits as appropriate. All interconnecting cabling and glanding , termination accessories as per specifications.						
	FOR ELECTRICAL AND INSTRUMENTATION						
		1					1.000
	Total						**1.000**
						Total Quantity in each	**1.000**
15.003	OD68681/2022-2023						
	Supply,installation and commisioning of solar units for STP						
	FOR SOLAR UNITS IN STP						
		1					1.000
	Total						**1.000**
						Total Quantity in each	**1.000**
15.004	OD85126/2022-2023						
	Transformer unit of 500 KVA indoor type including buildings, allied works and installation						
	500 KVA Transformer						
		2					2.000
	Total						**2.000**
						Total Quantity in each	**2.000**
16	COMPOUND WALL FOR STP SITEA AND WELL SITE						
16.001	OD71862/2022-2023						
	For the construction of compound wall and road for STP site						
	Construction of road						
		1					1.000
	Total						**1.000**
	Construction of compound wall						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
		1					1.000
	Total						**1.000**
						Total Quantity in L.S	**2.000**
17	SITE CLEARANCE						
17.001	OD85449/2022-2023						
	Site preparation including clearing vegetation, cutting trees, demolition of buildings etc..						
	Site preparation						
		1					1.000
	Total						**1.000**
						Total Quantity in L.S	**1.000**
18	SATUATORY CHARGES						
18.001	OD126185/2022-2023						
	Contingency including all statutory charges for STP and network						
	statutory charges						
		1					1.000
	Total						**1.000**
						Total Quantity in L.S	**1.000**

ABSTRACT ESTIMATE

Others-DPR PREPARATION OF ALAPPUZHA MUNICIPALITY SEWERAGE SCHEME-

Detailed estimate of Sewage treatment plant and co-treatment unit-phase 1 Alappuzha municipality-DPR Preparation Work

Sl No	Specification	Quantity	Rate	Amount
1	**RECEIVING CHAMBER**			
1.001	2.6.1			
	Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed.All kinds of soil			
	Net Total	5.382cum	@223.41/cum	1202.39
1.002	4.1.6			
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 40 mm nominal size)			
	Net Total	1.794cum	@7527.05/cum	13503.53
1.003	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	25.996cum	@10319.09/cum	268255.06
1.004	5.34.1			
	Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).			
	Net Total	30.074cum	@85.68/cum	2576.74
1.005	OD53391/2022-2023			
	Extra for providing sulphate resistant cement for the structures			
	Net Total	30.074cum	@1800.16/cum	54138.01
1.006	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	3.509cum	@12043.58/cum	42260.92
1.007	5.22.6			
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more			
	Net Total	3470.420kilogram	@102.61/kilogram	356099.80
1.008	OD53791/2022-2023			
	Extra for providing epoxy coating for reinforcement bar			
	Net Total	3470.420kg	@2.00/kg	6940.84
1.009	4.12			
	Extra for providing and mixing water proofing material in cement concrete work in doses by weight of cement as per manufacturer's specification .			
	Net Total	10031.700kg	@1.40/kg	14044.38
1.010	5.9.1			
	Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete			
	Net Total	5.880sqm	@350.00/sqm	2058.00
1.011	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	144.090sqm	@748.62/sqm	107868.66
1.012	5.9.3			
	Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform			
	Net Total	18.815sqm	@851.49/sqm	16020.78
1.013	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	1.548cum	@269.88/cum	417.77

Sl No	Specification	Quantity	Rate	Amount
1.014	22.23.1			
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin-charge. The product performance shall carry guarantee for 10 years against any leakage.For vertical surface two coats @0.70 kg per sqm			
	Net Total	39.960sqm	@595.25/sqm	23786.19
1.015	22.23.2			
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin-charge. The product performance shall carry guarantee for 10 years against any leakage.For horizontal surface one coat @1.10 kg per sqm.			
	Net Total	14.225sqm	@458.80/sqm	6526.43
1.016	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	211.370sqm	@418.80/sqm	88521.76
1.017	19.18.1			
	Supplying and fixing C.I with out frame for manholes:455 x 610 mm rectangular C.I cover (light duty) the weight of the cover to be no less than 23 kg			
	Net Total	4.000each	@1629.51/each	6518.04
1.018	OD53942/2022-2023			

Sl No	Specification	Quantity	Rate	Amount
	Supply of uPVC Pipe, IS 4985:2000,10Kg/cm2,110mmDia.-and fixing			
	Net Total	1.350metre	@572.91/metre	773.43
1.019	19.16			
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786, having minimum cross section as 23 mm x 25 mm and over all minimum length 263 mm and width as 165 mm with minimum 112 mm space between protruded legs having 2 mm tread on top surface by ribbing or chequering besides necessary and adequate anchoring projections on tail length on 138 mm as per standard drawing and suitable to with stand the bend test and chemical resistance test as per specifications and having manufactures permanent identification mark to be visible even after fixing including fixing in manholes with 30x20x15 cm cement concrete block 1:3:6 (1cement: 3 coarse sand: 6 graded stone aggregate 20 mm nominal size) Complete as per design			
	Net Total	12.000each	@568.91/each	6826.92
1.020	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	26.820Kilo litre	@190.05/Kilo litre	5097.14
1.021	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	211.370sqm	@232.70/sqm	49185.80
			Heading Total(Rs)	1072622.59
2	**SCREEN CHANNEL**			
2.001	5.37.1			
	Providing and laying in position ready mixed M-25 grade concrete for reinforced cement concrete work, using cement content as per approved design mix, manufactured in fully automatic batching plant and transported to site of work in transit mixer for all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding the cost of centering, shuttering finishing and reinforcement including cost of admixtures in recommended proportions as per IS: 9103 to accelerate/ retard setting of concrete, improve workability without impairing strength and durability as per direction of the Engineer - in -charge. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All wiork upto plinth level			
	Net Total	15.355cum	@10319.09/cum	158449.63
2.002	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			

Sl No	Specification	Quantity	Rate	Amount
	grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).			
	Net Total	15.350cum	@85.68/cum	1315.19
2.003	OD54060/2022-2023			
	Extra for providing sulphate resistant cement for the structures			
	Net Total	15.350cum	@1800.16/cum	27632.46
2.004	5.22.6			
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more			
	Net Total	1842.000kilogram	@102.61/kilogram	189007.62
2.005	OD54067/2022-2023			
	Extra for providing epoxy coating for reinforcement bar			
	Net Total	1842.000kg	@2.00/kg	3684.00
2.006	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	5219.000kg	@1.40/kg	7306.60
2.007	5.9.2			
	Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.			
	Net Total	68.475sqm	@748.62/sqm	51261.75
2.008	5.9.3			
	Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform			
	Net Total	26.325sqm	@851.49/sqm	22415.47
2.009	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-			

Sl No	Specification	Quantity	Rate	Amount
	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	39.000sqm	@595.25/sqm	23214.75
2.010	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	16.575sqm	@458.80/sqm	7604.61
2.011	13.7.1			
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)			
	Net Total	106.275sqm	@418.80/sqm	44507.97
2.012	19.16			
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786, having minimum cross section as 23 mm x 25 mm and over all minimum length 263 mm and width as 165 mm with minimum 112 mm space between protruded legs having 2 mm tread on top surface by ribbing or chequering besides necessary and adequate anchoring projections on tail length on 138 mm as per standard drawing and suitable to with stand the bend test and chemical resistance test as per specifications and having manufactures permanent identification mark to be visible even after fixing including fixing in manholes with 30x20x15 cm cement concrete block 1:3:6 (1cement: 3 coarse sand: 6 graded stone aggregate 20 mm nominal size) Complete as per design			
	Net Total	8.000each	@568.91/each	4551.28
2.013	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	8.775Kilo litre	@190.05/Kilo litre	1667.69
2.014	13.52.2			

Sl No	Specification	Quantity	Rate	Amount
	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	106.280sqm	@232.70/sqm	24731.36
			Heading Total(Rs)	567350.38
3	**OIL AND GREASE TRAP**			
3.001	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	21.079cum	@10319.09/cum	217516.10
3.002	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	24.104cum	@85.68/cum	2065.23
3.003	OD54273/2022-2023			
	Extra for providing sulphate resistant cement for the structures			
	Net Total	24.104cum	@1800.16/cum	43391.06
3.004	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	3.024cum	@12043.58/cum	36419.79
3.005	5.22.6			
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing			

Sl No	Specification	Quantity	Rate	Amount
	in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more			
	Net Total	2832.600kilogram	@102.61/kilogram	290653.09
3.006	OD54277/2022-2023			
	Extra for providing epoxy coating for reinforcement bar			
	Net Total	2832.600kg	@2.00/kg	5665.20
3.007	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	8197.400kg	@1.40/kg	11476.36
3.008	5.9.2			
	Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.			
	Net Total	104.400sqm	@748.62/sqm	78155.93
3.009	5.9.3			
	Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform			
	Net Total	44.313sqm	@851.49/sqm	37732.08
3.010	22.23.1			
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin-charge. The product performance shall carry guarantee for 10 years against any leakage.For vertical surface two coats @0.70 kg per sqm			
	Net Total	42.500sqm	@595.25/sqm	25298.13
3.011	22.23.2			
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts			

Sl No	Specification	Quantity	Rate	Amount
	integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin- charge. The product performance shall carry guarantee for 10 years against any leakage.For horizontal surface one coat @1.10 kg per sqm.			
	Net Total	18.063sqm	@458.80/sqm	8287.30
3.012	13.7.1			
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)			
	Net Total	184.645sqm	@418.80/sqm	77329.33
3.013	19.18.1			
	Supplying and fixing C.I with out frame for manholes:455 x 610 mm rectangular C.I cover (light duty) the weight of the cover to be no less than 23 kg			
	Net Total	2.000each	@1629.51/each	3259.02
3.014	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	7.000each	@568.91/each	3982.37
3.015	OD54332/2022-2023			
	Supply of uPVC Pipe, IS 4985:2000,10Kg/cm2,110mmDia.-and fixing			
	Net Total	0.450metre	@572.91/metre	257.81
3.016	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	50.625Kilo litre	@190.05/Kilo litre	9621.28
3.017	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,			

Sl No	Specification	Quantity	Rate	Amount
	preparation of surface, etc. complete.On concrete work			
	Net Total	184.650sqm	@232.70/sqm	42968.06
3.018	10.26.3			
	Providing and fixing hand rail of approved size by welding etc. to steel ladder railing, balcony railing, staircase railing and similar works, including applying priming coat of approves steel primer.G.I. pipes			
	Net Total	485.754kg	@194.15/kg	94309.14
3.019	13.48.3			
	Finishing with Deluxe Multi surface paint system for interiors and exteriors using primer as per manufacturers specifications:Painting Steel work with Deluxe Multi Surface Paint to give an even shade. Two or more coat applied @ 0.90 ltr/10 sqm over an under coat of primer applied @ 0.80 ltr/10 sqm of approved brand and manufacture			
	Net Total	15.240sqm	@154.59/sqm	2355.95
			Heading Total(Rs)	990743.23
4	**GRIT SEPERATOR**			
4.001	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	26.984cum	@10319.09/cum	278450.32
4.002	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	26.990cum	@85.68/cum	2312.50
4.003	OD54408/2022-2023			
	Extra for providing sulphate resistant cement for the structures			
	Net Total	26.990cum	@1800.16/cum	48586.32
4.004	5.22.6			
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more			

Sl No	Specification	Quantity	Rate	Amount
	Net Total	3238.800kilogram	@102.61/kilogram	332333.27
4.005	OD71095/2022-2023			
	Extra for providing epoxy coating for reinforcement bar			
	Net Total	3238.080kg	@2.00/kg	6476.16
4.006	4.12			
	Extra for providing and mixing water proofing material in cement concrete work in doses by weight of cement as per manufacturer's specification .			
	Net Total	9176.600kg	@1.40/kg	12847.24
4.007	5.9.2			
	Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.			
	Net Total	141.340sqm	@748.62/sqm	105809.95
4.008	5.9.3			
	Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform			
	Net Total	2.970sqm	@851.49/sqm	2528.93
4.009	22.23.1			
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin-charge. The product performance shall carry guarantee for 10 years against any leakage.For vertical surface two coats @0.70 kg per sqm			
	Net Total	69.960sqm	@595.25/sqm	41643.69
4.010	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			

Sl No	Specification	Quantity	Rate	Amount
	shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin- charge. The product performance shall carry guarantee for 10 years against any leakage.For horizontal surface one coat @1.10 kg per sqm.			
	Net Total	20.250sqm	@458.80/sqm	9290.70
4.011	13.7.1			
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)			
	Net Total	201.429sqm	@418.80/sqm	84358.47
4.012	19.18.1			
	Supplying and fixing C.I with out frame for manholes:455 x 610 mm rectangular C.I cover (light duty) the weight of the cover to be no less than 23 kg			
	Net Total	2.000each	@1629.51/each	3259.02
4.013	OD54500/2022-2023			
	Supply of uPVC Pipe, IS 4985:2000,10Kg/cm2,110mmDia.-and fixing			
	Net Total	0.450metre	@572.91/metre	257.81
4.014	19.16			
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786, having minimum cross section as 23 mm x 25 mm and over all minimum length 263 mm and width as 165 mm with minimum 112 mm space between protruded legs having 2 mm tread on top surface by ribbing or chequering besides necessary and adequate anchoring projections on tail length on 138 mm as per standard drawing and suitable to with stand the bend test and chemical resistance test as per specifications and having manufactures permanent identification mark to be visible even after fixing including fixing in manholes with 30x20x15 cm cement concrete block 1:3:6 (1cement: 3 coarse sand: 6 graded stone aggregate 20 mm nominal size) Complete as per design			
	Net Total	9.000each	@568.91/each	5120.19
4.015	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	49.604Kilo litre	@190.05/Kilo litre	9427.24
4.016	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			

