

KERALA WATER AUTHORITY



DETAILED PROJECT REPORT

SEWERAGE SCHEME TO MANANTHAVADY MUNICIPALITY - CONSTRUCTION OF 2 MLD CAPACITY SEWAGE TREATMENT PLANT AND LAYING SEWERAGE NETWORK



**KERALA WATER AUTHORITY
PPD & SEWERAGE VERTICAL
KOZHIKODE**

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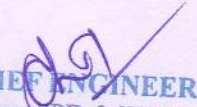
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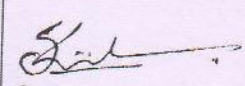
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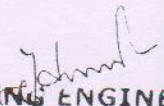
PROJECT AT A GLANCE

Sl. No.	Item	Description
1	Name of the Project	Sewerage scheme to Mananthavady Municipality - construction of 2 MLD capacity sewage treatment plant and laying sewerage network
2	Name of District	Wayanad
3	Name of Municipality	Mananthavady
4	Project area covered(km2)	10
5	Population Benefitted (in year 2054)	58138
6	STP Capacity	2 MLD
7	Total Network Length	25183 m
8	Number of Wells	0
9	Number of Pumping Stations	16
10	Number of Manholes	1029
11	Number of Connections	2200
12	O&M cost for 10 Years including 18% GST (including electricity charges)	446324357.8
13	Electricity charge for one year	20399268.2
14	Amount required for Land acquisition	10000000
15	Total cost including 10years O&M cost	1100000000
16	Implementation agency	Kerala Water Authority
17	Period of execution	2 Years


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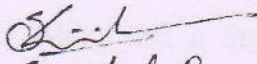

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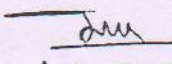

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ABSTRACT OF ESTIMATE

SL NO	HEADING DESCRIPTION	AMOUNT IN RS.
1	Cost of STP	70152517.81
2	Cost of ELECTRO MECHANICAL ITEMS	38440298.30
3	Cost of NETWORK (Including sewer connection charges)	360044299.07
4	O&M charges for 10 years (STP + Network)	378240981.20
5	Centage @10% (1+2+3+4)	84687809.64
6	GST @18% (1+2+3+4)	152438057.35
7	DPR PREPERATION CHARGES @2.5% (1+2+3)	11715927.88
8	Unforeseen items (including LS round off)	4280108.75
9	Grand Total	1100000000.00
	Rupees One Hundred and Ten Crore Only	


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EXECUTIVE SUMMARY

Environmental protection has been widely accepted as a vital aspect of sustainable development. Proper sewage and septage management is a crucial parameter in achieving this. Though considerable achievement has been marked by the state in the drinking water sector, the development in sewerage sector is lagging much behind. Unplanned urbanisation and poor sewage management has resulted in large scale pollution of water resources. This has become a complex challenge to the environment as well as to the public health. Realizing the threat, the government, in recent years, has made much deliberations and initiatives to address the situation. Moreover, the Honourable National Green Tribunal (NGT) has given mandate to implement sewerage system in whole of the state in a time bound manner.

The local bodies, who have been constitutionally entrusted with the responsibility of environmental protection, have only limited infrastructure and expertise to tackle the situation. Hence Kerala Water Authority, being a state wide establishment with qualified and experienced personnel in Public Health Engineering, has been considered by the government to take up the responsibility. As per the Kerala Water Supply and Sewerage Act, 1986 KWA has the function of rendering services in collection and disposal of waste water. KWA, as a 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 scientific and systematic way. To meet the growing demand for waste water management, KWA established a Sewerage Vertical Wing, led by the Chief Engineer, PPD & WASCON. The former Sewerage Circle office in Kochi, which had a Superintending Engineer, one Executive Engineer, and two Assistant Executive Engineers, has now been merged with this. In addition to their existing responsibilities, the PPD Wing's three circle offices in Thiruvananthapuram, Kochi, and Kozhikode have been designated as Sewage Circle offices. This wing is responsible for the investigation, planning, design, and DER preparation of sewerage projects.

This Detailed Engineering Report envisions the establishment of sewerage facilities to the Mananthavady Municipality's town area is designed to meet the sewerage demand up to the year 2054, using 2024 as the base year and a design period of 30 years. A sewer networked zone of 25.18 km is provided in the core town area. A septage zone is also proposed in areas where the population density is less than 200 per. km². Furthermore, septage treatment is proposed in densely populated areas where there is no road network. The ultimate sewage load for this Zone is 2 MLD including non-domestic demand and infiltration.

The scheme covers 10 km² area in Mananthavady Municipality's town area with the design population of 58138. Co- Treatment is proposed along with the Sewage Treatment Plant for entire Municipality area. This proposal includes 2 MLD STP with MBBR technology at Gandhi Park, Mananthavady, a sewer network of 25.18 km, 1029 manholes, and 16 lifting stations. Manholes at 30 m intervals and at all intersections are proposed to facilitate maintenance operations. Total Estimated cost of the project including 10-year O&M cost is 110 crores.



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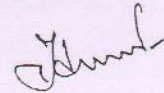
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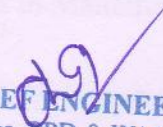
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CHAPTER 1 INTRODUCTION

1.1 BACKGROUND

Provision of drinking water and sanitation facilities has always been a key priority in our country as it is directly related with the health of the community and the responsibility for providing these services lies with the public domain. With unplanned urbanization the sewage management and pollution of water resources has become a complex challenge to the environment as well as to the public health. Even though Kerala State has achieved significant results in terms of improved water supply coverage through Kerala Water Authority, the sanitation sector could not cope up with the water supply sector. Immediate removal of sewage from its source of generation followed by proper treatment and safe disposal into environment in an eco-friendly manner or reuse is highly necessary to protect the public health and environment.

1.2 SCOPE OF THE REPORT

The scope of this work consists of planning and design of a comprehensive sewerage scheme for Mananthavady Municipality of Wayanad district in Kerala State. The project proposes a well-planned sewerage pipe line network for the core area of Municipality, pumping stations, and sewerage treatment plant with MBBR technology so as to ensure the quality of effluent as per KSPCB standards. Septage management facility will be provided for the area where laying sewerage network is not feasible.

1.3 PROJECT AREA

Mananthavady is the taluk head quarters of one of the three taluk of Wayanad District. It lies 34 kms away from Kalpetta and has a historic church, which is interestingly designed in the traditional Kerala style, with gabled roofs. There are some interesting tombstones in the church grounds. Pazhassi Raja, the lion of Kerala, met his end at Mananthavady and his memorial is termed Pazhassi Tomb. Pazhassi Raja, a scion of the Royal family was one of the earliest to strike the banner of revolt against British over lordship in this part of India. He remained successful for a remarkably long period until finally the English brought in heavy reinforcements from Madras and Bombay. The memorial of Veera Pazhassi Raja known as the Lion of Kerala- who organised guerilla warfare against British East India Company is situated at Mananthavady. He was downed in a ferocious encounter that took place at Mavilanthode in the last days of 1805. Pazhassi's tomb marks the point where he was cremated. Pazhassi museum is located nearby where a sword, which is believed to be of Pazhassi's era is kept.

The Valliyoorkavu Bhagavathi Temple is a most religious place in Mananthavady Panchayth 8 kms east of Mananthavady. The temple is dedicated to the mother goddess manifest in the three principal forms of Vana Durga, Bhadrakali and Jala Durga. The two week long festival in February/March is a major event attended by thousands of people.

The proposal is to provide Sewerage system to the inhabitations of above municipality. Boundaries of the Scheme area are Thirunelly grama panchayath on north, Pulpally and Mullankolly grama panchahayaths on east, Panamaram grama Panchayath on south and Thondernadu and Thavinhal on west.

The topography of the scheme area is undulating with hills and valleys. The minimum elevation with respect to mean sea level is in between + 705.000 to + 800.000. The climate of this area is moderately cold. The people living in the locality are mainly agriculturist and agriculture labours of small income group and small group of business men and Govt.employees. The people are experiencing acute scarcity of drinking water throughout the year mainly in the town area and in district hospital. The water demand of district hospital, Mananthavady is taken in to accounts for designing the scheme

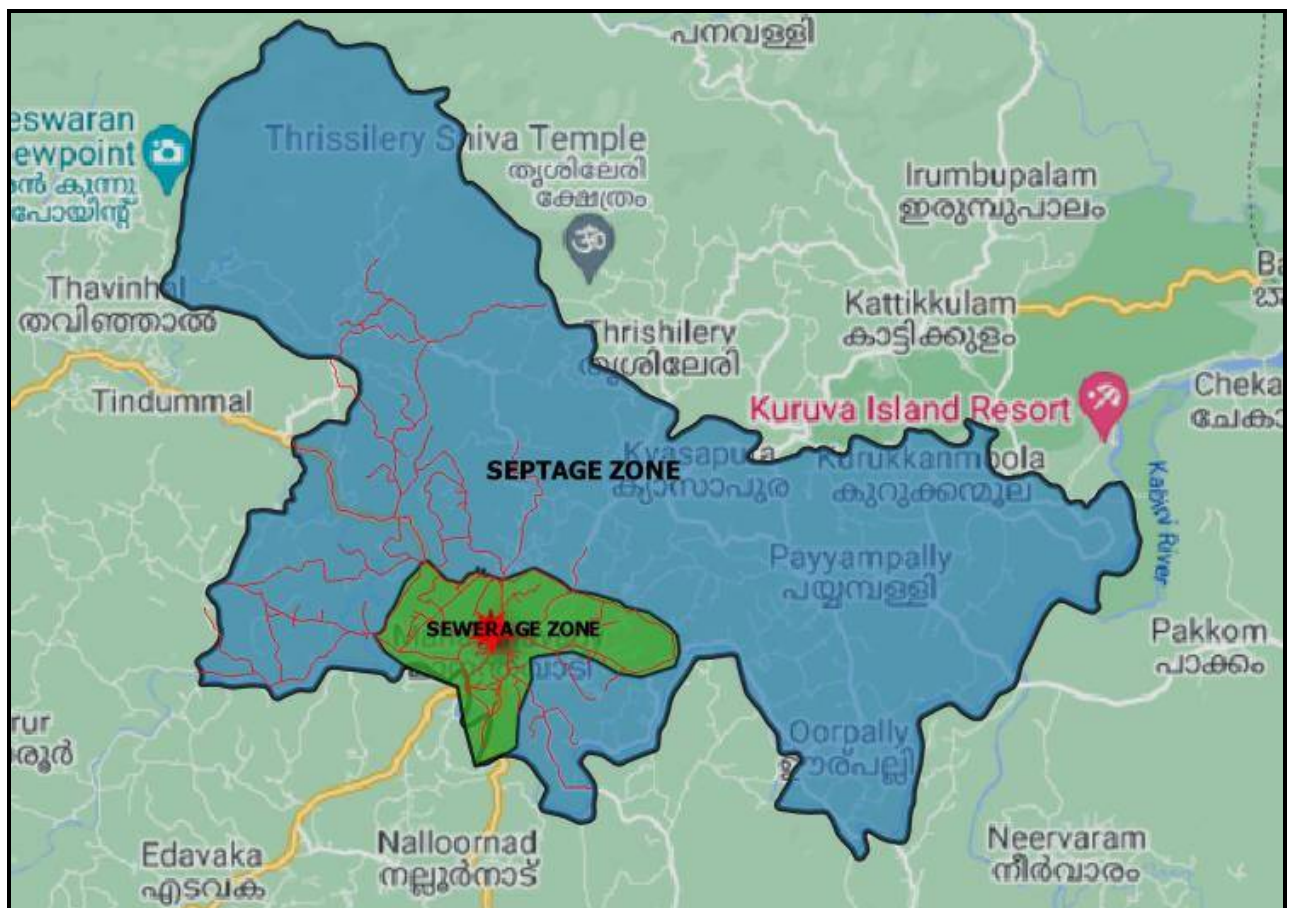


Figure 1 Project area

1.4 POPULATION PATTERN

The Mananthavady Municipality has population of 47974 of which 23468 are males while 24506 are females as per report released by Census India 2011. Density of population is 598/sq.km

Table 1 Population Pattern

Population as per 2011 census	No. of households	Male	Female	SC	ST
47974	11376	23468	24506	1689	7501

1.5 SOCIO-ECONOMIC PROFILE

The urban growth has been increasing very rapidly during the last decade. This has resulted in the growth of adjoining areas also. The Infrastructural facilities shall also have to be provided, to keep pace with the growth of the adjoining areas, so as to ensure a clean and healthy environment. All the areas has to be covered by the sewerage facilities in fast growing thickly populated residential area of the City. In the absence of an effective sewerage system, maintaining the hygienic conditions in the area is difficult. Common sewerage system is essential for maintaining hygienic conditions in the area and to ensure better health condition for residents of the area. The socio-economic conditions of the people in the area have changed and the living conditions have improved. Considering the need for common sewerage facility, survey has to be conducted through all roads in the City and the areas feasible for the implementation of sewerage system

1.6 GEOGRAPHICAL FEATURES

Mananthavady Municipality covers area of 80.1 km.sq and the boundaries are

South- Panamaram panchayath and Kabani river

North- Tirunelli Panchayath

East- Katikkulam

West- Kabani River

1.7 RAINFALL & TEMPERATURE

Mananthavady has a salubrious climate. The mean average rainfall in this area is 2322 mm. Lakkidi, Vythiri and Meppadi are the high rainfall areas in Wayanad. The annual rainfall in these areas ranges from 3000 mm to 4000 mm. High-velocity winds are common during the southwest monsoon and dry winds blow in March–April. High altitude regions experience severe cold. In Wayanad (Ambalavayal) the mean maximum and minimum temperature for the last five years were 29 °C and 18 °C respectively. This place experiences high relative humidity, which goes even up to 95 per cent during the southwest monsoon period. Generally, the year is classified into

four seasons, namely, cold weather (December–February), hot weather (March–May), south-west monsoon (June–September) and northeast monsoon (October–November) seasons

1.8 LAND USE

The total area of Wayanad district is 2132 Sq Km. From this it can easily be inferred that, the main land use categories in the district are forest and plantation, agricultural, forest and built up land use areas in the district.

Mananthavady Municipality total area 80.1 km² Residential land use constitutes 52.45% of the municipal area. The density in the already developed residential areas is not high providing scope for accommodating more population. The land value poses restriction on this forcing people to seek other options such as shifting to nearby LSGs. Higher concentration of residential land use is seen in Mananthavady Town, Jessy and Peruvaka wards. Commercial area constitutes only 2.07 % of the Municipal area. Industrial land constitutes only 1.06% of the Municipal area. Offices, educational institutions, hospitals and religious and cultural institutions are grouped under this category.

1.9 SOIL TYPE

The land form units identified are alluvial plains, valley fill, flood plains, valley fill, linear ridge hill crust, sloping terrains, rocky slope and hilly terrain. The flood plain and valley fill are the major fluvial land forms whereas moderately sloping terrain, highly sloping terrain, rocky slope, linear ridge and will crust are major denudational land form units

Rock type of Mananthavady is as follows: Charnockite group of rocks 1058.26 ha, High grade meta sedimentary rocks 716.98 ha, Metabasic and Ultra basic rocks 29.35 ha, Pegmatite/ Aplite/ Quartz vein 173.87 ha, Peninsular Gneissic Complex 20439.71 ha

DRAINAGE AND DRAINAGE PATTERN

There are east flowing and west flowing rivers in the region, due to the peculiar terrain of the district interspersed with both very high and medium hills, valleys and meadows. One of the major rivers in the district is Kabani River, a tributary of River Cauvery; it is also one of the only three east flowing rivers in Kerala. Kabani has many tributaries including Thirunelli River, Panamaram River and Mananthavady River.

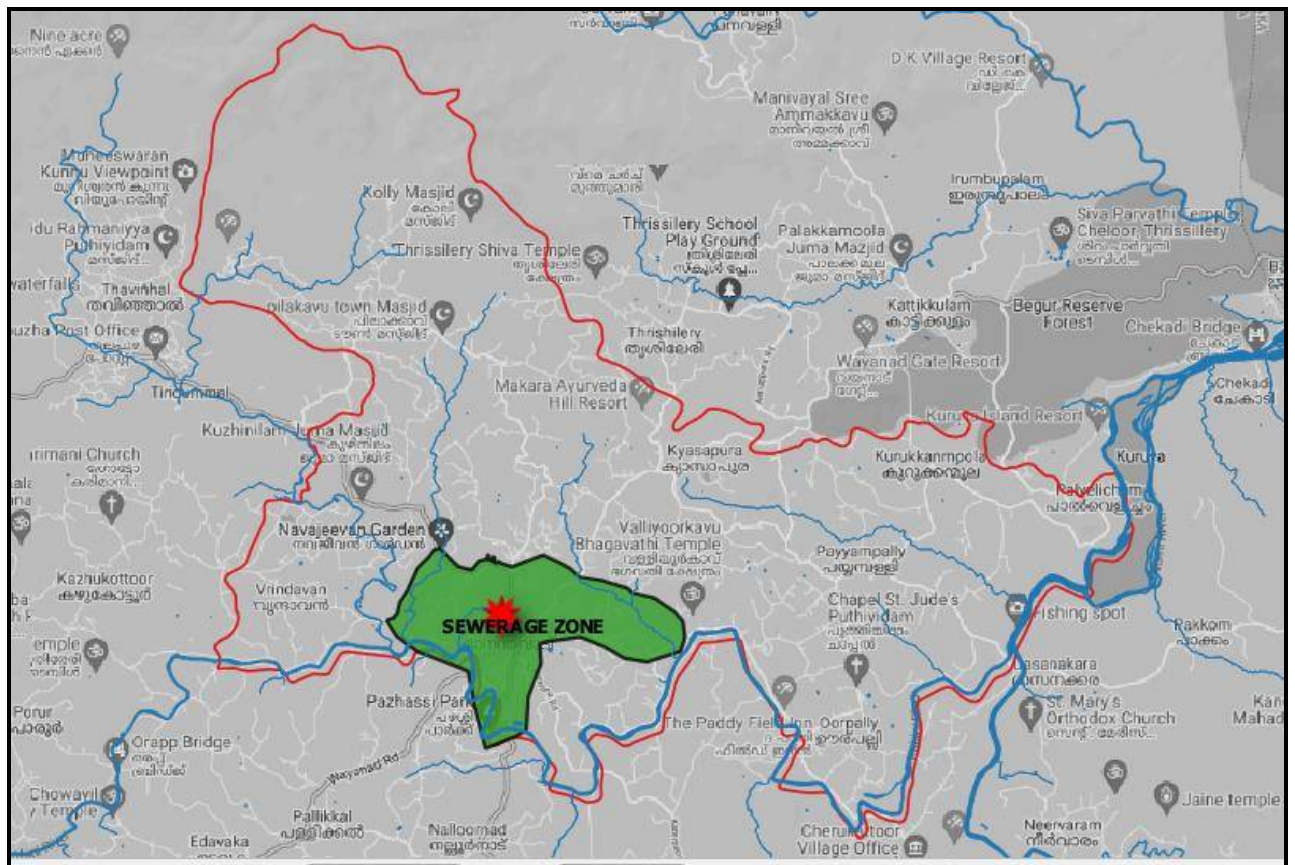


Figure 2 River basin maps

CHAPTER 2 PROJECT RATIONALE AND METHODOLOGY

2.1 SANITATION – VISION, STATUS AND GOALS

To address the situation of inadequate sanitation facilities to the urban population, the Government of India has formally approved the National Urban Sanitation Policy in 2008 which envisions the creation of totally sanitized cities and towns. The policy articulates awareness generation and behaviour change, open defecation free cities in which all urban dwellers have access to safe sanitation, integrated city-wide sanitation planning and sanitary and safe disposal of urban wastes. The vision of the policy is that the municipality shall be totally sanitized, healthy and liveable and ensure and sustain good public health and environmental outcomes for all the citizens with a special focus on hygienic and affordable sanitation. The policy articulates the following goals-

1. Awareness Generation and Behavioural Change
2. Open Defecation Free Cities
3. Integrated City-Wide Sanitation
4. Sanitary and Safe Disposal
5. Proper Operation and Maintenance of all Sanitary Installations

Wastewater disposal and treatment is a major problem in cities in Kerala. The wastewater from toilets has been disposed through septic tanks and soaks pits and grey form of wastewater from kitchen and bathrooms is directly discharged into the sludge drains without any treatment. As per Census 2011, 45.45% of the urban households have “no drainage”. There are 14.32% of the households connected to centralized sewerage system. About 97.43% of the households in the urban areas of Kerala state have a toilet within their residential premises. Almost 56.69% of them are connected to septic tanks, 21.87% to pit latrines while households having connection to the centralized sewer system are about 14.32%. There are both technical and institutional dimensions to the problem of septic tanks in the state of Kerala. The septic tanks design does not comply with the national guidelines with reference to planning, design and construction. Local masons are unaware of the existing design and construction guidelines to construct and design the septic tanks. There are multiple agencies involved in operation and maintenance of water and sanitation services in Kerala. Septage management is viewed as private provision with limited role of urban local bodies. Another set of reasons cited for urgency in taking up septage management is the occupational hazards for emptying the septic tanks. The Prohibition of Employment as Manual Scavengers and their Rehabilitation Act, 2013 has expanded the definition of workers engaged in

such sanitation works by including the practice of septic tank emptying and manual handling of such faecal sludge. The revised Manual Scavenging Act will require states to gear up the Municipal bodies in discharging their responsibilities effectively. In the absence of efficient waste water treatment systems and solid waste management systems, untreated domestic and industrial wastes, and agriculture-runoff flow into the rivers polluting the rivers in Kerala. There has been widespread bacteriological contamination of faecal origin in ground and surface water which relate to proximity of increasing numbers of leach pit latrines, leakages from septic tanks, washing, bathing and other domestic activities. Hence the goals for setting a sewerage strategy for a district will involve multi-faceted approach to cover every habitation and other institutions and establishments. This will render adequate results in both short term and long-term development plans. If a plan has been chalked out which can provide a systematic and flexible implementation mode, stage by stage implementation and better control over the system can be achieved. A district level plan document for sewerage prepared by KWA will create a backbone for the subsequent formation of detailed engineering reports for ULBs.

National Green Tribunal (NGT) while considering various OAs related to pollution of river trenches, pollution of coastal regions, pollution of ground water and restoration of water bodies in various States and UTs has ordered that all States and UTs shall ensure that various measures are taken to prevent the pollution of river stretches, water bodies and coastal areas on priority basis and within specified time limits. One of the directions is to ensure 100% treatment of sewage at least to the extent of in-situ remediation. Following this, being the agency for ensuring sewerage services in the State, Kerala Water Authority (KWA) has created a separate Vertical within it exclusively for preparation of DPR sewerage works across the State. The newly formed Sewerage Vertical of KWA has prepared Preliminary Engineering Report for establishing a sewerage network/ septage management across the State.

As per order no GO(Rt) No.352/2021/P&EA dated 16/8/2021 Administrative Sanction has been accorded for conducting DGPS levelling survey work for 28 Urban Local Bodies and DPR preparation of 4 corporations in Kerala and Mananthavady Municipality is one among them. PPD and Sewerage Vertical Circle, Kozhikode is assigned with the task of preparation of DPR for sewerage scheme for Mananthavady Municipality.

2.2 NEED FOR SEWERAGE SCHEME

The sewerage project in respect of which considerable public and social resources are being used, form a basic infrastructure for the country and an indisputable indicator of civilization and development. The works cover a number of substantial social needs and aim to improve the quality

of life and to protect public health and the environment. Some of the benefits and advantages of the sewerage system are as follows:

(a) Upgrading the quality of life

The quality of life and the hygienic conditions in the areas where the system operates have already improved. The operation of the sewerage system has relieved these areas to a great extent from previous problems that were caused by the continuous emptying of cesspools. In the past, hotels and blocks of apartments were required to empty and maintain septic tanks and soak ways. The sewerage system provides a healthier and more appropriate way to manage liquid wastes.

(b) Preserving the natural environment

Previously, all sewage waste was discharged in septic tanks and cesspits, resulting in the pollution of the ground water of the areas where such waste was discharged. Polluted waters then ended in the sea and caused various risks and other environmental problems. With the operation of the sewerage system no more pollution of ground water is affected and the discharge of sewage waste has significantly been reduced moreover, the wastewater treatment plant produces by-products such as treated biosolids and methane. Treated sludge is used as a soil-improving substance mainly for tree cultivations whilst methane is being used for electricity generation, covering part of the power, required to operate the plant.

(c) Saving and processing waters

Water is a substantial natural resource for our country and it should be managed in the best possible manner. The tertiary treated effluent at the wastewater treatment plant is reused for agricultural and other purposes. On completion of the project, the amount of water to be saved is expected to exceed 1.45 million cubic metres per year.

(d) Economic development and tourism

The most significant advantage of the system is maintaining sustainable development, the protection of the environment and improvement of the quality of life in our town, with a further impact on the development of tourism and the economy in general.

(e) Standard of living

As a result of the above, the sewerage system contributes to further development and increase of the standard of living of the town of Mananthavady inhabitants. Considering all the above advantages, there is no doubt that if we all cooperate, ourselves and our children will enjoy a better quality of life in the years to come and that we will secure a better environment



Figure 3 Wastewater

2.3 PRESENT SEWERAGE SYSTEM- OVERVIEW

Like all other Municipalities in Kerala, Mananthavady Municipality is also not having a sewerage system. All the residential building, commercial buildings, institutional establishments are having their own septic tanks for collecting sewage from latrines and grey water is either collected in leach pits or directly disposed to drainage system and nearby canals. Most of septic tanks are unscientifically constructed and do not have the facility for treating the effluent resulting in contamination of surroundings and the ground water. Even though Hospitals and other institutions are having their own independent facilities, in most cases partly treated effluent is discharged to nearby drains or water bodies. Most of dwellings have their own wells as drinking water source and proximity to the septic tanks leads pollution in well water also. Coliform bacteria is detected in 70% of wells in Kerala and emphasising the need for a well-planned sewerage system.

2.4 WATER SUPPLY FACILITIES

2.4.1 PRESENT SYSTEM

At present there exist three water supply schemes for the area. They are WSS to Mananathavady(10mld), Edavaka and part of ARWSS to Vemom Nalloornadu and Poronnannore villages. Due to quality problem and inadequacy, the above water supply can't meet the demand of

the public. For WSS to Mananathavady there is no treatment plant, the raw and distributing by adding bleaching powder. The same water has also supplied to District hospital, Mananthavady. This scheme is outdated and the distribution lines are mainly with AC pipes laid long back. The AC pipes are breaking frequently in the town area and the waste water entering in to the distribution line and water supply is interrupting several times. More over the lines are almost centre portion of the road in town area due to widening of road. The peoples are agitating and fact has noticed by Govt. and the Govt. has directed to Kerala Water Authority.

2.4.2 GROUND WATER SOURCES

Most of the people depends ground water source, open wells and shallow tube wells for their drinking water needs. Studies have revealed that

- Almost all samples were contaminated with Total Coli forms
- Level of bacteriological contamination is very high during monsoon
- Elevated areas had comparatively lesser level of contamination
- Contamination was higher in the vicinity of onsite sanitation structures especially in open wells situated within 10-15 m from latrines
- In a number of cases cause of contamination is of human origin

2.5 METHODOLOGY FOR PREPARATION OF SEWERAGE MASTER PLAN

The following tasks have been performed during the planning of the proposed Sewerage System:

- Data Collection and Field Visits
- Review of adequacy of existing sewerage system
- field levelling survey using DGPS
- Social survey
- Population Projection and Sewage Flow Estimation
- Design of Sewage Collection System
- STP site identification, assessing area requirement
- Phasing of construction of STP
- Capital cost and O & M costs

2.6 FIELD INVESTIGATIONS

General Field investigations like topographic survey, geotechnical investigation, and sewage samples analysis to be conducted to ascertain the topography of the area, the soil classifications and to ascertain its characteristics for designing the type of treatment, which forms the basis for proceeding further in designing the sewerage system.

2.6.1 SURVEY WORK

Topographical Survey Topographical survey forms a very important component in formulating the sewerage project. A detailed topographical survey has been performed covering the area using DGPS and Total Station.

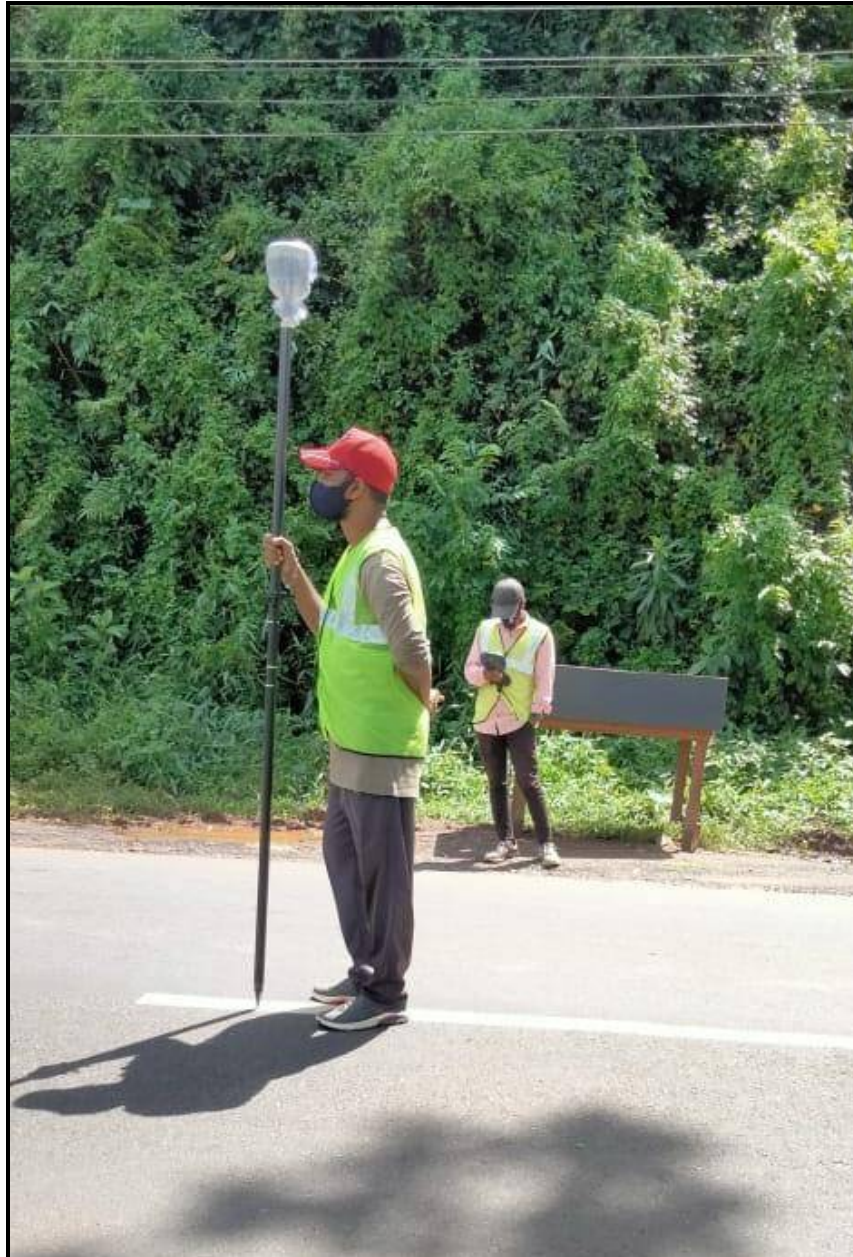


Figure 4DGPS Survey

Topographical survey of the project area was conducted using DGPS and Total station. Ground Levels have been taken along the roads at suitable intervals along straight portions and at all junctions of alignment. Important features and obligatory points like junctions such as culverts, major drains, and public utilities, cross roads, railway line have been captured. Using the

topographical survey data and detailed base map showing the features like roads, land marks, public buildings, parks etc. has been developed.

2.6.2 SOCIAL SURVEY

Social Survey was carried out for locating each buildings for arriving the sewer load in manholes. Identifying and arriving possible shock loads from institutions such as, flats, and other establishments are very important for avoiding overflows in manholes. Identifying the buildings which are not feasible to be connected to network, for arriving septage load /separate pumping arrangements is also carried out in social survey. Moreover the areas likely to be developed in future are to be identified for arriving sewer load to be incorporated in design.

CHAPTER 3 DESIGN CRITERIA

3.1 SEWAGE COLLECTION & CONVEYANCE SYSTEM

The sewerage system or storm water carriage system can be separate system or combined system or partially separate system depending on domestic sewage and rain water are drained through two separate set of pipes or through single set of piping. However, the combined system is not quite suitable in tropical Indian conditions as;

- i) Heavy and concentrated rainfall occurs during the monsoon period and thus there is a large variation in the quantity of sewage during different months of the year,
- ii) Dry weather flow is generally a very small proportion of the total flow and hence sewers are likely to get silted up due to low velocity of flow in lean periods,
- iii) Capital funds are limited,
- iv) Treatment costs and pumping costs are significantly reduced in separate system due to reduction in quantity.
- v) If the system is overdesigned, external flushing to attain the areas where the self-cleansing velocity is not attained which will increase the O&M cost. It affects system efficiency.

The pipes for collection can have;

- i) Zonal pattern in which entire city is divided into suitable zones and a separate interceptor is provided for each zone,
- ii) Radial pattern in which sewers are laid radially outwards from the center of the city to dispose sewage at multiple points,
- iii) Interceptor pattern in which sewers are intercepted by large size sewers laid along the natural watercourses or,
- iv) Fan pattern in which the STP is located at a certain point and the entire sewage flow is directed towards this point.

3.2 ESTIMATION OF QUANTITY OF SEWAGE

Separate drainage system is proposed for rain water as such only dry weather flow will pass through sewers. The connection of roof, backyard and foundation drains to the sanitary sewers should be avoided and hence shall not be considered for estimation of sanitary sewage. The prevalent sewerage systems in India do receive rain water even if separate system for rain water exists but sewers are designed for 30 years and have spare capacity in early phases of implementation and considering that by end of 30 years sewerage system will become water tight to rain water, it is appropriate to design system assuming no rain water penetration in sewers. The quantity of domestic sewage can be best estimated by quantity of water supply consumption minus

evaporation plus sewage flow from personal water sources which are other than those of community water supply and this water reaching to sewers. Another important factor in Indian cities is generally less connectivity of sewage to the sewerage system as many people continue to use on site sanitation i.e. septic tanks and soak pits etc. particularly in colonies where sewerage system is laid after a long gap of construction of houses which is a general phenomenon in Indian cities. In actual practice about 70-80% of the water supplied is reaching to sewers. As such 80% of quantity of water supply can be taken as sewage generation.

3.2.1 INFILTRATION AND LEAKAGE.

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. Some quantity of sewage may leak out from defective joints and defective pipes when head of sewage is more in sewers than head of ground water outside. Infiltration and leakage mainly depends on quality of construction and water table levels. Infiltration can be considered 5000-50000 liters per day per hectare or 500-5000 liters per day per km length of sewers or 250-500 liters per day per manhole for sewers laid below ground water level.

3.2.2 ESTIMATION OF INDUSTRIAL SEWAGE

The quantity of industrial sewage will vary with type and size of industry, the manufacturing processes involved, degree of water reuse and onsite treatment methods that are used, if any. However, in general the quantity of industrial sewage may be taken 80 to 90 % of quantity of water supplied through public water supply system. Some industries develop their own source of water supply and may discharge their liquid waste into sewers. This should be estimated separately for large 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.

3.3 DESIGN PERIOD

Sewerage projects are normally designed to meet the requirements over a period of 30 years after their completion. However, the period of 30 years may be modified in respect of certain components of the project depending on their useful life or the facility for carrying out extensions when required and rate of interest, so that expenditure far ahead of its utilization is avoided. As such design period for various main components has been taken as indicated in Table below.

S. N	Design Component	Design Period	Remarks
1	Land Acquisition for STP, SPS, sewers etc.	30 Years	Land acquisition in future difficult
2	Sewer network (laterals, Trunk mains, Outfall etc.)	30 Years	Replacement difficult and costly
3	Pumping mains	30 Years	Cost may be economical
4	Pumping Stations- Civil Work	30 Years	Life of civil structure is 30 years
5	Pumping Machinery	15 Years	Life of pumping machinery is 15 years
6	Sewage Treatment Plants	30 Years	The construction shall be modular in phased manner as actual population less than design population and in Indian cities initially flows are much less due to connectivity problems
7	Effluent disposal and utilization	30 Years	Provision of design capacities in the initial stages itself is economical

Table 3.1: Design Period of Sewerage Components

3.4 VARIATION IN RATE OF FLOW

The rate of flow of sewage varies from season to season (seasonal or monthly variation), from day to day (daily variation) and from hour to hour (hourly variation). For design of sewers maximum or peak flow rates are adopted. The value of peak factor (ratio of maximum flow to average flow) depends on the contributing population and the values recommended in the Manual on Sewerage and Sewage Treatment prepared by CPHEEO are given in Table below.

Table 2 Peak Factor

S.N	Contributing Population	Peak Factor
1	Up to 20,000	3.00
2	20,000 – 50,000	2.50
3	50,000 – 7,50,000	2.25

4	Above 7,50,000	2.00

The variation between maximum and average rates of flow is large for domestic and lateral sewers because they receive the flow directly from the source. This variation gradually diminishes as the flow reaches the branch or sub main sewers and the main sewers. Minimum rate of flow: The minimum rate of flow may vary from 0.5 to 0.33 of the average flow.

3.5 HYDRAULIC DESIGN OF SEWERS

The design for sewage collection system presumes flow to be steady and uniform. The unsteady and non-uniform sewage flow characteristics are accounted in the design by proper sizing of manhole. The sewage is mostly liquid containing about 0.1% of solid matter and hence follows same laws of flow as water. However the difference in design for water supply network and sewer network is, i) In order to avoid clogging of sewers due to settlement of heavier particles of solids, sewers are to be laid at such gradient that self-cleansing velocity is achieved at all values of discharge and that the inner surface of the sewers should be capable of resisting the wear and tear due to abrasive action of solid particles and ii) sewage flows under gravity as open channel flow and as such sewers are laid at continuous downward gradient.

3.5.1 DEPTH OF FLOW

The sewers shall not run full as otherwise the pressure will rise above or fall below the atmospheric pressure and condition of open channel flow will cease to exist. Moreover, from consideration of ventilation, sewers should not be designed to run full. In case of circular sewers, the Manning's formula reveals that:

The velocity at 0.8 depth of flow is 1.14 times the velocity at full depth of flow.

The discharge at 0.8 depth of flow is 0.98 times the discharge at full depth of flow.

Accordingly, the maximum depth of flow in design shall be limited to 0.80 of the diameter at ultimate peak flow.

3.5.2 HYDRAULIC FORMULAE FOR DESIGN OF SEWERS

Manning's formula has been used for design of sewers in case of gravity flow. For pressure flow (Pumping Mains), the Hazen-William's formula has been used. Sewer Network design has been done with the help of Manning's Formulae i.e.

Velocity $V = [(1/n) \times (R^{2/3} \cdot S^{1/2})]$ (in m/s)

For Circular Sections

$V = (1/n) (3.968 \times 10^{-3} D^{2/3} S^{1/2})$ $Q = (1/n) (3.118 \times 10^{-6} D^8/3 S^{1/2})$

Where, Q = discharge in lps; S = slope of hydraulic gradient; D = internal dia of pipe line in mm;
R = hydraulic radius in m; n = Manning's Coefficient of roughness

3.5.3 PER CAPITA SEWAGE FLOW

The rate of water supply has been adopted 150 LPCD at consumer end throughout the whole design period as water supply schemes are designed with per capita supply of 150lcd in Kerala. 80 percent of the water supply has been considered as sewage flow into the sewerage system

3.5.4 MINIMUM VELOCITY OF FLOW

A minimum velocity of 0.6 m/s for present peak flow and 0.8 m/s at design peak flow is recommended for sanitary sewers. Thus the sewers are designed on the assumption that although silting might occur at minimum flow, it would be flushed out during peak flows.

3.5.5 RECOMMENDED SLOPES FOR MINIMUM VELOCITY

For sewers running partially full, for a given flow and slope, velocity is little influenced by pipe diameter. As such for present peak flows up to 30 lps, the slopes given in Table below may be adopted which would ensure minimum velocity of 0.6 m/s in the early years.

Table 3 Recommended slope

S.N	Present Peak Flow in LPS	Slope per 1000
1	2	6.0
2	3	4.0
3	5	3.1
4	10	2.0
5	15	1.3
6	20	1.2
7	30	1.0

3.5.6 EROSION AND MAXIMUM VELOCITY OF FLOW

Erosion of sewers is caused by sand and other gritty material in the sewer and also by excessive velocity. Non-scouring or limiting velocities in sewers of different materials are given in CPHEEO manual. Accordingly maximum velocity for cement concrete pipes is 2.5- 3.00 m/s.

3.5.7 SEWER TRANSITIONS

Sewers shall be designed to ensure that the energy gradient is a continuous smooth line, thus transitions from larger to smaller diameters shall not be made. The crowns of sewers shall be kept continuous. In no case, the hydraulic flow line in the large sewers shall be higher than the

incoming sewer. To avoid backing up, the crown of outgoing sewer shall not be higher than the crown of incoming sewer

3.5.8 MINIMUM PIPE DIAMETER

Minimum pipe diameter recommended in CPHEEO manual is 150 mm except that in hilly areas, where extreme slopes are prevalent, 100 mm can be used. Some states and ULBs have started adopting minimum diameter as 200 mm or even 250 mm. The logic is Maintenance of sewer system is generally not good and 150 mm dia sewer will block frequently and remain un-attended for some time, Quality of construction in smaller size RCC main such as 150 mm is not good, The sewerage system is not totally closed one and undesired waste such as solid waste and drains finds way in sewerage, making smaller size sewer lines more prone to frequent blocking, The cost of pipe line element is only about 15 percent of total project cost and increase in pipe size from minimum of 150 mm to minimum of 200 mm size will increase cost of project by 2 percent whereas flow capacity increases by more than 80 percent.

The minimum diameter may be adopted as 200 mm for cities having present / base year population of over 1 lakh. However, depending on growth potential in certain areas even 150 mm diameter can also be considered. However, in towns having present / base year population of less than 1 lakh, the minimum diameter of 200mm shall be adopted.

The house sewer connection pipe to public sewer shall be (a) minimum 100 mm or higher based on the number of houses / flats connected and (b) subject to the receiving public sewer being of higher diameter. In this project 200 mm diameter have been suggested as minimum diameter in design of sewerage network.

3.6 MATERIAL OF CONSTRUCTION FOR GRAVITY SEWERS

Brickwork is used for large diameters as sewers can be constructed in any shape. However now it is not common. Concrete pipes are commonly used now as can be manufactured to any reasonable strength and laying is easy and jointing is leak proof. However these pipes are subject to corrosion where acid discharges are carried or where velocities are not sufficient to prevent septic conditions or where the soil is highly acidic or contains excessive sulphates. Only high alumina cement concrete should be used when it is exposed to corrosive sewage or industrial wastes. Salt glazed stoneware pipes are mostly manufactured in sizes 80-1000 mm but sizes greater than 380 mm are generally not used due to economic considerations. The length of these pipes is 60 cm, 75 cm and 90 cm. These pipes are good for corrosion resistance and erosion resistance. However due to less length, more joints, difficulty in jointing, requirement of special bedding and less compressive strength of pipes manufactured in India; use of these pipes is reducing in India.

Table 4 Pipe material Comparison

S · N	EVALU ATION CRITE RIA	RCC PIPES	DI PIPES	PE PIPES	DWC PE PIPES
1	Type of Joint	Available in both collar and S&S joints.	Tyton joint With rubber gasket	Butt fusion welding process.	Simple push fit joints with Elastomeric sealing Ring for online system or with extra couplers.
2	Weight	Heavy	Lighter than R.C.C.	Light	Very Light in Comparison of Other Solid Wall Pipes.
3	Corrosio n resistanc e	To prevent corrosion sulphate resistant cement concrete to be used for pipemanufacture.	Protective layers are Required to protect corrosion	Highly corrosion resistant	Highly corrosion resistant
4	Remarks on Cost	NP2 is Cheapest among all materials	Costlier than other pipes but cheaper than PE pipes.	Smaller diameter pipes are cheaper and higher diameter Pipes are xdcostlier.	Uses minimal material for equal strength, therefore cost cheaper from other pipes.
5	Infiltrati on	Infiltration is less	Infiltration is very less	Infiltration is very less	Infiltration is very less

6	Workability	due to heavy weight handling to be done with care	Good	Light weight for easy handling.	They are user friendly, very fast and inexpensive in installation
7	Jointing	Jointing is easy in S&S pipes with Rubber ring joints.	Jointing is easy in S&S pipes with Rubber ring joints.	Jointing is expensive	Joining time is 2-5 minutes per joint
8	Maintenance	Almost nil if proper velocity is maintained.	Minimum	Pipe may get damaged due to rodding	Maintenance is slow because of non adherence of sewage elements.
9	Previous Experience/Performance	In use for long period and performance is Good	It is durable pipe. Performance is yet to be proven	Recent use started in India. It is durable.	They are maintenance free and therefore, once installed, will be underground for years.
10	Trenchless compatibility	Micro tunneling	Micro tunneling	HDD & Micro tunneling	Not suitable for Trenchless

AC pipes cannot stand high superimposed loads, subject to corrosion from acids in sewage and high sulphate soils, require special bedding and weak against erosion where high velocities are encountered; as such use of AC pipe is not prevalent. Cast iron, DI and steel pipes are not used due to high cost. uPVC pipes are manufactured in sizes 75, 90, 110, 140, 160, 250, 290 and 315 mm outer dia. uPVC pipes are smooth, light, easy to joint and have leak proof joint. Rates are also low. These days these pipes are used for making connection from house to sewer but not prevalent in street sewers.

GRP pipes are widely used in other countries where corrosion resistant pipes are required at reasonable rates. When using concrete or reinforced concrete, high density sulphur resistant cement should be used. These pipes are made of slag cement that contains fewer calcareous

(CaOH₂) particles than pipes made of Portland cement. These particles react with the sulphuric acid (created by bacterial dissipation of hydrogen sulphide) in sewers, causing the aforementioned crown corrosion. If this particular cement is not used, lifetime of concrete sewers cannot be expected more than 30 years. A comparative study of characteristics of various pipe options for gravity sewers is presented in table above.

3.6.1 BENEFITS OF PE PIPES FOR SEWERS

When compared to other common wastewater piping system materials, such as PVC, ductile iron, or concrete, PE pipe offers significant benefits. Some of these include:

- **Chemical Resistance.** Hydrogen sulfide gas (H₂S) corrosion is a serious threat to conventional sewer lines, like concrete and ductile iron, greatly reducing their service life. WL Plastics PE pipe is not attacked, corroded or degraded by H₂S, ensuring a service life of 100 years.
- **Anti-corrosive properties.** PE piping systems are immune to the harmful effects of corrosion and tuberculation, common factors that reduces the operational life of concrete and ductile iron wastewater systems. PE also resists other corrosive or harmful agents, including scaling and organics such as fungi, bacteria, and other microbial contaminants.
- **Leak-free.** PE pipe is joined together via heat fusion, creating a welded, leak- free joint unlike conventional bell and spigot joints. These leak-free joints prevent infiltration and exfiltration making it a truly sanitary piping system.
- **Durability.** PE pipe is resistant to fatigue from water hammer and surge events in sewer force mains. PE pipe is also abrasion resistant, ensuring that flowing water and slurries won't damage the pipe throughout its service life.
- **Lightweight.** PE pipes are much lighter in weight compared with ductile iron or concrete alternatives, which makes transportation and installation significantly easier and safer.
- **Cost-effectiveness.** PE pipe is cost competitive with other sewer pipe options. PE pipe is faster, easier, and safer to install due to longer cut lengths and more linear footage per truck, which significantly reduce the overall project costs. With low maintenance costs and long service life, PE pipe is the ideal solution for wastewater systems.

However, PE pipes are slightly costlier compare to RCC pipe but as of now most of sewer pipes are laid through Trenchless technology method and because of this, plastic pipes like PE/ uPVC are most suitable and easy to use for trenchless as well as open cut trench method for pipe laying. The use of PE pipes are more economical and to be considered for smaller diameter pipes upto 110mm where they are available on coils thereby avoiding joints. Hence lesser number of

joints thereby reducing leaks and the rates of pipes are reasonable. As a general pipe policy decision the use of PE pipe shall be preferred up to 200mm & occasionally upto 350mm (source-KWA pipe policy, page 19).

Therefore, considering the above benefits of PE pipe over RCC pipes, PE pipes are recommended to use for maximum stretch of network. The pipe policy of KWA also favours adoption of PE pipes. However, RCC pipe (PE lined) has been recommended for higher diameter pipe (i.e. above 700 mm) as PE pipes for higher diameter pipes are not easily available and very costly for large diameter and generally not manufactured.

3.7 MANHOLES

3.7.1 GENERAL

A manhole is an opening constructed on the alignment of a sewer for facilitating a person to access the sewer for the purpose of inspection, testing, cleaning and removal of obstructions from the sewer line. Manholes will be located at:

- Change of direction
- Change of slope
- Change of pipe diameter
- Change of material
- Ginning of each line at points of branches
- Manhole Sizes

Table 5 Recommended Size of manholes

S.No.	Depth of Manhole(m)	Diameter of Manhole(m)
1	Above 0.90m and upto 1.65m	0.9 m (TYPE-I)
2	Above 1.65m and upto 2.30m	1.2m (TYPE-II)
3	Above 2.30m and upto 9.0m	1.5 m (TYPE-III)

3.7.2 TYPE OF MANHOLES

STRAIGHT – THROUGH MANHOLES

The simplest type of manhole is that built on a straight run of sewer with no side junctions. Where there is change in the size of sewer, the soffit or crown level of the two sewers should be the same, except where special conditions require otherwise.

JUNCTION MANHOLES

A manhole is provided at every junction of two or more sewers, and the curved portions of the inverts of tributary sewers have been formed within the manhole. The gradient of the smaller sewer may be steepened from the previous manhole sufficiently to reduce the difference of invert level at the point of junction to a convenient amount.

DROP MANHOLES

As per CPHEEO manual, drop manhole is to be provided when a sewer connects with another sewer, where the difference in level between water lines (peak flow levels) of main line and the invert level of branch line is more than 600mm or a drop of more than 600mm is required to be given in the same line and it is uneconomical or impractical to arrange the connection within 600mm.

The drop pipe may be either outside the manhole shaft and encased in concrete or supported on brackets inside the shaft. If the drop pipe is outside the shaft, a continuation of the sewer should be built through the shaft wall to form a rodding and inspection eye, which should be provided with a half blank flange. If the drop pipe inside the shaft, it should be in cast iron/ductile iron and it would be advantageous to provide adequate means for rodding and water cushion of 150mm depth should also be provided. The drop pipe should terminate at its lower end with a plan or duck-foot bend turned so as to discharge its flow at 45 degrees or less to the direction of the flow in the main sewer and the pipe, unless of cast iron, should be surrounded with 150mm concrete.

FLUSHING MANHOLES

Where it is not possible to obtain self-cleansing velocities due to flatness of the gradient especially at the starting point of branch sewers which receive very little flow, it is essential that some form of flushing device to be incorporated in the system. Flushing can be very conveniently accomplished using a fire hydrant or tanker and hose pipe.

The upper reaches of lateral sewers, the discharges shall be partially full even at the ultimate design flow conditions, because of necessity of adopting the prescribed minimum size of sewer. In such situations, flushing arrangements have to be provided in the initial years.

3.7.3 MATERIAL OF CONSTRUCTION FOR MANHOLE

BRICK MASONRY MANHOLES

Bricks used for construction of manholes shall conform to the relevant Indian Standards. They shall be sound, hard and homogeneous in texture, well burnt in kiln without being vitrified, table moulded, deep red, cherry or copper coloured, of regular shape and size and shall have sharp and square and parallel faces. The bricks shall be free from pores, chips, flaws or humps of any kind.

Bricks containing unground particles and/or which absorb water more than 1/6 th of their weight when soaked in water for twenty-four hours shall be rejected. Over burnt or under burnt bricks shall be liable to rejection. The bricks shall give a clear ringing sound when struck and shall have a minimum crushing strength of 35 Kg/sq.cm unless otherwise noted in drawings.

The class and quality requirements of bricks shall be as laid down in IS: 1077. The size of the brick shall be 23.0 x 11.5 x 7.5 or unless otherwise specified. Mortar for brick masonry shall be prepared as per IS: 2250. Manholes shall be constructed in brick masonry with cement mortar (1:4), 20 mm thick inside plaster with plasticized water proofing material consisting of 12 mm thick backing coat in CM 1:3 and 8 mm thick finishing coat in CM 1:1 and 15 mm thick outside plaster in CM 1:3. Whenever a pipe enters or leaves a manhole, bricks on edge must be cut to a proper form and laid around the upper end of the pipe so as to form an arch. All around the pipes, there shall be a joint of cement mortar (1:2) 13 mm thick between it and the bricks. The manhole base has been kept as 150mm for manholes upto 1m depth, and 200mm for manholes from 1 to 2 m depth and 300 mm for greater depths. In all cases, the thickness shall be counter checked for uplift conditions based on maximum ground water elevations at the site on the soil side by considering empty manhole conditions.

The thickness of walls shall be typically one brick up to 1.5 m deep manholes, one and a half brick for depths greater than 1.5 m. The actual thickness in any case shall be verified on the basis of engineering design in difficult soil conditions

3.7.4 RCC MANHOLES

The idea of RCC manholes is essentially to quicken the work of construction in the roads by adopting precast sections assembled at site. Thus, the issues related to their construction are more of design itself and quality control in casting. In general, plain and reinforced concrete work for manholes shall be carried out in accordance with the specification given in CPHEEO manual otherwise specified in this specification. Wherever good quality of brick and workmanship of the construction cannot be ensured, it is advisable to go in for RCC manholes. The provisions of IS: 456 and IS3370 Part I, II and IV shall inter alia apply to the design. The entire structure shall at all times be designed to the condition where the ground water is at ground level itself and the inside is empty and there is no superimposed load on the manhole and not considering the skin friction of the manhole side wall with the soil.

Now the newly available precast RCC chambers shall be conveniently used for the manholes upto 6.0m or more depth. This will make the construction very easy and faster.

3.7.5 PE MANHOLES

Polyethylene manholes remain leak-free because there is no chemical attack. The toughness of polyethylene eliminates the chance of cracking during installation. There is no infiltration of external ground water, reducing the amount of treatment required. There is no exfiltration of sewage to the environment. PE manholes are available with ladders installed. Ladder design has been inspected and meets all OSHA dimensional requirements.

CHAPTER 4 PROPOSED SEWERAGE SYSTEM

4.1 POPULATION PROJECTION

Population of the city normally depends on factors such as birth and death rates, migration, industrial development, general environmental conditions etc. Usually the population forecast of a city is made on the basis of methods of population forecast as provided for in section 1.5 of the CPHEO manual for sewerage and sewerage treatment. The latest available census records are that of 2011. As far as Kerala is concerned it is quite different from other states on education, health, life expectancy etc. The demographic pattern of the state therefore is quite different and need to take into account all the developmental parameters so as to avoid undue over designs.

The anticipation of future growth in any community in terms of population or commercial and industrial expansion forms the basis for preparation of plan for providing the amenities including installation of sewers in the area to be served. The anticipated population, its density and its waste production is generally estimated for a specified planning period. The recommended planning period is 30 years.

Decadal growth of 4.71% is adopted for population projection, as the district average for the decade from 2001 to 2011 is 4.71%

Decimal increase	4.71%
Current Year	2022
Execution Period	2 Year
Design Year	2054
Design Period	30 Years

Population for the area has been worked out and provided as per the projection the designed population is as follows

Table 6Population Projection

Sl No	Name	Area	2011	2021	2024	2039	2054
1	Mananthavady	Municipality	47974	50235	50939	54539	58138

Based on the population density a septage zone is also proposed to area where population density is below 200/km². In addition, in the high density populated areas but where there is no road network, septage treatment is proposed.

Table 7 STP Capacity

No	Type	Population 2011	Projected Population				Capacity
			2021	2024	2039	2054	
1	Municipality	47974	50235	50939	54539	58138	
2	Sewerage Area		10638	10782	11544	12306	2 MLD
3	Septage Area		39597	40157	42995	45832	11 KLD

Sewerage coverage area of 10 km². This is the town area of Mananthavady. The wards covered for the sewerage network are 15, 16, 17, 18, and 19. The total length of sewer network comes to 25.18 km. The proposed location of treatment plant is at Gandhi park .16 numbers of Pumping stations are proposed. The capacity of the plant is 2 MLD. Co- Treatment is proposed along with the Sewage Treatment Plant for septage zone. The capacity of Plant is arrived adding the whole septage load in Mananthavady Municipality.

4.2 COLLECTION SYSTEM

The collection system has been designed for ultimate year peak flow. The cumulative flows and the cumulative contributory population are discussed zone wise in the succeeding sections. The design diameter and slope have been finalized based on the minimum flow velocity of 0.60 m/s (present peak flow) with maximum velocity of 3.00 m/sec.

The system has been designed using EPASWMM software. Design calculations are shown in Annexure attached. The sewerage system network has been so planned to limit lifting and pumping stations. The Maximum depth of the sewer lines are kept at 4.5 m from the existing ground level.

4.3 SEWERAGE NETWORK AND MANHOLES

Design & estimates of the sewer collection system has prepared so as to limit the depth of excavation and to accommodate changes in location of STP. It is proposed to have separate collection System for each sub-Zone with a common STP

Based on the analysis of the topography of the city area and its surroundings, the existing and future land use of the area, the existing status of water courses, the proposal for network, manholes have been arrived.

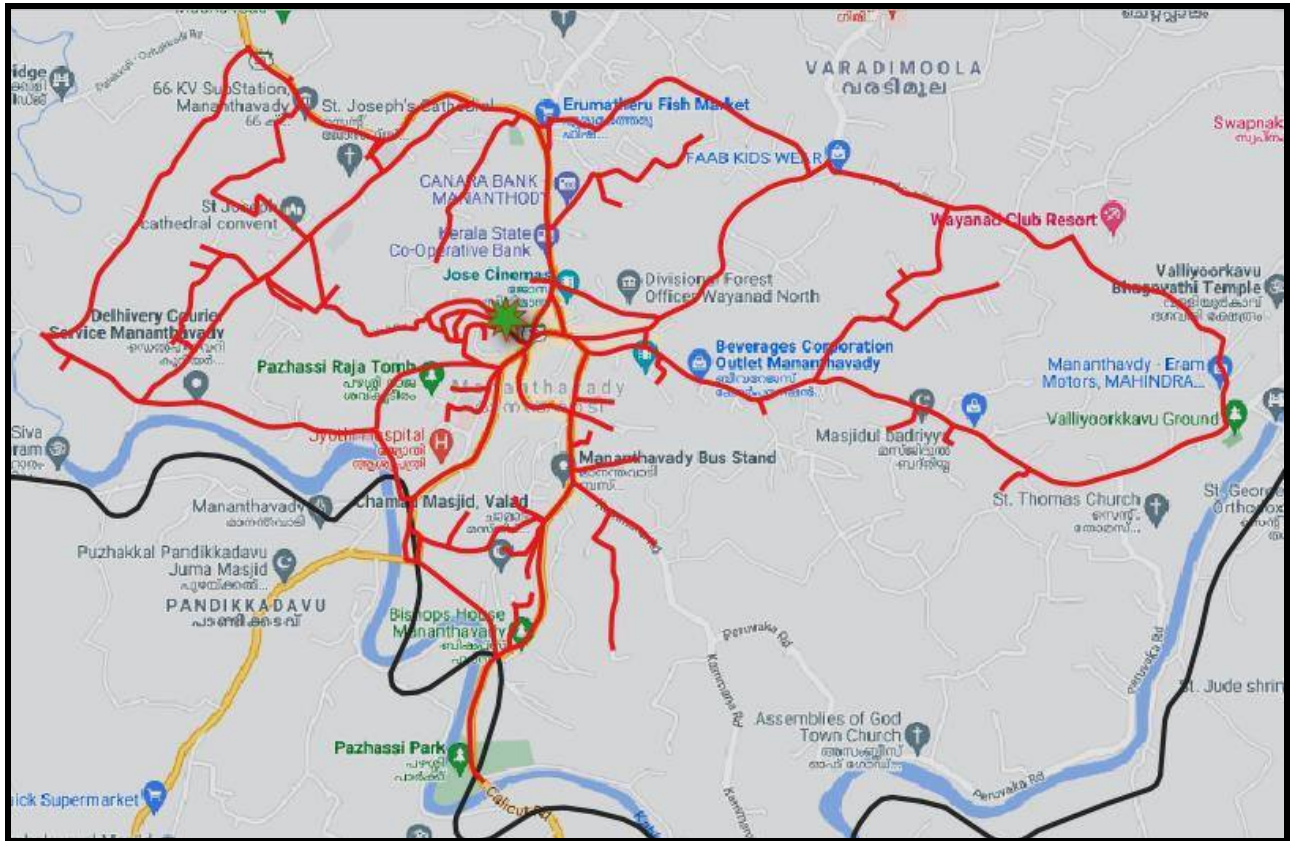


Figure 5 Network Sketch

4.3.1 DETAILS OF SEWER NETWORK

Abstract of sewer network is furnished below

Table 8 Network details

SI NO	Diameter in mm	Pipe Material	Length in metres
1	225	PE PE100	24042.1
2	250	PE PE100	689.2
3	280	PE PE100	390.5
4	315	PE PE100	48.6
5	355	PE PE100	12.2
Total			25182.6

Upto 3 meter depth of sewer line open cutting is proposed and above 3 m depth pipe laying through HDD method is proposed.

Table 9 Excavation Details

	225 mm	250 mm	280 mm	315 mm	355 mm	Total
Open Cut in metres	23264.00	526.80	390.50	48.60	12.20	2424.10
HDD in metres	778.10	162.40	0	0	0	940.50
Total	24042.10	689.20	390.50	48.60	12.20	25182.60

4.3.2 MANHOLES

Total number of manholes comes to 1023

Table 10 Details of Manholes

Manhole depth in Meters	No of manholes
Up to 1.5	861
1.5 to 2.5	95
2.5 to 3.5	51
3.5 to 4.5	22
Total	1029

4.4 PUMPING STATION AND RISING MAIN

4.4.1 GENERAL

Pumping or force mains deliver wastewater discharged from a pumping station to its destination, which may be a treatment plant or the final disposal point.

4.4.2 LIFTING STATION /PUMPING STATION

Pump stations are normally required in a sewage collection system to lift the sewage against a gradient or to limit the depth of cutting of the pertinent sewer line. A simplified form of the pump station, called a Lift Station, is also employed for the same purpose. The primary difference between a pump station and a lift station is that the Pump Station shall handle greater flows with arrangements for removal of floating material and grit prior to pumping through a force main. Lift Stations will have only an enlarged manhole as a wet well with pumps installed and a small control room adjacent to it, for lifting the sewage to ground level.

Lift stations are generally used to restrict the depth of cutting and discharging normally to the manhole in a downstream trunk sewer. No screens and grit wells are provided in lift stations.

Pumping and lifting stations shall use submersible pumps, such stations have a single well, circular or rectangular, in which pumps are installed. Superstructure requirement is minimum. The pump stations have been designed considering easy removal and reinstallation of the pumps without disturbing the connecting delivery pipe work.

Hydraulic Criteria:

According to the existing ground level contour from the topographic survey, the number of pumping stations has been finalized. Lift stations are generally proposed where depth of cutting exceeds 5.5 m. The location of pumping stations is at lower points of the network, but away from public and flood areas. Overflow is not allowed

4.4.3 DETAILS OF LIFTING STATIONS

Table 11 Lifting station details

Sl No	LS No	Peak Flow in LPS	Detention Period in Minutes	Storage Capacity m ³	SWD in Metres	Diameter in metres	Total Depth in metres
1	LS1	2.89	10	1.73	1.00	2	2.37
2	LS2	8.04	10	4.83	2.00	2	3.77
3	LS3	10.12	10	6.07	2.00	2	3.37
4	LS4	11.69	10	7.01	1.00	3	2.29
5	LS5	15.65	10	9.39	1.50	3	2.78
6	LS6	16.87	10	10.12	2.00	3	3.34
7	LS7	18.82	10	11.29	2.00	3	3.30
8	LS8	2.83	10	1.70	1.00	2	2.28
9	LS9	3.14	10	1.89	1.00	2	2.56
10	LS10	9.93	10	5.96	2.00	2	4.14
11	LS11	12.07	10	7.24	1.50	3	4.83
12	LS12	4.40	10	2.64	1.00	2	2.25
13	LS13	4.90	10	2.94	1.00	2	3.04
14	LS14	5.09	10	3.05	2.35	1.5	3.60
15	LS15	6.47	10	3.88	2.35	2	3.58
16	LS16	31.74	10	19.04	2.70	3	4.77

4.4.4 PUMPING MAINS AND LIFTING MAINS

Table 12 Pumping mains and Lifting mains

SI NO	Name	Length in metres	Diameter in mm	Material	Route (towards manhole)
1	LS1	695	100	DI	MH 659
2	LS2	238	100	DI	MH 706
3	LS3	243	150	DI	MH 8122
4	LS4	316	150	DI	MH 671
5	LS5	129	150	DI	MH 8108
6	LS6	460	150	DI	MH 498
7	LS7	279	150	DI	MH 955
8	LS8	855	100	DI	MH 1001
9	LS9	337	100	DI	MH 3188
10	LS10	405	100	DI	MH 3156
11	LS11	492	150	DI	MH 3115
12	LS12	523	100	DI	MH 955
13	LS13	438	100	DI	MH 8135
14	LS14	467	100	DI	MH 196
15	LS15	489	100	DI	MH 962
16	LS16	1131	200	DI	MH 962
17	Collection well in STP to Receiving chamber	30	300	DI	
18	Septage tank of STP to Receiving chamber	30	100	DI	

4.3 PUMP AND OPERATION CONTROL

Fluid level activated switches will be provided to start and to stop the pumps depending upon the quantity of sewage available in the pump house. This will ensure that the pumps will not run dry. A sluice valve will be provided on the suction side and a sluice valve and a non- return valve will be provided on the delivery side. Flow meter (digital type) will be provided to measure the quantity of sewage flowing out of the pumping station. It will be an integrating type indicating instantaneous flow and the cumulative flow.

4.4.5 DETAILS OF PUMP SETS

Table 13 Details of pump sets

Sl NO	Name	Number of Pup sets	HP	Type	Remarks
1	LS1	2	2.00	Submersible	
2	LS2	2	2.00	Submersible	
3	LS3	2	6.00	Submersible	
4	LS4	2	6.00	Submersible	
5	LS5	2	2.00	Submersible	
6	LS6	2	3.00	Submersible	
7	LS7	2	7.00	Submersible	
8	LS8	2	2.00	Submersible	
9	LS9	2	1.00	Submersible	
10	LS10	2	4.00	Submersible	
11	LS11	2	3.00	Submersible	
12	LS12	2	2.00	Submersible	
13	LS13	2	1.00	Submersible	
14	LS14	2	1.00	Submersible	
15	LS15	2	3.00	Submersible	
16	LS16	2	27.00	Submersible	
17	Collection well in STP to Receiving chamber	2	22.00	Submersible	
18	Septage tank to Receiving chamber	2	1.00	Submersible	

4.5 LAYING OF SEWER NETWORK

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

4.4.6 EXCAVATION AND LAYING

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

9. Proper backfilling methods both as regards to selection of materials, methods of placing and proper compaction should be in general agreement with the design assumptions.
10. In quicksand conditions, it is necessary to anchor the sewer to the ground and hold it at the grade as laid in the face of soil sinkage.
11. The type of bedding (granular, concrete cradle, full concrete encasement etc.) would depend on the soils and depth at which sewer is laid.
12. It is understood that the line (horizontal alignment) and grade layout of a sewer line as per design must be carried out meticulously. The horizontal layout determines the location as well as direction of the sewer line, while slope (grade) of the line provides the necessary hydraulic carrying capacity of the sewerage system.
13. The location of the trench is generally laid out first as an offset line running parallel to the proposed sewer centre line. This offset line is demarcated by wooden stakes driven into the ground surface at intervals of, say, 15 m. The offset line, as is clear, is quite away from the sewer centre line with a view not to allow it being disturbed during construction; however, it must be proximate enough so that the transfer of measurements to the actual trench can readily be done.

4.4 GANTRY

Gantry of adequate capacity having floor control pendant will be provided for handling heavy parts of equipments, valves etc. during erection and maintenance of pumping stations. Proper opening to lift the heavy equipment will be provided at motor floor slab in pumping station.

4.5 ARRANGEMENTS FOR POWER SUPPLY

KSEB will supply power at 11/22KV HT supply or 440 V LT supply for the operation of pumps in the pumping stations and for operation of equipment in the STP. In respect of HT supply, suitable transformers would be provided to step down the voltages to 440V. In case the Horse Power of pump set is less than 75HP, 440V LT supply will be availed. Each pumping station shall have Motor control centre for start-stop and other controls for protection and safety of motors and other auxiliary equipment. Capacitors of suitable capacity would be provided to improve the power factor so that power consumption can be brought down.

CHAPTER 5 PROPOSED SEWERAGE TREATMENT PLANT

5.1 GENERAL

The constituents of concern found in wastewater are removed by physical, chemical, and biological methods. The individual methods usually are classified as physical unit operations, chemical unit processes, and biological unit processes. Treatment methods in which the application of physical forces predominate are known as physical unit operations. Examples of physical unit operations include screening, mixing, sedimentation, gas transfer, filtration and adsorption. Treatment methods in which the removal or conversion of constituents is brought about by the addition of chemicals or other chemical reactions are known as chemical unit processes. Examples of chemical unit processes include disinfection, oxidation and precipitation. Treatment methods in which the removal of constituents is brought about by biological activity are known as biological unit processes. Biological treatment is used primarily to remove the biodegradable organic constituents and nutrients in wastewater. From practical observations, the rates at which physical, chemical and biological reactions and conversions occur are important, as they will affect the size of the treatment facilities that must be provided. The rate at which reactions and conversions occur, and the degree of their completion, is generally a function of the constituents involved, the temperature, and the type of reactor. The fundamental basis for the analysis of the physical, chemical and biological unit operations and processes used for wastewater treatment is the material mass balance principle in which an accounting of the mass is made before and after reactions and conversions have taken place.

5.2 CHARACTERISTICS OF SEWAGE

5.2.1 INFLUENT CHARACTERISTICS

Table 14 Influent Characteristics

Parameters	Units	Value
BiochemicalOxygenDemand(BOD ₅)	mg/l	250
ChemicalOxygenDemand(COD)	mg/l	400
pH	Units	6.00-7.00
TotalSuspendedSolids(TSS)	mg/l	400
TotalDissolvedSolids(TDS)	mg/l	800
TotalOrganicNitrogen(Kjeldhal)	mg/l	>35<55

Oil and Grease	mg/l	>1<10

5.2.2 EFFLUENT CHARACTERISTICS

Table 15 Effluent Characteristics

Parameters	Units	Value
Biochemical Oxygen Demand (BOD ₅)	mg/l	<10
Chemical Oxygen Demand (COD)	mg/l	<50
pH	Units	6.5– 7.5
Total Suspended Solids (TSS)	mg/l	<10
Total Dissolved Solids (TDS)	mg/l	100

5.3 CAPACITY CALCULATION OF STP

The details of forecasting of population and demand is shown below

Last census Population 2011	47974 Persons
Population for sewerage zone-2011	10159
Decennial increase	4.71%
Current year	2022
Design period	30 Years
Execution period	2 Years
Projected population 2054	12306 Persons
Per capita water supply	150 LPCD
Waste water generated	80% of water supply
Quantity of waste water generated	1.78 MLD
Groundwater Infiltration for pipeline & Manholes	5000L/km/day
Quantity of waste water generated	1.528 MLD
Groundwater Infiltration for pipeline & Manholes	500 L/km/day
Total Ground water infiltration	500 x 26.5=13250 L/day say 0.013 MLD
Non domestic demand	0.304 MLD
Total sewerage load	1.845 MLD
Septage load for co-treatment	0.22 KLD
Total	2.06 MLD
Say	2 MLD

Total Ground water infiltration	5000x 25.18=125900 L/day
Number of persons per house	5Persons
Average roof area	55m ²
Rainfall intensity	100mm/day
Number of households in 2054	1182 Nos
Waste water generated accounted for Rain water	0.066 MLD
Non domestic demand	0.37 MLD
Total sewerage load	1.97 MLD
Septage load for co-treatment	0.0119 MLD
Total	1.98 MLD
Say	2 MLD

5.4 UNIT OPERATIONS IN TREATMENT OF SEWAGE

Table 16 Unit Operations

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 - Nitrate and phosphate removal - Chemical oxidation - Suspended growth - Nitrification/De-nitrification - Air stripping - Ion exchange - Chemical treatment - Biological nutrient removal

3	Tertiary	• Polishing the effluent for reuse application	• Pathogen removal • Chlorine compounds • O₃, UV Radiation • Membrane filtration • Filtration variation • Carbon Adsorption • Iron exchange

5.5 THE PROPOSED PFD PROCESS FLOW DIAGRAM OF PROPOSED STP

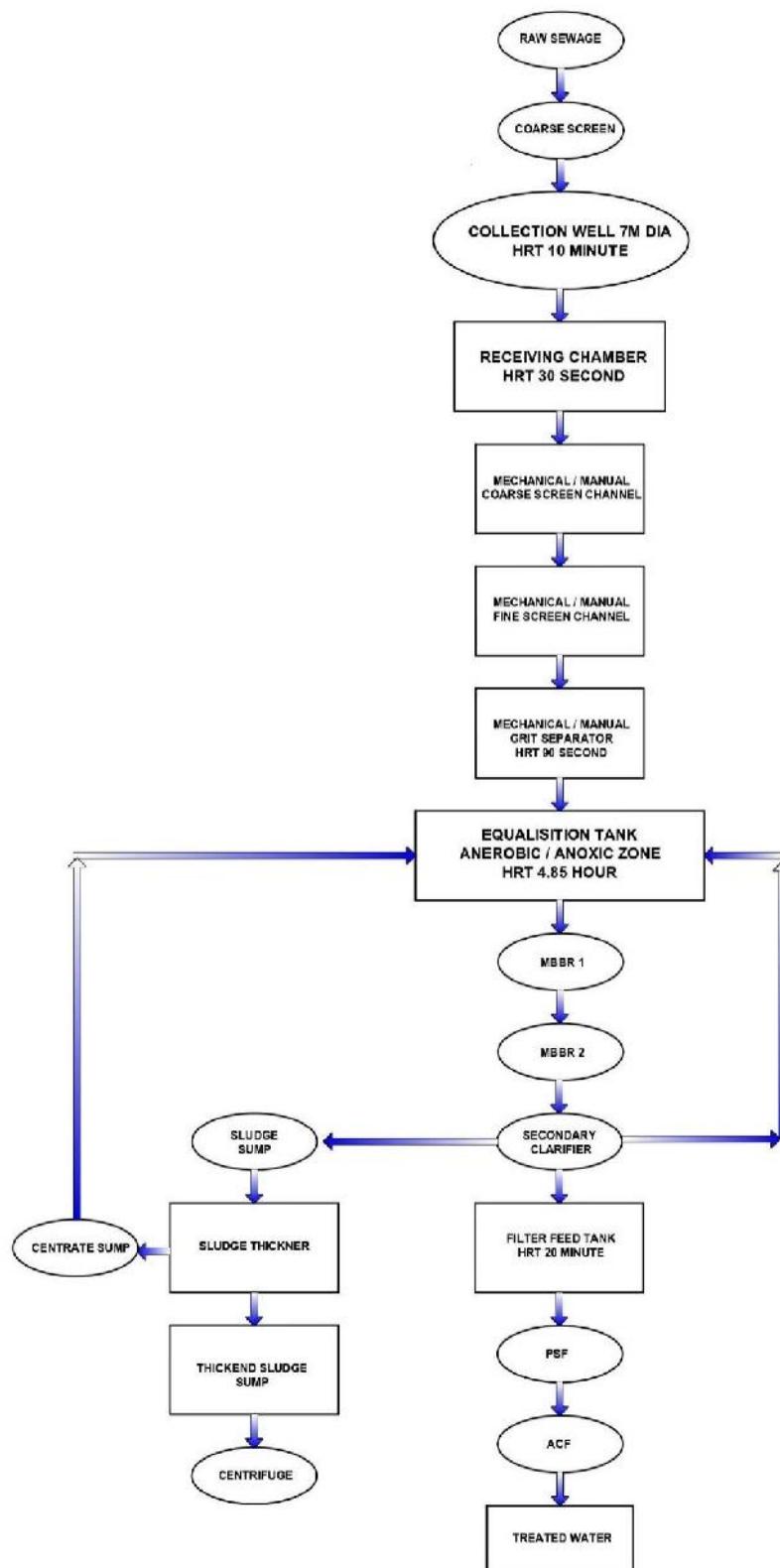


Figure 6 Process Flow Diagram

5.6 SELECTION OF TECHNOLOGY FOR THE PROPOSED STP

MBBR Technology is opted for secondary treatment in this project for following reasons.