Sl No	Specification	Quantity	Rate	Amount
	Net Total	201.450sqm	@232.70/sqm	46877.42
			Heading Total(Rs)	989579.23
5	**EQUALISATION TANK**			
5.001	2.6.1			
	Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed.All kinds of soil			
	Net Total	686.940cum	@223.41/cum	153469.27
5.002	OD54720/2022-2023			
	Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30cm in depth,1.5m in width aswell as 10 sqm on plan)including disposal of excavated earth ,lead up to 50m and lift up to 1.5 m ,disposed earth to be levelled and neatly dressed .All kind of soil-additional lift 1.5to 3m			
	Net Total	686.940cum	@334.44/cum	229740.21
5.003	OD54726/2022-2023			
	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 - additional depth 3.0 to 4.5 m.			
	Net Total	686.940cum	@445.49/cum	306024.90
5.004	OD54733/2022-2023			
	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 - additional depth 4.5 to 6m.			
	Net Total	480.858cum	@556.54/cum	267616.71
5.005	4.1.6			
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 40 mm nominal size)			
	Net Total	68.694cum	@7527.05/cum	517063.17
5.006	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			

Sl No	Specification	Quantity	Rate	Amount
	- 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	233.028cum	@10319.09/cum	2404636.90
5.007	OD54757/2022-2023			
	Extra for providing sulphate resistant cement for the structures			
	Net Total	463.720cum	@1800.16/cum	834770.20
5.008	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	463.720cum	@85.68/cum	39731.53
5.009	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	230.696cum	@12043.58/cum	2778405.73
5.010	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	55646.880kilogram	@102.61/kilogram	5709926.36
5.011	OD56162/2022-2023			
	Extra for providing epoxy coating for reinforcement bar			
	Net Total	55646.880kg	@2.00/kg	111293.76
5.012	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	157664.800kg	@1.40/kg	220730.72
5.013	5.9.1			
	Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete			

Sl No	Specification	Quantity	Rate	Amount
	Net Total	259.920sqm	@350.00/sqm	90972.00
5.014	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	1106.730sqm	@748.62/sqm	828520.21
5.015	5.9.3			
	Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform			
	Net Total	420.210sqm	@851.49/sqm	357804.61
5.016	22.23.1			
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin-charge. The product performance shall carry guarantee for 10 years against any leakage.For vertical surface two coats @0.70 kg per sqm			
	Net Total	324.000sqm	@595.25/sqm	192861.00
5.017	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	324.000sqm	@458.80/sqm	148651.20

Sl No	Specification	Quantity	Rate	Amount
5.018	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	2046.330sqm	@418.80/sqm	857003.00
5.019	2.25			
	Filling available excavated earth (excluding rock) in trenches, plinth, sides of foundation etc. in layers not exceeding 20 cm in depth, consolidating each deposited layer by ramming and watering, lead up to 50 m and lift up to 1.5 m.			
	Net Total	1011.804cum	@269.88/cum	273065.66
5.020	19.16			
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786, having minimum cross section as 23 mm x 25 mm and over all minimum length 263 mm and width as 165 mm with minimum 112 mm space between protruded legs having 2 mm tread on top surface by ribbing or chequering besides necessary and adequate anchoring projections on tail length on 138 mm as per standard drawing and suitable to with stand the bend test and chemical resistance test as per specifications and having manufactures permanent identification mark to be visible even after fixing including fixing in manholes with 30x20x15 cm cement concrete block 1:3:6 (1cement: 3 coarse sand: 6 graded stone aggregate 20 mm nominal size) Complete as per design			
	Net Total	14.000each	@568.91/each	7964.74
5.021	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	1409.805Kilo litre	@190.05/Kilo litre	267933.44
5.022	10.26.3			
	Providing and fixing hand rail of approved size by welding etc. to steel ladder railing, balcony railing, staircase railing and similar works, including applying priming coat of approves steel primer.G.I. pipes			
	Net Total	1907.022kg	@194.15/kg	370248.32
5.023	13.48.3			
	Finishing with Deluxe Multi surface paint system for interiors and exteriors using primer as per manufacturers specifications:Painting Steel work with Deluxe Multi Surface Paint to give an even shade. Two or more coat applied @ 0.90 ltr/10 sqm over an under coat of primer applied @ 0.80 ltr/10 sqm of approved brand and manufacture			
	Net Total	59.277sqm	@154.59/sqm	9163.63
5.024	13.52.2			
	Finishing with Epoxy paint (two or more coats) at all locations prepared and applied as per manufacturer's specifications including appropriate priming coat, preparation of surface, etc. complete.On concrete work			

Sl No	Specification	Quantity	Rate	Amount
	Net Total	1912.770sqm	@232.70/sqm	445101.58
			Heading Total(Rs)	17422698.85
6	**DILUTION TANK FOR CO TREATMENT-rectangular**			
6.001	2.6.1			
	Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed.All kinds of soil			
	Net Total	103.680cum	@223.41/cum	23163.15
6.002	OD55372/2022-2023			
	Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30cm in depth,1.5m in width aswell as 10 sqm on plan)including disposal of excavated earth ,lead up to 50m and lift up to 1.5 m ,disposed earth to be levelled and neatly dressed .All kind of soil-additional lift 1.5to 3m			
	Net Total	114.048cum	@334.44/cum	38142.21
6.003	4.1.6			
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 40 mm nominal size)			
	Net Total	10.368cum	@7527.05/cum	78040.45
6.004	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	65.043cum	@10319.09/cum	671184.57
6.005	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			

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 work above plinth level upto floor V level			
	Net Total	9.951cum	@12043.58/cum	119845.66
6.006	5.34.1			
	Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).			
	Net Total	74.994cum	@85.68/cum	6425.49
6.007	OD55377/2022-2023			
	Extra for providing sulphate resistant cement for the structures			
	Net Total	74.994cum	@1800.16/cum	135001.20
6.008	5.22.6			
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more			
	Net Total	8999.280kilogram	@102.61/kilogram	923416.12
6.009	OD55381/2022-2023			
	Extra for providing epoxy coating for reinforcement bar			
	Net Total	8999.280kg	@2.00/kg	17998.56
6.010	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	25398.450kg	@1.40/kg	35557.83
6.011	5.9.1			
	Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete			
	Net Total	54.560sqm	@350.00/sqm	19096.00
6.012	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	228.000sqm	@748.62/sqm	170685.36
6.013	5.9.3			
	Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform			
	Net Total	83.820sqm	@851.49/sqm	71371.89
6.014	22.23.1			
	Providing and applying integral crystalline slurry of hydrophilic in nature for			

Sl No	Specification	Quantity	Rate	Amount
	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	108.000sqm	@595.25/sqm	64287.00
6.015	22.23.2			
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin-charge. The product performance shall carry guarantee for 10 years against any leakage.For horizontal surface one coat @1.10 kg per sqm.			
	Net Total	40.000sqm	@458.80/sqm	18352.00
6.016	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	406.240sqm	@418.80/sqm	170133.31
6.017	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	62.865cum	@269.88/cum	16966.01
6.018	19.18.1			
	Supplying and fixing C.I with out frame for manholes:455 x 610 mm rectangular C.I			

Sl No	Specification	Quantity	Rate	Amount
	cover (light duty) the weight of the cover to be no less than 23 kg			
	Net Total	4.000each	@1629.51/each	6518.04
6.019	OD55499/2022-2023			
	Supply of uPVC Pipe, IS 4985:2000,10Kg/cm2,110mmDia.-and fixing			
	Net Total	0.900metre	@572.91/metre	515.62
6.020	19.16			
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786, having minimum cross section as 23 mm x 25 mm and over all minimum length 263 mm and width as 165 mm with minimum 112 mm space between protruded legs having 2 mm tread on top surface by ribbing or chequering besides necessary and adequate anchoring projections on tail length on 138 mm as per standard drawing and suitable to with stand the bend test and chemical resistance test as per specifications and having manufactures permanent identification mark to be visible even after fixing including fixing in manholes with 30x20x15 cm cement concrete block 1:3:6 (1cement: 3 coarse sand: 6 graded stone aggregate 20 mm nominal size) Complete as per design			
	Net Total	18.000each	@568.91/each	10240.38
6.021	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	120.000Kilo litre	@190.05/Kilo litre	22806.00
6.022	10.26.3			
	Providing and fixing hand rail of approved size by welding etc. to steel ladder railing, balcony railing, staircase railing and similar works, including applying priming coat of approves steel primer.G.I. pipes			
	Net Total	665.571kg	@194.15/kg	129220.61
6.023	13.48.3			
	Finishing with Deluxe Multi surface paint system for interiors and exteriors using primer as per manufacturers specifications:Painting Steel work with Deluxe Multi Surface Paint to give an even shade. Two or more coat applied @ 0.90 ltr/10 sqm over an under coat of primer applied @ 0.80 ltr/10 sqm of approved brand and manufacture			
	Net Total	20.768sqm	@154.59/sqm	3210.53
6.024	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	304.240sqm	@232.70/sqm	70796.65
			Heading Total(Rs)	2822974.64
7	**MOVING BED BIOFILM REACTOR TANK-BOD REMOVAL**			

Sl No	Specification	Quantity	Rate	Amount
7.001	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	119.917cum	@223.41/cum	26790.66
7.002	4.1.6			
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 40 mm nominal size)			
	Net Total	51.138cum	@7527.05/cum	384918.28
7.003	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	177.040cum	@10319.09/cum	1826891.69
7.004	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	970.331cum	@12043.58/cum	11686259.02
7.005	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	1147.208cum	@85.68/cum	98292.78

Sl No	Specification	Quantity	Rate	Amount
7.006	OD55694/2022-2023			
	Extra for providing sulphate resistant cement for the structures			
	Net Total	1147.208cum	@1800.16/cum	2065157.95
7.007	5.22.6			
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more			
	Net Total	288621.960kilogram	@102.61/kilogram	29615499.32
7.008	OD55693/2022-2023			
	Extra for providing epoxy coating for reinforcement bar			
	Net Total	288621.960kg	@2.00/kg	577243.92
7.009	4.12			
	Extra for providing and mixing water proofing material in cement concrete work in doses by weight of cement as per manufacturer's specification .			
	Net Total	390050.720kg	@1.40/kg	546071.01
7.010	5.9.1			
	Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete			
	Net Total	418.770sqm	@350.00/sqm	146569.50
7.011	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	5440.353sqm	@748.62/sqm	4072757.06
7.012	22.23.1			
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin-charge. The product performance shall carry guarantee for 10 years against any leakage.For vertical surface two coats @0.70 kg per sqm			
	Net Total	604.100sqm	@595.25/sqm	359590.53

Sl No	Specification	Quantity	Rate	Amount
7.013	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	655.446sqm	@458.80/sqm	300718.62
7.014	6.31.2			
	Brick work with common burnt clay machine moulded perforated modular bricks of class designation 12.5 conforming to IS : 2222 in exposed brick work including making horizontal and vertical grooves 10 mm wide 12 mm deep complete in cement mortar 1:6 (1 cement : 6 coarse sand)Above plinth level and upto floor V level			
	Net Total	6.890cum	@9281.31/cum	63948.23
7.015	10.6.1			
	Supplying and fixing rolling shutters of approved make, made of required size M.S. laths, interlocked together through their entire length and jointed together at the end by end locks, mounted on specially designed pipe shaft with brackets, side guides and arrangements for inside and outside locking with push and pull operation complete, including the cost of providing and fixing necessary 27.5 cm long wire springs manufactured from high tensile steel wire of adequate strength conforming to IS: 4454 - part 1 and M.S. top cover of required thickness for rolling shutters.80x1.25 mm M.S. laths with 1.25 mm thick top cover			
	Net Total	11.520sqm	@3617.31/sqm	41671.41
7.016	10.9			
	Extra for providing grilled rolling shutters manufactured out of 8 mm dia M.S. bar instead of laths as per design approved by Engineer -in-Charges, (area of grill to be measured).			
	Net Total	11.520sqm	@821.94/sqm	9468.75
7.017	5.21			
	Extra for providing and fixing expanded metal mesh of size 20x60 mm and strands 3.25 mm wide 1.6 mm thick weighing 3.64 kg per sqm for encasing or rolled steel sections in beams, columns and grillages excluding cost of hangers.			
	Net Total	27.880sqm	@545.46/sqm	15207.42
7.018	13.7.1			

Sl No	Specification	Quantity	Rate	Amount
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)			
	Net Total	6174.020sqm	@418.80/sqm	2585679.58
7.019	19.16			
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786, having minimum cross section as 23 mm x 25 mm and over all minimum length 263 mm and width as 165 mm with minimum 112 mm space between protruded legs having 2 mm tread on top surface by ribbing or chequering besides necessary and adequate anchoring projections on tail length on 138 mm as per standard drawing and suitable to with stand the bend test and chemical resistance test as per specifications and having manufactures permanent identification mark to be visible even after fixing including fixing in manholes with 30x20x15 cm cement concrete block 1:3:6 (1cement: 3 coarse sand: 6 graded stone aggregate 20 mm nominal size) Complete as per design			
	Net Total	44.000each	@568.91/each	25032.04
7.020	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	2382.520Kilo litre	@190.05/Kilo litre	452797.93
7.021	10.26.3			
	Providing and fixing hand rail of approved size by welding etc. to steel ladder railing, balcony railing, staircase railing and similar works, including applying priming coat of approves steel primer.G.I. pipes			
	Net Total	4069.800kg	@194.15/kg	790151.67
7.022	13.48.3			
	Finishing with Deluxe Multi surface paint system for interiors and exteriors using primer as per manufacturers specifications:Painting Steel work with Deluxe Multi Surface Paint to give an even shade. Two or more coat applied @ 0.90 ltr/10 sqm over an under coat of primer applied @ 0.80 ltr/10 sqm of approved brand and manufacture			
	Net Total	167.080sqm	@154.59/sqm	25828.90
7.023	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	6173.910sqm	@232.70/sqm	1436668.86
7.024	20.5.3			
	Providing, driving and installing driven Pre-cast reinforced cement concrete piles of specified diameter and length below the pile cap in M-25 cement concrete to carry safe working load not less than specified. With a central through preformed hole with M.S. black pipe of dia, 40 mm for grouting with cement sand grouting of mix 1:2 (1 cement : 2 coarse sand) under sufficient positive pressure to ensure complete filling			

Sl No	Specification	Quantity	Rate	Amount
	including centering, shuttering, driving and removing the steel casing pipe and lifting casing etc. complete but excluding the cost of steel reinforcement. (Length of pile for payment shall be measured from top of the shoe to the bottom of pile cap).500 mm dia piles			
	Net Total	360.000metre	@4947.90/metre	1781244.00
7.025	20.2A.1			
	Boring, providing and installation bored cast-in-situ reinforced cement concrete piles of garde M-25 of specified diameter and length below 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. by Crawler mounted, telescopic boom hydraulic pilling Rig all complete, including removal of excavated earth with all its lifts and leads (length of pile for payment shall be measured up to bottom of pile cap). Note: Truck Mounted rotary/TMR/Tube well boring machine shall not be used.600 mm dia piles			
	Net Total	1620.000metre	@5191.83/metre	8410764.60
7.026	20.5.5			
	Providing, driving and installing driven Pre-cast reinforced cement concrete piles of specified diameter and length below the pile cap in M-25 cement concrete to carry safe working load not less than specified. With a central through preformed hole with M.S. black pipe of dia, 40 mm for grouting with cement sand grouting of mix 1:2 (1 cement : 2 coarse sand) under sufficient positive pressure to ensure complete filling including centering, shuttering, driving and removing the steel casing pipe and lifting casing etc. complete but excluding the cost of steel reinforcement. (Length of pile for payment shall be measured from top of the shoe to the bottom of pile cap).750 mm dia piles			
	Net Total	1080.000metre	@10810.53/metre	11675372.40
7.027	20.6.3.1			
	Vertical load testing of piles in accordance with IS 2911(Part IV) including installation of loading platform and preparation of pile head or construction of test cap and dismantling of test cap after test etc. complete as per specification & the direction of engineer -in-Charge. Group of two or more piles upto 50 tonne capacityInitial test			
	Net Total	8.000per test	@82193.55/per test	657548.40
7.028	20.6.3.2			
	Vertical load testing of piles in accordance with IS 2911(Part IV) including installation of loading platform and preparation of pile head or construction of test cap and dismantling of test cap after test etc. complete as per specification & the			

Sl No	Specification	Quantity	Rate	Amount
	direction of engineer -in-Charge. Group of two or more piles upto 50 tonne capacityRoutine test			
	Net Total	14.000per test	@48494.19/per test	678918.66
			Heading Total(Rs)	80357063.19
8	**SECONDARY CLARIFIER WITH PLATE SETTLER**			
8.001	2.6.1			
	Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed.All kinds of soil			
	Net Total	86.436cum	@223.41/cum	19310.67
8.002	4.1.6			
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 40 mm nominal size)			
	Net Total	14.406cum	@7527.05/cum	108434.68
8.003	5.37.1			
	Providing and laying in position ready mixed M-25 grade concrete for reinforced cement concrete work, using cement content as per approved design mix, manufactured in fully automatic batching plant and transported to site of work in transit mixer for all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding the cost of centering, shuttering finishing and reinforcement including cost of admixtures in recommended proportions as per IS: 9103 to accelerate/ retard setting of concrete, improve workability without impairing strength and durability as per direction of the Engineer - in -charge. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All wiork upto plinth level			
	Net Total	39.967cum	@10319.09/cum	412423.07
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	70.250cum	@12043.58/cum	846061.50

Sl No	Specification	Quantity	Rate	Amount
8.005	5.34.1			
	Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).			
	Net Total	110.210cum	@85.68/cum	9442.79
8.006	OD57007/2022-2023			
	Extra for providing sulphate resistant cement for the structures			
	Net Total	110.210cum	@1800.16/cum	198395.63
8.007	5.22.6			
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more			
	Net Total	13225.200kilogram	@102.61/kilogram	1357037.77
8.008	OD57006/2022-2023			
	Extra for providing epoxy coating for reinforcement bar			
	Net Total	13225.200kg	@2.00/kg	26450.40
8.009	4.12			
	Extra for providing and mixing water proofing material in cement concrete work in doses by weight of cement as per manufacturer's specification .			
	Net Total	37471.400kg	@1.40/kg	52459.96
8.010	5.9.1			
	Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete			
	Net Total	43.420sqm	@350.00/sqm	15197.00
8.011	5.9.2			
	Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.			
	Net Total	510.754sqm	@748.62/sqm	382360.66
8.012	22.23.1			
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline			

Sl No	Specification	Quantity	Rate	Amount
	slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin- charge. The product performance shall carry guarantee for 10 years against any leakage.For vertical surface two coats @0.70 kg per sqm			
	Net Total	181.800sqm	@595.25/sqm	108216.45
8.013	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	20.250sqm	@458.80/sqm	9290.70
8.014	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	409.210sqm	@418.80/sqm	171377.15
8.015	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	19.000each	@568.91/each	10809.29
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	248.375Kilo	@190.05/Kilo	47203.67

Sl No	Specification	Quantity	Rate	Amount
		litre	litre	
8.017	10.26.3			
	Providing and fixing hand rail of approved size by welding etc. to steel ladder railing, balcony railing, staircase railing and similar works, including applying priming coat of approves steel primer.G.I. pipes			
	Net Total	493.436kg	@194.15/kg	95800.60
8.018	13.48.3			
	Finishing with Deluxe Multi surface paint system for interiors and exteriors using primer as per manufacturers specifications:Painting Steel work with Deluxe Multi Surface Paint to give an even shade. Two or more coat applied @ 0.90 ltr/10 sqm over an under coat of primer applied @ 0.80 ltr/10 sqm of approved brand and manufacture			
	Net Total	15.480sqm	@154.59/sqm	2393.05
8.019	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	409.210sqm	@232.70/sqm	95223.17
			Heading Total(Rs)	3967888.21
9	**SLUDGE SUMP**			
9.001	2.6.1			
	Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed.All kinds of soil			
	Net Total	16.810cum	@223.41/cum	3755.52
9.002	4.1.6			
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 40 mm nominal size)			
	Net Total	2.522cum	@7527.05/cum	18983.22
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			

Sl No	Specification	Quantity	Rate	Amount
	Net Total	15.007cum	@10319.09/cum	154858.58
9.004	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	15.007cum	@85.68/cum	1285.80
9.005	OD57071/2022-2023			
	Extra for providing sulphate resistant cement for the structures			
	Net Total	15.007cum	@1800.16/cum	27015.00
9.006	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	1800.000kilogram	@102.61/kilogram	184698.00
9.007	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	5100.000kg	@1.40/kg	7140.00
9.008	OD57082/2022-2023			
	Extra for providing epoxy coating for reinforcement bar			
	Net Total	1800.000kg	@2.32/kg	4176.00
9.009	5.9.1			
	Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete			
	Net Total	18.840sqm	@350.00/sqm	6594.00
9.010	5.9.2			
	Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.			
	Net Total	64.947sqm	@748.62/sqm	48620.62
9.011	22.23.1			
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per			

Sl No	Specification	Quantity	Rate	Amount
	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	25.434sqm	@595.25/sqm	15139.59
9.012	22.23.2			
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin- charge. The product performance shall carry guarantee for 10 years against any leakage.For horizontal surface one coat @1.10 kg per sqm.			
	Net Total	7.070sqm	@458.80/sqm	3243.72
9.013	13.7.1			
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)			
	Net Total	73.394sqm	@418.80/sqm	30737.41
9.014	19.16			
	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steeel bar conforming to IS:1786, having minimum cross section as 23 mm x 25 mm and over all minimum length 263 mm and width as 165 mm with minimum 112 mm space between protruded legs having 2 mm tread on top surface by ribbing or chequering besides necessary and adequate anchoring projections on tail length on 138 mm as per standard drawing and suitable to with stand the bend test and chemical resistance test as per specifications and having manufactures permanent identification mark to be visible even after fixing including fixing in manholes with 30x20x15 cm cement concrete block 1:3:6 (1cement: 3 coarse sand: 6 graded stone aggregate 20 mm nominal size) Complete as per design			
	Net Total	8.000each	@568.91/each	4551.28
9.015	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			

Sl No	Specification	Quantity	Rate	Amount
	tanker lorry, tools and other appliences and cost of water etc. complete.			
	Net Total	19.089Kilo litre	@190.05/Kilo litre	3627.86
9.016	10.26.3			
	Providing and fixing hand rail of approved size by welding etc. to steel ladder railing, balcony railing, staircase railing and similar works, including applying priming coat of approves steel primer.G.I. pipes			
	Net Total	147.168kg	@194.15/kg	28572.67
9.017	13.48.3			
	Finishing with Deluxe Multi surface paint system for interiors and exteriors using primer as per manufacturers specifications:Painting Steel work with Deluxe Multi Surface Paint to give an even shade. Two or more coat applied @ 0.90 ltr/10 sqm over an under coat of primer applied @ 0.80 ltr/10 sqm of approved brand and manufacture			
	Net Total	4.617sqm	@154.59/sqm	713.74
9.018	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	73.380sqm	@232.70/sqm	17075.53
			Heading Total(Rs)	560788.54
10	**SLUDGE THICKENER-Circular**			
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	80.688cum	@223.41/cum	18026.51
10.002	4.1.6			
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 40 mm nominal size)			
	Net Total	10.086cum	@7527.05/cum	75917.83
10.003	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			

Sl No	Specification	Quantity	Rate	Amount
	/less cement used as per design mix is payable/recoverable separately.All wiork upto plinth level			
	Net Total	48.766cum	@10319.09/cum	503220.74
10.004	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	48.760cum	@85.68/cum	4177.76
10.005	OD57321/2022-2023			
	Extra for providing sulphate resistant cement for the structures			
	Net Total	48.760cum	@1800.16/cum	87775.80
10.006	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	5851.200kilogram	@102.61/kilogram	600391.63
10.007	OD57320/2022-2023			
	Extra for providing epoxy coating for reinforcement bar			
	Net Total	5851.200kg	@2.00/kg	11702.40
10.008	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	16578.400kg	@1.40/kg	23209.76
10.009	5.9.1			
	Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete			
	Net Total	46.040sqm	@350.00/sqm	16114.00
10.010	5.9.2			
	Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.			
	Net Total	143.950sqm	@748.62/sqm	107763.85
10.011	22.23.1			
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material			

Sl No	Specification	Quantity	Rate	Amount
	shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin-charge. The product performance shall carry guarantee for 10 years against any leakage.For vertical surface two coats @0.70 kg per sqm			
	Net Total	54.175sqm	@595.25/sqm	32247.67
10.012	22.23.2			
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin-charge. The product performance shall carry guarantee for 10 years against any leakage.For horizontal surface one coat @1.10 kg per sqm.			
	Net Total	37.390sqm	@458.80/sqm	17154.53
10.013	13.7.1			
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)			
	Net Total	219.305sqm	@418.80/sqm	91844.93
10.014	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	7.000each	@568.91/each	3982.37
10.015	100.36.1			
	Filling water with 5000 litre tankers fited in lorry and conveying water from a			

Sl No	Specification	Quantity	Rate	Amount
	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	93.425Kilo litre	@190.05/Kilo litre	17755.42
10.016	10.26.3			
	Providing and fixing hand rail of approved size by welding etc. to steel ladder railing, balcony railing, staircase railing and similar works, including applying priming coat of approves steel primer.G.I. pipes			
	Net Total	364.487kg	@194.15/kg	70765.15
10.017	13.48.3			
	Finishing with Deluxe Multi surface paint system for interiors and exteriors using primer as per manufacturers specifications:Painting Steel work with Deluxe Multi Surface Paint to give an even shade. Two or more coat applied @ 0.90 ltr/10 sqm over an under coat of primer applied @ 0.80 ltr/10 sqm of approved brand and manufacture			
	Net Total	11.435sqm	@154.59/sqm	1767.74
10.018	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	219.300sqm	@232.70/sqm	51031.11
			Heading Total(Rs)	1734849.20
11	**FILTER FEED TANK-Rectangular**			
11.001	2.6.1			
	Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed.All kinds of soil			
	Net Total	25.205cum	@223.41/cum	5631.05
11.002	4.1.6			
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 40 mm nominal size)			
	Net Total	7.562cum	@7527.05/cum	56919.55
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			

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	37.564cum	@10319.09/cum	387626.30
11.004	OD57371/2022-2023			
	Extra for providing sulphate resistant cement for the structures			
	Net Total	37.564cum	@1800.16/cum	67621.21
11.005	5.34.1			
	Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).			
	Net Total	37.564cum	@85.68/cum	3218.48
11.006	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	4507.680kilogram	@102.61/kilogram	462533.04
11.007	OD57425/2022-2023			
	Extra for providing epoxy coating for reinforcement bar			
	Net Total	37.564kg	@2.00/kg	75.13
11.008	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	12771.760kg	@1.40/kg	17880.46
11.009	5.9.1			
	Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete			
	Net Total	42.600sqm	@350.00/sqm	14910.00
11.010	5.9.2			
	Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.			
	Net Total	142.040sqm	@748.62/sqm	106333.98
11.011	22.23.1			
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts			