1. MBBR has been in existence for a long time, also in India is approved technology.
2. Minimum foot print
3. Better Stabilized sludge
4. Better Effluent Quality
5. Less sophisticated
6. Spare parts available
7. Lower lifecycle cost
8. Nil odour nuisance and other environmental hazards

5.6.1 FEATURES OF MBBR

Biochemical oxygen demand (BOD) is an indirect measure of the concentration of biodegradable organic matter in water or wastewater. Organic matter (as measured by BOD) is one of the major constituents removed from wastewater in domestic wastewater treatment plants. The reason for being concerned about organic matter in water is its effect on dissolved oxygen in the receiving stream. Dissolved oxygen in water is essential for much of aquatic life, so organic contaminants that affect dissolved oxygen level in water are of concern.

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

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

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

The MBBR process is an attached growth biological wastewater treatment process. That is, the microorganisms that carry out the treatment are attached to a solid medium, as in trickling filter or RBC systems. By contrast, in a suspended growth biological wastewater treatment process, like the activated sludge process, the microorganisms that carry out the treatment are kept suspended in the mixed liquor in the aeration tank. In the conventional attached growth biological treatment processes, like trickling filter or RBC systems the microorganisms are attached to a medium that is fixed in place and the wastewater being treated flows past the surfaces of the medium with their attached biological growth. which are described in more detail in the next section. The MBBR treatment processes typically take place in a tank like an activated sludge aeration tank. In contrast, an MBBR process utilizes small plastic carrier media, which are kept suspended by a diffused air aeration system for an aerobic process or by a mechanical mixing system for an anoxic or anaerobic process. A sieve is typically used at the tank exit to keep the carrier media in the tank.

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

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

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

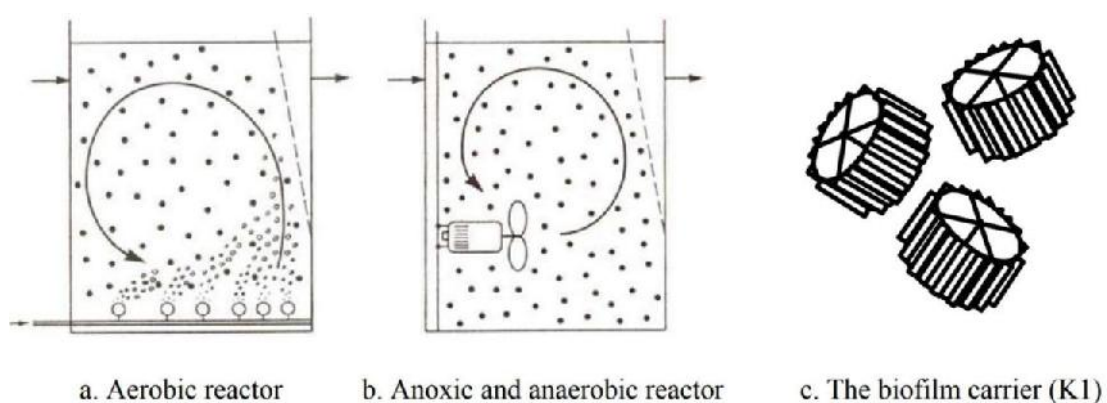




Figure 7 MBBR Carrier media in a MBBR tank

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

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

As an improvement over the attached growth systems, the concept of trapping the microbes into the attached biomass concentration and long solids retention time in a biological reactor can limit the waste sludge production for a given reduction of BOD. This is due to the higher biomass concentration in the reactor due to the immobilized biomass and hence the Food/Microorganism ratio Nitrification going beyond the extended aeration. It is stated that during aeration, the

synthesis and accumulation of readily biodegradable storage compounds are observed and these can be used for denitrification under starvation conditions.

Enhancing active biomass concentration, prolonging the life of immobilized carrier and improving the stability of immobilized microorganism play important roles in the process efficiency. The construction, operation, preventing clogging and reducing renewal costs are challenges in the commercial engineering of this technology. However, the fact remains that there are commercially operating STPs built with this technology in our country using various patented media of the respective vendors and with their own design criteria. As such, this technology holds the potential of reducing the footprint of the STP especially in land locked high density urban centres and thus merits its relative consideration.

The requirements for reactor media are high specific surface area, high percent void space, resistance to abrasion or disintegration during placement, insolubility in sewage and resistance to spalling and flaking. The inbuilt configuration must permit hydraulic self-cleaning of the media itself and thereby safeguarding the need to take the reactor out of service to attend for cleaning the clogged media.

Netting to hold back media is an important requirement and is usually provided near the top outlet of the treated sewage in the form of spread-out netting across the entire plan area or a netted cowl around the off take of the outlet pipe. Care is needed periodically to renew these.

5.6.2 NITRIFICATION

Biological nitrification/denitrification is a twostep process. The first step is nitrification, which is conversion of ammonia to nitrate through the action of nitrifying bacteria. The second step is nitrate conversion (denitrification), which is carried out by facultative heterotrophic bacteria under anoxic conditions.

There are two groups of chemoautotrophic bacteria that can be associated with the process of nitrification. One group (Nitrosomonas) derives its energy through the oxidation of ammonium to nitrite, whereas the other group (Nitrobacter) obtains energy through the oxidation of nitrite to nitrate. Both the groups, collectively called Nitrifiers, obtain carbon required, from inorganic carbon forms.

Combined system is favoured method of operation as it is less sensitive to load variations - owing to larger sized aeration tank - generally produces a smaller volume of surplus sludge owing to higher values of q_c adopted, and better sludge settleability.

Care should be taken to ensure that the oxygenation capacity of aeration tank is sufficient to meet oxygen uptake due to carbonaceous demand and nitrification. Recycling of sludge must be rapid enough to prevent denitrification (and rising sludge) owing to anoxic conditions in the settling

tank. This is rising sludge happens, the tertiary filters will chock very fast and will result reduction in plant capacity.

In separate system, the first tank can be smaller in size since a higher F/M ratio (Food to Microorganism Ratio) can be used, but this makes the system somewhat more sensitive to load variations and also tends to produce more sludge for disposal. An additional settling tank is also necessary between the two aeration tanks to keep the sludge separate. A principal advantage of this system is its higher efficiency of nitrification and its better performance when toxic substances are feared to be in the inflow.

5.6.3 DENITRIFICATION

The biological reduction of nitrate (NO_3) to nitrogen gas (N_2) by facultative heterotrophic bacteria is called Denitrification. "Heterotrophic" bacteria need a carbon source as food to live. "Facultative" bacteria can get their oxygen by taking dissolved oxygen out of the water or by taking it off of nitrate molecules.

Denitrification occurs when oxygen levels are depleted and nitrate becomes the primary oxygen source for microorganisms. The process is performed under anoxic conditions, when the dissolved oxygen concentration is less than 0.5 mg/L, ideally less than 0.2. When bacteria break apart nitrate (NO_3^-) to gain the oxygen (O_2), the nitrate is reduced to nitrous oxide (N_2O), and, in turn, nitrogen gas (N_2). Since nitrogen gas has low water solubility, it escapes into the atmosphere as gas bubbles.

Free nitrogen is the major component of air; thus, its release does not cause any environmental concern.

5.6.4 PHOSPHOROUS REMOVAL

The consciousness to restrict the phosphorous in the treated sewage before Discharge into the environment to curtail eutrophication is being recognised. The phosphorous can be removed by a process called as the luxury uptake. There are at least six different variations of these processes which have all been developed in advanced countries and every situation will need a separate evaluation and validation.

An alternative process is to introduce a chemical precipitation either in the secondary clarifier or as a separate tertiary stage where phosphorous is precipitated by coagulating with Ferric or Aluminium salts. There is also another technology of high Lime followed by acidification or carbonation whereby in addition to phosphorous removal, colour, heavy metals, fluorides, silica and magnesium can also be simultaneously removed. It is necessary to conduct lab studies to establish the efficiency and the type of chemicals.

5.6.5 A2O PROCESS

The combined removal of carbon, nitrogen and phosphorus can be achieved by several biological treatment processes. Two common biological treatment processes are the A2O and Barden-pho processes. The A2O process is a modification of A/O phosphorus removal process is to include an anoxic stage for denitrification. Influent and return activated sludge flow into the anaerobic tank while nitrified liquor is recycled with a circulating pump from the aerobic (nitrification) tank to the anoxic (denitrification) tank. Ammonia nitrogen is oxidized to nitrite or nitrate in the aerobic tank, and then nitrite or nitrate is denitrified to nitrogen gas in the anoxic tank

5.7 PROPOSED TREATMENT UNITS

5.7.1 RECEIVING CHAMBER

The sewage received in the collection well located at the plant premises is pumped to the receiving chamber. The average quantity of flow in to the receiving chamber is assumed to be 173.91 cum/hr whereas peak flow is taken as 391.3cum/hr.Dimensionofreceivingchamberis $2.25 \times 1.0 \times 1.0$ mwitha freeboardof0.5m.

5.7.2 SCREEN CHANNEL

After receiving chamber, sewage passes through screening chambers provided. The principal role of the fine screening is to remove floating materials from the sewage that could damages subsequent process equipment, eliminate materials that may inhibit the beneficial reuse of bio solids and reduce overall treatment process effectiveness. Screened materials are mechanically removed by the scrappers. In case of emergency, the screen chamber can be by passed to the manual screen chamber so that the treatment is continuously ensured.

5.7.3 GRIT SEPARATOR

The grit chamber is used to remove grit, consisting of sand, gravel, cinder, or other heavy solids materials that have specific gravity much higher than those of the organic solids in waste water. Grit chambers are provided to protect moving mechanical equipment from abrasion and abnormal wear; avoid deposition in pipelines, channels, and conduits; and to reduce frequency of digester cleaning. Two numbers of grit chambers are provided in the plant (one stand by) with a dimension of $3.3 \times 3.3 \times 2.50$ m.

5.7.4 APPROACH CHANNEL FOR PARSHALL FLUME

A Parshall flume is a fixed, hydraulic structure that is placed in a flow stream to determine the flow of water. The flume accelerates flow by both a contraction of the parallel sidewalls and a drop

in the floor elevation in the throat. It is used to measure volumetric flow rate in industrial discharges, municipal sewer lines, and influent/effluent flows in waste water treatment plants.

5.7.5 EQUALISATION TANK

Flow equalization is used to minimize the variability of water and wastewater flow rates and composition. Each unit operation in a treatment train is designed for specific waste water characteristics. Improved efficiency and control are possible when all unit operations are carried out at uniform flow conditions. The equalization tanks are provided (i) to balance fluctuating flows or concentrations, (ii) to assist self-neutralization, or (iii) to even out the effect of a periodic "slug" discharge from a batch process. The design is done to have a hydraulic retention time of 4.85 hours. A square tank with length and breadth 14.6 m proposed with a depth of 4.50 m. Equalization tank is divided into Anaerobic and Anoxic areas with the help of baffle wall for denitrification

5.7.6 MIXING EQUIPMENT

Mixers are often employed in equalization basins to achieve homogeneity in and to aerate the wastewater. Various types of mixers are available. The classification of mixers depends on the flow pattern the mixers produce.

5.7.7 PUMPSETS TO MBBR

Horizontal Centrifugal, level controlled, submersible, detachable non clog submersible pump sets (2W+1SB) shall be used to lift sewage to the MBBR chamber of the STP from Equalization Tank.

5.7.8 MOVING BED BIOREACTOR (MBBR)

Moving Bed Bio film Bioreactor (MBBR) process uses the whole tank volume for biomass growth. It uses simple floating media, which are carriers for attached growth of biofilms. Biofilm carrier movement is caused by the agitation of air bubbles. This compact treatment system is effective in removal of BOD as well as nitrogen and phosphorus while facilitating effective solids separation. Design of the reactor is based on the actual wastewater characteristics and local conditions. MBBR units are placed in series based on the load entering each reactor. Two square MBBR tanks are designed with sides 15.2 m with a depth of 4.50 m.

5.7.9 AIRBLOWERS

Aeration is the most critical component of a treatment system using the Moving Bed Bio Reactor. A well designed aeration system has a direct impact on the level of sewage treatment it achieves. An ample and evenly distributed oxygen supply in an aeration system is the key to rapid, economically-liable, and effective waste water treatment. Two numbers (1W+1S) of air blowers of 175 HP with a discharge of 5528 cum/hr are provided.

5.7.10 SECONDARY CLARIFIER

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 and (or) thickening. Secondary Clarifier is a circular basin in which effluent from the MBBR process is held for a period of time during which the heavier biomass (microorganisms) settle to the bottom as “activated sludge”. There is no need for sludge recirculation in MBBR due to its high MLSS values. So secondary settling tanks are just used for removing excess settleable solids present in the effluent comes out from MBBR tanks. One number of secondary clarifiers with 15.70m diameter and 3.3m depth is provided with a retention period of 3.10 hrs.

5.7.11 SLUDGE SUMP

Total sludge generated in the secondary clarifier is calculated as 914.46kg/day. Sludge sump is designed to have a hydraulic retention time of 2hrs. One number of sludge sump having circular shape with diameter 2.2m and depth 2.35 mis provided.

5.7.12 THICKENER FEEDPUMP

The major function of sludge thickener feed pump is to transfer the sludge from sludge sump to sludge thickener. Two numbers (1W+1SB) of non-clog, submersible pumps are provided with a discharge of 17.93cum/hr

5.7.13 SLUDGE THICKENER

Sludge thickening normally refers to the process of reducing the free water content of sludge or Thickening is a procedure used to increase the solids content of sludge by removing a portion of the liquid fraction.

5.7.14 CENTRIFUGEFEEDPUMP

The major function of Centrifuge feed pump is to transfer the sludge from thickened sludge sump to Centrifuge. Two numbers (1W+1SB) of non-clog, submersible pumps are provided with a discharge of 5.49cum/hr

5.7.15 SLUDGE CENTRIFUGE

Centrifugal thickening and dewatering of sewage sludge is a high speed process that uses the force from rapid rotation of a cylindrical bowl to separate wastewater solids from liquid. The centrifugal force in the decanters is utilized to separate the solids from the water. The use of organic flocculants, the polyelectrolytes, made it possible to coagulate the fines sludge particles to

relatively large sludge floc in the centrifugal field so that reliable separation of solids and water could take place.

5.7.16 PRESSURE SAND FILTER (PSF)

The treated water which is collected in the filter feed tank shall be pumped into the Pressure Sand Filter using the Filter Feed Pumps. They are the most popular method for removal of turbidity from water. 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 down wards 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 effected 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.



Figure 8 Pressure Sand Filter

Pressure sand filter is designed to have a dimension of 2.4mØ and 2.5m height. The work pressure is 3.5bar and it can be increased up to a maximum of 3.50 bar. Materials used in pressure sand filter are sand and anthracite (Dual media).

5.7.17 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.

Activated carbon is commonly used for removing organic constituents and residual disinfectants in water supplies. This not only improves taste and minimizes health hazards; it protects other water treatment units such as reverse osmosis membranes and ion exchange resins from possible damage due to oxidation or organic fouling. Activated carbon is a favored water treatment technique because of its multi-functional nature and the fact that it adds nothing detrimental to the treated water. Most activated carbons are made from raw materials such as nutshells, wood, coal and petroleum.

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.

The dimension of Activated Carbon Filter is 2.6mØx2.5m height.



Figure 9 Activated Carbon Filter

5.7.18 TREATED WATER TANK

The treated water is finally fed in to the treated water tank having a capacity of 176.40 m^3 . Treated water from Activated Carbon filter is pumped in to the treated water tank of dimension $9.8 \times 6 \times 3.35 \text{ m}$. Hydraulic retention time of 60 minutes is given in the treated water tank.

5.7.19 CHORINE CONTACT TANK

No separate Chlorine contact tank is proposed. Treated water tank is proposed as chlorine contact tank itself.

5.7.20 EFFLUENT CHANNEL

Effluent Conveyance System called as Effluent Channel is provided to carry treated effluent from STP to the sea.

5.7.21 OUTFALL

The disinfected clear effluent shall be let out to the sea through a RCC covered channel of adequate slope.

5.8 DETAILED DESIGN

Detailed design of the Sewage Treatment Plant With MBBR Technology is provided in the annexure

5.9 POWER REQUIREMENT

The total running power requirement is 163HP/136KW and the installed capacity is 350HP/260KW. The single largest motor capacity is 175HP (Air blower). An Indoor type transformer and a Generator is proposed with the following capacities.

- a. Transformer : 250KVA
- b. Generator : 250KVA

5.10 OTHER FACILITIES

Following provisions are also included in the proposal

5.7.13 Comfort room cum office in the laboratory

5.7.14 Internal Roads

5.7.15 Storm Water Drain

5.7.16 Providing Lawns

5.7.17 Planting trees

5.7.18 Bye-passing Arrangements

5.7.19 Walkways for all major elevated units

5.7.20 Walkways/ground pavements

5.7.21 Water Supply and sanitation arrangements

5.7.22 Laboratory

5.11 PLAN FOR REUSE OF RECYCLEDSEWAGE

In the planning and implementation of water reclamation and reuse, the reclaimed water application will usually govern the wastewater treatment needed to protect public health and the environment, and the degree of reliability required for the treatment processes and operation (Metcalf and Eddy). The major waste water reuse categories are as follows:

- a] agricultural irrigation, crop irrigation and commercial nurseries
- b] landscape irrigation
- c] industrial recycling and reuse
- d] groundwater recharge, groundwater replenishment and saltwater intrusion control
- e] recreational/environmental uses
- f] Non potable urban reuse

5.12 MAINTENANCE OF AN ECO-FRIENDLY SYSTEM

Since the treated water contains plant nutrients also, it will be beneficial for the environment when discharged as soil infiltration. Care has also been taken to properly treat the sludge produced during the operation. It has also been decided to impart a green environment to the STP units with special methods of growing plants at the exterior of plant components and space between units. Maximum utilisation of space has been taken at the planning and design stage itself and using the natural treatment properties of the soil, such decentralized systems provide good opportunities to use the natural environment. They can help reduce the level of difficulty and cost to treat pollutants, such as nutrients, and keeping them from entering lakes, rivers, and streams. The soil acts as a natural filter and provides final treatment by removing harmful bacteria, viruses, and nutrients.

5.13 PRELIMINARY STRUCTURAL DESIGN OF COMPONENTS

For the various units of the STP structural analysis and design have been performed in accordance with the stipulations of all relevant Indian Standard Codes of practice. For the reinforced concrete elements, special attention has been given to arrive at the preliminary dimensions to satisfy norms and conditions for the water retaining structures. For the metallic structures like pressure filter units, similar approach has been adopted. Since the units are constantly in contact with aggressive environment like sewage, non-corrosive coating for reinforcing steel and water proofing application for the inner side of reinforced concrete structures are recommended. These provisions are already given in the detailed estimates. During the execution stage, a detailed structural analysis of the components can be performed. However, the dimensions are expected to fall within the limits of the values obtained from the preliminary analysis. In the case of foundations, simple

raft and beam-slab type raft is adopted for safety considerations. Since the soil nature is observed to be satisfactory to withstand medium loading conditions, deep foundations are not suggested. Soil analysis reports available for the locality has been examined to arrive at a decision. However, during the execution stage, detailed soil investigations can be performed. Cover for the reinforced concrete elements is to be given in accordance with the exposure conditions given in the IS 456 Code of practice.

5.14 SEPTAGE

Septage or septic tank waste refers to the partially treated matter stored in and pumped out of a septic tank. In other words, fecal sludge from septic tanks is known as Septage, but fecal sludge and Septage are interchangeably used in India. Septage is a by-product of pretreatment of household wastewater in a septic tank where it accumulates overtime. It is generally pumped out of a septic tank or onsite sanitation system using a vacuum tanker. Septage is the liquid and solid material that is pumped from a septic tank, cesspool, or other such onsite treatment facilities after it has accumulated over a period of time.

5.14.1 SEPTAGE MANAGEMENT

Sanitation often focuses only on the provisioning of physical infrastructure toilets or latrines in order to increase the 'coverage of toilets', or to look at the epitome of sanitation: ODF cities. But in order to provide tangible and sustainable sanitation, there is a need to focus on the entire 'sanitation chain'. In simple terms, a sanitation chain is an outline for understanding how fecal waste flows through each system. It sets out interlinked steps vital to manage septage and effluent from generation to disposal or end use, thereby summarizing the city-level outcomes and current status of the same.



Figure 10Septage discharge using tankers

5.14.2 TRANSPORTATION OF SEPTAGE

Transportation is a very vital stage in the sanitation value chain and so are safety measures involved in it. Vehicles that carry Septage act as mobile sewer networks for OSS. Ideally, an ultimate discharge point of collected Septage is an STP or Septage treatment plant. The two main types of vehicles used in India are:

1. Truck-mounted vacuum tankers: These trucks have vacuum pumps with sizes based on lift elevation, pumping distance, volume of sludge to be removed, and volume of the tank. Their capacity varies between 3,000–10,000liters.

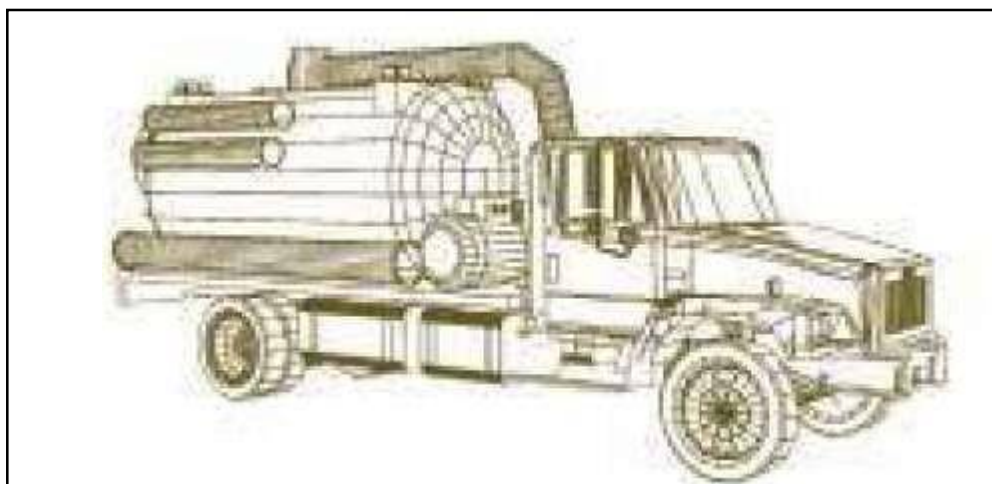


Figure 11Truck-mounted vacuum tankers

2. Tractor-mounted tankers: These vehicles are locally made across India, but their capacity is similar to that of vacuum trucks. The motor, the tank and the tractor are assembled according

to the complimenting capacity of each module.

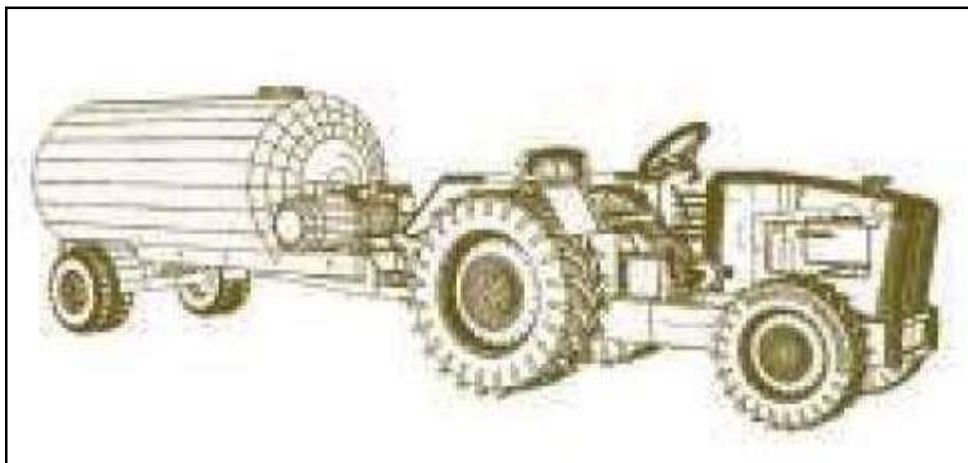


Figure 12 Tractor-mounted tankers

Septage transportation is one of the most important components of Septage management. There is need for evolving a standard method of collection, handling and transportation of Septage. Desludging trucks act as a “mobile sewer network” for onsite sanitation systems. They collect the Septage at the household level and transport it to treatment or disposal sites, thereby complimenting the functions of underground sewer network. It may be assumed that one vehicle having a capacity of 2,000 liters shall clean 3 to 10 septic tanks per day. This is based on the frequency of cleaning of septic tanks (once in 2 – 3 years) and also the distance from the location of septic tanks to the Septage treatment facility. The vehicles are available in different capacities from 2,000 up to 12,000 liters. It is to be noted that the requirement of machines also varies depending upon the capacity of vehicles, road width etc. In case of bigger cities having sufficient width of roads, vehicles having larger capacities may be adopted. Adequate provision for standby machines for cleaning of septic tanks may also be made. Small scale vacuum trucks called Vacutug (from 200 up to 2,000 Liters capacity) also are recommended for use in areas inaccessible to large desludging vehicles. The Vacutug is mounted on wheels and can be attached to a small vehicle. It can be manufactured locally to offer flexibility and mobility without losing the capacity to collect a substantial volume of fecal sludge within one operation.

For the purpose of planning sewerage/septage management systems for this proposal the project area is broadly categorized into two: areas with higher population density and areas with lower population density. Networked sewerage system with STPs is proposed for the first category where the density is generally more than 1500 per square kilometre. Furthermore, septage treatment is proposed in densely populated areas where there is no road network. Septage load from entire Mananthavady Municipality is proposed to be transported to the 2 MLD STP with MBBR

technology at Gandhi Parkin Mananthavady Municipality where Co-treatment facility will be provided.

5.14.3 SEPTAGE CO-TREATMENT PROPOSED

Septage collected from the septage Zone is proposed to be treated in the Sewage Treatment Plant. Capacity of septage load is considered while designing the Sewage Treatment Plant. A septage collecting tank of size 6mX3mX3m is proposed to collect the septage received by trucks. The septage is diluted with effluent from secondary clarifier and proposed to pump to receiving chamber of Sewage Treatment Plant.

5.15 LAND REQUIRED FOR STP AND WELLS

The details of land required for Sewage Treatment Plant, pumping stations and lifting stations are detailed below. Procurement of land is the sole responsibility of Municipal Authority.

Table 17 Land details

Sl No	Components	Area required in cents	Remarks	Remarks
1	Sewage Treatment Plant	140	Gandhi Park, Survey No: 308, 309	
2	Lifting Station, LS1	10	11.79980561, 76.02007563	
3	Lifting Station, LS2	10	11.81008634, 76.01336265	
4	Lifting Station, LS3	2	11.80708851, 76.01838560	
5	Lifting Station, LS4	2	11.80522536, 76.01687898	
6	Lifting Station, LS5	2	11.80184016, 76.01402084	
7	Lifting Station, LS6	2	11.80120426, 76.01173690	
8	Lifting Station, LS7	2	11.80310597, 76.00749811	
9	Lifting Station, LS8	2	11.79349028, 76.01024055	
10	Lifting Station, LS9	2	11.78953860, 76.00198152	

11	Lifting Station, LS10	2	11.79608960, 76.00121792	
12	Lifting Station, LS11	2	11.80161648, 75.98807906	
13	Lifting Station, LS12	2	11.79970105, 76.00551327	
14	Lifting Station, LS13	2	11.81290334, 75.99497630	
15	Lifting Station, LS14	2	11.80400497, 75.99785586	
16	Lifting Station, LS15	2	11.80364160, 76.00113908	
17	Lifting Station, LS16	2	11.80023155, 75.99648121	

SMARTMANAGEMENTANDON-LINEMONITORINGUSINGINTERNETOFTHINGS(IoT)

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

For the sewerage treatment plant, a network of various sensors can capture the variations of values of parameters like temperature, dissolved oxygen, chemical composition, TDS etc. at different control points of the system. The continuous data obtained through IoT is used by a customized algorithm for synthesis to impart a decision-making procedure. A centralised information processing system (CIPS) can be formed for this task. In addition Table 5.18 of this smart water flowmeters can also be coupled to this digital environment. IoT in wastewater management can also be used to calculate residual chemicals after the treatment. This data can be further used to calculate the efficiency of the treatment process and ensure that water quality standards are met before it is discharged in a water body.

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

ODOUR CONTROL METHODS

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

- Hydrogen sulphide, and
- Ammonia.

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

- A. Identify the odour source and characteristics through sampling and analysis.
- B. List and assign priorities to controlling a specific odour problem, recognizing considerations such as cost, plant location, future upgrading of various sewage processes, severity of the odour problem, and the nature of the affected area.
- C. Select one or more odour control method or technology for implementation to meet the objectives of steps “a” and “b”, taking into consideration the advantages and disadvantages of each.
- D. Monitor odour emissions from the treated air for process adjustments and for feedback to evaluate the solution’s effectiveness.

Hydrogen sulphide (H_2S) is the most common odorous gas found in sewage collection and treatment systems and results from the reduction of sulphate by bacteria under anaerobic conditions. Its characteristic rotten-egg odour is well known. The gas is corrosive, toxic and soluble in sewage. Hydrogen sulphide is considered a broad-spectrum poison, meaning it can poison several different systems in the body.

PREVENTION OF ODOUR

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

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

- Avoid storing screenings and grit generated in the grit chamber for a long time. Dispose of screenings and grit at appropriate intervals
- Retention time of sludge in the sludge treatment facilities should be appropriate (Do not retain sludge for a long time)
- Maintain sewage at neutral pH range because most of the sulphide is present at a pH value of less than 7.

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

- Remove scum routinely, with increased frequency during warm weather.
- Remove sludge before it can bubble or float.
- Wash weirs and other points where floatable and slime collect. Some facilities use submerged pipes with holes rather than effluent troughs. The submerged pipes do not splash the primary effluent, thereby reducing the release of hydrogen sulphide.
- Wash down all spills and grease coatings.
- When draining a tank, immediately flush it completely. If sludge does not drain quickly, spray lime, calcium hypochlorite, or potassium permanganate on the sludge surface to reduce odours. Because even a clean tank can produce odours, flushing the tank with a chlorine solution or keeping the tank floor covered with a low concentration of chlorine solution will reduce odours.
- If the sewage is septic, add chemicals in the collection system or at the plant, as appropriate, to reduce sulphides.
- If tanks are covered for odour control, keep plates and access hatches in place.
- Routinely check any odour scrubbers or deodorizers for plugging, adequate supply of chemicals, proper pressures for demisting, and/or effectiveness of carbon.
- The splashing of primary sewage into weir troughs and effluent channels can result in the release of hydrogen sulphide. If possible, try to minimize the splashing of primary sewage into the channel or weirs. If it cannot be accomplished operationally, then installing submerged sewer pipes may be necessary. This will require tank modifications to verify the plant hydraulics and provide proper control to avoid fluctuations in the tank levels.
- Minimize the stripping of hydrogen sulphide from the sewage when using channel air diffuser systems. Adoption of the following regular practices will not only increase removal efficiency but will provide better working conditions for the operator:
- Regularly remove accumulations from the in-let baffles and outlet weirs with a hose or a broom with stiff bristles. Only experience will determine the necessary frequency.

- Clean scum removal equipment regularly; otherwise, obnoxious odour sands an unsightly appearance will result.
- Keep cover plates in place except when operations or maintenance require their removal.
- Immediately flush and remove all sewage and sludge spills. Avoid hosing down motors and enclosed control devices.
- Establish a house keeping schedule for the primary treatment area, including galleries, stairwells, control rooms, and related buildings, and assign responsibility for each item to a specific employee.
- Repaint surfaces as necessary for surface protection and appearance.

CONTROL OF ODOUR BY CHEMICAL ADDITION

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

Table 19 Control of odour by chemical addition

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

CHAPTER 6 COST ESTIMATE, OPERATION AND MAINTENANCE CHARGES

6.1 DETAILED ESTIMATE

6.1.1 GENERAL

The detailed estimate for the STP components and Network components is prepared in accordance with the Delhi Schedule of Rates (DSR) 2018 provisions after applying District Cost Index. For certain items, market rates are adopted. The estimate prepared in Kerala Water Authority Price software.

6.2 DETAILED ESTIMATE OF COMPONENTS

The detailed estimates have been divided into components as Raw sewage well, Receiving Chamber, Screen Chamber, Grit chamber, Equalization Tank, Aeration/MBBR Tank, Secondary Settling Tank, Filter Feed Tank, Treated Water tank, Sludge sump, Sludge Thickner, Thickened sludge Centrifuge Structure, Centrate sump, Chlorinator room, Air blower room, Administrative Building, Well and pump house, Sewer network, Control room, etc, Mechanical works, Electrical installations and instrumentation, Operation and maintenance. The total estimate amount comes to Rs. 90 Crores including O&M for 10 years. Detailed estimate is enclosed as annexure.

6.3 PROPOSED SEWERAGE SYSTEM O&M

On completion of the construction, the system should be commissioned in phases. Trial commissioning and operation of all the components of the project shall be carried out in phases and any defects found during the period shall be attended immediately. The following components require regular supervision, operation and maintenance.

1. Sewerage Network.
2. Pumping Stations.
3. Sewage Treatment Plants.

For the efficient operation and maintenance of sewerage system, proper planning, staff/labour, tools & equipment and spares are required. For estimating the O&M cost for the Sewerage system, the cost is broadly categorized into

1. Establishment Charges
2. O&M for Network maintenance cost
3. O&M for STP

6.4 SEWER NETWORK MAINTENANCE

For the purpose of maintenance, the jet rodding machine will be used along with other components for maintenance of the collection system. It can either be procured or can be hired. The staff shall be properly trained to operate the jet rodding machine.

All the new connections shall be given under the supervision of O&M staff. No unauthorized connection shall be given to the sewerage system.

Sewer inspections and maintenance should be planned. The whole sewerage system should be marked on a plan and divided into sections and areas.

Quality maintenance shall be the most important step in smooth functioning of the proposed sewers. This includes the optimum use of labour, equipment and material to keep the system in good condition.

6.5 TYPES OF MAINTENANCE

There are two types of maintenance of an underground sewerage system - preventive and emergency. It is necessary that preventive or routine maintenance are carried out to prevent any breakdown of the system and to avoid emergency operations to deal with clogged sewer lines or over flowing manholes or backing up of sewage into a house or structural failure of the system. Preventive maintenance is more economical and provides for reliability in operations of the sewer facilities. Emergency repairs, which would be very rare if proper maintenance is carried out will also have to be provided for proper inspection and preventive maintenance is a necessity.

The organization required for the maintenance of the sewerage system will vary with the size and type of the sewerage system and the relative age of the system. The larger the municipality, the larger and more complex will be its maintenance organization. The size of the organization will vary from a couple of employees to several hundred regular employees. The primary effort of the staff is to maintain sewers free flowing and unobstructed.

6.5.1 STEPS TO BE TAKEN FOR OPERATION AND MAINTENANCE OF THE SEWERAGE NETWORK DETAILED IN THIS SECTION ARE AIMED AT

- 6.2.1.1 Regular maintenance of the system for proper functioning
- 6.2.1.2 Preventing any breakdown of the system
- 6.2.1.3 Emergency operations to deal with clogged sewer lines or overflowing manholes
- 6.2.1.4 Preventing back flow of sewage into residence sand
- 6.2.1.5 Preventing structural failure of the system.

6.5.2 INSTITUTIONAL STRUCTURE

Operation and maintenance of the proposed scheme shall be carried out through the maintenance wing of KWA.

The following list gives the duties that are to be performed for proper sewer maintenance:

- 6.2.1.6 Inspection of sewers, sewer appurtenance sand Sewage Treatment Plant.
- 6.2.1.7 Cleaning of sewers and sewer appurtenances.
- 6.2.1.8 Checking manhole conditions for deposition of silt etc.
- 6.2.1.9 Replacing broken manhole covers.
- 6.2.1.10 Raising the manhole cover for the construction of culverts, resurfacing etc.
- 6.2.1.11 Approval of sewer connection applications and executing connections
- 6.2.1.12 Maintaining records of sewers and STP including:
- 6.2.1.13 Daily operation and maintenance report
- 6.2.1.14 Complaints register
- 6.2.1.15 Stock of equipment
- 6.2.1.16 Disposal of silt, garbage removed after cleanings ewer, manholes and treatment plants.
- 6.2.1.17 Removal of debris, brick bats etc. After any repair work.
- 6.2.1.18 Identifying locations where regular maintenance is needed (problem areas) in sewers and STP.
- 6.2.1.19 Ensuring work is carried out correctly and safely with due regards to health and safety regulations.
- 6.2.1.20 Adopting preventive maintenance within the sub division as a whole, conducting periodic staff meeting and record of the proceedings.

6.5.3 PREVENTIVE MAINTENANCE

In order to maintain the sewer system in satisfactory manner, desilting of manholes and sewers is to be done by any of the following methods suitable for the purpose.

- a) By manually by ball passing method
- b) By drag bucket machine
- c) By jet rodding machine

6.5.4 BREAK DOWN MAINTENANCE

The work of each sewer maintenance gang would consist of the following:

- 1) The house sewer obstruction and main sewer obstruction or any other related complaints to be attended with high priority.
- 2) There were line leaks/complaints are to be attended with high priority.
- 3) Any silt or mud removed during sewer cleaning operation shall be removed from the roads within 24 hours to approved location.

It shall be the responsibility of the O&M division to arrange for traffic control and to obtain permission from concerned agencies for traffic diversion etc for purpose of maintenance. All

necessary precautions shall be taken. After the maintenance works are completed roads, cables, utilities etc shall be restored to the original condition.

6.5.5 PERFORMANCE LEVEL TO BE ACHIEVED

- a) Collection system shall be maintained without over flows from manholes/sewers on to streets or into storm water drains.
- b) Silt and trash removed from sewers during removal of block ages/routine cleaning of sewers shall be disposed off hygienically within 24hours.
- c) Preventive maintenance shall be carried out as per approved schedule.
- d) Duration of break down maintenance shall not exceed the specified norms.
- e) All safety precautions shall be taken in sewer maintenance`

6.6 ON COMPLETION OF MAINTENANCE WORKS RESTORE EVERYTHING TO THE ORIGINAL CONDITION. PROPOSED SEWERAGE SYSTEM O&M

On completion of the construction, the system should be commissioned in phases. Trial commissioning and operation of all the components of the project shall be carried out in phases and any defects found during the period shall be attended immediately. The following components require regular supervision, operation and maintenance.

6.2.2 Sewerage Network.

6.2.3 Pumping Stations.

6.2.4 Sewage Treatment Plants.

6.7 SAFTEYPRACTICES

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

6.8 O &M CHARGES

O&M charges for 10 years (STP + Netwrok)	Rs. 378240981.20

CHAPTER 7 IMPLIMENTATION OF THE PROJECT

7.1 IMPLEMENTING AGENCY

Kerala Water Authority is the responsible agency in Government sector in the water supply sector and sewerage Sector for implementation of Major Projects under various funding agencies AMRUTH, NABARD, Rebuild Kerala, ADB assistance, and also STATE PLAN Works. Being high value projects Implementation of sewerage projects also requires an agency with expertise and having sufficient human resources. Implementation can be done through concerned Project Divisions of KWA.

7.2 STEPS TO TAKEN WHILE TENDERING.

Conditions should be incorporated in the NIT that detailed field survey and design of network shall be carried out for ascertaining the levels due to road developments if any and in order to accommodate the fact that sewer network design based on gravity flow and accurate levels with Total Station equipment along both sides of road and centre of road is required. Due to limitation of fund and time DGPS survey along one side of the road is only taken in the present proposal. Additional changes required for satisfactory completion of work additional sewer lines required with additional manholes, lifting stations required due to future developments in the scheme area shall also be included in the scope of work while implementing the project. Better and advanced technology for treatment to be considered for STP while implementing the project. Soil investigation of STP site, well sites not carried out as the land proposed are private lands. Hence detailed soil investigation is to be carried out and type of foundation of the structures to be changed accordingly.

7.3 INTEGRATION WITH OTHERPROJECTS

Planning and design of sewerage schemes can be combined with other water projects. This is since most of these projects are inter-related and environment sensitive. Hence the location of an STP, collection wells and coverage of sewerage networks in an area depends upon the water supply system existing in that area, proximity of irrigation canals, water bodies and flood routing structures if any. Planning shall also be done for integrating with road development projects in the scheme area so as to execute all road reformation works after laying sewerage system.

7.4 SUPPORT ACTIVITIES

It has been observed that in many cases of the implementation of the sewerage projects, public protests are experienced by the implementing agencies and authorities. This

is because of the unawareness of the local people about the treatment process, disposal of sludge and re-use of treated sewage etc. In this regard, it is essential to educate the consumers to make them aware of the waste management process thereby encouraging them to come up with sewerage connections. The state government is promoting the waste management concept in all the possible ways. More support is needed from the Local Self Government Departments, Suchitwa Mission Kerala, Haritha Keralam Mission Kerala and all the other departments by organizing programmes for motivation public through seminars and

		2022						2023					
		1	3	5	7	9	11	1	3	5	7	9	11
		2	4	6	8	10	12	2	4	6	8	10	12
1	Appraisal of the report												
2	Sanction of the project												
3	Tendering, and awarding work												
4	Civil works												
5	Mechanical works												
6	Electrical and instrumentation works												
7	Sewer network and allied works												
8	Trial and commissioning												

awareness classes.

7.5 IMPLIMENTATION SCHEDULE

Table 20Implementation Schedule

Proposed implementation Schedule is provided above. The project is proposed to complete within a period of two years.

ENVIRONMENTALIMPACTMANAGEMENT

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

During the construction phase, the emissions from movement of vehicles used for project activity may affect the air quality due to the particulate matter generated during loading, transporting, unloading of materials during construction. Movement of heavy vehicles and concrete mixer would generate considerable noise in the surrounding environment. Hence a proper traffic management plan is recommended during the construction activities.

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

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

CHAPTER 8 CONCLUSION AND RECOMMENDATION

- The responsibility of providing sewerage systems rest with local bodies which can be facilitated by Kerala Water Authority. KWA has recently set up a Sewerage Vertical with four sewerage circles towards this. The idea and vision behind it are to visualize and materialize complete sewerage schemes for the State as it is vital for a safe environment. Moreover, there are directions from the Honourable National Green Tribunal (NGT) for ensuring the installation of Effluent Treatment Plants (ETPs), Common Effluent Treatment Plants (CETPs), Sewage Treatment Plants (STPs) and other pollution control measures. Hon. NGT has also directed to take necessary action to abate discharge of pollution into rivers (OA No. 673 of 2018).
- This proposal includes 2 MLD STP with MBBR technology at Gandhi Park in Mananthavady Municipality, a sewer network of 25.18 km, 1029 manholes, and sixteen lifting stations. Manholes at 30 m intervals and at all intersections are proposed to facilitate maintenance operations. Septage load from entire Mananthavady Municipality is proposed to be transported to the 2 MLD STP where Co-treatment facility will be provided.
- The cost estimate of the project is excluding land cost. The fund for land has to be provided by the local bodies /Government, according to the source of funding for the scheme.
- If sufficient funds and lands are made available, the projects can be taken up by KWA and can be completed in 2 years. For efficient control of operation and maintenance a monitoring cell at institutional level is to be formed.
- For better performance of the system testing of influent samples, effluent samples after treatment from each unit is to be tested at regular intervals and modifications if any shall be made at the initial stage itself so as to ensure efficiency of individual units and effluent standards as per design.
- Better and advanced technology for treatment to be considered for STP while implementing the project.

APPENDIX I: DESIGN OF STP

DESIGN OF STP WITH MOVING BED BIOFILM-REACTOR (MBBR)						
Average flow	2	MLD				
Design flow	2.087	MLD	2086957	LPD	2087	m ³ /day
Working hours	23		2087	KLD	86.96	m ³ /hour
Assumed peak factor	2.5					
Peak design flow	4.70	MLD	4695652	LPD	4696	m ³ /day
					195.65	m ³ /hour
Raw Sewage Characteristics						
Average sewage flow entering the STP	86.96	m ³ /hour				
Peak flow entering the STP	195.65	m ³ /hour				
COD	400	mg/l				
Primary ST/ET effluent BOD	250	mg/l				
Thickener overflow return as fraction of plant flow	0.15					
Thickener overflow return	0.313	MLD				
Thickener overflow return BOD	500	mg/l				
Centrate from sludge dewatering as fraction of plant flow	0.006					
Centrate from sludge dewatering return	0.01252	MLD				
Centrate from sludge dewatering return BOD	380	mg/l				
Influent BOD to aeration tank	283.1	mg/l				
TSS	400	mg/l				
Total Nitrogen (As N)	40	mg/l				
Total Phosphorous (As P)	7	mg/l				
Faecal Coliform	3E+07	mpn/100 ml				
E Coliform	4E+07	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	10	mg/l				
Total Nitrogen (As N)	9	mg/l				
Total Phosphorous (As P)	1	mg/l				
E Coliform	1000	mpn/100 ml				
pH	7					
Receiving Chamber						
Average quantity of flow	86.96	m ³ /hour				
Peak flow	195.65	m ³ /hour				
	0.054	m ³ /sec				
Average Retention Time for peak flow	30	sec	offset to wall	0.3	m	

Volume of the inlet chamber	1.63	m ³	free board	0.5	m	
Assumed depth of flow	1.5	m	total height	2	m	
Area required for inlet chamber	1.09	m ²	wall thickness	0.25	m	
Length of the tank	1.5	m	slab thickness	0.3	m	
Breadth of the tank	0.72	fix	1	m	area in m ²	5.46

Mechanical Coarse Screen Channel

Peak design flow	0.054	m ³ /sec				
Number of screen	1					
Peak flow rate per screen	0.054	m ³ /sec				
Velocity at peak flow	0.8	m/sec	assumed			
Velocity through clean bar screen	0.86	m/sec				
Length of channel U/S	1	m				
Width of channel provided	0.8	m				
Depth of flow	0.08	m				
Area required for screen	0.068	sqm				
Headloss through bar screen	0.01	m	assuming head loss coefficient = 0.7			
Assumed depth of flow after inserting bar screen	0.15	m	0.09	(control value)		
Width of channel required	0.45	m	fix	0.9	m	
Clear bar spacing	20	mm	(20 to 50 mm)			
Bar thickness	10	mm	(5 to 15 mm)			
Number of bars	20					
Clear bar spacing obtained	37	mm	OK			
Inside width of screen (openings)	0.7	m				
Full height of channel	1	m	fb	0.5		
Angle of inclination	70	degree	1.22	rad		
Actual velocity at peak flow	0.84	(between 0.60 m/sec and 0.90 m/sec)				
Length of channel required D/S	2.74	m	fix	2.75	m	3.375

Manual Coarse Screen Channel

Peak design flow	0.0543	m ³ /sec				
Number of screen	1					
Peak flow rate per screen	0.054	m ³ /sec				
Velocity at peak flow	0.8	m/sec	assumed			
Velocity through clean bar screen	0.90	m/sec				
Length of channel U/S	1	m	wall thickness	0.25	m	
Width of channel provided	0.8	m	offset to wall	0.25	m	
Depth of flow	0.08	m	slab	0.30	m	

			thickness			
Area required for screen	0.068	sqm				
Headloss through bar screen	0.01	m	<i>assuming head loss coefficient = 0.7</i>			
Assumed depth of flow after inserting bar screen	0.15	m	0.10	(control value)		
Width of channel required	0.45	m	fix	0.9	m	
Clear bar spacing	20	mm	(20 to 50 mm)			
Bar thickness	10	mm	(5 to 15 mm)			
Number of bars	25					
Clear bar spacing obtained	27	mm	OK			
Inside width of screen (openings)	0.65	m			area in m ²	7.125
Full height of channel	1	m	fb	0.3		
Angle of inclination	70	degree	1.22	rad		
Actual velocity at peak flow	0.86	(between 0.60 m/sec and 0.90 m/sec)				
Length of channel required D/S	2.74	m	fix	2.75	m	
Mechanical Fine Screen Channel						
Peak design flow	0.054	m ³ /sec				
Number of screen	1					
Peak flow rate per screen	0.054	m ³ /sec				
Velocity at peak flow	0.8	m/sec	assumed			
Velocity through clean bar screen	1.10	m/sec				
Length of channel U/S	1.75	m	wall thickness	0.25	m	
Width of channel provided	0.6	m	offset to wall	0.25	m	
Depth of flow	0.11	m	slab thickness	0.30	m	
Area required for screen	0.07	sqm				
Headloss through bar screen	0.04	m	<i>assuming head loss coefficient = 0.7</i>			
Assumed depth of flow after inserting bar screen	0.25	m	0.15	(control value)		
Width of channel required	0.27	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	57					
Clear bar spacing obtained	5.9	mm				
Inside width of screen (openings)	0.33	m				
Full height of channel	1	m	fb	0.5		

Angle of inclination	45	degree	0.79	rad		
Actual velocity at peak flow	1.06	(between 0.60 m/sec and 1.20 m/sec)				
Length of channel required D/S	1.00	m	fix	1	m	2.475
Daily screening quantity						
Daily sewage quantity	2087	m ³ /day				
Rate of screening quantity	0.015	m ³ /1000 m ³				
Daily screening quantity	0.0313	m ³ /day				
Grit Separator Chamber						
Number of grit units	1	SB	1			
Peak flow	0.0543	m ³ /sec				
Flow in one unit	0.0543	m ³ /sec				
Grit particle size	0.2	mm				
HRT	90	sec	(45 to 90 sec, typical 60)			
Volume of grit chamber	4.89	m ³				
SOR	900	m ³ /m ² /day	(empirical, from observations)			
	0.010	m ³ /m ² /sec				
Area required	5.22	m ²	wall thickness	0.25	m	
SWD	1.50	m	slab thickness	0.30	m	
Side of square channel	2.28	m	offset to wall	0.3	m	
Fix length	2.3	m	freeboard	0.5	m	
Fix width	2.3	m	area given	5.29	m ²	OK
Shape factor	0.85		volume given	7.94	m ³	OK
Specific gravity of liquid	2.65					
Kinematic viscosity	1E-06	m ² /sec				
V _p in m/sec	0.036	let $N_r < 1$, apply Stoke's law to get terminal velocity v_p				
N _r	6	apply Newton's equation				
assumed velocity in m/sec	0.0146					
N _r	2				area in m ²	11.56
drag coefficient Cd	11.95					
vp in m/sec	0.019					

Critical displacement velocity, Vc	0.0190	m/sec		R _t	1.53	
Horizontal velocity of flow, Vh	0.0158	m/sec	OK	R _v	1.21	
Equalisation Tank						
Number of units	1					
Average design flow	86.96	m ³ /hour				
Volume of tank required	421.00				m ³	
HRT	4.84	hours	free board	0.50	m	
SWD	3	m	offset to wall	0.45	m	
Area required for each tank	140.33	m ²	wall thickness	0.3	m	
Diameter of circular tank	13.37	m	fix	13.5	m	
Side if square tank	11.85	m	fix length	12	m	
Thickness of foundation slab	0.45	m	fix breadth	12	m	
Actual capacity provided	429.4	m ³	circular	OK		
	432.00	m ³	rectangular	OK	area in m ²	182.25
Sewage pump- for pumping to MBBR tank						
Number of pumping system	1	SB	1			
Type of pump set	submersible centrifugal sewage transfer-non clog					
Average flow	2086.96	m ³ /day				
Peak design flow	4695.65	m ³ /day				
Flow capacity of each pump	86.96	m ³ /hour				
Peak factor	1.20					
Discharge	28.99	LPS	0.0290	m ³ /sec		
Head required	12	m				
Efficiency	50%					
Power required	9.28	HP	fix	10	HP	
Energy	159.15	kwh				
Moving Bed Bio-Reactor (MBBR)-Single Stage						
Number of tanks proposed	1					
Average design flow/tank	2086.96	m ³ /day				
Number of streams	1					
BOD of incoming sewage	283.11	mg/l				
TSS of incoming sewage	400	mg/l				
BOD expected after treatment	10	mg/l				
BOD to be removed	273.11	mg/l				
BOD removal % expected	96.47					
BOD loading rate/volume	4	kg/m ³ /day	4-7 kg/m ³ /day as per M&E			

Actual BOD loading rate	590.85	kg/day				
Quantity of BOD to be removed per day	569.98	kg/day				
Volume of reactor required	147.71	m ³				
Surface area loading rate (SALR) for BOD removal	7.50	g/m ² /day				
Required carrier surface area	78779.60	m ²				
Specific surface area of carrier	450.00	m ² /m ³				
Required carrier volume	175.07	m ³				
Volume of media required	40%					
	59.08	m ³	depth of base	0.9	m	
Volume of tank required-BOD loading rate/volume method	206.80	m ³	slab thickness	0.35	m	
Volume of tank required- SALR method	437.66	m ³	offset to wall	0.45	m	
Volume of each tank	437.66	m ³	total height	4.50	m	
SWD	4	m	wall thickness	0.30	m	
Area of each tank	109.42	m ²	fix dia	12	m	
Diameter of circular tank	11.80	m	length	10.7	m	
Side of square tank	10.46	m	breadth	10.7	m	
Actual capacity provided-circular	452.39	m ³	OK			
Actual capacity provided-rectangular	457.96	m ³	OK			
Fix capacity	457.96	m ³				
Actual volume of media obtained	183.18	m ³				
Actual carrier surface area	82432.80	m ²				
Volume of liquid in the tank	384.69	m ³				
Hydraulic Retention Time at design average flow	4.42	hours	265.4	minute s		
Hydraulic Retention Time at peak flow	1.97	hours	118.0	minute s		
SARR for the given SALR	6.94	g/m ² /day			area in m ²	148.84
Estimated BOD removal rate	571.88	kg/day				
Actual BOD removal rate %	96.79	BOD of effluent		9.09	mg/l	ok
Moving Bed Bio-Reactor (MBBR)-Single Stage Nitrification						
Number of tanks proposed	1					
Average design flow/tank	2086.96	m ³ /day				
Number of streams	1					
BOD of incoming sewage	10.00	mg/l				
NH ₄ -N of incoming sewage	40.00	mg/l				
Alkalinity as CaCO ₃	140.00	mg/l				
Target effluent NH ₃ -N	3.30	mg/l	% removal	91.75		
DL level to be maintained in tank	2.00	mg/l				
Design minimum waste water temperature	20.00	°C				

SARR _{max}	0.61		SARR temp coefft. Θ		1.058	
Minimum NH ₃ -N at SARR _{max}	0.50		SARR _T	0.81	g/m ² /day	
Design value of SALR	0.88	g/m ² /day				
NH ₃ -N loading rate	83.48	kg/day				
Required carrier surface area	94715.55	m ² /day				
Specific surface area of carrier	600.00	m ² /m ³				
Required carrier volume	157.86	m ³ /day	depth of base	0.65	m	
Volume of media required	40%		slab thickness	0.35	m	
Volume of tank required- SALR method	394.65	m ³	offset to wall	0.45	m	
Volume of each tank	394.65	m ³	total height	3.50	m	
SWD	4	m	wall thickness	0.30	m	
Area of each tank	98.66	m ²	fix dia	11.5	m	
Diameter of circular tank	11.21	m	fix length	10.7	m	
Side of square tank	9.93	m	fix breadth	10.7	m	
Actual capacity provided-circular	415.48	m ³	OK			
Actual capacity provided-rectangular	457.96	m ²	OK			
Fix capacity	457.96	m ³				
Actual volume of media obtained	183.18	m ³				
Actual carrier surface area	109910.40	m ²			area in m ²	148.84
Volume of liquid in the tank	342.20	m ³				
Hydraulic Retention Time at design average flow	3.94	hours	236.12	minute s		
Hydraulic Retention Time at peak flow	1.75	hours	104.94	minute s		
Estimated NH ₃ -N removal rate	88.88	kg/day				
NH ₃ -N of effluent	-2.59	mg/l				
BOD SALR	0.19	g/m ² /day	<i>should be < 0.5 to achieve good nitrificatio n</i>			

Using the equivalent weight of CaCO₃ as 50, the equivalent weight of NaHCO₃ as 84, the alkalinity use for nitrification as 7.14 g CaCO₃/g NH₃-N and the target effluent alkalinity as 80 mg/L as CaCO₃, give the calculated alkalinity requirement as 118.5 mg/L as CaCO₃.

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	421.64	kg/day				

CaCO ₃						
Equiv wt. of CaCO ₃	50.00	g/equivalent				
Equiv wt. of NaHCO ₃	84.00	g/equivalent				
Daily NaHCO ₃ requirement	708.36	kg/day NaHCO ₃				
Blower air requirement						
BOD loading/tank	590.85	kg/day				
NH ₃ -N loading rate/tank	83.48	kg/day				
Oxygen uptake ratio-BOD	1.50	kg of O ₂ /kg of BOD				
Oxygen uptake ratio-NH ₃ -N	4.35	kg of O ₂ /kg of NH ₃ -N				
Oxygen required for BOD loading	886.27	kg/day				
Oxygen required for NH ₃ -N loading	363.13	kg/day				
Percentage of O ₂ in air	21.00					
Weight of air required-BOD loading	4220.34	kg/day				
Weight of air required-NH ₃ -N loading	1729.19	kg/day				
Density of air	1.225	kg/m ³				
Volume of air-BOD loading	3445.17	m ³ /day				
Volume of air-NH ₃ -N loading	1411.59	m ³ /day				
Air transfer efficiency of diffuser	0.100					
Quantity of air required-BOD loading	34451.72	m ³ /day				
Quantity of air required-NH ₃ -N loading	14115.86	m ³ /day				
Factor of safety	1.10					
Volume of air required-BOD loading	1579.04	m ³ /hour				
Volume of air required-NH ₃ -N loading	646.98	m ³ /hour				
Volume of equalisation tank	421.00	m ³				
Normal inflow	0.024	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	421.00	m ³				
Volume of air required for ET	526.25	m ³ /hour				
Volume of air required for ST	11.21	m ³				
Total air required	2763.47	m ³ /hour				
Capacity of blower	2763.00	m ³ /hour				
Number of blowers working	1.00	SB	1			
Air required per blower	2763.00	m ³ /hour				
Pressure given	0.60	kg/cm ²	5.89	m		
Volumetric efficiency	70%					
Power required for blower motor	86.65	HP	175.00	kw		

Fix power of blower motor	90.00	HP				
Energy/tank	1551.36	kwh				
Alum solution tank						
number of units	1					
dosage of alum	50	ppm				
requirement for 8 hours	34.780	kg				
volume of solution at 10% strength/unit	0.310	m ³				
length of tank	1	m				
breadth of tank	1	m				
liquid depth	0.31	m				
total depth	0.75	m				
solution flow rate	0.0388	m ³ /hour				
Lime solution tank						
number of units	1					
dosage of lime	35	ppm				
requirement for 8 hours	24.35	kg				
volume of solution at 10% strength/unit	0.22	m ³				
length of tank	1	m				
breadth of tank	1	m				
liquid depth	0.22	m				
total depth	0.6	m				
solution flow rate	0.02750	m ³ /hour				
Secondary Clarifier						
No. of Tanks	1					
Average Flow in each tank	2086.96	m ³ /day				
SOR	25.00	m ³ /m ² /day				
SWD	2.80	m				
Solid conc. In settled sludge -%	0.8 to 0.9	%				
Withdrawal frequency - continuous						
Area Required for the Tank	83.48	m ²				
Diametre Required for Secondary Settling Tank	10.31	m				
Assumed Detention Period	3.10	hrs				
Volume	269.57	m ³		FB	0.5	
Depth of the Clarifier assumed	2.80	m				
Area of the Clarifier	96.27	m ²				
Provide Secondary Clarifier of Diametrer	11.10	m				
Surface Loading Rate	21.68	m ³ /m ² /day		OK		
Check for Peak flow	48.77	m ³ /m ² /day		OK		
Sludge Sump						
Number of units	1					
Average flow/tank	2086.96	m ³ /day				
TSS	400	mg/l				
BOD	283.11	mg/l				

Assumed TSS Sludge	30%					
Assumed BOD Sludge	35%					
Sludge generated-TSS	250.4	kg/day				
Sludge generated-BOD	206.8	kg/day				
Total sludge	457.23	kg/day				
% sludge with 1.02 specific gravity	10%					
Sludge volume per day/tank	44.83	m ³ /day				
	1.87	m ³ /hour				
Assumed HRT	2	hours	freeboard	0.35	m	
Volume of tank	3.74	m ³	slab thickness	0.3	m	
Assumed SWD	1.5	m	offset to wall	0.3	m	
Area of the tank	2.49	m ²	wall thickness	0.25	m	
Diameter of circular tank	1.78	m	fix	2	m	
Actual capacity provided	4.71	m ³			area in m ²	3.10
Pump for Sludge transfer to Thickner						
Number of pumps	1.00	W	1	SB		
Specific gravity of liquid	1.03					
Type of pump set	submersible centrifugal sewage transfer-non clog					
Working hours	5.00	hours				
Discharge required	8.97	m ³ /hour	0.002490	m ³ /sec		
Required head	15.00	m				
Velocity in sludge transfer pipe adopted	0.70	m/sec				
Pipe diameter required	67.30	mm	fix	100	mm	
Efficiency	50%					
Power required	1.00	HP	fix	2.00	HP	
Energy	3.72	kwh				
Sludge Thickener						
Number of units	1					
Total sludge	457.23	kg/day				
Solids Loading Rate	40	kg/m ² /day				
Thickening area required	11.43	m ²				
Surface Loading Rate	12	m ³ /m ² /day				
Thickening area required	3.74	m ²	freeboard	0.35	m	
Maximum area	11.43	m ²	slab thickness	0.35	m	
Area of distribution chamber	20%		offset to wall	0.35	m	
Total area required	13.72	m ²	wall thickness	0.3	m	

Diameter of circular tank	4.18	m	fix	4.2	m	
Thickening area available	13.85	m ²				
SWD	2.5	m				
Actual volume provided	34.64	m ³				
Thickened sludge consistency	3%	of total sludge volume				
Thickened sludge volume	13.72	m ³ /day			area in m ²	5.50
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	13.72	m ³ /day				
Working hours of centrifuge	5.00	hours				
Discharge required	2.74	m ³ /hour	7.6E-04	m ³ /sec		
Head required	15.00	m				
Efficiency	50%					
Power required	0.30	fix	1.00	HP		
Energy	1.137	kwh				
Sludge Centrifuge and Dosing Tanks						
Number of centrifuges	1	SB	1			
Capacity of centrifuge	0.25	m ³ /hour				
Poly electrolyte dosing for centrifuge & thickener	10%					
Sludge volume	457.23	kg/day				
Dose	2	kg/1000 kg				
Quantity of Poly Electrolyte	0.91	kg/day				
Concentration	0.1					
Volume of tanks @ 24 hour	0.91	m ³				
	914.46	litres				
Volume	38.10	litres/hour				
Volume required for 8 hours	0.30	m ³				
Liquid depth of tank	1	m				
Area required	0.30	m ²				
side of square tank	0.55	m	fix	0.6	area in m ²	0.72
Chlorine contact tank						
HRT	30	minutes	offset to wall	0.3	m	
Average flow	86.96	m ³ /hour	wall thickness	0.25	m	
Volume of tank	43.48	m ³	slab thickness	0.35	m	
Assumed liquid depth	2.5	m	freeboard	0.35	m	
Area of the tank	17.39	m ²			area in m ²	28.09
side of square tank	4.17	m	fix	4.2	m	

Filter feed tank						
HRT	20	minutes	offset to wall	0.3	m	
Average flow	86.96	m ³ /hour	wall thickness	0.25	m	
Volume of tank	28.99	m ³	slab thickness	0.3	m	
Assumed liquid depth	2.5	m	freeboard	0.35	m	
Area of the tank	11.59	m ²				
side of square tank	3.41	m	fix length	3.5	m	
			fix breadth	3.5	m	
Volume provided	30.63	OK			area in m ²	21.16
Pressure Sand Filter						
Number of units	2					
Average flow/filter	1043.48	m ³ /day				
Filter operating hours	20	hours				
Operating flow/filter	52.17	m ³ /hour				
Filter Loading Rate	12	m ³ /m ² /hour				
Area of the filter required	4.35	m ²				
Area of each filter	4.35	sqm				
Diameter of filter required	2.35	m	fix	2.4	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	23.12
Activated Carbon Filter						
Number of units	2					
Average flow/filter	1043.48	m ³ /day				
Filter operating hours	20	hours				
Operating flow/filter	52.17	m ³ /hour				
Filter Loading Rate	10	m ³ /m ² /hour				
Area of the filter required	5.22	m ²				
Area of each filter	5.22	sqm				
Diameter of filter required	2.58	m	fix	2.6	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	25.92
Pump for clarified water to PSF and ACF						
Type of pump set	CF					
Number of pumps	2.00	W	1	SB		
Discharge of clarified water required/pum set	43.48	m ³ /hour				
Working hours of pumps	20.00	hours				
Discharge required/pump set	52.17	m ³ /hour	1.4E-02	m ³ /sec		

Head required	40.00	m				
Efficiency	60%					
Power required	12.88	fix	15.00	HP		
Energy	192.21	kwh				
Treated Water Tank						
HRT	60	minutes	offset to wall	0.3	m	
Average flow	86.96	m ³ /hour	wall thickness	0.3	m	
Volume of the tank	87.0	m ³	slab thickness	0.35	m	
Assumed liquid depth	3	m	freeboard	0.35	m	
Area of the tank	28.99	m ²				
Number of tanks	1		fix length	6	m	
Area of one tank	28.99	m ²	fix breadth	5	m	
Side of square tank	5.38	m				
Volume provided	90.00	m ³	OK			

APPENDIX II

DESIGN OF CO-TREATMENT UNIT FOR SEPTAGE WITH STP						
Design population	45832					
Sludge deposit coefficient	95	litres/person/year				
Sludge deposit	11.93	KLD				
Average septage flow	9.08	KLD				
Working hours	24					
Design flow	9.08	KLD	9080	LPD	9.1	m ³ /day
Maximum peak factor expected	1.5		9	KLD	0.38	m ³ /hour
Peak design flow	13.62	KLD	13620	LPD	14	m ³ /day
					0.57	m ³ /hour
Number of trips/day	8				0.00016	cum/sec
Quantity of septage obtained in single trip with peak factor	1.70	m ³				
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	0.38	m ³ /hour				
Peak flow	0.57	m ³ /hour				
	0.00016	m ³ /sec				
Average Retention Time for peak flow	600	sec	offset to wall	0.3	m	
Volume of the inlet chamber	0.0946	m ³	free board	0.85	m	
Assumed depth of flow	1	m	total height	1.35	m	
Area required for inlet chamber	0.09	m ²	wall thickness	0.25	m	
Length of the tank	0.5	m	slab thickness	0.3	m	
Breadth of the tank	0.19	fix	0.45	m	area in m ²	2.48
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	PF			
Volume of recycled water used for dilution	32000	litres				
Quantity of septage obtained as above	1.70	m ³	ratio of dilution		18.80	
BOD of diluted septage	262.07	mg/l	S			
TSS of diluted septage	372.60	mg/l	ok			

Total volume of dilution tank	33.70	m ³				
Liquid depth adopted inside dilution tank	2.50	m	side of square tank		3.67	m
Length of dilution tank adopted	6.00	m				
Breadth of dilution tank adopted	4.00	m	volume	60.00	m ³	ok
Average outflow from dilution tank	7.49	m ³ /hour				
Oil and Grease Trap						
Average quantity of flow	7.49	m ³ /hour				
Peak flow	11.23	m ³ /hour				
	0.00312	m ³ /sec				
Average Retention Time for peak flow	300	sec	offset to wall	0.15	m	
Volume of the inlet chamber	0.94	m ³	free board	0.75	m	
Assumed depth of flow	1.5	m	total height	1.5	m	
Area required for inlet chamber	0.62	m ²	wall thickness	0.25	m	
Length of the tank	1.5	m	slab thickness	0.3	m	
Breadth of the tank	0.42	fix	0.75	m	area in m ²	3.565
Breadth of baffle wall inside	0.75	m				
Manual Coarse Screen Channel						
Peak design flow	0.00312	m ³ /sec				
Number of screen	1					
Peak flow rate per screen	0.0031	m ³ /sec				
Velocity at peak flow	0.75	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	0.6	m	offset to wall	0.25	m	
Depth of flow	0.01	m	slab thickness	0.30	m	
Area required for screen	0.00	sqm				
Headloss through bar screen	0.01	m	assuming head loss coefficient = 0.7			
Assumed depth of flow after inserting bar screen	0.1	m	0.02	(control value)		
Width of channel required	0.04	m	fix	0.45	m	
Clear bar spacing	20	mm	(20 to 50 mm)			
Bar thickness	10	mm	(5 to 15 mm)			
Number of bars	15					
Clear bar spacing obtained	21	mm	OK			
Inside width of screen (openings)	0.3	m			area in m ²	3.625

Full height of channel	1.5	m	fb	0.3		
Angle of inclination	45	degree	0.79	rad		
Actual velocity at peak flow	0.56	(between 0.60 m/sec and 0.90 m/sec)				
Length of channel required D/S	1.50	m	fix	1.5	m	
Sewage pump- for pumping to equalisation tank of STP						
Number of pumps	1	SB	1			
Type of pump set	submersible centrifugal sewage transfer-non clog					
Average flow	7.49	m ³ /hour				
Peak design flow	11.23	m ³ /hour				
Working hours	23					
Flow capacity of each pump	11.72	m ³ /hour				
Peak factor	1.20					
Discharge	3.91	LPS	0.0039	m ³ /sec		
Head required	18	m				
Efficiency	50%					
Power required	1.88	HP	fix	3.25	HP	
Energy	32.18	kwh				

General Abstract

SEWERAGE SCHEME TO MANANTHAVADY MUNICIPALITY - CONSTRUCTION OF 2MLD CAPACITY SEWAGE TREATMENT PLANT AND LAYING SEWERAGE NETWORK

(Dsr year: 2018)

SI No	Heading Description	Amount
1	STP- PART- A ESTIMATE ID: 2022/2693 (Incl GST)	36180605.00
2	STP- PART- B ESTIMATE ID: 2022/2694 (Incl GST)	53614618.00
3	NETWORK DESIGN- ESTIMATE ID: 2022/2671 (Incl GST)	460856703.00
4	ELECTROMECHANICAL WORKS- ESTIMATE ID: 2022/2668 (Incl GST)	49203582.00
5	O&M - ESTIMATE ID : 2022/2700 (Incl GST)	484148456.00
Total		1084003964.00
Centage @		0.0%
Centage Amount		0.00
Provision for GST payments (in %) @		0.0%
Amount reserved for GST payments		0.00
Total & Centage		1084003964.00
Lumpsum for round off		0.00
Kerala Water Authority GRAND TOTAL Rs		1084003964.00
Rounded Grand Total Rs 1,08,40,03,964		
Rupees One Hundred Eight Crore Forty Lakh Three Thousand Nine Hundred and Sixty Four Only		

General Abstract

**SEWERAGE SCHEME TO MANANTHAVADY MUNICIPALITY - CONSTRUCTION
OF 2 MLD CAPACITY SEWAGE TREATMENT PLANT AND LAYING SEWERAGE
NETWORK- STP PART A**

(Dsr year: 2018)

SI No	Heading Description	Amount
1	RAW SEWAGE RECEIVING CHAMBER CUM WELL	4310870.60
2	SEPTAGE TANK(4x3x3m)	757216.18
3	INLET CHEMBER/SCREEN CHANEL/GRIT CHEMBER/PARSHALLFLUME	3590250.92
4	EQUALISATION TANK	4796897.41
5	MBBR 1 & 2	7675816.26
6	SECONDARY CLARIFIER	3253191.95
7	SLUDGE SUMP	276361.36
8	SLUDGE THICKNER	897481.11
9	THICKENED SLUDGE SUMP	410623.02
10	FILTER FEED TANK	590334.73
11	TREATED WATER TANK	1296430.79
12	Centrate Sump	410623.02
Total		28266097.38
Kerala Water Authority Centage @		10.0%
Centage Amount		2826609.74
Provision for GST payments (in %) @		18.0%
Amount reserved for GST payments		5087897.53
Total & Centage		36180604.64
Lumpsum for round off		0.00
GRAND TOTAL Rs		36180604.64
Rounded Grand Total Rs 3,61,80,605		
Rupees Three Crore Sixty One Lakh Eighty Thousand Six Hundred and Five Only		

Detailed Estimate

SEWERAGE SCHEME TO MANANTHAVADY MUNICIPALITY - CONSTRUCTION OF 2 MLD CAPACITY SEWAGE TREATMENT PLANT AND LAYING SEWERAGE NETWORK- STP PART A

(Dsr year: **2018**)

Sl No	Description	No	L	B	D	CF	Quantity	Remark
1RAW SEWAGE RECEIVING CHAMBER CUM WELL (Cost Index:36.44 %)								
1	2.1.1 Earth work in surface excavation not exceeding 30 cm in depth but exceeding 1.5m in width as well as 10 sqm on plan including disposal of excavated earth up to 50 m and lift up to 1.5 m, disposed soil to be levelled and neatly dressed:All Kinds of soil							
		1	10.000	10.000			100.000	
		Total Quantity					100.000 sqm	
		Total Deducted Quantity					0.000 sqm	
		Net Total Quantity					100.000 sqm	
		Say 100.000 sqm @ Rs 109.63 / sqm					Rs 10963.00	
2	2.8.1 Earth work in excavation by mechanical means (Hydraulic excavator) /manual means in foundation trenches or drains (not exceeding 1.5 m in width or 10 sqm on plan), including dressing of sides and ramming of bottoms, lift up to 1.5 m, including getting out the excavated soil and disposal of surplus excavated soil as directed, within a lead of 50 m.All kinds of soil							
	Construction of Kerb	1	7.600	7.600	1.500		86.640	
		Total Quantity					86.640 cum	
		Total Deducted Quantity					0.000 cum	
		Net Total Quantity					86.640 cum	
		Say 86.640 cum @ Rs 298.80 / cum					Rs 25888.03	
3	od344740/2021_2022 Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas(exceeding 30cm in depth,150cm in width as well as 10 sqm on plan) including disposal of excavated earth disposed earth to be levelled and neatly dressed for Manhole 2nd depth 1.5m to 3m							
	Construction of Kerb with 1 st Rise of Steining	1	7.600	7.600	1.000		57.760	
		Total Quantity					57.760 cum	
		Total Deducted Quantity					0.000 cum	

	Net Total Quantity						57.760 cum	
	Say 57.760 cum @ Rs 322.41 / cum						Rs 18622.40	
4	od344741/2021_2022 Fabricating MS Kerb of size using 8 mm thick MS plate including cost ms plate and 10mm dia anger bar welded to the kerb and conveyance charges of MS plate,all fabrication charges, charges of painting outer side of the steel work with two or more coat deluxe multi surface paint to give an even shade over an under coat of primer erection tying anger bar with reinforcement placing in position etc complete:							
	For Kerb	1	3.140	7.600			23.864	
	Total Quantity						23.864 metre	
	Total Deducted Quantity						0.000 metre	
	Net Total Quantity						23.864 metre	
	Say 23.864 metre @ Rs 6489.86 / metre						Rs 154874.02	
5	5.7 Reinforced cement concrete work in well - steining excluding the cost of centering, shuttering, finishing and reinforcement, with 1:1.5:3 (1 cement : 1.5 coarse sand (Zone - III) : 3 graded stone aggregate 20 mm nominal size)							
	For Kerb	1	3.140*7.6	0.5*0.5	1.200		7.160	
	For steining up to ground	1	3.14*7.6	0.300	7.020		50.258	
	Total Quantity						57.418 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						57.418 cum	
	Say 57.418 cum @ Rs 8611.41 / cum						Rs 494449.94	
6	od344743/2021_2022 Sinking wells (third depth) 7.00 m inside below spring level in all classes of soil to lines and levels and plumb by scooping out earth from inside and below the steining using necessary appliances including hire and labour for the same including dumping the spoil beyond the initial lead of 50 m etc. complete. Total depth 3 to 4.5m (vide KWA SoR KW.5.4)							
		1			1.500		1.500	
	Total Quantity						1.500 metre	
	Total Deducted Quantity						0.000 metre	
	Net Total Quantity						1.500 metre	
	Say 1.500 metre @ Rs 42951.76 / metre						Rs 64427.64	
7	od344744/2021_2022 Sinking wells (4th depth) 7.00 m inside below spring level in all classes of soil to lines and levels and plumb by scooping out earth from inside and below the steining using necessary appliances including hire and labour for the same including dumping the spoil beyond the initial lead of 50 m etc. complete. Total depth 4.5 to 6.0m (vide KWA SoR KW.5.4)							

		1			1.500		1.500	
	Total Quantity						1.500 metre	
	Total Deducted Quantity						0.000 metre	
	Net Total Quantity						1.500 metre	
	Say 1.500 metre @ Rs 68382.01 / metre						Rs 102573.01	
8	od344745/2021_2022 Sinking wells (5th depth) 7.00 m inside below spring level in all classes of soil to lines and levels and plumb by scooping out earth from inside and below the steining using necessary appliances including hire and labour for the same including dumping the spoil beyond the initial lead of 50 m etc. complete. Total depth 6 to 7.5m (vide KWA SoR KW.5.4)							
		1			1.500		1.500	
	Total Quantity						1.500 metre	
	Total Deducted Quantity						0.000 metre	
	Net Total Quantity						1.500 metre	
	Say 1.500 metre @ Rs 72489.71 / metre						Rs 108734.57	
9	4.1.8 Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:4:8 (1 cement : 4 coarse sand : 8 graded stone aggregate 40 nominal size)							
	Top portion	1	3.14/4	7.6*7.6	0.300		13.603	
	bottom portion like c a p o f hemisphere0.166*3.14*0.6(3*16)+0.36	1	0.166*3.14*0.6	(3*16)+0.36			15.125	
	Total Quantity						28.728 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						28.728 cum	
	Say 28.728 cum @ Rs 6857.61 / cum						Rs 197005.42	
10	4.1.3 Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:2:4 (cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size)							
	For bottom plugging	1	3.14/4	7.6*7.6	0.300		13.603	
	Total Quantity						13.603 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						13.603 cum	

	Say 13.603 cum @ Rs 8040.95 / cum						Rs 109381.04	
11	5.1.2 Providing and laying in position specified grade of reinforced cement concrete, excluding the cost of centering, shuttering, finishing and reinforcement - All work up to plinth level:1:1:5:3 (1 cement 1.5 coarse sand :3 graded stone aggregate 20 mm nominal size							
	well base	1	3.14/4	7.6*7.6	0.800		36.274	
	Total Quantity						36.274 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						36.274 cum	
	Say 36.274 cum @ Rs 9142.09 / cum						Rs 331620.17	
12	4.15 Extra for laying concrete in or under water and or liquid mud including cost of pumping or bailing out water and removing slush etc. complete. Note for item No. 4.15 : - The quantity will be calculated by multiplying the depth measured from the sub-soil water level upto centre of gravity of concrete under sub-soil water level with quantity of concrete in cum executed under the sub-soil water. The depth of centre of gravity shall be reconed correct to 0.10 m 0.05 m or more shall be taken as 0.10 m and less than 0.05 m ignored.							
	Top portion	1	3.14/4	7.6*7.6	0.300		13.603	
	bottom portion like cap of hemisphere	1	0.166*3.14*0.60	(3*16)+0.36			15.125	
	pcc For bottom plugging	1	3.14/4	7.900*7.9	0.300		14.698	
	Total Quantity						43.426 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						43.426 cum	
	Say 43.426 cum @ Rs 941.23 / cum						Rs 40873.85	
13	5.22.4 Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelHot rolled deformed bars							
	(57.418+36.274+8.17) @120kg/m3	1	101.862	120.000			12223.440	
	Total Quantity						12223.440 kilogram	
	Total Deducted Quantity						0.000 kilogram	
	Net Total Quantity						12223.440 kilogram	
	Say 12223.440 kilogram @ Rs 98.92 / kilogram						Rs 1209142.68	

14	5.3 Reinforced cement concrete work in beams, suspended floors, roofs, having slope up to 15 ⁰ landings, balconies, shelves, chajjas, lintels, bands, plain window sills, staircases and spiral stair cases up to floor five level excluding the cost of centering, shuttering, finishing and reinforcement, with 1:1.5:3 (1 cement : 1.5 coarse sand (Zone III) : 3 graded stone aggregate 20 mm nominal size).							
	bottom across the well for providing guide pipe of pump set and chain	1	7.600	0.300	0.600		1.368	
	Slab for working platform over the well and beam	1	3.14/4	7.6*7.6	0.150		6.802	
	Total Quantity						8.170 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						8.170 cum	
	Say 8.170 cum @ Rs 11564.93 / cum						Rs 94485.48	
15	od344746/2021_2022 Centering and shuttering including strutting propping etc and removal of form etc. Well Steining for circular works							
	outer of kerb	1	3.14*7.6		0.900		21.478	
	inner of kerb	1	3.14*7		0.975		21.431	
	steining up to ground level outer	1	3.14*7.6		7.000		167.048	
	steining up to ground level inner	1	3.14*7		7.000		153.860	
	Total Quantity						363.817 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						363.817 sqm	
	Say 363.817 sqm @ Rs 301.51 / sqm						Rs 109694.46	
16	5.9.5 Centering and shuttering including strutting, etc. and removal of form for: Lintels, beams, plinth beams, girders, bressumers and cantilevers							
	for beam	1	7.000	0.300	0.6*2		2.520	
	Total Quantity						2.520 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						2.520 sqm	
	Say 2.520 sqm @ Rs 653.89 / sqm						Rs 1647.80	

17	5.9.3 Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform							
	slab for working plat form over the well and beam	1	3.14/4	7.6*7.6			45.342	
	Total Quantity						45.342 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						45.342 sqm	
	Say 45.342 sqm @ Rs 820.89 / sqm						Rs 37220.79	
18	19.16 Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS: 10910 on 12 mm dia steel bar conforming to IS:1786, 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							
	steps	1	3*14				42.000	
	Total Quantity						42.000 No	
	Total Deducted Quantity						0.000 No	
	Net Total Quantity						42.000 No	
	Say 42.000 No @ Rs 548.42 / No						Rs 23033.64	
19	14.72 Providing and fixing double scaffolding system (cup lock type) on the exterior side, upto seven story hight made with 40 mm dia. M.S. tube 1.5 m centre to centre, horizontal & vertical tubes joining with cup & lock system with M.S. tubes, M.S. tube challies, M.S. clamps and M.S. starcase system in the scaffolding for working platform etc. and maintaining it in a serviceable condition for the required duration as approved and removing it there after. The scaffolding system shall be stiffened with bracings, runners, connection with the building etc wherever required for inspection of work at required location with essential safety features for the workmen etc. complete as per directions and approval of Engineer- in Charge. The elevational area of the scaffolding shall be measured for payment purpose. The payment will be made once irrespective of duration of scaffolding. Note:- This item to be used for maintenance work judicially, necessary deduction for scaffolding in the existing item to be done .							
		1	3.140	7.600	7.600		181.367	
	Total Quantity						181.367 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						181.367 sqm	

	Say 181.367 sqm @ Rs 305.56 / sqm						Rs 55418.50	
20	13.7.1 12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)							
	Bottom of well	1	3.14/4	7*7			38.465	
	inside of steining	1	3.14*7		7.000		153.860	
	working plat form under side	1	3.14/4	7*7			38.465	
	working platform top	1	3.14/4	7.6*7.6			45.342	
	face of beam	1	7.600	0.300	0.6*2		2.736	
	Total Quantity						278.868 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						278.868 sqm	
	Say 278.868 sqm @ Rs 403.73 / sqm						Rs 112587.38	
21	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							
	Bottom of well	1	3.14/4	7*7			38.465	
	inside of steining	1	3.14*7		7.000		153.860	
	working plat form under side	1	3.14/4	7*7			38.465	
	working platform top	1	3.14/4	7.6*7.6			45.342	
	face of beam	1	7.600	0.300	0.6*2		2.736	
	Total Quantity						278.868 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						278.868 sqm	
	Say 278.868 sqm @ Rs 224.31 / sqm						Rs 62552.88	
22	od344747/2021_2022 Conveying disposing the excess earth and debries etc.by lorry up to 5Km s							
		1	70.000				70.000	
	Total Quantity						70.000 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						70.000 cum	
	Say 70.000 cum @ Rs 142.17 / cum						Rs 9951.90	
23	100.7.1							

	Bailing out water with 5 HP engine and pumpset including conveyance to the site, erection, dismantling and taking back of engine and pump, cost of fuel lubricating oil and other stores pay of staff etc. complete. NEW DATA (Prepared based on PHED SDB - Item No.1070)							
		1	5*0.746	40.000	8.000		1193.600	
	Total Quantity							1193.600 Kwh
	Total Deducted Quantity							0.000 Kwh
	Net Total Quantity							1193.600 Kwh
	Say 1193.600 Kwh @ Rs 37.18 / Kwh							Rs 44378.05
24	100.7.2 Bailing out water with engine and pumpset above 5 HP upto 10 HP including conveyance to the site, erection, dismantling and taking back of engine and pump, cost of fuel lubricating oil and other stores pay of staff etc. complete. NEW DATA (Prepared based on PHED SDB - Item No.1070)							
		1	10*0.746	40.000	8.000		2387.200	
	Total Quantity							2387.200 Kwh
	Total Deducted Quantity							0.000 Kwh
	Net Total Quantity							2387.200 Kwh
	Say 2387.200 Kwh @ Rs 18.56 / Kwh							Rs 44306.43
25	100.98.1008 Engaging Coolie							
		1	60.000				60.000	
	Total Quantity							60.000 Day
	Total Deducted Quantity							0.000 Day
	Net Total Quantity							60.000 Day
	Say 60.000 Day @ Rs 884.27 / Day							Rs 53056.20
26	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 1.5 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 50 m : All kinds of soil (Ref. Item No. 2.10.1 of DSR)							
		1	7.200	3.000	1.500		32.401	
	Total Quantity							32.401 cum
	Total Deducted Quantity							0.000 cum

	Net Total Quantity						32.401 cum	
	Say 32.401 cum @ Rs 558.99 / cum						Rs 18111.83	
27	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 3 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 50 m: 1.50m to 3.0m All kinds of soil (Ref. Item No. 2.11 of DSR)							
		1	7.200	3.000	1.500		32.401	
	Total Quantity						32.401 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						32.401 cum	
	Say 32.401 cum @ Rs 666.03 / cum						Rs 21580.04	
28	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.							
		1	7.2*2+3*2		3.000		61.200	
	Total Quantity						61.200 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						61.200 sqm	
	Say 61.200 sqm @ Rs 753.83 / sqm						Rs 46134.40	
29	4.1.5 Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size)							
		1	6.000	2.150	0.200		2.580	
	Total Quantity						2.580 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						2.580 cum	

	Say 2.580 cum @ Rs 7413.74 / cum						Rs 19127.45	
30	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 work upto plinth level							
	Base slab	1	6.200	1.750	0.300		3.255	
	side wall	2	6.200	0.250	3.000		9.300	
		2	1.250	0.250	3.000		1.875	
	Baffle wall	2*2	0.500	0.250	2.300		1.150	
	innerwall	1	3.700	0.250	3.000		2.776	
	roof slab	1	1.750	1.200	0.120		0.252	
	Total Quantity						18.608 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						18.608 cum	
	Say 18.608 cum @ Rs 9947.98 / cum						Rs 185112.01	
31	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 .							
	Tot qty CC	1	18.608				18.608	
	Total Quantity						18.608 kg	
	Total Deducted Quantity						0.000 kg	
	Net Total Quantity						18.608 kg	
	Say 18.608 kg @ Rs 1.36 / kg						Rs 25.31	
32	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							
	@120kg/m3	1	120.000	18.608			2232.960	
	Total Quantity						2232.960 kilogram	
	Total Deducted Quantity						0.000 kilogram	
	Net Total Quantity						2232.960 kilogram	
	Say 2232.960 kilogram @ Rs 98.92 / kilogram						Rs 220884.40	

33	5.9.1 Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete							
	Base PCC	2	6.600		0.200		2.640	
		2	2.150		0.200		0.860	
	Base slab	2	6.200		0.300		3.720	
		2	1.750		0.300		1.050	
	well base	3.14	6.000		0.200		3.769	
		3.14	5.600		0.300		5.276	
	Total Quantity						17.315 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						17.315 sqm	
	Say 17.315 sqm @ Rs 337.42 / sqm						Rs 5842.43	
34	5.9.2 Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, buttresses, plinth and string courses etc.							
	side wall	2	14.900		3.000		89.400	
	innerwall	2	3.200		3.000		19.201	
	Baffle wall	4*2	0.500		2.300		9.200	
		4	0.500	0.250			0.500	
	Landing slab	2	1.200	0.500			1.200	
	Total Quantity						119.501 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						119.501 sqm	
	Say 119.501 sqm @ Rs 721.70 / sqm						Rs 86243.87	
35	22.23.1 Providing and applying integral crystalline slurry of hydrophilic in nature forwaterproofing 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 partsintegral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 partsintegral crystalline slurry : 1 part water) for horizontal surfaces and applying thesame from negative (internal) side with the help of synthetic fiber brush. The materialshall meet the requirements as specified in ACI-212-3R-2010 i.e by reducingpermeability of concrete by more than 90% compared with control concrete as perDIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystallineslurry shall be capable of self-healing of cracks up to a width of 0.50mm. The workshall 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 anyleakage.For vertical surface two coats @0.70 kg per sqm							

	side wall	4	7.900		6.000		189.601	
		4	2.600		6.000		62.401	
	innerwall	2	5.000		6.000		60.000	
	Total Quantity						312.002 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						312.002 sqm	
	Say 312.002 sqm @ Rs 573.87 / sqm						Rs 179048.59	
36	22.23.2 Providing and applying integral crystalline slurry of hydrophilic in nature forwaterproofing treatment to the RCC structures like retaining walls of the basement,water tanks, roof slabs, podiums, reserrior, sewage & water treatment plant, tunnels/ subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 partsintegral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 partsintegral crystalline slurry : 1 part water) for horizontal surfaces and applying thesame from negative (internal) side with the help of synthetic fiber brush. The materials shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducingpermeability of concrete by more than 90% compared with control concrete as perDIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystallineslurry shall be capable of self-healing of cracks up to a width of 0.50mm. The workshall 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 anyleakage.For horizontal surface one coat @1.10 kg per sqm.							
	Base slab	1	21.000		0.300		6.300	
	roof slab	1	7.900	2.600			20.541	
	Total Quantity						26.841 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						26.841 sqm	
	Say 26.841 sqm @ Rs 442.27 / sqm						Rs 11870.97	
SI No	Description	No	L	B	D	CF	Quantity	Remark
2SEPTAGE TANK(4x3x3m) (Cost Index:36.44 %)								
1	2.6.1 Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed.All kinds of soil							
		1	5.400	4.400	2.000		47.521	
	Total Quantity						47.521 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						47.521 cum	
	Say 47.521 cum @ Rs 215.37 / cum						Rs 10234.60	

2	4.1.5 Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size)							
		1	5.400	4.400	0.200		4.753	
		Total Quantity					4.753 cum	
		Total Deducted Quantity					0.000 cum	
		Net Total Quantity					4.753 cum	
		Say 4.753 cum @ Rs 7413.74 / cum					Rs 35237.51	
3	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 work upto plinth level							
	bottom	1	5.200	4.200	0.300		6.553	
	side upto GL	1	4.6*2+3*2	0.300	1.500		6.840	
		Total Quantity					13.393 cum	
		Total Deducted Quantity					0.000 cum	
		Net Total Quantity					13.393 cum	
		Say 13.393 cum @ Rs 9947.98 / cum					Rs 133233.30	
4	5.37.2 Providing and laying in position ready mixed M-25 grade concrete for reinforced cement concrete work, using cement content as per approved design mix, manufactured in fully automatic batching plant and transported to site of work in transit mixer for all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding the cost of centering, shuttering finishing and reinforcement including cost of admixtures in recommended proportions as per IS: 9103 to accelerate/ retard setting of concrete, improve workability without impairing strength and durability as per direction of the Engineer - in -charge. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All work above plinth level upto floor V level							
	slab	1	4.600	3.600	0.1500		2.484	
	side upto slab	1	4.6*2+3*2	0.300	1.500		6.840	
		Total Quantity					9.324 cum	
		Total Deducted Quantity					0.000 cum	

	Net Total Quantity						9.324 cum	
	Say 9.324 cum @ Rs 11610.43 / cum						Rs 108255.65	
5	5.34.1 Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).							
		1	22.717				22.717	
	Total Quantity						22.717 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						22.717 cum	
	Say 22.717 cum @ Rs 82.61 / cum						Rs 1876.65	
6	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 .							
		1	22.717	330.000			7496.610	
	Total Quantity						7496.610 kg	
	Total Deducted Quantity						0.000 kg	
	Net Total Quantity						7496.610 kg	
	Say 7496.610 kg @ Rs 1.36 / kg						Rs 10195.39	
7	od344739/2021_2022 Extra for providing sulphate resistant cement for the structures above plinth level.							
	slab	1	4.600	3.600	0.1500		2.484	
	side upto slab	1	4.6*2+3*2	0.300	1.500		6.840	
	Total Quantity						9.324 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						9.324 cum	
	Say 9.324 cum @ Rs 1899.47 / cum						Rs 17710.66	
8	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							
		1	22.717	120.000			2726.040	
	Total Quantity						2726.040 kilogram	
	Total Deducted Quantity						0.000 kilogram	
	Net Total Quantity						2726.040 kilogram	
	Say 2726.040 kilogram @ Rs 98.92 / kilogram						Rs 269659.88	

9	5.9.1 Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete							
		1	5.4*2+4.4* 2	0.300			5.880	
	Total Quantity						5.880 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						5.880 sqm	
	Say 5.880 sqm @ Rs 337.42 / sqm						Rs 1984.03	
10	5.9.2 Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, buttresses, plinth and string courses etc.							
	Inside	1	2*4+2*3	3.000			42.000	
	Out side	1	2*4.6+2*3. 6	3.000			49.200	
	Total Quantity						91.200 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						91.200 sqm	
	Say 91.200 sqm @ Rs 721.70 / sqm						Rs 65819.04	
11	5.9.3 Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform							
	slab	1	4.000	3.000			12.000	
	Total Quantity						12.000 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						12.000 sqm	
	Say 12.000 sqm @ Rs 820.89 / sqm						Rs 9850.68	
12	13.1.1 12 mm cement plaster of mix:1:4 (1 cement : 4 fine sand)							
	side wall	2	14.900		3.000		89.400	
	inner wall	2	3.200		3.000		19.201	
	Baffle wall	4*2	0.500		2.300		9.200	
		4	0.500	0.250			0.500	
	Bottom	1	5.700	1.250			7.125	
	landing slab	2	1.200	0.500			1.200	
	Total Quantity						126.626 sqm	

	Total Deducted Quantity							0.000 sqm
	Net Total Quantity							126.626 sqm
	Say 126.626 sqm @ Rs 316.06 / sqm							Rs 40021.41
13	13.82.2 Wall painting with acrylic emulsion paint, having VOC (Volatile Organic Compound) content less than 50 grams/ litre, of approved brand and manufacture including applying additional coats wherever required, to achieve even shade and colour. Two coats							
	side wall- outer	1	15.900		0.600		9.540	
	well outer	3.14	5.600		0.600		10.551	
	Total Quantity							20.091 sqm
	Total Deducted Quantity							0.000 sqm
	Net Total Quantity							20.091 sqm
	Say 20.091 sqm @ Rs 126.55 / sqm							Rs 2542.52
14	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, reservoir, 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 engineer in-charge. The product performance shall carry guarantee for 10 years against any leakage. For vertical surface two coats @ 0.70 kg per sqm							
	side wall	2	5.700		3.000		34.200	
		2	1.250		3.000		7.500	
	inner wall	2	3.200		3.000		19.201	
	baffle wall	4*2	0.500		2.300		9.200	
	Total Quantity							70.101 sqm
	Total Deducted Quantity							0.000 sqm
	Net Total Quantity							70.101 sqm
	Say 70.101 sqm @ Rs 573.87 / sqm							Rs 40228.86
15	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, reservoir, 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 thesame from negative (internal) side with the help of synthetic fiber brush. The materialshall meet the requirements as specified in ACI-212-3R-2010 i.e by reducingpermeability of concrete by more than 90% compared with control concrete as perDIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystallineslurry shall be capable of self-healing of cracks up to a width of 0.50mm. The workshall 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 anyleakage.For horizontal surface one coat @1.10 kg per sqm.							
	Base slab	1	5.700	1.250			7.125	
	Landing slab	2	0.500	1.200			1.200	
	Total Quantity						8.325 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						8.325 sqm	
	Say 8.325 sqm @ Rs 442.27 / sqm						Rs 3681.90	
16	100.36.1 Filling water with 5000 litre tankers fitted 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 appliances and cost of water etc. complete. "(Ref. No. 000, Technical Circular)"							
		1	4.000	3.000	3.000		36.000	
	Total Quantity						36.000 Kilo litre	
	Total Deducted Quantity						0.000 Kilo litre	
	Net Total Quantity						36.000 Kilo litre	
	Say 36.000 Kilo litre @ Rs 185.67 / Kilo litre						Rs 6684.12	
SI No	Description	No	L	B	D	CF	Quantity	Remark
3INLET CHEMBER/SCREEN CHANEL/GRIT CHEMBER/PARSHALLFLUME (Cost Index:36.44 %)								
1	2.6.1 Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed.All kinds of soil							
	Reciving chamber footing	4	1.600	1.600	1.500		15.361	
	Receiving and Distribution chamber footing	6	1.900	1.900	1.500		32.491	
	Grit chamber Footing	6	2.200	2.200	1.500		43.561	
	Parshalflume and Distribution chamber	6	1.900	1.900	1.500		32.491	

	Staircase column footing	3	1.600	1.600	1.500		11.521	
	Total Quantity						135.425 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						135.425 cum	
	Say 135.425 cum @ Rs 215.37 / cum						Rs 29166.48	
2	4.1.5 Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size)							
	Receiving chamber footing	4	1.600	1.600	0.200		2.049	
	Receiving and Distribution chamber footing	6	1.900	1.900	0.200		4.332	
	Grit chamber Footing	6	2.200	2.200	0.200		5.809	
	Parshallflume and Distribution chamber	6	1.900	1.900	0.200		4.332	
	Staircase column footing	3	1.600	1.600	0.200		1.537	
	Total Quantity						18.059 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						18.059 cum	
	Say 18.059 cum @ Rs 7413.74 / cum						Rs 133884.73	
3	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 work upto plinth level							
	Receiving chamber footing Size 1.2 x 1.2 x 0.9 m	4	1.200	1.200	0.150		0.864	
		4	0.700	0.700	0.750		1.470	

	Receiving and Distribution chamber footing Size 1.5 x 1.5 x 0.9 m	6	1.500	1.500	0.150		2.025	
		6	0.900	0.900	0.750		3.646	
	Grit chamber Footing Size 1.8x1.8x0.9m	6	1.800	1.800	0.150		2.916	
		6	1.100	1.100	0.750		5.446	
	Parshall flume and Distribution chamber footing Size 1.5 x 1.5 x 0.9 m	6	1.500	0.150	0.150		0.203	
		6	0.900	0.900	0.750		3.646	
	Staircase column footing Size 1.2 x 1.2 x 0.9 m	3	1.200	1.200	0.150		0.648	
		3	0.700	0.700	0.750		1.103	
	Pedestal column-Receiving chamber	4	0.250	0.400	0.400		0.161	
	Pedestal column-Receiving and Distribution chamber	6	0.250	0.450	0.400		0.270	
	Pedestal column-staircase	3	0.200	0.400	0.400		0.097	
	Pedestal column-Grit chamber	6	0.250	0.500	0.400		0.301	
	Pedestal column-Parshall flume and Distribution chamber	6	0.250	0.450	0.400		0.270	
	Total Quantity						23.066 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						23.066 cum	
	Say 23.066 cum @ Rs 9947.98 / cum						Rs 229460.11	
4	5.37.2 Providing and laying in position ready mixed M-25 grade concrete for reinforced cement concrete work, using cement content as per approved design mix, manufactured in fully automatic batching plant and transported to site of work in transit mixer for all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding the cost of centering, shuttering finishing and reinforcement							

	including cost of admixtures in recommended proportions as per IS: 9103 to accelerate/ retard setting of concrete, improve workability without impairing strength and durability as per direction of the Engineer - in-charge. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All work above plinth level upto floor V level							
	Plinth level beam	1	110.150	0.250	0.450		12.392	
	Reciving chamber column 250x400	4	0.250	0.400	2.550		1.020	
	Reciving and Distribution chamber column 250x450	6	0.250	0.450	3.000		2.026	
	Grit chamber Column 250x500	6	0.250	0.500	2.200		1.651	
	Parshalflume and Distribution chamber column 250x450	6	0.250	0.450	3.000		2.026	
	Staircase column 200x400	1	0.200	0.400	1.500		0.121	
	Staircase column 200x400	1	0.200	0.400	3.000		0.241	
	Staircase column 200x400	1	0.200	0.400	5.000		0.401	
	Reciving chamber base slab	1	2.250	1.000	0.200		0.450	
	Reciving chamber side wall	1	2.750	0.250	2.200		1.513	
		2	1.000	0.250	2.200		1.100	
		1	2.750	0.250	1.000		0.688	
	Coarse and fine screen chamber base slab	2	10.000	1.000	0.200		4.000	
	Coarse and fine screen chamber side wall	3	10.000	0.250	1.000		7.500	
	Grit chamber base slab -side portion	2	6.500		0.200		2.600	
	Grit chamber base slab -Centre portion	2	2.500	2.500	0.200	1.2	3.000	
	Grit Chamber sidewall	2	5.750	0.250	2.500		7.188	
		3	2.500	0.250	2.500		4.688	

	parshelfume and distribution chamber base slab	1	5.750	2.500	0.200		2.875	
	parshelfume and distribution chamber side wall	2	5.750	0.250	1.000		2.875	
	Allround verandha slab	1	59.000	1.000	0.150		8.850	
	verandha beam	15	1.000	0.250	0.400		1.500	
	Staircase -steps	18	1.000	0.300	0.150		0.810	
	Staircase -landing	1	1.000	1.000	0.150		0.150	
		1	1.700	1.000	0.150		0.255	
	Total Quantity						69.920 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						69.920 cum	
	Say 69.920 cum @ Rs 11610.43 / cum						Rs 811801.27	
5	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 .							
	Reciving chamber base slab	1	2.250	1.000	0.200	330.0	148.500	
	Reciving chamber side wall	1	2.750	0.250	2.200	330.0	499.126	
		2	1.000	0.250	2.200	330.0	363.001	
		1	2.750	0.250	1.000	330.0	226.875	
	Coarse and fine screen chamber base slab	2	10.000	1.000	0.200	330.0	1320.000	
	Coarse and fine screen chamber side wall	3	10.000	0.250	1.000	330.0	2475.000	
	Grit chamber base slab -side portion	2	6.500		0.200	330.0	858.000	
	Grit chamber base slab -Centre portion	2	2.500	2.500	0.200	330.0	825.000	
	Grit Chamber sidewall	2	5.750	0.250	2.500	330.0	2371.875	
		3	2.500	0.250	2.500	330.0	1546.875	

	parshelfume and distribution chamber base slab	1	5.750	2.500	0.200	330.0	948.750	
	parshelfume and distribution chamber side wall	2	5.750	0.250	1.000	330.0	948.750	
	Allround verandha slab	1	59.000	1.000	0.150	330.0	2920.500	
	Total Quantity						15452.252 kg	
	Total Deducted Quantity						0.000 kg	
	Net Total Quantity						15452.252 kg	
	Say 15452.252 kg @ Rs 1.36 / kg						Rs 21015.06	
6	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							
	From item no 3 @120 kg/m3	1			23.066	120.0	2767.920	
	From item no 4 @120 kg/m3	1			69.920	120.0	8390.400	
	Total Quantity						11158.320 kilogram	
	Total Deducted Quantity						0.000 kilogram	
	Net Total Quantity						11158.320 kilogram	
	Say 11158.320 kilogram @ Rs 98.92 / kilogram						Rs 1103781.01	
7	od344739/2021_2022 Extra for providing sulphate resistant cement for the structures above plinth level.							
	Reciving chamber base slab	1	2.250	1.000	0.200		0.450	
	Reciving chamber side wall	1	2.750	0.250	2.200		1.513	
		2	1.000	0.250	2.200		1.100	
		1	2.750	0.250	1.000		0.688	
	Coarse and fine screen chamber base slab	2	10.000	1.000	0.200		4.000	
	Coarse and fine screen chamber side wall	3	10.000	0.250	1.000		7.500	

	Grit chamber base slab -side portion	2	6.500		0.200		2.600	
	Grit chamber base slab -Centre portion	2	2.500	2.500	0.200		2.500	
	Grit Chamber sidewall	2	5.750	0.250	2.500		7.188	
		3	2.500	0.250	2.500		4.688	
	parshelfume and distribution chamber base slab	1	5.750	2.500	0.200		2.875	
	parshelfume and distribution chamber side wall	2	5.750	0.250	1.000		2.875	
	Allround verandha slab	1	59.000	1.000	0.150		8.850	
	Total Quantity						46.827 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						46.827 cum	
	Say 46.827 cum @ Rs 1899.47 / cum						Rs 88946.48	
8	5.9.1 Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete							
	Reciving n chamber footing Size 1.2 x 1.2 x 0.9 m	4	4.800		0.150		2.880	
	Reciving and Distribution chamber footing Size 1.5 x 1.5 x 0.9 m	6	6.000		0.150		5.400	
	Grit chamber Footing Size 1.8x1.8x0.9m	6	7.200		0.150		6.480	
	Parshalflume and Distribution chamber footing Size 1.5 x 1.5 x 0.9 m	6	6.000		0.150		5.400	
	Staircase column footing Size 1.2 x 1.2 x 0.9 m	3	4.800		0.150		2.160	
	Pedastral column-Reciving chamber	4	1.300		0.400		2.080	

	Pedastral column- Reciving and Distribution chamber	6	1.400		0.400		3.360	
	Pedastral column- staircase	3	1.200		0.400		1.440	
	Pedastral column- Gritchamber	6	1.500		0.400		3.601	
	Pedastral column- Parshalfume and Distribution chamber	6	1.400		0.400		3.360	
	Total Quantity						36.161 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						36.161 sqm	
	Say 36.161 sqm @ Rs 337.42 / sqm						Rs 12201.44	
9	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.							
	Reciving chamber side wall-out side	1	2.750		2.200		6.051	
	Reciving chamber side wall-inside	2	2.250		2.000		9.000	
	Reciving chamber side wall-inside	2	1.000		2.200		4.400	
	Reciving chamber side wall-out side	2	1.500		2.200		6.601	
	Reciving chamber side wall-out side	1	2.750		1.000		2.750	
	Coarse and fine screen chamber side wall	3*2	10.000		1.000		60.000	
	Grit Chamber sidewall	2	5.750		2.500		28.750	
		2	5.000		2.500		25.000	
		3	3.000		2.500		22.500	
		3	2.500		2.500		18.750	
	parshelfume and distribution chamber side wall	2	5.750		1.000		11.500	
		2	5.000		1.000		10.000	

		1	2.000		1.000		2.000	
		1	2.500		1.000		2.500	
	Total Quantity						209.802 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						209.802 sqm	
	Say 209.802 sqm @ Rs 721.70 / sqm						Rs 151414.10	
10	5.9.3 Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform							
	Reciving chamber base slab	1	2.250	1.000			2.250	
	Coarse and fine screen chamber base slab	2	10.000	1.000			20.000	
	Grit chamber base slab -side portion	2	7.730				15.460	
	Grit chamber base slab -Centre portion	2	10.890				21.780	
	parshelfume and distribution chamber base slab	1	5.750	2.500			14.375	
	Total Quantity						73.865 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						73.865 sqm	
	Say 73.865 sqm @ Rs 820.89 / sqm						Rs 60635.04	
11	5.9.5 Centering and shuttering including strutting, etc. and removal of form for:Lintels, beams, plinth beams, girders bressumers and cantilevers							
	Allround verandha slab	1	59.000	1.150			67.850	
	verandha beam	15	1.000	0.250	0.400*2		3.000	
	Staircase -steps	18	1.000	0.300*2	0.150*2		3.240	
	Staircase -landing	1	1.000	1.000			1.000	
		1	1.700	1.000			1.700	
	Total Quantity						76.790 sqm	
	Total Deducted Quantity						0.000 sqm	

	Net Total Quantity						76.790 sqm	
	Say 76.790 sqm @ Rs 653.89 / sqm						Rs 50212.21	
12	5.9.6 Centering and shuttering including strutting, etc. and removal of form for:Columns, Pillars, Piers, Abutments, Posts and Struts							
	Plinth level beam	1	110.150	0.250+0.45*2			126.673	
	Reciving chamber column 250x400	4	0.250*2+0.4*2		2.550		13.260	
	Reciving and Distribution chamber column 250x450	6	0.250*2+0.45*2		3.000		25.200	
	Grit chamber Column250x500	6	0.250*2+0.5*2		2.200		19.800	
	Parshalflume and Distribution chamber column250x450	6	0.250*2*0.45*2		3.000		8.101	
	Staircase column 200x400	1	0.200*2*0.4*2		1.500		0.481	
	Staircase column 200x400	1	0.200*2+0.4*2		3.000		3.601	
	Staircase column 200x400	1	0.200*2+0.4*2		5.750		6.901	
	Total Quantity						204.017 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						204.017 sqm	
	Say 204.017 sqm @ Rs 869.05 / sqm						Rs 177300.97	
13	13.7.1 12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)							
	Plinth level beam	1	110.150	1.400			154.210	
	Reciving chamber column 250x400	4	1.300		2.550		13.260	
	Reciving and Distribution chamber column 250x450	6	1.400		3.000		25.200	
	Grit chamber Column250x500	6	1.500		2.200		19.800	

Parshalflume and Distribution chamber column 250x450	6	1.400		3.000		25.200	
Staircase column 200x400	1	1.200		1.500		1.800	
Staircase column 200x400	1	1.200		3.000		3.600	
Staircase column 200x400	1	1.200		5.000		6.000	
Receiving chamber base slab- top and bottom	2	2.250	1.000			4.500	
Receiving chamber side wall- inside and out side	2	2.750		2.200		12.101	
	4	1.000		2.200		8.800	
	2	2.750		1.000		5.500	
Coarse and fine screen chamber base slab-top and bottom	4	10.000	1.000			40.000	
Coarse and fine screen chamber side wall	6	10.000		1.000		60.000	
Grit chamber base slab -side portion -top and bottom	4	6.500				26.000	
Grit chamber base slab -Centre portion -top and bottom	4	2.500	2.500		1.15	28.750	
Grit Chamber sidewall-inside and out side	4	5.750		2.500		57.500	
	6	2.500		2.500		37.500	
parshelfume and distribution chamber base slab-top and bottom	2	5.750	2.500			28.750	

	parshelfume and distribution chamber side wall-inside and out side	4	5.750		1.000		23.000	
	Allround verandha slab-top and bottom	2	61.120	1.000	0.150		18.336	
	verandha -edge	1	61.200	0.150			9.180	
	verandha beam	15	1.000	1.050			15.750	
	Staircase -steps	18	1.000	0.900			16.200	
	Staircase -waist slab bottom	1	15.000	1.000			15.000	
	Staircase -landing -top only	1	1.000	1.000			1.000	
		1	1.700	1.000			1.700	
	Total Quantity						658.637 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						658.637 sqm	
	Say 658.637 sqm @ Rs 403.73 / sqm						Rs 265911.52	
14	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							
	Qty same as item no-13	1	658.637				658.637	
	Total Quantity						658.637 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						658.637 sqm	
	Say 658.637 sqm @ Rs 224.31 / sqm						Rs 147738.87	
15	22.23.1 Providing and applying integral crystalline slurry of hydrophilic in nature forwaterproofing treatment to the RCC structures like retaining walls of the basement,water tanks, roof slabs, podiums, reserrior, sewage & water treatment plant, tunnels/ subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 partsintegral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 partsintegral crystalline slurry : 1 part water) for horizontal surfaces and applying thesame from negative (internal) side with the help of synthetic fiber brush. The materials shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducingpermeability of concrete by more than 90% compared with control concrete as perDIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystallineslurry shall be capable of self-healing of cracks up to a width of 0.50mm. The workshall 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							
	Receiving chamber side wall- inside and out side	2	2.750		2.200		12.101	
		4	1.000		2.200		8.800	
		2	2.750		1.000		5.500	
	Coarse and fine screen chamber side wall	6	10.000		1.000		60.000	
	Grit Chamber sidewall-inside and out side	4	5.750		2.500		57.500	
		6	2.500		2.500		37.500	
	parashelfume and distribution chamber side wall-inside and out side	4	5.750		1.000		23.000	
	Total Quantity						204.401 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						204.401 sqm	
	Say 204.401 sqm @ Rs 573.87 / sqm						Rs 117299.60	
16	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, reservoir, 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 engineer in-charge. The product performance shall carry guarantee for 10 years against any leakage. For horizontal surface one coat @1.10 kg per sqm.							
	Receiving chamber base slab- top and bottom	2	2.250	1.000			4.500	
	Coarse and fine screen chamber base slab-top and bottom	4	10.000	1.000			40.000	

	Grit chamber base slab -side portion -top and bottom	4	6.000				24.000	
	Grit chamber base slab -Centre portion -top and bottom	4	2.500	2.500		1.15	28.750	
	parshelfume and distribution chamber base slab-top and bottom	2	5.750	2.500			28.750	
	Total Quantity						126.000 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						126.000 sqm	
	Say 126.000 sqm @ Rs 442.27 / sqm						Rs 55726.02	
17	50.10.1 Steel work in built up G I tubular (round, square or rectangular hollow tubes etc.) trusses etc., including cutting, hoisting,fixing in position and applying a priming coat of approved steel primer, including welding and bolted with special shaped washers etc. complete							
	All round verandha	1	700.000				700.000	
	Total Quantity						700.000 kg	
	Total Deducted Quantity						0.000 kg	
	Net Total Quantity						700.000 kg	
	Say 700.000 kg @ Rs 191.08 / kg						Rs 133756.00	
SI No	Description	No	L	B	D	CF	Quantity	Remark
4EQUALISATION TANK (Cost Index:36.44 %)								
1	2.6.1 Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed.All kinds of soil							
		1	12.900	12.900	0.500		83.205	
	Total Quantity						83.205 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						83.205 cum	
	Say 83.205 cum @ Rs 215.37 / cum						Rs 17919.86	
2	4.1.5 Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm							

	nominal size)							
		1	12.900	12.900	0.200		33.282	
	Total Quantity						33.282 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						33.282 cum	
	Say 33.282 cum @ Rs 7413.74 / cum						Rs 246744.09	
3	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 work upto plinth level							
		1	12.500	12.500	0.300		46.875	
	Total Quantity						46.875 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						46.875 cum	
	Say 46.875 cum @ Rs 9947.98 / cum						Rs 466311.56	
4	5.37.2 Providing and laying in position ready mixed M-25 grade concrete for reinforced cement concrete work, using cement content as per approved design mix, manufactured in fully automatic batching plant and transported to site of work in transit mixer for all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding the cost of centering, shuttering finishing and reinforcement including cost of admixtures in recommended proportions as per IS: 9103 to accelerate/ retard setting of concrete, improve workability without impairing strength and durability as per direction of the Engineer - in -charge. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All work above plinth level upto floor V level							
	c/c	1	4.000*11. 3	4.500	0.300		61.020	
	Baffle wall	1	11.600	4.000	0.100		4.640	
	Walkway	1	50.400	1.000	0.100		5.040	
	cantilever beams	8	1.000	0.250	0.250		0.500	
	Stair-step	29	1.000	0.50*0.30* 0.15			0.653	
	Stair - Landing	11	1.000	1.000	0.120		1.320	

	Stair- Waist	11	6.300	1.000	0.120		8.316	
	Walkway to MBBR	11	2.000	1.200	0.120		3.168	
	Total Quantity						84.657 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						84.657 cum	
	Say 84.657 cum @ Rs 11610.43 / cum						Rs 982904.17	
5	5.34.1 Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).							
	Qty Vide Item No:3	1	46.875				46.875	
	Qty Vide Item No:4	1	84.657				84.657	
	Total Quantity						131.532 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						131.532 cum	
	Say 131.532 cum @ Rs 82.61 / cum						Rs 10865.86	
6	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 .							
	Qty Vide Item No:3	1	46.875	330.000			15468.750	
	Qty Vide Item No:4	1	84.657	330.000			27936.810	
	Total Quantity						43405.560 kg	
	Total Deducted Quantity						0.000 kg	
	Net Total Quantity						43405.560 kg	
	Say 43405.560 kg @ Rs 1.36 / kg						Rs 59031.56	
7	od344739/2021_2022 Extra for providing sulphate resistant cement for the structures above plinth level.							
	Qty Vide Item No:3	1	46.875				46.875	
	Qty Vide Item No:4	1	84.657				84.657	
	Total Quantity						131.532 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						131.532 cum	
	Say 131.532 cum @ Rs 1899.47 / cum						Rs 249841.09	
8	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							
	Qty Vide Item No:3@120 kg/m3	1	46.875	120.000			5625.000	
	Qty Vide Item No:4@120 kg/m3	1	84.657	120.000			10158.840	
	Total Quantity						15783.840 kilogram	
	Total Deducted Quantity						0.000 kilogram	
	Net Total Quantity						15783.840 kilogram	
	Say 15783.840 kilogram @ Rs 98.92 / kilogram						Rs 1561337.45	
9	od344742/2021_2022 Extra for providing epoxy coating for reinforcement bars.							
	Qty Vide Item No:3@120 kg/m3	1	46.875	120.000			5625.000	
	Qty Vide Item No:4@120 kg/m3	1	84.657	120.000			10158.840	
	Total Quantity						15783.840 kg	
	Total Deducted Quantity						0.000 kg	
	Net Total Quantity						15783.840 kg	
	Say 15783.840 kg @ Rs 2.32 / kg						Rs 36618.51	
10	5.9.1 Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete							
		1	50.400	0.300			15.120	
	Total Quantity						15.120 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						15.120 sqm	
	Say 15.120 sqm @ Rs 337.42 / sqm						Rs 5101.79	
11	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.							
	Inside	4	11.000	4.500			198.000	
	Outside	4	11.600	4.500			208.800	
	Baffle	2	11.000	4.000			88.000	
	Total Quantity						494.800 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						494.800 sqm	

	Say 494.800 sqm @ Rs 721.70 / sqm						Rs 357097.16	
12	5.9.3 Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform							
	Walkway	1	50.400	1.000			50.400	
	Stair- Landing	1	1.000	1.000			1.000	
	Stair- Waist	1	6.300	1.000			6.300	
	Stair- Step	29	1.000	0.150			4.350	
	Walkway to MBBR	1	2.000	1.200			2.400	
	Total Quantity						64.450 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						64.450 sqm	
	Say 64.450 sqm @ Rs 820.89 / sqm						Rs 52906.36	
13	5.9.5 Centering and shuttering including strutting, etc. and removal of form for:Lintels, beams, plinth beams, girders bressumers and cantilevers							
		8	1.000	0.750			6.000	
	Total Quantity						6.000 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						6.000 sqm	
	Say 6.000 sqm @ Rs 653.89 / sqm						Rs 3923.34	
14	13.7.1 12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)							
	Qty vide Item No:10	1	1.000	15.120			15.120	
	Qty vide Item No:11	1	1.000	494.800			494.800	
	Qty vide Item No:12	1	1.000	64.450			64.450	
	Qty vide Item No:13	1	1.000	6.000			6.000	
	Total Quantity						580.370 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						580.370 sqm	
	Say 580.370 sqm @ Rs 403.73 / sqm						Rs 234312.78	
15	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							

	Tank	1	46.400	4.500			208.800	
	Walkway	1	50.400	1.000			50.400	
	Beams	8	1.000	0.750			6.000	
	Total Quantity						265.200 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						265.200 sqm	
	Say 265.200 sqm @ Rs 224.31 / sqm						Rs 59487.01	
16	22.23.1 Providing and applying integral crystalline slurry of hydrophilic in nature forwaterproofing 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 partsintegral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 partsintegral crystalline slurry : 1 part water) for horizontal surfaces and applying thesame from negative (internal) side with the help of synthetic fiber brush. The materialshall meet the requirements as specified in ACI-212-3R-2010 i.e by reducingpermeability of concrete by more than 90% compared with control concrete as perDIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystallineslurry shall be capable of self-healing of cracks up to a width of 0.50mm. The workshall 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 anyleakage.For vertical surface two coats @0.70 kg per sqm							
	Tank	4	11.000	4.500			198.000	
	Baffle	2	11.000	4.000			88.000	
	Total Quantity						286.000 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						286.000 sqm	
	Say 286.000 sqm @ Rs 573.87 / sqm						Rs 164126.82	
17	22.23.2 Providing and applying integral crystalline slurry of hydrophilic in nature forwaterproofing 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 partsintegral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 partsintegral crystalline slurry : 1 part water) for horizontal surfaces and applying thesame from negative (internal) side with the help of synthetic fiber brush. The materialshall meet the requirements as specified in ACI-212-3R-2010 i.e by reducingpermeability of concrete by more than 90% compared with control concrete as perDIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystallineslurry shall be capable of self-healing of cracks up to a width of 0.50mm. The workshall 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 anyleakage.For horizontal surface one coat @1.10 kg per sqm.							
		1	11.000	11.000			121.000	
	Total Quantity						121.000 sqm	

	Total Deducted Quantity							0.000 sqm	
	Net Total Quantity							121.000 sqm	
	Say 121.000 sqm @ Rs 442.27 / sqm							Rs 53514.67	
18	100.36.1 Filling water with 5000 litre tankers fitted 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 appliances and cost of water etc. complete. "(Ref. No. 000, Technical Circular)"								
		1	11.000	11.000	4.500		544.500		
	Total Quantity							544.500 Kilo litre	
	Total Deducted Quantity							0.000 Kilo litre	
	Net Total Quantity							544.500 Kilo litre	
	Say 544.500 Kilo litre @ Rs 185.67 / Kilo litre							Rs 101097.31	
19	50.10.1 Steel work in built up G I tubular (round, square or rectangular hollow tubes etc.) trusses etc., including cutting, hoisting,fixing in position and applying a priming coat of approved steel primer, including welding and bolted with special shaped washers etc. complete								
		1	700.000				700.000		
	Total Quantity							700.000 kg	
	Total Deducted Quantity							0.000 kg	
	Net Total Quantity							700.000 kg	
	Say 700.000 kg @ Rs 191.08 / kg							Rs 133756.00	
SI No	Description	No	L	B	D	CF	Quantity	Remark	
5MBBR 1 & 2 (Cost Index:36.44 %)									
1	2.6.1 Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed.All kinds of soil								
		1	23.600	12.600	0.550		163.549		
	Total Quantity							163.549 cum	
	Total Deducted Quantity							0.000 cum	
	Net Total Quantity							163.549 cum	
	Say 163.549 cum @ Rs 215.37 / cum							Rs 35223.55	
2	4.1.5 Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm								

	nominal size)							
		1	23.600	12.600	0.200		59.473	
	Total Quantity						59.473 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						59.473 cum	
	Say 59.473 cum @ Rs 7413.74 / cum						Rs 440917.36	
3	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 work upto plinth level							
		1	23.200	12.200	0.350		99.064	
	Total Quantity						99.064 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						99.064 cum	
	Say 99.064 cum @ Rs 9947.98 / cum						Rs 985486.69	
4	5.37.2 Providing and laying in position ready mixed M-25 grade concrete for reinforced cement concrete work, using cement content as per approved design mix, manufactured in fully automatic batching plant and transported to site of work in transit mixer for all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding the cost of centering, shuttering finishing and reinforcement including cost of admixtures in recommended proportions as per IS: 9103 to accelerate/ retard setting of concrete, improve workability without impairing strength and durability as per direction of the Engineer - in -charge. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All work above plinth level upto floor V level							
	Long Wall	2	22.300	0.300	4.500		60.210	
	Short Wall	3	10.700	0.300	4.500		43.335	
	Walkway	1	(24.3+13.3)*2	1.000	0.100		7.521	
	Cantilever beams	8	1.000	0.250	0.250		0.500	
	Total Quantity						111.566 cum	
	Total Deducted Quantity						0.000 cum	

	Net Total Quantity						111.566 cum	
	Say 111.566 cum @ Rs 11610.43 / cum						Rs 1295329.23	
5	5.34.1 Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).							
	Qty vide item 3	1	99.064				99.064	
	Qty vide item 4	1	111.566				111.566	
	Total Quantity						210.630 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						210.630 cum	
	Say 210.630 cum @ Rs 82.61 / cum						Rs 17400.14	
6	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 .							
	Qty vide item 3	1	99.064		330.000		32691.120	
	Qty vide item 4	1	111.566		330.000		36816.780	
	Total Quantity						69507.900 kg	
	Total Deducted Quantity						0.000 kg	
	Net Total Quantity						69507.900 kg	
	Say 69507.900 kg @ Rs 1.36 / kg						Rs 94530.74	
7	od344739/2021_2022 Extra for providing sulphate resistant cement for the structures above plinth level.							
	Qty vide item 3	1	99.064				99.064	
	Qty vide item 4	1	111.566				111.566	
	Total Quantity						210.630 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						210.630 cum	
	Say 210.630 cum @ Rs 1899.47 / cum						Rs 400085.37	
8	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							
	@120kg/m3	1	210.630	120.000			25275.600	
	Total Quantity						25275.600 kilogram	
	Total Deducted Quantity						0.000 kilogram	

	Net Total Quantity						25275.600 kilogram
	Say 25275.600 kilogram @ Rs 98.92 / kilogram						Rs 2500262.35
9	od344742/2021_2022 Extra for providing epoxy coating for reinforcement bars.						
	@120kg/m3	1	344.540	120.000			41344.800
	Total Quantity						41344.800 kg
	Total Deducted Quantity						0.000 kg
	Net Total Quantity						41344.800 kg
	Say 41344.800 kg @ Rs 2.32 / kg						Rs 95919.94
10	5.9.1 Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete						
		1	25.2*2+12 .2*2		0.350		26.180
	Total Quantity						26.180 sqm
	Total Deducted Quantity						0.000 sqm
	Net Total Quantity						26.180 sqm
	Say 26.180 sqm @ Rs 337.42 / sqm						Rs 8833.66
11	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.						
	Inside	2*4	15.200	4.500			547.200
	Outside	1	67.200	4.500			302.401
	Total Quantity						849.601 sqm
	Total Deducted Quantity						0.000 sqm
	Net Total Quantity						849.601 sqm
	Say 849.601 sqm @ Rs 721.70 / sqm						Rs 613157.04
12	5.9.3 Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform						
	Walkway	1	75.200		0.100		7.521
	Total Quantity						7.521 sqm
	Total Deducted Quantity						0.000 sqm
	Net Total Quantity						7.521 sqm
	Say 7.521 sqm @ Rs 820.89 / sqm						Rs 6173.91

13	5.9.5 Centering and shuttering including strutting, etc. and removal of form for:Lintels, beams, plinth beams, girders bressumers and cantilevers							
	Cantilever beam	8	1.000	0.750			6.000	
	Total Quantity						6.000 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						6.000 sqm	
	Say 6.000 sqm @ Rs 653.89 / sqm						Rs 3923.34	
14	13.7.1 12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)							
	Item No:10	1	26.180				26.180	
	Item No:11	1	971.101				971.101	
	Item No:12	1	7.521				7.521	
	Item No:13	1	6.000				6.000	
	Total Quantity						1010.802 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						1010.802 sqm	
	Say 1010.802 sqm @ Rs 403.73 / sqm						Rs 408091.09	
15	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							
	Tank	1	67.200	4.500			302.401	
	Walkway	1	75.200	1.000			75.200	
	Beams	3	1.000	0.250			0.750	
	Total Quantity						378.351 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						378.351 sqm	
	Say 378.351 sqm @ Rs 224.31 / sqm						Rs 84867.91	
16	22.23.1 Providing and applying integral crystalline slurry of hydrophilic in nature forwaterproofing 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 partsintegral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 partsintegral crystalline slurry : 1 part water) for horizontal surfaces and applying thesame from negative (internal) side with the help of synthetic fiber brush. The materialshall meet the requirements as specified in ACI-212-3R-2010 i.e by reducingpermeability of concrete by more than 90% compared with control concrete as perDIN							

	1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystallineslurry shall be capable of self-healing of cracks up to a width of 0.50mm. The workshall 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 anyleakage.For vertical surface two coats @0.70 kg per sqm							
		8	10.700	4.500			385.200	
	Total Quantity						385.200 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						385.200 sqm	
	Say 385.200 sqm @ Rs 573.87 / sqm						Rs 221054.72	
17	22.23.2 Providing and applying integral crystalline slurry of hydrophilic in nature forwaterproofing treatment to the RCC structures like retaining walls of the basement,water tanks, roof slabs, podiums, reserrior, sewage & water treatment plant, tunnels/ subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 partsintegral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 partsintegral crystalline slurry : 1 part water) for horizontal surfaces and applying thesame from negative (internal) side with the help of synthetic fiber brush. The materialshall meet the requirements as specified in ACI-212-3R-2010 i.e by reducingpermeability of concrete by more than 90% compared with control concrete as perDIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystallineslurry shall be capable of self-healing of cracks up to a width of 0.50mm. The workshall 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 anyleakage.For horizontal surface one coat @1.10 kg per sqm.							
		2	10.700	10.700			228.980	
	Total Quantity						228.980 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						228.980 sqm	
	Say 228.980 sqm @ Rs 442.27 / sqm						Rs 101270.98	
18	100.36.1 Filling water with 5000 litre tankers fitted 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. "(Ref. No. 000, Technical Circular)"							
		2	10.700	10.700	4.500		1030.410	
	Total Quantity						1030.410 Kilo litre	
	Total Deducted Quantity						0.000 Kilo litre	
	Net Total Quantity						1030.410 Kilo litre	
	Say 1030.410 Kilo litre @ Rs 185.67 / Kilo litre						Rs 191316.22	
19	50.10.1 Steel work in built up G I tubular (round, square or rectangular hollow tubes etc.) trusses etc., including cutting, hoisting,fixing in position and applying a priming coat of approved steel primer, including welding							

	and bolted with special shaped washers etc. complete							
		1	900.000				900.000	
	Total Quantity						900.000 kg	
	Total Deducted Quantity						0.000 kg	
	Net Total Quantity						900.000 kg	
	Say 900.000 kg @ Rs 191.08 / kg						Rs 171972.00	
SI No	Description	No	L	B	D	CF	Quantity	Remark
6SECONDARY CLARIFIER (Cost Index:36.44 %)								
1	2.6.1 Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed.All kinds of soil							
		1	3.14/4	13*13	0.900		119.399	
	Total Quantity						119.399 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						119.399 cum	
	Say 119.399 cum @ Rs 215.37 / cum						Rs 25714.96	
2	4.1.5 Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size)							
		1	3.14/4	13*13	0.200		26.533	
	Total Quantity						26.533 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						26.533 cum	
	Say 26.533 cum @ Rs 7413.74 / cum						Rs 196708.76	
3	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 work upto plinth level							
		1	3.14/4	12.6*12.6	0.300	1.15	42.997	

	Total Quantity						42.997 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						42.997 cum	
	Say 42.997 cum @ Rs 9947.98 / cum						Rs 427733.30	
4	5.37.2 Providing and laying in position ready mixed M-25 grade concrete for reinforced cement concrete work, using cement content as per approved design mix, manufactured in fully automatic batching plant and transported to site of work in transit mixer for all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding the cost of centering, shuttering finishing and reinforcement including cost of admixtures in recommended proportions as per IS: 9103 to accelerate/ retard setting of concrete, improve workability without impairing strength and durability as per direction of the Engineer - in -charge. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All work above plinth level upto floor V level							
	Wall	3.14	11.700	0.300	3.300		36.371	
	Trough	3.14	10.600	0.500	0.150		2.497	
		3.14	10.000	0.300	0.100		0.943	
	Walkway	3.14	12.600	0.900	0.150		5.342	
	Total Quantity						45.153 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						45.153 cum	
	Say 45.153 cum @ Rs 11610.43 / cum						Rs 524245.75	
5	5.34.1 Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).							
	Qty Vide Item No:3	1	42.970				42.970	
	Qty Vide Item No:4	1	45.153				45.153	
	Total Quantity						88.123 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						88.123 cum	
	Say 88.123 cum @ Rs 82.61 / cum						Rs 7279.84	
6	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 .							
	Qty Vide Item No:3	1	42.970		330.000		14180.100	
	Qty Vide Item No:4	1	45.153		330.000		14900.490	

	Total Quantity							29080.590 kg
	Total Deducted Quantity							0.000 kg
	Net Total Quantity							29080.590 kg
	Say 29080.590 kg @ Rs 1.36 / kg							Rs 39549.60
7	od344739/2021_2022 Extra for providing sulphate resistant cement for the structures above plinth level.							
	Qty Vide Item No:3	1	42.970				42.970	
	Qty Vide Item No:4	1	45.153				45.153	
	Total Quantity							88.123 cum
	Total Deducted Quantity							0.000 cum
	Net Total Quantity							88.123 cum
	Say 88.123 cum @ Rs 1899.47 / cum							Rs 167386.99
8	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							
	Qty Vide Item No:3 @ 120kg/m3	1	42.970	120.000			5156.400	
	Qty Vide Item No:4 @ 120kg/m3	1	45.153	120.000			5418.360	
	Total Quantity							10574.760 kilogram
	Total Deducted Quantity							0.000 kilogram
	Net Total Quantity							10574.760 kilogram
	Say 10574.760 kilogram @ Rs 98.92 / kilogram							Rs 1046055.26
9	od344742/2021_2022 Extra for providing epoxy coating for reinforcement bars.							
	Qty Vide Item No:3 @ 120kg/m3	1	42.970	120.000			5156.400	
	Qty Vide Item No:4 @ 120kg/m3	1	45.153	120.000			5418.360	
	Total Quantity							10574.760 kg
	Total Deducted Quantity							0.000 kg
	Net Total Quantity							10574.760 kg
	Say 10574.760 kg @ Rs 2.32 / kg							Rs 24533.44
10	5.9.1 Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete							

		3.14	13.000	0.200			8.165	
	Total Quantity						8.165 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						8.165 sqm	
	Say 8.165 sqm @ Rs 337.42 / sqm						Rs 2755.03	
11	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.							
	Wall Inside&outside	3.14	11.700		3.300		121.236	
		3.14	11.100		3.300		115.019	
	trough	3.14	11.400		0.800		28.637	
	Walkway	3.14	12.600		1.200		47.477	
	Total Quantity						312.369 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						312.369 sqm	
	Say 312.369 sqm @ Rs 721.70 / sqm						Rs 225436.71	
12	5.9.3 Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform							
	trough	3.14	11.400		0.800		28.637	
	Walkway	3.14	12.600		1.200		47.477	
	Total Quantity						76.114 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						76.114 sqm	
	Say 76.114 sqm @ Rs 820.89 / sqm						Rs 62481.22	
13	13.7.1 12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)							
	Qty Vide Item No:10	1	8.165				8.165	
	Qty Vide Item No:11	1	312.369				312.369	
	Qty Vide Item No:12	1	76.114				76.114	
	Total Quantity						396.648 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						396.648 sqm	
	Say 396.648 sqm @ Rs 403.73 / sqm						Rs 160138.70	

14	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							
	Outer wall	1	3.140	11.700	3.300		121.236	
	Walkway	1	3.140	12.150	1.000		38.151	
	Total Quantity						159.387 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						159.387 sqm	
	Say 159.387 sqm @ Rs 224.31 / sqm						Rs 35752.10	
15	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, reservoir, 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 engineer in-charge. The product performance shall carry guarantee for 10 years against any leakage. For vertical surface two coats @ 0.70 kg per sqm							
		3.14	11.100		3.300		115.019	
	Total Quantity						115.019 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						115.019 sqm	
	Say 115.019 sqm @ Rs 573.87 / sqm						Rs 66005.95	
16	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, reservoir, 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 engineer in-charge. The product performance shall carry guarantee for 10 years against any leakage. For horizontal surface one coat @ 1.10 kg per sqm.							
	Bottom	3.14/4	11.100	11.100		1.15	111.228	

	Trough	1	3.140*10. 6	1.000			33.284	
	Total Quantity						144.512 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						144.512 sqm	
	Say 144.512 sqm @ Rs 442.27 / sqm						Rs 63913.32	
17	100.36.1 Filling water with 5000 litre tankers fitted 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 appliances and cost of water etc. complete. "(Ref. No. 000, Technical Circular)"							
		3.14/4	11.100	11.100	3.500		338.520	
	Total Quantity						338.520 Kilo litre	
	Total Deducted Quantity						0.000 Kilo litre	
	Net Total Quantity						338.520 Kilo litre	
	Say 338.520 Kilo litre @ Rs 185.67 / Kilo litre						Rs 62853.01	
18	50.10.1 Steel work in built up G I tubular (round, square or rectangular hollow tubes etc.) trusses etc., including cutting, hoisting,fixing in position and applying a priming coat of approved steel primer, including welding and bolted with special shaped washers etc. complete							
	Hand rail	1	600.000				600.000	
	Total Quantity						600.000 kg	
	Total Deducted Quantity						0.000 kg	
	Net Total Quantity						600.000 kg	
	Say 600.000 kg @ Rs 191.08 / kg						Rs 114648.00	
SI No	Description	No	L	B	D	CF	Quantity	Remark
7SLUDGE SUMP (Cost Index:36.44 %)								
1	2.6.1 Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed.All kinds of soil							
	Sludge sump	3.14	1.700	1.700	0.700		6.353	
	Total Quantity						6.353 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						6.353 cum	
	Say 6.353 cum @ Rs 215.37 / cum						Rs 1368.25	

2	4.1.5 Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size)							
		3.14	1.700	1.700	0.200		1.815	
		Total Quantity					1.815 cum	
		Total Deducted Quantity					0.000 cum	
		Net Total Quantity					1.815 cum	
		Say 1.815 cum @ Rs 7413.74 / cum					Rs 13455.94	
3	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 work upto plinth level							
	For floor slab	3.14	1.600	1.600	0.300		2.412	
		Total Quantity					2.412 cum	
		Total Deducted Quantity					0.000 cum	
		Net Total Quantity					2.412 cum	
		Say 2.412 cum @ Rs 9947.98 / cum					Rs 23994.53	
4	5.37.2 Providing and laying in position ready mixed M-25 grade concrete for reinforced cement concrete work, using cement content as per approved design mix, manufactured in fully automatic batching plant and transported to site of work in transit mixer for all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding the cost of centering, shuttering finishing and reinforcement including cost of admixtures in recommended proportions as per IS: 9103 to accelerate/ retard setting of concrete, improve workability without impairing strength and durability as per direction of the Engineer - in -charge. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All work above plinth level upto floor V level							
	For tank wall	3.14	2.300	1.850	0.300		4.009	
	slopped portion	3.14*0.5	2.000	0.600	0.600		1.131	
	covering slab	3.14	1.300	1.300	0.150		0.796	
		Total Quantity					5.936 cum	
		Total Deducted Quantity					0.000 cum	

	Net Total Quantity						5.936 cum	
	Say 5.936 cum @ Rs 11610.43 / cum						Rs 68919.51	
5	5.34.1 Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).							
	Qty vide item no-3	1	2.412				2.412	
	Qty vide item no-4	1	5.936				5.936	
	Total Quantity						8.348 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						8.348 cum	
	Say 8.348 cum @ Rs 82.61 / cum						Rs 689.63	
6	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 .							
		1	8.348		330.000		2754.840	
	Total Quantity						2754.840 kg	
	Total Deducted Quantity						0.000 kg	
	Net Total Quantity						2754.840 kg	
	Say 2754.840 kg @ Rs 1.36 / kg						Rs 3746.58	
7	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							
	120kg/m3	1	8.348	120.000			1001.761	
	Total Quantity						1001.761 kilogram	
	Total Deducted Quantity						0.000 kilogram	
	Net Total Quantity						1001.761 kilogram	
	Say 1001.761 kilogram @ Rs 98.92 / kilogram						Rs 99094.20	
8	od344742/2021_2022 Extra for providing epoxy coating for reinforcement bars.							
	@120kg/m3	1	8.348	120.000			1001.761	
	Total Quantity						1001.761 kg	
	Total Deducted Quantity						0.000 kg	
	Net Total Quantity						1001.761 kg	
	Say 1001.761 kg @ Rs 2.32 / kg						Rs 2324.09	

9	od344739/2021_2022 Extra for providing sulphate resistant cement for the structures above plinth level.							
		1	8.348				8.348	
	Total Quantity						8.348 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						8.348 cum	
	Say 8.348 cum @ Rs 1899.47 / cum						Rs 15856.78	
10	5.9.1 Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete							
	PCC	1	3.140*3.4		0.200		2.136	
	Base slab	1	3.140*3.2		0.300		3.015	
	Total Quantity						5.151 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						5.151 sqm	
	Say 5.151 sqm @ Rs 337.42 / sqm						Rs 1738.05	
11	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.							
	INSIDE	1	3.14*2.		1.850		11.618	
	OUTSIDE	1	3.14*2.6		1.850		15.104	
	Total Quantity						26.722 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						26.722 sqm	
	Say 26.722 sqm @ Rs 721.70 / sqm						Rs 19285.27	
12	5.9.3 Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform							
	Cover slab	3.14/4	2.000	2.000			3.140	
	Total Quantity						3.140 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						3.140 sqm	
	Say 3.140 sqm @ Rs 820.89 / sqm						Rs 2577.59	
13	13.7.1 12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)							

	OUT SIDE	1	3.14*2.6		1.850		15.104	
	INSIDE	1	3.14*2.0		1.850		11.618	
	Total Quantity						26.722 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						26.722 sqm	
	Say 26.722 sqm @ Rs 403.73 / sqm						Rs 10788.47	
14	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							
		3.14	2.600	1.850			15.104	
	Total Quantity						15.104 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						15.104 sqm	
	Say 15.104 sqm @ Rs 224.31 / sqm						Rs 3387.98	
15	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, reservoir, 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 engineer in-charge. The product performance shall carry guarantee for 10 years against any leakage. For vertical surface two coats @ 0.70 kg per sqm							
		3.14	2.000		1.850		11.618	
	Total Quantity						11.618 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						11.618 sqm	
	Say 11.618 sqm @ Rs 573.87 / sqm						Rs 6667.22	
16	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, reservoir, 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 engineer in-charge. The product performance shall carry guarantee for 10 years against any leakage. For horizontal surface one coat @ 1.10 kg per sqm.							
		3.14/4	2.000	2.000			3.140	
	Total Quantity						3.140 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						3.140 sqm	
	Say 3.140 sqm @ Rs 442.27 / sqm						Rs 1388.73	
17	100.36.1 Filling water with 5000 litre tankers fitted 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 appliances and cost of water etc. complete. "(Ref. No. 000, Technical Circular)"							
		3.14/4	2.000	2.000	1.850		5.809	
	Total Quantity						5.809 Kilo litre	
	Total Deducted Quantity						0.000 Kilo litre	
	Net Total Quantity						5.809 Kilo litre	
	Say 5.809 Kilo litre @ Rs 185.67 / Kilo litre						Rs 1078.56	
SI No	Description	No	L	B	D	CF	Quantity	Remark
8 SLUDGE THICKNER (Cost Index: 36.44 %)								
1	2.6.1 Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed. All kinds of soil							
		1	3.14/4	5.8*5.8	0.500		13.204	
	Total Quantity						13.204 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						13.204 cum	
	Say 13.204 cum @ Rs 215.37 / cum						Rs 2843.75	
2	4.1.5 Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level: 1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size)							
		1	3.14/4	5.8*5.8	0.200		5.282	

	Total Quantity						5.282 cum
	Total Deducted Quantity						0.000 cum
	Net Total Quantity						5.282 cum
	Say 5.282 cum @ Rs 7413.74 / cum						Rs 39159.37
3	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 work upto plinth level						
		1	3.14/4	4.8*4.8	0.350	1.2	7.597
	Total Quantity						7.597 cum
	Total Deducted Quantity						0.000 cum
	Net Total Quantity						7.597 cum
	Say 7.597 cum @ Rs 9947.98 / cum						Rs 75574.80
4	5.37.2 Providing and laying in position ready mixed M-25 grade concrete for reinforced cement concrete work, using cement content as per approved design mix, manufactured in fully automatic batching plant and transported to site of work in transit mixer for all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding the cost of centering, shuttering finishing and reinforcement including cost of admixtures in recommended proportions as per IS: 9103 to accelerate/ retard setting of concrete, improve workability without impairing strength and durability as per direction of the Engineer - in -charge. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All work above plinth level upto floor V level						
	Wall	3.14	4.500	0.300	2.850		12.082
	chamber	3.14	3.700	0.500	0.100		0.581
		3.14	3.200	0.300	0.100		0.302
	Walkway	3.14	5.800	1.000	0.100		1.822
	Cantilever beam	4	1.000	0.250	0.250		0.250
	Step	19	0.50*.3*.1 5	1.000			0.428
	Step Waist	1	5.600	1.000	0.120		0.672
	Total Quantity						16.137 cum

Total Deducted Quantity								0.000 cum
Net Total Quantity								16.137 cum
Say 16.137 cum @ Rs 11610.43 / cum								Rs 187357.51
5	5.34.1 Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately. Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).							
	Qty Vide Item No: 3	1	7.597				7.597	
	Qty Vide Item No: 4	1	16.137				16.137	
Total Quantity								23.734 cum
Total Deducted Quantity								0.000 cum
Net Total Quantity								23.734 cum
Say 23.734 cum @ Rs 82.61 / cum								Rs 1960.67
6	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 .							
	Qty Vide Item No: 3	1	7.597			300.0	2279.100	
	Qty Vide Item No: 4	1	16.137			300.0	4841.100	
Total Quantity								7120.200 kg
Total Deducted Quantity								0.000 kg
Net Total Quantity								7120.200 kg
Say 7120.200 kg @ Rs 1.36 / kg								Rs 9683.47
7	od344739/2021_2022 Extra for providing sulphate resistant cement for the structures above plinth level.							
	Qty Vide Item No: 3	1	7.597				7.597	
	Qty Vide Item No: 4	1	16.137				16.137	
Total Quantity								23.734 cum
Total Deducted Quantity								0.000 cum
Net Total Quantity								23.734 cum
Say 23.734 cum @ Rs 1899.47 / cum								Rs 45082.02
8	5.22.6 Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth level Thermo - Mechanically Treated bars of grade Fe-500D or more							
	Qty Vide Item No: 3@120km/m3	1	7.597	120.000			911.641	

	Qty Vide Item No: 4@120km/m3	1	16.137	120.000			1936.440	
	Total Quantity						2848.081 kilogram	
	Total Deducted Quantity						0.000 kilogram	
	Net Total Quantity						2848.081 kilogram	
	Say 2848.081 kilogram @ Rs 98.92 / kilogram						Rs 281732.17	
9	od344742/2021_2022 Extra for providing epoxy coating for reinforcement bars.							
	Qty Vide Item No: 3@120km/m3	1	7.597	120.000			911.641	
	Qty Vide Item No: 4@120km/m3	1	16.137	120.000			1936.440	
	Total Quantity						2848.081 kg	
	Total Deducted Quantity						0.000 kg	
	Net Total Quantity						2848.081 kg	
	Say 2848.081 kg @ Rs 2.32 / kg						Rs 6607.55	
10	5.9.1 Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete							
		3.14	5.800	0.200			3.643	
	Total Quantity						3.643 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						3.643 sqm	
	Say 3.643 sqm @ Rs 337.42 / sqm						Rs 1229.22	
11	5.9.2 Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, buttresses, plinth and string courses etc.							
	Wall Inside&outside	3.14*2	4.500		2.850		80.542	
		3.14*4	3.200		0.300		12.058	
	Total Quantity						92.600 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						92.600 sqm	
	Say 92.600 sqm @ Rs 721.70 / sqm						Rs 66829.42	
12	5.9.3 Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform							

	chamber	3.14	3.700	0.500			5.809	
	Walkway	3.14	5.800	1.000			18.212	
	Stair -step	19	0.150	1.000			2.850	
	Stair Waist	1	5.600	1.000			5.600	
	Total Quantity						32.471 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						32.471 sqm	
	Say 32.471 sqm @ Rs 820.89 / sqm						Rs 26655.12	
13	5.9.5 Centering and shuttering including strutting, etc. and removal of form for: Lintels, beams, plinth beams, girders, bressumers and cantilevers							
		4	1.000	0.750			3.000	
	Total Quantity						3.000 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						3.000 sqm	
	Say 3.000 sqm @ Rs 653.89 / sqm						Rs 1961.67	
14	13.7.1 12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)							
	Qty Vide Item No:10	1	1.508				1.508	
	Qty Vide Item No:11	1	92.600				92.600	
	Qty Vide Item No:12	1	32.471				32.471	
	Qty Vide Item No:13	1	3.000				3.000	
	Total Quantity						129.579 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						129.579 sqm	
	Say 129.579 sqm @ Rs 403.73 / sqm						Rs 52314.93	
15	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							
	Outer wall	1	3.140	4.800	2.850		42.956	
	Walkway	1	3.140	5.800	1.000		18.212	
	Beams	4	1.000	0.750			3.000	
	Total Quantity						64.168 sqm	
	Total Deducted Quantity						0.000 sqm	

	Net Total Quantity						64.168 sqm	
	Say 64.168 sqm @ Rs 224.31 / sqm						Rs 14393.52	
16	22.23.1 Providing and applying integral crystalline slurry of hydrophilic in nature forwaterproofing 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 partsintegral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 partsintegral crystalline slurry : 1 part water) for horizontal surfaces and applying thesame from negative (internal) side with the help of synthetic fiber brush. The materialshall meet the requirements as specified in ACI-212-3R-2010 i.e by reducingpermeability of concrete by more than 90% compared with control concrete as perDIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystallineslurry shall be capable of self-healing of cracks up to a width of 0.50mm. The workshall 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 anyleakage.For vertical surface two coats @0.70 kg per sqm							
		3.14	4.200		2.850		37.586	
	Total Quantity						37.586 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						37.586 sqm	
	Say 37.586 sqm @ Rs 573.87 / sqm						Rs 21569.48	
17	22.23.2 Providing and applying integral crystalline slurry of hydrophilic in nature forwaterproofing 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 partsintegral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 partsintegral crystalline slurry : 1 part water) for horizontal surfaces and applying thesame from negative (internal) side with the help of synthetic fiber brush. The materialshall meet the requirements as specified in ACI-212-3R-2010 i.e by reducingpermeability of concrete by more than 90% compared with control concrete as perDIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystallineslurry shall be capable of self-healing of cracks up to a width of 0.50mm. The workshall 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 anyleakage.For horizontal surface one coat @1.10 kg per sqm.							
		3.14/4	4.200	4.200		1.15	15.925	
	Total Quantity						15.925 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						15.925 sqm	
	Say 15.925 sqm @ Rs 442.27 / sqm						Rs 7043.15	
18	100.36.1 Filling water with 5000 litre tankers fitted 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 appliances and cost of water etc. complete.							