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 vertical surface two coats @0.70 kg per sqm			
	Net Total	60.000sqm	@595.25/sqm	35715.00
11.012	22.23.2			
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin- charge. The product performance shall carry guarantee for 10 years against any leakage.For horizontal surface one coat @1.10 kg per sqm.			
	Net Total	36.000sqm	@458.80/sqm	16516.80
11.013	13.7.1			
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)			
	Net Total	161.000sqm	@418.80/sqm	67426.80
11.014	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	7.000each	@568.91/each	3982.37
11.015	100.36.1			

Sl No	Specification	Quantity	Rate	Amount
	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	90.000Kilo litre	@190.05/Kilo litre	17104.50
11.016	10.26.3			
	Providing and fixing hand rail of approved size by welding etc. to steel ladder railing, balcony railing, staircase railing and similar works, including applying priming coat of approves steel primer.G.I. pipes			
	Net Total	413.111kg	@194.15/kg	80205.50
11.017	13.48.3			
	Finishing with Deluxe Multi surface paint system for interiors and exteriors using primer as per manufacturers specifications:Painting Steel work with Deluxe Multi Surface Paint to give an even shade. Two or more coat applied @ 0.90 ltr/10 sqm over an under coat of primer applied @ 0.80 ltr/10 sqm of approved brand and manufacture			
	Net Total	3.935sqm	@154.59/sqm	608.31
11.018	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	161.000sqm	@232.70/sqm	37464.70
			Heading Total(Rs)	1381773.18
12	**TREATED WATER TANK-CHLORINE CONTACT TANK Rectangular**			
12.001	2.6.1			
	Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed.All kinds of soil			
	Net Total	193.489cum	@223.41/cum	43227.38
12.002	OD57489/2022-2023			
	Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30cm in depth,1.5m in width aswell as 10 sqm on plan)including disposal of excavated earth ,lead up to 50m and lift up to 1.5 m ,disposed earth to be levelled and neatly dressed .All kind of soil-additional lift 1.5to 3m			
	Net Total	193.489cum	@334.44/cum	64710.46
12.003	OD57488/2022-2023			
	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 - additional depth 3.0 to 4.5 m.			
	Net Total	58.047cum	@445.49/cum	25859.36

Sl No	Specification	Quantity	Rate	Amount
12.004	4.1.6			
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 40 mm nominal size)			
	Net Total	19.349cum	@7527.05/cum	145640.89
12.005	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	138.882cum	@10319.09/cum	1433135.86
12.006	5.34.1			
	Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).			
	Net Total	138.880cum	@85.68/cum	11899.24
12.007	OD57637/2022-2023			
	Extra for providing sulphate resistant cement for the structures			
	Net Total	138.880cum	@3152.04/cum	437755.32
12.008	5.22.6			
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more			
	Net Total	55059.600kilogram	@102.61/kilogram	5649665.56
12.009	OD57636/2022-2023			
	Extra for providing epoxy coating for reinforcement bar			
	Net Total	55059.600kg	@2.00/kg	110119.20
12.010	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	47219.200kg	@1.40/kg	66106.88
12.011	5.9.1			

Sl No	Specification	Quantity	Rate	Amount
	Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete			
	Net Total	123.720sqm	@350.00/sqm	43302.00
12.012	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	566.908sqm	@748.62/sqm	424398.67
12.013	22.23.1			
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin-charge. The product performance shall carry guarantee for 10 years against any leakage.For vertical surface two coats @0.70 kg per sqm			
	Net Total	204.750sqm	@595.25/sqm	121877.44
12.014	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	104.376sqm	@458.80/sqm	47887.71
12.015	13.7.1			
	12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1			

Sl No	Specification	Quantity	Rate	Amount
	cement : 3 fine sand)			
	Net Total	594.170sqm	@418.80/sqm	248838.40
12.016	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	26.000each	@568.91/each	14791.66
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	365.313Kilo litre	@190.05/Kilo litre	69427.74
12.018	10.26.3			
	Providing and fixing hand rail of approved size by welding etc. to steel ladder railing, balcony railing, staircase railing and similar works, including applying priming coat of approves steel primer.G.I. pipes			
	Net Total	625.409kg	@194.15/kg	121423.16
12.019	13.48.3			
	Finishing with Deluxe Multi surface paint system for interiors and exteriors using primer as per manufacturers specifications:Painting Steel work with Deluxe Multi Surface Paint to give an even shade. Two or more coat applied @ 0.90 ltr/10 sqm over an under coat of primer applied @ 0.80 ltr/10 sqm of approved brand and manufacture			
	Net Total	19.620sqm	@154.59/sqm	3033.06
12.020	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	594.170sqm	@232.70/sqm	138263.36
12.021	20.5.3			
	Providing, driving and installing driven Pre-cast reinforced cement concrete piles of specified diameter and length below the pile cap in M-25 cement concrete to carry safe working load not less than specified. With a central through preformed hole with M.S. black pipe of dia, 40 mm for grouting with cement sand grouting of mix 1:2 (1 cement : 2 coarse sand) under sufficient positive pressure to ensure complete filling including centering, shuttering, driving and removing the steel casing pipe and lifting			

Sl No	Specification	Quantity	Rate	Amount
	casing etc. complete but excluding the cost of steel reinforcement. (Length of pile for payment shall be measured from top of the shoe to the bottom of pile cap).500 mm dia piles			
	Net Total	900.000metre	@4947.90/metre	4453110.00
12.022	20.5.5			
	Providing, driving and installing driven Pre-cast reinforced cement concrete piles of specified diameter and length below the pile cap in M-25 cement concrete to carry safe working load not less than specified. With a central through preformed hole with M.S. black pipe of dia, 40 mm for grouting with cement sand grouting of mix 1:2 (1 cement : 2 coarse sand) under sufficient positive pressure to ensure complete filling including centering, shuttering, driving and removing the steel casing pipe and lifting casing etc. complete but excluding the cost of steel reinforcement. (Length of pile for payment shall be measured from top of the shoe to the bottom of pile cap).750 mm dia piles			
	Net Total	180.000metre	@10810.53/metre	1945895.40
12.023	20.6.3.1			
	Vertical load testing of piles in accordance with IS 2911(Part IV) including installation of loading platform and preparation of pile head or construction of test cap and dismantling of test cap after test etc. complete as per specification & the direction of engineer -in-Charge. Group of two or more piles upto 50 tonne capacityInitial test			
	Net Total	6.000per test	@82193.55/per test	493161.30
12.024	20.6.3.2			
	Vertical load testing of piles in accordance with IS 2911(Part IV) including installation of loading platform and preparation of pile head or construction of test cap and dismantling of test cap after test etc. complete as per specification & the direction of engineer -in-Charge. Group of two or more piles upto 50 tonne capacityRoutine test			
	Net Total	6.000per test	@48494.19/per test	290965.14
			Heading Total(Rs)	16404495.19
13	**ECO-FRIENDLY AND ADMINISTRATIVE UNITS**			
13.001	OD68432/2022-2023			
	Construction of administrative cum laboratary building			
	Net Total	300.000sqm	@16700.05/sqm	5010015.00
13.002	OD68444/2022-2023			
	Construction of blower room on roof top of MBBR with Truss roof			
	Net Total	196.000sqm	@100000.11/sqm	19600021.56
13.003	OD68445/2022-2023			
	Equipment, laboratory items , furniture and computer system for CIPS of IoT			
	Net Total	1.000each	@500000.00/each	500000.00

Sl No	Specification	Quantity	Rate	Amount
13.004	OD68446/2022-2023			
	Facility for Recycling purpose			
	Net Total	1.000each	@150000.00/each	150000.00
13.005	OD68521/2022-2023			
	Green Belt, Special Exterior Wall Garden and Landscaping, 3 layer buffer vegetation in the outer periphery with provision for landscape and internal roads, etc at STP site			
	Net Total	1.000each	@2090700.00/each	2090700.00
13.006	OD82214/2022-2023			
	Providing and installing acoustics services for necessary sound insulation standards.			
	Net Total	1.000each	@1000000.39/each	1000000.39
			Heading Total(Rs)	28350736.95
14	**MECHANICAL ITEMS-STP**			
14.001	OD67391/2022-2023			
	Supply, erection, testing, and commissioning of new generation non clog motor pump set having suitable discharge and head, including all accessories such as cost of the panel board with an ammeter, voltmeter, phase indicating lamps, change over switch, main switch, cost of soft starter, cable from panel board to starter, starter to motor, capacitors suction pipe, foot valve, Non return valve, suction and delivery pipes of required length, pressure gauge, earthing and wiring materials, cables etc. complete. - As per KWA/HO/SP-333/2014 Dtd.18-03-2016 of The Managing Director - for Centrifugal Pump sets			
	Net Total	124.000HP (Horse power)	@16858.01/HP (Horse power)	2090393.24
14.002	OD67442/2022-2023			
	MBBR media- Supplying and fixing of non-clogging freely moving biomass media of polypropylene construction Sp.Gravity 0.93 for MBBR reactor with required specific surface area, length 10-20 mm, dia 20-25 mm complete as per technical specification or as directed by Engineer in Charge			
	Net Total	800.640each	@24553.57/each	19658570.28
14.003	OD67510/2022-2023			
	Air Blower Supply, erection, testing and commissioning of twin lobe air blower for indoor application complete with acoustic canopy, air filter, motor of 1500 rpm , pulleys, pressure gauges, pressure relief valve, acoustic hood, suction silencer with suitable flanges, common motor and compressor base frame with motor belt tightening arrangement interconnecting line with flanges including all accessories complete as per technical specification or as Directed by Engineer in Charge. - 50-99HP, head 20-50m			

Sl No	Specification	Quantity	Rate	Amount
	Net Total	980.000HP (Horse power)	@16858.01/HP (Horse power)	16520849.80
14.004	OD67546/2022-2023			
	Bubble Diffuser for MBBR- Fine Bubble Diffuser Supplying and fixing of retrievable type fine bubble diffusers of 90mm dia,1500mm length, Ethylene Propylene Diene Monomer (EPDM) make with SStee1"x1",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 hos clamp, RCC block complete as per technical specification compatible for specified air flow			
	Net Total	4.000each	@66964.28/each	267857.12
14.005	OD67563/2022-2023			
	Air Grid Pipe Supply and installation of air pipes (HDPE) assembly into valves and other accessories as required for the blowers to various tanks as a complete unit.			
	Net Total	4.000each	@53570.99/each	214283.96
14.006	OD67571/2022-2023			
	Tube settler media- Media to be of UV stabilized PVC material, hexagonal chevron shaped, 750mm height and about 1.0mm thick and with tongue and groove tube fitting. The plan settling area should be between 10 – 12 m2/m3 /day minimum at 60o slope. The media is to be provided along with lock nuts as required.			
	Net Total	1.000each	@133928.00/each	133928.00
14.007	OD67584/2022-2023			
	"Supply, erection, testing, and commissioning of new generation non clog motor pump set having suitable discharge and head, including all accessories such as cost of the panel board with an ammeter, voltmeter, phase indicating lamps, change over switch, main switch, cost of soft starter, cable from panel board to starter, starter to motor, capacitors suction pipe, foot valve, Non return valve, suction and delivery pipes of required length, pressure gauge, earthing and wiring materials, cables etc. complete. - As per KWA/HO/SP-333/2014 Dtd.18-03-2016 of The Managing Director - for Centrifugal Pump sets.			
	Net Total	130.000HP (Horse power)	@16858.01/HP (Horse power)	2191541.30
14.008	OD67604/2022-2023			
	Pressure Sand Filter- Supply, installation and erection, testing and commissioning of of Pressure Sand Filter - MS vessel construction. Filter to be of MS construction with multiport valve for operations. Suitable stand / support should be provided along with the filter. Filtration rate should not be greater than 12 m3/hour/m2 of the filtration area. Dirt loading capacity to be sufficient to initiate backwash once in 8 hours i.e. once / shift. Filter to have inlet and outlet piping, inlet and outlet for backwash and air vent. Sand filter to be fitted with pressure guage at inlet and outlet. Sand filter main header is to be fitted with flow meter – turbine type / rotameter type with range up to minimum of 125% of the rated flow through the pipe line. Media to consist of graded pebble, coarse and fine sand. Depth of media to be as per recommendations provided in CPHEEO manual and all relevant IS Codes of prectice.			