	"(Ref. No. 000, Technical Circular)"							
		3.14/4	4.2*4.2		3.000		41.543	
	Total Quantity						41.543 Kilo litre	
	Total Deducted Quantity						0.000 Kilo litre	
	Net Total Quantity						41.543 Kilo litre	
	Say 41.543 Kilo litre @ Rs 185.67 / Kilo litre						Rs 7713.29	
19	50.10.1 Steel work in built up G I tubular (round, square or rectangular hollow tubes etc.) trusses etc., including cutting, hoisting,fixing in position and applying a priming coat of approved steel primer, including welding and bolted with special shaped washers etc. complete							
		1	250.000				250.000	
	Total Quantity						250.000 kg	
	Total Deducted Quantity						0.000 kg	
	Net Total Quantity						250.000 kg	
	Say 250.000 kg @ Rs 191.08 / kg						Rs 47770.00	
SI No	Description	No	L	B	D	CF	Quantity	Remark
9THICKENED SLUDGE SUMP (Cost Index:36.44 %)								
1	2.6.1 Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed.All kinds of soil							
		3.14/4	5.400	5.400	0.500		11.446	
	Total Quantity						11.446 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						11.446 cum	
	Say 11.446 cum @ Rs 215.37 / cum						Rs 2465.13	
2	4.1.5 Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size)							
		3.14/4	5.400	5.400	0.200		4.579	
	Total Quantity						4.579 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						4.579 cum	
	Say 4.579 cum @ Rs 7413.74 / cum						Rs 33947.52	

3	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 work upto plinth level							
		3.14/4	5.400	5.400	0.300		6.868	
	Total Quantity						6.868 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						6.868 cum	
	Say 6.868 cum @ Rs 9947.98 / cum						Rs 68322.73	
4	5.37.2 Providing and laying in position ready mixed M-25 grade concrete for reinforced cement concrete work, using cement content as per approved design mix, manufactured in fully automatic batching plant and transported to site of work in transit mixer for all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding the cost of centering, shuttering finishing and reinforcement including cost of admixtures in recommended proportions as per IS: 9103 to accelerate/ retard setting of concrete, improve workability without impairing strength and durability as per direction of the Engineer - in -charge. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All work above plinth level upto floor V level							
		3.14/4	4.600	4.600	0.120		1.994	
	Manhole	1	0.500	0.500	0.120		-0.030	
	Total Quantity						1.994 cum	
	Total Deducted Quantity						-0.030 cum	
	Net Total Quantity						1.964 cum	
	Say 1.964 cum @ Rs 11610.43 / cum						Rs 22802.88	
5	5.34.1 Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).							
		1	8.844				8.844	
	Total Quantity						8.844 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						8.844 cum	

	Say 8.844 cum @ Rs 82.61 / cum						Rs 730.60	
6	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 .							
		1	8.844		330.000		2918.520	
	Total Quantity						2918.520 kg	
	Total Deducted Quantity						0.000 kg	
	Net Total Quantity						2918.520 kg	
	Say 2918.520 kg @ Rs 1.36 / kg						Rs 3969.19	
7	od344739/2021_2022 Extra for providing sulphate resistant cement for the structures above plinth level.							
		1	8.844				8.844	
	Total Quantity						8.844 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						8.844 cum	
	Say 8.844 cum @ Rs 1899.47 / cum						Rs 16798.91	
8	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							
	@120kg/m3	1	8.844	120.000			1061.280	
	Total Quantity						1061.280 kilogram	
	Total Deducted Quantity						0.000 kilogram	
	Net Total Quantity						1061.280 kilogram	
	Say 1061.280 kilogram @ Rs 98.92 / kilogram						Rs 104981.82	
9	od344742/2021_2022 Extra for providing epoxy coating for reinforcement bars.							
	@120kg/m3	1	8.844	120.000			1061.280	
	Total Quantity						1061.280 kg	
	Total Deducted Quantity						0.000 kg	
	Net Total Quantity						1061.280 kg	
	Say 1061.280 kg @ Rs 2.32 / kg						Rs 2462.17	
10	5.9.1 Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete							
		3.14	5.400		0.200		3.392	

	Total Quantity							3.392 sqm
	Total Deducted Quantity							0.000 sqm
	Net Total Quantity							3.392 sqm
	Say 3.392 sqm @ Rs 337.42 / sqm							Rs 1144.53
11	5.9.2 Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, buttresses, plinth and string courses etc.							
		2*3.14	4.300		2.500		67.510	
	Base Slab side	13.14	5.200		0.300		20.499	
	Total Quantity							88.009 sqm
	Total Deducted Quantity							0.000 sqm
	Net Total Quantity							88.009 sqm
	Say 88.009 sqm @ Rs 721.70 / sqm							Rs 63516.10
12	5.9.3 Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform							
		3.14/4	4.000	4.000			12.560	
	Manhole	1	0.500	0.500			-0.250	
	Total Quantity							12.560 sqm
	Total Deducted Quantity							-0.250 sqm
	Net Total Quantity							12.310 sqm
	Say 12.310 sqm @ Rs 820.89 / sqm							Rs 10105.16
13	13.7.1 12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)							
	Qty Vide Item No:10	1	3.392				3.392	
	Qty Vide Item No:11	1	88.009				88.009	
	Qty Vide Item No:12	1	12.310				12.310	
	Total Quantity							103.711 sqm
	Total Deducted Quantity							0.000 sqm
	Net Total Quantity							103.711 sqm
	Say 103.711 sqm @ Rs 403.73 / sqm							Rs 41871.24
14	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							

		3.14	4.600		2.500		36.110	
	Total Quantity						36.110 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						36.110 sqm	
	Say 36.110 sqm @ Rs 224.31 / sqm						Rs 8099.83	
15	22.23.1 Providing and applying integral crystalline slurry of hydrophilic in nature forwaterproofing 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 partsintegral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 partsintegral crystalline slurry : 1 part water) for horizontal surfaces and applying thesame from negative (internal) side with the help of synthetic fiber brush. The materials shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducingpermeability of concrete by more than 90% compared with control concrete as perDIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystallineslurry shall be capable of self-healing of cracks up to a width of 0.50mm. The workshall 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 anyleakage.For vertical surface two coats @0.70 kg per sqm							
		3.14	4.000		2.500		31.401	
	Total Quantity						31.401 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						31.401 sqm	
	Say 31.401 sqm @ Rs 573.87 / sqm						Rs 18020.09	
16	22.23.2 Providing and applying integral crystalline slurry of hydrophilic in nature forwaterproofing 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 partsintegral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 partsintegral crystalline slurry : 1 part water) for horizontal surfaces and applying thesame from negative (internal) side with the help of synthetic fiber brush. The materials shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducingpermeability of concrete by more than 90% compared with control concrete as perDIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystallineslurry shall be capable of self-healing of cracks up to a width of 0.50mm. The workshall 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 anyleakage.For horizontal surface one coat @1.10 kg per sqm.							
		3.14/4	4.000	4.000			12.560	
	Total Quantity						12.560 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						12.560 sqm	
	Say 12.560 sqm @ Rs 442.27 / sqm						Rs 5554.91	

17	100.36.1 Filling water with 5000 litre tankers fitted 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 appliances and cost of water etc. complete. "(Ref. No. 000, Technical Circular)"							
		3.14/4	4.000	4.000	2.500		31.401	
	Total Quantity						31.401 Kilo litre	
	Total Deducted Quantity						0.000 Kilo litre	
	Net Total Quantity						31.401 Kilo litre	
	Say 31.401 Kilo litre @ Rs 185.67 / Kilo litre						Rs 5830.22	
SI No	Description	No	L	B	D	CF	Quantity	Remark
10FILTER FEED TANK (Cost Index:36.44 %)								
1	2.6.1 Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed.All kinds of soil							
		1	4.800	4.800	0.500		11.520	
	Total Quantity						11.520 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						11.520 cum	
	Say 11.520 cum @ Rs 215.37 / cum						Rs 2481.06	
2	4.1.5 Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size)							
		1	4.800	4.800	0.200		4.608	
	Total Quantity						4.608 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						4.608 cum	
	Say 4.608 cum @ Rs 7413.74 / cum						Rs 34162.51	
3	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 work upto plinth level							
		1	4.600	4.600	0.300		6.348	
	Total Quantity						6.348 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						6.348 cum	
	Say 6.348 cum @ Rs 9947.98 / cum						Rs 63149.78	
4	5.37.2 Providing and laying in position ready mixed M-25 grade concrete for reinforced cement concrete work, using cement content as per approved design mix, manufactured in fully automatic batching plant and transported to site of work in transit mixer for all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding the cost of centering, shuttering finishing and reinforcement including cost of admixtures in recommended proportions as per IS: 9103 to accelerate/ retard setting of concrete, improve workability without impairing strength and durability as per direction of the Engineer - in-charge. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All work above plinth level upto floor V level							
	Long Wall	2	3.750	0.250	2.850		5.344	
		2	3.250	0.250	2.850		4.632	
	Total Quantity						9.976 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						9.976 cum	
	Say 9.976 cum @ Rs 11610.43 / cum						Rs 115825.65	
5	5.34.1 Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).							
		1	16.324				16.325	
	Total Quantity						16.325 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						16.325 cum	
	Say 16.325 cum @ Rs 82.61 / cum						Rs 1348.61	
6	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 .							
		1	16.324		330.000		5386.921	
	Total Quantity						5386.921 kg	

	Total Deducted Quantity							0.000 kg
	Net Total Quantity							5386.921 kg
	Say 5386.921 kg @ Rs 1.36 / kg							Rs 7326.21
7	od344739/2021_2022 Extra for providing sulphate resistant cement for the structures above plinth level.							
		1	16.324				16.325	
	Total Quantity							16.325 cum
	Total Deducted Quantity							0.000 cum
	Net Total Quantity							16.325 cum
	Say 16.325 cum @ Rs 1899.47 / cum							Rs 31008.85
8	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							
	@120kg/m3	1	16.324	120.000			1958.880	
	Total Quantity							1958.880 kilogram
	Total Deducted Quantity							0.000 kilogram
	Net Total Quantity							1958.880 kilogram
	Say 1958.880 kilogram @ Rs 98.92 / kilogram							Rs 193772.41
9	od344742/2021_2022 Extra for providing epoxy coating for reinforcement bars.							
	@120kg/m3	1	16.324	120.000			1958.880	
	Total Quantity							1958.880 kg
	Total Deducted Quantity							0.000 kg
	Net Total Quantity							1958.880 kg
	Say 1958.880 kg @ Rs 2.32 / kg							Rs 4544.60
10	5.9.1 Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete							
	PCC	4	4.800	0.200			3.840	
	Base	4	4.600	0.300			5.520	
	Total Quantity							9.360 sqm
	Total Deducted Quantity							0.000 sqm
	Net Total Quantity							9.360 sqm
	Say 9.360 sqm @ Rs 337.42 / sqm							Rs 3158.25

11	5.9.2 Centering and shuttering including strutting, etc. and removal of form for: Walls (any thickness) including attached pilasters, buttersesses, plinth and string courses etc.							
	c/c	4*2	3.500	2.850			79.800	
	Total Quantity						79.800 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						79.800 sqm	
	Say 79.800 sqm @ Rs 721.70 / sqm						Rs 57591.66	
12	13.7.1 12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)							
	c/c	4*2	3.500	2.850			79.800	
	Total Quantity						79.800 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						79.800 sqm	
	Say 79.800 sqm @ Rs 403.73 / sqm						Rs 32217.65	
13	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							
		4	3.500	2.850			39.900	
	Total Quantity						39.900 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						39.900 sqm	
	Say 39.900 sqm @ Rs 224.31 / sqm						Rs 8949.97	
14	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, reservoir, 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 engineer in-charge. The product performance shall carry guarantee for 10 years against any leakage. For vertical surface two coats @ 0.70 kg per sqm							
		4	3.500	2.850			39.900	
	Total Quantity						39.900 sqm	

	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						39.900 sqm	
	Say 39.900 sqm @ Rs 573.87 / sqm						Rs 22897.41	
15	22.23.2 Providing and applying integral crystalline slurry of hydrophilic in nature forwaterproofing 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 partsintegral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 partsintegral crystalline slurry : 1 part water) for horizontal surfaces and applying thesame from negative (internal) side with the help of synthetic fiber brush. The materialshall meet the requirements as specified in ACI-212-3R-2010 i.e by reducingpermeability of concrete by more than 90% compared with control concrete as perDIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystallineslurry shall be capable of self-healing of cracks up to a width of 0.50mm. The workshall 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 anyleakage.For horizontal surface one coat @1.10 kg per sqm.							
		1	3.500	3.500			12.250	
	Total Quantity						12.250 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						12.250 sqm	
	Say 12.250 sqm @ Rs 442.27 / sqm						Rs 5417.81	
16	100.36.1 Filling water with 5000 litre tankers fitted 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 appliencs and cost of water etc. complete. "(Ref. No. 000, Technical Circular)"							
		1	3.500	3.500	2.850		34.913	
	Total Quantity						34.913 Kilo litre	
	Total Deducted Quantity						0.000 Kilo litre	
	Net Total Quantity						34.913 Kilo litre	
	Say 34.913 Kilo litre @ Rs 185.67 / Kilo litre						Rs 6482.30	
SI No	Description	No	L	B	D	CF	Quantity	Remark
11TREATED WATER TANK (Cost Index:36.44 %)								
1	2.6.1 Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed.All kinds of soil							
		1	7.400	6.400	0.500		23.681	
	Total Quantity						23.681 cum	

	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						23.681 cum	
	Say 23.681 cum @ Rs 215.37 / cum						Rs 5100.18	
2	4.1.5 Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size)							
		1	6.400	7.400	0.200		9.473	
	Total Quantity						9.473 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						9.473 cum	
	Say 9.473 cum @ Rs 7413.74 / cum						Rs 70230.36	
3	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 work upto plinth level							
		1	6.200	7.200	0.300		13.392	
	Total Quantity						13.392 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						13.392 cum	
	Say 13.392 cum @ Rs 9947.98 / cum						Rs 133223.35	
4	5.37.2 Providing and laying in position ready mixed M-25 grade concrete for reinforced cement concrete work, using cement content as per approved design mix, manufactured in fully automatic batching plant and transported to site of work in transit mixer for all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding the cost of centering, shuttering finishing and reinforcement including cost of admixtures in recommended proportions as per IS: 9103 to accelerate/ retard setting of concrete, improve workability without impairing strength and durability as per direction of the Engineer - in -charge. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All work above plinth level upto floor V level							
	Long Wall	2	6.600	0.300	3.350		13.266	
	Short Wall	2	5.000	0.300	3.350		10.050	

	Total Quantity							23.316 cum
	Total Deducted Quantity							0.000 cum
	Net Total Quantity							23.316 cum
	Say 23.316 cum @ Rs 11610.43 / cum							Rs 270708.79
5	5.34.1 Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately. Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).							
		1	37.080				37.080	
	Total Quantity							37.080 cum
	Total Deducted Quantity							0.000 cum
	Net Total Quantity							37.080 cum
	Say 37.080 cum @ Rs 82.61 / cum							Rs 3063.18
6	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 .							
		1	37.080		330.000		12236.400	
	Total Quantity							12236.400 kg
	Total Deducted Quantity							0.000 kg
	Net Total Quantity							12236.400 kg
	Say 12236.400 kg @ Rs 1.36 / kg							Rs 16641.50
7	od344739/2021_2022 Extra for providing sulphate resistant cement for the structures above plinth level.							
		1	37.080				37.080	
	Total Quantity							37.080 cum
	Total Deducted Quantity							0.000 cum
	Net Total Quantity							37.080 cum
	Say 37.080 cum @ Rs 1899.47 / cum							Rs 70432.35
8	5.22.6 Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth level Thermo - Mechanically Treated bars of grade Fe-500D or more							
	@120kg/m3	1	37.080	120.000			4449.600	
	Total Quantity							4449.600 kilogram
	Total Deducted Quantity							0.000 kilogram
	Net Total Quantity							4449.600 kilogram

	Say 4449.600 kilogram @ Rs 98.92 / kilogram						Rs 440154.43	
9	od344742/2021_2022 Extra for providing epoxy coating for reinforcement bars.							
	@120kg/m3	1	37.080	120.000			4449.600	
	Total Quantity						4449.600 kg	
	Total Deducted Quantity						0.000 kg	
	Net Total Quantity						4449.600 kg	
	Say 4449.600 kg @ Rs 2.32 / kg						Rs 10323.07	
10	5.9.1 Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete							
	Long Wall	2	7.200	0.300			4.320	
	Short Wall	2	6.200	0.300			3.720	
	Total Quantity						8.040 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						8.040 sqm	
	Say 8.040 sqm @ Rs 337.42 / sqm						Rs 2712.86	
11	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.							
	Inside Wall	1	2*5+2*6		3.350		73.700	
	Outside Wall	1	2*5.6+2*6.6		3.350		81.740	
	Total Quantity						155.440 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						155.440 sqm	
	Say 155.440 sqm @ Rs 721.70 / sqm						Rs 112181.05	
12	13.7.1 12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)							
	Long Wall	2	6.200	0.300			3.720	
	Short Wall	2	7.200	0.300			4.320	
	Offset Top	1	2*6.9+2*5.9	0.300			7.680	
	Inside Wall	1	2*5+2*6		3.350		73.700	

	Outside Wall	1	2*5.6+2*6. 6		3.350		81.740	
	Total Quantity						171.160 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						171.160 sqm	
	Say 171.160 sqm @ Rs 403.73 / sqm						Rs 69102.43	
13	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							
		1	2*5.6+2*6. 6		3.350		81.740	
	Total Quantity						81.740 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						81.740 sqm	
	Say 81.740 sqm @ Rs 224.31 / sqm						Rs 18335.10	
14	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, reservoir, 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 engineer in-charge. The product performance shall carry guarantee for 10 years against any leakage. For vertical surface two coats @ 0.70 kg per sqm							
		1	2*5+2*6		3.350		73.700	
	Total Quantity						73.700 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						73.700 sqm	
	Say 73.700 sqm @ Rs 573.87 / sqm						Rs 42294.22	
15	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, reservoir, 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 engineer in-charge. The product performance shall carry guarantee for 10 years against any leakage. For horizontal surface one coat @ 1.10 kg per sqm.							
	Bottom	1	5.000	6.000			30.000	
	Total Quantity						30.000 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						30.000 sqm	
	Say 30.000 sqm @ Rs 442.27 / sqm						Rs 13268.10	
16	100.36.1 Filling water with 5000 litre tankers fitted 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 appliances and cost of water etc. complete. "(Ref. No. 000, Technical Circular)"							
		1	5.000	6.000	3.350		100.500	
	Total Quantity						100.500 Kilo litre	
	Total Deducted Quantity						0.000 Kilo litre	
	Net Total Quantity						100.500 Kilo litre	
	Say 100.500 Kilo litre @ Rs 185.67 / Kilo litre						Rs 18659.84	
SI No	Description	No	L	B	D	CF	Quantity	Remark
12Centrate Sump (Cost Index:36.44 %)								
1	2.6.1 Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed.All kinds of soil							
		3.14/4	5.400	5.400	0.500		11.446	
	Total Quantity						11.446 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						11.446 cum	
	Say 11.446 cum @ Rs 215.37 / cum						Rs 2465.13	
2	4.1.5 Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size)							
		3.14/4	5.400	5.400	0.200		4.579	

	Total Quantity						4.579 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						4.579 cum	
	Say 4.579 cum @ Rs 7413.74 / cum						Rs 33947.52	
3	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 work upto plinth level							
		3.14/4	5.400	5.400	0.300		6.868	
	Total Quantity						6.868 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						6.868 cum	
	Say 6.868 cum @ Rs 9947.98 / cum						Rs 68322.73	
4	5.37.2 Providing and laying in position ready mixed M-25 grade concrete for reinforced cement concrete work, using cement content as per approved design mix, manufactured in fully automatic batching plant and transported to site of work in transit mixer for all leads, having continuous agitated mixer, manufactured as per mix design of specified grade for reinforced cement concrete work including pumping of R.M.C. from transit mixer to site of laying, excluding the cost of centering, shuttering finishing and reinforcement including cost of admixtures in recommended proportions as per IS: 9103 to accelerate/ retard setting of concrete, improve workability without impairing strength and durability as per direction of the Engineer - in -charge. Note:- Cement content considered in this item is @330 kg/cum. Excess /less cement used as per design mix is payable/recoverable separately.All work above plinth level upto floor V level							
		3.14/4	4.600	4.600	0.120		1.994	
	Manhole	1	0.500	0.500	0.120		-0.030	
	Total Quantity						1.994 cum	
	Total Deducted Quantity						-0.030 cum	
	Net Total Quantity						1.964 cum	
	Say 1.964 cum @ Rs 11610.43 / cum						Rs 22802.88	
5	5.34.1 Extra for providing richer mixes at all floor levels. Note:- Excess/less cement over the specified cement content used is payable/ recoverable separately.Providing M-30 grade concrete instead of M-25 grade BMC/RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum).							

		1	8.844				8.844	
	Total Quantity						8.844 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						8.844 cum	
	Say 8.844 cum @ Rs 82.61 / cum						Rs 730.60	
6	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 .							
		1	8.844		330.000		2918.520	
	Total Quantity						2918.520 kg	
	Total Deducted Quantity						0.000 kg	
	Net Total Quantity						2918.520 kg	
	Say 2918.520 kg @ Rs 1.36 / kg						Rs 3969.19	
7	od344739/2021_2022 Extra for providing sulphate resistant cement for the structures above plinth level.							
		1	8.844				8.844	
	Total Quantity						8.844 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						8.844 cum	
	Say 8.844 cum @ Rs 1899.47 / cum						Rs 16798.91	
8	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							
	@120kg/m3	1	8.844	120.000			1061.280	
	Total Quantity						1061.280 kilogram	
	Total Deducted Quantity						0.000 kilogram	
	Net Total Quantity						1061.280 kilogram	
	Say 1061.280 kilogram @ Rs 98.92 / kilogram						Rs 104981.82	
9	od344742/2021_2022 Extra for providing epoxy coating for reinforcement bars.							
	@120kg/m3	1	8.844	120.000			1061.280	
	Total Quantity						1061.280 kg	
	Total Deducted Quantity						0.000 kg	
	Net Total Quantity						1061.280 kg	
	Say 1061.280 kg @ Rs 2.32 / kg						Rs 2462.17	

10	5.9.1 Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete							
		3.14	5.400		0.200		3.392	
	Total Quantity						3.392 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						3.392 sqm	
	Say 3.392 sqm @ Rs 337.42 / sqm						Rs 1144.53	
11	5.9.2 Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, buttresses, plinth and string courses etc.							
		2*3.14	4.300		2.500		67.510	
	Base Slab side	13.14	5.200		0.300		20.499	
	Total Quantity						88.009 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						88.009 sqm	
	Say 88.009 sqm @ Rs 721.70 / sqm						Rs 63516.10	
12	5.9.3 Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform							
		3.14/4	4.000	4.000			12.560	
	Manhole	1	0.500	0.500			-0.250	
	Total Quantity						12.560 sqm	
	Total Deducted Quantity						-0.250 sqm	
	Net Total Quantity						12.310 sqm	
	Say 12.310 sqm @ Rs 820.89 / sqm						Rs 10105.16	
13	13.7.1 12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)							
	Qty Vide Item No:10	1	3.392				3.392	
	Qty Vide Item No:11	1	88.009				88.009	
	Qty Vide Item No:12	1	12.310				12.310	
	Total Quantity						103.711 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						103.711 sqm	
	Say 103.711 sqm @ Rs 403.73 / sqm						Rs 41871.24	

14	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							
		3.14	4.600		2.500		36.110	
		Total Quantity					36.110 sqm	
		Total Deducted Quantity					0.000 sqm	
		Net Total Quantity					36.110 sqm	
		Say 36.110 sqm @ Rs 224.31 / sqm					Rs 8099.83	
15	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, reservoir, 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 engineer in-charge. The product performance shall carry guarantee for 10 years against any leakage. For vertical surface two coats @ 0.70 kg per sqm							
		3.14	4.000		2.500		31.401	
		Total Quantity					31.401 sqm	
		Total Deducted Quantity					0.000 sqm	
		Net Total Quantity					31.401 sqm	
		Say 31.401 sqm @ Rs 573.87 / sqm					Rs 18020.09	
16	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, reservoir, 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 engineer in-charge. The product performance shall carry guarantee for 10 years against any leakage. For horizontal surface one coat @ 1.10 kg per sqm.							
		3.14/4	4.000	4.000			12.560	
		Total Quantity					12.560 sqm	

	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						12.560 sqm	
	Say 12.560 sqm @ Rs 442.27 / sqm						Rs 5554.91	
17	100.36.1 Filling water with 5000 litre tankers fitted 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 appliances and cost of water etc. complete. "(Ref. No. 000, Technical Circular)"							
		3.14/4	4.000	4.000	2.500		31.401	
	Total Quantity						31.401 Kilo litre	
	Total Deducted Quantity						0.000 Kilo litre	
	Net Total Quantity						31.401 Kilo litre	
	Say 31.401 Kilo litre @ Rs 185.67 / Kilo litre						Rs 5830.22	
Total						28266097.38		
Centage @						10.0%		
Centage Amount						2826609.74		
Provision for GST payments (in %) @						18.0%		
Amount reserved for GST payments						5087897.53		
Total & Centage						36180604.64		
Lumpsum for round off						0.00		
GRAND TOTAL Rs						36180604.64		
Rounded Grand Total Rs 3,61,80,605								
Rupees Three Crore Sixty One Lakh Eighty Thousand Six Hundred and Five Only								

General Abstract

**SEWERAGE SCHEME TO MANANTHAVADY MUNICIPALITY - CONSTRUCTION
OF 2MLD CAPACITY SEWAGE TREATMENT PLANT AND LAYING SEWERAGE
NETWORK- STP PART B**

(Dsr year: 2018)

SI No	Heading Description	Amount
1	Site Preparation	5828205.02
2	Administrative/Laboratory/Chemical House / Control Room Building	4782474.92
3	Security Cabin	320279.13
4	Air Blower Room and Control Panel room	2658105.57
5	Chlorination Building	2495824.58
6	Compound Wall	4048054.69
7	Internal Roads	2048864.99
8	Storm Water Drains	551910.65
9	Transformer Building	628364.03
10	DG Room	534866.07
11	Centrifuge Building	3285165.34
12	PSF/ACF Foundation	749466.71
13	Sludge Shed	654838.72
14	LANDSCAPING AND GREENBELT FORMATION AROUND THE STP SITE	300000.00
15	Providing Odour Control System	8000000.00
16	Supplying and Installing Solar panel with all accessories at STP	2500000.00
17	Provision for Automating entire plant by SCADA SYSTEM	2500000.00
Total		41886420.43
Centage @		10.0%
Centage Amount		4188642.04
Provision for GST payments (in %) @		18.0%
Amount reserved for GST payments		7539555.68
Total & Centage		53614618.14
Lumpsum for round off		0.00
GRAND TOTAL Rs		53614618.14
Rounded Grand Total Rs 5,36,14,618		
Rupees Five Crore Thirty Six Lakh Fourteen Thousand Six Hundred and Eighteen Only		

Detailed Estimate

**SEWERAGE SCHEME TO MANANTHAVADY MUNICIPALITY - CONSTRUCTION
OF 2MLD CAPACITY SEWAGE TREATMENT PLANT AND LAYING SEWERAGE
NETWORK- STP PART B**

(Dsr year: 2018)

Sl No	Description	No	L	B	D	CF	Quantity	Remark
1 Site Preparation (Cost Index: 36.44 %)								
1	2.32 Clearing grass and removal of the rubbish up to a distance of 50 m outside the periphery of the area cleared.							
		1	77.000	78.000			6006.000	
	Total Quantity						6006.000 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						6006.000 sqm	
	Say 6006.000 sqm @ Rs 7.57 / sqm						Rs 45465.42	
2	2.33.3 Felling trees of the girth (measured at a height of 1 m above ground level) including cutting of trunks and branches, removing the roots and stacking of serviceable material and disposal of unserviceable material. Beyond 120 cm girth up to and including 240 cm girth							
		10					10.000	
	Total Quantity						10.000 No	
	Total Deducted Quantity						0.000 No	
	Net Total Quantity						10.000 No	
	Say 10.000 No @ Rs 9310.60 / No						Rs 93106.00	
3	50.2.26.1 Filling with contractor own earth (excluding rock) in open areas in layers not exceeding 20 cm in depth, consolidating each deposited layer by ramming and watering, lead up to 50 m and lift up to 1.5 m as per direction of site Engineer-in-charge.							
		1	78.000	79.000	2.000		12324.000	
	Total Quantity						12324.000 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						12324.000 cum	
	Say 12324.000 cum @ Rs 297.37 / cum						Rs 3664787.88	
4	od345409/2021_2022							

	Construction of granular sub-base by providing graded material, spreading in uniform layers with a motor grader on a prepared surface, mixing by mix in-place method with rotavator at OMC, and compacting with a vibratory roller to achieve the desired density, complete as per clause 401. Grading-V - For sub-base cum drainage layer - Mix in Place Method							
		1	77.000	78.000	0.150	0.7	630.630	
	Total Quantity						630.630 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						630.630 cum	
	Say 630.630 cum @ Rs 3210.83 / cum						Rs 2024845.72	
SI No	Description	No	L	B	D	CF	Quantity	Remark
2Administrative/Laboratory/Chemical House / Control Room Building (Cost Index:36.44 %)								
1	2.8.1 Earth work in excavation by mechanical means (Hydraulic excavator) /manual means in foundation trenches or drains (not exceeding 1.5 m in width or 10 sqm on plan), including dressing of sides and ramming of bottoms, lift up to 1.5 m, including getting out the excavated soil and disposal of surplus excavated soil as directed, within a lead of 50 m.All kinds of soil							
	FOR FOOTING	16	1.500	1.500	1.500		54.000	
	FOR STEP	1	2.000	2.000	0.200		0.800	
	FOR RAMP	0.5	3.000	0.150	1.500		0.338	
	Total Quantity						55.138 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						55.138 cum	
	Say 55.138 cum @ Rs 298.80 / cum						Rs 16475.23	
2	4.1.8 Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:4:8 (1 cement : 4 coarse sand : 8 graded stone aggregate 40 nominal size)							
	FOR FOOTING BASE	16	1.500	1.500	0.100		3.600	
	FOR STEP BOTTOM	1	2.000	2.000	0.100		0.400	
	FOR RAMP BOTTOM	0.5	3.000	0.150	1.500		0.338	
	Total Quantity						4.338 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						4.338 cum	
	Say 4.338 cum @ Rs 6857.61 / cum						Rs 29748.31	
3	4.1.3 Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:2:4 (cement : 2 coarse sand : 4 graded stone aggregate 20 mm							

	nominal size)							
	FOR RAMP	0.5	3.000	0.450	1.500		1.013	
	Total Quantity						1.013 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						1.013 cum	
	Say 1.013 cum @ Rs 8040.95 / cum						Rs 8145.48	
4	50.2.26.1 Filling with contractor own earth (excluding rock) in open areas in layers not exceeding 20 cm in depth, consolidating each deposited layer by ramming and watering, lead up to 50 m and lift up to 1.5 m as per direction of site Engineer-in-charge.							
	Basement Filling							
	Office Room	1	7.000	5.000	0.500		17.500	
	stair	1	7.000	3.000	0.500		10.500	
	chemical room	1	6.000	4.000	0.500		12.000	
	visitors room	1	4.000	4.000	0.500		8.000	
	Ramp	1*0.5	2.000	1.500	0.600		0.900	
	Total Quantity						48.900 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						48.900 cum	
	Say 48.900 cum @ Rs 297.37 / cum						Rs 14541.39	
5	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 work upto plinth level							
	FOR FIRST FOOTING	16	1.400	1.400	0.250		7.840	
	FOR SECOND FOOTING	16	0.167	3.920	0.350		3.666	
	COLUMN UP TO PLINTH BEAM	16	0.400	0.200	0.800		1.025	
	PLINTH BEAMS	3	11.100	0.200	0.450		2.998	

	PLINTH BEAMS	4	10.400	0.200	0.450		3.744	
	PLINTH BEAMS	1	3.200	0.200	0.450		0.289	
	FLOOR SLAB	1	11.300	10.600	0.100		11.979	
	Total Quantity						31.541 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						31.541 cum	
	Say 31.541 cum @ Rs 9947.98 / cum						Rs 313769.24	
6	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							
	GROUND FLOOR							
	COLUMN ABOVE PLINTH UP TO ROOF SLAB	16	3.250	0.200	0.400		4.160	
	SUN SHADE DOOR	2	2.000	1.200	0.080		0.384	
	SUN SHADE W3	7	1.900	0.600	0.080		0.639	
	SUN SHADE RS	1	3.400	1.200	0.080		0.327	
	SUN SHADE V	1	1.000	0.600	0.080		0.048	
	LINTELS	3	11.100	0.200	0.150		1.000	
	LINTELS	3	10.400	0.200	0.150		0.936	
	LINTELS	1	3.200	0.200	0.150		0.097	
	BEAMS	6	3.100	0.200	0.450		1.675	
	BEAMS	2	4.000	0.200	0.450		0.721	
	BEAMS	2	3.200	0.200	0.450		0.577	
	BEAMS	2	4.200	0.200	0.450		0.757	
	BEAMS	4	5.500	0.200	0.450		1.981	
	BEAMS	4	1.700	0.200	0.450		0.613	
	BEAMS	4	4.200	0.200	0.450		1.513	

	STAIR CASE WAIST SLAB	2	3.700	1.500	0.125		1.388	
	LANDING	1	3.000	1.500	0.125		0.563	
	STEPS	22*0.5	1.500	0.300	0.150		0.743	
	ROOF SLAB	1	11.300	10.600	0.125		14.973	
	FIRST FLOOR							
	COLUMN UP TO ROOF SLAB	16	3.250	0.200	0.400		4.160	
	LINTELS	2	11.100	0.200	0.150		0.666	
	LINTELS	4	10.400	0.200	0.150		1.248	
	LINTELS	1	1.700	0.200	0.150		0.052	
	SUN SHADE	8	2.000	0.600	0.080		0.768	
	SUN SHADE	1	1.000	0.600	0.080		0.048	
	BEAMS	6	3.100	0.200	0.450		1.675	
	BEAMS	2	4.000	0.200	0.450		0.721	
	BEAMS	2	3.200	0.200	0.450		0.577	
	BEAMS	2	4.200	0.200	0.450		0.757	
	BEAMS	4	5.500	0.200	0.450		1.981	
	BEAMS	4	1.700	0.200	0.450		0.613	
	BEAMS	4	4.200	0.200	0.450		1.513	
	ROOF SLAB	1	11.900	11.200	0.125		16.660	
	GROUND&FIRST FLOOR							
	COLUMN	16	0.600	0.200	0.400		-0.768	
	OPENING	1	1.500	0.200	0.150		-0.045	
	Total Quantity						64.534 cum	
	Total Deducted Quantity						-0.813 cum	
	Net Total Quantity						63.721 cum	
	Say 63.721 cum @ Rs 11610.43 / cum						Rs 739828.21	
7	50.6.7.2 Laterate masonry with neatly dressed laterate stone of size 40x20x15cm or nearest size in cement mortar 1:6 for super structure above plinth level up to floor two level including all cost of materials, labour charges etc.							
	GROUND FLOOR							
	Long Wall	3	11.100	0.200	3.200		21.313	

	Short Wall	3	10.400	0.200	3.200		19.969	
	Short Wall	1	3.200	0.200	3.200		2.049	
	Door							
	D	1	1.200	2.100	0.200		-0.504	
	D1	2	1.000	2.100	0.200		-0.840	
	D2	1	0.800	2.100	0.200		-0.336	
	W3	7	1.500	1.500	0.200		-3.150	
	V	1	0.600	0.500	0.200		-0.060	
	RS	1	2.000	2.000	2.100		-8.400	
	Column	16	0.400	0.200	3.200		-4.096	
	Opening	1	1.500	0.200	3.200		-0.960	
	FIRST FLOOR							
	Long Wall	2	11.100	0.200	3.200		14.209	
	Short Wall	4	10.400	0.200	3.200		26.625	
	Short Wall	1	7.000	0.200	3.200		4.480	
	Parappet	1	45.400	0.200	0.600		5.448	
	Door							
	D1	2	1.000	2.100	0.200		-0.840	
	D2	1	0.800	2.100	0.200		-0.336	
	W3	8	1.500	1.500	0.200		-3.600	
	V	1	0.600	0.500	0.200		-0.060	
	Column	16	0.400	0.200	3.200		-4.096	
	Opening	1	1.500	0.200	3.200		-0.960	
	Total Quantity						94.093 cum	
	Total Deducted Quantity						-28.238 cum	
	Net Total Quantity						65.855 cum	
	Say 65.855 cum @ Rs 7968.75 / cum						Rs 524782.03	
8	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 FIRST FOOTING	16	1.400	1.400	0.250	90.0	705.600	
	FOR SECOND FOOTING	16	0.167	3.920	0.350	90.0	329.939	

	COLUMN UP TO PLINTH BEAM	16	0.400	0.200	0.800	90.0	92.161	
	PLINTH BEAMS	3	11.100	0.200	0.450	90.0	269.730	
	PLINTH BEAMS	4	10.400	0.200	0.450	90.0	336.961	
	PLINTH BEAMS	1	3.200	0.200	0.450	90.0	25.921	
	FLOOR SLAB	1	11.300	10.600	0.100	90.0	1078.021	
	GROUND FLOOR							
	COLUMN ABOVE PLINTH UP TO ROOF SLAB	16	3.250	0.200	0.400	95.0	395.200	
	SUN SHADE DOOR	2	2.000	1.200	0.080	85.0	32.640	
	SUN SHADE W3	7	1.900	0.600	0.080	85.0	54.264	
	SUN SHADE RS	1	3.400	1.200	0.080	85.0	27.745	
	SUN SHADE V	1	1.000	0.600	0.080	85.0	4.080	
	LINTELS	3	11.100	0.200	0.150	85.0	84.915	
	LINTELS	3	10.400	0.200	0.150	85.0	79.560	
	LINTELS	1	3.200	0.200	0.150	85.0	8.161	
	BEAMS	6	3.100	0.200	0.450	90.0	150.661	
	BEAMS	2	4.000	0.200	0.450	90.0	64.801	
	BEAMS	2	3.200	0.200	0.450	90.0	51.841	
	BEAMS	2	4.200	0.200	0.450	90.0	68.040	
	BEAMS	4	5.500	0.200	0.450	90.0	178.201	
	BEAMS	4	1.700	0.200	0.450	90.0	55.081	
	BEAMS	4	4.200	0.200	0.450	90.0	136.080	
	STAIR CASE WAIST SLAB	2	3.700	1.500	0.125	90.0	124.876	
	LANDING	1	3.000	1.500	0.125	90.0	50.625	
	STEPS	22*0.5	1.500	0.300	0.150	90.0	66.825	
	ROOF SLAB	1	11.300	10.600	0.125	90.0	1347.525	
	FIRST FLOOR							
	COLUMN UP TO ROOF SLAB	16	3.250	0.200	0.400	95.0	395.200	
	LINTELS	2	11.100	0.200	0.150	85.0	56.611	
	LINTELS	4	10.400	0.200	0.150	85.0	106.080	

	LINTELS	1	1.700	0.200	0.150	85.0	4.335	
	SUN SHADE	8	2.000	0.600	0.080	85.0	65.280	
	SUN SHADE	1	1.000	0.600	0.080	85.0	4.080	
	BEAMS	6	3.100	0.200	0.450	90.0	150.661	
	BEAMS	2	4.000	0.200	0.450	90.0	64.801	
	BEAMS	2	3.200	0.200	0.450	90.0	51.841	
	BEAMS	2	4.200	0.200	0.450	90.0	68.040	
	BEAMS	4	5.500	0.200	0.450	90.0	178.201	
	BEAMS	4	1.700	0.200	0.450	90.0	55.081	
	BEAMS	4	4.200	0.200	0.450	90.0	136.080	
	ROOF SLAB	1	11.900	11.200	0.125	90.0	1499.400	
	GROUND&F&FIRST FLOOR							
	COLUMN	16	0.600	0.200	0.400	95.0	-72.960	
	OPENING	1	1.500	0.200	0.150	85.0	-3.825	
	Total Quantity						8655.145 kilogram	
	Total Deducted Quantity						-76.785 kilogram	
	Net Total Quantity						8578.360 kilogram	
	Kerala Water Authority Say 8578.360 kilogram @ Rs 98.92 / kilogram						Rs 848571.37	
9	14.12 Providing and fixing 16 mm M.S. Fan clamps of standard shape and size in existing R.C.C. slab, including cutting chase, anchoring clamp to reinforcement bar, including cleaning, refilling, making good the chase with matching concrete, plastering and painting the exposed portion of the clamps complete.							
		2					2.000	
	Total Quantity						2.000 No	
	Total Deducted Quantity						0.000 No	
	Net Total Quantity						2.000 No	
	Say 2.000 No @ Rs 503.53 / No						Rs 1007.06	
10	5.9.5 Centering and shuttering including strutting, etc. and removal of form for:Lintels, beams, plinth beams, girders bressumers and cantilevers							
	FOR FIRST FOOTING	16*4	1.400		0.250		22.400	
	FOR SECOND FOOTING	16*4	1.600		0.175		17.920	

	COLUMN UP TO PLINTH BEAM	16	0.800		1.200		15.360	
	PLINTH BEAMS	3	11.100		1.100		36.630	
	PLINTH BEAMS	4	10.400		1.100		45.761	
	PLINTH BEAMS	1	3.200		1.100		3.521	
GROUND FLOOR								
	COLUMN ABOVE PLINTH UP TO ROOF SLAB	16	3.250		0.400		20.800	
	SUN SHADE DOOR	2	2.200		1.300		5.721	
	SUN SHADE W3	7	2.100		0.700		10.290	
	SUN SHADE RS	1	3.600		1.300		4.681	
	SUN SHADE V	1	1.200		0.700		0.840	
	LINTELS	3	11.100		0.500		16.650	
	LINTELS	3	10.400		0.500		15.601	
	LINTELS	1	3.200		0.500		1.600	
	BEAMS	6	3.100		1.100		20.461	
	BEAMS	2	4.000		1.100		8.800	
	BEAMS	2	3.200		1.100		7.041	
	BEAMS	2	4.200		1.100		9.241	
	BEAMS	4	5.500		1.100		24.201	
	BEAMS	4	1.700		1.100		7.480	
	BEAMS	4	4.200		1.100		18.481	
FIRST FLOOR								
	COLUMN UP TO ROOF SLAB	16	3.250		1.200		62.400	
	LINTELS	2	11.100		0.500		11.100	
	LINTELS	4	10.400		0.500		20.800	
	LINTELS	1	1.700		0.500		0.850	
	SUN SHADE	8	2.200		1.300		22.881	
	SUN SHADE	1	1.200		1.300		1.560	
	BEAMS	6	3.100		1.100		20.461	
	BEAMS	2	4.000		1.100		8.800	
	BEAMS	2	3.200		1.100		7.041	

	BEAMS	2	4.200		1.100		9.241	
	BEAMS	4	5.500		1.100		24.201	
	BEAMS	4	1.700		1.100		7.480	
	BEAMS	4	4.200		1.100		18.481	
	GROUND&FLOOR							
	COLUMN	16	0.600	0.200	0.400		-0.768	
	OPENING	1	1.500	0.200	0.150		-0.045	
	Total Quantity						528.776 sqm	
	Total Deducted Quantity						-0.813 sqm	
	Net Total Quantity						527.963 sqm	
	Say 527.963 sqm @ Rs 653.89 / sqm						Rs 345229.73	
11	5.9.3 Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform							
	GROUND FLOOR							
	STAIR CASE WAIST SLAB	2	3.700		1.500		11.101	
	LANDING	1	3.000		1.500		4.500	
	STEPS	22	1.600		0.150		5.280	
	ROOF SLAB	1	11.300		10.600		119.780	
	FIRST FLOOR							
	ROOF SLAB	1	11.900		11.200		133.280	
	Total Quantity						273.941 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						273.941 sqm	
	Say 273.941 sqm @ Rs 820.89 / sqm						Rs 224875.43	
12	13.1.1 12 mm cement plaster of mix:1:4 (1 cement : 4 fine sand)							
	GROUND FLOOR							
	Building Outside-Long Wall	2	11.300		3.900		88.140	
	Short Wall	2	10.600		3.900		82.680	
	Building Inside long wall	4	10.900		3.300		143.880	
	Short wall	4	10.000		3.300		132.000	

	Toilet out side	2	1.600		3.300		10.560	
	Toilet inside	2	1.500		3.300		9.900	
	Sun shade	7	2.100		0.700		10.290	
	Sun shade	2	2.200		1.300		5.721	
	Sun shade	1	1.200		0.700		0.840	
	Step top	1	1.500		1.500		2.250	
	Step side	2	0.900		0.300		0.540	
	Ramp	2*0.5	0.300		1.500		0.450	
	Rolling shutter	1	2.000		2.100		-4.200	
	Door D2	3	1.000		2.100		-6.300	
	Window W1	7	1.500		1.500		-15.750	
	Ventilators V1	1	0.450		0.600		-0.270	
	Opening	2	1.500		3.300		-9.899	
	First Floor							
	Building Outside-Long Wall	2	11.300		3.300		74.580	
	Short Wall	2	10.600		3.300		69.960	
	Building Inside long wall	2	10.700		3.300		70.620	
	Short wall	4	10.000		3.300		132.000	
	Short wall	1	5.700		3.300		18.810	
	Short Wall	1	7.000		3.300		23.100	
	Toilet inside	2	1.500		3.300		9.900	
	Parappet	1	45.400		1.400		63.560	
		1					0.000	
	Door D2	2	1.000		2.100		-4.200	
	Door D2	1	0.800		2.100		-1.680	
	Window W1	8	1.500		1.500		-18.000	
	Ventilators V1	1	0.450		0.600		-0.270	
	Total Quantity						949.781 sqm	
	Total Deducted Quantity						-60.569 sqm	
	Net Total Quantity						889.212 sqm	
	Say 889.212 sqm @ Rs 316.06 / sqm						Rs 281044.34	

13	13.16.1 6 mm cement plaster of mix:1:3 (1 cement : 3 fine sand)							
	Ground Floor							
	Roof slab-Bottom	1	10.700		10.000		107.000	
	Beam Bottom	1	82.800		0.850		70.380	
	Sunshead Door	2	2.000		1.200		4.800	
	Sunshead W3	7	1.900		0.600		7.980	
	Sunshead V	1	0.900		0.600		0.540	
	Sunshead edge	1	30.200		0.100		3.020	
	Stair Waist Slab bottom	2	3.700		1.700		12.580	
	Landing	1	3.000		1.500		4.500	
	First Floor							
	Roof slab-Bottom	1	10.700		10.000		107.000	
	Beam Bottom	1	82.800		0.850		70.380	
	Sunshead W3	8	1.900		0.600		9.120	
	Sunshead V	1	0.900		0.600		0.540	
	Sunshead edge	1	30.200		0.100		3.020	
	Roof Slab Out Side	1	33.700		0.300		10.111	
	Total Quantity						410.971 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						410.971 sqm	
	Say 410.971 sqm @ Rs 269.26 / sqm						Rs 110658.05	
14	13.7.1 12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)							
	Roof top	1	11.900	11.200			133.280	
	Total Quantity						133.280 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						133.280 sqm	
	Say 133.280 sqm @ Rs 403.73 / sqm						Rs 53809.13	
15	11.41.2 Providing and laying vitrified floor tiles in different sizes (thickness to be specified by the manufacturer) with water absorption less than 0.08% and conforming to IS : 15622, of approved make, in all colours and shades, laid on 20 mm thick cement mortar 1:4(1 cement : 4 coarse sand), including grouting the joints with white cement and matching pigments etc., complete.Size of Tile 600 x 600 mm.							

	Ground Floor							
	Office room	1	7.000	7.000			49.000	
	Vistors room	1	4.000	4.000			16.000	
	Skirting-office room	1	26.500		0.100		2.651	
	Skirting-Vistors room	1	14.200		0.100		1.420	
	Chemical Room	1	6.000	4.000			24.000	
	Skirting-Chemical room	1	20.000		0.100		2.000	
	Stair Case Room	1	3.000	7.000			21.000	
	Step	22	1.500		0.450		14.851	
	Landing	1	3.000	1.500			4.500	
	First Floor							
	Controll Room	1	7.000	5.000			35.000	
	Laboratary Room	1	10.200	4.000			40.800	
	Passage	1	7.000	1.500			10.500	
	Total Quantity						221.722 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						221.722 sqm	
	Say 221.722 sqm @ Rs 1777.34 / sqm						Rs 394075.38	
16	11.37 Providing and laying Ceramic glazed floor tiles of size 300x300 mm (thickness to be specified by the manufacturer), of 1st quality conforming to IS : 15622, of approved make, in colours such as White, Ivory, Grey, Fume Red Brown, laid on 20 mm thick cement mortar 1:4 (1 Cement : 4 Coarse sand), including pointing the joints with white cement and matching pigment etc., complete.							
	For floor-Toilet	1	1.500	1.500			2.250	
	For Floor Toilet	1	3.000	1.500			4.500	
	Total Quantity						6.750 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						6.750 sqm	
	Say 6.750 sqm @ Rs 1097.86 / sqm						Rs 7410.55	
17	11.38 Providing and laying Ceramic glazed floor tiles of size 300x300 mm (thickness to be specified by the manufacturer), of Ist quality conforming to IS : 15622, of approved make, in all colours, shades, except White, Ivory, Grey, Fume Red Brown, laid on 20 mm thick bed of cement mortar 1:4 (1 cement : 4 Coarse sand), including pointing the joints with white cement and matching pigments etc., complete.							

	Wall Tile	1	6.000		2.100		12.601	
	Wall Tile	1	9.000		2.100		18.901	
	Door D2	2	0.800		2.100		-3.360	
	Total Quantity						31.502 sqm	
	Total Deducted Quantity						-3.360 sqm	
	Net Total Quantity						28.142 sqm	
	Say 28.142 sqm @ Rs 1180.55 / sqm						Rs 33223.04	
18	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							
	RS	1	2.000		2.100		4.200	
	Total Quantity						4.200 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						4.200 sqm	
	Say 4.200 sqm @ Rs 3487.20 / sqm						Rs 14646.24	
19	10.7 Providing and fixing ball bearing for rolling shutters.							
	RS	1					1.000	
	Total Quantity						1.000 Nos	
	Total Deducted Quantity						0.000 Nos	
	Net Total Quantity						1.000 Nos	
	Say 1.000 Nos @ Rs 497.32 / Nos						Rs 497.32	
20	13.43.1 Applying one coat of water thinnable cement primer of approved brand and manufacture on wall surface:Water thinnable cement primer							
	GROUND FLOOR							
	Building Outside-Long Wall	2	11.300		3.900		88.140	
	Short Wall	2	10.600		3.900		82.680	
	Building Inside long wall	4	10.900		3.300		143.880	

	Short wall	4	10.000		3.300		132.000	
	Toilet out side	2	1.600		3.300		10.560	
	Toilet inside	2	1.500		1.200		3.600	
	Sun shade	7	2.100		0.700		10.290	
	Sun shade	2	2.200		1.300		5.721	
	Sun shade	1	1.200		0.700		0.840	
	Step top	1	1.500		1.500		2.250	
	Step side	2	0.900		0.300		0.540	
	Ramp	2*0.5	0.300		1.500		0.450	
	Rolling shutter	1	2.000		2.100		-4.200	
	Door D2	3	1.000		2.100		-6.300	
	Window W1	7	1.500		1.500		-15.750	
	Ventilators V1	1	0.450		0.600		-0.270	
	Opening	2	1.500		3.300		-9.899	
	First Floor							
	Building Outside-Long Wall	2	11.300		3.300		74.580	
	Short Wall	2	10.600		3.300		69.960	
	Building Inside long wall	2	10.700		3.300		70.620	
	Short wall	4	10.000		3.300		132.000	
	Short wall	1	5.700		3.300		18.810	
	Short Wall	1	7.000		3.300		23.100	
	Toilet inside	2	1.500		1.200		3.600	
	Door D2	2	1.000		2.100		-4.200	
	Door D2	1	0.800		2.100		-1.680	
	Window W1	8	1.500		1.500		-18.000	
	Ventilators V1	1	0.450		0.600		-0.270	
	Total Quantity						873.621 sqm	
	Total Deducted Quantity						-60.569 sqm	
	Net Total Quantity						813.052 sqm	
	Say 813.052 sqm @ Rs 71.09 / sqm						Rs 57799.87	
21	13.60.1	Wall painting with acrylic emulsion paint of approved brand and manufacture to give an even shade:Two						

	or more coats on new work							
	GROUND FLOOR							
	Building Outside-Long Wall	2	11.300		3.900		88.140	
	Short Wall	2	10.600		3.900		82.680	
	Building Inside long wall	4	10.900		3.300		143.880	
	Short wall	4	10.000		3.300		132.000	
	Toilet out side	2	1.600		3.300		10.560	
	Toilet inside	2	1.500		1.200		3.600	
	Sun shade	7	2.100		0.700		10.290	
	Sun shade	2	2.200		1.300		5.721	
	Sun shade	1	1.200		0.700		0.840	
	Step top	1	1.500		1.500		2.250	
	Step side	2	0.900		0.300		0.540	
	Ramp	2*0.5	0.300		1.500		0.450	
	Rolling shutter	1	2.000		2.100		-4.200	
	Door D2	3	1.000		2.100		-6.300	
	Window W1	7	1.500		1.500		-15.750	
	Ventilators V1	1	0.450		0.600		-0.270	
	Opening	2	1.500		3.300		-9.899	
	Toilet Inside	1	6.000		2.100		-12.600	
	First Floor							
	Building Outside-Long Wall	2	11.300		3.300		74.580	
	Short Wall	2	10.600		3.300		69.960	
	Building Inside long wall	2	10.700		3.300		70.620	
	Short wall	4	10.000		3.300		132.000	
	Short wall	1	5.700		3.300		18.810	
	Short Wall	1	7.000		3.300		23.100	
	Toilet inside	2	1.500		1.200		3.600	
	Door D2	2	1.000		2.100		-4.200	
	Door D2	1	0.800		2.100		-1.680	

	Window W1	8	1.500		1.500		-18.000	
	Ventilators V1	1	0.450		0.600		-0.270	
	Toilet	1	9.000		2.100		-18.900	
	Total Quantity						873.621 sqm	
	Total Deducted Quantity						-92.069 sqm	
	Net Total Quantity						781.552 sqm	
	Say 781.552 sqm @ Rs 152.34 / sqm						Rs 119061.63	
22	13.61.1 Painting with synthetic enamel paint of approved brand and manufacture to give an even shade:Two or more coats on new work							
	Door	6	1.000	2.100			12.601	
	Window	15	1.500	1.500			33.750	
	Window Grill	15	1.500	1.500			33.750	
	Rolling Shutter	2	2.000	2.100			8.400	
	CG	2	1.500	2.100			6.301	
	Total Quantity						94.802 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						94.802 sqm	
	Say 94.802 sqm @ Rs 143.94 / sqm						Rs 13645.80	
23	10.3 Providing and fixing in position collapsible steel shutters with vertical channels 20x10x2 mm and braced with flat iron diagonals 20x5 mm size, with top and bottom rail of T-iron 40x40x6 mm, with 40 mm dia steel pulleys, complete with bolts, nuts,locking arrangement, stoppers, handles, including applying a priming coat of approved steel primer .							
	CG	1	1.500	2.100			3.151	
	Total Quantity						3.151 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						3.151 sqm	
	Say 3.151 sqm @ Rs 10269.91 / sqm						Rs 32360.49	
24	21.1.1.1 Providing and fixing aluminium work for doors, windows, ventilators and partitions with extruded built up standard tubular sections/ appropriate Z sections and other sections of approved make conforming to IS : 733 and IS: 1285, fixing with dash fasteners of required dia and size, including necessary filling up the gaps at junctions, i.e. at top, bottom and sides with required EPDM rubber/ neoprene gasket etc. Aluminium sections shall be smooth, rust free, straight, mitred and jointed mechanically wherever required including cleat angle, Aluminium snap beading for glazing /paneling, C.P. brass/ stainless steel screws, all complete as per architectural drawings and the directions of Engineer-in-charge.(Glazing,							

	paneling and dash fasteners to be paid for separately):For fixed portionAnodised aluminium (anodised transparent or dyed to required shade according to IS : 1868, Minimum anodic coating of grade AC 15)							
	For window frames	15	1.500	1.500	4.500		151.875	
	For ventilator frames	2	0.600	0.450	4.500		2.430	
	Total Quantity						154.305 kg	
	Total Deducted Quantity						0.000 kg	
	Net Total Quantity						154.305 kg	
	Say 154.305 kg @ Rs 502.17 / kg						Rs 77487.34	
25	21.1.2.1 For shutters of doors, windows & ventilators including providing and fixing hinges / pivots and making provision for fixing of fittings wherever required including the cost of EPDM rubber/ neoprene gasket required (Fittings shall be paid for separately)Anodised aluminium (anodised transparent or dyed to required shade according to IS : 1868, Minimum anodic coating of grade AC 15)							
	Ground Floor							
	For window shutter frames	7	0.500	1.440	6.500		32.760	
	For ventilator shutter frames	1	0.520	0.450	6.500		1.522	
	Door	3	0.860	1.960	6.500		32.870	
	Kerala Water Authority First Floor							
	For window shutter frames	8	0.500	1.440	6.500		37.440	
	For ventilator shutter frames	1	0.520	0.450	6.500		1.522	
	For Door Shutter	2	0.860	1.960	6.500		21.913	
	Total Quantity						128.027 kg	
	Total Deducted Quantity						0.000 kg	
	Net Total Quantity						128.027 kg	
	Say 128.027 kg @ Rs 608.11 / kg						Rs 77854.50	
26	21.3.1 Providing and fixing glazing in aluminium door, window, ventilator shutters and partitions etc. with EPDM rubber / neoprene gasket etc. complete as per the architectural drawings and the directions of Engineer - in -Charge. (Cost of aluminium snap beading shall be paid in basic item):With float glass panes of 4.0 mm thickness							
	Ground Floor							
	For window shutter	7	0.500		1.500		5.250	
	For ventilator shutter	1	0.600		0.450		0.270	

	First Floor							
	For window shutter	8	0.500		1.500		6.000	
	For ventilator shutter	1	0.600		0.450		0.270	
	Total Quantity						11.790 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						11.790 sqm	
	Say 11.790 sqm @ Rs 1184.03 / sqm						Rs 13959.71	
27	9.48.2 Providing and fixing M.S. Grills of required pattern in frames of windows etc. with M.S. flats, square or round bars etc. including priming coat with approved steel primer all complete.Fixed to openings/ wooden frames with rawl plugs screws etc							
	Ground Floor							
	For window	7	1.500	1.500	17.000		267.750	
	For ventilator	1	0.600	0.450	17.000		4.590	
	First Floor							
	For window	8	1.500	1.500	17.000		306.000	
	For ventilator	1	0.600	0.450	17.000		4.590	
	Total Quantity						582.930 kg	
	Total Deducted Quantity						0.000 kg	
	Net Total Quantity						582.930 kg	
	Say 582.930 kg @ Rs 217.35 / kg						Rs 126699.84	
28	10.28 Providing and fixing stainless steel (Grade 304) railing made of Hollow tubes, channels, plates etc., including welding, grinding, buffing, polishing and making curvature (wherever required) and fitting the same with necessary stainless steel nuts and bolts complete, i/c fixing the railing with necessary accessories & stainless steel dash fasteners, stainless steel bolts etc., of required size on the top of the floor or the side of waist slab with suitable arrangement as per approval of Engineer-in-charge, (for payment purpose only weight of stainless steel members shall be considered excluding fixing accessories such as nuts, bolts, fasteners etc.)							
	Stair Hand Rail	1				223.0	223.000	
	Hand Rail For Ramp	1				30.0	30.000	
	Total Quantity						253.000 kg	
	Total Deducted Quantity						0.000 kg	
	Net Total Quantity						253.000 kg	
	Say 253.000 kg @ Rs 681.59 / kg						Rs 172442.27	
29	9.117.1							

	Providing and fixing factory made uPVC door frame made of uPVC extruded sections having an overall dimension as below (tolerance ± 1 mm), with wall thickness 2.0mm (± 0.2 mm), corners of the door frame to be jointed with galvanized brackets and stainless steel screws, joints mitred and plastic welded. The hinge side vertical of the frames reinforced by galvanized M.S. tube of size 19 x 19 mm and 1 mm (± 0.1 mm) wall thickness and 3 nos. stainless steel hinges fixed to the frame complete as per manufacturer's specification and direction of Engineer-in-chargeExtruded section profile size 48x40 mm							
	Ground Floor							
	For doors	3	5.000				15.000	
	First Floor							
	For doors	2	5.000				10.000	
	Total Quantity						25.000 metre	
	Total Deducted Quantity						0.000 metre	
	Net Total Quantity						25.000 metre	
	Say 25.000 metre @ Rs 262.58 / metre						Rs 6564.50	
30	9.118.3 Providing and fixing to existing door frames25 mm thick PVC flush door shutters made out of a one piece Multi chamber extruded PVC section of the size of 762 mm x 25 mm or less as per requirement with and average wall thickness of 1 mm (± 0.3 mm). PVC foam end cap of size 23x10 mm area provided on both vertical edges to ensure the overall thickness of 25 mm. An M.S. tube having dimensions 19 mm x 19 mm and 1.0 mm (± 0.1 mm) is inserted along the hinge side of the door. Core of the door shutter should be filled with High Density Polyurethane foam. The Top & Bottom edges of the shutter are covered with an end -cap of the size 25 mm x 11 mm. Door shutter shall be reinforced with special polymeric reinforcements as per manufacturer,s specification and direction of Engineer-in-charge to take up necessary hardware and fixtures. Stickers indicating the locations of hardware will be pasted at appropriate places.							
	Ground Floor							
	For doors	1	0.800		2.100		1.681	
	First Floor							
	For doors	1	0.800		2.100		1.681	
	Total Quantity						3.362 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						3.362 sqm	
	Say 3.362 sqm @ Rs 3058.64 / sqm						Rs 10283.15	
31	17.2.1 Providing and fixing white vitreous china pedestal type water closet (European type W.C. pan) with seat and lid, 10 litre low level white P.V.C. flushing cistern, including flush pipe, with manually controlled device (handle lever), conforming to IS : 7231, with all fittings and fixtures complete, including cutting and making good the walls and floors wherever required:W.C. pan with ISI marked white solid plastic seat and lid							

		2					2.000	
	Total Quantity						2.000 No	
	Total Deducted Quantity						0.000 No	
	Net Total Quantity						2.000 No	
	Say 2.000 No @ Rs 6231.49 / No						Rs 12462.98	
32	17.7.2 Providing and fixing wash basin with C.I. brackets, 15 mm C.P. brass pillar taps, 32 mm C.P. brass waste of standard pattern, including painting of fittings and brackets, cutting and making good the walls wherever require:White Vitreous China Wash basin size 630 x 450 mm with a single 15 mm C.P. brass pillar tap							
		2					2.000	
	Total Quantity						2.000 No	
	Total Deducted Quantity						0.000 No	
	Net Total Quantity						2.000 No	
	Say 2.000 No @ Rs 3258.80 / No						Rs 6517.60	
33	18.9.2 Providing and fixing Chlorinated Polyvinyl Chloride (CPVC) pipes, having thermal stability for hot & cold water supply including all CPVC plain & brass threaded fittings. This includes jointing of pipes & fittings with one step CPVC solvent cement, trenching , refilling & testing of joints complete as per direction of Engineer- in-Charge. External work20 mm nominal outer dia pipes							
		1	45.000				45.000	
	Total Quantity						45.000 metre	
	Total Deducted Quantity						0.000 metre	
	Net Total Quantity						45.000 metre	
	Say 45.000 metre @ Rs 300.51 / metre						Rs 13522.95	
34	18.9.3 Providing and fixing Chlorinated Polyvinyl Chloride (CPVC) pipes, having thermal stability for hot & cold water supply including all CPVC plain & brass threaded fittings. This includes jointing of pipes & fittings with one step CPVC solvent cement, trenching , refilling & testing of joints complete as per direction of Engineer- in-Charge. External work25 mm nominal outer dia pipes							
		1	25.000				25.000	
	Total Quantity						25.000 metre	
	Total Deducted Quantity						0.000 metre	
	Net Total Quantity						25.000 metre	
	Say 25.000 metre @ Rs 386.88 / metre						Rs 9672.00	
35	18.9.4 Providing and fixing Chlorinated Polyvinyl Chloride (CPVC) pipes, having thermal stability for hot & cold							

	water supply including all CPVC plain & brass threaded fittings. This includes jointing of pipes & fittings with one step CPVC solvent cement, trenching , refilling & testing of joints complete as per direction of Engineer- in-Charge. External work32 mm nominal outer dia pipes							
		1	50.000				50.000	
	Total Quantity						50.000 metre	
	Total Deducted Quantity						0.000 metre	
	Net Total Quantity						50.000 metre	
	Say 50.000 metre @ Rs 490.02 / metre						Rs 24501.00	
36	od345410/2021_2022 :Providing and fixing uPVC pipes including fixing the pipe with clamps/clips at 1.00 m spacing. This included fittings, jointing of pipes with one step uPVC solvent cement and testing of joints complete as per direction of Engineer-in-Charge 63 mm dia 6Kgf/cm2 -							
		1	55.000				55.000	
	Total Quantity						55.000 metre	
	Total Deducted Quantity						0.000 metre	
	Net Total Quantity						55.000 metre	
	Say 55.000 metre @ Rs 255.33 / metre						Rs 14043.15	
37	od345413/2021_2022 :Providing and fixing uPVC pipes includings jointing of pipes with one step uPVC solvent cement, trenching,fitting refilling & testing of Joints complete as per direction of engineer in charge.110 mm dia 6Kgf/cm2							
		1	30.000				30.000	
	Total Quantity						30.000 metre	
	Total Deducted Quantity						0.000 metre	
	Net Total Quantity						30.000 metre	
	Say 30.000 metre @ Rs 600.16 / metre						Rs 18004.80	
38	18.19.1.2 Providing and fixing gun metal non-return valve of approved quality (screwed end):25 mm nominal boreVertical							
		1					1.000	
	Total Quantity						1.000 No	
	Total Deducted Quantity						0.000 No	
	Net Total Quantity						1.000 No	
	Say 1.000 No @ Rs 597.54 / No						Rs 597.54	
39	18.49.1 Providing and fixing C.P brass bib cock of approved quality conforming to IS: 8931.15 mm nominal bore							

		1					1.000	
	Total Quantity						1.000 No	
	Total Deducted Quantity						0.000 No	
	Net Total Quantity						1.000 No	
	Say 1.000 No @ Rs 496.23 / No						Rs 496.23	
40	18.58.2.1 Providing and fixing PTMT grating of approved quality and colour.Rectangular type with openable circular lid150 mm nominal size square 100 mm diameter of the inner hinged round grating							
		1					1.000	
	Total Quantity						1.000 No	
	Total Deducted Quantity						0.000 No	
	Net Total Quantity						1.000 No	
	Say 1.000 No @ Rs 200.16 / No						Rs 200.16	
41	17.31 Providing and fixing 600x450 mm beveled edge mirror of superior glass (of approved quality) complete with 6 mm thick hard board ground fixed to wooden cleats with C.P. brass screws and washers complete.							
		1					1.000	
	Total Quantity						1.000 No	
	Total Deducted Quantity						0.000 No	
	Net Total Quantity						1.000 No	
	Say 1.000 No @ Rs 1519.87 / No						Rs 1519.87	
42	18.48 Providing and placing on terrace (at all floor levels) polyethylene water storage tank :ISI 12701 marked, with cover and suitable locking arrangement and making necessary holes for inlet, outlet and overflow pipes but without fittings and the base support for tank.							
		1	1000.000				1000.000	
	Total Quantity						1000.000 Litre	
	Total Deducted Quantity						0.000 Litre	
	Net Total Quantity						1000.000 Litre	
	Say 1000.000 Litre @ Rs 10.44 / Litre						Rs 10440.00	
SI No	Description	No	L	B	D	CF	Quantity	Remark
3Security Cabin (Cost Index:36.44 %)								

1	2.8.1 Earth work in excavation by mechanical means (Hydraulic excavator) /manual means in foundation trenches or drains (not exceeding 1.5 m in width or 10 sqm on plan), including dressing of sides and ramming of bottoms, lift up to 1.5 m, including getting out the excavated soil and disposal of surplus excavated soil as directed, within a lead of 50 m.All kinds of soil							
	Foundation	2	3.150	0.600	0.700		2.646	
	„	2	1.950	0.600	0.700		1.638	
	steps	1	1.000	0.700	0.100		0.070	
	Total Quantity						4.354 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						4.354 cum	
	Say 4.354 cum @ Rs 298.80 / cum						Rs 1300.98	
2	4.1.8 Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:4:8 (1 cement : 4 coarse sand : 8 graded stone aggregate 40 nominal size)							
	Foundation	2	3.150	0.600	0.100		0.378	
	„	2	1.950	0.600	0.100		0.234	
	steps	1	1.000	0.700	0.100		0.070	
	Floor	1	2.500	2.500	0.080		0.500	
	Total Quantity						1.182 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						1.182 cum	
	Say 1.182 cum @ Rs 6857.61 / cum						Rs 8105.70	
3	7.1.1 Random rubble masonry with hard stone in foundation and plinth including levelling up with cement concrete 1:6:12 (1 cement : 6 coarse sand : 12 graded stone aggregate 20 mm nominal size) up to plinth level with:Cement mortar 1:6 (1 cement : 6 coarse sand)							
	For Foundation	2	3.150	0.600	0.600		2.268	
	„	2	1.950	0.600	0.600		1.404	
	Basement	2	3.000	0.450	0.450		1.215	
	„	2	2.100	0.450	0.450		0.851	
	Total Quantity						5.738 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						5.738 cum	
	Say 5.738 cum @ Rs 7249.94 / cum						Rs 41600.16	

4	50.6.7.2 Laterate masonry with neatly dressed laterate stone of size 40x20x15cm or nearest size in cement mortar 1:6 for super structure above plinth level up to floor two level including all cost of materials, labour charges etc.							
	wall	4	2.700	0.200	2.850		6.157	
	Parapet	4	2.700	0.200	0.300		0.648	
	Steps	1	1.000	0.600	0.200		0.120	
		1	1.000	0.300	0.200		0.060	
	Door D1	1	1.000	0.200	2.100		-0.420	
	Window W1	2	1.500	0.200	1.500		-0.900	
	Total Quantity						6.985 cum	
	Total Deducted Quantity						-1.320 cum	
	Net Total Quantity						5.665 cum	
	Say 5.665 cum @ Rs 7968.75 / cum						Rs 45142.97	
5	50.5.33.2 Providing and laying in position machine batched and machine mixed design mix M-20 grade cement concrete for reinforced cement concrete work, using cement content as per approved design mix, including pumping of concrete to site of laying but excluding the cost of centering, shuttering, finishing and reinforcement, including 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 Engineer-in-charge. Note:- Cement content considered in this item is @ 330 kg/cum. Excess or less cement used as per design mix is payable or recoverable separately. All work above plinth level upto floor V level							
	Lintel	4	2.700	0.200	0.150		0.324	
	Sunshade	1	2.900	0.600	0.100		0.175	
	„	2	1.900	0.600	0.100		0.228	
	Roof slab	1	3.500	3.500	0.120		1.470	
	Total Quantity						2.197 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						2.197 cum	
	Say 2.197 cum @ Rs 11135.00 / cum						Rs 24463.60	
6	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 work upto plinth level							
	Plinth Belt							
	Long wall	2	3.000	0.250	0.150		0.225	
	Short wall	2	2.500	0.250	0.150		0.188	
	Total Quantity						0.413 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						0.413 cum	
	Say 0.413 cum @ Rs 9947.98 / cum						Rs 4108.52	
7	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							
	@80Kg of Steel / 1 Cum of CC ie,	1	2.197+0.4 13		80.000		208.800	
	Total Quantity						208.800 kilogram	
	Total Deducted Quantity						0.000 kilogram	
	Net Total Quantity						208.800 kilogram	
	Say 208.800 kilogram @ Rs 98.92 / kilogram						Rs 20654.50	
8	14.12 Providing and fixing 16 mm M.S. Fan clamps of standard shape and size in existing R.C.C. slab, including cutting chase, anchoring clamp to reinforcement bar, including cleaning, refilling, making good the chase with matching concrete, plastering and painting the exposed portion of the clamps complete.							
		1					1.000	
	Total Quantity						1.000 No	
	Total Deducted Quantity						0.000 No	
	Net Total Quantity						1.000 No	
	Say 1.000 No @ Rs 503.53 / No						Rs 503.53	
9	5.9.5 Centering and shuttering including strutting, etc. and removal of form for:Lintels, beams, plinth beams, girders bressumers and cantilevers							
	Belt	4	2.900		0.150		1.740	
		4	2.500		0.150		1.500	
	Lintel-	4	2.900		0.150		1.740	
	inside	4	2.500		0.150		1.500	
	Op Bott.	1	1.000		0.200		0.200	

	„	2	1.500		0.200		0.601	
	Shade	1	3.100	0.600			1.860	
	„	2	2.100	0.600			2.520	
	Total Quantity						11.661 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						11.661 sqm	
	Say 11.661 sqm @ Rs 653.89 / sqm						Rs 7625.01	
10	5.9.3 Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform							
	Roof slab bottom	1	2.500	2.500			6.250	
	Edge	4	3.500		0.120		1.680	
	Projection	4	3.200		0.300		3.840	
	Total Quantity						11.770 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						11.770 sqm	
	Say 11.770 sqm @ Rs 820.89 / sqm						Rs 9661.88	
11	13.7.1 12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)							
	roof top	1	3.500	3.500			12.250	
	Total Quantity						12.250 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						12.250 sqm	
	Say 12.250 sqm @ Rs 403.73 / sqm						Rs 4945.69	
12	13.1.1 12 mm cement plaster of mix:1:4 (1 cement : 4 fine sand)							
	Building outside	4	2.900		3.000		34.800	
	Building inside	4	2.500		3.000		30.000	
	Parapet including slab width	4	3.200		0.950		12.160	
	Basement	1	11.000		0.600		6.600	
	Door D1	1	1.000		2.100		-2.100	
	Window W1	2	1.500		1.500		-4.500	
	Total Quantity						83.560 sqm	

	Total Deducted Quantity						-6.600 sqm	
	Net Total Quantity						76.960 sqm	
	Say 76.960 sqm @ Rs 316.06 / sqm						Rs 24323.98	
13	13.16.1 6 mm cement plaster of mix:1:3 (1 cement : 3 fine sand)							
	Roof slab bottom	1	2.500	2.500			6.250	
	Projection	4	3.200		0.300		3.840	
	Sunshade bottom & top	2	3.000	0.600			3.600	
		2*2	1.900	0.600			4.560	
	Edge	6	0.600	0.100			0.360	
	Total Quantity						18.610 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						18.610 sqm	
	Say 18.610 sqm @ Rs 269.26 / sqm						Rs 5010.93	
14	11.41.2 Providing and laying vitrified floor tiles in different sizes (thickness to be specified by the manufacturer) with water absorption less than 0.08% and conforming to IS : 15622, of approved make, in all colours and shades, laid on 20 mm thick cement mortar 1:4(1 cement : 4 coarse sand), including grouting the joints with white cement and matching pigments etc., complete.Size of Tile 600 x 600 mm.							
	Floor	1	2.500	2.500			6.250	
	Skirting	1	10.000		0.100		1.000	
	Step	1	1.000	0.600			0.600	
	„ Rise	3	1.000	0.200			0.601	
	Side	2	0.600	0.200			0.240	
	„	2	0.300	0.200			0.120	
	Total Quantity						8.811 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						8.811 sqm	
	Say 8.811 sqm @ Rs 1777.34 / sqm						Rs 15660.14	
15	21.1.1.1 Providing and fixing aluminium work for doors, windows, ventilators and partitions with extruded built up standard tubular sections/ appropriate Z sections and other sections of approved make conforming to IS : 733 and IS: 1285, fixing with dash fasteners of required dia and size, including necessary filling up the gaps at junctions, i.e. at top, bottom and sides with required EPDM rubber/ neoprene gasket etc. Aluminium sections shall be smooth, rust free, straight, mitred and jointed mechanically wherever							

	required including cleat angle, Aluminium snap beading for glazing /paneling, C.P. brass/ stainless steel screws, all complete as per architectural drawings and the directions of Engineer-in-charge.(Glazing, paneling and dash fasteners to be paid for separately):For fixed portionAnodised aluminium (anodised transparent or dyed to required shade according to IS : 1868, Minimum anodic coating of grade AC 15)							
	Window frames W1	2	1.500	1.500		4.5	20.250	
	Doors	1	1.000	2.100		4.5	9.451	
	Total Quantity						29.701 kg	
	Total Deducted Quantity						0.000 kg	
	Net Total Quantity						29.701 kg	
	Say 29.701 kg @ Rs 502.17 / kg						Rs 14914.95	
16	21.3.1 Providing and fixing glazing in aluminium door, window, ventilator shutters and partitions etc. with EPDM rubber / neoprene gasket etc. complete as per the architectural drawings and the directions of Engineer - in -Charge. (Cost of aluminium snap beading shall be paid in basic item):With float glass panes of 4.0 mm thickness							
	Window shutter	2*2	0.700		1.450		4.060	
	Door	1	0.900		2.000		1.800	
	Total Quantity						5.860 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						5.860 sqm	
	Say 5.860 sqm @ Rs 1184.03 / sqm						Rs 6938.42	
17	10.2 Structural steel work riveted, bolted or welded in built up sections, trusses and framed work, including cutting, hoisting, fixing in position and applying a priming coat of approved steel primer all complete.							
	Door	1	1.000	2.100		16.0	33.600	
	Total Quantity						33.600 kg	
	Total Deducted Quantity						0.000 kg	
	Net Total Quantity						33.600 kg	
	Say 33.600 kg @ Rs 120.54 / kg						Rs 4050.14	
18	9.48.2 Providing and fixing M.S. Grills of required pattern in frames of windows etc. with M.S. flats, square or round bars etc. including priming coat with approved steel primer all complete.Fixed to openings/ wooden frames with rawl plugs screws etc							
	window	2	1.500	1.500		20.0	90.000	
	Total Quantity						90.000 kg	
	Total Deducted Quantity						0.000 kg	

	Net Total Quantity						90.000 kg	
	Say 90.000 kg @ Rs 217.35 / kg						Rs 19561.50	
19	13.43.1 Applying one coat of water thinnable cement primer of approved brand and manufacture on wall surface:Water thinnable cement primer							
	Building outside	4	2.900		3.000		34.800	
	Building inside	4	2.500		3.000		30.000	
	Parapet including slab width	4	3.200		0.950		12.160	
	Basement	1	11.000		0.600		6.600	
	Door D1	1	1.000		2.100		-2.100	
	Window W1	2	1.500		1.500		-4.500	
	Roof slab bottom	1	2.500	2.500			6.250	
	Projection	4	3.200		0.300		3.840	
	Sunshade bottom & top	2	3.000	0.600			3.600	
		2*2	1.900	0.600			4.560	
	Edge	6	0.600	0.100			0.360	
	Kerala Water Authority Total Quantity						102.170 sqm	
	Total Deducted Quantity						-6.600 sqm	
	Net Total Quantity						95.570 sqm	
	Say 95.570 sqm @ Rs 71.09 / sqm						Rs 6794.07	
20	13.82.2 Wall painting with acrylic emulsion paint, having VOC (Volatile Organic Compound) content less than 50 grams/ litre, of approved brand and manufacture including applying additional coats wherever required, to achieve even shade and colour.Two coats							
	Building outside	4	2.900		3.000		34.800	
	Building inside	4	2.500		3.000		30.000	
	Parapet including slab width	4	3.200		0.950		12.160	
	Basement	1	11.000		0.600		6.600	
	Door D1	1	1.000		2.100		-2.100	
	Window W1	2	1.500		1.500		-4.500	
	Roof slab bottom	1	2.500	2.500			6.250	
	Projection	4	3.200		0.300		3.840	

	Sunshade bottom & top	2	3.000	0.600			3.600	
		2*2	1.900	0.600			4.560	
	Edge	6	0.600	0.100			0.360	
	Total Quantity						102.170 sqm	
	Total Deducted Quantity						-6.600 sqm	
	Net Total Quantity						95.570 sqm	
	Say 95.570 sqm @ Rs 126.55 / sqm						Rs 12094.38	
21	17.7.2 Providing and fixing wash basin with C.I. brackets, 15 mm C.P. brass pillar taps, 32 mm C.P. brass waste of standard pattern, including painting of fittings and brackets, cutting and making good the walls wherever require:White Vitreous China Wash basin size 630 x 450 mm with a single 15 mm C.P. brass pillar tap							
		1					1.000	
	Total Quantity						1.000 No	
	Total Deducted Quantity						0.000 No	
	Net Total Quantity						1.000 No	
	Say 1.000 No @ Rs 3258.80 / No						Rs 3258.80	
22	18.9.2 Providing and fixing Chlorinated Polyvinyl Chloride (CPVC) pipes, having thermal stability for hot & cold water supply including all CPVC plain & brass threaded fittings. This includes jointing of pipes & fittings with one step CPVC solvent cement, trenching , refilling & testing of joints complete as per direction of Engineer- in-Charge. External work20 mm nominal outer dia pipes							
		1	25.000				25.000	
	Total Quantity						25.000 metre	
	Total Deducted Quantity						0.000 metre	
	Net Total Quantity						25.000 metre	
	Say 25.000 metre @ Rs 300.51 / metre						Rs 7512.75	
23	18.9.3 Providing and fixing Chlorinated Polyvinyl Chloride (CPVC) pipes, having thermal stability for hot & cold water supply including all CPVC plain & brass threaded fittings. This includes jointing of pipes & fittings with one step CPVC solvent cement, trenching , refilling & testing of joints complete as per direction of Engineer- in-Charge. External work25 mm nominal outer dia pipes							
	LS	1	25.000				25.000	
	Total Quantity						25.000 metre	
	Total Deducted Quantity						0.000 metre	
	Net Total Quantity						25.000 metre	

	Say 25.000 metre @ Rs 386.88 / metre						Rs 9672.00	
24	18.9.4 Providing and fixing Chlorinated Polyvinyl Chloride (CPVC) pipes, having thermal stability for hot & cold water supply including all CPVC plain & brass threaded fittings. This includes jointing of pipes & fittings with one step CPVC solvent cement, trenching , refilling & testing of joints complete as per direction of Engineer- in-Charge. External work 32 mm nominal outer dia pipes							
	LS	1	25.000				25.000	
	Total Quantity						25.000 metre	
	Total Deducted Quantity						0.000 metre	
	Net Total Quantity						25.000 metre	
	Say 25.000 metre @ Rs 490.02 / metre						Rs 12250.50	
25	od345410/2021_2022 :Providing and fixing uPVC pipes including fixing the pipe with clamps/clips at 1.00 m spacing. This included fittings, jointing of pipes with one step uPVC solvent cement and testing of joints complete as per direction of Engineer-in-Charge 63 mm dia 6Kg/cm2 -							
		1	30.000				30.000	
	Total Quantity						30.000 metre	
	Total Deducted Quantity						0.000 metre	
	Net Total Quantity						30.000 metre	
	Kerala Water Authority Say 30.000 metre @ Rs 255.33 / metre						Rs 7659.90	
26	17.31 Providing and fixing 600x450 mm beveled edge mirror of superior glass (of approved quality) complete with 6 mm thick hard board ground fixed to wooden cleats with C.P. brass screws and washers complete.							
		1					1.000	
	Total Quantity						1.000 No	
	Total Deducted Quantity						0.000 No	
	Net Total Quantity						1.000 No	
	Say 1.000 No @ Rs 1519.87 / No						Rs 1519.87	
27	13.62.1 Painting with synthetic enamel paint of approved brand and manufacture of required colour to give an even shade:Two or more coats on new work over an under coat of suitable shade with ordinary paint of approved brand and manufacture .							
	For windows	2	1.500	1.500			4.500	
	Total Quantity						4.500 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						4.500 sqm	

	Say 4.500 sqm @ Rs 209.84 / sqm						Rs 944.28	
SI No	Description	No	L	B	D	CF	Quantity	Remark
4Air Blower Room and Control Panel room (Cost Index:36.44 %)								
1	2.8.1 Earth work in excavation by mechanical means (Hydraulic excavator) /manual means in foundation trenches or drains (not exceeding 1.5 m in width or 10 sqm on plan), including dressing of sides and ramming of bottoms, lift up to 1.5 m, including getting out the excavated soil and disposal of surplus excavated soil as directed, within a lead of 50 m.All kinds of soil							
	FOOTING							
	C O L U M N FOOTING(CORNER)	4	1.700	1.700	1.000		11.560	
	C O L U M N FOOTING(INSIDE A N D INTERMEDIATE)	12	2.000	2.000	1.000		48.000	
	Total Quantity						59.560 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						59.560 cum	
	Say 59.560 cum @ Rs 298.80 / cum						Rs 17796.53	
2	4.1.5 Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size)							
	FOOTING							
	C O L U M N FOOTING(CORNER)	4	1.700	1.700	0.200		2.312	
	C O L U M N FOOTING(INSIDE A N D INTERMEDIATE)	12	2.000	2.000	0.200		9.601	
	PLINTH BEAM	2	10.000	0.400	0.200		1.600	
		2	8.000	0.400	0.200		1.281	
	Total Quantity						14.794 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						14.794 cum	
	Say 14.794 cum @ Rs 7413.74 / cum						Rs 109678.87	
3	50.2.26.1 Filling with contractor own earth (excluding rock) in open areas in layers not exceeding 20 cm in depth,							

	consolidating each deposited layer by ramming and watering, lead up to 50 m and lift up to 1.5 m as per direction of site Engineer-in-charge.							
		1	10.000	8.000	0.500		40.000	
	Total Quantity						40.000 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						40.000 cum	
	Say 40.000 cum @ Rs 297.37 / cum						Rs 11894.80	
4	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 work upto plinth level							
	FOOTING							
	CORNER COLUMN FOOTING	4	1.400	1.400	0.150		1.176	
		4	$\frac{(0.2+1.4)}{2}$	1.400	0.750		3.360	
	INSIDE COLUMN FOOTING	4	1.700	1.700	0.150		1.734	
		4	$\frac{(0.2+1.7)}{2}$	1.700	0.750		4.845	
	INTERMEDIATE COLUMN FOOTING	8	1.700	1.700	0.150		3.468	
		8	$\frac{(0.2+1.7)}{2}$	1.700	0.750		9.690	
	Total Quantity						24.273 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						24.273 cum	
	Say 24.273 cum @ Rs 9947.98 / cum						Rs 241467.32	
5	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							
	PLINTH BEAM							
		1	37.800	0.250	0.500		4.725	
	Beam (0.20 * 0.50)	2	8.200	0.200	0.500		1.640	
		2	10.200	0.200	0.500		2.040	
	Column (0.2 * 0.50)	16	0.200	0.500	5.200		8.320	
	Roof slab	1	11.000	9.000	0.120		11.880	
	Lintel	1	37.600	0.200	0.200		1.505	
	SUNSHADE	1	(11.6+9.6) *2	0.600	0.100		2.544	
	RAMP							
		1	5.000	2.000	0.200		2.000	
	Total Quantity						34.654 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						34.654 cum	
	Say 34.654 cum @ Rs 11610.43 / cum						Rs 402347.84	
6	50.5.33.2 Providing and laying in position machine batched and machine mixed design mix M-20 grade cement concrete for reinforced cement concrete work, using cement content as per approved design mix, including pumping of concrete to site of laying but excluding the cost of centering, shuttering, finishing and reinforcement, including 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 Engineer-in-charge.Note:- Cement content considered in this item is @ 330 kg/cum. Excess or less cement used as per design mix is payable or recoverable separately. All work above plinth level upto floor V level							
	PEDESTAL COLUMN							
		16	0.500	0.200	0.500		0.800	
	PLINTH SLAB							
		1	10.400	8.400	0.200		17.473	
	Total Quantity						18.273 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						18.273 cum	
	Say 18.273 cum @ Rs 11135.00 / cum						Rs 203469.86	

7	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							
	FOOTING							
	CORNER COLUMN FOOTING	8	1.400	1.400	0.150	100.0	235.200	
		8	$(0.2+1.4)/2$	1.400	0.750	100.0	672.000	
	INSIDE COLUMN FOOTING	4	1.700	1.700	0.150	100.0	173.400	
		4	$(0.2+1.7)/2$	1.700	0.750	100.0	484.500	
	INTERMEDIATE COLUMN FOOTING	8	1.700	1.700	0.150	100.0	346.800	
		8	$(0.2+1.7)/2$	1.700	0.750	100.0	969.000	
	PEDESTAL COLUMN	20	0.500	0.200	0.500	100.0	100.000	
	Beam (0.20 * 0.50)	2	8.200	0.200	0.500	100.0	164.000	
		2	10.200	0.200	0.500	100.0	204.000	
	Column (0.2 * 0.50)	16	0.200	0.500	5.200	100.0	832.000	
	Roof slab	1	11.000	9.000	0.120	100.0	1188.000	
	Lintel	1	37.600	0.200	0.150	75.0	84.601	
	SUNSHADE	1	$(11.6+9.6)*2$	0.600	0.150	75.0	286.200	
	PLINTH SLAB							
		1	10.400	8.400	0.200	100.0	1747.201	
	RAMP							
		1	5.000	2.000	0.200	75.0	150.000	
	PLINTH BEAM							
		1	37.800	0.250	0.500	100.0	472.500	
	Total Quantity						8109.402 kilogram	
	Total Deducted Quantity						0.000 kilogram	
	Net Total Quantity						8109.402 kilogram	
	Say 8109.402 kilogram @ Rs 98.92 / kilogram						Rs 802182.05	
8	5.9.1 Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of							

	columns, etc for mass concrete							
	COLUMN FOOTING							
	C O L U M N A T C O R N E R	4	(1.4+1.4)* 2		0.150		3.360	
	INTERMEDIATE C O L U M N	8	(1.7+1.7)* 2		0.150		8.160	
	INSIDE COLUMN	4	(1.7+1.7)* 2		0.150		4.080	
	Total Quantity						15.600 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						15.600 sqm	
	Say 15.600 sqm @ Rs 337.42 / sqm						Rs 5263.75	
9	5.9.5 Centering and shuttering including strutting, etc. and removal of form for:Lintels, beams, plinth beams, girders bressumers and cantilevers							
	BEAM (0.2*0.5)							
	SIDE	2*2	8.200		0.500		16.400	
	BOTTOM	1*2	8.200	0.200			3.280	
	SIDE	2*2	10.200		0.500		20.400	
	BOTTOM	1*2	10.200	0.200			4.080	
	PLINTH SLAB							
		1	37.600		0.200		7.521	
	LINTEL							
	INSIDE	1	(10+8)*2		0.200		7.200	
	OUT SIDE	1	(10.4+8.4)*2		0.200		7.521	
	SUNSHADE							
		1	(11.6+9.6)*2		0.750		31.800	
	RAMP							
		1	2.000	5.000			10.000	
		2	2.000		0.200		0.800	
		1	5.000		0.200		1.000	
	PLINTH BEAM							
	INSIDE	1	35.800		0.500		17.900	

	OUT SIDE	1	37.800		0.500		18.900	
	Total Quantity						146.802 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						146.802 sqm	
	Say 146.802 sqm @ Rs 653.89 / sqm						Rs 95992.36	
10	5.9.6 Centering and shuttering including strutting, etc. and removal of form for:Columns, Pillars, Piers, Abutments, Posts and Struts							
	PEDESTAL COLUMN	16	(0.2+0.5)* 2		0.500		11.200	
	COLUMN	16	(0.2+0.5)* 2		5.200		116.480	
	Total Quantity						127.680 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						127.680 sqm	
	Say 127.680 sqm @ Rs 869.05 / sqm						Rs 110960.30	
11	5.9.3 Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform							
	Kerala Water Authority ROOF SLAB							
	BOTTOM	1	11.000	9.000			99.000	
	SIDE	2	11.000		0.120		2.640	
		2	9.000		0.120		2.160	
	Total Quantity						103.800 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						103.800 sqm	
	Say 103.800 sqm @ Rs 820.89 / sqm						Rs 85208.38	
12	13.1.1 12 mm cement plaster of mix:1:4 (1 cement : 4 fine sand)							
	Outside	1	36.000		5.200		187.201	
	Inside	1	37.600		5.200		195.520	
	ROLLING SHUTTER	1	2.000		3.000		-6.000	
	Window	4	1.500		1.500		-9.000	
	PARAPET WALL							
		2	11.000		0.800		17.600	

		2	11.000	0.150			3.300	
		2	9.000		0.800		14.400	
		2	9.000	0.150			2.700	
	SUNSHADE TOP	1	(11.6+9.6) *2		0.600		25.440	
	COLUMN							
		16	0.500	0.200	5.200		8.320	
	BEAM							
		2	0.900	8.200			14.760	
		1	0.900	10.200			9.180	
	Total Quantity						478.421 sqm	
	Total Deducted Quantity						-15.000 sqm	
	Net Total Quantity						463.421 sqm	
	Say 463.421 sqm @ Rs 316.06 / sqm						Rs 146468.84	
13	13.16.1 6 mm cement plaster of mix:1:3 (1 cement : 3 fine sand)							
	Roof slab	1	11.000	9.000			99.000	
		2	11.000		0.120		2.640	
		2	9.000		0.120		2.160	
	SUNSHADE BOTTOM	1	(9.6+11.6) *2		0.600		25.440	
	Total Quantity						129.240 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						129.240 sqm	
	Say 129.240 sqm @ Rs 269.26 / sqm						Rs 34799.16	
14	13.43.1 Applying one coat of water thinnable cement primer of approved brand and manufacture on wall surface:Water thinnable cement primer							
	Outside	1	36.000		5.200		187.201	
	Inside	1	37.600		5.200		195.520	
	Roof slab	1	11.000	9.000			99.000	
		2	11.000		0.120		2.640	
		2	9.000		0.120		2.160	
	ROLLING SHUTTER	1	2.000		3.000		-6.000	

	Window	4	1.500		1.500		-9.000	
	SUNSHADE TOP & BOTTOM	2	(11.6+9.6) *2		0.600		50.880	
	COLUMN							
		16	0.500	0.200	5.200		8.320	
	BEAM							
		2	0.900	8.200			14.760	
		1	0.900	10.200			9.180	
	Total Quantity						569.661 sqm	
	Total Deducted Quantity						-15.000 sqm	
	Net Total Quantity						554.661 sqm	
	Say 554.661 sqm @ Rs 71.09 / sqm						Rs 39430.85	
15	13.82.2 Wall painting with acrylic emulsion paint, having VOC (Volatile Organic Compound) content less than 50 grams/ litre, of approved brand and manufacture including applying additional coats wherever required, to achieve even shade and colour.Two coats							
	Outside	1	36.000		5.200		187.201	
	Inside	1	37.600		5.200		195.520	
	Roof slab	1	11.000	9.000			99.000	
		2	11.000		0.120		2.640	
		2	9.000		0.120		2.160	
	ROLLING SHUTTER	1	2.000		3.000		-6.000	
	Window	4	1.500		1.500		-9.000	
	SUNSHADE TOP & BOTTOM	2	(11.6+9.6) *2		0.600		50.880	
	COLUMN							
		16	0.500	0.200	5.200		8.320	
	BEAM							
		2	0.900	8.200			14.760	
		1	0.900	10.200			9.180	
	Total Quantity						569.661 sqm	
	Total Deducted Quantity						-15.000 sqm	
	Net Total Quantity						554.661 sqm	
	Say 554.661 sqm @ Rs 126.55 / sqm						Rs 70192.35	

16	11.41.2 Providing and laying vitrified floor tiles in different sizes (thickness to be specified by the manufacturer) with water absorption less than 0.08% and conforming to IS : 15622, of approved make, in all colours and shades, laid on 20 mm thick cement mortar 1:4(1 cement : 4 coarse sand), including grouting the joints with white cement and matching pigments etc., complete. Size of Tile 600 x 600 mm.							
		1	10.000	8.000			80.000	
	SKIRTING	1	36.000		0.100		3.600	
	Total Quantity						83.600 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						83.600 sqm	
	Say 83.600 sqm @ Rs 1777.34 / sqm						Rs 148585.62	
17	10.4 Providing and fixing 1 mm thick M.S. sheet sliding- shutters, with frame and diagonal braces of 40x40x6 mm angle iron, 3 mm M.S. gusset plates at the junction and corners, 25 mm dia pulley, 40x40x6 mm angle and T-iron guide at the top and bottom respectively, including applying a priming coat of approved steel primer.							
	Window	4	1.500		1.500		9.000	
	Total Quantity						9.000 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						9.000 sqm	
	Say 9.000 sqm @ Rs 5912.90 / sqm						Rs 53216.10	
18	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							
		1	2.000		3.000		6.000	
	Total Quantity						6.000 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						6.000 sqm	
	Say 6.000 sqm @ Rs 3487.20 / sqm						Rs 20923.20	
19	od345412/2021_2022 Supplying and fixing ISMB250 for Chain Pulley Block							
		1					1.000	
	Total Quantity						1.000 kg	

	Total Deducted Quantity						0.000 kg	
	Net Total Quantity						1.000 kg	
	Say 1.000 kg @ Rs 58227.39 / kg						Rs 58227.39	
SI No	Description	No	L	B	D	CF	Quantity	Remark
5Chlorination Building (Cost Index:36.44 %)								
1	2.8.1 Earth work in excavation by mechanical means (Hydraulic excavator) /manual means in foundation trenches or drains (not exceeding 1.5 m in width or 10 sqm on plan), including dressing of sides and ramming of bottoms, lift up to 1.5 m, including getting out the excavated soil and disposal of surplus excavated soil as directed, within a lead of 50 m.All kinds of soil							
	NEUTRALIZATION PIT							
		1	2.700	2.700	1.000		7.291	
	FOOTING							
	CORNER COLUMN FOOTING	4	1.700	1.700	1.000		11.560	
	INTERMEDIATE COLUMN FOOTING	6	1.700	1.700	1.000		17.340	
	Total Quantity						36.191 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						36.191 cum	
	Say 36.191 cum @ Rs 298.80 / cum						Rs 10813.87	
2	4.1.5 Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size)							
	NEUTRALIZATION PIT							
		1	2.700	2.700	0.200		1.459	
	PLINTHBEAM	2	10.000	0.400	0.200		1.600	
		2	8.000	0.400	0.200		1.281	
	FOOTING							
	CORNER COLUMN FOOTING	4	1.700	1.700	0.200		2.312	
	INTERMEDIATE COLUMN FOOTING	6	1.700	1.700	0.200		3.468	
	Total Quantity						10.120 cum	
	Total Deducted Quantity						0.000 cum	

	Net Total Quantity						10.120 cum	
	Say 10.120 cum @ Rs 7413.74 / cum						Rs 75027.05	
3	50.2.26.1 Filling with contractor own earth (excluding rock) in open areas in layers not exceeding 20 cm in depth, consolidating each deposited layer by ramming and watering, lead up to 50 m and lift up to 1.5 m as per direction of site Engineer-in-charge.							
		1	10.000	8.000	0.500		40.000	
	Total Quantity						40.000 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						40.000 cum	
	Say 40.000 cum @ Rs 297.37 / cum						Rs 11894.80	
4	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 work upto plinth level							
	FOOTING							
	CORNER COLUMN FOOTING	4	1.400	1.400	0.150		1.176	
	INTERMEDIATE COLUMN FOOTING	6	(0.25+1.4) /2	1.400	0.750		5.198	
	PLINTH BEAM							
		1	37.800	0.250	0.500		4.725	
	NEUTRALIZATION PIT							
		1	2.600	2.600	0.200		1.353	
		2	2.500	0.200	1.500		1.500	
	Total Quantity						13.952 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						13.952 cum	
	Say 13.952 cum @ Rs 9947.98 / cum						Rs 138794.22	
5	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							
	COLUMN (0.25*0.5)							
		10	0.500	0.250	5.000		6.250	
	BEAM (0.25*0.5)							
		2	8.200	0.200	0.500		1.640	
		1	10.200	0.200	0.500		1.020	
	LINTEL							
		1	37.600	0.200	0.200		1.505	
	SUNSHADE							
		1	(11.6+9.6) *2	0.600	0.100		2.544	
	ROOF SLAB							
		1	11.000	9.000	0.120		11.880	
	Kerala Water Authority Total Quantity							24.839 cum
	Total Deducted Quantity							0.000 cum
	Net Total Quantity							24.839 cum
	Say 24.839 cum @ Rs 11610.43 / cum							Rs 288391.47
6	50.5.33.2 Providing and laying in position machine batched and machine mixed design mix M-20 grade cement concrete for reinforced cement concrete work, using cement content as per approved design mix, including pumping of concrete to site of laying but excluding the cost of centering, shuttering, finishing and reinforcement, including 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 Engineer-in-charge.Note:- Cement content considered in this item is @ 330 kg/cum. Excess or less cement used as per design mix is payable or recoverable separately. All work above plinth level upto floor V level							
	PEDESTAL COLUMN							
		10	0.500	0.250	0.500		0.625	
	PLINTH SLAB							
		1	10.400	8.400	0.200		17.473	
	RAMP							

		1	5.000	2.000	0.200		2.000	
	Total Quantity						20.098 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						20.098 cum	
	Say 20.098 cum @ Rs 11135.00 / cum						Rs 223791.23	
7	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							
	Qty vide item no 4	1	13.952			100.0	1395.200	
	Qty vide item no 5	1	24.839			100.0	2483.900	
	Qty vide item no 6	1	20.098			100.0	2009.800	
	Total Quantity						5888.900 kilogram	
	Total Deducted Quantity						0.000 kilogram	
	Net Total Quantity						5888.900 kilogram	
	Say 5888.900 kilogram @ Rs 98.92 / kilogram						Rs 582529.99	
8	5.9.1 Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete							
	Kerala Water Authority COLUMN FOOTING							
	C O L U M N A T C O R N E R	4	(1.4+1.4)* 2		0.150		3.360	
	I N T E R M E D I A T E C O L U M N	6	(1.4+1.4)* 2		0.150		5.040	
	P L I N T H B E A M							
	INSIDE	1	35.800		0.500		17.900	
	OUT SIDE	1	37.800		0.500		18.900	
	N E U T R A L I Z A T I O N P I T							
		4	2.600		0.200		2.080	
		2*2	2.500		1.500		15.000	
	Total Quantity						62.280 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						62.280 sqm	
	Say 62.280 sqm @ Rs 337.42 / sqm						Rs 21014.52	
9	5.9.6 Centering and shuttering including strutting, etc. and removal of form for:Columns, Pillars, Piers,							

	Abutments, Posts and Struts							
	PEDESTAL COLUMN	10	(0.25+0.5) *2		0.500		7.500	
	COLUMN	10	(0.25+0.5) *2		5.000		75.000	
	Total Quantity						82.500 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						82.500 sqm	
	Say 82.500 sqm @ Rs 869.05 / sqm						Rs 71696.63	
10	5.9.5 Centering and shuttering including strutting, etc. and removal of form for:Lintels, beams, plinth beams, girders bressumers and cantilevers							
	PLINTH SLAB							
		1	10.450		0.200		2.090	
		1	8.450		0.200		1.690	
	BEAM (0.25*0.5)							
	SIDE	2*2	8.200		0.500		16.400	
	BOTTOM	2*1	8.200	0.250			4.100	
	SIDE	1*2	10.200		0.500		10.200	
	BOTTOM	1	10.200	0.200			2.040	
	LINTEL							
	INSIDE	1	(10+8)*2		0.200		7.200	
	OUT SIDE	1	(10.4+8.4) *2		0.200		7.521	
	SUNSHADE							
		1	(11.6+9.6) *2		0.700		29.680	
	RAMP							
		1	2.000	5.000			10.000	
		2	2.000		0.200		0.800	
		1	5.000		0.200		1.000	
	Total Quantity						92.721 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						92.721 sqm	
	Say 92.721 sqm @ Rs 653.89 / sqm						Rs 60629.33	

11	5.9.3 Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform							
	ROOF SLAB							
	BOTTOM	1	11.000	9.000			99.000	
	SIDE	2	11.000		0.120		2.640	
		2	9.000		0.120		2.160	
	Total Quantity						103.800 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						103.800 sqm	
	Say 103.800 sqm @ Rs 820.89 / sqm						Rs 85208.38	
12	50.6.7.2 Laterate masonry with neatly dressed laterate stone of size 40x20x15cm or nearest size in cement mortar 1:6 for super structure above plinth level up to floor two level including all cost of materials, labour charges etc.							
	LONG WALL	2	10.400	0.200	5.200		21.632	
	SHORT WALL	2	8.000	0.200	5.200		16.640	
	PARAPET WALL							
		2	11.000	0.200	0.800		3.521	
		2	9.000	0.200	0.800		2.881	
	DEDUCTIONS							
	ROLLING SHUTTER	1	3.000	0.200	3.000		-1.800	
	WINDOW	4	1.500	0.200	1.500		-1.800	
	DOOR	1	1.500	0.200	2.100		-0.630	
	STEP							
		2	1.500	0.150	0.300		0.135	
	Total Quantity						44.809 cum	
	Total Deducted Quantity						-4.230 cum	
	Net Total Quantity						40.579 cum	
	Say 40.579 cum @ Rs 7968.75 / cum						Rs 323363.91	
13	13.1.1 12 mm cement plaster of mix:1:4 (1 cement : 4 fine sand)							
	Wall Outside	1	36.000		5.000		180.000	
	Wall Inside	1	37.600		5.000		188.000	
	DEDUCTIONS							

	ROLLING SHUTTER	1	3.000		3.000		-9.000	
	WINDOW	4	1.500		1.500		-9.000	
	DOOR	1	1.500		2.100		-3.150	
	PARAPET WALL							
	SIDE	2	11.000		0.800		17.600	
	TOP	2	11.000	0.150			3.300	
	SIDE	2	9.000		0.800		14.400	
	TOP	2	9.000	0.150			2.700	
	SUNSHADE TOP							
		1	(11.6+9.6) *2		0.600		25.440	
	COLUMN							
		10	0.500	0.250	5.000		6.250	
	BEAM							
		2	1.000	8.200			16.400	
		1	1.000	10.200			10.200	
	NEUTRALIZATION PIT							
		2	2.500		1.500		7.500	
		1	2.500	2.500			6.250	
	Total Quantity						478.040 sqm	
	Total Deducted Quantity						-21.150 sqm	
	Net Total Quantity						456.890 sqm	
	Say 456.890 sqm @ Rs 316.06 / sqm						Rs 144404.65	
14	13.16.1 6 mm cement plaster of mix:1:3 (1 cement : 3 fine sand)							
	Roof slab	1	11.000	9.000			99.000	
		2	11.000		0.120		2.640	
		2	9.000		0.120		2.160	
	S U N S H A D E B O T T O M	1	(9.6+11.6) *2		0.600		25.440	
	Total Quantity						129.240 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						129.240 sqm	
	Say 129.240 sqm @ Rs 269.26 / sqm						Rs 34799.16	

15	13.43.1 Applying one coat of water thinnable cement primer of approved brand and manufacture on wall surface:Water thinnable cement primer							
	Wall Outside	1	36.000		5.000		180.000	
	Wall Inside	1	37.600		5.000		188.000	
	DEDUCTIONS							
	ROLLING SHUTTER	1	3.000		3.000		-9.000	
	WINDOW	4	1.500		1.500		-9.000	
	DOOR	1	1.500		2.100		-3.150	
	PARAPET WALL							
	SIDE	2	11.000		0.800		17.600	
	TOP	2	11.000	0.150			3.300	
	SIDE	2	9.000		0.800		14.400	
	TOP	2	9.000	0.150			2.700	
	SUNSHADE TOP							
		1	(11.6+9.6) *2		0.600		25.440	
	COLUMN							
		10	0.500	0.250	5.000		6.250	
	BEAM							
		2	1.000	8.200			16.400	
		1	1.000	10.200			10.200	
	Roof slab	1	11.000	9.000			99.000	
		2	11.000		0.120		2.640	
		2	9.000		0.120		2.160	
	S U N S H A D E B O T T O M	1	(9.6+11.6) *2		0.600		25.440	
	Total Quantity						593.530 sqm	
	Total Deducted Quantity						-21.150 sqm	
	Net Total Quantity						572.380 sqm	
	Say 572.380 sqm @ Rs 71.09 / sqm						Rs 40690.49	
16	13.82.2 Wall painting with acrylic emulsion paint, having VOC (Volatile Organic Compound) content less than 50 grams/ litre, of approved brand and manufacture including applying additional coats wherever required, to achieve even shade and colour.Two coats							

	Wall Outside	1	36.000		5.000		180.000	
	Wall Inside	1	37.600		5.000		188.000	
	DEDUCTIONS							
	ROLLING SHUTTER	1	3.000		3.000		-9.000	
	WINDOW	4	1.500		1.500		-9.000	
	DOOR	1	1.500		2.100		-3.150	
	PARAPET WALL							
	SIDE	2	11.000		0.800		17.600	
	TOP	2	11.000	0.150			3.300	
	SIDE	2	9.000		0.800		14.400	
	TOP	2	9.000	0.150			2.700	
	SUNSHADE TOP							
		1	(11.6+9.6) *2		0.600		25.440	
	COLUMN							
		10	0.500	0.250	5.000		6.250	
	BEAM							
		2	1.000	8.200			16.400	
		1	1.000	10.200			10.200	
	Roof slab	1	11.000	9.000			99.000	
		2	11.000		0.120		2.640	
		2	9.000		0.120		2.160	
	S U N S H A D E B O T T O M	1	(9.6+11.6) *2		0.600		25.440	
	Total Quantity						593.530 sqm	
	Total Deducted Quantity						-21.150 sqm	
	Net Total Quantity						572.380 sqm	
	Say 572.380 sqm @ Rs 126.55 / sqm						Rs 72434.69	
17	10.4 Providing and fixing 1 mm thick M.S. sheet sliding- shutters, with frame and diagonal braces of 40x40x6 mm angle iron, 3 mm M.S. gusset plates at the junction and corners, 25 mm dia pulley, 40x40x6 mm angle and T-iron guide at the top and bottom respectively, including applying a priming coat of approved steel primer.							
	Window	4	1.500		1.500		9.000	
	Total Quantity						9.000 sqm	

	Total Deducted Quantity							0.000 sqm
	Net Total Quantity							9.000 sqm
	Say 9.000 sqm @ Rs 5912.90 / sqm							Rs 53216.10
18	10.5.1 Providing and fixing 1 mm thick M.S. sheet door with frame of 40x40x6 mm angle iron and 3 mm M.S. gusset plates at the junctions and corners, all necessary fittings complete, including applying a priming coat of approved steel primer.Using M.S. angels 40x40x6 mm for diagonal braces							
	DOOR							
		1	1.500		2.100		3.151	
	Total Quantity							3.151 sqm
	Total Deducted Quantity							0.000 sqm
	Net Total Quantity							3.151 sqm
	Say 3.151 sqm @ Rs 5244.96 / sqm							Rs 16526.87
19	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							
		1	3.000		3.000		9.000	
	Total Quantity							9.000 sqm
	Total Deducted Quantity							0.000 sqm
	Net Total Quantity							9.000 sqm
	Say 9.000 sqm @ Rs 3487.20 / sqm							Rs 31384.80
20	11.41.2 Providing and laying vitrified floor tiles in different sizes (thickness to be specified by the manufacturer) with water absorption less than 0.08% and conforming to IS : 15622, of approved make, in all colours and shades, laid on 20 mm thick cement mortar 1:4(1 cement : 4 coarse sand), including grouting the joints with white cement and matching pigments etc., complete.Size of Tile 600 x 600 mm.							
		1	10.000	8.000			80.000	
	SKIRTING	1	36.000		0.100		3.600	
	STEP	2	1.500	0.300			0.900	
		2	1.500	0.150			0.450	
	Total Quantity							84.950 sqm
	Total Deducted Quantity							0.000 sqm

	Net Total Quantity						84.950 sqm	
	Say 84.950 sqm @ Rs 1777.34 / sqm						Rs 150985.03	
21	od345411/2021_2022 Supplying and fixing ISMB250							
		1					1.000	
	Total Quantity						1.000 kg	
	Total Deducted Quantity						0.000 kg	
	Net Total Quantity						1.000 kg	
	Say 1.000 kg @ Rs 58227.39 / kg						Rs 58227.39	
SI No	Description	No	L	B	D	CF	Quantity	Remark
6Compound Wall (Cost Index:36.44 %)								
1	2.8.1 Earth work in excavation by mechanical means (Hydraulic excavator) /manual means in foundation trenches or drains (not exceeding 1.5 m in width or 10 sqm on plan), including dressing of sides and ramming of bottoms, lift up to 1.5 m, including getting out the excavated soil and disposal of surplus excavated soil as directed, within a lead of 50 m.All kinds of soil							
	(78*77)-1.5 acre	1	310.000	0.700	0.400		86.801	
	Total Quantity						86.801 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						86.801 cum	
	Say 86.801 cum @ Rs 298.80 / cum						Rs 25936.14	
2	4.1.8 Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:4:8 (1 cement : 4 coarse sand : 8 graded stone aggregate 40 nominal size)							
	Wall	1	310.000	0.700	0.200		43.401	
	Total Quantity						43.401 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						43.401 cum	
	Say 43.401 cum @ Rs 6857.61 / cum						Rs 297627.13	
3	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 work upto plinth level							
	strip footing	1	310.000	0.600	0.200		37.200	
	strip beam	1	310.000	0.250	0.300		23.250	
	Total Quantity						60.450 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						60.450 cum	
	Say 60.450 cum @ Rs 9947.98 / cum						Rs 601355.39	
4	5.22.6 Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more							
		1	60.450	100.000			6045.000	
	Total Quantity						6045.000 kilogram	
	Total Deducted Quantity						0.000 kilogram	
	Net Total Quantity						6045.000 kilogram	
	Say 6045.000 kilogram @ Rs 98.92 / kilogram						Rs 597971.40	
5	5.9.1 Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete							
	Column footing	2	310.000	0.500			310.000	
	Total Quantity						310.000 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						310.000 sqm	
	Say 310.000 sqm @ Rs 337.42 / sqm						Rs 104600.20	
6	50.6.7.2 Laterate masonry with neatly dressed laterate stone of size 40x20x15cm or nearest size in cement mortar 1:6 for super structure above plinth level up to floor two level including all cost of materials, labour charges etc.							
	Wall	1	310.000	0.200	2.500		155.000	
	Column	103	2.500	0.400	0.400		41.200	
	Total Quantity						196.200 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						196.200 cum	
	Say 196.200 cum @ Rs 7968.75 / cum						Rs 1563468.75	
7	10.25.2							

	Item Shifted to Sub head 14 as item 14.73Item Shifted to head 14 as item 14.74Steel work welded in built up sections/framed work, including cutting, hoisting, fixing in position and applying a priming coat of approved steel primer using structural steel etc. as required.In gratings, frames, guard bar, ladder, railings, brackets, gates and similar works							
	Gate	1	5.000	2.400	40.000		480.000	
	Total Quantity						480.000 kg	
	Total Deducted Quantity						0.000 kg	
	Net Total Quantity						480.000 kg	
	Say 480.000 kg @ Rs 155.13 / kg						Rs 74462.40	
8	13.83.2 Wall painting with premium acrylic emulsion paint of interior grade, having VOC (Volatile including applying additional coats wherever required to achieve even shade and colour.Two coats							
	Gate	1	5.000	2.400			12.000	
	Total Quantity						12.000 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						12.000 sqm	
	Say 12.000 sqm @ Rs 134.94 / sqm						Rs 1619.28	
9	13.1.1 12 mm cement plaster of mix:1:4 (1 cement : 4 fine sand)							
	Wall	2	310.000		2.500		1550.000	
	Wall top	1	310.000	0.200			62.000	
	Total Quantity						1612.000 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						1612.000 sqm	
	Say 1612.000 sqm @ Rs 316.06 / sqm						Rs 509488.72	
10	13.48.1 Finishing with Deluxe Multi surface paint system for interiors and exteriors using primer as per manufacturers specifications:Two or more coats applied on walls @ 1.25 ltr/10 sqm over and including one coat of special primer applied @ 0.75 ltr /10 sqm							
	Wall	2	310.000		2.500		1550.000	
	Wall top	1	310.000	0.200			62.000	
	Total Quantity						1612.000 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						1612.000 sqm	
	Say 1612.000 sqm @ Rs 168.44 / sqm						Rs 271525.28	
SI No	Description	No	L	B	D	CF	Quantity	Remark

7Internal Roads (Cost Index:36.44 %)								
1	16.91.2 Providing and laying factory made chamfered edge Cement Concrete paver blocks in footpath, parks, lawns, drive ways or light traffic parking etc, of required strength,thickness & size/ shape, made by table vibratory method using PU mould, laid inrequired colour & pattern over 50mm thick compacted bed of sand, compacting andproper embedding/laying of inter locking paver blocks into the sand bedding layerthrough vibratory compaction by using plate vibrator, filling the joints with sand andcutting of paver blocks as per required size and pattern, finishing and sweepingextra sand. complete all as per direction of Engineer-in-Charge.80 mm thick C.C. paver block of M-30 grade with approved color design and pattern.							
	5m wide road	1	280.000	5.000			1400.000	
	Total Quantity						1400.000 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						1400.000 sqm	
	Say 1400.000 sqm @ Rs 1128.84 / sqm						Rs 1580376.00	
2	16.59.2 Manufacturing, supplying and fixing retro reflective sign boards made up of 2 mmthick aluminium sheet, face to be fully covered with high intensity encapsulatedtype heat activated retro reflective sheeting conforming to type - IV of ASTM-D4956-01 in blue and silver white or other colour combination including subjectmatter, message (bi-lingual), symbols and borders etc. as per IRC: 67- 2001, pastedon substrate by an adhesive backing which shall be activated by applying heatand pressure conforming to class-2 of ASTM-D-4956-01 and fixing the same withsuitable sized aluminium alloy rivets @ 20 cm c/c to back support frame of M.S.angle iron of size 25x25x3 mm along with theft resistant measures, mounted andfixed with 2 Nos M.S. angles of size 35x35x5 mm to a vertical post made up to M.S.Tee section ISMT 50x50x6 mm welded with base plate of size 100x100x 5 mm at thebottom end and including making holes in pipes, angles flats, providing & fixingM.S. message plate of required size, steel work to be painted with two or morecoats of synthetic enamel paint of required shade and of approved brand &manufacture over priming coat of zinc chromate yellow primer (vertical MS-Teesupport to be painted in black and white colours). Backside of aluminium sheet tobe painted with two or more coats of epoxy paint over and including appropriatepriming coat including all leads and lifts etc. complete as per drawing , specification and direction of Engineer-in-Charge.Cautionary / warning sign boards of equilateral triangular shape having each side of 900 mm with support length of 3650 mm							
		2					2.000	
	Total Quantity						2.000 No	
	Total Deducted Quantity						0.000 No	
	Net Total Quantity						2.000 No	
	Say 2.000 No @ Rs 5370.69 / No						Rs 10741.38	
3	16.59.1 Manufacturing, supplying and fixing retro reflective sign boards made up of 2 mmthick aluminium sheet, face to be fully covered with high intensity encapsulatedtype heat activated retro reflective sheeting conforming to type - IV of ASTM-D4956-01 in blue and silver white or other colour combination including							

	subjectmatter, message (bi-lingual), symbols and borders etc. as per IRC: 67- 2001, pasted on substrate by an adhesive backing which shall be activated by applying heat and pressure conforming to class-2 of ASTM-D-4956-01 and fixing the same with suitable sized aluminium alloy rivets @ 20 cm c/c to back support frame of M.S. angle iron of size 25x25x3 mm along with theft resistant measures, mounted and fixed with 2 Nos M.S. angles of size 35x35x5 mm to a vertical post made up to M.S. Tee section ISMT 50x50x6 mm welded with base plate of size 100x100x 5 mm at the bottom end and including making holes in pipes, angles flats, providing & fixing M.S. message plate of required size, steel work to be painted with two or more coats of synthetic enamel paint of required shade and of approved brand & manufacture over priming coat of zinc chromate yellow primer (vertical MS-Tee support to be painted in black and white colours). Backside of aluminium sheet to be painted with two or more coats of epoxy paint over and including appropriate priming coat including all leads and lifts etc. complete as per drawing, specification and direction of Engineer-in-Charge. Mandatory / Regulatory sign boards of 900 mm diameter with support length of 3750 mm						
		2					2.000
	Total Quantity						2.000 No
	Total Deducted Quantity						0.000 No
	Net Total Quantity						2.000 No
	Say 2.000 No @ Rs 7103.70 / No						Rs 14207.40
4	16.63 Providing, laying and making kerb channel 30 cm wide and 50 mm thick with cement concrete 1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size) over 75 mm bed of dry brick ballast 40 mm nominal size, well rammed and consolidated and grouted with fine sand, including finishing the top smooth etc. complete and as per direction Engineer - in-Charge.						
		1	642.000	0.300			192.600
	Total Quantity						192.600 sqm
	Total Deducted Quantity						0.000 sqm
	Net Total Quantity						192.600 sqm
	Say 192.600 sqm @ Rs 572.09 / sqm						Rs 110184.53
5	16.69 Providing and laying at or near ground level factory made kerb stone of M-25 grade cement concrete in position to the required line, level and curvature jointed with cement mortar 1:3 (1 cement : 3 coarse sand) , including making joints with or without grooves (thickness of joints except at sharp curve shall not to more than 5 mm), including making drainage opening wherever required complete etc. as per direction of Engineer-in-charge (length of finished kerb edging shall be measured for payment). (Precast C.C. kerb stone shall be approved by Engineer-in-Charge)						
		1	560.000	0.200	0.300		33.600
	Total Quantity						33.600 cum
	Total Deducted Quantity						0.000 cum
	Net Total Quantity						33.600 cum

Say 33.600 cum @ Rs 9921.30 / cum							Rs 333355.68	
SI No	Description	No	L	B	D	CF	Quantity	Remark
8Storm Water Drains (Cost Index:36.44 %)								
1	2.8.1 Earth work in excavation by mechanical means (Hydraulic excavator) /manual means in foundation trenches or drains (not exceeding 1.5 m in width or 10 sqm on plan), including dressing of sides and ramming of bottoms, lift up to 1.5 m, including getting out the excavated soil and disposal of surplus excavated soil as directed, within a lead of 50 m.All kinds of soil							
		1	280.000	0.700	0.600		117.600	
	Total Quantity						117.600 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						117.600 cum	
	Say 117.600 cum @ Rs 298.80 / cum						Rs 35138.88	
2	4.1.8 Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:4:8 (1 cement : 4 coarse sand : 8 graded stone aggregate 40 nominal size)							
		1	280.000	0.700	0.100		19.600	
	Total Quantity						19.600 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						19.600 cum	
	Say 19.600 cum @ Rs 6857.61 / cum						Rs 134409.16	
3	4.1.5 Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size)							
	Side wall	1	280.000	0.100	0.500		14.000	
	Total Quantity						14.000 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						14.000 cum	
	Say 14.000 cum @ Rs 7413.74 / cum						Rs 103792.36	
4	4.1.3 Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:2:4 (cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size)							
	Wearing coat	1	280.000	0.500	0.050		7.000	
	Total Quantity						7.000 cum	

	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						7.000 cum	
	Say 7.000 cum @ Rs 8040.95 / cum						Rs 56286.65	
5	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.							
	Wall-outside	1	280.000		0.600		168.000	
	Inside	1	280.000		0.500		140.000	
	Total Quantity						308.000 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						308.000 sqm	
	Say 308.000 sqm @ Rs 721.70 / sqm						Rs 222283.60	
SI No	Description	No	L	B	D	CF	Quantity	Remark
9Transformer Building (Cost Index:36.44 %)								
1	2.8.1 Earth work in excavation by mechanical means (Hydraulic excavator) /manual means in foundation trenches or drains (not exceeding 1.5 m in width or 10 sqm on plan), including dressing of sides and ramming of bottoms, lift up to 1.5 m, including getting out the excavated soil and disposal of surplus excavated soil as directed, within a lead of 50 m.All kinds of soil							
		1	24.000	0.800	0.900		17.281	
	For ramp	1	4.000	1.500	0.100		0.601	
	Step	1	1.000	0.500	0.100		0.050	
	Wire duct	1	10.700	1.100	0.800		9.416	
	Total Quantity						27.348 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						27.348 cum	
	Say 27.348 cum @ Rs 298.80 / cum						Rs 8171.58	
2	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)							
		1	21.400	0.100	1.000		2.140	
		1	10.700	0.900	0.100		0.963	
		1	24.800	0.800	0.100		1.985	
	Ramp	1	4.000	0.700	0.075		0.210	
	Floor	1	6.500	5.500	0.075		2.682	

	Step	1	1.000	0.500	0.100		0.050	
	Wire duct	1	10.700	1.100	0.075		-0.882	
	Total Quantity						8.030 cum	
	Total Deducted Quantity						-0.882 cum	
	Net Total Quantity						7.148 cum	
	Say 7.148 cum @ Rs 7256.36 / cum						Rs 51868.46	
3	7.1.1 Random rubble masonry with hard stone in foundation and plinth including levelling up with cement concrete 1:6:12 (1 cement : 6 coarse sand : 12 graded stone aggregate 20 mm nominal size) up to plinth level with:Cement mortar 1:6 (1 cement : 6 coarse sand)							
		1	24.800	0.450	0.450		5.022	
	Ramp	2*5	1.500	0.400	0.450		2.701	
	Total Quantity						7.723 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						7.723 cum	
	Say 7.723 cum @ Rs 7249.94 / cum						Rs 55991.29	
4	50.6.7.2 Laterate masonry with neatly dressed laterate stone of size 40x20x15cm or nearest size in cement mortar 1:6 for super structure above plinth level up to floor two level including all cost of materials, labour charges etc.							
	Wall	1	24.800	0.200	3.050		15.129	
	Parapet	1	27.200	0.100	0.600		1.633	
	step	1	1.000	0.250	0.150		0.038	
		1	1.000	0.500	0.150		0.075	
	Shutter	1	4.000	0.200	2.100		-1.680	
	Door	1	1.000	0.200	2.100		-0.420	
	Window	1	1.500	0.200	1.500		-0.450	
	Total Quantity						16.875 cum	
	Total Deducted Quantity						-2.550 cum	
	Net Total Quantity						14.325 cum	
	Say 14.325 cum @ Rs 7968.75 / cum						Rs 114152.34	
5	4.1.3 Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:2:4 (cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size)							

	Ramp	1	4.000	1.500	0.050		0.301	
	Total Quantity						0.301 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						0.301 cum	
	Say 0.301 cum @ Rs 8040.95 / cum						Rs 2420.33	
6	50.5.33.2 Providing and laying in position machine batched and machine mixed design mix M-20 grade cement concrete for reinforced cement concrete work, using cement content as per approved design mix, including pumping of concrete to site of laying but excluding the cost of centering, shuttering, finishing and reinforcement, including 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 Engineer-in-charge.Note:- Cement content considered in this item is @ 330 kg/cum. Excess or less cement used as per design mix is payable or recoverable separately. All work above plinth level upto floor V level							
	Roof slab	1	7.500	6.500	0.100		4.875	
	Lintel	1	24.800	0.200	0.150		0.745	
	Sunshade	1	1.700	0.600	0.075		0.077	
	Total Quantity						5.697 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						5.697 cum	
	Say 5.697 cum @ Rs 11135.00 / cum						Rs 63436.10	
7	5.1.2 Providing and laying in position specified grade of reinforced cement concrete, excluding the cost of centering, shuttering, finishing and reinforcement - All work up to plinth level:1:1:5:3 (1 cement 1.5 coarse sand :3 graded stone aggregate 20 mm nominal size							
	For transformer	1	5.000	2.000	0.100		1.000	
	Total Quantity						1.000 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						1.000 cum	
	Say 1.000 cum @ Rs 9142.09 / cum						Rs 9142.09	
8	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							
		1	6.697		80.000		535.760	
	Total Quantity						535.760 kilogram	
	Total Deducted Quantity						0.000 kilogram	
	Net Total Quantity						535.760 kilogram	

	Say 535.760 kilogram @ Rs 98.92 / kilogram						Rs 52997.38	
9	5.9.5 Centering and shuttering including strutting, etc. and removal of form for:Lintels, beams, plinth beams, girders bressumers and cantilevers							
	Lintel outside	1	25.600		0.150		3.840	
	Inside	1	24.000		0.150		3.600	
	Total Quantity						7.440 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						7.440 sqm	
	Say 7.440 sqm @ Rs 653.89 / sqm						Rs 4864.94	
10	5.9.3 Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform							
	Roof slab	1	6.500	5.500			35.750	
	Slab edge	1	25.600		0.100		2.561	
	Sunshade	1	1.700	0.600			1.020	
	Sunshade edge	1	2.900	0.100			0.290	
	Total Quantity						39.621 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						39.621 sqm	
	Say 39.621 sqm @ Rs 820.89 / sqm						Rs 32524.48	
11	13.1.1 12 mm cement plaster of mix:1:4 (1 cement : 4 fine sand)							
	Outside	1	25.600		3.200		81.921	
	Inside	1	24.000		3.200		76.801	
	Parapet outside	1	28.000		0.600		16.800	
	Parapet inside	1	27.200		0.600		16.320	
	Parapet top	1	27.600	0.100			2.761	
	Steps	2	1.000	0.250			0.500	
		3	1.000		0.150		0.450	
	Side	2	0.250		0.150		0.075	
		2	0.250		0.300		0.150	
	Shutter	1*2	4.000		2.100		-16.800	
	Door	1	1.000		2.100		-2.100	

	Window	1	1.500		1.500		-2.250	
	Total Quantity						195.778 sqm	
	Total Deducted Quantity						-21.150 sqm	
	Net Total Quantity						174.628 sqm	
	Say 174.628 sqm @ Rs 316.06 / sqm						Rs 55192.93	
12	13.7.1 12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)							
	Roof top	1	7.300	6.300			45.990	
	Total Quantity						45.990 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						45.990 sqm	
	Say 45.990 sqm @ Rs 403.73 / sqm						Rs 18567.54	
13	11.37 Providing and laying Ceramic glazed floor tiles of size 300x300 mm (thickness to be specified by the manufacturer), of 1st quality conforming to IS : 15622, of approved make, in colours such as White, Ivory, Grey, Fume Red Brown, laid on 20 mm thick cement mortar 1:4 (1 Cement : 4 Coarse sand), including pointing the joints with white cement and matching pigment etc., complete.							
	Transformer room	1	6.500	5.500			35.750	
	Skirting	1	24.000		0.100		2.401	
	Total Quantity						38.151 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						38.151 sqm	
	Say 38.151 sqm @ Rs 1097.86 / sqm						Rs 41884.46	
14	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							
		1	4.000		2.100		8.400	
	Total Quantity						8.400 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						8.400 sqm	
	Say 8.400 sqm @ Rs 3487.20 / sqm						Rs 29292.48	

15	10.7 Providing and fixing ball bearing for rolling shutters.							
		1					1.000	
	Total Quantity						1.000 Nos	
	Total Deducted Quantity						0.000 Nos	
	Net Total Quantity						1.000 Nos	
	Say 1.000 Nos @ Rs 497.32 / Nos						Rs 497.32	
16	21.1.1.1 Providing and fixing aluminium work for doors, windows, ventilators and partitions with extruded built up standard tubular sections/ appropriate Z sections and other sections of approved make conforming to IS : 733 and IS: 1285, fixing with dash fasteners of required dia and size, including necessary filling up the gaps at junctions, i.e. at top, bottom and sides with required EPDM rubber/ neoprene gasket etc. Aluminium sections shall be smooth, rust free, straight, mitred and jointed mechanically wherever required including cleat angle, Aluminium snap beading for glazing /paneling, C.P. brass/ stainless steel screws, all complete as per architectural drawings and the directions of Engineer-in-charge.(Glazing, paneling and dash fasteners to be paid for separately):For fixed portionAnodised aluminium (anodised transparent or dyed to required shade according to IS : 1868, Minimum anodic coating of grade AC 15)							
	For window frame	1	1.500	1.500	4.500		10.125	
	Total Quantity						10.125 kg	
	Total Deducted Quantity						0.000 kg	
	Net Total Quantity						10.125 kg	
	Say 10.125 kg @ Rs 502.17 / kg						Rs 5084.47	
17	21.1.2.1 For shutters of doors, windows & ventilators including providing and fixing hinges / pivots and making provision for fixing of fittings wherever required including the cost of EPDM rubber/ neoprene gasket required (Fittings shall be paid for separately)Anodised aluminium (anodised transparent or dyed to required shade according to IS : 1868, Minimum anodic coating of grade AC 15)							
	For window frame	1	1.500	1.500	4.500		10.125	
	Total Quantity						10.125 kg	
	Total Deducted Quantity						0.000 kg	
	Net Total Quantity						10.125 kg	
	Say 10.125 kg @ Rs 608.11 / kg						Rs 6157.11	
18	21.3.1 Providing and fixing glazing in aluminium door, window, ventilator shutters and partitions etc. with EPDM rubber / neoprene gasket etc. complete as per the architectural drawings and the directions of Engineer - in -Charge. (Cost of aluminium snap beading shall be paid in basic item):With float glass panes of 4.0 mm thickness							
	For window shutter	3	0.500		1.500		2.250	

	Total Quantity							2.250 sqm
	Total Deducted Quantity							0.000 sqm
	Net Total Quantity							2.250 sqm
	Say 2.250 sqm @ Rs 1184.03 / sqm							Rs 2664.07
19	9.48.2 Providing and fixing M.S. Grills of required pattern in frames of windows etc. with M.S. flats, square or round bars etc. including priming coat with approved steel primer all complete.Fixed to openings/ wooden frames with rawl plugs screws etc							
	For window frame	1	1.500	1.500	4.500		10.125	
	Total Quantity							10.125 kg
	Total Deducted Quantity							0.000 kg
	Net Total Quantity							10.125 kg
	Say 10.125 kg @ Rs 217.35 / kg							Rs 2200.67
20	13.43.1 Applying one coat of water thinnable cement primer of approved brand and manufacture on wall surface:Water thinnable cement primer							
	Outside	1	25.600		3.200		81.921	
	Inside	1	24.000		3.200		76.801	
	Parapet outside	1	28.000		0.600		16.800	
	Parapet inside	1	27.200		0.600		16.320	
	Parapet top	1	27.600	0.100			2.761	
	Roof slab bottom	1	6.500	5.500			35.750	
	Projection	2	7.500	0.400			6.000	
		2	5.900	0.400			4.721	
	Sunshade top and bottom	2	1.700	0.600			2.040	
	Edge	1	2.900		0.100		0.290	
	Shutter	1*2	4.000		2.100		-16.800	
	Door	1	1.000		2.100		-2.100	
	Window	1	1.500		1.500		-2.250	
	Total Quantity							243.404 sqm
	Total Deducted Quantity							-21.150 sqm
	Net Total Quantity							222.254 sqm
	Say 222.254 sqm @ Rs 71.09 / sqm							Rs 15800.04
21	13.82.2							

	Wall painting with acrylic emulsion paint, having VOC (Volatile Organic Compound) content less than 50 grams/ litre, of approved brand and manufacture including applying additional coats wherever required, to achieve even shade and colour.Two coats							
	Outside	1	25.600		3.200		81.921	
	Inside	1	24.000		3.200		76.801	
	Parapet outside	1	28.000		0.600		16.800	
	Parapet inside	1	27.200		0.600		16.320	
	Parapet top	1	27.600	0.100			2.761	
	Roof slab bottom	1	6.500	5.500			35.750	
	Projection	2	7.500	0.400			6.000	
		2	5.900	0.400			4.721	
	Sunshade top and bottom	2	1.700	0.600			2.040	
	Edge	1	2.900		0.100		0.290	
	Shutter	1*2	4.000		2.100		-16.800	
	Door	1	1.000		2.100		-2.100	
	Window	1	1.500		1.500		-2.250	
	Total Quantity						243.404 sqm	
	Total Deducted Quantity						-21.150 sqm	
	Net Total Quantity						222.254 sqm	
	Say 222.254 sqm @ Rs 126.55 / sqm						Rs 28126.24	
22	13.16.1 6 mm cement plaster of mix:1:3 (1 cement : 3 fine sand)							
	Roof slab bottom	1	6.500	5.500			35.750	
	Projection	2	7.500	0.400			6.000	
		2	5.900	0.400			4.721	
	Sonshade top and bottom	2	1.700	0.600			2.040	
	Edge	1	2.900		0.100		0.290	
	Total Quantity						48.801 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						48.801 sqm	
	Say 48.801 sqm @ Rs 269.26 / sqm						Rs 13140.16	
23	10.2 Structural steel work riveted, bolted or welded in built up sections, trusses and framed work, including							

	cutting, hoisting, fixing in position and applying a priming coat of approved steel primer all complete.							
	Grill	1	10.700	1.100	10.000		117.700	
	Total Quantity						117.700 kg	
	Total Deducted Quantity						0.000 kg	
	Net Total Quantity						117.700 kg	
	Say 117.700 kg @ Rs 120.54 / kg						Rs 14187.56	
SI No	Description	No	L	B	D	CF	Quantity	Remark
10DG Room (Cost Index:36.44 %)								
1	2.8.1 Earth work in excavation by mechanical means (Hydraulic excavator) /manual means in foundation trenches or drains (not exceeding 1.5 m in width or 10 sqm on plan), including dressing of sides and ramming of bottoms, lift up to 1.5 m, including getting out the excavated soil and disposal of surplus excavated soil as directed, within a lead of 50 m.All kinds of soil							
	Foundation	1	4.6*4	0.600	0.700		7.728	
	Total Quantity						7.728 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						7.728 cum	
	Say 7.728 cum @ Rs 298.80 / cum						Rs 2309.13	
2	4.1.8 Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:4:8 (1 cement : 4 coarse sand : 8 graded stone aggregate 40 nominal size)							
	Foundation	1	4.6*4	0.600	0.100		1.104	
	Total Quantity						1.104 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						1.104 cum	
	Say 1.104 cum @ Rs 6857.61 / cum						Rs 7570.80	
3	7.1.1 Random rubble masonry with hard stone in foundation and plinth including levelling up with cement concrete 1:6:12 (1 cement : 6 coarse sand : 12 graded stone aggregate 20 mm nominal size) up to plinth level with:Cement mortar 1:6 (1 cement : 6 coarse sand)							
	Foundation	1	4.6*4	0.600	0.600		6.624	
	Basement	1	4.45*4	0.450	0.300		2.403	
	Total Quantity						9.027 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						9.027 cum	

	Say 9.027 cum @ Rs 7249.94 / cum						Rs 65445.21	
4	5.9.5 Centering and shuttering including strutting, etc. and removal of form for:Lintels, beams, plinth beams, girders bressumers and cantilevers							
	Plinth Belt	4*4	4.200		0.200		13.441	
	Lintel	4*4	4.200		0.150		10.080	
	Shade	3	1.700		0.600		3.060	
	„	1	2.400		0.600		1.440	
	Total Quantity						28.021 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						28.021 sqm	
	Say 28.021 sqm @ Rs 653.89 / sqm						Rs 18322.65	
5	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 work upto plinth level							
	Plinth beam	4	4.200	0.250	0.150		0.630	
	Lintel	4	4.200	0.200	0.150		0.504	
	Shade	3	1.500	0.600	0.100		0.270	
	„	1	2.200	0.600	0.100		0.132	
	Total Quantity						1.536 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						1.536 cum	
	Say 1.536 cum @ Rs 9947.98 / cum						Rs 15280.10	
6	5.9.20 Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform with water proof ply 12 mm thick							
	Slab	1	4.000	4.000			16.000	
	Proj.	4	5.000	0.600			12.000	
	Slab Edge	4	5.600	0.120			2.688	
	Total Quantity						30.688 sqm	

Total Deducted Quantity							0.000 sqm
Net Total Quantity							30.688 sqm
Say 30.688 sqm @ Rs 923.02 / sqm							Rs 28325.64
7	50.5.33.2 Providing and laying in position machine batched and machine mixed design mix M-20 grade cement concrete for reinforced cement concrete work, using cement content as per approved design mix, including pumping of concrete to site of laying but excluding the cost of centering, shuttering, finishing and reinforcement, including 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 Engineer-in-charge. Note:- Cement content considered in this item is @ 330 kg/cum. Excess or less cement used as per design mix is payable or recoverable separately. All work above plinth level upto floor V level						
	Roof	1	5.600	5.600	0.120		3.764
	Total Quantity						3.764 cum
	Total Deducted Quantity						0.000 cum
	Net Total Quantity						3.764 cum
	Say 3.764 cum @ Rs 11135.00 / cum						Rs 41912.14
8	50.6.7.2 Laterate masonry with neatly dressed laterate stone of size 40x20x15cm or nearest size in cement mortar 1:6 for super structure above plinth level up to floor two level including all cost of materials, labour charges etc.						
	wall	4	4.200	0.200	5.000		16.800
	Door	1	2.000	0.200	2.400		-0.960
	Window	3	1.200	0.200	1.500		-1.080
	Total Quantity						16.800 cum
	Total Deducted Quantity						-2.040 cum
	Net Total Quantity						14.760 cum
	Say 14.760 cum @ Rs 7968.75 / cum						Rs 117618.75
9	5.22.6 Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth level Thermo - Mechanically Treated bars of grade Fe-500D or more						
	@ 80 Kg/ Cum of CC	1	1.536+3.765		80.000		424.081
	Total Quantity						424.081 kilogram
	Total Deducted Quantity						0.000 kilogram
	Net Total Quantity						424.081 kilogram
	Say 424.081 kilogram @ Rs 98.92 / kilogram						Rs 41950.09

10	13.1.1 12 mm cement plaster of mix:1:4 (1 cement : 4 fine sand)							
	Outside-wall	4	4.400		5.000		88.000	
	Inside	4	4.000		5.000		80.000	
	Door	1*2	2.000		2.400		-9.600	
	Window	3	1.200		1.500		-5.399	
	Total Quantity						168.000 sqm	
	Total Deducted Quantity						-14.999 sqm	
	Net Total Quantity						153.001 sqm	
	Say 153.001 sqm @ Rs 316.06 / sqm						Rs 48357.50	
11	13.7.1 12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)							
	Roof Top	1	5.600	5.600			31.360	
	Total Quantity						31.360 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						31.360 sqm	
	Say 31.360 sqm @ Rs 403.73 / sqm						Rs 12660.97	
12	13.16.1 6 mm cement plaster of mix:1:3 (1 cement : 3 fine sand)							
	Roof slab	1	4.000	4.000			16.000	
	Proj.	4	5.000	0.600			12.000	
	Roof edge	4	5.600		0.120		2.688	
	Total Quantity						30.688 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						30.688 sqm	
	Say 30.688 sqm @ Rs 269.26 / sqm						Rs 8263.05	
13	11.41.2 Providing and laying vitrified floor tiles in different sizes (thickness to be specified by the manufacturer) with water absorption less than 0.08% and conforming to IS : 15622, of approved make, in all colours and shades, laid on 20 mm thick cement mortar 1:4(1 cement : 4 coarse sand), including grouting the joints with white cement and matching pigments etc., complete.Size of Tile 600 x 600 mm.							
	Floor	1	4.000	4.000			16.000	
	Skirting	1	16.000		0.100		1.600	
	Total Quantity						17.600 sqm	
	Total Deducted Quantity						0.000 sqm	

	Net Total Quantity						17.600 sqm	
	Say 17.600 sqm @ Rs 1777.34 / sqm						Rs 31281.18	
14	13.43.1 Applying one coat of water thinnable cement primer of approved brand and manufacture on wall surface:Water thinnable cement primer							
	Outside-wall	4	4.400		5.000		88.000	
	Inside	4	4.000		5.000		80.000	
	Door	1*2	2.000		2.400		-9.600	
	Window	3	1.200		1.500		-5.399	
	Roof slab	1	4.000	4.000			16.000	
	Proj.	4	5.000	0.600			12.000	
	Roof edge	4	5.600		0.120		2.688	
	Total Quantity						198.688 sqm	
	Total Deducted Quantity						-14.999 sqm	
	Net Total Quantity						183.689 sqm	
	Say 183.689 sqm @ Rs 71.09 / sqm						Rs 13058.45	
15	13.82.2 Wall painting with acrylic emulsion paint, having VOC (Volatile Organic Compound) content less than 50 grams/ litre, of approved brand and manufacture including applying additional coats wherever required, to achieve even shade and colour.Two coats							
	Outside-wall	4	4.400		5.000		88.000	
	Inside	4	4.000		5.000		80.000	
	Door	1*2	2.000		2.400		-9.600	
	Window	3	1.200		1.500		-5.399	
	Roof slab	1	4.000	4.000			16.000	
	Proj.	4	5.000	0.600			12.000	
	Roof edge	4	5.600		0.120		2.688	
	Total Quantity						198.688 sqm	
	Total Deducted Quantity						-14.999 sqm	
	Net Total Quantity						183.689 sqm	
	Say 183.689 sqm @ Rs 126.55 / sqm						Rs 23245.84	
16	10.4 Providing and fixing 1 mm thick M.S. sheet sliding- shutters, with frame and diagonal braces of 40x40x6 mm angle iron, 3 mm M.S. gusset plates at the junction and corners, 25 mm dia pulley, 40x40x6 mm angle and T-iron guide at the top and bottom respectively, including applying a priming coat of approved steel primer.							