Sl No	Specification	Quantity	Rate	Amount
	Cost includes supporting foundation.			
	Net Total	2.000each	@2271377.36/each	4542754.72
14.009	OD67645/2022-2023			
	Carbon Filter- Supply, Installation and erection, testing and commissioning of Activated Carbon Filter - MS composite vessel construction. Filter to be of MS construction with multiport valve for operations. Suitable stand / support should be provided along with the filter. Filtration rate should not be greater than 10 m3/hour/m2 of the filtration area. Filter to have inlet and outlet piping, inlet and outlet for backwash and air vent. Carbon filter to be fitted with pressure guage at outlet. Media to consist of graded pebble, coarse, fine sand and activated carbon. Depth of media to be as per recommendations provided in CPHEEO manual. Activated carbon should be of high quality for removal of impurities and to be used for waste water purification. Cost includes for foundation also.			
	Net Total	2.000each	@2555300.00/each	5110600.00
14.010	OD67666/2022-2023			
	Alum and Lime Dosing System- Supply, installation, commissioning and testing of Alum dosing tank having capacity 50 litre in LLDPE/ FRP/PP material and alum dosing electronic metering type pump of 1-3 LPH range with 2.5 bar working pressure.			
	Net Total	2.000each	@25000.01/each	50000.02
14.011	OD67702/2022-2023			
	Hypo Dosing System - Supply, installation, commissioning 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	2.000each	@399999.99/each	799999.98
14.012	OD67713/2022-2023			
	Odour control unit for co-treatment unit and STP.			
	Net Total	1.000each	@52267.50/each	52267.50
14.013	OD67725/2022-2023			
	Supply, erection, testing, and commissioning of new generation non clog motor pump set having suitable discharge and head, including all accessories such as cost of the panel board with an ammeter, voltmeter, phase indicating lamps, change over switch, main switch, cost of soft starter, cable from panel board to starter, starter to motor, capacitors suction pipe, foot valve, Non return valve, suction and delivery pipes of required length, pressure gauge, earthing and wiring materials, cables etc. complete.- centrifuge pump of screw type-- As per KWA/HO/SP-333/2014 Dtd.18-03-2016 of The Managing Director - centrifuge pump of screw type			
	Net Total	2.000HP (Horse power)	@23832.00/HP (Horse power)	47664.00
14.014	OD67748/2022-2023			
	Supply, erection, testing, and commissioning of new generation non clog motor pump			

Sl No	Specification	Quantity	Rate	Amount
	set having suitable discharge and head, including all accessories such as cost of the panel board with an ammeter, voltmeter, phase indicating lamps, change over switch, main switch, cost of soft starter, cable from panel board to starter, starter to motor, capacitors suction pipe, foot valve, Non return valve, suction and delivery pipes of required length, pressure gauge, earthing and wiring materials, cables etc. complete. - As per KWA/HO/SP-333/2014 Dtd.18-03-2016 of The Managing Director - for Centrifugal Pump sets.			
	Net Total	41.400HP (Horse power)	@27680.87/HP (Horse power)	1145988.02
14.015	OD67824/2022-2023			
	Mechanical arrangement for Oil and Grease trap			
	Net Total	1.000each	@25000.01/each	25000.01
14.016	OD67825/2022-2023			
	Mechanical arrangements for screens and grit removals			
	Net Total	4.000each	@300000.03/each	1200000.12
14.017	OD67826/2022-2023			
	Mechanical arrangement for anoxic tank			
	Net Total	1.000each	@200000.00/each	200000.00
14.018	OD67827/2022-2023			
	Mechanical arrangement for sludge thickner			
	Net Total	1.000each	@500000.00/each	500000.00
14.019	OD67967/2022-2023			
	Supply and installation of centrifuge.			
	Net Total	2.000each	@172191.00/each	344382.00
14.020	OD67969/2022-2023			
	Piping, initial channel arrangements, bypass arrangements, steel ladder, framework and fire fighting arrangements			
	Net Total	1.000each	@500000.00/each	500000.00
14.021	OD67970/2022-2023			
	Interconnecting piping system: • All process piping is to be in uPVC of approved ISI make, Class 2 minimum • All process valves to be in PP/PVC of Ball / Globe type• For valves in piping of ID > 150 mm, Butterfly valves are preferred • NRV should be provided at the common discharge header of all process pumps • Dosing lines to be in flexible Teflon / rigid PVC / HDPE. Detailed hydraulic analysis must be done for the system before supply and installation.			
	Net Total	1.000each	@311116.07/eac	311116.07

Sl No	Specification	Quantity	Rate	Amount
			h	
14.022	OD67968/2022-2023			
	Providing Mechanical arrangement for cleaning and flushing manholes, Collection of septic waste			
	Net Total	1.000each	@4000000.00/each	4000000.00
14.023	OD85408/2022-2023			
	Bar Screen-fine- Supply and installation, of manual bar screen, MS – epoxy frame to be fitted in bar screen chamber of specified width, with MS flat bars and 20 mm c/c gap between bars. The frame to be mounted on the chamber and provided with MS rake arm with racks for removal of collected solids and trough to be provided for transfer of the collected solids. Flow Rate and height should be as specified. Angle of Inclination: 45 Degree, Spacing: 6mm			
	Net Total	2.000each	@29037.50/each	58075.00
14.024	OD85412/2022-2023			
	Electromagnetic Flow meter, pressure and quality sensors- Supply and erection of electromagnetic flow meter, pressure and quality sensors compatible to IoT and central control system with flow recorder, digital flow/quality/pressure indicator, flow/quality/pressure integrator with sensors, totaliser, transmittal and display arrangements and all accessories including housing arrangements, etc. complete to fix in the incoming pipeline to STP or at the Screen channel as directed by the Engineer in Charge.			
	Net Total	2.000each	@51852.68/each	103705.36
14.025	OD85414/2022-2023			
	Bar Screen- Supply and installation, of manual bar screen, MS – epoxy frame to be fitted in bar screen chamber of specified width, with MS flat bars and 20 mm c/c gap between bars. The frame to be mounted on the chamber and provided with MS rake arm with racks for removal of collected solids and trough to be provided for transfer of the collected solids. Flow Rate and height should be as specified. Angle of Inclination: 45 Degree, Spacing: 20mm, Bar Size: 50x10 mm			
	Net Total	2.000each	@29037.50/each	58075.00
			Heading Total(Rs)	60127051.50
15	**ELECTRICAL WORKS-STP**			
15.001	OD68682/2022-2023			
	Supply Installation and commissioning of Diesel Generator at STP 5 MLD			
	Net Total	1.000each	@4561348.72/each	4561348.72
15.002	OD68680/2022-2023			
	ELECTRICAL & INSTRUMENTATION-Instrumentation items consisting of pressure guages, level switches, electro magnetic flow meter, normal flow meter , pressure gauges, IoT based sensors, electrical panels – Powder coated MCC Panel shall be Non compartmentalized free standing floor mounted, dust and vermin proof, with reinforcement of suitable size angle iron, channel, T -iron flats as			

Sl No	Specification	Quantity	Rate	Amount
	required. Panel shall be suitable for 415V, 3-Phase,50 Hz incomer. Switchgear components to include, but not limited to, MCCB for incomer and for each switchgear, suitable OLR and contactor provisions to be given as per guidelines of the Electrical authority. Panel to be fabricated based on the Motor Load List as given in the technical specifications AC: MS powder coated panel with switchgear components as per motor load list, fixed, floor mounted and non compartmentalized pane.INTERCONNECTING CABLING – Outgoing feeders from AC panel to each prime mover will be based on CEIG guidelines. Cables to be suitably protected either through (a) PVC conduit or (b) armored cables as appropriate Cabling includes glanding and termination for each prime mover. Cables should not be run on the ground or directly on the walls. Cables to be mounted on suitable runners / cable trays / PVC conduits as appropriate. All interconnecting cabling and glanding , termination accessories as per specifications.			
	Net Total	1.000each	@6250000.02/each	6250000.02
15.003	OD68681/2022-2023			
	Supply,installation and commisioning of solar units for STP			
	Net Total	1.000each	@1000000.00/each	1000000.00
15.004	OD85126/2022-2023			
	Transformer unit of 500 KVA indoor type including buildings, allied works and installation			
	Net Total	2.000each	@1400000.00/each	2800000.00
			Heading Total(Rs)	14611348.74
16	**COMPOUND WALL FOR STP SITEA AND WELL SITE**			
16.001	OD71862/2022-2023			
	For the construction of compound wall and road for STP site			
	Net Total	2.000L.S	@2000000.03/L.S	4000000.06
			Heading Total(Rs)	4000000.06
17	**SITE CLEARANCE**			
17.001	OD85449/2022-2023			
	Site preparation including clearing vegetation, cutting trees, demolition of buildings etc..			
	Net Total	1.000L.S	@2500000.00/L.S	2500000.00
			Heading Total(Rs)	2500000.00
18	**SATUATORY CHARGES**			
18.001	OD126185/2022-2023			
	Contingency including all statutory charges for STP and network			

Sl No	Specification	Quantity	Rate	Amount
	Net Total	1.000L.S	@1499999.99/L.S	1499999.99
			Heading Total(Rs)	1499999.99
			Total Estimation PAC	239361963.67
20	**Extra Charges**			
19.001	Provision for GST			
		239361963.67	18.00%	43085153.46
			Grand Total	0.00
			Round off	0.00
			Rounded Total(Rs)	282447117.13
	Rupees Twenty Eight Crore Twenty Four Lakh Forty Seven Thousand One Hundred and Seventeen			

GENERAL ABSTRACT

Others-DPR PREPARATION OF ALAPPUZHA MUNICIPALITY SEWERAGE SCHEME-Sewerage Net work with pipes ,Manholes, Inspection Chambers and wells. Alappuzha Muncipality Subzone 1-Sewerage Work

Sl No	Head Description		Amount
1	Sewer Net work with Pipes,Manholes,Inspection chambers and Wells		302729434.61
2	Eco-friendly items		1502107.55
3	Mechanical Items		2304967.89
4	Electrical Items		492920.00
	Total Estimation PAC		307029430.05
C	**Extra Charges**		
C.001	Provision for GST		
	307029430.05	18.00%	55265297.41
	Grand Total		0.00
	Round off		0.00
	Rounded Total(Rs)		362294727.46
	Rupees Thirty Six Crore Twenty Two Lakh Ninety Four Thousand Seven Hundred and Twenty Seven		

DETAILED ESTIMATE

Others-DPR PREPARATION OF ALAPPUZHA MUNICIPALITY SEWERAGE SCHEME-Sewerage Net work with pipes ,Manholes, Inspection Chambers and wells. Alappuzha Muncipality Subzone 1-Sewerage Work

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
1	Sewer Net work with Pipes,Manholes,Inspection chambers and Wells						
1.001	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						
	Sewer Net Work with Pipes, Manholes, Inspection Chambers and Wells.						
	For Manholes SZ1-Class 1(.9mdia)	183	1.900	1.900	1.500		990.945
	For Manholes SZ1-Class 2 (1.2mdia)	68	2.300	2.300	1.500		539.580
	For Manholes SZ1-Class 3(1.5mdia)	133	2.700	2.700	1.500		1454.355
	Additional depth for storage in lift Manholes	3	2.700	2.700	1.000	1.000000	21.870
	For Collection Well-1	1	60.790		1.500	1.000000	91.185
	For lift manhole panel board foundation	3	1.000	0.450	0.600	1.000000	0.810
	For Sewer Chambers	768	1.300	1.300	1.000	1.000000	1297.920
	Total						**4396.665**
						Total Quantity in cum	**4396.665**
1.002	OD76500/2022-2023						
	Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30cm in depth,1.5m in width aswell as 10 sqm on plan)including disposal of excavated earth ,lead up to 50m and lift up to 1.5 m ,disposed earth to be levelled and neatly dressed .All kind of soil-additional lift 1.5to 3m						
	For Sewer Network with Pipes,Manholes, Inspection chambers and Wells						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	For Manholes SZ1-class1(0.9m dia)	183	1.900	1.900	0.630		416.197
	For Manholes SZ1-class2(1.2m dia)	68	2.300	2.300	1.010		363.317
	For Manholes SZ-1-class3(1.5m dia)	133	2.700	2.700	1.500		1454.355
	Total						**2233.869**
						Total Quantity in cum	**2233.869**
1.003	OD76499/2022-2023						
	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 - additional depth 3.0 to 4.5 m.						
	For Sewer Network with Pipes,Manholes, Inspection chambers and Wells						
	For Manholes SZ1-class3(1.5m dia)	133	2.700	2.700	0.800		775.656
	Total						**775.656**
						Total Quantity in cum	**775.656**
1.004	OD78182/2022-2023						
	Earthwork open well excavation (in or under water) for wells of dia. 6.0m and up to 9.0m in all kinds of soil and conveying and depositing the spoil within initial lead of 50m and lift from 1.50m to 3.0 m including neat banking - sinking well						
	FOR SZ1,collection well (6-9m)						
		1	1.500				1.500
	Total						**1.500**
						Total Quantity in metre	**1.500**
1.005	OD78321/2022-2023						
	Earthwork in open well excavation (in or under water) for wells of diameter above 6.0m and up to 9.0m 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.						
	FOR SZ1,collection well (6-9m)						
		1	1.500				1.500
	Total						**1.500**
						Total Quantity in metre	**1.500**
1.006	OD78342/2022-2023						
	Earthwork in open well excavation (in or under water) for wells of diameter above 6.0m and up to 9.0m in all kinds of soil and conveying and depositing the spoil within initial lead of 50m and lift from 4.5m to 6.0m including neat banking.						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	FOR SZ1,collection well (6-9m)						
		1	1.500				1.500
	Total						**1.500**
						Total Quantity in metre	**1.500**
1.007	OD78320/2022-2023						
	Earthwork in open well excavation (in or under water) for wells of diameter above 6.0m and up to 9.0m in all kinds of soil and conveying and depositing the spoil within initial lead of 50m and lift from 6.0m to 7.5m including neat banking.						
	FOR SZ1,collection well (6-9m)						
		1	1.623				1.623
	Total						**1.623**
						Total Quantity in metre	**1.623**
1.008	4.1.6						
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 40 mm nominal size)						
	Providing and laying cement concrete						
	For Manholes-Class1(.9mdia)	183	1.900	1.900	0.150		99.095
	For Manholes - Class1 (1.2mdia)	68	2.300	2.300	0.150		53.958
	For Manholes - Class3(1.5mdia)133	133	2.700	2.700	0.150		145.436
	For Collection Well-1	1	8.800	8.800	0.150		11.616
	For lift Manhole Panel board foundationFor Collection Well-1	3	1.000	0.450	0.600		0.810
	For Sewer Chamber	768	1.300	1.300	0.150		194.688
	Total						**505.603**
						Total Quantity in cum	**505.603**
1.009	5.37.1						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Providing and laying in position ready mixed M-25 grade concrete for reinforced cement concrete work, using cement content as per approved design mix, manufactured in fully automatic batching plant and transported to site of work in transit mixer for all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding the cost of centering, shuttering finishing and reinforcement including cost of admixtures in recommended proportions as per IS: 9103 to accelerate/ retard setting of concrete, improve workability without impairing strength and durability as per direction of the Engineer - in -charge. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All wiork upto plinth level						
	Providing and laying inM30 grade concrete						
	Base Slab - Manhole-1	183	1.900	1.900	0.350		231.221
	Base Slab- Manhole class-2	68	2.300	2.300	0.400		143.888
	Base slab- Manhole Class-3	133	2.700	2.700	0.450		436.307
	Base Slab Collection Well-1	1	0.785*8.8 *8.8		0.450		27.356
	Walls-Manhole class-1	183	0.900		1.130		186.111
	Walls Manhole Class-3	68	1.410		1.960		187.925
	Walls -Manhole Class-3	133	2.030		3.200		863.968
	Walls Manhole Class-4	0	2.760		0.000		0.000
	Top Slab - Manhole Cass-5	0	3.020		0.000		0.000
	Wall-Well1 Well-1	1	10.530		7.620		80.239
	Wall-Well1 Top slab	1	10.000	10.000	0.200		20.000
	Top Slab- Manhole Class-1ss-2	183	1.540		0.200		56.364
	Top slab- Manhole Class-2Chamber Slab	68	2.540		0.200		34.544
	Top Slab- Manhole class-3	133	3.800		0.200		101.080
	Top Slab- Manhole Class-4	0	5.310		0.200		0.000
	Top Slab- Manhole Class-5	0	6.160		0.200		0.000