	Window	3	1.200		1.500		5.400	
	Total Quantity						5.400 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						5.400 sqm	
	Say 5.400 sqm @ Rs 5912.90 / sqm						Rs 31929.66	
17	10.5.1 Providing and fixing 1 mm thick M.S. sheet door with frame of 40x40x6 mm angle iron and 3 mm M.S. gusset plates at the junctions and corners, all necessary fittings complete, including applying a priming coat of approved steel primer.Using M.S. angels 40x40x6 mm for diagonal braces							
	Door	1	2.000		2.400		4.800	
	Total Quantity						4.800 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						4.800 sqm	
	Say 4.800 sqm @ Rs 5244.96 / sqm						Rs 25175.81	
18	13.61.1 Painting with synthetic enamel paint of approved brand and manufacture to give an even shade:Two or more coats on new work							
	For window	3	1.200	1.500			5.400	
	Door	1	2.000	2.400		2.0	9.600	
	Total Quantity						15.000 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						15.000 sqm	
	Say 15.000 sqm @ Rs 143.94 / sqm						Rs 2159.10	
SI No	Description	No	L	B	D	CF	Quantity	Remark
11Centrifuge Building (Cost Index:36.44 %)								
1	2.8.1 Earth work in excavation by mechanical means (Hydraulic excavator) /manual means in foundation trenches or drains (not exceeding 1.5 m in width or 10 sqm on plan), including dressing of sides and ramming of bottoms, lift up to 1.5 m, including getting out the excavated soil and disposal of surplus excavated soil as directed, within a lead of 50 m.All kinds of soil							
	Column Footing	10	2.000	2.000	1.600		64.000	
	Total Quantity						64.000 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						64.000 cum	
	Say 64.000 cum @ Rs 298.80 / cum						Rs 19123.20	
2	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)							
	Column Footing	10	2.000	2.000	0.100		4.000	
	Plinth Beam bottm	3*3	3.130	0.350	0.100		0.986	
	„	2*2	2.800	0.350	0.100		0.392	
	„	2*2	2.980	0.350	0.100		0.418	
	Floor PCC	6	3.130	3.330	0.100		6.254	
	Total Quantity						12.050 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						12.050 cum	
	Say 12.050 cum @ Rs 7256.36 / cum						Rs 87439.14	
3	2.25 Filling available excavated 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.							
	inside plinth	6	3.130	3.330	0.350		21.889	
	Total Quantity						21.889 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						21.889 cum	
	Say 21.889 cum @ Rs 260.19 / cum						Rs 5695.30	
4	5.9.5 Centering and shuttering including strutting, etc. and removal of form for:Lintels, beams, plinth beams, girders bressumers and cantilevers							
	Plinth beam							
	PB1	3*6	3.130		0.450		25.353	
	PB2	2*4	2.800		0.450		10.080	
	PB3	2*2	6.200		0.450		11.160	
	GF beam							
	B1	3*3	3.130		0.950		26.762	
	B2	2*2	2.800		0.950		10.640	
	B3	2*2	2.980		1.350		16.093	
	Rs Beam	1	3.330		0.850		2.831	
	Shade	1	3.500		0.600		2.100	
	shade edge	2	0.600		0.100		0.120	

	FF beam							
	B1	3*3	3.130		0.900		25.353	
	B2	2*2	2.800		0.900		10.080	
	B3	2*2	2.980		1.350		16.093	
	Total Quantity						156.665 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						156.665 sqm	
	Say 156.665 sqm @ Rs 653.89 / sqm						Rs 102441.68	
5	5.9.1 Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete							
	Column Footing	10*4	1.800		0.150		10.800	
	Total Quantity						10.800 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						10.800 sqm	
	Say 10.800 sqm @ Rs 337.42 / sqm						Rs 3644.14	
6	5.9.6 Centering and shuttering including strutting, etc. and removal of form for:Columns, Pillars, Piers, Abutments, Posts and Struts							
	Column-GF Column	10	1.700		4.000		68.000	
	Column-FF Column	10	1.700		4.000		68.000	
	Total Quantity						136.000 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						136.000 sqm	
	Say 136.000 sqm @ Rs 869.05 / sqm						Rs 118190.80	
7	5.9.3 Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform							
	Slab							
	GF Slab	6	3.130	3.330			62.538	
	FF Slab	6	3.130	3.330			62.538	
	Ope. Side	1	8.660	0.150			1.299	
	Stair op	1	2.000	3.330			-6.660	
	Total Quantity						126.375 sqm	
	Total Deducted Quantity						-6.660 sqm	

	Net Total Quantity						119.715 sqm	
	Say 119.715 sqm @ Rs 820.89 / sqm						Rs 98272.85	
8	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 work upto plinth level							
	Column footing-raft							
	Column Footing	10	1.800	1.800	0.150		4.860	
	Isolated Portion	10/3	1.800	1.800	0.750		8.101	
	Grad Slab	6	3.330	3.130	0.150		9.381	
	Column footing-Column							
	Column Pedestal	10	0.250	0.600	0.400		0.600	
	Plinth beam							
	PB1	3*3	3.130	0.250	0.450		3.170	
	PB2	2*2	2.800	0.250	0.450		1.260	
	PB3	2*2	3.980	0.250	0.450		1.791	
	Total Quantity						29.163 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						29.163 cum	
	Say 29.163 cum @ Rs 9947.98 / cum						Rs 290112.94	
9	50.5.33.2 Providing and laying in position machine batched and machine mixed design mix M-20 grade cement concrete for reinforced cement concrete work, using cement content as per approved design mix, including pumping of concrete to site of laying but excluding the cost of centering, shuttering, finishing and reinforcement, including 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 Engineer-in-charge.Note:- Cement content considered in this item is @ 330 kg/cum. Excess or less cement used as per design mix is payable or recoverable separately. All work above plinth level upto floor V level							
	Slab							
	GF	4	4.700	5.800	0.150		16.357	
	FF (Roof)	4	4.700	5.800	0.120		13.085	

	Slab Proj.	1	38.000	0.600	0.100		2.281	
	RS beam	1	3.330	0.200	0.300		0.200	
	Shade	1	3.500	0.600	0.100		0.211	
	Stair case Portion	1	2.000	3.330	0.150		-0.999	
	Total Quantity						32.134 cum	
	Total Deducted Quantity						-0.999 cum	
	Net Total Quantity						31.135 cum	
	Say 31.135 cum @ Rs 11135.00 / cum						Rs 346688.23	
10	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							
	Column-GF							
	GF Column	10	0.250	0.600	4.000		6.000	
	Beam-GF							
	B1	3*3	3.130	0.250	0.350		2.465	
	B2	2*2	2.800	0.250	0.350		0.980	
	B3	2*2	2.980	0.250	0.550		1.639	
	Column-FF							
	FF Column	10	0.250	0.600	4.000		6.000	
	Beam-FF							
	B1	3*3	3.130	0.250	0.350		2.465	
	B2	2*2	2.800	0.250	0.350		0.980	
	B3	2*2	2.980	0.250	0.550		1.639	
	Total Quantity						22.168 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						22.168 cum	
	Say 22.168 cum @ Rs 11610.43 / cum						Rs 257380.01	
11	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							
	@120 Kg / Cum of Concrete Qty , ie	1	22.168+31.14+29.16 3		120.000		9896.520	
	Total Quantity						9896.520 kilogram	
	Total Deducted Quantity						0.000 kilogram	
	Net Total Quantity						9896.520 kilogram	
	Say 9896.520 kilogram @ Rs 98.92 / kilogram						Rs 978963.76	
12	50.6.7.2 Laterate masonry with neatly dressed laterate stone of size 40x20x15cm or nearest size in cement mortar 1:6 for super structure above plinth level up to floor two level including all cost of materials, labour charges etc.							
	Wall- GF &&& FF							
	GF wall	5	3.130	0.200	3.650		11.425	
	„	4	2.800	0.200	3.650		8.176	
	Over Rs	1	3.130	0.200	0.350		0.220	
	FF Wall	6	3.130	0.200	3.650		13.710	
	„	4	2.800	0.200	3.650		8.176	
	Total Quantity						41.707 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						41.707 cum	
	Say 41.707 cum @ Rs 7968.75 / cum						Rs 332352.66	
13	11.41.2 Providing and laying vitrified floor tiles in different sizes (thickness to be specified by the manufacturer) with water absorption less than 0.08% and conforming to IS : 15622, of approved make, in all colours and shades, laid on 20 mm thick cement mortar 1:4(1 cement : 4 coarse sand), including grouting the joints with white cement and matching pigments etc., complete.Size of Tile 600 x 600 mm.							
	Floor Finishing	1	10.000	7.000			70.000	
	Total Quantity						70.000 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						70.000 sqm	
	Say 70.000 sqm @ Rs 1777.34 / sqm						Rs 124413.80	
14	13.1.1 12 mm cement plaster of mix:1:4 (1 cement : 4 fine sand)							
	GF Plastering							
	inside wall	2	10.000		4.000		80.000	

	„	2	7.000		4.000		56.000	
	Column Portion	2*4	0.350		4.000		11.200	
	FF Inside	2	10.000		4.000		80.000	
	„	2	7.000		4.000		56.000	
	Column Portion	2*4	0.350		4.000		11.200	
	Out Side wall	2	10.400		8.750		182.000	
		2	7.400		8.750		129.500	
	Rolling Shutter	2	3.130		3.000		-18.780	
	Total Quantity						605.900 sqm	
	Total Deducted Quantity						-18.780 sqm	
	Net Total Quantity						587.120 sqm	
	Say 587.120 sqm @ Rs 316.06 / sqm						Rs 185565.15	
15	13.7.1 12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)							
	Roof Top	1	11.600	8.600			99.760	
	Total Quantity						99.760 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						99.760 sqm	
	Say 99.760 sqm @ Rs 403.73 / sqm						Rs 40276.10	
16	13.16.1 6 mm cement plaster of mix:1:3 (1 cement : 3 fine sand)							
	slab-							
	GF	1	10.000	7.000			70.000	
	Beam Side	3*2	3.130	0.350			6.573	
	„	4*2	2.980	0.550			13.112	
	FF	1	10.000	7.000			70.000	
	„Beam Side	3*2	3.130	0.350			6.573	
	„	4*2	2.980	0.550			13.112	
	Slab Prj.	1	38.000	0.600			22.800	
	Edge	1	40.400	0.120			4.848	
	Total Quantity						207.018 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						207.018 sqm	

	Say 207.018 sqm @ Rs 269.26 / sqm						Rs 55741.67	
17	13.43.1 Applying one coat of water thinnable cement primer of approved brand and manufacture on wall surface:Water thinnable cement primer							
	GF Plastering							
	inside wall	2	10.000		4.000		80.000	
	„	2	7.000		4.000		56.000	
	Column Portion	2*4	0.350		4.000		11.200	
	FF Inside	2	10.000		4.000		80.000	
	„	2	7.000		4.000		56.000	
	Column Portion	2*4	0.350		4.000		11.200	
	Out Side wall	2	10.400		8.750		182.000	
		2	7.400		8.750		129.500	
	Rolling Shutter	2	3.130		3.000		-18.780	
	slab-							
	GF	1	10.000	7.000			70.000	
	Beam Side	3*2	3.130	0.350			6.573	
	„	4*2	2.980	0.550			13.112	
	FF	1	10.000	7.000			70.000	
	„Beam Side	3*2	3.130	0.350			6.573	
	„	4*2	2.980	0.550			13.112	
	Slab Prj.	1	38.000	0.600			22.800	
	Edge	1	40.400	0.120			4.848	
	Total Quantity						812.918 sqm	
	Total Deducted Quantity						-18.780 sqm	
	Net Total Quantity						794.138 sqm	
	Say 794.138 sqm @ Rs 71.09 / sqm						Rs 56455.27	
18	13.82.2 Wall painting with acrylic emulsion paint, having VOC (Volatile Organic Compound) content less than 50 grams/ litre, of approved brand and manufacture including applying additional coats wherever required, to achieve even shade and colour.Two coats							
	GF Plastering							
	inside wall	2	10.000		4.000		80.000	
	„	2	7.000		4.000		56.000	

	Column Portion	2*4	0.350		4.000		11.200	
	FF Inside	2	10.000		4.000		80.000	
	„	2	7.000		4.000		56.000	
	Column Portion	2*4	0.350		4.000		11.200	
	Out Side wall	2	10.400		8.750		182.000	
		2	7.400		8.750		129.500	
	Rolling Shutter	2	3.130		3.000		-18.780	
	slab-							
	GF	1	10.000	7.000			70.000	
	Beam Side	3*2	3.130	0.350			6.573	
	„	4*2	2.980	0.550			13.112	
	FF	1	10.000	7.000			70.000	
	„Beam Side	3*2	3.130	0.350			6.573	
	„	4*2	2.980	0.550			13.112	
	Slab Prj.	1	38.000	0.600			22.800	
	Edge	1	40.400	0.120			4.848	
	Total Quantity						812.918 sqm	
	Total Deducted Quantity						-18.780 sqm	
	Net Total Quantity						794.138 sqm	
	Say 794.138 sqm @ Rs 126.55 / sqm						Rs 100498.16	
19	10.25.1 Item Shifted to Sub head 14 as item 14.73Item Shifted to head 14 as item 14.74Steel work welded in built up sections/framed work, including cutting, hoisting, fixing in position and applying a priming coat of approved steel primer using structural steel etc. as required.In stringers, treads,landings etc. of stair cases, including use of chequered plate wherever required, all complete							
	Stair - using MS Channel, MS Angle and MS Flat							
	Stair - Flight	2	2.500	0.900		30.0	135.000	
	Stair landing	1	2.000	1.000		30.0	60.000	
	Hand rails	1	9.000		0.900	15.0	121.500	
	Hand rail - Floor op side	1	5.500		0.900	15.0	74.250	
	Total Quantity						390.750 kg	
	Total Deducted Quantity						0.000 kg	
	Net Total Quantity						390.750 kg	

	Say 390.750 kg @ Rs 110.93 / kg						Rs 43345.90	
20	10.6.2 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.80x1.20 mm M.S. laths with 1.20 mm thick top cover							
	GF Rolling shutter	1	3.130	3.000			9.390	
	Total Quantity						9.390 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						9.390 sqm	
	Say 9.390 sqm @ Rs 3320.81 / sqm						Rs 31182.41	
21	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							
	Stair - using MS Channel, MS Angle and MS Flat							
	Stair - Flight	2	2.500	0.900		2.0	9.000	
	Stair landing	1	2.000	1.000		2.0	4.000	
	Hand rails	1	9.000		0.900		8.100	
	Hand rail - Floor op side	1	5.500		0.900		4.950	
	Rolling shutter	1	3.130		3.000	2.5	23.475	
	Total Quantity						49.525 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						49.525 sqm	
	Say 49.525 sqm @ Rs 149.06 / sqm						Rs 7382.20	
SI No	Description	No	L	B	D	CF	Quantity	Remark
12PSF/ACF Foundation (Cost Index:36.44 %)								
1	2.6.1 Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed.All kinds of soil							
		1	16.200	8.200	0.300		39.852	

	Total Quantity						39.852 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						39.852 cum	
	Say 39.852 cum @ Rs 215.37 / cum						Rs 8582.93	
2	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)							
		1	16.200	8.200	0.150		19.926	
	Total Quantity						19.926 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						19.926 cum	
	Say 19.926 cum @ Rs 7256.36 / cum						Rs 144590.23	
3	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 work upto plinth level							
		1	16.000	8.000	0.300		38.400	
	Total Quantity						38.400 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						38.400 cum	
	Say 38.400 cum @ Rs 9947.98 / cum						Rs 382002.43	
4	5.9.1 Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete							
		1	48.000		0.300		14.400	
	Total Quantity						14.400 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						14.400 sqm	
	Say 14.400 sqm @ Rs 337.42 / sqm						Rs 4858.85	
5	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							
		1	38.400		40.000		1536.000	
	Total Quantity						1536.000 kilogram	
	Total Deducted Quantity						0.000 kilogram	
	Net Total Quantity						1536.000 kilogram	
	Say 1536.000 kilogram @ Rs 98.92 / kilogram						Rs 151941.12	
6	13.7.1 12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)							
		1	16.000	8.000			128.000	
		1	48.000	0.300			14.400	
	Total Quantity						142.400 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						142.400 sqm	
	Say 142.400 sqm @ Rs 403.73 / sqm						Rs 57491.15	
SI No	Description	No	L	B	D	CF	Quantity	Remark
13Sludge Shed (Cost Index:36.44 %)								
1	2.8.1 Earth work in excavation by mechanical means (Hydraulic excavator) /manual means in foundation trenches or drains (not exceeding 1.5 m in width or 10 sqm on plan), including dressing of sides and ramming of bottoms, lift up to 1.5 m, including getting out the excavated soil and disposal of surplus excavated soil as directed, within a lead of 50 m.All kinds of soil							
	Column Footing	4	1.700	1.700	1.600		18.496	
	Total Quantity						18.496 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						18.496 cum	
	Say 18.496 cum @ Rs 298.80 / cum						Rs 5526.60	
2	4.1.8 Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:4:8 (1 cement : 4 coarse sand : 8 graded stone aggregate 40 nominal size)							
	Column Footing	4	1.700	1.700	0.100		1.156	
	Floor PCC	1	5.000	5.000	0.100		2.500	
	Plinth Bottom	2	5.000	0.350	0.100		0.351	
	„	2	4.600	0.350	0.100		0.322	
	Total Quantity						4.329 cum	

Total Deducted Quantity								0.000 cum
Net Total Quantity								4.329 cum
Say 4.329 cum @ Rs 6857.61 / cum								Rs 29686.59
3	2.25 Filling available excavated 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.							
	Plinth inside filling	1	5.000	5.000	0.350		8.750	
	Total Quantity							8.750 cum
	Total Deducted Quantity							0.000 cum
	Net Total Quantity							8.750 cum
	Say 8.750 cum @ Rs 260.19 / cum							Rs 2276.66
4	50.6.7.1 Laterate masonry with neatly dressed laterate stone of size 40x20x15cm or nearest size in cement mortar 1:6 for foundation and basement including all cost of materials, labour charges etc.							
	Outer wall	2	5.000	0.200	4.300		8.600	
	„	2	4.600	0.200	4.300		7.912	
	Rolling shutter	1	2.400	0.200	3.000		-1.440	
	Total Quantity							16.512 cum
	Total Deducted Quantity							-1.440 cum
	Net Total Quantity							15.072 cum
	Say 15.072 cum @ Rs 7216.83 / cum							Rs 108772.06
5	50.5.33.2 Providing and laying in position machine batched and machine mixed design mix M-20 grade cement concrete for reinforced cement concrete work, using cement content as per approved design mix, including pumping of concrete to site of laying but excluding the cost of centering, shuttering, finishing and reinforcement, including 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 Engineer-in-charge. Note:- Cement content considered in this item is @ 330 kg/cum. Excess or less cement used as per design mix is payable or recoverable separately. All work above plinth level upto floor V level							
	Column							
	Column	4	0.200	0.400	4.500		1.441	
	Lintel							
	over wall	2	4.600	0.200	0.200		0.368	
	„	1	5.000	0.200	0.200		0.200	
	„	1	5.000	0.200	0.300		0.300	

	shade	1	5.400	0.600	0.100		0.325	
	Tile beam	2	5.000	0.200	0.200		0.400	
	„	2	4.600	0.200	0.200		0.368	
	Total Quantity						3.402 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						3.402 cum	
	Say 3.402 cum @ Rs 11135.00 / cum						Rs 37881.27	
6	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 work upto plinth level							
	Column footing-raft							
	Column Footing	4	1.500	1.500	0.150		1.350	
	Isolated Portion	4/3	1.500	1.500	0.350		1.050	
	Column footing-Column							
	Column Pedestal	4	0.200	0.400	0.900		0.289	
	Plinth beam							
	PB1	2	5.000	0.200	0.450		0.900	
	PB2	2	4.600	0.200	0.450		0.828	
	Total Quantity						4.417 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						4.417 cum	
	Say 4.417 cum @ Rs 9947.98 / cum						Rs 43940.23	
7	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							
	@100 Kg / Cum of Concrete Qty , ie	1	3.402+4.417			100.0	781.900	
	Total Quantity						781.900 kilogram	
	Total Deducted Quantity						0.000 kilogram	

	Net Total Quantity						781.900 kilogram	
	Say 781.900 kilogram @ Rs 98.92 / kilogram						Rs 77345.55	
8	5.9.1 Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete							
	Column footing	4*4	1.500	0.150			3.600	
	Total Quantity						3.600 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						3.600 sqm	
	Say 3.600 sqm @ Rs 337.42 / sqm						Rs 1214.71	
9	5.9.6 Centering and shuttering including strutting, etc. and removal of form for:Columns, Pillars, Piers, Abutments, Posts and Struts							
	Column	4	1.200		4.500		21.600	
	Total Quantity						21.600 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						21.600 sqm	
	Say 21.600 sqm @ Rs 869.05 / sqm						Rs 18771.48	
10	5.9.5 Centering and shuttering including strutting, etc. and removal of form for:Lintels, beams, plinth beams, girders bressumers and cantilevers							
	Lintel							
	over wall	2*2	4.600		0.200		3.680	
	„	1*2	5.000		0.200		2.000	
	„	1*2	5.000		0.300		3.000	
	Bottom	1	2.400	0.200			0.480	
	shade	1	5.600	0.600			3.360	
	Tile beam	2*2	5.000		0.200		4.000	
	„	2*2	4.600		0.200		3.680	
	Plinth beam							
	PB1	2*2	5.000		0.450		9.000	
	PB2	2*2	4.600		0.450		8.280	
	Total Quantity						37.480 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						37.480 sqm	

	Say 37.480 sqm @ Rs 653.89 / sqm						Rs 24507.80	
11	12.1.1 Providing corrugate G.S. sheet roofing including vertical/ curved surface fixed with polymer coated J or L hooks, bolts and nuts 8 mm diameter with bitumen and G.I. limpet washers or with G.I. limpet washers filled with white lead, including a coat of approved steel primer and two coats of approved paint on overlapping of sheets complete (up to any pitch in horizontal / vertical or curved surfaces), excluding the cost of purlins, rafters and trusses and including cutting to size and shape wherever required.1.00 mm thick with zinc coating not less than 275 gm/m2							
	Roofing	2	4.000	6.600			52.800	
	Total Quantity						52.800 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						52.800 sqm	
	Say 52.800 sqm @ Rs 1461.95 / sqm						Rs 77190.96	
12	13.1.1 12 mm cement plaster of mix:1:4 (1 cement : 4 fine sand)							
	inside wall	4	5.000	4.500			90.000	
	outside wall	4	5.400	4.500			97.200	
	basement	4	5.400	0.300			6.480	
	Tie beam top	4	5.200	0.200			4.160	
	Rolling shutter	2	2.400	3.000			-14.399	
	Total Quantity						197.840 sqm	
	Total Deducted Quantity						-14.399 sqm	
	Net Total Quantity						183.441 sqm	
	Say 183.441 sqm @ Rs 316.06 / sqm						Rs 57978.36	
13	13.9.2 Cement plaster 1:3 (1 cement : 3 coarse sand) finished with a floating coat of neat cement.20 mm cement plaster							
	Floor finishing	1	5.000	5.000			25.000	
	Total Quantity						25.000 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						25.000 sqm	
	Say 25.000 sqm @ Rs 545.69 / sqm						Rs 13642.25	
14	10.2 Structural steel work riveted, bolted or welded in built up sections, trusses and framed work, including cutting, hoisting, fixing in position and applying a priming coat of approved steel primer all complete.							

	For truss - 75x75mm IS angle	4*2	3.800			6.78	206.112	
	Horizontal Tie,	4*2	5.400			6.78	292.896	
	Brazing 45x45 mm MS Angle	4*2	2.000			3.95	63.200	
	„	4*4	1.000			3.95	63.200	
	„ Vertical	4*1	2.000			3.95	31.600	
	Purlin 50x50 mm MS Tub 16g	2*5	6.500			4.42	287.300	
	Total Quantity						944.308 kg	
	Total Deducted Quantity						0.000 kg	
	Net Total Quantity						944.308 kg	
	Say 944.308 kg @ Rs 120.54 / kg						Rs 113826.89	
15	13.43.1 Applying one coat of water thinnable cement primer of approved brand and manufacture on wall surface:Water thinnable cement primer							
	inside wall	4	5.000	4.500			90.000	
	outside wall	4	5.400	4.500			97.200	
	basement	4	5.400	0.300			6.480	
	Tie beam top	4	5.200	0.200			4.160	
	Rolling shutter	2	2.400	3.000			-14.399	
	Total Quantity						197.840 sqm	
	Total Deducted Quantity						-14.399 sqm	
	Net Total Quantity						183.441 sqm	
	Say 183.441 sqm @ Rs 71.09 / sqm						Rs 13040.82	
16	13.82.2 Wall painting with acrylic emulsion paint, having VOC (Volatile Organic Compound) content less than 50 grams/ litre, of approved brand and manufacture including applying additional coats wherever required, to achieve even shade and colour.Two coats							
	inside wall	4	5.000	4.500			90.000	
	outside wall	4	5.400	4.500			97.200	
	basement	4	5.400	0.300			6.480	
	Tie beam top	4	5.200	0.200			4.160	
	Rolling shutter	2	2.400	3.000			-14.399	
	Total Quantity						197.840 sqm	

	Total Deducted Quantity						-14.399 sqm	
	Net Total Quantity						183.441 sqm	
	Say 183.441 sqm @ Rs 126.55 / sqm						Rs 23214.46	
17	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							
	Rolling Shutter	1	2.400	3.000		2.5	18.000	
	Truss work	4*1/2	5.400	2.000		0.5	10.800	
	Purline	2*5	5.800	0.200			11.600	
	Total Quantity						40.400 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						40.400 sqm	
	Say 40.400 sqm @ Rs 149.06 / sqm						Rs 6022.02	
SI No	Description	No	L	B	D	CF	Quantity	Remark
14LANDSCAPING AND GREENBELT FORMATION AROUND THE STP SITE								
Lump-Sum Total						Rs 300000.00		
SI No	Description	No	L	B	D	CF	Quantity	Remark
15Providing Odour Controle System								
Lump-Sum Total						Rs 8000000.00		
SI No	Description	No	L	B	D	CF	Quantity	Remark
16Supplying and Installing Solar panel with all accessories at STP								
Lump-Sum Total						Rs 2500000.00		
SI No	Description	No	L	B	D	CF	Quantity	Remark
17Provision for Automating entire plant by SCADA sYSTEM								
Lump-Sum Total						Rs 2500000.00		
Total						41886420.43		
Centage @						10.0%		
Centage Amount						4188642.04		
Provision for GST payments (in %) @						18.0%		
Amount reserved for GST payments						7539555.68		
Total & Centage						53614618.14		
Lumpsum for round off						0.00		
GRAND TOTAL Rs						53614618.14		

Rounded Grand Total Rs 5,36,14,618

Rupees Five Crore Thirty Six Lakh Fourteen Thousand Six Hundred and Eighteen Only



Kerala Water Authority

P R I C E

General Abstract

**SEWERAGE SCHEME TO MANANTHAVADY MUNICIPALITY - CONSTRUCTION
OF 2MLD CAPACITY SEWAGE TREATMENT PLANT AND LAYING SEWERAGE
NETWORK- ELECTROMECHANICAL**

(Dsr year: **2018**)

SI No	Heading Description	Amount
1	MECHANICAL WORKS	20156099.31
2	ELECTRICAL WORKS	10084198.98
3	Charges for Power allocation to KSEB and power extension by cable	8000000.00
4	Tools and Plants	200000.00
Total		38440298.30
Centage @		10.0%
Centage Amount		3844029.83
Provision for GST payments (in %) @		18.0%
Amount reserved for GST payments		6919253.69
Total & Centage		49203581.82
Lumpsum for round off		0.00
GRAND TOTAL Rs		49203581.82
Rounded Grand Total Rs		4,92,03,582
Rupees Four Crore Ninety Two Lakh Three Thousand Five Hundred and Eighty Two Only		

Detailed Estimate

SEWERAGE SCHEME TO MANANTHAVADY MUNICIPALITY - CONSTRUCTION OF 2MLD CAPACITY SEWAGE TREATMENT PLANT AND LAYING SEWERAGE NETWORK- ELECTROMECHANICAL

(Dsor year: **2018**)

SI No	Description	No	L	B	D	CF	Quantity	Remark
1MECHANICAL WORKS (Cost Index:36.44 %)								
1	od345428/2021_2022 Supply at site,erection, testing and commissioning of self priming, non clog centrifugal submersible sewage transfer pump for rated continuous duty and efficiency (from reputed manufacturers complying to IS 1520 and conforming to other relevant standards), CI construction, bronze impeller,complete with 3 phase motor, SS shaft, with automatic pedestal coupling, delivery bend, required wire chain, washers, SS bolts etc including Double Flange DI/CI PN 1 rating sluice valves, Pressure gauges, Double Flange DI/CI PN 1 rating NRVs with DI/I/Pipes connecting common delivery suitable for operation on 415 /-10% volts, 50 HZ, AC power supply etc. complete in all respects with detachable arrangements, level indicators for automatic switch on & switch off as required by the standard specifications complete with all accessories as per technical specification or as directed by Engineer In Charge.Pumps shall have dry run protection & high/ low level alarm. Electrical Control panel shall be supplied with the pump as per the specifications in the Electrical BOQ Three phase Motor with IP 68 protection (1W 1S)"- Raw Sewage Transfer Pump							
		2					2.000	
						Total Quantity	2.000 No	
						Total Deducted Quantity	0.000 No	
						Net Total Quantity	2.000 No	
						Say 2.000 No @ Rs 817696.00 / No	Rs 1635392.00	
2	od345430/2021_2022 Supply at site,erection, testing and commissioning of self priming, non clog centrifugal submersible sewage transfer pump for rated continuous duty and efficiency (from reputed manufacturers complying to IS 1520 and conforming to other relevant standards), CI construction, bronze impeller,complete with 3 phase motor, SS shaft, with automatic pedestal coupling, delivery bend, required wire chain, washers, SS bolts etc including Double Flange DI/CI PN 1 rating sluice valves, Pressure gauges, Double Flange DI/CI PN 1 rating NRVs with DI/I/Pipes connecting common delivery suitable for operation on 415 /-10% volts, 50 HZ, AC power supply etc. complete in all respects with detachable arrangements, level indicators for automatic switch on & switch off as required by the standard specifications complete with all accessories as per technical specification or as directed by Engineer In Charge.Pumps shall have dry run protection & high/ low level alarm. Electrical Control panel shall be supplied with the pump as per the specifications in the Electrical BOQ Motor : three phase motor with IP 68 Protection"-Pump for septage tank to inlet							
		2					2.000	
						Total Quantity	2.000 No	

	Total Deducted Quantity							0.000 No
	Net Total Quantity							2.000 No
	Say 2.000 No @ Rs 39491.00 / No							Rs 78982.00
3	od345432/2021_2022 Supply,erection, testing and commissioning of direct driven floating mixers of approximately 4HP or as required with the rotating arm for rated continuous duty mixing and efficiency, complete set with 3 phase motor, including rotary paddles, gear box, cables, wall mooring and anchoring system with all electro mechancial equipments etc complete for the equalization tank . Electrical Control panel shall be supplied with the pump as per the specifications in the Electrical BOQ or as directed by the Engineer in Charge 							
		2					2.000	
	Total Quantity							2.000 No
	Total Deducted Quantity							0.000 No
	Net Total Quantity							2.000 No
	Say 2.000 No @ Rs 139380.00 / No							Rs 278760.00
4	od345433/2021_2022 Supply at site,erection, testing and commissioning of self priming, non clog centrifugal submersible sewage transfer pump for rated continuous duty and efficiency (from reputed manufacturers complying to IS 1520 and conforming to other relevant standards), CI construction, bronze impeller,complete with 3 phase motor, SS shaft, with automatic pedestal coupling, delivery bend, required wire chain, washers, SS bolts etc including Double Flange DI/CI PN 1 rating sluice valves, Pressure gauges, Double Flange DI/CI PN 1 rating NRVs with DI/I/Pipes connecting common delivery suitable for operation on 415 +/-10% volts, 50 HZ, AC power supply etc. complete in all respects with detachable arrangements, level indicators for automatic switch on & switch off as required by the standard specifications complete with all accessories as per technical specification or as directed by Engineer In Charge.Pumps shall have dry run protection & high/ low level alarm. Electrical Control panel shall be supplied with the pump as per the specifications in the Electrical BOQ Motor : three phase motor with IP 68 Protection"-Sludge Thickener Feed Pump & Clarifier to sludge sump							
	Sludge Thickener Feed Pump	2					2.000	
	Clarifier to sludge sump	2					2.000	
	Total Quantity							4.000 No
	Total Deducted Quantity							0.000 No
	Net Total Quantity							4.000 No
	Say 4.000 No @ Rs 87112.50 / No							Rs 348450.00
5	od345436/2021_2022 Supply at site,erection, testing and commissioning of self priming, non clog centrifugal submersible sewage transfer pump for rated continuous duty and efficiency (from reputed manufacturers complying to IS 1520 and conforming to other relevant standards). CI construction, bronze impeller,complete with 3							

	phase motor, SS shaft, with automatic pedestal coupling, delivery bend, required wire chain, washers, SS bolts etc including Double Flange DI/CI PN 1 rating sluice valves, Pressure gauges, Double Flange DI/CI PN 1 rating NRVs with DI/I/Pipes connecting common delivery suitable for operation on 415 /-10% volts, 50 HZ, AC power supply etc. complete in all respects with detachable arrangements, level indicators for automatic switch on & switch off as required by the standard specifications complete with all accessories as per technical specification or as directed by Engineer In Charge.Pumps shall have dry run protection & high/ low level alarm. Electrical Control panel shall be supplied with the pump as per the specifications in the Electrical BOQ Motor : three phase motor with IP 68 Protection"- Sludge transfer to centrifuge pump						
		2					2.000
	Total Quantity						2.000 No
	Total Deducted Quantity						0.000 No
	Net Total Quantity						2.000 No
	Say 2.000 No @ Rs 37168.00 / No						Rs 74336.00
6	od345437/2021_2022 Supply at site,erection, testing and commissioning of self priming, non clog centrifugal submersible sewage transfer pump for rated continuous duty and efficiency (from reputed manufacturers complying to IS 1520 and conforming to other relevant standards), CI construction, bronze impeller,complete with 3 phase motor, SS shaft, with automatic pedestal coupling, delivery bend, required wire chain, washers, SS bolts etc including Double Flange DI/CI PN 1 rating sluice valves, Pressure gauges, Double Flange DI/CI PN 1 rating NRVs with DI/I/Pipes connecting common delivery suitable for operation on 415 /-10% volts, 50 HZ, AC power supply etc. complete in all respects with detachable arrangements, level indicators for automatic switch on & switch off as required by the standard specifications complete with all accessories as per technical specification or as directed by Engineer In Charge.Pumps shall have dry run protection & high/ low level alarm. Electrical Control panel shall be supplied with the pump as per the specifications in the Electrical BOQ Motor : three phase motor with IP 68 Protection"-Centrate sump to equalisation tank Pump						
		2					2.000
	Total Quantity						2.000 No
	Total Deducted Quantity						0.000 No
	Net Total Quantity						2.000 No
	Say 2.000 No @ Rs 74336.00 / No						Rs 148672.00
7	od345439/2021_2022 Supplying and fixing of mono block centrifugal pump, for rated continuous duty and best efficiency CI construction, CI impeller, complete with 3 phase motor,FRP motor cover, pressure gauge, operation on 415 /-10% volts, 50 HZ, AC power supply etc including sluice valves, Pressure gauges, NRVs with DI/I/Pipes connecting common delivery suitable for complete in all respects as required by the standard specifications and shall suit following capacities complete with all accessories as per technical specification.Pumps shall have dry run protection & high/ low level alarm. Electrical Control panel shall be supplied with the pump as per the specifications in the Electrical BOQMotor : three phase motor with IP 68 Protection"- Pump for clarifier to PSF						

		2					2.000	
	Total Quantity						2.000 No	
	Total Deducted Quantity						0.000 No	
	Net Total Quantity						2.000 No	
	Say 2.000 No @ Rs 383295.00 / No						Rs 766590.00	
8	od345441/2021_2022 Supplying and fixing of mono block centrifugal pump, for rated continuous duty and best efficiency CI construction, CI impeller, complete with 3 phase motor,FRP motor cover, pressure gauge, operation on 415 /-10% volts, 50 HZ, AC power supply etc including sluice valves, Pressure gauges, NRVs with DI//Pipes connecting common delivery suitable for complete in all respects as required by the standard specifications and shall suit following capacities complete with all accessories as per technical specification.Pumps shall have dry run protection & high/ low level alarm. Electrical Control panel shall be supplied with the pump as per the specifications in the Electrical BOQ Motor : three phase motor with IP 68 Protection"- Treated water to septage tank							
		2					2.000	
	Total Quantity						2.000 No	
	Total Deducted Quantity						0.000 No	
	Net Total Quantity						2.000 No	
	Say 2.000 No @ Rs 76659.00 / No						Rs 153318.00	
9	od345443/2021_2022 "Air Blower Supply,erection, testing and commissioning of twin lobe air blower for indoor application complete with acoustic canopy, air filter, motor of 1500 rpm , pulleys, pressure gauges, pressure relief valve, acoustic hood, suction silencer with suitable flanges, common motor and compressor base frame with motor belt tightening arrangement interconnecting line with flanges including all accessories complete as per technical specification or as Directed by Engineer in Charge Capacity: 1800 m ³ /hr. Pressure: 0.6 kg/sqcm Motor : three phase motor with IP 68 Protection (2W + 1 S)" 90HP							
		2					2.000	
	Total Quantity						2.000 No	
	Total Deducted Quantity						0.000 No	
	Net Total Quantity						2.000 No	
	Say 2.000 No @ Rs 580750.00 / No						Rs 1161500.00	
10	od345446/2021_2022 "Bubble Diffuser for MBBR Tank Supplying at site, erection, testing & commissioning of Fine Bubble Diffuser (retrievable type using rope and pulley arrangement) for the aeration system of the MBBR Tansk (2Nos) with diffusers of sufficient size and length made of EPDM make with SS tee 1"" x 1 """, SS lifting hook 8 mm, SS foundation bolt 6 mm, SS C clamp suitable for 1"" O.D, hose, PP Rope, PP swivel nut, PP sleeve, Silicone Washer, SS hose clamp, RCC block complete at a minimum rating of 95m/hr as per technical specification or as directed by the Engineer in Charge"							

		2					2.000	
	Total Quantity						2.000 No	
	Total Deducted Quantity						0.000 No	
	Net Total Quantity						2.000 No	
	Say 2.000 No @ Rs 209070.00 / No						Rs 418140.00	
11	od345447/2021_2022 "Bubble Diffuser for Equalisation Tank Supplying at site, erection, testing & commissioning of Coarse Bubble Diffuser (retrievable type using rope and pulley arrangement) for the aeration system of the Equalization Tank with diffusers of sufficient size and length made of EPDM make with SS tee 1" x 1", SS lifting hook 8 mm, SS foundation bolt 6 mm, SS C clamp suitable for 1" O.D, hose, PP Rope, PP swivel nut, PP sleeve, Silicone Washer, SS hose clamp, RCC block complete at a minimum rating of 95m/hr as per technical specification or as directed by the Engineer in Charge"							
		2					2.000	
	Total Quantity						2.000 No	
	Total Deducted Quantity						0.000 No	
	Net Total Quantity						2.000 No	
	Say 2.000 No @ Rs 80724.25 / No						Rs 161448.50	
12	od345449/2021_2022 "Air Grid Pipe Supply and installation of air pipes (HDPE) aly into valves and other acessories as required for the blowers to various tanks as a complete unit"							
		1					1.000	
	Total Quantity						1.000 set	
	Total Deducted Quantity						0.000 set	
	Net Total Quantity						1.000 set	
	Say 1.000 set @ Rs 290375.00 / set						Rs 290375.00	
13	od345452/2021_2022 "MBBR Media Supplying and fixing of non- clogging freely moving biomass media of polypropylene construction Sp.Gravity 0.93 for MBBR reactor with surface area not less than 450m/m, length 16-20 mm, dia 22 mm complete as per technical specification or as directed by Engineer in Charge"							
		1				366.37	366.370	
	Total Quantity						366.370 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						366.370 cum	
	Say 366.370 cum @ Rs 10453.50 / cum						Rs 3829848.80	
14	od345454/2021_2022							

	"Gas Chlorinator system Supply at site, erection, testing and commissioning of electronic chlorine dosing system (gas filled Chlorine) with all wetted parts in PP construction suitable for pumping Chlorine gas including booster pumps, valves, suctions and delivery lines using heavy duty PVC tubes, gas line diffusers, emergency repair kit, FRP motor cover etc.complete with all accessories. Capacity : 500gm to 1kg/hr with 2nos of chlorine tonners"							
		2					2.000	
	Total Quantity						2.000 set	
	Total Deducted Quantity						0.000 set	
	Net Total Quantity						2.000 set	
	Say 2.000 set @ Rs 464600.00 / set						Rs 929200.00	
15	od345456/2021_2022 "Electromagnetic flow meter Supply, installation, testing and commissioning of electro magnetic/ Ultra Sonic D/F permanent conduit flow meter with flow recorder, digital flow indicator, flow integrator with sensors, 7digit totaliser, transmittal and digital display arrangements and all accessories including housing arrangements, internal data logger, to save upto 2000 linesof data etc. complete to fix as per the specifications . Flow range of 10 to 600LPS, One display shall be installed at the main control centre"							
		2					2.000	
	Total Quantity						2.000 No	
	Total Deducted Quantity						0.000 No	
	Net Total Quantity						2.000 No	
	Say 2.000 No @ Rs 87112.50 / No						Rs 174225.00	
16	od345457/2021_2022 "Lifting Mechanism for Air Grid Supply , installation & commissioning of the manually operating chain pulley mechanism to lift the equipments from a height not less than 5m including all equipments , foundation etc"							
		5					5.000	
	Total Quantity						5.000 No	
	Total Deducted Quantity						0.000 No	
	Net Total Quantity						5.000 No	
	Say 5.000 No @ Rs 11615.00 / No						Rs 58075.00	
17	od345458/2021_2022 "SS Gates Supplying at site, installation testing and commissioning of all materials, fabricating, fixing and commissioning of spindle operated open channel sluice gates/shutter of DI make with a peak flow of 145LPS and velocity less than 1m/s at the inleta and outlet of the screen channel to suit the channel sizes as per drawings, tender specifications and as directed by Engineer in Charge"							

		8					8.000	
	Total Quantity						8.000 set	
	Total Deducted Quantity						0.000 set	
	Net Total Quantity						8.000 set	
	Say 8.000 set @ Rs 17422.50 / set						Rs 139380.00	
18	od345459/2021_2022 "Mechanical Coarse Screen Supplying all materials, fabricating, fixing and commissioning of mechanical SS Screen Bar of following or nearest suitable size made of flats having 50mm x 10mm and 20mm clear space across the screen chamber channel (fixed type) at 70 inclination including cost of mechanical screen grab bucket and arrangement for automated scrapping clogged materials suitable for operation on 415+/-10% volts, 50 HZ, AC power supply etc. complete in all respects as required by the standard specifications complete with all accessories as per technical specification"							
		1					1.000	
	Total Quantity						1.000 set	
	Total Deducted Quantity						0.000 set	
	Net Total Quantity						1.000 set	
	Say 1.000 set @ Rs 69690.00 / set						Rs 69690.00	
19	od345460/2021_2022 "Mechanical Fine Screen Supplying all materials, fabricating, fixing and commissioning of mechanical SS Screen Bar of following or nearest suitable size made of flats having 50mm x 10mm and 6mm clear space across the screen chamber channel (fixed type) at 70 inclination including cost of mechanical screen grab bucket and arrangement for automated scrapping clogged materials suitable for operation on 415+/-10% volts, 50 HZ, AC power supply etc. complete in all respects as required by the standard specifications complete with all accessories as per technical specification"							
		1					1.000	
	Total Quantity						1.000 set	
	Total Deducted Quantity						0.000 set	
	Net Total Quantity						1.000 set	
	Say 1.000 set @ Rs 116150.00 / set						Rs 116150.00	
20	od345461/2021_2022 "Manual Coarse Screen Supplying all materials, fabricating, fixing and commissioning of Manual SS Screen Bar of following or nearest suitable size made of flats having 50mm x 10mm and 20mm clear space across the screen chamber channel (fixed type) at 45 inclination including cost of screen grab bucket and arrangement for manual scrapping clogged materials as per drawings, tender specifications and as directed by Engineer in Charge"							
		1					1.000	

				Total Deducted
				Net Total
				Say 2.000 No @ Rs 54590
2				
als, fabricating, fixing and commissioning of Bridge ake for the half diameter of the Clarifier Tank as per hanism with removable scrappers with sufficient nder specifications and as directed by Engineer				
1				Total
				Total Deducted

	"Poly Electrolyte dosing system Supplying and fixing of electronic dosing pump with all wetted parts in PP construction suitable for pumping Poly Electrolyte solution including cost of suitable agitators, control gears, valve, suction and delivery lines using heavy duty PVC tubes, HD, FRP motor cover etc. and complete with all accessories to prepare 5% solution of 0.2kg/hr"							
		2					2.000	
	Total Quantity							2.000 No
	Total Deducted Quantity							0.000 No
	Net Total Quantity							2.000 No
	Say 2.000 No @ Rs 92920.00 / No							Rs 185840.00
25	od345466/2021_2022 "High Pressure Jet Pump Supply and commissioning of portable high pressure water pumps (along with 500litre water tanks to supply water to the pumps) all mounted on a suitable medium vehicle platform for clearing the wells, pumps, and other equipments using high pressure gauges, safety arrangements etc complete as per standards"							
		1					1.000	
	Total Quantity							1.000 No
	Total Deducted Quantity							0.000 No
	Net Total Quantity							1.000 No
	Say 1.000 No @ Rs 34845.00 / No							Rs 34845.00
26	od345467/2021_2022 "Portable Hoist - 500kg Supply and commissioning of portable Monkey type Hoist with capacity upto 500kg, with lifting height of 6m, 5HP Motor, 415V 50Hz all mounted on a suitable medium vehicle platform for easy shifting of equipments and materials whenever required with complete set as per standards"							
		1					1.000	
	Total Quantity							1.000 No
	Total Deducted Quantity							0.000 No
	Net Total Quantity							1.000 No
	Say 1.000 No @ Rs 104535.00 / No							Rs 104535.00
27	od345468/2021_2022 "Wheel Barrow Supply of three wheel type wheel barrow of capacity 200ltrs"							
		1					1.000	
	Total Quantity							1.000 No
	Total Deducted Quantity							0.000 No

	Net Total Quantity							1.000 No
	Say 1.000 No @ Rs 29037.50 / No							Rs 29037.50
28	od345469/2021_2022 "Aluminium Ladder Supply, Installation of aluminium ladders with caging on each elevated structures of required height as per the drawings or as directed by the Engineer in Charges"							
		4					4.000	
	Total Quantity							4.000 No
	Total Deducted Quantity							0.000 No
	Net Total Quantity							4.000 No
	Say 4.000 No @ Rs 6969.00 / No							Rs 27876.00
29	od345470/2021_2022 "FRP Ladder Supply, Installation of FRP ladders with caging on each elevated structures of required height as per the drawings or as directed by the Engineer in Charges"							
		4					4.000	
	Total Quantity							4.000 No
	Total Deducted Quantity							0.000 No
	Net Total Quantity							4.000 No
	Say 4.000 No @ Rs 34845.00 / No							Rs 139380.00
30	od345471/2021_2022 "Monorail Crane Supply, Installation and commissioning in position mechanically operated mono rail crane of load bearing capacity of 2tonnes suitable for operation on 415+/-10% volts, 50 HZ, AC power supply etc. with 6m lift & span upto 20m complete in all respects as required by the standard specifications complete with all accessories as per technical specification"							
		1					1.000	
	Total Quantity							1.000 No
	Total Deducted Quantity							0.000 No
	Net Total Quantity							1.000 No
	Say 1.000 No @ Rs 406525.00 / No							Rs 406525.00
31	od345472/2021_2022 "Pressure sand filter Supply at site, erection and commissioning of pressure sand filter vertical type pressure vessel fabricated with MS construction with epoxy coating inside and anti corrosive treatment outside, two coats of paint outside (pain quality as instructed by Engineer) withstand a minimum test pressure of 7.0Kg/cm with as operating pressure of 3.5 Kg/cm, complete with valves and dual filter media including graded pebble and sand and antracite , frontal piping, butterfly valves, internals, pressure gauges, strainers, supporting structure, back wash arrangement, etc and all other accessories tested							

	twice the working pressure supported over pebble/gravel with inspection manholes etc complete as per specification or as directed by Engineer in Charge. The scope shall include complete piping with MS fabricated pipes and specials including valves Flow Rate:52 m3/hour Diameter - 2.4m. Height - 2.5m"							
		2					2.000	
	Total Quantity							2.000 No
	Total Deducted Quantity							0.000 No
	Net Total Quantity							2.000 No
	Say 2.000 No @ Rs 522675.00 / No							Rs 1045350.00
32	od345473/2021_2022 "Activated Carbon filter Supply at site, erection and commissioning of Activated Carbon filter vertical type pressure vessel fabricated with MS construction with epoxy coating inside and anti corrosive treatment outside, two coats of paint outside (pain quality as instructed by Engineer) withstand a minimum test pressure of 7.0Kg/cm with as operating pressure of 3.5 Kg/cm, complete with valves and filter media including activated carbon of approved grade and quality , frontal piping, butterfly valves, internals, pressure gauges, strainers, supporting structure, back wash arrangement, etc and all other accessories tested twice the working pressure supported over pebble/gravel with inspection manholes etc complete as per specification or as directed by Engineer in Charge. The scope shall include complete piping with MS fabricated pipes and specials including valves Flow rate - 52 m/hr. Diameter - 2.6m. Height - 2.5m"							
		2					2.000	
	Total Quantity							2.000 No
	Total Deducted Quantity							0.000 No
	Net Total Quantity							2.000 No
	Say 2.000 No @ Rs 551712.50 / No							Rs 1103425.00
33	od345474/2021_2022 "Centrifuge System Supply at site, installation and commissioning of filter press /centrifuge system. Filter Press shall be automated, recessed type press with SS fabricated structure pipe button surface and SS flat parallel bar, with PP cloth. Filter operations to be mechanical. Outlet cake consistency should not be more than 35% moisture. The capacity of the filter press shall be 1cum/hr. The Filter Press Unit shall be mounted on a platform and all around drain system to be provided to prevent the filtrate water from contaminating the entire surroundings as per the specifications or as directed by the engineer in charge"							
		2					2.000	
	Total Quantity							2.000 No
	Total Deducted Quantity							0.000 No
	Net Total Quantity							2.000 No
	Say 2.000 No @ Rs 348450.00 / No							Rs 696900.00
34	od345475/2021_2022							

	SLUDGE DEWATERING and Packing UNIT-Volute is a dewatering unit for convenient sludge dewatering.Machine is available for dry sludge (DS) output of 1.0kg/hr to 750kg/hr the Sludge to be dried from 70% moisture content to 10%.The similar type can be suggested.The Packing of the dried sludge to be packed in the packing machine.The necessary electrification civil works,cost of packing machine,cost of gunny bags for 6months.The machines suggested should be cost effective							
		2					2.000	
	Total Quantity						2.000 L.S	
	Total Deducted Quantity						0.000 L.S	
	Net Total Quantity						2.000 L.S	
	Say 2.000 L.S @ Rs 1200000.00 / L.S						Rs 2400000.00	
35	10.28 Providing and fixing stainless steel (Grade 304) railing made of Hollow tubes, channels, plates etc., including welding, grinding, buffing, polishing and making curvature (wherever required) and fitting the same with necessary stainless steel nuts and bolts complete, i/c fixing the railing with necessary accessories & stainless steel dash fasteners, stainless steel bolts etc., of required size on the top of the floor or the side of waist slab with suitable arrangement as per approval of Engineer-in-charge, (for payment purpose only weight of stainless steel members shall be considered excluding fixing accessories such as nuts, bolts, fasteners etc.)							
		1				8.0	8.000	
	Total Quantity						8.000 kg	
	Total Deducted Quantity						0.000 kg	
	Net Total Quantity						8.000 kg	
	Say 8.000 kg @ Rs 681.59 / kg						Rs 5452.72	
36	18.73.1 Providing and laying Double Flanged (Screwed / Welded) Centrifugally (Spun) Ductile Iron Pipes of Class K - 9 conforming to IS: 8329 :100 mm dia Ductile Iron Double Flanged							
		1	50.000				50.000	
	Total Quantity						50.000 metre	
	Total Deducted Quantity						0.000 metre	
	Net Total Quantity						50.000 metre	
	Say 50.000 metre @ Rs 1815.06 / metre						Rs 90753.00	
37	18.73.2 Providing and laying Double Flanged (Screwed / Welded) Centrifugally (Spun) Ductile Iron Pipes of Class K - 9 conforming to IS: 8329 :150 mm dia Ductile Iron Double Flanged							
		1	20.000				20.000	
	Total Quantity						20.000 metre	
	Total Deducted Quantity						0.000 metre	

							Net Total Quantity	20.000 metre
							Say 20.000 metre @ Rs 2722.86 / metre	Rs 54457.20
38	18.73.3	Providing and laying Double Flanged (Screwed / Welded) Centrifugally (Spun) Ductile Iron Pipes of Class K - 9 conforming to IS: 8329 :200 mm dia Ductile Iron Double Flanged						
		1	20.000				20.000	
							Total Quantity	20.000 metre
							Total Deducted Quantity	0.000 metre
							Net Total Quantity	20.000 metre
							Say 20.000 metre @ Rs 3436.45 / metre	Rs 68729.00
39	18.73.5	Providing and laying Double Flanged (Screwed / Welded) Centrifugally (Spun) Ductile Iron Pipes of Class K - 9 conforming to IS: 8329 :300 mm dia Ductile Iron Double Flanged						
		1	40.000				40.000	
							Total Quantity	40.000 metre
							Total Deducted Quantity	0.000 metre
							Net Total Quantity	40.000 metre
							Say 40.000 metre @ Rs 6262.46 / metre	Rs 250498.40
40	18.73.8	Providing and laying Double Flanged (Screwed / Welded) Centrifugally (Spun) Ductile Iron Pipes of Class K - 9 conforming to IS: 8329 :450 mm dia Ductile Iron Double Flanged						
		1	40.000				40.000	
							Total Quantity	40.000 metre
							Total Deducted Quantity	0.000 metre
							Net Total Quantity	40.000 metre
							Say 40.000 metre @ Rs 10666.33 / metre	Rs 426653.20
SI No	Description	No	L	B	D	CF	Quantity	Remark
2ELECTRICAL WORKS (Cost Index:36.44 %)								
1	od345429/2021_2022 "250kVA Indoor Transformer and 11 kv indoor free standing cubcle type vcb switch gear panel of suitable capacity Supplying, installation, testing and commissioning of 250KVA, 11KV/433V, 3 Phase, 50 Hz, Dyn 11, indoor ONAN type, copper wound transformer with OFF load tap changing arrangement on HV and LV side complete with all accessories i/c first filling of filtered dehydrated oil and confirming to IS 2026 (Part 1 to Part 5) & as per specification attached complete in all respects as required at site or as directed by the Engineer In Charge including suuply installation commissioning of suitable rated 11kv cubicle type vcb panel and suitable rated 11kv cable and termination							
		1					1.000	

	Total Quantity							1.000 No
	Total Deducted Quantity							0.000 No
	Net Total Quantity							1.000 No
	Say 1.000 No @ Rs 1000000.00 / No							Rs 1000000.00
2	od345431/2021_2022 "CT - PT Unit and TOD meter Supplying, installation, testing and commissioning of Indoor type 11KV CT-PT Unit 3Phase Dry type confirming to IS 2026 (Part 1 to Part 5) & as per KSEB specification complete in all respects as required at site or as directed by the Engineer In Charge"							
		1						1.000
	Total Quantity							1.000 No
	Total Deducted Quantity							0.000 No
	Net Total Quantity							1.000 No
	Say 1.000 No @ Rs 200000.00 / No							Rs 200000.00
3	od345434/2021_2022 "10kA Surge (Lightning Arrester) Supply & Installation of Heavy Duty hot dipped galvanized 10kA lightning arrester suitable for the 11KV incoming line complying IS: 3070 (Part - III) & IEC 60099 - 4 (2009) 50Hz, rated voltage of 12kV with a operating load of 10kV with terminals made of MS/Aluminium with Zinc plating full set or as directed by the Engineer in Charge"							
		2						2.000
	Total Quantity							2.000 No
	Total Deducted Quantity							0.000 No
	Net Total Quantity							2.000 No
	Say 2.000 No @ Rs 4646.00 / No							Rs 9292.00
4	od345435/2021_2022 Main LT panel Supplying, installation, testing and commissioning of S3phase 415V, 50Hz, floor mounted MS Cubicle type panel board suitable for connecting 250 kva transformer and all motors including all inter connections, wiring in all etc using 14 gauge CRCA sheet painted with 2coats of superior quality enamel paint of approved color over a coat of superior quality iron primer of approved quality as per specification complete in all respects as required at site conforming to relevant BIS standards and KSEB standards or as directed by the Engineer In Charge. 							
		1						1.000
	Total Quantity							1.000 No
	Total Deducted Quantity							0.000 No
	Net Total Quantity							1.000 No
	Say 1.000 No @ Rs 350000.00 / No							Rs 350000.00
5	od345438/2021_2022							

	"Earthing Equipments for Transformer Earthing with copper earth plate 600 mm X 600 mm X 3 mm thick including accessories, and providing masonry enclosure with cover plate having locking arrangement and watering pipe of 2.7 meter long etc. with charcoal/ coke and salt as required."							
		1					1.000	
	Total Quantity							1.000 L.S
	Total Deducted Quantity							0.000 L.S
	Net Total Quantity							1.000 L.S
	Say 1.000 L.S @ Rs 250000.00 / L.S							Rs 250000.00
6	od345440/2021_2022 "250KVA Diesel Generator Providing, Installing, Testing and Commissioning of ?Silent Type? Diesel Generating set alongwith having Prime Power Rating of 250 KVA, 415 volts at 1500 RPM, 0.8 lagging power factor at 415 V suitable for 50 Hz, 3 phase system& for 0.85 Load Factor .							
		1					1.000	
	Total Quantity							1.000 No
	Total Deducted Quantity							0.000 No
	Net Total Quantity							1.000 No
	Say 1.000 No @ Rs 1509950.00 / No							Rs 1509950.00
7	od345442/2021_2022 "Auto Mains Failure Unit (AMF Panel) Fabricating, Installing, Testing & Commissioning of automatic mains failure control including auto by-pass panel, suitable for 250 KVA silent type DG set complete with relays, timers, set of CTs for metering & protection and energy analyser to indicate currents, phase and line voltages, frequency, power factor, KWH, KVARH & provision for overload, short circuit, restricted earth fault, under frequency, control cabling from AMF panel to diesel engine and elsewhere if required, all complete .							
		1					1.000	
	Total Quantity							1.000 No
	Total Deducted Quantity							0.000 No
	Net Total Quantity							1.000 No
	Say 1.000 No @ Rs 232300.00 / No							Rs 232300.00
8	od345444/2021_2022 "Earthing Equipments for DG Earthing with copper earth plate 600 mm X 600 mm X 3 mm thick including accessories, and providing masonry enclosure with cover plate having locking arrangement and watering pipe of 2.7 meter long etc. with charcoal/ coke and salt as required."							
		1					1.000	
	Total Quantity							1.000 L.S
	Total Deducted Quantity							0.000 L.S

	Net Total Quantity						1.000 L.S
	Say 1.000 L.S @ Rs 102139.99 / L.S						Rs 102139.99
9	od345445/2021_2022 "Main Control Centre Design, Fabrication, Supply, Installation and commissioning of Electrical Control Panel of cubical construction with fully automated feature (indoor type) preferably floor mounted fabricated of 2mm thick CRCA Sheets compartmentalised with hinge lock doors with Dust, vermi proof and powder coated with approved shade. The panel shall have enough size to accomadate the individual control centres of each equipment set with individual MCCB's/MCB of appropriate capacity and also to have provision for Busbars, ACBs & RCCB's as specified below with cable alley, interconnections having all accessories mounting and internal wiring, earth terminals, numbering etc, complete in all respect suitable for operation on 415V, 3 phase 50Hz AC supply with enclosure protection class IP 54 as required. Including supply, installation, termination testing & Commissioning of the all power and control cables as per specifications or as directed by the Engineer In Charge."						
		1					1.000
	Total Quantity						1.000 L.S
	Total Deducted Quantity						0.000 L.S
	Net Total Quantity						1.000 L.S
	Say 1.000 L.S @ Rs 2323000.00 / L.S						Rs 2323000.00
10	od345448/2021_2022 Wiring for Each equipment Supplying and Laying of PVC insulated and PVC sheathed / XLPE power cable of Aluminium conductor XLPE power cables as per IS:7098/Part-I/88 with latest ammendments 1.1 kv grad of required size direct in ground including excavation, sand cushioning, protective covering and refilling the trench etc. as required in the specifications or as directed by the Engineer in Charge.						
		1					1.000
	Total Quantity						1.000 L.S
	Total Deducted Quantity						0.000 L.S
	Net Total Quantity						1.000 L.S
	Say 1.000 L.S @ Rs 1889258.73 / L.S						Rs 1889258.73
11	od345450/2021_2022 Brass Glands & Aluminium Lugs Supplying and making end termination with brass compression gland and aluminium lugs for required size of PVC insulated and PVC sheathed I XLPE aluminium conductor cable of 1.1 kV grade as required.						
		1					1.000
	Total Quantity						1.000 L.S
	Total Deducted Quantity						0.000 L.S
	Net Total Quantity						1.000 L.S
	Say 1.000 L.S @ Rs 251238.26 / L.S						Rs 251238.26

12	od345451/2021_2022 "Power Distribution Board (Control Room & Centrifuge Building) Supplying and fixing of following ways surface/ recess mounting, vertical type, 415 V, TPN MCB distribution board of sheet steel, dust protected, duly powder painted, inclusive of 200 A, tinned copper bus bar, common neutral link, earth bar, din bar for mounting MCBs (but without MCBs and incomer) as required. (Note : Vertical type MCB TPDB is normally used where 3 phase outlets are required.) 12 way (4 + 36), Double door (i) Incoming - 63A MCCB & 63A , 100mA RCCB ii) Outgoing Feeders - 4Nos of 25A MCCB with 25A, 30mA RCCBs iii) Outgoing Feeders - 1Nos of 6A MCB iv) Outgoing Feeders - 2Nos Spares"							
		1					1.000	
	Total Quantity						1.000 L.S	
	Total Deducted Quantity						0.000 L.S	
	Net Total Quantity						1.000 L.S	
	Say 1.000 L.S @ Rs 66073.09 / L.S						Rs 66073.09	
13	od345453/2021_2022 "Wiring & Lighting accessories :- Wiring for circuit/submain wiring along with earthwire with required sizes of FRLS PVC insulated copper conductor,supply and fitting of GI boxes along with modular base and cover plates,supplying and fixing following modular switch/ sockets,supply,installation,testing and commissioning of all accessories and fixtures as approved by dept.							
		1					1.000	
	Total Quantity						1.000 L.S	
	Total Deducted Quantity						0.000 L.S	
	Net Total Quantity						1.000 L.S	
	Say 1.000 L.S @ Rs 274846.91 / L.S						Rs 274846.91	
14	od345455/2021_2022 "EXTERNAL LIGHTING Providing external lighting arrangements by supplying and laying of PVC insulated and PVC sheathed / XLPE power cable of Copper conductor XLPE control cables as per is:7098/Part-I/88 with latest amendments 1.1 kv grade of required size direct in ground including MCCB/MCB/RCCB,supply and erection of mettalic poles,strret light poles,earthing and safety equipments ,fire extinguishers ,etc . complete including necessary excavation, sand cushioning, protective covering and refilling the trench etc. as required in the specifications or as directed by the Engineer in Charge."							
		1					1.000	
	Total Quantity						1.000 L.S	
	Total Deducted Quantity						0.000 L.S	
	Net Total Quantity						1.000 L.S	
	Say 1.000 L.S @ Rs 1626100.00 / L.S						Rs 1626100.00	
SI No	Description	No	L	B	D	CF	Quantity	Remark

3Charges for Power allocation to KSEB and power extension by cable								
Lump-Sum Total							Rs 8000000.00	
SI No	Description	No	L	B	D	CF	Quantity	Remark
4Tools and Plants								
Lump-Sum Total							Rs 200000.00	
Total							38440298.30	
Centage @							10.0%	
Centage Amount							3844029.83	
Provision for GST payments (in %) @							18.0%	
Amount reserved for GST payments							6919253.69	
Total & Centage							49203581.82	
Lumpsum for round off							0.00	
GRAND TOTAL Rs							49203581.82	
Rounded Grand Total Rs 4,92,03,582								
Rupees Four Crore Ninety Two Lakh Three Thousand Five Hundred and Eighty Two Only								

Kerala Water Authority

PRICE

General Abstract

**SEWERAGE SCHEME TO MANANTHAVADY MUNICIPALITY - CONSTRUCTION
OF 2MLD CAPACITY SEWAGE TREATMENT PLANT AND LAYING SEWERAGE
NETWORK - O & M**

(Dsor year: 2018)

SI No	Heading Description	Amount
1	STP-Providing skilled and experienced personnals for the monitoring of the day to day operation and maintenance of the all systems for STP	7088399.85
2	STP-Periodical cleaning STP units	7435.00
3	STP-Upkeep of Civil structures, maintaining Landscaping etc.	133765.68
4	STP-Annual Chemicals charges	296675.50
5	STP-Major repairs and maintenance of Electro Mechanical work (Break down maintainence).	60000.00
6	STP-Others	748893.00
7	STP-Annual Operation and Maintenance for 9 years (2nd year to 10th year)	103506089.78
8	SEWER- O&M OF CIVIL, ELECTRICAL, MECHANICAL WORKS, O&M OF LIFTING STATIONS, ETC	3199090.47
9	SEWER-O&M OF SEWER LINE	1389662.50
10	SEWER-O&M for 2nd year to 10th Year	57818287.42
11	Electricity Charges for STP and Sewer net work for 10 Years	203992682.00
Total		378240981.20
Centage @		10.0%
Centage Amount		37824098.12
Provision for GST payments (in %) @		18.0%
Amount reserved for GST payments		68083376.62
Total & Centage		484148455.94
Lumpsum for round off		0.00
GRAND TOTAL Rs		484148455.94
Rounded Grand Total Rs 48,41,48,456		
Rupees Forty Eight Crore Forty One Lakh Forty Eight Thousand Four Hundred and Fifty Six Only		

Detailed Estimate

SEWERAGE SCHEME TO MANANTHAVADY MUNICIPALITY - CONSTRUCTION OF 2MLD CAPACITY SEWAGE TREATMENT PLANT AND LAYING SEWERAGE NETWORK - O & M

(Dsor year: 2018)

Sl No	Description	No	L	B	D	CF	Quantity	Remark
1STP-Providing skilled and experienced personnels for the monitoring of the day to day operation and maintenance of the all systems for STP (Cost Index:36.44 %)								
1	od345842/2021_2022 Plant Manager (Call on duty)							
		1	365.000				365.000	
	Total Quantity						365.000 Day	
	Total Deducted Quantity						0.000 Day	
	Net Total Quantity						365.000 Day	
	Say 365.000 Day @ Rs 1563.28 / Day						Rs 570597.20	
2	100.98.1030 Engaging Operator (pile/ Special Machine)							
		3	365.000				1095.000	
	Total Quantity						1095.000 Day	
	Total Deducted Quantity						0.000 Day	
	Net Total Quantity						1095.000 Day	
	Say 1095.000 Day @ Rs 1169.56 / Day						Rs 1280668.20	
3	100.98.1032 Engaging Technician							
	Process Chemist(Call on duty)							
	Single shift	1	365.000				365.000	
	Total Quantity						365.000 Day	
	Total Deducted Quantity						0.000 Day	
	Net Total Quantity						365.000 Day	
	Say 365.000 Day @ Rs 1228.16 / Day						Rs 448278.40	
4	100.98.1009 Engaging Fitter (grade 1)							

	Mechanic(General shift)	1	365.000				365.000	
	Total Quantity						365.000 Day	
	Total Deducted Quantity						0.000 Day	
	Net Total Quantity						365.000 Day	
	Say 365.000 Day @ Rs 1169.56 / Day						Rs 426889.40	
5	100.98.1008 Engaging Coolie							
	Sweeper/Cleaner(General shift)	3	365.000				1095.000	
	Total Quantity						1095.000 Day	
	Total Deducted Quantity						0.000 Day	
	Net Total Quantity						1095.000 Day	
	Say 1095.000 Day @ Rs 884.27 / Day						Rs 968275.65	
6	od379244/2021_2022 Supply of sewage truck for septage collecting conveying and discharging pump unit with storage tank							
		1					1.000	
	Total Quantity						1.000 No	
	Total Deducted Quantity						0.000 No	
	Net Total Quantity						1.000 No	
	Say 1.000 No @ Rs 2323000.00 / No						Rs 2323000.00	
7	100.98.1036 Supply of Security Guard without gun.							
	Security guards							
		1*3	365.000				1095.000	
	Total Quantity						1095.000 No	
	Total Deducted Quantity						0.000 No	
	Net Total Quantity						1095.000 No	
	Say 1095.000 No @ Rs 977.80 / No						Rs 1070691.00	
SI No	Description	No	L	B	D	CF	Quantity	Remark
2STP-Periodical cleaning STP units (Cost Index:36.44 %)								
1	2.31 Clearing jungle including uprooting of rank vegetation, grass, brush wood, trees and saplings of girth up to 30 cm measured at a height of 1 m above ground level and removal of rubbish up to a distance of 50 m outside the periphery of the area cleared							

		2	250.000				500.000	
	Total Quantity						500.000 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						500.000 sqm	
	Say 500.000 sqm @ Rs 14.87 / sqm						Rs 7435.00	
SI No	Description	No	L	B	D	CF	Quantity	Remark
3STP-Upkeep of Civil structures, maintaining Landscaping etc. (Cost Index:36.44 %)								
1	od345836/2021_2022 Maintaining the garden as per the direction of department officers							
	For each month for a year							
		1	12.000				12.000	
	Total Quantity						12.000 Month	
	Total Deducted Quantity						0.000 Month	
	Net Total Quantity						12.000 Month	
	Say 12.000 Month @ Rs 5264.39 / Month						Rs 63172.68	
2	13.99.1 Painting with synthetic enamel paint of approved brand and manufacture of required colour to give an even shade :One or more coats on old work							
		1	100.000				100.000	
	Total Quantity						100.000 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						100.000 sqm	
	Say 100.000 sqm @ Rs 94.69 / sqm						Rs 9469.00	
3	13.51.2 Painting with silicon & acrylic emulsion based water thinnable sealer of approved brand and manufacture on wet or patchy portion of plastered surfaces:Two coats							
	P a i n t i n g Area:2000m2. Two painting within O& M Period. Area= 2x2000/10=400m2 / year	1	400.000				400.000	
	Total Quantity						400.000 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						400.000 sqm	
	Say 400.000 sqm @ Rs 152.81 / sqm						Rs 61124.00	

SI No	Description	No	L	B	D	CF	Quantity	Remark
4STP-Annual Chemicals charges (Cost Index:36.44 %)								
1	od345837/2021_2022 Supply of liquid chlorine in Tonne Cylinders (3.5 PPM dosage) 							
		2	5.000	365.000			3650.000	
	Total Quantity						3650.000 kg	
	Total Deducted Quantity						0.000 kg	
	Net Total Quantity						3650.000 kg	
	Say 3650.000 kg @ Rs 26.45 / kg						Rs 96542.50	
2	od345841/2021_2022 Supply and delivery of Hydrated lime as per specification (7 PPM dosage) 							
		2	7.000	365.000			5110.000	
	Total Quantity						5110.000 kg	
	Total Deducted Quantity						0.000 kg	
	Net Total Quantity						5110.000 kg	
	Say 5110.000 kg @ Rs 14.05 / kg						Rs 71795.50	
3	od345845/2021_2022 Supply and delivery of Alum at (7 PPM dosage) as per specification 							
		2	7.000	365.000			5110.000	
	Total Quantity						5110.000 kg	
	Total Deducted Quantity						0.000 kg	
	Net Total Quantity						5110.000 kg	
	Say 5110.000 kg @ Rs 13.75 / kg						Rs 70262.50	
4	od345848/2021_2022 Other Chemicals							
		1					1.000	
	Total Quantity						1.000 L.S	
	Total Deducted Quantity						0.000 L.S	
	Net Total Quantity						1.000 L.S	
	Say 1.000 L.S @ Rs 58075.00 / L.S						Rs 58075.00	
SI No	Description	No	L	B	D	CF	Quantity	Remark
5STP-Major repairs and maintenance of Electro Mechanical work (Break down maintenance). (Cost Index:36.44 %)								

1	od345854/2021_2022 Repair and Rewinding of motors and its assembly and putting into use for the break down maintenance for the pumps.							
		1					1.000	
	Total Quantity						1.000 set	
	Total Deducted Quantity						0.000 set	
	Net Total Quantity						1.000 set	
	Say 1.000 set @ Rs 60000.00 / set						Rs 60000.00	
SI No	Description	No	L	B	D	CF	Quantity	Remark
6STP-Others (Cost Index:36.44 %)								
1	od345843/2021_2022 Testing and calibration of electrical meters and relays,ammeter and voltmeters,cranes and hoists,testing of ELCB,testing of earth pit,testing and cathodic protection of MS line,environmental monitoring,sludge testing,transformer testing and other inspection charges payable to inspecting agencies excluding the Govt.agencies.							
		1					1.000	
	Total Quantity						1.000 No	
	Total Deducted Quantity						0.000 No	
	Net Total Quantity						1.000 No	
	Say 1.000 No @ Rs 5000.00 / No						Rs 5000.00	
2	od345852/2021_2022 Attending the repairs in the valves,actuators,electro magnetic flow meters and connected works							
		1					1.000	
	Total Quantity						1.000 No	
	Total Deducted Quantity						0.000 No	
	Net Total Quantity						1.000 No	
	Say 1.000 No @ Rs 5000.00 / No						Rs 5000.00	
3	od345853/2021_2022 Attending repairs in the E.O.T crane including changing of spare if any during servicing							
		1					1.000	
	Total Quantity						1.000 No	
	Total Deducted Quantity						0.000 No	
	Net Total Quantity						1.000 No	
	Say 1.000 No @ Rs 4000.00 / No						Rs 4000.00	
4	od345855/2021_2022 Transformer air filtration and topup oil in transformer,replacement of tap changing							

	mechanism, replacement of dial thermometer, replacement of terminal bushes(HT), painting of the transformer etc.							
		1					1.000	
	Total Quantity							1.000 No
	Total Deducted Quantity							0.000 No
	Net Total Quantity							1.000 No
	Say 1.000 No @ Rs 5000.00 / No							Rs 5000.00
5	od345856/2021_2022 Attending emergency repair works in starter like replacement of fixed contacts, moving contacts, auxiliary contacts, replacement of over load relays, replacement of timer, no volt coil, repair work in switches like replacement of fixed contacts, moving contacts, fuse carrier sets. HRC fuse base and carriers, replacement of isolator, isolator bridges, repair of oil circuit breaker and air circuit breaker like replacement of fixed contacts, moving contacts, replacement of operating mechanism sets, tripping mechanism sets, no volt coils control circuit etc.							
		1					1.000	
	Total Quantity							1.000 No
	Total Deducted Quantity							0.000 No
	Net Total Quantity							1.000 No
	Say 1.000 No @ Rs 5000.00 / No							Rs 5000.00
6	od345857/2021_2022 Hire charges of Tools and Plants required for the day to day operation of the Plant and equipment s							
		1					1.000	
	Total Quantity							1.000 No
	Total Deducted Quantity							0.000 No
	Net Total Quantity							1.000 No
	Say 1.000 No @ Rs 5000.00 / No							Rs 5000.00
7	od345858/2021_2022 Supply and maintenance of emergency personal and fire fighting equipment s including periodical check up, refilling and getting sanction from concerned departments, license renewal etc except renewal of Factories and Boilers and Electrical Inspectorate							
		1					1.000	
	Total Quantity							1.000 No
	Total Deducted Quantity							0.000 No
	Net Total Quantity							1.000 No
	Say 1.000 No @ Rs 5000.00 / No							Rs 5000.00
8	od345859/2021_2022							

	Repair and maintenance of control/instrumentation cabling,communication cabling,instrumentation cabling etc for the proper upkeep of SCADA and telemetry system including repair of all faulty components whenever necessary							
		1					1.000	
	Total Quantity						1.000 No	
	Total Deducted Quantity						0.000 No	
	Net Total Quantity						1.000 No	
	Say 1.000 No @ Rs 6000.00 / No						Rs 6000.00	
9	od345860/2021_2022 Maintenance of SCADA system like Hardware including servers,printers,monitors etc for control room Scada,office stationary items.software for , etc including replacing of all faulty components whenever necessary							
		1					1.000	
	Total Quantity						1.000 No	
	Total Deducted Quantity						0.000 No	
	Net Total Quantity						1.000 No	
	Say 1.000 No @ Rs 8000.00 / No						Rs 8000.00	
10	od345861/2021_2022 Replacement of Catridge one time between 5 to 10 years							
		1					1.000	
	Total Quantity						1.000 L.S	
	Total Deducted Quantity						0.000 L.S	
	Net Total Quantity						1.000 L.S	
	Say 1.000 L.S @ Rs 40000.00 / L.S						Rs 40000.00	
11	od345862/2021_2022 Generator Fuel charges							
		1	100.000				100.000	
	Total Quantity						100.000 hour	
	Total Deducted Quantity						0.000 hour	
	Net Total Quantity						100.000 hour	
	Say 100.000 hour @ Rs 6608.93 / hour						Rs 660893.00	
SI No	Description	No	L	B	D	CF	Quantity	Remark
7STP-Annual Operation and Maintenance for 9 years (2nd year to 10th year) (Cost Index:36.44 %)								
1	od345850/2021_2022 STP-Annual Operation and Maintenance for 9 year							

	2 nd Year - Add 8 % to 1st year	1	1.080				1.080	
	3rd Year - Add 16 % to 1st year	1	1.160				1.160	
	4th Year - Add 24 % to 1st year	1	1.240				1.240	
	5th Year - Add 32 % to 1st year	1	1.320				1.320	
	6th Year - Add 40 % to 1st year	1	1.400				1.400	
	7th Year - Add 48 % to 1st year	1	1.480				1.480	
	8th Year - Add 56 % to 1st year	1	1.560				1.560	
	9th Year - Add 64 % to 1st year	1	1.640				1.640	
	10th Year - Add 72 % to 1st year	1	1.720				1.720	
	Total Quantity						12.600 No	
	Total Deducted Quantity						0.000 No	
	Net Total Quantity						12.600 No	
	Say 12.600 No @ Rs 8214769.03 / No						Rs 103506089.78	
Sl No	Description	No	L	B	D	CF	Quantity	Remark
8SEWER- O&M OF CIVIL, ELECTRICAL, MECHANICAL WORKS, O&M OF LIFTING STATIONS, ETC (Cost Index:36.44 %)								
1	od345839/2021_2022 Civil structures maintenance and painting							
		1					1.000	
	Total Quantity						1.000 L.S	
	Total Deducted Quantity						0.000 L.S	
	Net Total Quantity						1.000 L.S	
	Say 1.000 L.S @ Rs 100000.00 / L.S						Rs 100000.00	
2	od345840/2021_2022 Replacement of mechanical items (Including painting existing items)							
		1					1.000	
	Total Quantity						1.000 L.S	
	Total Deducted Quantity						0.000 L.S	

	Net Total Quantity							1.000 L.S
	Say 1.000 L.S @ Rs 100000.00 / L.S							Rs 100000.00
3	od345844/2021_2022 Replacement of electrical items (Including painting existing items)							
		1					1.000	
	Total Quantity							1.000 L.S
	Total Deducted Quantity							0.000 L.S
	Net Total Quantity							1.000 L.S
	Say 1.000 L.S @ Rs 100000.00 / L.S							Rs 100000.00
4	od345846/2021_2022 Cotton waste ,Lubricants (oil and Grease)soap ,chemicals,Glass ware,safety equipment & Devices, Cleaning etc.. for wet well and pumping station							
		12					12.000	
	Total Quantity							12.000 L.S
	Total Deducted Quantity							0.000 L.S
	Net Total Quantity							12.000 L.S
	Say 12.000 L.S @ Rs 8000.00 / L.S							Rs 96000.00
5	100.98.1032 Engaging Technician							
		1	365.000			0.5	182.500	
	Total Quantity							182.500 Day
	Total Deducted Quantity							0.000 Day
	Net Total Quantity							182.500 Day
	Say 182.500 Day @ Rs 1228.16 / Day							Rs 224139.20
6	od379308/2021_2022 Labour for operation the well and connected works as per the direction of departmental officers. 							
	For one pumping station - 1 operator 1 assistant for 3 shift	1					1.000	
	Total Quantity							1.000 No
	Total Deducted Quantity							0.000 No
	Net Total Quantity							1.000 No
	Say 1.000 No @ Rs 2248951.27 / No							Rs 2248951.27
7	od345851/2021_2022 Generator Fuel Charges for Wet wells (1 No) and Lifting Stations (14Nos)							