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Chamber slab	768	1.000	1.000	0.200		153.600
	Chamber Walls	768	2.400	0.200	0.500		184.320
	ChamberCover Slab	768	1.000	1.000	0.150		115.200
	Deduct Manhole Cover (600mmdia)	-384	0.280		0.200		-21.504
	Total						**2800.619**
						Total Quantity in cum	**2800.619**
1.010	OD72452/2022-2023						
	Extra for providing sulphate resistant cement for the structures						
	Providing S RC						
	QTY as per item code5.37.1	1	2797.581				2797.581
	Total						**2797.581**
						Total Quantity in cum	**2797.581**
1.011	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).						
	Providing richer Mixes at Floor Levels.						
	QTY as per item code5.37.1	1	2797.581				2797.581
	Total						**2797.581**
						Total Quantity in cum	**2797.581**
1.012	OD72488/2022-2023						
	Extra for providing epoxy coating for reinforcement bar						
	Epoxy coated for RCC						
	QTY as per item code5.37.1	1	2797.581			110.000000	307733.910
	Total						**307733.910**
						Total Quantity in kg	**307733.910**
1.013	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						
	RCC Work						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	QTY as per item code5.37.1	1	2797.581			110.000000	307733.910
	Total						**307733.910**
						Total Quantity in kilogram	**307733.910**
1.014	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 .						
	Water proofing material						
	QTY as per item code5.37.1	1	2797.581			340.000000	951177.540
	Total						**951177.540**
						Total Quantity in kg	**951177.540**
1.015	5.9.1						
	Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete						
	Centering and shuttering Base Slab						
	For manholes-Class 1	183	7.600		0.350		486.780
	For Manholes-Class2	68	9.200		0.400		250.240
	For Manholes-Class-3	133	10.800		0.450		646.380
	For Collection well-1	1	35.200		0.450		15.840
	For Sewer Chambers	768	4.000		0.200		614.400
	Total						**2013.640**
						Total Quantity in sqm	**2013.640**
1.016	5.9.2						
	Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.						
	For Walls Inside. SUB ZONE1						
	For Manholes Class-1	183	2.830		1.130		585.216
	For Manholes Class-2	68	3.770		1.960		502.466
	For Manholes Class-3	133	4.710		3.200		2004.576

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	For Collection Well-1	1			6.020		6.020
	For Sewer Chambers	768	2.400		0.500		921.600
	Top Slab	768	5.000		0.500		1920.000
	For Manholes Class-1	183	1.000				183.000
	For Manholes Class-2	68	1.000				68.000
	For Man holes Class-3	133	1.000				133.000
	Total						**6323.878**
	For Walls Out side Sub Zone 1						
	For Manhole - Class 1	183	4.400		1.130		909.876
	For Manholes-Class -2	68	5.650		1.960		753.032
	For Manholes-Class3	133	6.910		3.200		2940.896
	For Collection Well-1	1	24.810		6.020		149.356
	For Sewer Chamber	768	4.000		0.500		1536.000
	Total						**6289.160**
						Total Quantity in sqm	**12613.038**
1.017	22.23.1						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin-charge. The product performance shall carry guarantee for 10 years against any leakage.For vertical surface two coats @0.70 kg per sqm						
	Inside of Walls SUB ZONE1						
	For Manholes - Class1	183	2.830		1.130		585.216

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	For Manholes - Class 2	68	3.770		1.960		502.466
	For Manholes-Class-3For Manholes -Class 2	133	4.710		3.200		2004.576
	For Collection Well-1	1	21.980		21.980		483.120
	For Sewer Chambers	768	2.400		0.500		921.600
	Total						**4496.978**
						Total Quantity in sqm	**4496.978**
1.018	22.23.2						
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin-charge. The product performance shall carry guarantee for 10 years against any leakage.For horizontal surface one coat @1.10 kg per sqm.						
	Bottom Slab						
	For Manholes-Class1	183	0.640				117.120
	For Manholes-Class2For Manholes-Class1	68	1.130				76.840
	For Manholes-Class3	133	1.770				235.410
	For Collection Well-1	1	38.480				38.480
	For Sewer Chambers	768	0.360				276.480
	Total						**744.330**
						Total Quantity in sqm	**744.330**
1.019	2.25						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	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.						
	Quantity as same as 4.1.6						
	PCC	-1				505.603000	-505.603
	Walls -Collection well	-1	48.990		7.570		-370.854
	Total						**-876.457**
	Deductions						
	For Manholes-class1	-183	1.540		1.480		-417.094
	For Manholes-class2	-68	2.540		2.360		-407.619
	For Manholes - class3	-133	3.800		3.650		-1844.710
	Total						**-2669.423**
	Quantity as per item 1,2,3						
	Quantity as per item 1,2,3	1				7431.180000	7431.180
	Collection well1	1	60.790		7.573		460.363
	Total						**7891.543**
	Top slab-Manholes+Chambers						
	Top slab-Manhole class-1	-183	1.540		0.200		-56.364
	Top slab - Manhole class-2	-68	2.540		0.200		-34.544
	Top slab - Manhole class3	-133	3.800		0.200		-101.080
	Top slab-Manhole class-4	0	5.310		0.200		0.000
	Top slab - Manhole class5	0	6.160		0.200		0.000
	Total						**-191.988**
						Total Quantity in cum	**4153.675**
1.020	100.41.40						
	Supply, stacking, spreading and consolidating of Red earth in the trench of pipe line for cushion including carriage, loading, unloading & stacking up to any lead.						
	Supply ,stacking red earth						
	Pipe PN8160	0.5	9968.640	0.600	0.300		897.178
	Pipe PN8 200	1	9202.000	1.200	0.300		3312.720

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Pipe PN8280	1	133.000	1.200	0.300		47.880
	Pipe PN315	1	255.000	1.200	0.300		91.800
	Pipe PN 355	1	200.000	1.200	0.300		72.000
	Total						**4421.578**
						Total Quantity in cum	**4421.578**
1.021	50.2.25.1						
	Filling with contractor's own earth (excluding rock) in trenches, plinth, sides of foundations 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 as per direction of site Engineer-in-charge						
	Filling with Contractors own earth						
		0.1	19805.300				1980.530
		0.1	8051.780				805.178
		0.1	2253.470				225.347
	Total						**3011.055**
						Total Quantity in cum	**3011.055**
1.022	100.98.138						
	Supply of HDPE Pipe PE 100 (IS 4984/1995), 8kg, 160mm Outer Dia.						
	For connection from chamber to manholes						
		768	5.000	1.000			3840.000
	Total						**3840.000**
						Total Quantity in metre	**3840.000**
1.023	100.98.140						
	Supply of HDPE Pipe PE 100 (IS 4984/1995), 8kg, 200mm Outer Dia.						
	Dedutions for Manholes						
	Class1	-183	0.900				-164.700
	Class2	-60	1.200				-72.000
	Class3	-117	1.500				-175.500
	Total						**-412.200**
	For sewer network						
		1	9202.000				9202.000
	Total						**9202.000**
						Total Quantity in metre	**8789.800**
1.024	100.98.143						
	Supply of HDPE Pipe PE 100 (IS 4984/1995), 8kg, 280mm Outer Dia.						
	For sewer network						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	For sewer network	1	133.000				133.000
	Class2	-8	1.200				-9.600
	Total						**123.400**
						Total Quantity in metre	**123.400**
1.025	100.98.144						
	Supply of HDPE Pipe PE 100 (IS 4984/1995), 8kg, 315mm Outer Dia.						
	For sewer network						
	For sewer network	1	255.000				255.000
	Class3	-9	1.500				-13.500
	Total						**241.500**
						Total Quantity in metre	**241.500**
1.026	100.98.145						
	Supply of HDPE Pipe PE 100 (IS 4984/1995), 8kg, 355mm Outer Dia.						
	For sewer network						
	For sewer network	1	200.000				200.000
	Class3	-7	1.500				-10.500
	Clear water pump	1	650.000				650.000
	Total						**839.500**
						Total Quantity in metre	**839.500**
1.027	100.98.158						
	Supply of HDPE Pipe PE 100 (IS 4984/1995), 10kg, 160mm Outer Dia.						
	For sewer network						
	Lifting Station1	1	80.000				80.000
	Lifting station2	1	105.000				105.000
	Lifting station3	1	180.000				180.000
	Total						**365.000**
						Total Quantity in metre	**365.000**
1.028	100.98.164						
	Supply of HDPE Pipe PE 100 (IS 4984/1995), 10kg, 315mm Outer Dia.						
	Well to STP						
	Well to STP	1	150.000				150.000
	Total						**150.000**
						Total Quantity in metre	**150.000**
1.029	100.1.1						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	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.						
	Pipes,cables etc.exceeding 80mm dia but not exceeding 300mm dia for depth 0-1.5m						
		1	3351.000	1.200	1.160		4664.592
		1	3740.000	1.200	1.500		6732.000
		1	2699.000	1.200	1.500		4858.200
	For lifting stations	1	80.000	0.700	1.200		67.200
		1	105.000	0.700	1.200		88.200
		1	180.000	0.700	1.200		151.200
	Chamber to MH	1	3840.000	0.700	0.750		2016.000
	From well 1to STP	1	150.000	1.000	1.300		195.000
	Clear water pumping	1	650.000	1.200	1.400		1092.000
	Total						**19864.392**
						Total Quantity in cum	**19864.392**
1.030	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.						
	For depth 1.5m to 3.0m						
		1	3740.000	1.200	0.710		3186.480
		1	2699.000	1.200	1.500		4858.200
	Total						**8044.680**
						Total Quantity in cum	**8044.680**
1.031	100.1.3						
	Excavating trenches of required width for pipes, cables, etc., including excavation for sockets, and dressing of sides, ramming of bottoms, depth exceeding 3m but not exceeding 4.5 m, including getting out the excavated soil, and then returning the soil as required, in layers not exceeding 20 cm 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.						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	For depth 3.0m to 4.5m						
		1	2699.000	1.200	0.700		2267.160
	Total						**2267.160**
						Total Quantity in cum	**2267.160**
1.032	100.10.5						
	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: 160mm Nominal Outside Diameter Pipes.						
	FOR SZ1						
	Connection from chamber to manhole	768	5.000		1.000	1.000000	3840.000
	For sewer network-160mm OD HDPE pipes	1	365.000				365.000
	Total						**4205.000**
						Total Quantity in metre	**4205.000**
1.033	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.						
	For sewer network-200mmODHDPE pipes						
	Sewer network	1	8789.800				8789.800
	Total						**8789.800**
						Total Quantity in metre	**8789.800**
1.034	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.						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	FOR SZ1						
	For sewernetwork-280mm OD HDPE pipes	1	123.400				123.400
	Total						**123.400**
						Total Quantity in metre	**123.400**
1.035	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.						
	FOR SZ1						
	For sewer network -315mm OD HDPE pipes	1	241.500				241.500
	well to stp	1	150.000				150.000
	Total						**391.500**
						Total Quantity in metre	**391.500**
1.036	100.10.12						
	Laying HDPE pipes (IS : 4984) on land portion including conveying within initial lead and aligning the pipes, electro-fusion welding using automatic or semi-automatic electrofusion machines, testing the pipeline thus fabricated to suit the hydraulic working pressure and after testing, aligning the pipeline, lowering the pipe in position into the trenches already made, testing the line to suitable pressure with potable water before back filling and levelling the trenches including all labour charge, hire for appliances etc., complete but excluding cost of pipe and fittings: 355mm Nominal Outside Diameter Pipes.						
	FOR SZ1						
	For sewer network-355mmOD HDPEpipes	1	200.000				200.000
	Clear water pumping	1	650.000				650.000
	Total						**850.000**
						Total Quantity in metre	**850.000**
1.037	OD77554/2022-2023						
	Supply and fixing 150 mm non return valves						
	FOR SZ1						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	For pumping lines	1	3.000				3.000
	Total						**3.000**
						Total Quantity in 1 nos	**3.000**
1.038	OD83462/2022-2023						
	Supply and fixing 150mm butterfly valve						
	150mm butterfly valve						
		6					6.000
	Total						**6.000**
						Total Quantity in no	**6.000**
1.039	OD78384/2022-2023						
	Supply and fixing 300 mm butterfly valves						
	300mm Butterfly valve						
	Well to STP	2	1.000				2.000
	Total						**2.000**
						Total Quantity in 1 nos	**2.000**
1.040	OD83472/2022-2023						
	Supply and fixing 350mm butterfly valve						
	350mm butterfly valve						
		3					3.000
	Total						**3.000**
						Total Quantity in no	**3.000**
1.041	OD77588/2022-2023						
	Road Cutting - Restoration charge - As per order No.GO(Ms)No.59/2020/PWD Dtd.30-07-2020 Tvpm PW(H)D, Excluding GST						
	FOR SZ1						
	BM/BC roads	1	3000.000	3.000			9000.000
	Total						**9000.000**
						Total Quantity in sqm	**9000.000**
1.042	OD77595/2022-2023						
	Road Cutting - Restoration charge - As per order No.GO(Ms)No.59/2020/PWD Dtd.30-07-2020 Tvpm PW(H)D, Excluding GST.						
	FOR SZ1						
	For muncipal roads	1	4300.000	3.000			12900.000
	Total						**12900.000**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
						Total Quantity in sqm	**12900.000**
1.043	OD77596/2022-2023						
	Road Cutting - Restoration charge - As per order No.GO(Ms)No.59/2020/PWD Dtd.30-07-2020 Tvpm PW(H)D, Excluding GST						
	FOR SZ1						
	Concrete roads	1	2180.000	3.000			6540.000
	Total						**6540.000**
						Total Quantity in sqm	**6540.000**
1.044	OD77594/2022-2023						
	Connection for manholes and chambers						
	FOR SZ1						
	Sewer network	384			2.000		768.000
	Chamber	768			2.000		1536.000
	Total						**2304.000**
						Total Quantity in no	**2304.000**
1.045	19.18.3						
	Supplying and fixing C.I with out frame for manholes:560 mm diameter (heavy duty) the weight of the cover to be not less than 108 kg						
	FOR SZ1						
		384	1.000				384.000
	Total						**384.000**
						Total Quantity in each	**384.000**
1.046	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.						
	FOR SZ1						
		420	12.000	5.000	0.750		18900.000
	Total						**18900.000**
						Total Quantity in Kwh	**18900.000**
1.047	100.7.2						
	Bailing out water with engine and pump set above 5HP up to 10HP including conveyance to the site, erecting, dismantling and taking back of engine and pump, cost of fuel lubricating oil and other stores pay of staff etc., complete.						
	FOR SZ1						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
		220	10.000	8.000	0.750		13200.000
	Total						**13200.000**
						Total Quantity in Kwh	**13200.000**
1.048	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.						
	FOR SZ1						
		220	10.000	20.000	0.750		33000.000
	Total						**33000.000**
						Total Quantity in Kwh	**33000.000**
1.049	2.16.1						
	Close timbering in trenches including strutting, shoring and packing cavities (wherever required) complete (Measurements to be taken of the face area timbered).Depth not exceeding 1.5m						
	Deduction						
	For manholes-class1	-183	2.400		1.132		-497.174
	For manholes - class2	-68	2.400		1.500		-244.800
	For manholes-class3	-133	2.400		1.500		-478.800
	Total						**-1220.774**
	Wooden shoring						
	pipe line	2	3351.000		1.161		7781.022
		2	3740.000		1.500		11220.000
		2	2699.000		1.500		8097.000
	For manholes-class1	183	7.600		1.132		1574.386
	For manholes class-2	68	9.200		1.500		938.400
	For manholes-class3	133	10.800		1.500		2154.600
	Total						**31765.408**