		1					1.000	
	Total Quantity						1.000 set	
	Total Deducted Quantity						0.000 set	
	Net Total Quantity						1.000 set	
	Say 1.000 set @ Rs 330000.00 / set						Rs 330000.00	
SI No	Description	No	L	B	D	CF	Quantity	Remark
9SEWER-O&M OF SEWER LINE (Cost Index:36.44 %)								
1	100.98.1008 Engaging Coolie							
		1	365.000				365.000	
	Total Quantity						365.000 Day	
	Total Deducted Quantity						0.000 Day	
	Net Total Quantity						365.000 Day	
	Say 365.000 Day @ Rs 884.27 / Day						Rs 322758.55	
2	100.98.1009 Engaging Fitter (grade 1)							
		1	365.000				365.000	
	Total Quantity						365.000 Day	
	Total Deducted Quantity						0.000 Day	
	Net Total Quantity						365.000 Day	
	Say 365.000 Day @ Rs 1169.56 / Day						Rs 426889.40	
3	100.98.1035 Supply of sewer man.							
		1	365.000				365.000	
	Total Quantity						365.000 No	
	Total Deducted Quantity						0.000 No	
	Net Total Quantity						365.000 No	
	Say 365.000 No @ Rs 884.27 / No						Rs 322758.55	
4	od345847/2021_2022 Vehicle hire charges							
		12					12.000	
	Total Quantity						12.000 Month	
	Total Deducted Quantity						0.000 Month	
	Net Total Quantity						12.000 Month	

	Say 12.000 Month @ Rs 13938.00 / Month						Rs 167256.00	
5	od345849/2021_2022 Rent for sewer cleaning machine							
		1					1.000	
	Total Quantity						1.000 L.S	
	Total Deducted Quantity						0.000 L.S	
	Net Total Quantity						1.000 L.S	
	Say 1.000 L.S @ Rs 150000.00 / L.S						Rs 150000.00	
SI No	Description	No	L	B	D	CF	Quantity	Remark
10SEWER-O&M for 2nd year to 10th Year (Cost Index:36.44 %)								
1	od345838/2021_2022 SEWER-Annual Operation and Maintenance for 9 year							
	2 nd Year - Add 8 % to 1st year	1	1.080				1.080	
	3rd Year - Add 16 % to 1st year	1	1.160				1.160	
	4th Year - Add 24 % to 1st year	1	1.240				1.240	
	5th Year - Add 32 % to 1st year	1	1.320				1.320	
	6th Year - Add 40 % to 1st year	1	1.400				1.400	
	7th Year - Add 48 % to 1st year	1	1.480				1.480	
	8th Year - Add 56 % to 1st year	1	1.560				1.560	
	9th Year - Add 64 % to 1st year	1	1.640				1.640	
	10th Year - Add 72 % to 1st year	1	1.720				1.720	
	Total Quantity						12.600 No	
	Total Deducted Quantity						0.000 No	
	Net Total Quantity						12.600 No	
	Say 12.600 No @ Rs 4588752.97 / No						Rs 57818287.42	
SI No	Description	No	L	B	D	CF	Quantity	Remark
11Electricity Charges for STP and Sewer net work for 10 Years (Cost Index:36.44 %)								

1	od23784/2022_2023 Electricity Charges for STP and Sewer net work @20399268.20/Year							
	Electricity charges for 1 0 year@20399268.20/Y ear	10					10.000	
	Total Quantity						10.000 No	
	Total Deducted Quantity						0.000 No	
	Net Total Quantity						10.000 No	
	Say 10.000 No @ Rs 20399268.20 / No						Rs 203992682.00	
Total							378240981.20	
Centage @							10.0%	
Centage Amount							37824098.12	
Provision for GST payments (in %) @							18.0%	
Amount reserved for GST payments							68083376.62	
Total & Centage							484148455.94	
Lumpsum for round off							0.00	
GRAND TOTAL Rs							484148455.94	
Kerala Water Authority							Rounded Grand Total Rs 48,41,48,456	
Rupees Forty Eight Crore Forty One Lakh Forty Eight Thousand Four Hundred and Fifty Six Only								

General Abstract

**SEWERAGE SCHEME TO MANANTHAVADY MUNICIPALITY - CONSTRUCTION
OF 2 MLD CAPACITY SEWAGE TREATMENT PLANT AND LAYING SEWERAGE
NETWORK - NETWORK DESIGN**

(Dsr year: **2018**)

SI No	Heading Description	Amount
1	Laying of sewer network	150964579.82
2	Road Restoration work of laying of sewers and pumping main.	19894955.05
3	Pumping mains	20031838.23
4	Construction of Man holes	69496219.09
5	Road Restoration - to PWD/NH	52149470.24
6	Lifting Stations and Allied work	24107236.64
7	Water Supply and Sanatory arrangements, Electrical wiring in pumping stations	400000.00
8	Line extension , Deposit to KSEB, etc	1000000.00
9	Sewer service Connection charges	22000000.00
Total		360044299.07
Centage @		10.0%
Centage Amount		36004429.91
Provision for GST payments (in %) @		18.0%
Amount reserved for GST payments		64807973.83
Total & Centage		460856702.82
Lumpsum for round off		0.00
GRAND TOTAL Rs		460856702.82
Rounded Grand Total Rs 46,08,56,703		
Rupees Forty Six Crore Eight Lakh Fifty Six Thousand Seven Hundred and Three Only		

Detailed Estimate

SEWERAGE SCHEME TO MANANTHAVADY MUNICIPALITY - CONSTRUCTION OF 2 MLD CAPACITY SEWAGE TREATMENT PLANT AND LAYING SEWERAGE NETWORK - NETWORK DESIGN

(Dsr year: 2018)

Sl No	Description	No	L	B	D	CF	Quantity	Remark
1Laying of sewer network (Cost Index:36.44 %)								
1	100.59.1 Cutting the bituminous / concrete roads with cutting machine for a minimum depth of 200mm along the sides of proposed alignment of the pipe to be laid without causing any damage to other utilities, including the charges for hire and conveyance of tools and plant, cost of consumables and charges for lighting, watching, ribbon fencing, caution boards, traffice diversion, and as per the direction of departmental officers etc. complete, before carrying out the demolition of bituminous / concrete road by mechanical means and carrying out the excavation.							
	Sewer lines from 225mm to 355mm	2	25182.600				50365.200	
	Inspection Chamber to Manhole	2	12348.000				24696.000	1029X12
Kerala Water Authority Total Quantity							75061.200 metre	
Total Deducted Quantity							0.000 metre	
Net Total Quantity							75061.200 metre	
Say 75061.200 metre @ Rs 30.63 / metre							Rs 2299124.56	
2	15.43.2 Dismantling manually / by mechanical means including stacking of serviceable material and disposal of unserviceable material within 50 metres lead as per direction of Engineer -in-Charge:Bituminous road							
	Sewer lines from 225mm to 355mm	1	25182.600	1.000		0.6	15109.560	
	Inspection Chamber to Manhole	1	12348.000	0.600		0.6	4445.280	1029x12
Total Quantity							19554.840 sqm	
Total Deducted Quantity							0.000 sqm	
Net Total Quantity							19554.840 sqm	
Say 19554.840 sqm @ Rs 363.20 / sqm							Rs 7102317.89	
3	15.2.1 Demolishing cement concrete manually / by mechanical means including disposal of material within 50 metres lead as per direction of Engineer - in-Charge.Nominal concrete 1:3:6 or richer mix (i/c equivalent							

	design mix)							
	Sewer lines from 225mm to 3550mm	1	25182.600	1.000	0.150	0.4	1510.956	
	Inspection Chamber to Manhole	1	12348.000	0.600	0.150	0.4	444.528	1029X12
	Total Quantity						1955.484 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						1955.484 cum	
	Say 1955.484 cum @ Rs 2057.94 / cum						Rs 4024268.74	
4	4.1.2 Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:1/2:3 (cement : 11/2 coarse sand : 3 graded stone aggregate 20 mm nominal size)							
	Sewer lines from 225mm to 3550mm	1	25182.600	1.000	0.150	0.4	1510.956	
	Inspection Chamber to Manhole	1	12348.000	0.600	0.150	0.4	444.528	1029X12
	Total Quantity						1955.484 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						1955.484 cum	
	Say 1955.484 cum @ Rs 8540.67 / cum						Rs 16701143.53	
5	100.8.2 Fencing 1.50m high with two rows of casuarina poles (girth 15cm to 24cm) tied with coir yarn on vertical casuarina pole (girth 15cm to 24cm) fixed at 1.5m intervals. NEW DATA (Prepared based on PWD SDB - Item No.1009)							
	Sewer lines from 225mm to 355mm	1	25182.600			0.3	7554.780	
	Inspection Chamber to Manhole	1	12348.000			0.3	3704.400	1029X12
	Total Quantity						11259.180 metre	
	Total Deducted Quantity						0.000 metre	
	Net Total Quantity						11259.180 metre	
	Say 11259.180 metre @ Rs 96.77 / metre						Rs 1089550.85	
6	100.8.1 Fencing one side of trenches, 1.50 m height with two rows of 10 cm plastic caution tape in vertical casuarina pole (girth 15cm to 24cm) fixed at 2 m intervals. (Data Prepared based on PWD SDB - Item No.1009)							

	Sewer lines from 225mm to 355mm	1	25182.600			0.7	17627.820	
	Inspection Chamber to Manhole	1	12348.000			0.7	8643.600	1029x12
	Total Quantity						26271.420 metre	
	Total Deducted Quantity						0.000 metre	
	Net Total Quantity						26271.420 metre	
	Say 26271.420 metre @ Rs 28.12 / metre						Rs 738752.33	
7	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 1.5 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 50 m : All kinds of soil (Ref. Item No. 2.10.1 of DSR)							
	Sewer lines from 225mm to 355mm	1	26551.320			0.6	15930.792	
	Inspection Chamber to Manhole	1	12348.000	0.600	1.000	0.6	4445.280	1029x12
	Kerala Water Authority Total Quantity						20376.072 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						20376.072 cum	
	Say 20376.072 cum @ Rs 558.99 / cum						Rs 11390020.49	
8	100.1.5 Excavating trenches of required width for pipes, cables, etc including excavation for sockets, and dressing of sides, ramming of bottoms, depth up to 1.5 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 50 m :" Ordinary Rock. (Ref. Item No. 2.13.1 of DSR)							
	Sewer lines from 225mm to 355mm	1	26551.323			0.25	6637.831	
	Inspection Chamber to Manhole	1	12348.000	0.600	1.000	0.25	1852.200	1029x12
	Total Quantity						8490.031 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						8490.031 cum	

	Say 8490.031 cum @ Rs 811.82 / cum						Rs 6892376.97	
9	100.2.7 "Excavating trenches of required width for pipes, cables, etc including excavation for sockets, and dressing of sides, ramming of bottoms, depth up to 1.5 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 50 m : Medium Rock (blasting prohibited) New Data derived from DAR							
	Sewer lines from 225mm to 355mm	1	26551.323			0.15	3982.699	
	Inspection Chamber to Manhole	1	12348.000	0.600	1.000	0.15	1111.320	1029x12
	Total Quantity						5094.019 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						5094.019 cum	
	Say 5094.019 cum @ Rs 1350.01 / cum						Rs 6876976.59	
10	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 3 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 50 m: 1.50m to 3.0m All kinds of soil (Ref. Item No. 2.11 of DSR)							
	From calculation sheet- sewerline 225 to 355mm	1	2503.876			0.6	1502.326	
	Total Quantity						1502.326 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						1502.326 cum	
	Say 1502.326 cum @ Rs 666.03 / cum						Rs 1000594.19	
11	100.1.6 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 3 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 50 m : 1.50m to 3.0m. Ordinary Rock. (Ref. Item No. 2.14 of DSR)							

	From calculation sheet- sewerline 225 to 355mm	1	2503.876			0.25	625.969	
	Total Quantity						625.969 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						625.969 cum	
	Say 625.969 cum @ Rs 1003.79 / cum						Rs 628341.42	
12	100.2.8 Excavating trenches of required width for pipes, cables, etc including excavation for sockets, and dressing of sides, ramming of bottoms, depth up to 1.5 m but not exceeding 3 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 50 m : (Rate is over corresponding basic item for depth up to 1.5 metre) 1.5m to 3.0m Medium Rock (blasting prohibited) New Data derived from DAR							
	From calculation sheet- sewerline 225 to 355mm	1	2503.876			0.15	375.582	
	Total Quantity						375.582 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						375.582 cum	
	Say 375.582 cum @ Rs 1541.98 / cum						Rs 579139.93	
13	2.17.2 Close timbering in case of shafts, wells, cesspits, manholes and the like including strutting, shoring and packing cavities (wherever required) etc. complete (Measurements to be taken of the face area timbered).Depth exceeding 1.5 m but not exceeding 3 m							
		2	25182.600	3.000		0.15	22664.340	
	Total Quantity						22664.340 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						22664.340 sqm	
	Say 22664.340 sqm @ Rs 192.52 / sqm						Rs 4363338.74	
14	2.23 Extra for planking and strutting in open timbering if required to be left permanently in position (Face area of the timber permanently left to be measured).							
		2	350.000	3.000			2100.000	
	Total Quantity						2100.000 sqm	
	Total Deducted Quantity						0.000 sqm	

	Net Total Quantity						2100.000 sqm
	Say 2100.000 sqm @ Rs 971.93 / sqm						Rs 2041053.00
15	od340793/2021_2022 Installation of PE pipe between 110mm & 225mm outer dia by HDD method for on grade gravity sewer including preparing and setting up the plant and equipment,preparing new pipe work material making of entry pit and exit pit up to required depth installing new pipe work and commissioning system or making the system or making the system ready for commissioning by HDD operating including all related civil and mechanical works like excavation shoring/strutting etc drilling stringing reaming and pulling back the new pipe work on the designed borne path alignment proper disposal of drilling fluid and back fill of site after completion all inclusive as per Conditions PE pipes also using Ground penetrating radar survey in corridor with to detect buried utilities on the map of corridor with information of locations and depths to the top of various utilities detected .work to be conducted using 500MHZ and 300MHZ antenna or latest forthe best possible resolution and penetration						
	225mm dia HDPE	1	778.100				778.100
	Total Quantity						778.100 metre
	Total Deducted Quantity						0.000 metre
	Net Total Quantity						778.100 metre
	Say 778.100 metre @ Rs 5100.12 / metre						Rs 3968403.37
16	od343118/2021_2022 :Installation of PE -250mm-315mm mm dia PE pipe by horizontal directional drilling method in all types of soil above /below water table for pumping /gravity /distribution main including preparing and setting up the plat and equipment, installing new pipe work, testing and commissioning excluding cost of pipe (6 m line pipe with butt joint all related civil /mechanical works like entry /exits pit as necessary. De watering ,drilling stringing, reaming, pulling back the new pipe on the designed alignment and monitoring by approved guidance system. wastage of pipes, proper disposal of drilling fluid /bentonite slurry. Proper back filling og pit and holes by approved borrow material as per specification approved method statement or as directed by engineer in charge. also using Ground penetrating radar survey in corridor with to detect buried utilities on the map of corridor with information of locations and depths to the top of various utilities detected .work to be conducted using 500MHZ and 300MHZ antenna or latest for the best possible resolution and penetration including hydrolic testing						
		1	162.400				162.400
	Total Quantity						162.400 metre
	Total Deducted Quantity						0.000 metre
	Net Total Quantity						162.400 metre
	Say 162.400 metre @ Rs 6445.97 / metre						Rs 1046825.53
17	od340794/2021_2022 Supplying, Providing bedding with m sand for sewer lines as per specifications to be laid wherever necessary with all lead and lift.						

	beding for lines	1	25182.600	0.600	0.100	0.4	604.383	
	Total Quantity						604.383 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						604.383 cum	
	Say 604.383 cum @ Rs 2303.86 / cum						Rs 1392413.82	
18	4.1.5 Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size)							
	P C C bedding concrete where ever necessary	1	25182.600	0.600	0.100	0.4	604.383	
	Total Quantity						604.383 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						604.383 cum	
	Say 604.383 cum @ Rs 7413.74 / cum						Rs 4480738.42	
19	100.98.226 Supply of uPVC Pipe, IS 4985: 2000 , 8kg/cm2, 160mm Dia.							
	For house connection IC to MH	1	12348.000				12348.000	1029x12
	Total Quantity						12348.000 metre	
	Total Deducted Quantity						0.000 metre	
	Net Total Quantity						12348.000 metre	
	Say 12348.000 metre @ Rs 905.95 / metre						Rs 11186670.60	
20	od367207/2021_2022 Conveying to site, lowering into trenches, laying to correct line and grade using CC holding clamps, 160mm PVC SN 8 (8 Kg/Cm2) S & S Sewerage pipes conforming to I.S.15328, including jointing the pipes using rubber rings as per approved methods with rubber gasket for flexible joints as per specification including cost of gasket, to correct line , de watering with all rates of recuperation etc, providing bedding for pipe line trenches with available earth, hydraulic testing the line to the required test pressure as per IS, CPHEEO specifications, lighting, watching, providing caution boards etc. wherever required, during laying and jointing the pipes including hire for all tools etc complete including commissioning for the following diamters							
	For house connection IC to MH	1	12348.000				12348.000	1029x12
	Total Quantity						12348.000 metre	
	Total Deducted Quantity						0.000 metre	
	Net Total Quantity						12348.000 metre	

	Say 12348.000 metre @ Rs 214.42 / metre							Rs 2647658.16
21	60.2.3 Bailing out water using pump above 5 HP and Up to 10 HP-Bailing out water with engine and pump set above 5HP and up to 10HP, including conveyance to site and erection, cost of fuel, lubrication oil and other stores, pay of staff etc complete							
		40	6.000	5.000*.74 6			895.200	
	Total Quantity							895.200 hour
	Total Deducted Quantity							0.000 hour
	Net Total Quantity							895.200 hour
	Say 895.200 hour @ Rs 435.24 / hour							Rs 389626.85
22	60.2.4 BAILING OUT WATER USING PUMP ABOVE 10HP AND UP TO 20HP - Bailing out water with engine and pump set above 10HP and up to 20HP, including conveyance to site and erection, cost of fuel, lubrication oil and other stores, pay of staff etc complete							
		20	15.000*.7 46	5.000			1119.000	
	Total Quantity							1119.000 hour
	Total Deducted Quantity							0.000 hour
	Net Total Quantity							1119.000 hour
	Say 1119.000 hour @ Rs 540.40 / hour							Rs 604707.60
23	60.2.5 BAILING OUT WATER USING PUMP ABOVE 20HP AND UP TO 30HP -Bailing out water with engine and pump set above 25HP and up to 30HP, including conveyance to site and erection, cost of fuel, lubrication oil and other stores, pay of staff etc complete							
		10	25.000*.7 46	5.000			932.500	
	Total Quantity							932.500 hour
	Total Deducted Quantity							0.000 hour
	Net Total Quantity							932.500 hour
	Say 932.500 hour @ Rs 978.66 / hour							Rs 912600.45
24	od340800/2021_2022 Supply of PE Pipe PE 100 (IS 14333/ sewerage pipe with latest IS), 8kg, 225mm Outer Dia							
	HDPE Pipe PE 100 , 8kg, 225mm Outer Dia	1	24042.100				24042.100	
	Total Quantity							24042.100 metre
	Total Deducted Quantity							0.000 metre

	Net Total Quantity							24042.100 metre
	Say 24042.100 metre @ Rs 1336.89 / metre							Rs 32141643.07
25	od340801/2021_2022 Supply of PE Pipe PE 100 (IS 14333), 8kg, 250mm Outer Dia							
	HDPE Pipe PE 100 , 8kg, 250mm Outer Dia.	1	689.200				689.200	
	Total Quantity							689.200 metre
	Total Deducted Quantity							0.000 metre
	Net Total Quantity							689.200 metre
	Say 689.200 metre @ Rs 2079.09 / metre							Rs 1432908.83
26	od340802/2021_2022 Supply of PE Pipe PE 100 (IS 14333/ sewerage pipe with latest IS), 8kg, 280mm Outer Dia.							
	HDPE Pipe PE 100, 8kg, 280mm Outer Dia.	1	390.500				390.500	
	Total Quantity							390.500 metre
	Total Deducted Quantity							0.000 metre
	Net Total Quantity							390.500 metre
	Say 390.500 metre @ Rs 2066.31 / metre							Rs 806894.05
27	od340803/2021_2022 Supply of PE Pipe PE 100 (IS 14333/ sewerage pipe with latest IS), 8kg, 315mm Outer Dia.							
	HDPE Pipe PE 100 , 8kg, 315mm Outer Dia.	1	48.600				48.600	
	Total Quantity							48.600 metre
	Total Deducted Quantity							0.000 metre
	Net Total Quantity							48.600 metre
	Say 48.600 metre @ Rs 2624.99 / metre							Rs 127574.51
28	od340804/2021_2022 Supply of PE Pipe PE 100 (IS 14333/ sewerage pipe with latest IS), 8kg, 355mm Outer Dia.							
	HDPE Pipe PE 100 , 8kg, 355mm Outer Dia.	1	12.200				12.200	
	Total Quantity							12.200 metre
	Total Deducted Quantity							0.000 metre

	Net Total Quantity						12.200 metre
	Say 12.200 metre @ Rs 3313.76 / metre						Rs 40427.87
29	100.10.8 Laying HDPE pipes (IS : 4984)on land portion including conveying within initial lead and aligning the pipes, electro-fusion welding using automatic or semi automatic electrofusion machines, testing the pipe line thus fabricated to suit the hydruhc 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 leveling the trenches including all labour charge, hire for appliances etc. complete but excluding cost of pipe and fittings. 225 mm OD HDPE pipe NEW DATA						
	HDPE Pipe PE 100 , 8kg, 225mm Outer Dia	1	24042.100				24042.100
	Total Quantity						24042.100 metre
	Total Deducted Quantity						0.000 metre
	Net Total Quantity						24042.100 metre
	Say 24042.100 metre @ Rs 379.64 / metre						Rs 9127342.84
30	100.10.9 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 pipe line thus fabricated to suit the hydruhc 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 leveling the trenches including all labour charge, hire for appliances etc. complete but excluding cost of pipe and fittings. 250 mm OD HDPE pipe NEW DATA						
	HDPE Pipe PE 100 , 8kg, 250mm Outer Dia.	1	689.200				689.200
	Total Quantity						689.200 metre
	Total Deducted Quantity						0.000 metre
	Net Total Quantity						689.200 metre
	Say 689.200 metre @ Rs 444.59 / metre						Rs 306411.43
31	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 pipe line thus fabricated to suit the hydruhc 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 leveling the trenches including all labour charge, hire for appliances etc. complete but excluding cost of pipe and fittings.						

	280 mm OD HDPE pipe NEW DATA							
	HDPE Pipe PE 100, 8kg, 280mm Outer Dia.	1	390.500				390.500	
	Total Quantity						390.500 metre	
	Total Deducted Quantity						0.000 metre	
	Net Total Quantity						390.500 metre	
	Say 390.500 metre @ Rs 523.04 / metre						Rs 204247.12	
32	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 pipe line thus fabricated to suit the hydrylic 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 leveling the trenches including all labour charge, hire for appliances etc. complete but excluding cost of pipe and fittings. 315 mm OD HDPE pipe NEW DATA							
	HDPE Pipe PE 100 , 8kg, 315mm Outer Dia.	1	48.600				48.600	
	Total Quantity						48.600 metre	
	Total Deducted Quantity						0.000 metre	
	Net Total Quantity						48.600 metre	
	Say 48.600 metre @ Rs 584.65 / metre						Rs 28413.99	
33	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 pipe line thus fabricated to suit the hydrylic 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 leveling the trenches including all labour charge, hire for appliances etc. complete but excluding cost of pipe and fittings. 355 mm OD HDPE pipe NEW DATA							
	HDPE Pipe PE 100 , 8kg, 355mm Outer Dia.	1	12.200				12.200	
	Total Quantity						12.200 metre	
	Total Deducted Quantity						0.000 metre	
	Net Total Quantity						12.200 metre	

	Say 12.200 metre @ Rs 659.69 / metre						Rs 8048.22	
34	od340807/2021_2022 Constructing inspection chambers of size 0.45x0.45m (inside) and 0.60m deep with RCC M20 using 20mm broken stone for floor slab ,RCC M20 slab using 20mm broken stone for removable cover slab, Brick work in CM 1:6 for walls, PCC 1:4:8 using 20mm broken stone for levelling course below foundation including earth work excavation in all classes of soil,, plastering the inside with CM 1:3, 9mm thick with neat cement flush coat, providing necessary slope in the benching towards main sewer, providing provision for connecting main sewer and service connections, conveying, lifting, placing the cover slab in position by suitable means, conveying and disposing the surplus earth with all lead and lift as per drawings and specifications , including the cost of reinforcement , testing the chamber and sulphate resistant cement shall be used for the the construction of inspection chamber							
	Inspection chambers of inside size 0.45x0.45x0.6m	515					515.000	(1029X2)0.25=515
	Total Quantity						515.000 No	
	Total Deducted Quantity						0.000 No	
	Net Total Quantity						515.000 No	
	Say 515.000 No @ Rs 7276.70 / No						Rs 3747500.50	
35	od340808/2021_2022 Constructing inspection chambers of size 0.45x0.45m (inside) and 0.45m deep with RCC M20 using 20mm broken stone for floor slab ,RCC M20 slab using 20mm broken stone for removable cover slab, Brick work in CM 1:6 for walls, PCC 1:4:8 using 20mm broken stone for leveling course below foundation including earth work excavation in all classes of soil, , plastering the inside with CM 1:3, 9mm thick with neat cement flush coat, providing necessary slope in the benching towards main sewer, providing provision for connecting main sewer and service connections, conveying, lifting, placing the cover slab in position by suitable means, conveying and disposing the surplus earth with all lead and lift as per drawings and specifications , including the cost of reinforcement , testing the chamber and sulphate resistant cement shall be used for the the construction of inspection chamber							
	Inspection chambers of inside size 0.45x0.45x0.45m	308					308.000	2058x0.15=308
	Total Quantity						308.000 No	
	Total Deducted Quantity						0.000 No	
	Net Total Quantity						308.000 No	
	Say 308.000 No @ Rs 3673.89 / No						Rs 1131558.12	
36	od340809/2021_2022 Constructing inspection chambers of size 0.60x0.60m (inside) and 0.90m deep with RCC M20 using 20mm broken stone for floor slab ,RCC M20 slab using 20mm broken stone for removable cover slab, Brick work in CM 1:6 for walls, PCC 1:4:8 using 20mm broken stone for leveling course below foundation including earth work excavation in all classes of soil, plastering the inside with CM 1:3, 9mm thick with neat cement flush coat, providing necessary slope in the benching towards main sewer, providing							

	provision for connecting main sewer and service connections, conveying, lifting, placing the cover slab in position by suitable means, conveying and disposing the surplus earth with all lead and lift as per drawings and specifications , including the cost of reinforcement , testing the chamber and sulphate resistant cement shall be used for the the construction of inspection chamber						
	Inspection chambers of inside size 0.6 X 0.6 X 0.9 m	411				411.000	2058x0.20 =411
	Total Quantity						411.000 No
	Total Deducted Quantity						0.000 No
	Net Total Quantity						411.000 No
	Say 411.000 No @ Rs 7929.36 / No						Rs 3258966.96
37	od340810/2021_2022 Constructing inspection chambers of size 0.60x0.60m (inside) and 0.60m deep with RCC M20 using 20mm broken stone for floor slab ,RCC M20 slab using 20mm broken stone for removable cover slab, Brick work in CM 1:6 for walls, PCC 1:4:8 using 20mm broken stone for leveling course below foundation including earth work excavation in all classes of soil, plastering the inside with CM 1:3, 9mm thick with neat cement flush coat, providing necessary slope in the benching towards main sewer, providing provision for connecting main sewer and service connections, conveying, lifting, placing the cover slab in position by suitable means, conveying and disposing the surplus earth with all lead and lift as per drawings and specifications , including the cost of reinforcement , testing the chamber and sulphate resistant cement shall be used for the the construction of inspection chamber						
	Inspection chambers of inside size 0.6 x 0.6 x 0.6 m	412				412.000	2058x0.2= 412
	Total Quantity						412.000 No
	Total Deducted Quantity						0.000 No
	Net Total Quantity						412.000 No
	Say 412.000 No @ Rs 7472.74 / No						Rs 3078768.88
38	od340811/2021_2022 Constructing inspection chambers of size 0.60x0.60m (inside) and 0.75m deep with RCC M20 using 20mm broken stone for floor slab ,RCC M20 slab using 20mm broken stone for removable cover slab, Brick work in CM 1:6 for walls, PCC 1:4:8 using 20mm broken stone for leveling course below foundation including earth work excavation in all classes of soil, plastering the inside with CM 1:3, 9mm thick with neat cement flush coat, providing necessary slope in the benching towards main sewer, providing provision for connecting main sewer and service connections, conveying, lifting, placing the cover slab in position by suitable means, conveying and disposing the surplus earth with all lead and lift as per drawings and specifications , including the cost of reinforcement , testing the chamber and sulphate resistant cement shall be used for the the construction of inspection chamber						
	Inspection chambers of inside size 0.6 x 0.6 x 0.75 m	412				412.000	2058x0.2= 412

Total Quantity							412.000 No	
Total Deducted Quantity							0.000 No	
Net Total Quantity							412.000 No	
Say 412.000 No @ Rs 7687.45 / No							Rs 3167229.40	
SI No	Description	No	L	B	D	CF	Quantity	Remark
2Road Restoration work of laying of sewers and pumping main. (Cost Index:36.44 %)								
1	od340784/2021_2022 Excavation for roadwork in soil with hydraulic excavator of 0.9 cum bucket capacity including cutting and loading in tippers, trimming bottom and side slopes, in accordance with requirements of lines, grades and cross sections, and transporting to the embankment location within all lifts and lead up to 1000 m							
	Sewer lines from 225mm to 355mm	1	25182.600	1.200	0.300	0.6	5439.442	
	Inspection Chamber to Manhole	1	1029*12	0.600	0.300	0.6	1333.584	(1029X12)
	Pumping main(100mm to 200mm DI)	1	7497*0.4	0.800	0.300	0.5	359.857	7497x0.4
Total Quantity							7132.883 cum	
Total Deducted Quantity							0.000 cum	
Net Total Quantity							7132.883 cum	
Kerala Water Authority Say 7132.883 cum @ Rs 58.08 / cum							Rs 414277.84	
2	100.41.39 Supply ,stacking,spreading and consolidating of Quarry Muck in the trench of pipe line, including carriage, loading ,unloading & stacking up to any lead.							
	Sewer lines from 225mm to 355mm	1	25182.600	1.200	0.150	0.6	2719.721	
	Inspection Chamber to Manhole	1	1029*12	0.600	0.150	0.6	666.792	(1029X12)
	Pumping main(100mm to 200mm DI)	1	7497*0.4	0.800	0.150	0.5	179.929	7497x0.4
Total Quantity							3566.442 cum	
Total Deducted Quantity							0.000 cum	
Net Total Quantity							3566.442 cum	
Say 3566.442 cum @ Rs 549.44 / cum							Rs 1959545.89	
3	16.79 Providing , laying spreading and compacting graded stone aggregate (size range 53 mm to 0.075 mm) to wet mix macadam (WMM) specification including premixing the material with water at OMC in mechanical mix plant, carriage of mixed material by tipper to site, for all leads & lifts, laying in uniform layers with							

	mechanical paver finisher in sub - base / base course on well prepared surface and compacting with vibratory roller of 8 to 10 tonne capacity to achieve the desired density, complete as per specifications and directions of Engineer - in- Charge.							
	Sewer lines from 225mm to 355mm	1	25182.600	1.200	0.150	0.6	2719.721	
	Inspection Chamber to Manhole	1	1029*12	0.600	0.150	0.6	666.792	(1029X12)
	Pumping main(100mm to 200mm DI)	1	7497*0.4	0.800	0.150	0.5	179.929	7497x0.4
	Total Quantity						3566.442 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						3566.442 cum	
	Say 3566.442 cum @ Rs 3128.64 / cum						Rs 11158113.10	
4	od340788/2021_2022 Providing and applying primer coat with bitumen emulsion (SS) on prepared surface of granular Base including clearing of road surface and spraying primer at the rate of 0.70 - 1.0 kg/sqm using mechanical means							
	Sewer lines from 225mm to 355mm	1	25182.600	1.200	0.600	0.6	10878.884	60% of muniपाल road & 40% as PWD road
	Inspection Chamber to Manhole	1	1029*12	0.600	0.600	0.6	2667.168	
	Pumping main(100mm to 200mm DI)	1	7497*0.4* 0.5	0.800			1199.521	7497x0.4
	Total Quantity						14745.573 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						14745.573 sqm	
	Say 14745.573 sqm @ Rs 59.03 / sqm						Rs 870431.17	
5	od340789/2021_2022 Providing and applying tack coat with bitumen emulsion(RS) using emulsion pressure distributor at the rate of 0.20 - 0.30 kg per sqm on the prepared bituminous surface cleaned with mechanical broom							
	Sewer lines from 225mm to 355mm	1	25182.600	1.500	0.600	0.6	13598.604	60% of muniपाल road & 40% as PWD road

	Inspection Chamber to Manhole	1	1029*12	1.200	0.600	0.6	5334.336	
	Pumping main(100mm to 200mm DI)	1	7497*0.4*0.5	1.200			1799.280	7497x0.4
	Total Quantity						20732.220 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						20732.220 sqm	
	Say 20732.220 sqm @ Rs 10.41 / sqm						Rs 215822.41	
6	od340790/2021_2022 Providing, laying and rolling of open graded premix carpet of 20 mm thickness with 0.27 cum of 12 mm departmental aggregates premixed with 12.96 kg of bitumen per 10 sqm using penetration grade bitumen to required line, grade and level on a previously prepared base, after priming the existing surface with 5 kg of bitumen (VG 30) 10 sqm including mixing in a suitable plant, laying and rolling with a three wheel static roller of 80-100 KN capacity, finished to required level and grades,followed by a seal coat of 0.09 cum of 6 mm departmental aggregates premixed with 8.64 kg of bitumen per 10 sqm.By Manual Means.							
	Sewer lines from 225mm to 355mm	1	25182.600	1.500	0.600	0.6	13598.604	60% of munalpal road & 40% as PWD road
	Inspection Chamber to Manhole	1	1029*12	1.200	0.600	0.6	5334.336	
	Pumping main(100mm to 200mm DI)	1	7497*0.4*0.5	1.200			1799.280	7497x0.4
	Total Quantity						20732.220 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						20732.220 sqm	
	Say 20732.220 sqm @ Rs 176.52 / sqm						Rs 3659651.47	
7	od340791/2021_2022 Seal Coat - Manual Means - Type C - Bitumen S-65 Providing and laying seal coat sealing the voids in a bituminous surface laid to the specified levels, grade and cross fall using Type A, Type B and Type C as per Technical Specification Clause 510 A.By Manual Means:-Case - III : Type C							
	Sewer lines from 225mm to 355mm	1	25182.600	1.500	0.600	0.6	13598.604	60% of munalpal road & 40% as PWD road

	Inspection Chamber to Manhole	1	1029*12	1.200	0.600	0.6	5334.336	
	Pumping main(100mm to 200mm DI)	1	7497*0.4*0.5	1.200			1799.280	7497x0.4
	Total Quantity						20732.220 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						20732.220 sqm	
	Say 20732.220 sqm @ Rs 78.00 / sqm						Rs 1617113.16	
SI No	Description	No	L	B	D	CF	Quantity	Remark
3Pumping mains (Cost Index:36.44 %)								
1	100.59.1 Cutting the bituminous / concrete roads with cutting machine for a minimum depth of 200mm along the sides of proposed alignment of the pipe to be laid without causing any damage to other utilities, including the charges for hire and conveyance of tools and plant, cost of consumables and charges for lighting, watching, ribbon fencing, caution boards, traffice diversion, and as per the direction of departmental officers etc. complete, before carrying out the demolition of bituminous / concrete road by mechanical means and carrying out the excavation.							
	100mm DI	2	4447.000	0.800			7115.201	
	150mm DI	2	1919.000	0.800			3070.400	
	200mmDI	2	1131.000	0.800			1809.601	
	Total Quantity						11995.202 metre	
	Total Deducted Quantity						0.000 metre	
	Net Total Quantity						11995.202 metre	
	Say 11995.202 metre @ Rs 30.63 / metre						Rs 367413.04	
2	15.43.2 Dismantling manually / by mechanical means including stacking of serviceable material and disposal of unserviceable material within 50 metres lead as per direction of Engineer -in-Charge:Bituminous road							
	100mm DI	1	4447.000	0.600		0.4	1067.280	
	150mm DI	1	1919.000	0.600		0.4	460.560	
	200mmDI	1	1131.000	0.700		0.4	316.680	
	Total Quantity						1844.520 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						1844.520 sqm	
	Say 1844.520 sqm @ Rs 363.20 / sqm						Rs 669929.66	
3	15.2.1 Demolishing cement concrete manually / by mechanical means including disposal of material within 50 metres lead as per direction of Engineer - in-Charge.Nominal concrete 1:3:6 or richer mix (i/c equivalent							

	design mix)							
	100mm DI	1	4447.000	0.600	0.150	0.4	160.092	
	150mm DI	1	1919.000	0.600	0.150	0.4	69.084	
	200mmDI	1	1131.000	0.700	0.150	0.4	47.502	
	Total Quantity							276.678 cum
	Total Deducted Quantity							0.000 cum
	Net Total Quantity							276.678 cum
	Say 276.678 cum @ Rs 2057.94 / cum							Rs 569386.72
4	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 1.5 m, including getting out the excavated soil, and then returning the soil as required, in layers not exceeding 20 cm in depth, including consolidatingeach deposited layer by ramming, watering, etc. and disposing of surplus excavated soil as directed, within a lead of 50 m : All kinds of soil (Ref. Item No. 2.10.1 of DSR)							
	100mm DI	1	4447.000	0.600	1.000	0.6	1600.920	
	150mm DI	1	1919.000	0.600	1.000	0.6	690.840	
	200mmDI	1	1131.000	0.700	1.000	0.6	475.020	
	Kerala Water Authority Total Quantity							2766.780 cum
	Total Deducted Quantity							0.000 cum
	Net Total Quantity							2766.780 cum
	Say 2766.780 cum @ Rs 558.99 / cum							Rs 1546602.35
5	100.1.5 Excavating trenches of required width for pipes, cables, etc including excavation for sockets, and dressing of sides, ramming of bottoms, depth up to 1.5 m, including getting out the excavated soil, and then returning the soil as required, in layers not exceeding 20 cm in depth, including consolidatingeach deposited layer by ramming, watering, etc. and disposing of surplus excavated soil as directed, within a lead of 50 m :" Ordinary Rock. (Ref. Item No. 2.13.1 of DSR)							
	100mm DI	1	4447.000	0.600	1.000	0.3	800.460	
	150mm DI	1	1919.000	0.600	1.000	0.3	345.420	
	200mmDI	1	1131.000	0.700	1.000	0.3	237.510	
	Total Quantity							1383.390 cum
	Total Deducted Quantity							0.000 cum
	Net Total Quantity							1383.390 cum

	Say 1383.390 cum @ Rs 811.82 / cum						Rs 1123063.67	
6	2.7.2 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.Hard rock (requiring blasting)							
	100mm DI	1	4447.000	0.600	1.000	0.1	266.820	
	150mm DI	1	1919.000	0.600	1.000	0.1	115.140	
	200mmDI	1	1131.000	0.700	1.000	0.1	79.170	
	Total Quantity						461.130 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						461.130 cum	
	Say 461.130 cum @ Rs 722.11 / cum						Rs 332986.58	
7	100.8.1 Fencing one side of trenches, 1.50 m height with two rows of 10 cm plastic caution tape in vertical casuarina pole (girth 15cm to 24cm) fixed at 2 m intervals. (Data Prepared based on PWD SDB - Item No.1009)							
		1	7497.000			0.6	4498.200	
	Total Quantity						4498.200 metre	
	Total Deducted Quantity						0.000 metre	
	Net Total Quantity						4498.200 metre	
	Say 4498.200 metre @ Rs 28.12 / metre						Rs 126489.38	
8	100.98.115 Supply of DI K9 Pipe Conforming to IS 8329/2000, 100mm Dia.							
	DI K9 Pipe , 100mm Dia.	1	4447.000				4447.000	
	Total Quantity						4447.000 metre	
	Total Deducted Quantity						0.000 metre	
	Net Total Quantity						4447.000 metre	
	Say 4447.000 metre @ Rs 1143.05 / metre						Rs 5083143.35	
9	100.98.116 Supply of DI K9 Pipe Conforming to IS 8329/2000, 150mm Dia.							
	DI K9 Pipe 150mm Dia.	1	1919.000				1919.000	
	Total Quantity						1919.000 metre	
	Total Deducted Quantity						0.000 metre	

	Net Total Quantity							1919.000 metre
	Say 1919.000 metre @ Rs 1673.35 / metre							Rs 3211158.65
10	100.98.117 Supply of DI K9 Pipe Conforming to IS 8329/2000, 200mm Dia.							
	DI K9 Pipe, 200mm Dia.	1	1131.000				1131.000	
	Total Quantity							1131.000 metre
	Total Deducted Quantity							0.000 metre
	Net Total Quantity							1131.000 metre
	Say 1131.000 metre @ Rs 2100.55 / metre							Rs 2375722.05
11	100.14.1 Conveying and laying S&S Centrifugally Cast (Spun) / Ductile Iron Pipes conforming to IS: 8329 excluding cost of pipes and specials : 100 mm dia Ductile Iron Class K-9 Pipes Data derived from 18.72.15 in DAR							
	DI K9 Pipe , 100mm Dia.	1	4447.000				4447.000	
	Total Quantity							4447.000 metre
	Total Deducted Quantity							0.000 metre
	Net Total Quantity							4447.000 metre
	Say 4447.000 metre @ Rs 59.21 / metre							Rs 263306.87
12	100.14.2 Conveying and laying S&S Centrifugally Cast (Spun) / Ductile Iron Pipes conforming to IS: 8329 excluding cost of pipes and specials : 150 mm dia Ductile Iron Class K-9 Pipes Data derived from 18.72.16 in DAR							
	DI K9 Pipe 150mm Dia.	1	1919.000				1919.000	
	Total Quantity							1919.000 metre
	Total Deducted Quantity							0.000 metre
	Net Total Quantity							1919.000 metre
	Say 1919.000 metre @ Rs 88.21 / metre							Rs 169274.99
13	100.14.3 Conveying and laying S&S Centrifugally Cast (Spun) / Ductile Iron Pipes conforming to IS: 8329 excluding cost of pipes and specials : 200 mm dia Ductile Iron Class K-9 Pipes Data derived from 18.72.17 in DAR							

	DI K9 Pipe, 200mm Dia.	1	1131.000				1131.000	
	Total Quantity						1131.000 metre	
	Total Deducted Quantity						0.000 metre	
	Net Total Quantity						1131.000 metre	
	Say 1131.000 metre @ Rs 122.86 / metre						Rs 138954.66	
14	18.70.1 Providing push - on-joints to Centrifugally (Spun) Cast Iron Pipes or Ductile Iron Pipes including testing of joints and including the cost of rubber gasket:100 mm dia pipes							
	DI K9 Pipe , 100mm Dia.	1	890.000				890.000	
	Total Quantity						890.000 joint	
	Total Deducted Quantity						0.000 joint	
	Net Total Quantity						890.000 joint	
	Say 890.000 joint @ Rs 108.54 / joint						Rs 96600.60	
15	18.70.2 Providing push - on-joints to Centrifugally (Spun) Cast Iron Pipes or Ductile Iron Pipes including testing of joints and including the cost of rubber gasket:150 mm dia pipes							
	150mm DI	384					384.000	422/5
	Total Quantity						384.000 joint	
	Total Deducted Quantity						0.000 joint	
	Net Total Quantity						384.000 joint	
	Say 384.000 joint @ Rs 177.51 / joint						Rs 68163.84	
16	18.70.3 Providing push - on-joints to Centrifugally (Spun) Cast Iron Pipes or Ductile Iron Pipes including testing of joints and including the cost of rubber gasket:200 mm dia pipes							
	200mm DI	227					227.000	
	Total Quantity						227.000 joint	
	Total Deducted Quantity						0.000 joint	
	Net Total Quantity						227.000 joint	
	Say 227.000 joint @ Rs 260.40 / joint						Rs 59110.80	
17	18.83.2 Labour for cutting C.I. pipe with steel saw.100 mm diameter C.I. pipe							
	100 DI	30					30.000	
	Total Quantity						30.000 Each Cut	

	Total Deducted Quantity						0.000 Each Cut	
	Net Total Quantity						30.000 Each Cut	
	Say 30.000 Each Cut @ Rs 172.94 / Each Cut						Rs 5188.20	
18	18.83.4 Labour for cutting C.I. pipe with steel saw.150 mm diameter C.I. pipe							
	150mm DI	26					26.000	
	Total Quantity						26.000 Each Cut	
	Total Deducted Quantity						0.000 Each Cut	
	Net Total Quantity						26.000 Each Cut	
	Say 26.000 Each Cut @ Rs 325.00 / Each Cut						Rs 8450.00	
19	18.83.5 Labour for cutting C.I. pipe with steel saw.200 mm diameter C.I. pipe							
	200mm DI	20					20.000	
	Total Quantity						20.000 Each Cut	
	Total Deducted Quantity						0.000 Each Cut	
	Net Total Quantity						20.000 Each Cut	
	Say 20.000 Each Cut @ Rs 433.40 / Each Cut						Rs 8668.00	
20	18.68.1 Providing and laying D.I specials of class K - 12 suitable for push - on jointing as per IS : 9523 :Upt 600 mm dia							
		1	45.000				45.000	
	Total Quantity						45.000 quintal	
	Total Deducted Quantity						0.000 quintal	
	Net Total Quantity						45.000 quintal	
	Say 45.000 quintal @ Rs 20247.70 / quintal						Rs 911146.50	
21	100.35.1 Testing 100mm DI/CI pipeline with potable water to the required test pressure 100 mm dia Observed Data derived from item no.1016 of PHED DATA							
	DI K9 Pipe , 100mm Dia.	1	4447.000				4447.000	
	Total Quantity						4447.000 metre	
	Total Deducted Quantity						0.000 metre	
	Net Total Quantity						4447.000 metre	
	Say 4447.000 metre @ Rs 23.49 / metre						Rs 104460.03	

22	100.35.2 Testing 150mm DI/CI pipeline with potable water to the required test pressure 150 mm dia Observed Data derived from item no.1018 of PHED DATA							
	DI K9 Pipe 150mm Dia.	1	1919.000				1919.000	
	Total Quantity						1919.000 metre	
	Total Deducted Quantity						0.000 metre	
	Net Total Quantity						1919.000 metre	
	Say 1919.000 metre @ Rs 31.74 / metre						Rs 60909.06	
23	100.35.3 Testing 200mm DI/CI pipeline with potable water to the required test pressure 200 mm dia Observed Data derived from item no.1020 of PHED DATA							
	200mm DI	1	1131.000				1131.000	
	Total Quantity						1131.000 metre	
	Total Deducted Quantity						0.000 metre	
	Net Total Quantity						1131.000 metre	
	Say 1131.000 metre @ Rs 40.14 / metre						Rs 45398.34	
24	5.1.3 Providing and laying in position specified grade of reinforced cement concrete, excluding the cost of centering, shuttering, finishing and reinforcement - All work up to plinth level:1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size)							
	pipe supports/ anchor blocks	15	1.000	1.000	1.000		15.000	
	Total Quantity						15.000 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						15.000 cum	
	Say 15.000 cum @ Rs 8642.31 / cum						Rs 129634.65	
25	5.9.1 Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete							
		15	2.000				30.000	
	For item no...airvalve and scour valve chamber	2	9.200		1.300		23.920	
	Total Quantity						53.920 sqm	

	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						53.920 sqm	
	Say 53.920 sqm @ Rs 337.42 / sqm						Rs 18193.69	
26	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							
		1	15.000			80.0	1200.000	
	For item no.....air valve and scour valve chamber	1	2.487			80.0	198.960	
	Total Quantity						1398.960 kilogram	
	Total Deducted Quantity						0.000 kilogram	
	Net Total Quantity						1398.960 kilogram	
	Say 1398.960 kilogram @ Rs 98.92 / kilogram						Rs 138385.12	
27	2.8.1 Earth work in excavation by mechanical means (Hydraulic excavator) /manual means in foundation trenches or drains (not exceeding 1.5 m in width or 10 sqm on plan), including dressing of sides and ramming of bottoms, lift up to 1.5 m, including getting out the excavated soil and disposal of surplus excavated soil as directed, within a lead of 50 m.All kinds of soil							
	Air valve & Scour valve Chamber	2	1.300	1.300	1.500		5.070	
	Total Quantity						5.070 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						5.070 cum	
	Say 5.070 cum @ Rs 298.80 / cum						Rs 1514.92	
28	4.1.3 Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:2:4 (cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size)							
	Air valve & Scour valve chamber	2	1.300	1.300	1.500	0.2	1.014	
	Total Quantity						1.014 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						1.014 cum	
	Say 1.014 cum @ Rs 8040.95 / cum						Rs 8153.52	
29	5.2.2 Reinforced cement concrete work in walls (any thickness), including attached pilasters, buttresses, plinth							

	and string courses, fillets, columns, pillars, piers, abutments, posts and struts etc. up tot floor five level excluding cost of centering, shuttering, finishing and reinforcement :1:1.5:3(1 cement : 1.5 coarse sand : 3 graded stone aggregate 20 mm nominal size)							
	air valve & Scour valve back to collection well-sidewall	2	4*1.15	0.150	1.100		1.518	
	bottom	2	1.150	1.150	0.150		0.397	
	cover slab	2	1.300	1.300	0.200		0.677	
	for MH cover	2	3.14/4	0.560	0.600	0.2	-0.105	
	Total Quantity						2.592 cum	
	Total Deducted Quantity						-0.105 cum	
	Net Total Quantity						2.487 cum	
	Say 2.487 cum @ Rs 11022.71 / cum						Rs 27413.48	
30	4.1.2 Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:1/2:3 (cement : 11/2 coarse sand : 3 graded stone aggregate 20 mm nominal size)							
	100mm DI	1	4447.000	0.600	0.150	0.4	160.092	
	150mm DI	1	1919.000	0.600	0.150	0.4	69.084	
	200mmDI	1	1131.000	0.700	0.150	0.4	47.502	
	Total Quantity						276.678 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						276.678 cum	
	Say 276.678 cum @ Rs 8540.67 / cum						Rs 2363015.49	
SI No	Description	No	L	B	D	CF	Quantity	Remark
4Construction of Man holes (Cost Index:36.44 %)								
1	od340777/2021_2022 Constructing manholes of different depths as per drawings and specifications on sewer lines and provided with tight fitting approved make heavy duty CI manhole cover with frame 600 mm dia, embedded into the cover slab, providing provision of encapsulated PVC/CI foot rests @ 30 cm apart in a staggered manner, bottom slab, side wall and cover slabwith RCC M30 with a provision of PCC 1:3:6, 10 cm thick below floor slab, inside to be plastered with CM. 1:3, 12mm thick one coat with a neat cement flushing coat, two coats of anticorrosive bituminous paint to the outside surfaces, providing benching and channelling inside the manhole with CC M30 as per drawings and specifications. The rate shall include earthwork excavation for all leads and lifts, backfilling, de-watering, side protection with steel shoring, provision of pipe connection for inlet, outlet and service connection pipes, providing danger lights, barricades etc.and disposing the surplus earth away with all leads and lifts as directed upto manhole depth 1.5m (internal dia-1200mm)							

	MH-up to 1.5m depth, 1.2m dia	858					858.000	
	Total Quantity						858.000 No	
	Total Deducted Quantity						0.000 No	
	Net Total Quantity						858.000 No	
	Say 858.000 No @ Rs 58049.94 / No						Rs 49806848.52	
2	od340782/2021_2022 Constructing manholes of different depths as per drawings and specifications on sewer lines and provided with tight fitting approved make heavy CI manhole cover with frame 600 mm dia, embeded into the cover slab, providing provision of encapsulated PVC/CI foot rests @ 30 cm apart in a staggered manner, bottom slab, side wall and cover slabwith RCC M30 with a provision of PCC 1:3:6, 10 cm thick below floor slab, inside to be plastered with CM. 1:3, 12mm thick one coat with a neat cement flushing coat, two coats of anticorrossive bituminous paint to the outside surfaces, providing benching and channelling inside the manhole with CC M30 as per drawings and specifications. The rate shall include earthwork excavation for all leads and lifts, backfilling, de-watering, side protection with steel shoring, provision of pipe connection for inlet, outlet and service connection pipes, providing danger lights, barricades etc.and disposing the surplus earth away with all leads and lifts as directed upto manhole depth 2.5m (internal diameter 1200m)							
	MH- up to 2.5m depth, 1.2m dia	98					98.000	
	Total Quantity						98.000 No	
	Total Deducted Quantity						0.000 No	
	Net Total Quantity						98.000 No	
	Say 98.000 No @ Rs 76668.65 / No						Rs 7513527.70	
3	od340783/2021_2022 Constructing manholes of different depths as per drawings and specifications on sewer lines and provided with tight fitting approved make heavy CI manhole cover with frame 600 mm dia, embeded into the cover slab, providing provision of encapsulated PVC/CI foot rests @ 30 cm apart in a staggered manner, bottom slab, side wall and cover slabwith RCC M30 with a provision of PCC 1:3:6, 10 cm thick below floor slab, inside to be plastered with CM. 1:3, 12mm thick one coat with a neat cement flushing coat, two coats of anticorrossive bituminous paint to the outside surfaces, providing benching and channelling inside the manhole with CC M30 as per drawings and specifications. The rate shall include earthwork excavation for all leads and lifts, backfilling, de-watering, side protection with steel shoring, provision of pipe connection for inlet, outlet and service connection pipes, providing danger lights, barricades etc.and disposing the surplus earth away with all leads and lifts as directed upto manhole depth 3.5m (internal diameter - 1500mm)							
	upto manhole depth 3.5 m (internal diameter - 1500mm)	51					51.000	
	Total Quantity						51.000 No	

Total Deducted Quantity							0.000 No	
Net Total Quantity							51.000 No	
Say 51.000 No @ Rs 153988.35 / No							Rs 7853405.85	
4	od340785/2021_2022 Constructing manholes of different depths as per drawings and specifications on sewer lines and provided with tight fitting approved make heavy CI manhole cover with frame 600 mm dia, embeded into the cover slab, providing provision of encapsulated PVC/CI foot rests @ 30 cm apart in a staggered manner, bottom slab, side wall and cover slabwith RCC M30 with a provision of PCC 1:3:6, 10 cm thick below floor slab, inside to be plastered with CM. 1:3, 12mm thick one coat with a neat cement flushing coat, two coats of anticorrosive bituminous paint to the outside surfaces, providing benching and channelling inside the manhole with CC M30 as per drawings and specifications. The rate shall include earthwork excavation for all leads and lifts, backfilling, de-watering, side protection with steel shoring, provision of pipe connection for inlet, outlet and service connection pipes, providing danger lights, barricades etc.and disposing the surplus earth away with all leads and lifts as directed upto manhole depth upto 4.5m (internal diameter-1500mm)							
	upto manhole depth upto 4.5m (internal diameter-1500mm)	22					22.000	
Total Quantity							22.000 No	
Total Deducted Quantity							0.000 No	
Net Total Quantity							22.000 No	
Say 22.000 No @ Rs 196474.41 / No							Rs 4322437.02	
SI No	Description	No	L	B	D	CF	Quantity	Remark
5Road Restoration - to PWD/NH (Cost Index:36.44 %)								
1	od340774/2021_2022 PWD Berm Cutting							
	Sewer line -225 to 355 mm	1	6044.000	1.800		0.1	1087.920	25182.6X 0.6X0.4=6 043.82
	IC to MH Line -160mm	1	2964.000	1.500		0.1	444.600	1029x12X 0.6X0.4=2 963.5
	Pumping main 100 to 250mm DI	1	1500.000	1.500		0.1	225.000	7497X0.4 X0.5=149 9.4
	For inspection chamber	2058	1.000	1.000		0.1	205.800	1029X2=2 058
Total Quantity							1963.320 sqm	
Total Deducted Quantity							0.000 sqm	

	Net Total Quantity						1963.320 sqm	
	Say 1963.320 sqm @ Rs 304.95 / sqm						Rs 598714.43	
2	od340776/2021_2022 PWD Road reformation Charges- BT Cutting							
	Sewer line -225 to 355 mm	1	6044.000	1.800		0.6	6527.520	25182.6X 0.6X0.4=6 043.82
	IC to MH Line -160mm	1	2964.000	1.500		0.6	2667.600	1029x12X 0.6X0.4=2 963.5
	Pumping main 100 to 250mm DI	1	1500.000	1.500		0.6	1350.000	7497X0.4 X0.5=149 9.4
	For inspection chamber	2058	1.000	1.000		0.6	1234.800	1029x2=2 058
	Total Quantity						11779.920 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						11779.920 sqm	
	Say 11779.920 sqm @ Rs 2651.79 / sqm						Rs 31237874.06	
3	od340780/2021_2022 Road restoration charges for BM & BC Tar Cutting							
	Sewer line -225 to 355 mm	1	6044.000	1.800		0.3	3263.760	25182.6X 0.6X0.4=6 043.82
	IC to MH Line -160mm	1	2964.000	1.500		0.3	1333.800	1029x12X 0.6X0.4=2 963.5
	Pumping main 100 to 250mm DI	1	1500.000	1.500		0.3	675.000	7497X0.4 X0.5=149 9.4
	For inspection chamber	2058	1.000	1.000		0.3	617.400	
	Total Quantity						5889.960 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						5889.960 sqm	
	Say 5889.960 sqm @ Rs 3448.73 / sqm						Rs 20312881.75	
SI No	Description	No	L	B	D	CF	Quantity	Remark
6Lifting Stations and Allied work (Cost Index:36.44 %)								

1	100.3.3.1 Earthwork open well excavation (above water) for wells of dia. above 2.5m and upto 3.50 m in all kinds of soil and conveying and depositing the spoil within initial lead of 50m and lift up to 1.5 m including neat banking. NEW DATA (Prepared based on PHED SDB - Item No.1080 & 1083)							
	2m dia- LS1-depth 2.37M	1	3.140	1.600*1.60	1.500		12.058	Depth 4.97m
	2m dia- LS2-depth 3.77M	1	3.140	1.600*1.60	1.500		12.058	
	2m dia- LS3-depth 3.77M	1	3.140	1.600*1.60	1.500		12.058	
	2m dia- LS4-depth 3.79m	1	3.140	1.600*1.60	1.500		12.058	
	2m dia- LS5-depth 4.68m	1	3.140	1.600*1.60	1.500		12.058	
	2m dia- LS6-depth 4.84m	1	3.140	1.600*1.60	1.500		12.058	
	2m dia- LS7-depth 5.10m	1	3.140	1.600*1.60	1.500		12.058	
	2m dia- LS8-depth 2.78m	1	3.140	1.600*1.60	1.500		12.058	
	2m dia- LS9-depth 2.76m	1	3.140	1.600*1.60	1.500		12.058	
	2m dia- LS10-depth 4.64m	1	3.140	1.600*1.60	1.500		12.058	
	2m dia- LS12-depth 3.05m	1	3.140	1.600*1.60	1.500		12.058	
	2m dia- LS13-depth 3.54m	1	3.140	1.600*1.60	1.500		12.058	
	2m dia- LS14-depth 3.60m	1	3.140	1.600*1.60	1.500		12.058	
	2m dia- LS15-depth 3.58m	1	3.140	1.600*1.60	1.500		12.058	
	Total Quantity						168.812 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						168.812 cum	
	Say 168.812 cum @ Rs 513.76 / cum						Rs 86728.85	
2	100.3.3.2							

	Earthwork open well excavation (above water) for wells of dia. above 2.5m and upto 3.50 m in all kinds of soil and conveying and depositing the spoil within initial lead of 50m and lift from 1.5m to 3.0 m including neat banking. NEW DATA (Prepared based on PHED SDB - Item No.1082 & 1085)							
	2m dia- LS1-depth 2.37M	1	3.140	1.600*1.6 0	1.370		11.013	Depth 4.97m
	2m dia- LS2- depth 3.77 M	1	3.140	1.600*1.6 0	1.500		12.058	
	2m dia- LS3-depth 3.77M	1	3.140	1.600*1.6 0	1.500		12.058	
	2m dia- LS4-depth 3.79m	1	3.140	1.600*1.6 0	1.500		12.058	
	2m dia- LS5-depth 4.68m	1	3.140	1.600*1.6 0	1.500		12.058	
	2m dia- LS6-depth 4.84m	1	3.140	1.600*1.6 0	1.500		12.058	
	2m dia- LS7- depth 5.10 m	1	3.140	1.600*1.6 0	1.500		12.058	
	2m dia- LS8- depth 2.78 m	1	3.140	1.600*1.6 0	1.280		10.290	
	2m dia- LS9- depth 2.76 m	1	3.140	1.600*1.6 0	1.260		10.129	
	2m dia- LS10- depth 4.64 m	1	3.140	1.600*1.6 0	1.500		12.058	
	2m dia- LS12- depth 3.05 m	1	3.140	1.600*1.6 0	1.500		12.058	
	2m dia- LS13- depth 3.54 m	1	3.140	1.600*1.6 0	1.500		12.058	
	2m dia- LS14- depth 3.60 m	1	3.140	1.600*1.6 0	1.500		12.058	
	2m dia- LS15- depth 3.58 m	1	3.140	1.600*1.6 0	1.500		12.058	
	Total Quantity						164.070 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						164.070 cum	
	Say 164.070 cum @ Rs 565.13 / cum						Rs 92720.88	
3	100.3.3.13 Earthwork open well excavation (in or under water) for wells of dia. above 2.5m and upto 3.50 m in all							

	kinds of soil and conveying and depositing the spoil within initial lead of 50m and lift from 3.0m to 4.5 m including neat banking. NEW DATA (Prepared based on PHED SDB - Item No.1081 & 1084)							
	2 m dia- LS 2 - depth 3.77 M	1	3.140	1.600*1.6 0	1.270		10.209	
	2m dia- LS3-depth 3.77M	1	3.140	1.600*1.6 0	1.270		10.209	
	2m dia- LS4-depth 3.79m	1	3.140	1.600*1.6 0	1.290		10.370	
	2m dia- LS5-depth 4.68m	1	3.140	1.600*1.6 0	1.500		12.058	
	2m dia- LS6-depth 4.84m	1	3.140	1.600*1.6 0	1.500		12.058	
	2 m dia- LS 7 - depth 5.10 m	1	3.140	1.600*1.6 0	1.500		12.058	
	2 m dia- LS 10 - depth 4.64 m	1	3.140	1.600*1.6 0	1.500		12.058	
	2 m dia- LS 12 - depth 3.05 m	1	3.140	1.600*1.6 0	0.550		4.422	
	2 m dia- LS 13 - depth 3.54 m	1	3.140	1.600*1.6 0	1.040		8.360	
	2 m dia- LS 14 - depth 3.60 m	1	3.140	1.600*1.6 0	1.100		8.843	
	2 m dia- LS 15 - depth 3.58 m	1	3.140	1.600*1.6 0	1.080		8.682	
	Total Quantity						109.327 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						109.327 cum	
	Say 109.327 cum @ Rs 739.78 / cum						Rs 80877.93	
4	100.3.4.14 Earthwork open well excavation (in or under water) for wells of dia. above 2.5m and upto 3.50 m in ordinary rock in ordinary rock and conveying and depositing the spoil within initial lead of 50m and lift from 4.5m to 6.0 m including neat banking. NEW DATA (Prepared based on PHED SDB - Item No.1087)							
	2m dia- LS5-depth 4.68m	1	3.140	1.600*1.6 0	0.680		5.467	
	2m dia- LS6-depth 4.84m	1	3.140	1.600*1.6 0	0.840		6.753	

	2m dia- LS7- depth5.10m	1	3.140	1.600*1.6 0	1.100		8.843	
	2m dia- LS10- depth4.64m	1	3.140	1.600*1.6 0	0.640		5.145	
	Total Quantity						26.208 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						26.208 cum	
	Say 26.208 cum @ Rs 2077.50 / cum						Rs 54447.12	
5	100.3.5.1 Earthwork open well excavation (above water) for wells of dia. above 3.5m and upto 6.0 m in all kinds of soil and conveying and depositing the spoil within initial lead of 50m and lift up to 1.5 m including neat banking. NEW DATA (Prepared based on PHED SDB - Item No.1089 & 1092)							
	3m dia LS11, Depth 4.73	1	3.140	2.1*2.1	1.500		20.772	
	3m dia LS16, Depth 5.07	1	3.140	2.1*2.1	1.500		20.772	
	Total Quantity						41.544 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						41.544 cum	
	Say 41.544 cum @ Rs 473.11 / cum						Rs 19654.88	
6	100.3.5.2 Earthwork open well excavation (above water) for wells of dia. above 3.5m and upto 6.0 m in all kinds of soil and conveying and depositing the spoil within initial lead of 50m and lift from 1.5m to 3.0 m including neat banking. NEW DATA (Prepared based on PHED SDB - Item No.1089 & 1092)							
	3m dia LS11, Depth 4.73	1	3.140	2.1*2.1	1.500		20.772	
	3m dia LS16, Depth 5.07	1	3.140	2.1*2.1	1.500		20.772	
	Total Quantity						41.544 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						41.544 cum	
	Say 41.544 cum @ Rs 520.45 / cum						Rs 21621.57	
7	100.3.5.13 Earthwork open well excavation (in or under water) for wells of dia. above 3.5m and upto 6.0 m in all kinds of soil and conveying and depositing the spoil within initial lead of 50m and lift from 3.0m to 4.5 m including neat banking.							

	NEW DATA (Prepared based on PHED SDB - Item No.1090 & 1093)							
	3m dia LS11, Depth 4.73	1	3.140	2.1*2.1	1.500		20.772	
	3m dia LS16, Depth 5.07	1	3.140	2.1*2.1	1.500		20.772	
	Total Quantity						41.544 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						41.544 cum	
	Say 41.544 cum @ Rs 681.24 / cum						Rs 28301.43	
8	100.3.6.4 Earthwork open well excavation (above water) for wells of dia. above 3.5m and upto 6.0 m in ordinary rock and conveying and depositing the spoil within initial lead of 50m and lift from 4.5m to 6.00 m including neat banking. NEW DATA (Prepared based on PHED SDB - Item No.1095)							
	3m dia LS11, Depth 4.73	1	3.140	2.1*2.1	0.730		10.109	
	3m dia LS16, Depth 5.07	1	3.140	2.1*2.1	1.070		14.817	
	Total Quantity						24.926 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						24.926 cum	
	Say 24.926 cum @ Rs 1555.35 / cum						Rs 38768.65	
9	100.7.1 Bailing out water with 5 HP engine and pumpset including conveyance to the site, errection, dismantling and taking back of engine and pump, cost of fuel lubricating oil and other stores pay of staff etc. complete. NEW DATA (Prepared based on PHED SDB - Item No.1070)							
		18	200.000				3600.000	
	Total Quantity						3600.000 Kwh	
	Total Deducted Quantity						0.000 Kwh	
	Net Total Quantity						3600.000 Kwh	
	Say 3600.000 Kwh @ Rs 37.18 / Kwh						Rs 133848.00	
10	2.17.3 Close timbering in case of shafts, wells, cesspits, manholes and the like including strutting, shoring and packing cavities (wherever required) etc. complete (Measurements to be taken of the face area timbered).Depth exceeding 3 m but not exceeding 4.5 m							

	2m dia- LS1-depth 2.37M	1	3.140	3.700	2.870		33.344	2.37+0.5= 2.87
	2m dia- LS2- depth3.77M	1	3.140	3.700	4.270		49.609	
	2m dia- LS3-depth 3.77M	1	3.140	3.700	4.270		49.609	
	2m dia- LS4-depth 3.79m	1	3.140	3.700	4.290		49.842	
	2m dia- LS5-depth 4.68m	1	3.140	3.700	5.180		60.182	
	2m dia- LS6-depth 4.84m	1	3.140	3.700	5.340		62.041	
	2m dia- LS7- depth5.10m	1	3.140	3.700	5.600		65.061	
	2m dia- LS8- depth2.78m	1	3.140	3.700	3.280		38.108	
	2m dia- LS9- depth2.76m	1	3.140	3.700	3.260		37.875	
	2m dia- LS10- depth4.64m	1	3.140	3.700	5.140		59.717	
	2m dia- LS12- depth3.05m	1	3.140	3.700	3.550		41.244	
	2m dia- LS13- depth3.54m	1	3.140	3.700	4.040		46.937	
	2m dia- LS14- depth3.60m	1	3.140	3.700	4.100		47.634	
	2m dia- LS15- depth3.58m	1	3.140	3.700	4.080		47.402	
	3m dia LS11, Depth 4.73	1	3.140	4.600	5.230		75.543	
	3m dia LS16, Depth 5.07	1	3.140	4.600	5.570		80.454	
	Total Quantity						844.602 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						844.602 sqm	
	Say 844.602 sqm @ Rs 222.60 / sqm						Rs 188008.41	
11	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)							
2m dia- LS1-depth 2.37M	1	3.140	1.600*1.60	0.200		1.608	Depth 4.97m	
2m dia- LS2-depth 3.77M	1	3.140	1.600*1.60	0.200		1.608		
2m dia- LS3-depth 3.77M	1	3.140	1.600*1.60	0.200		1.608		
2m dia- LS4-depth 3.79m	1	3.140	1.600*1.60	0.200		1.608		
2m dia- LS5-depth 4.68m	1	3.140	1.600*1.60	0.200		1.608		
2m dia- LS6-depth 4.84m	1	3.140	1.600*1.60	0.200		1.608		
2m dia- LS7-depth 5.10m	1	3.140	1.600*1.60	0.200		1.608		
2m dia- LS8-depth 2.78m	1	3.140	1.600*1.60	0.200		1.608		
2m dia- LS9-depth 2.76m	1	3.140	1.600*1.60	0.200		1.608		
2m dia- LS10-depth 4.64m	1	3.140	1.600*1.60	0.200		1.608		
2m dia- LS12-depth 3.05m	1	3.140	1.600*1.60	0.200		1.608		
2m dia- LS13-depth 3.54m	1	3.140	1.600*1.60	0.200		1.608		
2m dia- LS14-depth 3.60m	1	3.140	1.600*1.60	0.200		1.608		
2m dia- LS15-depth 3.58m	1	3.140	1.600*1.60	0.200		1.608		
3m dia LS11, Depth 4.73	1	3.140	2.1*2.1	0.200		2.770		
3m dia LS16, Depth 5.07	1	3.140	2.1*2.1	0.200		2.770		
	Total Quantity						28.052 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						28.052 cum	
	Say 28.052 cum @ Rs 7256.36 / cum						Rs 203555.41	

12	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 work upto plinth level							
	2m dia- LS1-depth 2.37M-Bottom plugging	1	3.140	1.600*1.60	0.300		2.412	Depth 4.97m
	LS side wall	1	3.140*2.3	0.300	2.370		5.135	
	LS Cover slab	1	3.140	1.3*1.3	0.250		1.327	
	2 m dia - LS 2 - depth 3.77M--Bottom plugging	1	3.140	1.600*1.60	0.300		2.412	
	LS side wall	1	3.140*2.3	0.300	3.770		8.169	
	LS Cover slab	1	3.140	1.3*1.3	0.250		1.327	
	2m dia- LS3-depth 3.77M-Bottom plugging	1	3.140	1.600*1.60	0.300		2.412	
	LS side wall	1	3.140*2.3	0.300	3.770		8.169	
	LS Cover slab	1	3.140	1.3*1.3	0.250		1.327	
	2m dia- LS4-depth 3.79m-Bottom plugging	1	3.140	1.600*1.60	0.300		2.412	
	LS side wall	1	3.140*2.3	0.300	3.790		8.212	
	LS Cover slab	1	3.140	1.3*1.3	0.250		1.327	
	2m dia- LS5-depth 4.68m-Bottom plugging	1	3.140	1.600*1.60	0.300		2.412	
	LS side wall	1	3.140*2.3	0.300	4.680		10.140	
	LS Cover slab	1	3.140	1.3*1.3	0.250		1.327	
	2m dia- LS6-depth 4.84m-Bottom plugging	1	3.140	1.600*1.60	0.300		2.412	
	LS side wall	1	3.140*2.3	0.300	4.840		10.487	
	LS Cover slab	1	3.140	1.3*1.3	0.250		1.327	
	2 m dia - LS 7 - depth 5.10m-Bottom plugging	1	3.140	1.600*1.60	0.300		2.412	

	LS side wall	1	3.140*2.3	0.300	5.100		11.050	
	LS Cover slab	1	3.140	1.3*1.3	0.250		1.327	
	2 m dia - LS 8 - depth 2.78m - Bottom plugging	1	3.140	1.600*1.6 0	0.300		2.412	
	LS side wall	1	3.140*2.3	0.300	2.780		6.024	
	LS Cover slab	1	3.140	1.3*1.3	0.250		1.327	
	2 m dia - LS 9 - depth 2.76m - Bottom plugging	1	3.140	1.600*1.6 0	0.300		2.412	
	LS side wall	1	3.140*2.3	0.300	2.760		5.980	
	LS Cover slab	1	3.140	1.3*1.3	0.250		1.327	
	2 m dia - LS 10 - depth 4.64m - Bottom plugin	1	3.140	1.600*1.6 0	0.300		2.412	
	LS side wall	1	3.140*2.3	0.300	4.640		10.054	
	LS Cover slab	1	3.140	1.3*1.3	0.250		1.327	
	2 m dia - LS 12 - depth 3.05m - Bottom plugin	1	3.140	1.600*1.6 0	0.300		2.412	
	LS side wall	1	3.140*2.3	0.300	3.050		6.609	
	LS Cover slab	1	3.140	1.3*1.3	0.250		1.327	
	2 m dia - LS 13 - depth 3.54m - Bottom plugin	1	3.140	1.600*1.6 0	0.300		2.412	
	LS side wall	1	3.140*2.3	0.300	3.540		7.670	
	LS Cover slab	1	3.140	1.3*1.3	0.250		1.327	
	2 m dia - LS 14 - depth 3.60m - Bottom plugin	1	3.140	1.600*1.6 0	0.300		2.412	
	LS side wall	1	3.140*2.3	0.300	3.600		7.800	
	LS Cover slab	1	3.140	1.3*1.3	0.250		1.327	
	2 m dia - LS 15 - depth 3.58m - Bottom plugin	1	3.140	1.600*1.6 0	0.300		2.412	
	LS side wall	1	3.140*2.3	0.300	3.580		7.757	
	LS Cover slab	1	3.140	1.3*1.3	0.250		1.327	

	3m dia LS11, Depth 4.73-Bottom plug	1	3.140	2.1*2.1	0.300		4.155	
	LS side wall	1	3.140*3.3	0.300	4.730		14.704	
	LS cover slab	1	3.140	1.8*1.8	0.300		3.053	
	3m dia LS16, Depth 5.07-Bottom plug	1	3.140	2.1*2.1	0.200		2.770	
	LS side wall	1	3.140*3.3	0.300	5.070		15.761	
	LS cover slab	1	3.140	1.8*1.8	0.300		3.053	
	manhole	14	0.500	0.500	0.250		-0.875	
		2	0.500	0.500	0.300		-0.150	
	Total Quantity						209.098 cum	
	Total Deducted Quantity						-1.025 cum	
	Net Total Quantity						208.073 cum	
	Say 208.073 cum @ Rs 9947.98 / cum						Rs 2069906.04	
13	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).							
	Qty taken from item no-12	1	208.073				208.073	
	Total Quantity						208.073 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						208.073 cum	
	Say 208.073 cum @ Rs 82.61 / cum						Rs 17188.91	
14	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 .							
	Qty taken from item no-12*340	1	208.073	340.000			70744.820	
	Total Quantity						70744.820 kg	
	Total Deducted Quantity						0.000 kg	
	Net Total Quantity						70744.820 kg	
	Say 70744.820 kg @ Rs 1.36 / kg						Rs 96212.96	
15	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.							