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
						Total Quantity in sqm	**30544.634**
1.050	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.						
	Deduction						
	Manholes-class2	-68	2.400		1.960		-319.872
	Manholes-class3	-133	2.400		3.200		-1021.440
	Total						**-1341.312**
	FOR SZ1						
	Pipe line(1.5-3m)	2	3740.000		0.712		5325.760
		2	2699.000		1.500		8097.000
	Manholes-class2	68	9.200		1.960		1226.176
	Manholes-class3	133	10.800		1.500		2154.600
	Pipe line(3-4.5m)	2	2699.000		0.696		3757.008
	Manholes-class3	133	10.800		3.195		4589.298
	Lift manholes	3	2.400		1.000		7.200
	Total						**25157.042**
						Total Quantity in sqm	**23815.730**
1.051	OD77635/2022-2023						
	Provision for side protection work in cases where there is chances for land slide and damage to nearby compound walls and buildings.						
	Provision for side protection work						
	For SZ1	1					1.000
	Total						**1.000**
						Total Quantity in L.S	**1.000**
1.052	OD77636/2022-2023						
	Charges for utility shifting						
	For utility shifting						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	For SZ1	1					1.000
	Total						**1.000**
						Total Quantity in L.S	**1.000**
1.053	OD77643/2022-2023						
	New sewer connection to house						
	Household sewer connection						
		1	2048.000				2048.000
	Total						**2048.000**
						Total Quantity in no	**2048.000**
2	Eco-friendly items						
2.001	OD83552/2022-2023						
	Pump house building above wells.						
	Pump house building						
		1	8.800	8.800			77.440
	Total						**77.440**
						Total Quantity in sqm	**77.440**
3	Mechanical Items						
3.001	OD83788/2022-2023						
	Bar Screen- Supply and installation, of manual bar screen, MS – epoxy frame to be fitted in bar screen chamber of specified width, with MS flat bars and 20 mm c/c gap between bars. The frame to be mounted on the chamber and provided with MS rake arm with racks for removal of collected solids and trough to be provided for transfer of the collected solids. Flow Rate and height should be as specified. Angle of Inclination: 45 Degree, Spacing: 20mm, Bar Size: 50x10 mm						
	Bar screen - Course						
		1					1.000
	Total						**1.000**
						Total Quantity in each	**1.000**
3.002	OD83789/2022-2023						
	Electromagnetic flow meter capable of generating analog output to be installed at the outlet of sewage transfer pump from collection tank and treated water tank, flow range 150-200m3/hr,150mm						
	Electro magnetic flow meter						
		1					1.000
	Total						**1.000**
						Total Quantity in no	**1.000**
3.003	OD123421/2022-2023						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Supply, erection, testing, and commissioning of new generation non clog Submersible motor pump set having suitable discharge and head, including all accessories such as cost of the panel board with an ammeter, voltmeter, phase indicating lamps, change over switch, main switch, cost of soft starter, cable from panel board to starter, starter to motor, capacitors suction pipe, foot valve, Non return valve, suction and delivery pipes of required length, pressure gauge, earthing and wiring materials, cables etc. complete.0-10HP						
	Non clog submersible motor pump 0-10HP						
	Lifting station 1 & 3	4	0.500				2.000
	Lifting station 2	2	1.500				3.000
	Well to STP (5HP)	2	5.000				10.000
	Total						**15.000**
						Total Quantity in HP (Horse power)	**15.000**
3.004	OD123423/2022-2023						
	Supply, erection, testing, and commissioning of new generation non clog motor pump set having suitable discharge and head, including all accessories such as cost of the panel board with an ammeter, voltmeter, phase indicating lamps, change over switch, main switch, cost of soft starter, cable from panel board to starter, starter to motor, capacitors suction pipe, foot valve, Non return valve, suction and delivery pipes of required length, pressure gauge, earthing and wiring materials, cables etc. complete. - As per KWA/HO/SP-333/2014 Dtd.18-03-2016 of The Managing Director - for Centrifugal Pump sets 20-30 HP						
	20-30 HP						
	Treated water pump set (57.87lps,16m head)	2	25.000				50.000
	well to stp (peak)	2	25.000				50.000
	Total						**100.000**
						Total Quantity in HP (Horse power)	**100.000**
4	Electrical Items						
4.001	OD83791/2022-2023						
	Supply ,installation and commissioning of solar units for lifting station						
	Solar units						
	Lifting station	3					3.000
	Collection well	1					1.000
	Total						**4.000**
						Total Quantity in 1 nos	**4.000**
4.002	OD83792/2022-2023						
	Supply and installation of accessories for electrical connection and control units for lifting stations and collection wells including foundation						

Sl No	Specification	No	Length	Width	Depth	Cf	Quantity
	Electrical connection and control units						
	Lifting station	3					3.000
	Collection well	1					1.000
	Total						**4.000**
						Total Quantity in 1 nos	**4.000**

ABSTRACT ESTIMATE

Others-DPR PREPARATION OF ALAPPUZHA MUNICIPALITY SEWERAGE SCHEME-Sewerage Net work with pipes ,Manholes, Inspection Chambers and wells. Alappuzha Muncipality Subzone 1-Sewerage Work

Sl No	Specification	Quantity	Rate	Amount
1	**Sewer Net work with Pipes,Manholes,Inspection chambers and Wells**			
1.001	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	4396.665cum	@223.41/cum	982258.93
1.002	OD76500/2022-2023			
	Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30cm in depth,1.5m in width aswell as 10 sqm on plan)including disposal of excavated earth ,lead up to 50m and lift up to 1.5 m ,disposed earth to be levelled and neatly dressed .All kind of soil-additional lift 1.5to 3m			
	Net Total	2233.869cum	@334.44/cum	747095.15
1.003	OD76499/2022-2023			
	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 - additional depth 3.0 to 4.5 m.			
	Net Total	775.656cum	@445.49/cum	345546.99
1.004	OD78182/2022-2023			
	Earthwork open well excavation (in or under water) for wells of dia. 6.0m and up to 9.0m in all kinds of soil and conveying and depositing the spoil within initial lead of 50m and lift from 1.50m to 3.0 m including neat banking - sinking well			
	Net Total	1.500metre	@41434.78/metre	62152.17
1.005	OD78321/2022-2023			
	Earthwork in open well excavation (in or under water) for wells of diameter above 6.0m and up to 9.0m in all kinds of soil and conveying and depositing the spoil within initial lead of 50m and lift from 3.0m to 4.5m including neat banking.			
	Net Total	1.500metre	@44348.09/metre	66522.14
1.006	OD78342/2022-2023			
	Earthwork in open well excavation (in or under water) for wells of diameter above 6.0m and up to 9.0m in all kinds of soil and conveying and depositing the spoil within			

Sl No	Specification	Quantity	Rate	Amount
	initial lead of 50m and lift from 4.5m to 6.0m including neat banking.			
	Net Total	1.500metre	@47262.25/metre	70893.38
1.007	OD78320/2022-2023			
	Earthwork in open well excavation (in or under water) for wells of diameter above 6.0m and up to 9.0m in all kinds of soil and conveying and depositing the spoil within initial lead of 50m and lift from 6.0m to 7.5m including neat banking.			
	Net Total	1.623metre	@50176.41/metre	81436.31
1.008	4.1.6			
	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 40 mm nominal size)			
	Net Total	505.603cum	@7527.05/cum	3805699.06
1.009	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	2800.619cum	@10319.09/cum	28899839.52
1.010	OD72452/2022-2023			
	Extra for providing sulphate resistant cement for the structures			
	Net Total	2797.581cum	@1800.16/cum	5036093.41
1.011	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	2797.581cum	@85.68/cum	239696.74
1.012	OD72488/2022-2023			
	Extra for providing epoxy coating for reinforcement bar			
	Net Total	307733.910kg	@2.32/kg	713942.67
1.013	5.22.6			
	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing			

Sl No	Specification	Quantity	Rate	Amount
	in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more			
	Net Total	307733.910kilogram	@102.61/kilogram	31576576.51
1.014	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	951177.540kg	@1.40/kg	1331648.56
1.015	5.9.1			
	Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete			
	Net Total	2013.640sqm	@350.00/sqm	704774.00
1.016	5.9.2			
	Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.			
	Net Total	12613.038sqm	@748.62/sqm	9442372.51
1.017	22.23.1			
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin-charge. The product performance shall carry guarantee for 10 years against any leakage.For vertical surface two coats @0.70 kg per sqm			
	Net Total	4496.978sqm	@595.25/sqm	2676826.15
1.018	22.23.2			
	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservior, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing			

Sl No	Specification	Quantity	Rate	Amount
	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	744.330sqm	@458.80/sqm	341498.60
1.019	2.25			
	Filling available excavated earth (excluding rock) in trenches, plinth, sides of foundation etc. in layers not exceeding 20 cm in depth, consolidating each deposited layer by ramming and watering, lead up to 50 m and lift up to 1.5 m.			
	Net Total	4153.675cum	@269.88/cum	1120993.81
1.020	100.41.40			
	Supply, stacking, spreading and consolidating of Red earth in the trench of pipe line for cushion including carriage, loading, unloading & stacking up to any lead.			
	Net Total	4421.578cum	@370.72/cum	1639167.40
1.021	50.2.25.1			
	Filling with contractor's own earth (excluding rock) in trenches, plinth, sides of foundations 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 as per direction of site Engineer-in-charge			
	Net Total	3011.055cum	@548.87/cum	1652677.76
1.022	100.98.138			
	Supply of HDPE Pipe PE 100 (IS 4984/1995), 8kg, 160mm Outer Dia.			
	Net Total	3840.000metre	@689.21/metre	2646566.40
1.023	100.98.140			
	Supply of HDPE Pipe PE 100 (IS 4984/1995), 8kg, 200mm Outer Dia.			
	Net Total	8789.800metre	@1068.73/metre	9393922.95
1.024	100.98.143			
	Supply of HDPE Pipe PE 100 (IS 4984/1995), 8kg, 280mm Outer Dia.			
	Net Total	123.400metre	@2087.37/metre	257581.46
1.025	100.98.144			
	Supply of HDPE Pipe PE 100 (IS 4984/1995), 8kg, 315mm Outer Dia.			
	Net Total	241.500metre	@2644.49/metre	638644.34
1.026	100.98.145			
	Supply of HDPE Pipe PE 100 (IS 4984/1995), 8kg, 355mm Outer Dia.			
	Net Total	839.500metre	@3475.43/metre	2917623.49

Sl No	Specification	Quantity	Rate	Amount
1.027	100.98.158			
	Supply of HDPE Pipe PE 100 (IS 4984/1995), 10kg, 160mm Outer Dia.			
	Net Total	365.000metre	@841.02/metre	306972.30
1.028	100.98.164			
	Supply of HDPE Pipe PE 100 (IS 4984/1995), 10kg, 315mm Outer Dia.			
	Net Total	150.000metre	@3239.58/metre	485937.00
1.029	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	19864.392cum	@579.88/cum	11518963.63
1.030	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	8044.680cum	@690.92/cum	5558230.31
1.031	100.1.3			
	Excavating trenches of required width for pipes, cables, etc., including excavation for sockets, and dressing of sides, ramming of bottoms, depth exceeding 3m but not exceeding 4.5 m, including getting out the excavated soil, and then returning the soil as required, in layers not exceeding 20 cm 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	2267.160cum	@801.97/cum	1818194.31
1.032	100.10.5			
	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: 160mm Nominal Outside Diameter Pipes.			
	Net Total	4205.000metre	@224.62/metre	944527.10
1.033	100.10.7			
	Laying HDPE pipes (IS : 4984) on land portion including conveying within initial			

Sl No	Specification	Quantity	Rate	Amount
	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.			
	Net Total	8789.800metre	@333.88/metre	2934738.42
1.034	100.10.10			
	Laying HDPE pipes (IS : 4984) on land portion including conveying within initial lead and aligning the pipes, electro-fusion welding using automatic or semi-automatic electrofusion machines, testing the pipeline thus fabricated to suit the hydraulic working pressure and after testing, aligning the pipeline, lowering the pipe in position into the trenches already made, testing the line to suitable pressure with potable water before back filling and levelling the trenches including all labour charge, hire for appliances etc., complete but excluding cost of pipe and fittings: 280mm Nominal Outside Diameter Pipes.			
	Net Total	123.400metre	@542.53/metre	66948.20
1.035	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	391.500metre	@606.44/metre	237421.26
1.036	100.10.12			
	Laying HDPE pipes (IS : 4984) on land portion including conveying within initial lead and aligning the pipes, electro-fusion welding using automatic or semi-automatic electrofusion machines, testing the pipeline thus fabricated to suit the hydraulic working pressure and after testing, aligning the pipeline, lowering the pipe in position into the trenches already made, testing the line to suitable pressure with potable water before back filling and levelling the trenches including all labour charge, hire for appliances etc., complete but excluding cost of pipe and fittings: 355mm Nominal Outside Diameter Pipes.			
	Net Total	850.000metre	@684.28/metre	581638.00
1.037	OD77554/2022-2023			
	Supply and fixing 150 mm non return valves			
	Net Total	3.0001 nos	@15772.07/1 nos	47316.21
1.038	OD83462/2022-2023			
	Supply and fixing 150mm butterfly valve			
	Net Total	6.000no	@27250.00/no	163500.00

Sl No	Specification	Quantity	Rate	Amount
1.039	OD78384/2022-2023			
	Supply and fixing 300 mm butterfly valves			
	Net Total	2.0001 nos	@27250.00/1 nos	54500.00
1.040	OD83472/2022-2023			
	Supply and fixing 350mm butterfly valve			
	Net Total	3.000no	@27250.00/no	81750.00
1.041	OD77588/2022-2023			
	Road Cutting - Restoration charge - As per order No.GO(Ms)No.59/2020/PWD Dtd.30-07-2020 Tvpm PW(H)D, Excluding GST			
	Net Total	9000.000sqm	@3633.48/sqm	32701320.00
1.042	OD77595/2022-2023			
	Road Cutting - Restoration charge - As per order No.GO(Ms)No.59/2020/PWD Dtd.30-07-2020 Tvpm PW(H)D, Excluding GST.			
	Net Total	12900.000sqm	@3086.88/sqm	39820752.00
1.043	OD77596/2022-2023			
	Road Cutting - Restoration charge - As per order No.GO(Ms)No.59/2020/PWD Dtd.30-07-2020 Tvpm PW(H)D, Excluding GST			
	Net Total	6540.000sqm	@4886.99/sqm	31960914.60
1.044	OD77594/2022-2023			
	Connection for manholes and chambers			
	Net Total	2304.000no	@756.40/no	1742745.60
1.045	19.18.3			
	Supplying and fixing C.I with out frame for manholes:560 mm diameter (heavy duty) the weight of the cover to be not less than 108 kg			
	Net Total	384.000each	@8382.43/each	3218853.12
1.046	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	18900.000Kwh	@38.55/Kwh	728595.00
1.047	100.7.2			
	Bailing out water with engine and pump set above 5HP up to 10HP including conveyance to the site, erecting, dismantling and taking back of engine and pump, cost of fuel lubricating oil and other stores pay of staff etc., complete.			
	Net Total	13200.000Kwh	@19.29/Kwh	254628.00
1.048	100.7.3			
	Bailing out water with engine and pump set above 10HP up to 20HP including conveyance to the site, erecting, dismantling and taking back of engine and pump, cost of fuel lubricating oil and other stores pay of staff etc., complete.			

Sl No	Specification	Quantity	Rate	Amount
	Net Total	33000.000Kwh	@9.64/Kwh	318120.00
1.049	2.16.1			
	Close timbering in trenches including strutting, shoring and packing cavities (wherever required) complete (Measurements to be taken of the face area timbered).Depth not exceeding 1.5m			
	Net Total	30544.634sqm	@159.67/sqm	4877061.71
1.050	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	23815.730sqm	@781.91/sqm	18621757.44
1.051	OD77635/2022-2023			
	Provision for side protection work in cases where there is chances for land slide and damage to nearby compound walls and buildings.			
	Net Total	1.000L.S	@1499999.99/L.S	1499999.99
1.052	OD77636/2022-2023			
	Charges for utility shifting			
	Net Total	1.000L.S	@1000000.00/L.S	1000000.00
1.053	OD77643/2022-2023			
	New sewer connection to house			
	Net Total	2048.000no	@16500.00/no	33792000.00
			Heading Total(Rs)	302729434.61
2	**Eco-friendly items**			
2.001	OD83552/2022-2023			
	Pump house building above wells.			
	Net Total	77.440sqm	@19397.05/sqm	1502107.55
			Heading Total(Rs)	1502107.55

Sl No	Specification	Quantity	Rate	Amount
3	**Mechanical Items**			
3.001	OD83788/2022-2023			
	Bar Screen- Supply and installation, of manual bar screen, MS – epoxy frame to be fitted in bar screen chamber of specified width, with MS flat bars and 20 mm c/c gap between bars. The frame to be mounted on the chamber and provided with MS rake arm with racks for removal of collected solids and trough to be provided for transfer of the collected solids. Flow Rate and height should be as specified. Angle of Inclination: 45 Degree, Spacing: 20mm, Bar Size: 50x10 mm			
	Net Total	1.000each	@29037.50/each	29037.50
3.002	OD83789/2022-2023			
	Electromagnetic flow meter capable of generating analog output to be installed at the outlet of sewage transfer pump from collection tank and treated water tank, flow range 150-200m3/hr,150mm			
	Net Total	1.000no	@99999.34/no	99999.34
3.003	OD123421/2022-2023			
	Supply, erection, testing, and commissioning of new generation non clog Submersible motor pump set having suitable discharge and head, including all accessories such as cost of the panel board with an ammeter, voltmeter, phase indicating lamps, change over switch, main switch, cost of soft starter, cable from panel board to starter, starter to motor, capacitors suction pipe, foot valve, Non return valve, suction and delivery pipes of required length, pressure gauge, earthing and wiring materials, cables etc. complete.0-10HP			
	Net Total	15.000HP (Horse power)	@27680.87/HP (Horse power)	415213.05
3.004	OD123423/2022-2023			
	Supply, erection, testing, and commissioning of new generation non clog motor pump set having suitable discharge and head, including all accessories such as cost of the panel board with an ammeter, voltmeter, phase indicating lamps, change over switch, main switch, cost of soft starter, cable from panel board to starter, starter to motor, capacitors suction pipe, foot valve, Non return valve, suction and delivery pipes of required length, pressure gauge, earthing and wiring materials, cables etc. complete. - As per KWA/HO/SP-333/2014 Dtd.18-03-2016 of The Managing Director - for Centrifugal Pump sets 20-30 HP			
	Net Total	100.000HP (Horse power)	@17607.18/HP (Horse power)	1760718.00
			Heading Total(Rs)	2304967.89
4	**Electrical Items**			
4.001	OD83791/2022-2023			
	Supply ,installation and commissioning of solar units for lifting station			
	Net Total	4.0001 nos	@23230.00/1 nos	92920.00
4.002	OD83792/2022-2023			
	Supply and installation of accessories for electrical connection and control units for			

Sl No	Specification	Quantity	Rate	Amount
	lifting stations and collection wells including foundation			
	Net Total	4.0001 nos	@100000.00/1 nos	400000.00
			Heading Total(Rs)	492920.00
			Total Estimation PAC	307029430.05
6	**Extra Charges**			
5.001	Provision for GST			
		307029430.05	18.00%	55265297.41
			Grand Total	0.00
			Round off	0.00
			Rounded Total(Rs)	362294727.46
	Rupees Thirty Six Crore Twenty Two Lakh Ninety Four Thousand Seven Hundred and Twenty Seven			

ആലപ്പുഴ നഗരസഭ

29/10/2022 – ലെ 7–ാം നമ്പർ കൗൺസിൽ അജണ്ടയും, തീരുമാനവും

അജണ്ട:– 7 **E10 – 18527/21**

ആലപ്പുഴ നഗരസഭ– എഞ്ചിനീയറിംഗ് വിഭാഗം – ആലപ്പുഴ നഗരസഭപ്രദേശത്ത് സ്വീവറേജ് സംസ്ക്കരണ സംവിധാനം നടപ്പിലാക്കുന്നതിനോടനുബന്ധിച്ച് കേരള ജല അതോറിറ്റിയും നഗരസഭ ഉദ്യോഗസ്ഥരും സംയുക്ത പരിശോധന നടത്തി കണ്ടെത്തിയ സ്ഥലങ്ങൾ ഏറ്റെടുത്ത് നൽകണമെന്നുള്ള നഗരസഭ കൗൺസിൽ തീരുമാനം ലഭ്യമാക്കിയിട്ടില്ല എന്ന് വാട്ടർ അതോറിറ്റി സ്വീവറേജ് സർക്കിൾ സൂപ്രണ്ടിംഗ് എഞ്ചീനയറുടെ 11/05/22 ലെ KWA/SCK/ALP/2020 നമ്പർ കത്ത് മുഖാന്തിരം അറിയിച്ചിട്ടുണ്ട്. അമൃത് പദ്ധതിയിൽ ആലപ്പുഴ നഗരസഭ ഉൾപ്പെട്ടിട്ടുള്ള തിനാൽ സ്വീവറേജ് സംവിധാനം നടപ്പിലാക്കുന്നതിന് വേണ്ടിയുള്ള വിശദമായ പദ്ധതി രൂപകൽപ്പന സർക്കാരിന് കെ.ഡബ്ല്യൂ.എ. സമർപ്പിക്കേണ്ടതിനാൽ ആലിശ്ശേരിയിൽ കെ.ഡബ്ല്യൂ.എ. ഉടമസ്ഥതയി ലുള്ള സ്റ്റോർ കെട്ടിടം ഒഴികെയുള്ള 75 സെന്റ് സ്ഥലം ഉപയോഗപ്പെടുത്തി വികേന്ദ്രീകൃത സംവിധാനത്തിൽ നഗരസഭ 32 to 36, വാർഡുകൾ പൂർണ്ണമായും 37, 38, 42, 44 വാർഡുകൾ ഭാഗിക മായും ഉൾപ്പെടുത്തി 5 ദശലക്ഷം ശേഷിയുള്ള ശുദ്ധീകരണശാലയും അനുബന്ധ ഘടകങ്ങളും തയ്യാറാക്കുന്നതിന് കെ.ഡബ്ല്യൂ.എ. തീരുമാനിച്ചിട്ടുള്ളതിനാൽ നഗരസഭയിൽ നിന്നും അനുമതി പത്രവും ആവശ്യമായ സ്ഥലങ്ങൾ ഏറ്റെടുത്ത് നൽകാമെന്നുള്ള കൗൺസിൽ തീരുമാനവും അടിയന്തിരമായി നൽകുന്നതിന് ആവശ്യപ്പെട്ടിട്ടുണ്ട്. വിഷയം ബഹു. കൗൺസിലിന്റെ പരിഗണന യ്ക്കായി.

ചർച്ച

കേരള ജല അതോറിറ്റി ഇ.ഇ. ശ്രീമതി സുജാത. എ. മലീനജല ശുദ്ധീകരണശാലയുമായി ബന്ധപ്പെട്ട റിവൈസ്ഡ് പ്രോജക്ട് റിപ്പോർട്ട് അവതരിപ്പിച്ചു. അസിസ്റ്റന്റ് എഞ്ചിനീയർ ശ്രീ. ഉണ്ണികൃഷ്ണൻ ഇളയത്. സി.എൻ. പദ്ധതി സംബന്ധിച്ച് വിശദീകരിച്ചു.

തീരുമാനം – 7

ആലിശ്ശേരിയിൽ കെ.ഡബ്ല്യൂ.എ. യുടെ ഉടമസ്ഥതയിലുള്ള 75 സെന്റ് സ്ഥലത്ത് 5 എം.എൽ.ഡി. എസ്.റ്റി.പി., Co - Treatment ഉൾപ്പെടെ നിർമ്മിക്കുന്നതിന് അംഗീകാരം നൽകുന്നതിന് തീരുമാനിച്ചു.

(ഒപ്പ്)

ചെയർപേഴ്സൺ

ആലപ്പുഴ നഗരസഭ

// ശരിപകർപ്പ് //

സെക്രട്ടറി

ആലപ്പുഴ നഗരസഭ