2m dia- LS1-depth 2.37M-Wall inside	1	3.140	2.000	2.370		14.884	Depth 4.97m
LS outside wall	1	3.140	2.600	2.370		19.349	
2 m dia- LS 2 - depth3.77M--Wall inside	1	3.140	2.000	3.770		23.676	
LS outside wall	1	3.140	2.600	3.770		30.779	
2m dia- LS3-depth 3.77M--Wall inside	1	3.140	2.000	3.770		23.676	
LS outside wall	1	3.140	2.600	3.770		30.779	
2m dia- LS4-depth 3.79m--Wall inside	1	3.140	2.000	3.790		23.802	
LS outside wall	1	3.140	2.600	3.790		30.942	
2m dia- LS5-depth 4.68m-Wall inside	1	3.140	2.000	4.680		29.391	
LS outside wall	1	3.140	2.600	4.680		38.208	
2m dia- LS6-depth 4.84m--Wall inside	1	3.140	2.000	4.840		30.396	
LS outside wall	1	3.140	2.600	4.840		39.514	
2 m dia- LS 7 - depth5.10m--Wall inside	1	3.140	2.000	5.100		32.028	
LS outside wall	1	3.140	2.600	5.100		41.637	
2 m dia- LS 8 - depth2.78m-Wall inside	1	3.140	2.000	2.780		17.459	
LS outside wall	1	3.140	2.600	2.780		22.696	
2 m dia- LS 9 - depth2.76m-Wall inside	1	3.140	2.000	2.760		17.333	
LS outside wall	1	3.140	2.600	2.760		22.533	
2 m dia- LS10- depth4.64m--Wall inside	1	3.140	2.000	4.640		29.140	
LS outside wall	1	3.140	2.600	4.640		37.881	
2 m dia- LS12- depth3.05m--Wall inside	1	3.140	2.000	3.050		19.154	

	LS outside wall	1	3.140	2.600	3.050		24.901	
	2m dia- LS13- depth3.54m--Wall inside	1	3.140	2.000	3.540		22.232	
	LS outside wall	1	3.140	2.600	3.540		28.901	
	2m dia- LS14- depth3.60m--Wall inside	1	3.140	2.000	3.600		22.608	
	LS outside wall	1	3.140	2.600	3.600		29.391	
	2m dia- LS15- depth3.58m--Wall inside	1	3.140	2.000	3.580		22.483	
	LS outside wall	1	3.140	2.600	3.580		29.228	
	3m dia LS11, Depth 4.73--Wall inside	1	3.140	3.000	4.730		44.557	
	LS outside wall	1	3.140	3.600	4.730		53.468	
	3m dia LS16, Depth 5.07--Wall inside	1	3.140	3.000	5.070		47.760	
	LS outside wall	1	3.140	3.600	5.070		57.312	
	Kerala Water Authority PRICEL Total Quantity						958.098 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						958.098 sqm	
	Say 958.098 sqm @ Rs 721.70 / sqm						Rs 691459.33	
16	5.9.20 Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform with water proof ply 12 mm thick							
	2m dia- LS1-depth 2.37M-Cover slab	1	3.140	1.3*1.3			5.307	Depth 4.97m
	Cover slab edge	1	3.140	0.300	0.250		0.236	
	2m dia- LS2- depth3.77M--Cover slab	1	3.140	1.3*1.3			5.307	
	Cover slab edge	1	3.140	0.300	0.250		0.236	
	2m dia- LS3-depth 3.77M--Cover slab	1	3.140	1.3*1.3			5.307	
	Cover slab edge	1	3.140	0.300	0.250		0.236	

2m dia- LS4-depth 3.79m--Cover slab	1	3.140	1.3*1.3			5.307	
Cover slab edge	1	3.140	0.300	0.250		0.236	
2m dia- LS5-depth 4.68m--Cover slab	1	3.140	1.3*1.3			5.307	
Cover slab edge	1	3.140	0.300	0.250		0.236	
2m dia- LS6-depth 4.84m--Cover slab	1	3.140	1.3*1.3			5.307	
Cover slab edge	1	3.140	0.300	0.250		0.236	
2 m dia - LS 7 - depth5.10m--Cover slab	1	3.140	1.3*1.3			5.307	
Cover slab edge	1	3.140	0.300	0.250		0.236	
2 m dia - LS 8 - depth2.78m--Cover slab	1	3.140	1.3*1.3			5.307	
Cover slab edge	1	3.140	0.300	0.250		0.236	
2 m dia - LS 9 - depth2.76m--Cover slab	1	3.140	1.3*1.3			5.307	
Cover slab edge	1	3.140	0.300	0.250		0.236	
2 m dia- LS10- depth4.64m--Cover slab	1	3.140	1.3*1.3			5.307	
Cover slab edge	1	3.140	0.300	0.250		0.236	
2 m dia- LS12- depth3.05m--Cover slab	1	3.140	1.3*1.3			5.307	
Cover slab edge	1	3.140	0.300	0.250		0.236	
2 m dia- LS13- depth3.54m--Cover slab	1	3.140	1.3*1.3			5.307	
Cover slab edge	1	3.140	0.300	0.250		0.236	
2 m dia- LS14- depth3.60m--Cover slab	1	3.140	1.3*1.3			5.307	
Cover slab edge	1	3.140	0.300	0.250		0.236	

	2m dia- LS15- depth3.58m---Cover slab	1	3.140	1.3*1.3			5.307	
	Cover slab edge	1	3.140	0.300	0.250		0.236	
	3m dia LS11, Depth 4.73-Cover slab	1	3.140	1.8*1.8			10.174	
	Cover slab edge	1	3.140	3.600	0.300		3.392	
	3m dia LS16, Depth 5.07-Cover slab	1	3.140	1.8*1.8			10.174	
	Cover slab edge	1	3.140	3.600	0.300		3.392	
	Total Quantity						104.734 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						104.734 sqm	
	Say 104.734 sqm @ Rs 923.02 / sqm						Rs 96671.58	
17	5.22.1 Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelMild steel and Medium Tensile steel bars							
	Qty taken from item n o - 1 2 S t e e l reinforcement @ 100Kg/ 1Cum of CC	1	208.073	100.000			20807.300	
	Total Quantity						20807.300 kg	
	Total Deducted Quantity						0.000 kg	
	Net Total Quantity						20807.300 kg	
	Say 20807.300 kg @ Rs 97.28 / kg						Rs 2024134.14	
18	od340792/2021_2022 Extra for providing epoxy coating for reinforcement bars.							
	Qty taken from item n o - 1 2 S t e e l reinforcement @ 100Kg/ 1Cum of CC	1	208.073	100.000			20807.300	
	Total Quantity						20807.300 kg	
	Total Deducted Quantity						0.000 kg	
	Net Total Quantity						20807.300 kg	
	Say 20807.300 kg @ Rs 2.32 / kg						Rs 48272.94	
19	22.23.1 Providing and applying integral crystalline slurry of hydrophilic in nature forwaterproofing treatment to the							

RCC structures like retaining walls of the basement,water tanks, roof slabs, podiums, reservoir, sewage & water treatment plant, tunnels/ subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 partsintegral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 partsintegral crystalline slurry : 1 part water) for horizontal surfaces and applying thesame from negative (internal) side with the help of synthetic fiber brush. The materialshall meet the requirements as specified in ACI-212-3R-2010 i.e by reducingpermeability of concrete by more than 90% compared with control concrete as perDIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystallineslurry shall be capable of self-healing of cracks up to a width of 0.50mm. The workshall 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 anyleakage.For vertical surface two coats @0.70 kg per sqm								
2m dia- LS1-depth 2.37M-Wall inside	1	3.140	2.000	2.370		14.884	Depth 4.97m	
LS outside wall	1	3.140	2.600	2.370		19.349		
2 m dia- LS 2 - depth3.77M--Wall inside	1	3.140	2.000	3.770		23.676		
LS outside wall	1	3.140	2.600	3.770		30.779		
2m dia- LS3-depth 3.77M--Wall inside	1	3.140	2.000	3.770		23.676		
LS outside wall	1	3.140	2.600	3.770		30.779		
2m dia- LS4-depth 3.79m--Wall inside	1	3.140	2.000	3.790		23.802		
LS outside wall	1	3.140	2.600	3.790		30.942		
2m dia- LS5-depth 4.68m-Wall inside	1	3.140	2.000	4.680		29.391		
LS outside wall	1	3.140	2.600	4.680		38.208		
2m dia- LS6-depth 4.84m--Wall inside	1	3.140	2.000	4.840		30.396		
LS outside wall	1	3.140	2.600	4.840		39.514		
2 m dia- LS 7 - depth5.10m--Wall inside	1	3.140	2.000	5.100		32.028		
LS outside wall	1	3.140	2.600	5.100		41.637		
2 m dia- LS 8 - depth2.78m-Wall inside	1	3.140	2.000	2.780		17.459		
LS outside wall	1	3.140	2.600	2.780		22.696		

	2 m dia- LS9- depth2.76m--Wall inside	1	3.140	2.000	2.760		17.333	
	LS outside wall	1	3.140	2.600	2.760		22.533	
	2 m dia- LS10- depth4.64m--Wall inside	1	3.140	2.000	4.640		29.140	
	LS outside wall	1	3.140	2.600	4.640		37.881	
	2 m dia- LS12- depth3.05m--Wall inside	1	3.140	2.000	3.050		19.154	
	LS outside wall	1	3.140	2.600	3.050		24.901	
	2 m dia- LS13- depth3.54m--Wall inside	1	3.140	2.000	3.540		22.232	
	LS outside wall	1	3.140	2.600	3.540		28.901	
	2 m dia- LS14- depth3.60m--Wall inside	1	3.140	2.000	3.600		22.608	
	LS outside wall	1	3.140	2.600	3.600		29.391	
	2 m dia- LS15- depth3.58m--Wall inside	1	3.140	2.000	3.580		22.483	
	LS outside wall	1	3.140	2.600	3.580		29.228	
	3m dia LS11, Depth 4.73--Wall inside	1	3.140	3.000	4.730		44.557	
	LS outside wall	1	3.140	3.600	4.730		53.468	
	3m dia LS16, Depth 5.07--Wall inside	1	3.140	3.000	5.070		47.760	
	LS outside wall	1	3.140	3.600	5.070		57.312	
	Total Quantity						958.098 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						958.098 sqm	
	Say 958.098 sqm @ Rs 573.87 / sqm						Rs 549823.70	
20	22.23.2 Providing and applying integral crystalline slurry of hydrophilic in nature forwaterproofing treatment to the RCC structures like retaining walls of the basement,water tanks, roof slabs, podiums, reserrior, sewage & water treatment plant, tunnels/ subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5							

partsintegral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 partsintegral crystalline slurry : 1 part water) for horizontal surfaces and applying thesame from negative (internal) side with the help of synthetic fiber brush. The materialshall meet the requirements as specified in ACI-212-3R-2010 i.e by reducingpermeability of concrete by more than 90% compared with control concrete as perDIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystallineslurry shall be capable of self-healing of cracks up to a width of 0.50mm. The workshall 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 anyleakage.For horizontal surface one coat @1.10 kg per sqm.								
2m dia- LS1-depth 2 . 3 7 M - C o v e r slab&base slab	2	3.140	1.3*1.3			10.614	Depth 4.97m	
2 m dia- LS2- depth3.77M--Cover slab&base slab	2	3.140	1.3*1.3			10.614		
2m dia- LS3-depth 3 . 7 7 M - - C o v e r slab&base slab	2	3.140	1.3*1.3			10.614		
2m dia- LS4-depth 3 . 7 9 m - - C o v e r slab&base slab	2	3.140	1.3*1.3			10.614		
2m dia- LS5-depth 4 . 6 8 m - - C o v e r slab&base slab	2	3.140	1.3*1.3			10.614		
2m dia- LS6-depth 4 . 8 4 m - - C o v e r slab&base slab	2	3.140	1.3*1.3			10.614		
2 m dia- LS7- depth5.10m--Cover slab&base slab	2	3.140	1.3*1.3			10.614		
2 m dia- LS8- depth2.78m--Cover slab&base slab	2	3.140	1.3*1.3			10.614		
2 m dia- LS9- depth2.76m--Cover slab&base slab	2	3.140	1.3*1.3			10.614		
2m dia- LS10- depth4.64m--Cover slab&base slab	2	3.140	1.3*1.3			10.614		
2m dia- LS12- depth3.05m--Cover slab&base slab	2	3.140	1.3*1.3			10.614		

	2m dia- LS13- depth3.54m--Cover slab&base slab	2	3.140	1.3*1.3			10.614	
	2m dia- LS14- depth3.60m--Cover slab&base slab	2	3.140	1.3*1.3			10.614	
	2m dia- LS15- depth3.58m---Cover slab&base slab	2	3.140	1.3*1.3			10.614	
	3m dia LS11, Depth 4.73-Cover slab&base slab	2	3.140	1.8*1.8			20.348	
	3m dia LS16, Depth 5.07-Cover slab&base slab	2	3.140	1.8*1.8			20.348	
	Total Quantity						189.292 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						189.292 sqm	
	Say 189.292 sqm @ Rs 442.27 / sqm						Rs 83718.17	
21	13.7.1 12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)							
	2m dia- LS1-depth 2.37M-Wall inside	1	3.140	2.000	2.370		14.884	Depth 4.97m
	LS outside wall	1	3.140	2.600	2.370		19.349	
	2m dia- LS2- depth3.77M--Wall inside	1	3.140	2.000	3.770		23.676	
	LS outside wall	1	3.140	2.600	3.770		30.779	
	2m dia- LS3-depth 3.77M--Wall inside	1	3.140	2.000	3.770		23.676	
	LS outside wall	1	3.140	2.600	3.770		30.779	
	2m dia- LS4-depth 3.79m--Wall inside	1	3.140	2.000	3.790		23.802	
	LS outside wall	1	3.140	2.600	3.790		30.942	
	2m dia- LS5-depth 4.68m-Wall inside	1	3.140	2.000	4.680		29.391	
	LS outside wall	1	3.140	2.600	4.680		38.208	

2m dia- LS6-depth 4.84m--Wall inside	1	3.140	2.000	4.840		30.396	
LS outside wall	1	3.140	2.600	4.840		39.514	
2 m dia- LS 7 - depth5.10m--Wall inside	1	3.140	2.000	5.100		32.028	
LS outside wall	1	3.140	2.600	5.100		41.637	
2 m dia- LS 8 - depth2.78m--Wall inside	1	3.140	2.000	2.780		17.459	
LS outside wall	1	3.140	2.600	2.780		22.696	
2 m dia- LS 9 - depth2.76m--Wall inside	1	3.140	2.000	2.760		17.333	
LS outside wall	1	3.140	2.600	2.760		22.533	
2 m dia- LS10- depth4.64m--Wall inside	1	3.140	2.000	4.640		29.140	
LS outside wall	1	3.140	2.600	4.640		37.881	
2 m dia- LS12- depth3.05m--Wall inside	1	3.140	2.000	3.050		19.154	
LS outside wall	1	3.140	2.600	3.050		24.901	
2 m dia- LS13- depth3.54m--Wall inside	1	3.140	2.000	3.540		22.232	
LS outside wall	1	3.140	2.600	3.540		28.901	
2 m dia- LS14- depth3.60m--Wall inside	1	3.140	2.000	3.600		22.608	
LS outside wall	1	3.140	2.600	3.600		29.391	
2 m dia- LS15- depth3.58m--Wall inside	1	3.140	2.000	3.580		22.483	
LS outside wall	1	3.140	2.600	3.580		29.228	
3m dia LS11, Depth 4.73--Wall inside	1	3.140	3.000	4.730		44.557	
LS outside wall	1	3.140	3.600	4.730		53.468	

3m dia LS16, Depth 5.07-Wall inside	1	3.140	3.000	5.070		47.760	
LS outside wall	1	3.140	3.600	5.070		57.312	
2m dia- LS1-depth 2.37 M - Cover slab&base slab	2	3.140	1.3*1.3			10.614	Depth 4.97m
2m dia- LS2-depth 3.77M--Cover slab&base slab	2	3.140	1.3*1.3			10.614	
2m dia- LS3-depth 3.77 M - - Cover slab&base slab	2	3.140	1.3*1.3			10.614	
2m dia- LS4-depth 3.79 m - - Cover slab&base slab	2	3.140	1.3*1.3			10.614	
2m dia- LS5-depth 4.68 m - - Cover slab&base slab	2	3.140	1.3*1.3			10.614	
2m dia- LS6-depth 4.84 m - - Cover slab&base slab	2	3.140	1.3*1.3			10.614	
2m dia- LS7-depth 5.10m--Cover slab&base slab	2	3.140	1.3*1.3			10.614	
2m dia- LS8-depth 2.78m--Cover slab&base slab	2	3.140	1.3*1.3			10.614	
2m dia- LS9-depth 2.76m--Cover slab&base slab	2	3.140	1.3*1.3			10.614	
2m dia- LS10-depth 4.64m--Cover slab&base slab	2	3.140	1.3*1.3			10.614	
2m dia- LS12-depth 3.05m--Cover slab&base slab	2	3.140	1.3*1.3			10.614	
2m dia- LS13-depth 3.54m--Cover slab&base slab	2	3.140	1.3*1.3			10.614	

	2 m dia- LS14- depth3.60m--Cover slab&base slab	2	3.140	1.3*1.3			10.614	
	2 m dia- LS15- depth3.58m---Cover slab&base slab	2	3.140	1.3*1.3			10.614	
	3m dia LS11, Depth 4.73-Cover slab&base slab	2	3.140	1.8*1.8			20.348	
	3m dia LS16, Depth 5.07-Cover slab&base slab	2	3.140	1.8*1.8			20.348	
	Total Quantity						1147.390 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						1147.390 sqm	
	Say 1147.390 sqm @ Rs 403.73 / sqm						Rs 463235.76	
22	13.44.1 Finishing walls with water proofing cement paint of required shade:New work (Two or more coats applied @ 3.84 kg/10 sqm)							
	Qty vide item no 21	1	1147.390				1147.390	
	Total Quantity						1147.390 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						1147.390 sqm	
	Say 1147.390 sqm @ Rs 108.06 / sqm						Rs 123986.96	
23	13.65.1 Painting with black anti- corrosive bitumastic paint of approved brand and manufacture to give an even shade:Two or more coats on new work							
	Qty vide item no 21	1	1147.390				1147.390	
	Total Quantity						1147.390 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						1147.390 sqm	
	Say 1147.390 sqm @ Rs 125.59 / sqm						Rs 144100.71	
24	100.41.34 Supplying and fixing Rectangular CI manhole cover 455x610 mm with frame (low duty) charges including all cost, labour charges etc complete.							
	Fixing on Cover slab	16					16.000	
	Total Quantity						16.000 No	

	Total Deducted Quantity						0.000 No	
	Net Total Quantity						16.000 No	
	Say 16.000 No @ Rs 2815.71 / No						Rs 45051.36	
25	100.36.1 Filling water with 5000 litre tankers fitted 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 appliances and cost of water etc. complete. "(Ref. No. 000, Technical Circular)"							
	2m dia- LS1-depth 2.37M	1	3.140	1*1	2.370		7.442	Depth 4.97m
	2m dia- LS2-depth 3.77M	1	3.140	1*1	3.770		11.838	
	2m dia- LS3-depth 3.77M	1	3.140	1*1	3.770		11.838	
	2m dia- LS4-depth 3.79m	1	3.140	1*1	3.790		11.901	
	2m dia- LS5-depth 4.68m	1	3.140	1*1	4.680		14.696	
	2m dia- LS6-depth 4.84m	1	3.140	1*1	4.840		15.198	
	2m dia- LS7-depth 5.10m	1	3.140	1*1	5.100		16.014	
	2m dia- LS8-depth 2.78m	1	3.140	1*1	2.780		8.730	
	2m dia- LS9-depth 2.76m	1	3.140	1*1	2.760		8.667	
	2m dia- LS10-depth 4.64m	1	3.140	1*1	4.640		14.570	
	2m dia- LS12-depth 3.05m	1	3.140	1*1	3.050		9.577	
	2m dia- LS13-depth 3.54m	1	3.140	1*1	3.540		11.116	
	2m dia- LS14-depth 3.60m	1	3.140	1*1	3.600		11.304	
	2m dia- LS15-depth 3.58m	1	3.140	1*1	3.580		11.242	
	3m dia LS11, Depth 4.73	1	3.140	1.5*1.5	4.730		33.418	

	3m dia LS16, Depth 5.07	1	3.140	1.5*1.3	5.070		31.044	
	Total Quantity						228.595 Kilo litre	
	Total Deducted Quantity						0.000 Kilo litre	
	Net Total Quantity						228.595 Kilo litre	
	Say 228.595 Kilo litre @ Rs 185.67 / Kilo litre						Rs 42443.23	
26	2.25 Filling available excavated 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.							
	2m dia- LS1-depth 2.37M	1	3.140*2.6	0.500	2.370		9.675	Depth 4.97m
	2m dia- LS2-depth 3.77M	1	3.140*2.6	0.500	3.770		15.390	
	2m dia- LS3-depth 3.77M	1	3.140*2.6	0.500	3.770		15.390	
	2m dia- LS4-depth 3.79m	1	3.140*2.6	0.500	3.790		15.471	
	2m dia- LS5-depth 4.68m	1	3.140*2.6	0.500	4.680		19.104	
	2m dia- LS6-depth 4.84m	1	3.140*2.6	0.500	4.840		19.757	
	2m dia- LS7-depth 5.10m	1	3.140*2.6	0.500	5.100		20.819	
	2m dia- LS8-depth 2.78m	1	3.140*2.6	0.500	2.780		11.348	
	2m dia- LS9-depth 2.76m	1	3.140*2.6	0.500	2.760		11.267	
	2m dia- LS10-depth 4.64m	1	3.140*2.6	0.500	4.640		18.941	
	2m dia- LS12-depth 3.05m	1	3.140*2.6	0.500	3.050		12.451	
	2m dia- LS13-depth 3.54m	1	3.140*2.6	0.500	3.540		14.451	
	2m dia- LS14-depth 3.60m	1	3.140*2.6	0.500	3.600		14.696	
	2m dia- LS15-depth 3.58m	1	3.140*2.6	0.500	3.580		14.614	

	3m dia LS11, Depth 4.73	1	3.140*3.6	0.500	4.730		26.734	
	3m dia LS16, Depth 5.07	1	3.140*3.6	0.500	5.070		28.656	
	Total Quantity						268.764 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						268.764 cum	
	Say 268.764 cum @ Rs 260.19 / cum						Rs 69929.71	
27	od340795/2021_2022 Pump set - Supply, Installation, Commissioning, testing and trial run of SUBMERSIBLE SLURRY HANDLING Type Pump Set							
	LS1 to MH-id 659	2	2.000				4.000	
	LS2 to MH-id 706	2	2.000				4.000	
	LS3 to MH-id 8122	2	6.000				12.000	
	LS4 to MH-id 671	2	6.000				12.000	
	LS5 to MH-id 8108	2	2.000				4.000	
	LS6 to MH-id 498	2	3.000				6.000	
	LS7 to MH-id 955	1	7.000				7.000	
	LS8 to MH-id 1001	1	2.000				2.000	
	LS9 to MH-id 3188	1	1.000				1.000	
	LS10 to MH-id 3156	1	4.000				4.000	
	LS11 to MH-id 3115	1	3.000				3.000	
	LS12 to MH-id 955	1	2.000				2.000	
	LS13 to MH-id 8135	1	1.000				1.000	
	LS14 to MH-id 196	1	1.000				1.000	
	LS15 to MH-id 962	1	3.000				3.000	
	LS16 to MH-id 962	1	27.000				27.000	
	Total Quantity						93.000 Hp	
	Total Deducted Quantity						0.000 Hp	
	Net Total Quantity						93.000 Hp	
	Say 93.000 Hp @ Rs 29037.50 / Hp						Rs 2700487.50	
28	od340796/2021_2022 Supply and erection of Indoor Type Generator Suitable Capacity UP TO 15 KVA							

LS1 to MH-id 659- (2*0.746)/0.8=1.865*3 =5.6	1	1.000				1.000	
LS2 to MH-id 706- (2*0.746)/0.8=1.865*3 =5.6	1	1.000				1.000	
LS3 to MH-id 8122- (6*0.746)/0.8=5.595*3 =16.785	1	1.120				1.120	
LS4 to MH-id 671- (6*0.746)/0.8=5.595*3 =16.785	1	1.120				1.120	
LS5 to MH-id 8108- (2*0.746)/0.8=1.865*3 =5.6	1	1.000				1.000	
LS6 to MH-id 498- (3*0.746)/0.8=2.79*3= 8.37	1	1.000				1.000	
LS7 to MH-id 955- (7*0.746)/0.8=6.527*3 =19.58	1	1.300				1.300	
LS8 to MH-id 1001- (2*0.746)/0.8=1.865*3 =5.6	1	1.000				1.000	
LS9 to MH-id 3188- (1*0.746)/0.8=0.93*3= 2.79	1	1.000				1.000	
LS10 to MH-id 3156- (4*0.746)/0.8=3.73*3= 11.19	1	1.000				1.000	
LS11 to MH-id 3115- (3*0.746)/0.8=2.79*3= 8.37	1	1.000				1.000	
LS12 to MH-id 955- (2*0.746)/0.8=1.865*3 =5.6	1	1.000				1.000	
LS13 to MH-id 8135- (1*0.746)/0.8=0.93*3= 2.79	1	1.000				1.000	

	LS14 to MH-id 196- (1*0.746)/0.8=0.93*3=2.79	1	1.000				1.000	
	LS15 to MH-id 962- (3*0.746)/0.8=2.79*3=8.37	1	1.000				1.000	
	LS16 to MH-id 962- (27*0.746)/0.8=25.17*3=75.51	1	5.030				5.030	
	Total Quantity						20.570 Nos	
	Total Deducted Quantity						0.000 Nos	
	Net Total Quantity						20.570 Nos	
	Say 20.570 Nos @ Rs 348450.00 / Nos						Rs 7167616.50	
29	od340797/2021_2022 Automatic Control system							
		16					16.000	
	Total Quantity						16.000 No	
	Total Deducted Quantity						0.000 No	
	Net Total Quantity						16.000 No	
	Say 16.000 No @ Rs 100000.00 / No						Rs 1600000.00	
30	od340798/2021_2022 Control Room and Generator Room							
		16					16.000	
	Total Quantity						16.000 No	
	Total Deducted Quantity						0.000 No	
	Net Total Quantity						16.000 No	
	Say 16.000 No @ Rs 320279.00 / No						Rs 5124464.00	
SI No	Description	No	L	B	D	CF	Quantity	Remark
7Water Supply and Sanatory arrangements, Electrical wiring in pumping stations								
Lump-Sum Total						Rs 400000.00		
SI No	Description	No	L	B	D	CF	Quantity	Remark
8Line extension , Deposit to KSEB, etc								
Lump-Sum Total						Rs 1000000.00		
SI No	Description	No	L	B	D	CF	Quantity	Remark
9Sewer service Connection charges (Cost Index:36.44 %)								

1	od23785/2022_2023 Sewer service connection charges including connection deposit fee and all materials and labour charges							
	Sewer service connection including D/ND	2200					2200.000	
	Total Quantity						2200.000 No	
	Total Deducted Quantity						0.000 No	
	Net Total Quantity						2200.000 No	
	Say 2200.000 No @ Rs 10000.00 / No						Rs 22000000.00	
	Total						360044299.07	
	Centage @						10.0%	
	Centage Amount						36004429.91	
	Provision for GST payments (in %) @						18.0%	
	Amount reserved for GST payments						64807973.83	
	Total & Centage						460856702.82	
	Lumpsum for round off						0.00	
	GRAND TOTAL Rs						460856702.82	
	Kerala Water Authority						Rounded Grand Total Rs 46,08,56,703	
	Rupees Forty Six Crore Eight Lakh Fifty Six Thousand Seven Hundred and Three Only							

APPENDIX IV: DESIGN OF LIFTING STATIONS

Sl no.	Name of Lifting Station	Peak flow, LPS	Detention Period in min.	Storage capacity m ³	SWD (m)	Size	Total Depth (GL-IL + SWD)
1	LS1	2.89	10.00	1.73	1.00	1.48	2.37
						say 2.0 m dia	
		2.89					
2	LS2	8.04	10.00	4.83	2.00	1.75	3.77
						say 2.0 m dia	
		8.04					
3	LS3	10.12	10.00	6.07	2.40	1.80	3.77
						say 2.0 m dia	
		10.12					
4	LS4	11.69	10.00	7.01	2.50	1.89	3.79
						say 2 m dia	
		11.69					
5	LS5	15.65	10.00	9.39	3.40	1.88	4.68
						say 2 m dia	
		15.65					
6	LS6	16.87	10.00	10.12	3.50	1.92	4.84
						say 2 m dia	
		16.87					
7	LS7	18.82	10.00	11.29	3.80	1.95	5.10
						say 2 m dia	
		18.82					
8	LS8	2.83	10.00	1.70	1.50	1.20	2.78
						say 2.0 m dia	
		2.83					
9	LS9	3.14	10.00	1.89	1.20	1.41	2.76
						say 2.0 m dia	
		3.14					
10	LS10	9.93	10.00	5.96	2.50	1.74	4.64
						say 2.0 m dia	
		9.93					
11	LS11	12.07	10.00	7.24	1.40	2.57	4.73
						say 3 m dia	
		12.07					
12	LS12	4.40	10.00	2.64	1.80	1.37	3.05
						say 2.0 m dia	
		4.40					
13	LS13	4.90	10.00	2.94	1.50	1.58	3.54

		4.90				say 2.0 m dia	
14	LS14	5.09	10.00	3.05	2.35	1.29	3.60
						say 2 m dia	
		5.09					
15	LS15	6.47	10.00	3.88	2.35	1.45	3.58
						say 2.0 m dia	
		6.47					
16	LS16	31.74	10.00	19.04	3.00	2.84	5.07
						say 3.0 m dia	
		31.74					

7	LS7	955	279	18.8179	Ltrs/sec	0.0151	1.25	0.1385	150	0.150	1.0654	7.71	2.152	12.74	2.00	16.89	7.00	5.22
				0.0188	m3/sec													
				0.0917	m3/mint													
8	LS 8	1001	855	2.8282	Ltrs/sec	0.0023	1.25	0.0537	100	0.100	0.3603	1.32	1.131	25.17	2.00	28.30	2.00	1.49
				0.0028	m3/sec													
				0.2979	m3/mint													
9	LS9	3188	337	3.1425	Ltrs/sec	0.0025	1.25	0.0566	100	0.100	0.4003	1.63	0.551	8.36	2.00	10.91	1.00	0.75
				0.0031	m3/sec													
				0.1031	m3/mint													
10	LS10	3156	405	9.9303	Ltrs/sec	0.0079	1.25	0.1006	100	0.100	1.2650	16.31	6.607	8.72	2.00	17.33	4.00	2.98
				0.0099	m3/sec													
				0.0344	m3/mint													
11	LS11	3115	492	12.0672	Ltrs/sec	0.0097	1.25	0.1109	150	0.150	0.6832	3.17	1.562	5.55	2.00	9.11	3.00	2.24
				0.0121	m3/sec													
				0.0344	m3/mint													
12	LS12	955	523	4.3994	Ltrs/sec	0.0035	1.25	0.0670	100	0.100	0.5604	3.20	1.673	9.60	2.00	13.27	2.00	1.49
				0.0044	m3/sec													
				2.1543	m3/mint													
13	LS13	8135	438	4.9023	Ltrs/sec	0.0039	1.25	0.0707	100	0.100	0.6245	3.98	1.740	3.49	2.00	7.23	1.00	0.75
				0.0049	m3/sec													
				0.0944	m3/mint													
14	LS14	196	467	5.0909	Ltrs/sec	0.0004	1.25	0.0228	100	0.100	0.0649	0.04	0.020	22.89	2.00	24.91	1.00	0.75
				0.0005	m3/sec													
				0.1949	m3/mint													
15	LS15	962	489	6.4727	Ltrs/sec	0.0052	1.25	0.0812	100	0.100	0.8245	6.93	3.389	11.37	2.00	16.76	3.00	2.24
				0.0065	m3/sec													
				0.2637	m3/mint													
16	LS 16	962	1131	31.7393	Ltrs/sec	0.0254	1.25	0.1798	200	0.200	1.0108	5.21	5.887	36.23	2.00	44.12	27.00	20.14
				0.0317	m3/sec													
				0.2063	m3/mint													
17	CW in STP	Receiving chamber	30	64.6700	Ltrs/sec	0.0517	1.25	0.2567	300	0.300	0.9154	2.85	0.085	15.00	2.00	17.09	22.00	16.41
				0.0647	m3/sec													
				0.2637	m3/mint													

18	co treatment	Receiving chamber	30	0.1273	Ltrs/sec	0.0001	1.25	0.0114	100	0.100	0.0162	0.00	0.000	10.00	2.00	12.00	1.00	0.75
				0.0001	m3/sec													
				0.2637	m3/mint													

APPENDIX VI: FLEX TABLE – CONDUITS

ID	Label	Start Node	Invert (Start) (m)	Stop Node	Invert (Stop) (m)	Outer Diameter (mm)	Length (3D) (m)	Elevation Ground (Start) (m)	Elevation Ground (Stop) (m)	Material
7719	CO-14	n940	728.97	n3168	726.99	225	29.8	730.16	728.18	HDPE
7730	CO-36	n942	730.49	n940	728.97	225	31.2	731.68	730.16	HDPE
7732	CO-40	n1111	745.61	n1113	747.49	225	27.1	746.8	748.68	HDPE
7767	CO-98	n1170	731.34	n1168	730.97	225	25.4	732.53	732.16	HDPE
7768	CO-100	n1353	731.86	n1168	730.97	225	34.4	733.05	732.16	HDPE
7769	CO-102	n1166	730.72	n1168	730.97	225	26.9	731.91	732.16	HDPE
7791	CO-146	n765	745.36	n763	746.1	225	20.1	746.55	747.29	HDPE
7847	CO-200	n1162	730.6	n1164	730.45	225	14.9	731.79	731.64	HDPE
7857	CO-214	n1139	751.58	n1141	747.62	225	40.7	752.77	748.81	HDPE
7875	CO-238	n1042	725.86	n1044	727.44	225	26.4	727.05	728.63	HDPE
7881	CO-250	n960	749.09	n962	750.95	225	43.7	750.28	752.14	HDPE
7889	CO-266	n977	752.71	n979	751.59	225	40	753.9	752.78	HDPE
7894	CO-276	n1025	768.07	n1023	764.2	225	26.2	769.26	765.39	HDPE
7906	CO-300	n315	727.09	n317	727.98	225	26.6	728.28	729.17	HDPE
7925	CO-326	n45	719.45	n43	719.22	225	16.7	720.64	720.41	HDPE
7930	CO-330	n3091	720.37	n3189	720.97	225	20.3	721.56	722.16	HDPE
7932	CO-334	n3089	719.44	n3091	720.37	225	18.3	720.63	721.56	HDPE
7950	CO-364	n206	726.46	n204	725.08	225	27.7	727.65	726.27	HDPE
7951	CO-366	n204	725.08	n149	724.24	225	5.7	726.27	725.43	HDPE
7955	CO-374	n3387	728.07	n3385	729.83	225	20.4	729.26	731.02	HDPE
7956	CO-376	n3385	729.83	n3383	731.6	225	26.3	731.02	732.79	HDPE
7966	CO-396	n3362	747.07	n3364	744.87	225	26.5	748.26	746.06	HDPE
7978	CO-420	n618	719.49	n620	720.1	225	16.8	720.68	721.29	HDPE
8010	CO-478	n86	746.08	n84	746.47	225	7.1	747.27	747.66	HDPE
8019	CO-484	n602	743.86	n605	742.07	225	34.9	745.05	743.26	HDPE
8023	CO-492	n372	759.95	n353	755.1	225	38.5	761.14	756.29	HDPE
8033	CO-512	n397	765.85	n391	764.94	225	13.6	767.04	766.13	HDPE
8093	CO-538(2)	MH-31	732.09	MH-23	732.22	225	35.4	733.28	733.41	HDPE
4015	p164	n171	743.11	n172	743.57	225	5.3	744.3	744.76	HDPE
4014	p163	n170	742.48	n171	743.11	225	6.6	743.67	744.3	HDPE
7252	p3406	n3387	728.07	n3388	727.35	225	7.2	729.26	728.54	HDPE
4034	p183	n190	742.37	n191	743.7	225	8.4	743.56	744.89	HDPE
7274	p3428	n3409	721.48	n3410	721.84	225	8.4	722.67	723.03	HDPE
7191	p3345	n86	746.08	n3331	746.47	225	9.1	747.27	747.66	HDPE
3924	p73	n77	750.96	n78	749.87	225	10.3	752.15	751.06	HDPE
4535	p686	n692	721.84	n693	721.69	225	10.3	723.03	722.88	HDPE
7273	p3427	n3408	721.08	n3409	721.48	225	10.3	722.27	722.67	HDPE
4313	p464	n470	748.6	n471	748.73	225	10.3	749.79	749.92	HDPE
4442	p593	n600	741.95	n601	742.69	225	11	743.14	743.88	HDPE
7042	p3196	n3189	720.97	n3190	721.49	225	11.4	722.16	722.68	HDPE
3914	p63	n66	746.98	n67	747.94	225	11.6	748.17	749.13	HDPE
4493	p644	n651	753.58	n652	752.48	225	11.7	754.77	753.67	HDPE

4241	p392	n397	765.85	n398	767.47	225	12.4	767.04	768.66	HDPE
3900	p49	n52	727.07	n53	727.59	225	12.8	728.26	728.78	HDPE
7100	p3254	n3243	762.86	n3244	762.32	225	13.8	764.05	763.51	HDPE
4407	p558	n564	760.59	n565	763.09	225	13.8	761.78	764.28	HDPE
3925	p74	n78	749.87	n79	748.08	225	14.1	751.06	749.27	HDPE
7259	p3413	n3394	723.21	n3395	722.09	225	14.4	724.4	723.28	HDPE
4991	p1142	n1143	741.58	n1144	740.11	225	14.8	742.77	741.3	HDPE
7021	p3175	n3168	726.99	n3169	726.24	225	14.9	728.18	727.43	HDPE
7281	p3435	n204	725.08	n3415	727.11	225	15.2	726.27	728.3	HDPE
4902	p1053	n1055	745.95	n1056	746.87	225	15.3	747.14	748.06	HDPE
4901	p1052	n1054	745.19	n1055	745.95	225	15.5	746.38	747.14	HDPE
4464	p615	n622	747.36	n623	747.62	225	15.7	748.55	748.81	HDPE
4870	p1021	n1022	762.35	n1023	764.2	225	16	763.54	765.39	HDPE
4026	p175	n182	754.07	n183	753.72	225	17	755.26	754.91	HDPE
4120	p269	n276	751.24	n277	750.58	225	17.1	752.43	751.77	HDPE
4990	p1141	n1142	743.87	n1143	741.58	225	17.4	745.06	742.77	HDPE
4265	p416	n422	733.22	n423	732.69	225	17.7	734.41	733.88	HDPE
4113	p262	n269	757.46	n270	756.69	225	17.9	758.65	757.88	HDPE
4892	p1043	n1045	727.86	n1046	728.46	225	17.9	729.05	729.65	HDPE
4094	p243	n250	758.08	n251	758.6	225	18	759.27	759.79	HDPE
4076	p225	n232	748.07	n233	748.21	225	18	749.26	749.4	HDPE
4134	p283	n290	740.7	n291	739.85	225	18.1	741.89	741.04	HDPE
4303	p454	n460	756.24	n461	755.24	225	18.2	757.43	756.43	HDPE
7106	p3260	n3249	756.08	n3250	756.86	225	18.8	757.27	758.05	HDPE
7258	p3412	n3393	723.98	n3394	723.21	225	19.1	725.17	724.4	HDPE
4234	p384	n390	763.96	n391	764.94	225	19.5	765.15	766.13	HDPE
4167	p316	n323	735.48	n324	736.58	225	19.6	736.67	737.77	HDPE
4016	p165	n172	743.57	n173	745.21	225	19.8	744.76	746.4	HDPE
4179	p328	n335	748.73	n336	749.85	225	20.4	749.92	751.04	HDPE
7232	p3386	n3368	742.97	n3369	742.47	225	20.9	744.16	743.66	HDPE
4800	p951	n953	739.87	n954	740.19	225	21.5	741.06	741.38	HDPE
4626	p777	n783	733.86	n784	733.7	225	22.2	735.05	734.89	HDPE
8123	p594(1)	n601	742.69	MH-37	743.74	225	22.3	743.88	744.93	HDPE
4923	p1074	n1075	719.35	n1076	719.97	225	22.3	720.54	721.16	HDPE
4534	p685	n691	722.1	n692	721.84	225	22.4	723.29	723.03	HDPE
7212	p3366	n3350	763.36	n3351	763.6	225	22.5	764.55	764.79	HDPE
4975	p1126	n1127	756.33	n1128	756.73	225	22.7	757.52	757.92	HDPE
4459	p610	n617	718.74	n618	719.49	225	22.9	719.93	720.68	HDPE
4791	p942	n944	732.82	n945	733.73	225	22.9	734.01	734.92	HDPE
7260	p3414	n3395	722.09	n3396	721.33	225	23	723.28	722.52	HDPE
4114	p263	n270	756.69	n271	755.61	225	23	757.88	756.8	HDPE
4985	p1136	n1137	755.95	n1138	754.32	225	23.2	757.14	755.51	HDPE
4309	p460	n466	748.99	n467	748.49	225	23.2	750.18	749.68	HDPE
7184	p3338	n3325	740.62	n3326	740.94	225	23.3	741.81	742.13	HDPE
4408	p559	n565	763.09	n566	765.95	225	23.5	764.28	767.14	HDPE
4161	p310	n317	727.98	n318	729.11	225	23.8	729.17	730.3	HDPE
6967	p3121	n3120	716.97	n3121	717.47	225	23.8	718.16	718.66	HDPE
4218	p367	n374	762.98	n375	764.36	225	24	764.17	765.55	HDPE
3899	p48	n51	726.11	n52	727.07	225	24.3	727.3	728.26	HDPE

7185	p3339	n3326	740.94	n3327	741.47	225	24.5	742.13	742.66	HDPE
4135	p284	n291	739.85	n292	738.87	225	25.7	741.04	740.06	HDPE
4940	p1091	n1092	753.11	n1093	754.2	225	25.8	754.3	755.39	HDPE
7196	p3350	n3335	747.58	n3336	748.35	225	25.9	748.77	749.54	HDPE
4246	p397	n403	764.11	n404	761.21	225	26.1	765.3	762.4	HDPE
8017	p406(1)	n412	739.49	MH-19	738.73	225	26.3	740.68	739.92	HDPE
4115	p264	n271	755.61	n272	754.49	225	26.3	756.8	755.68	HDPE
7172	p3326	n3314	722.62	n3315	724.19	225	26.6	723.81	725.38	HDPE
4858	p1009	n1010	754.83	n1011	755.07	225	27	756.02	756.26	HDPE
4826	p977	n979	751.59	n980	751.44	225	27.1	752.78	752.63	HDPE
8012	p3358(1))	n3343	759.24	MH-18	760.07	225	27.1	760.43	761.26	HDPE
7233	p3387	n3369	742.47	n3370	738.45	225	27.3	743.66	739.64	HDPE
4396	p547	n553	760.46	n554	759.22	225	27.6	761.65	760.41	HDPE
7737	p947(1)	n949	738.2	MH-2	738.86	225	27.7	739.39	740.05	HDPE
4258	p409	n415	736.83	n416	735.98	225	28.2	738.02	737.17	HDPE
7928	p3097(1))	n3096	718.58	MH-15	718.2	225	28.2	719.77	719.39	HDPE
7915	p435(2)	MH-14	724.74	n442	724.46	225	28.5	725.93	725.65	HDPE
7051	p3205	n3198	733.96	n88	735.35	225	28.6	735.15	736.54	HDPE
4189	p338	n345	753.24	n346	753.35	225	28.7	754.43	754.54	HDPE
8013	p3358(2))	MH-18	760.07	n3344	760.95	225	28.9	761.26	762.14	HDPE
4891	p1042	n1044	727.44	n1045	727.86	225	28.9	728.63	729.05	HDPE
7107	p3261	n3250	756.86	n3251	756.97	225	29.1	758.05	758.16	HDPE
4062	p211	n219	739.96	n220	742.44	225	29.3	741.15	743.63	HDPE
4116	p265	n272	754.49	n273	753.07	225	29.3	755.68	754.26	HDPE
4069	p218	n226	746.74	n227	747.48	225	29.4	747.93	748.67	HDPE
4989	p1140	n1141	747.62	n1142	743.87	225	29.4	748.81	745.06	HDPE
3897	p46	n49	723.69	n50	725.07	225	29.5	724.88	726.26	HDPE
4986	p1137	n1138	754.32	n1139	751.58	225	29.6	755.51	752.77	HDPE
4143	p292	n299	730.34	n300	729.34	225	30	731.53	730.53	HDPE
4795	p946	n948	736.86	n949	738.2	225	30.3	738.05	739.39	HDPE
4190	p339	n346	753.35	n347	753.46	225	30.3	754.54	754.65	HDPE
4197	p346	n353	755.1	n354	758.12	225	30.4	756.29	759.31	HDPE
3898	p47	n50	725.07	n51	726.11	225	30.8	726.26	727.3	HDPE
4136	p285	n292	738.87	n293	737.59	225	30.8	740.06	738.78	HDPE
7011	p3165	n3159	718.62	n3160	718.87	225	31.3	719.81	720.06	HDPE
4527	p678	n684	724.37	n685	723.87	225	31.4	725.56	725.06	HDPE
4144	p293	n300	729.34	n301	728.45	225	31.5	730.53	729.64	HDPE
4804	p955	n957	744.12	n958	745.6	225	31.7	745.31	746.79	HDPE
4992	p1143	n1144	740.11	n1145	738.32	225	32.1	741.3	739.51	HDPE
4191	p340	n347	753.46	n348	753.74	225	32.1	754.65	754.93	HDPE
4803	p954	n956	742.73	n957	744.12	225	32.2	743.92	745.31	HDPE
7046	p3200	n3193	727.82	n3194	730.07	225	32.3	729.01	731.26	HDPE
4285	p436	n442	724.46	n443	724.08	225	32.3	725.65	725.27	HDPE
3907	p56	n59	737.1	n60	739.44	225	32.4	738.29	740.63	HDPE
4101	p250	n257	758.58	n258	758.12	225	32.7	759.77	759.31	HDPE
4059	p208	n216	731.32	n217	733.7	225	32.8	732.51	734.89	HDPE
4102	p251	n258	758.12	n259	757.84	225	33.1	759.31	759.03	HDPE

5018	p1169	n1170	731.34	n1171	733.62	225	33.7	732.53	734.81	HDPE
7060	p3214	n3206	739.07	n3207	739.44	225	34.2	740.26	740.63	HDPE
3949	p98	n103	756.86	n104	758.86	225	34.3	758.05	760.05	HDPE
4802	p953	n955	741.48	n956	742.73	225	34.4	742.67	743.92	HDPE
7168	p3322	n3311	720.73	n3312	721.2	225	34.5	721.92	722.39	HDPE
4801	p952	n954	740.19	n955	741.48	225	34.7	741.38	742.67	HDPE
4272	p423	n429	730.34	n430	729.85	225	34.8	731.53	731.04	HDPE
3982	p131	n137	739.23	n138	738.6	225	34.8	740.42	739.79	HDPE
3913	p62	n65	745.35	n66	746.98	225	36	746.54	748.17	HDPE
4237	p388	n394	758.85	n395	755.46	225	36	760.04	756.65	HDPE
7049	p3203	n3196	730.94	n3197	731.94	225	37.2	732.13	733.13	HDPE
7075	p3229	n3219	752.47	n3220	752.61	225	37.5	753.66	753.8	HDPE
7183	p3337	n3324	740.2	n3325	740.62	225	38.2	741.39	741.81	HDPE
3908	p57	n60	739.44	n61	740.49	225	38.9	740.63	741.68	HDPE
4068	p217	n225	746.19	n226	746.74	225	40.3	747.38	747.93	HDPE
7061	p3215	n3207	739.44	n3208	741.98	225	40.7	740.63	743.17	HDPE
4249	p400	n406	753.36	n407	746.09	225	41.2	754.55	747.28	HDPE
7182	p3336	n3323	739.74	n3324	740.2	225	41.6	740.93	741.39	HDPE
7186	p3340	n3327	741.47	n3328	743.44	225	43.4	742.66	744.63	HDPE
7050	p3204	n3197	731.94	n3198	733.96	225	44.2	733.13	735.15	HDPE
7467	p3623	n1284	765.76	n3601	765.34	225	40.6	766.95	766.53	HDPE
7718	CO-12	n3182	721.89	n3180	721.57	225	33.5	723.08	722.76	HDPE
7727	CO-30	n1072	718.09	n1074	718.75	225	27.9	719.28	719.94	HDPE
7731	CO-38	n1107	734.11	n1105	731.27	225	33.1	735.3	732.46	HDPE
7733	CO-42	n1109	742.15	n1111	745.61	225	16	743.34	746.8	HDPE
7754	CO-72	n1171	733.62	n1173	735.53	225	18.2	734.81	736.72	HDPE
7788	CO-140	n622	747.36	n489	746.89	225	31.3	748.55	748.08	HDPE
7795	CO-154	n782	734.17	n780	734.7	225	36.5	735.36	735.89	HDPE
7797	CO-158	n917	733.66	n915	732.6	225	9.9	734.85	733.79	HDPE
7802	CO-168	n106	759.89	n104	758.86	225	46.1	761.08	760.05	HDPE
7844	CO-194	n1173	735.53	n1176	737.84	225	30.8	736.72	739.03	HDPE
7845	CO-196	n1363	744.69	n1361	744.05	225	32.6	745.88	745.24	HDPE
7855	CO-210	n1145	738.32	n1147	737.26	225	29.7	739.51	738.45	HDPE
7859	CO-218	n1133	760.34	n1131	758.91	225	17.9	761.53	760.1	HDPE
7860	CO-220	n947	735.54	n945	733.73	225	27.7	736.73	734.92	HDPE
7874	CO-236	n1040	723.63	n1042	725.86	225	13.7	724.82	727.05	HDPE
7876	CO-240	n1047	731.06	n1049	735.46	225	31	732.25	736.65	HDPE
7877	CO-242	n1050	737.54	n1052	740.12	225	23.1	738.73	741.31	HDPE
7878	CO-244	n1056	746.87	n1058	748.68	225	16.4	748.06	749.87	HDPE
7883	CO-254	n1083	752.64	n1081	751.46	225	31.2	753.83	752.65	HDPE
7884	CO-256	n1081	751.46	n963	751.15	225	14.6	752.65	752.34	HDPE
7888	CO-264	n974	754.34	n976	753.3	225	29.2	755.53	754.49	HDPE
7892	CO-272	n988	753.5	n990	754.45	225	36.9	754.69	755.64	HDPE
7893	CO-274	n1020	758.08	n991	755.41	225	19.8	759.27	756.6	HDPE
7897	CO-282	n929	758.66	n250	758.08	225	14.7	759.85	759.27	HDPE
7898	CO-284	n250	758.08	n248	756.91	225	32.6	759.27	758.1	HDPE
7899	CO-286	n938	751.53	n471	748.73	225	20.4	752.72	749.92	HDPE
7901	CO-290	n267	758.66	n269	757.46	225	23.2	759.85	758.65	HDPE
7902	CO-292	n274	752.16	n276	751.24	225	18.5	753.35	752.43	HDPE

7903	CO-294	n682	725.16	n684	724.37	225	38.4	726.35	725.56	HDPE
7905	CO-298	n313	726.77	n315	727.09	225	14.3	727.96	728.28	HDPE
7911	CO-304(2)	MH-13	724.29	n446	723.46	225	27.4	725.48	724.65	HDPE
7917	CO-310	n409	742.6	n411	740.04	225	30.3	743.79	741.23	HDPE
7921	CO-318	n562	758.55	n559	757.36	225	20.4	759.74	758.55	HDPE
7926	CO-328	n43	719.22	n3122	718.15	225	40	720.41	719.34	HDPE
7931	CO-332	n3087	718.4	n3089	719.44	225	28.4	719.59	720.63	HDPE
7937	CO-344	n100	751.69	n97	749.67	225	16.4	752.88	750.86	HDPE
7938	CO-346	n102	754.3	n100	751.69	225	46.5	755.49	752.88	HDPE
7941	CO-348(1)	n97	749.67	MH-16	746.61	225	25.1	750.86	747.8	HDPE
7942	CO-348(2)	MH-16	746.61	n94	743.63	225	24.5	747.8	744.82	HDPE
7943	CO-350	n90	739.75	n88	735.35	225	36.1	740.94	736.54	HDPE
7944	CO-352	n130	763.84	n117	763.55	225	8.7	765.03	764.74	HDPE
7945	CO-354	n117	763.55	n127	761.58	225	41.2	764.74	762.77	HDPE
7946	CO-356	n123	746.98	n121	742.81	225	30.6	748.17	744	HDPE
7947	CO-358	n137	739.23	n135	742.43	225	29.1	740.42	743.62	HDPE
7948	CO-360	n142	725.69	n144	723.3	225	21	726.88	724.49	HDPE
7954	CO-372	n3390	726.75	n3388	727.35	225	17.5	727.94	728.54	HDPE
7963	CO-390	n177	751.42	n175	746.84	225	25.3	752.61	748.03	HDPE
7969	CO-402	n245	753.17	n243	751.69	225	21.1	754.36	752.88	HDPE
7970	CO-404	n653	752.18	n585	751.94	225	26.4	753.37	753.13	HDPE
7971	CO-406	n585	751.94	n587	750.41	225	17	753.13	751.6	HDPE
7972	CO-408	n592	739.63	n594	738.45	225	18.8	740.82	739.64	HDPE
7973	CO-410	n594	738.45	n596	736.15	225	26.3	739.64	737.34	HDPE
7976	CO-416	n605	742.07	n607	739.06	225	25.6	743.26	740.25	HDPE
7997	CO-452	n2018	721.74	n2016	721.89	225	21.1	722.93	723.08	HDPE
8003	CO-464	n2845	722.13	n3312	721.2	225	37.4	723.32	722.39	HDPE
8006	CO-470	n77	750.96	n83	750.04	225	17.3	752.15	751.23	HDPE
8007	CO-472	n3328	743.44	n81	745.03	225	29.6	744.63	746.22	HDPE
8008	CO-474	n81	745.03	n79	748.08	225	32.7	746.22	749.27	HDPE
8009	CO-476	n81	745.03	n86	746.08	225	17.9	746.22	747.27	HDPE
8022	CO-490	n361	768.27	n359	766.22	225	22.2	769.46	767.41	HDPE
8027	CO-500	n736	741.11	n734	740.05	225	10.2	742.3	741.24	HDPE
8029	CO-504	n731	735.64	n729	733.97	225	22.4	736.83	735.16	HDPE
8031	CO-508	n380	745.47	n64	744.79	225	6.3	746.66	745.98	HDPE
8072	CO-530(1)	MH-26	733.35	MH-27	732.79	225	32.4	734.54	733.98	HDPE
8073	CO-530(2)	MH-27	732.79	MH-23	732.22	225	32.7	733.98	733.41	HDPE
8155	CO-564	n387	757.22	n195	755.53	225	37.1	758.41	756.72	HDPE
8167	CO-572(1)	n938	751.53	MH-47	754.49	225	20.6	752.72	755.68	HDPE
7104	p3258	n3216	752.61	n3248	752.93	225	6.1	753.8	754.12	HDPE
4201	p350	n357	764.22	n358	765.04	225	6.8	765.41	766.23	HDPE
4226	p376	n383	751.37	n384	752.26	225	7.8	752.56	753.45	HDPE
4406	p557	n563	759.42	n564	760.59	225	8.3	760.61	761.78	HDPE
4939	p1090	n1083	752.64	n1092	753.11	225	8.4	753.83	754.3	HDPE
4254	p405	n411	740.04	n412	739.49	225	8.4	741.23	740.68	HDPE

4494	p645	n652	752.48	n653	752.18	225	8.7	753.67	753.37	HDPE
7267	p3421	n3402	719.68	n3403	719.59	225	8.9	720.87	720.78	HDPE
4202	p351	n358	765.04	n359	766.22	225	9.2	766.23	767.41	HDPE
4216	p365	n372	759.95	n373	761.16	225	9.6	761.14	762.35	HDPE
7268	p3422	n3403	719.59	n3404	719.52	225	10	720.78	720.71	HDPE
7264	p3418	n3399	720.23	n3400	720.18	225	10	721.42	721.37	HDPE
4173	p322	n329	741.62	n330	742.18	225	10	742.81	743.37	HDPE
4834	p985	n987	753.11	n988	753.5	225	10	754.3	754.69	HDPE
7225	p3379	n3361	747.68	n3362	747.07	225	10.3	748.87	748.26	HDPE
7261	p3415	n3396	721.33	n3397	721.29	225	10.5	722.52	722.48	HDPE
4441	p592	n599	741.27	n600	741.95	225	10.6	742.46	743.14	HDPE
7220	p3374	n3357	751.99	n3358	752.9	225	10.9	753.18	754.09	HDPE
6971	p3125	n43	719.22	n3124	719.25	225	11	720.41	720.44	HDPE
7247	p3401	n3382	732.75	n3383	731.6	225	11	733.94	732.79	HDPE
4823	p974	n976	753.3	n977	752.71	225	11.3	754.49	753.9	HDPE
7228	p3382	n3364	744.87	n3365	744.66	225	11.3	746.06	745.85	HDPE
4248	p399	n405	755.14	n406	753.36	225	11.4	756.33	754.55	HDPE
4149	p298	n305	725.72	n306	725.43	225	11.8	726.91	726.62	HDPE
4127	p276	n283	745.47	n284	744.91	225	11.8	746.66	746.1	HDPE
4250	p401	n407	746.09	n408	744.67	225	11.9	747.28	745.86	HDPE
7263	p3417	n3398	720.79	n3399	720.23	225	11.9	721.98	721.42	HDPE
3971	p120	n126	760	n127	761.58	225	12	761.19	762.77	HDPE
4123	p272	n279	748.71	n280	748.14	225	12	749.9	749.33	HDPE
4124	p273	n280	748.14	n281	747.33	225	12	749.33	748.52	HDPE
4227	p377	n384	752.26	n385	753.46	225	12.1	753.45	754.65	HDPE
4487	p638	n645	756.32	n646	755.55	225	12.2	757.51	756.74	HDPE
5012	p1163	n1164	730.45	n1165	730.54	225	12.2	731.64	731.73	HDPE
4225	p375	n381	750.4	n383	751.37	225	13	751.59	752.56	HDPE
6977	p3131	n3129	721.48	n3130	721.55	225	12.8	722.67	722.74	HDPE
4242	p393	n398	767.47	n399	769.25	225	13.3	768.66	770.44	HDPE
4863	p1014	n1015	755.11	n1016	754.13	225	13.6	756.3	755.32	HDPE
4304	p455	n461	755.24	n462	754.92	225	14.3	756.43	756.11	HDPE
4145	p294	n301	728.45	n302	727.91	225	14.4	729.64	729.1	HDPE
4537	p688	n694	721.51	n695	721.45	225	14.4	722.7	722.64	HDPE
4137	p286	n293	737.59	n294	736.9	225	14.5	738.78	738.09	HDPE
4301	p452	n458	758.46	n459	757.4	225	14.5	759.65	758.59	HDPE
4398	p549	n555	758.88	n556	758.57	225	14.6	760.07	759.76	HDPE
4859	p1010	n1011	755.07	n1012	755.4	225	14.9	756.26	756.59	HDPE
7171	p3325	n2845	722.13	n3314	722.62	225	14.9	723.32	723.81	HDPE
5852	p2003	n2018	721.74	n2019	721.27	225	15	722.93	722.46	HDPE
4219	p368	n375	764.36	n376	765.4	225	15.1	765.55	766.59	HDPE
4251	p402	n408	744.67	n409	742.6	225	15.1	745.86	743.79	HDPE
4172	p321	n328	740.77	n329	741.62	225	15.3	741.96	742.81	HDPE
4200	p349	n356	762.91	n357	764.22	225	15.3	764.1	765.41	HDPE
7178	p3332	n3319	733.49	n3320	735.04	225	15.3	734.68	736.23	HDPE
4896	p1047	n1049	735.46	n1050	737.54	225	15.4	736.65	738.73	HDPE
7205	p3359	n3344	760.95	n3247	761.66	225	15.6	762.14	762.85	HDPE
4580	p731	n737	742.31	n738	742.84	225	15.6	743.5	744.03	HDPE
4083	p232	n239	750.32	n240	750.53	225	15.8	751.51	751.72	HDPE

4266	p417	n423	732.69	n424	732.27	225	15.8	733.88	733.46	HDPE
4536	p687	n693	721.69	n694	721.51	225	15.9	722.88	722.7	HDPE
4470	p621	n628	749.36	n629	749.15	225	16.1	750.55	750.34	HDPE
4033	p182	n189	741.3	n190	742.37	225	16.1	742.49	743.56	HDPE
7062	p3216	n3208	741.98	n121	742.81	225	16.1	743.17	744	HDPE
4860	p1011	n1012	755.4	n1013	755.82	225	16.2	756.59	757.01	HDPE
4231	p381	n387	757.22	n388	759.42	225	16.2	758.41	760.61	HDPE
4833	p984	n986	752.55	n987	753.11	225	16.2	753.74	754.3	HDPE
4168	p317	n324	736.58	n325	737.42	225	16.3	737.77	738.61	HDPE
4302	p453	n459	757.4	n460	756.24	225	16.3	758.59	757.43	HDPE
4616	p767	n773	742.58	n774	741.66	225	16.4	743.77	742.85	HDPE
4133	p282	n289	741.65	n290	740.7	225	16.5	742.84	741.89	HDPE
7177	p3331	n3318	731.92	n3319	733.49	225	16.6	733.11	734.68	HDPE
7181	p3335	n3322	739.29	n3323	739.74	225	16.7	740.48	740.93	HDPE
7275	p3429	n3410	721.84	n3411	722.64	225	16.7	723.03	723.83	HDPE
7195	p3349	n3334	747.3	n3335	747.58	225	16.7	748.49	748.77	HDPE
4832	p983	n985	752.2	n986	752.55	225	16.9	753.39	753.74	HDPE
7469	p3625	n3602	764.76	n3603	764.35	225	17	765.95	765.54	HDPE
4151	p300	n307	724.89	n308	724.7	225	17	726.08	725.89	HDPE
3901	p50	n53	727.59	n54	728.77	225	17	728.78	729.96	HDPE
4837	p988	n990	754.45	n991	755.41	225	17.1	755.64	756.6	HDPE
4013	p162	n169	741.67	n170	742.48	225	17.2	742.86	743.67	HDPE
7048	p3202	n3195	730.68	n3196	730.94	225	17.2	731.87	732.13	HDPE
7022	p3176	n3169	726.24	n3170	725.42	225	17.2	727.43	726.61	HDPE
6976	p3130	n3128	721.25	n3129	721.48	225	17.2	722.44	722.67	HDPE
4922	p1073	n1074	718.75	n1075	719.35	225	17.5	719.94	720.54	HDPE
3911	p60	n63	744.22	n64	744.79	225	17.5	745.41	745.98	HDPE
4196	p345	n352	753.17	n353	755.1	225	17.5	754.36	756.29	HDPE
4465	p616	n623	747.62	n624	748.05	225	17.6	748.81	749.24	HDPE
4268	p419	n425	731.74	n426	731.31	225	17.8	732.93	732.5	HDPE
7047	p3201	n3194	730.07	n3195	730.68	225	17.8	731.26	731.87	HDPE
4857	p1008	n1009	754.56	n1010	754.83	225	17.9	755.75	756.02	HDPE
4138	p287	n294	736.9	n295	735.86	225	17.9	738.09	737.05	HDPE
4267	p418	n424	732.27	n425	731.74	225	18.1	733.46	732.93	HDPE
4622	p773	n779	735.26	n780	734.7	225	18.3	736.45	735.89	HDPE
4205	p354	n361	768.27	n362	769.85	225	18.4	769.46	771.04	HDPE
4900	p1051	n1053	743.05	n1054	745.19	225	19.4	744.24	746.38	HDPE
4817	p968	n970	753.92	n971	754.86	225	19.5	755.11	756.05	HDPE
4122	p271	n278	749.65	n279	748.71	225	19.6	750.84	749.9	HDPE
5845	p1996	n2011	720.7	n2012	720.76	225	19.7	721.89	721.95	HDPE
4869	p1020	n1021	760.17	n1022	762.35	225	20	761.36	763.54	HDPE
3912	p61	n64	744.79	n65	745.35	225	20	745.98	746.54	HDPE
4063	p212	n220	742.44	n221	744.42	225	20	743.63	745.61	HDPE
4924	p1075	n1076	719.97	n1077	720.3	225	20.1	721.16	721.49	HDPE
7012	p3166	n3160	718.87	n3161	719.14	225	20.1	720.06	720.33	HDPE
4233	p383	n389	761.75	n390	763.96	225	20.4	762.94	765.15	HDPE
4077	p226	n233	748.21	n234	748.63	225	20.5	749.4	749.82	HDPE
4079	p228	n235	749.12	n236	749.5	225	20.7	750.31	750.69	HDPE
4479	p630	n637	751.96	n638	753.02	225	21	753.15	754.21	HDPE

4873	p1024	n1025	768.07	n1026	771.06	225	21.1	769.26	772.25	HDPE
4397	p548	n554	759.22	n555	758.88	225	21.1	760.41	760.07	HDPE
4271	p422	n428	730.79	n429	730.34	225	21.1	731.98	731.53	HDPE
4027	p176	n183	753.72	n184	753.26	225	21.3	754.91	754.45	HDPE
4126	p275	n282	746.25	n283	745.47	225	21.4	747.44	746.66	HDPE
4893	p1044	n1046	728.46	n1047	731.06	225	21.6	729.65	732.25	HDPE
4280	p431	n437	726.34	n438	726.14	225	21.7	727.53	727.33	HDPE
4051	p200	n207	729.56	n208	731.94	225	21.7	730.75	733.13	HDPE
4131	p280	n287	743.55	n288	742.74	225	21.7	744.74	743.93	HDPE
4868	p1019	n1020	758.08	n1021	760.17	225	21.8	759.27	761.36	HDPE
3906	p55	n58	736.06	n59	737.1	225	21.8	737.25	738.29	HDPE
4794	p945	n947	735.54	n948	736.86	225	21.9	736.73	738.05	HDPE
4082	p231	n238	750.04	n239	750.32	225	21.9	751.23	751.51	HDPE
5211	p1362	n1364	745.39	n1365	746.86	225	22.3	746.58	748.05	HDPE
7284	p3438	n3417	737.89	n3418	739.96	225	22.5	739.08	741.15	HDPE
4132	p281	n288	742.74	n289	741.65	225	22.5	743.93	742.84	HDPE
4178	p327	n334	747.66	n335	748.73	225	22.5	748.85	749.92	HDPE
4220	p369	n376	765.4	n377	766.2	225	22.5	766.59	767.39	HDPE
4955	p1106	n1107	734.11	n1108	738.53	225	22.7	735.3	739.72	HDPE
4533	p684	n690	722.42	n691	722.1	225	22.8	723.61	723.29	HDPE
4851	p1002	n1003	753.3	n1004	753.99	225	23	754.49	755.18	HDPE
4125	p274	n281	747.33	n282	746.25	225	23	748.52	747.44	HDPE
4148	p297	n304	726.15	n305	725.72	225	23.1	727.34	726.91	HDPE
4164	p313	n320	732.21	n321	733.38	225	23.3	733.4	734.57	HDPE
3895	p44	n47	721.45	n48	722.66	225	23.5	722.64	723.85	HDPE
8018	p406(2)	MH-19	738.73	n413	738.05	225	23.6	739.92	739.24	HDPE
4259	p410	n416	735.98	n417	735.4	225	23.7	737.17	736.59	HDPE
4100	p249	n256	758.8	n257	758.58	225	23.8	759.99	759.77	HDPE
7052	p3206	n88	735.35	n3199	736.04	225	23.8	736.54	737.23	HDPE
4121	p270	n277	750.58	n278	749.65	225	23.8	751.77	750.84	HDPE
4429	p580	n588	746.59	n589	743.16	225	23.9	747.78	744.35	HDPE
5009	p1160	n1161	731.56	n1162	730.6	225	24	732.75	731.79	HDPE
4540	p691	n697	721.03	n698	720.58	225	24.1	722.22	721.77	HDPE
4305	p456	n462	754.92	n463	752.99	225	24.1	756.11	754.18	HDPE
4264	p415	n421	733.91	n422	733.22	225	24.2	735.1	734.41	HDPE
4171	p320	n327	739.61	n328	740.77	225	24.3	740.8	741.96	HDPE
4476	p627	n634	748.52	n635	749.22	225	24.4	749.71	750.41	HDPE
4482	p633	n640	754.52	n641	755.19	225	24.4	755.71	756.38	HDPE
4899	p1050	n1052	740.12	n1053	743.05	225	24.5	741.31	744.24	HDPE
4170	p319	n326	738.54	n327	739.61	225	24.8	739.73	740.8	HDPE
7197	p3351	n3336	748.35	n3337	749.89	225	25	749.54	751.08	HDPE
4478	p629	n636	751.17	n637	751.96	225	25.1	752.36	753.15	HDPE
4180	p329	n336	749.85	n337	751.18	225	25.2	751.04	752.37	HDPE
4162	p311	n318	729.11	n319	730.4	225	25.3	730.3	731.59	HDPE
4166	p315	n322	734.29	n323	735.48	225	25.4	735.48	736.67	HDPE
4206	p355	n362	769.85	n363	772.9	225	25.6	771.04	774.09	HDPE
4316	p467	n473	748.08	n474	747.77	225	25.6	749.27	748.96	HDPE
4217	p366	n373	761.16	n374	762.98	225	25.6	762.35	764.17	HDPE
4306	p457	n463	752.99	n464	751.4	225	25.6	754.18	752.59	HDPE

4198	p347	n354	758.12	n355	760.65	225	25.6	759.31	761.84	HDPE
7914	p435(1)	n441	725	MH-14	724.74	225	25.7	726.19	725.93	HDPE
4428	p579	n587	750.41	n588	746.59	225	25.8	751.6	747.78	HDPE
4117	p266	n273	753.07	n274	752.16	225	26	754.26	753.35	HDPE
4283	p434	n440	725.33	n441	725	225	26	726.52	726.19	HDPE
4579	p730	n736	741.11	n737	742.31	225	26.1	742.3	743.5	HDPE
4454	p605	n612	727.25	n613	722.19	225	26.1	728.44	723.38	HDPE
5210	p1361	n1363	744.69	n1364	745.39	225	26.1	745.88	746.58	HDPE
5024	p1175	n1176	737.84	n1177	740.27	225	26.2	739.03	741.46	HDPE
4608	p759	n765	745.36	n766	745.17	225	26.3	746.55	746.36	HDPE
4974	p1125	n1126	755.89	n1127	756.33	225	26.5	757.08	757.52	HDPE
4025	p174	n181	754.39	n182	754.07	225	26.7	755.58	755.26	HDPE
4276	p427	n433	727.91	n434	727.49	225	26.7	729.1	728.68	HDPE
4941	p1092	n1093	754.2	n1094	757	225	26.9	755.39	758.19	HDPE
7272	p3426	n3407	720.03	n3408	721.08	225	27	721.22	722.27	HDPE
4862	p1013	n1014	755.68	n1015	755.11	225	27	756.87	756.3	HDPE
4469	p620	n627	749.54	n628	749.36	225	27.1	750.73	750.55	HDPE
7203	p3357	n3342	757.56	n3343	759.24	225	27.4	758.75	760.43	HDPE
4176	p325	n332	744.3	n333	745.84	225	27.6	745.49	747.03	HDPE
4050	p199	n206	726.46	n207	729.56	225	28.1	727.65	730.75	HDPE
7213	p3367	n3351	763.6	n3352	763.92	225	28.1	764.79	765.11	HDPE
3948	p97	n102	754.3	n103	756.86	225	28.2	755.49	758.05	HDPE
4799	p950	n952	739.66	n953	739.87	225	28.2	740.85	741.06	HDPE
4625	p776	n782	734.17	n783	733.86	225	28.3	735.36	735.05	HDPE
3905	p54	n57	734.87	n58	736.06	225	28.4	736.06	737.25	HDPE
7043	p3197	n3190	721.49	n3191	723.63	225	28.6	722.68	724.82	HDPE
7929	p3097(2)	MH-15	718.2	n3097	717.81	225	28.7	719.39	719	HDPE
8109	p618(1)	n625	748.66	MH-34	749.86	225	28.8	749.85	751.05	HDPE
4542	p693	n699	720.28	n620	720.1	225	28.8	721.47	721.29	HDPE
7101	p3255	n3244	762.32	n3245	761.93	225	28.8	763.51	763.12	HDPE
7256	p3410	n3391	725.97	n3392	725.65	225	28.8	727.16	726.84	HDPE
4814	p965	n967	751.6	n968	751.75	225	28.9	752.79	752.94	HDPE
4477	p628	n635	749.22	n636	751.17	225	29.1	750.41	752.36	HDPE
4831	p982	n984	751.9	n985	752.2	225	29.3	753.09	753.39	HDPE
4177	p326	n333	745.84	n334	747.66	225	29.3	747.03	748.85	HDPE
7255	p3409	n3390	726.75	n3391	725.97	225	29.4	727.94	727.16	HDPE
5846	p1997	n2012	720.76	n2013	720.87	225	29.5	721.95	722.06	HDPE
4468	p619	n626	749.98	n627	749.54	225	29.6	751.17	750.73	HDPE
7468	p3624	n3601	765.34	n3602	764.76	225	29.6	766.53	765.95	HDPE
4620	p771	n777	737.45	n778	736.5	225	29.6	738.64	737.69	HDPE
4275	p426	n432	728.44	n433	727.91	225	29.7	729.63	729.1	HDPE
5013	p1164	n1165	730.54	n1166	730.72	225	29.8	731.73	731.91	HDPE
3903	p52	n55	731.2	n56	733.28	225	29.8	732.39	734.47	HDPE
6968	p3122	n3121	717.47	n3122	718.15	225	29.8	718.66	719.34	HDPE
7200	p3354	n3339	753.56	n3340	754.35	225	29.9	754.75	755.54	HDPE
4528	p679	n685	723.87	n686	723.64	225	29.9	725.06	724.83	HDPE
3910	p59	n62	742.5	n63	744.22	225	30	743.69	745.41	HDPE
4619	p770	n776	739.01	n777	737.45	225	30.1	740.2	738.64	HDPE

7231	p3385	n3367	744.17	n3368	742.97	225	30.1	745.36	744.16	HDPE
4078	p227	n234	748.63	n235	749.12	225	30.1	749.82	750.31	HDPE
3986	p135	n141	730.66	n142	725.69	225	30.3	731.85	726.88	HDPE
7045	p3199	n3192	724.92	n3193	727.82	225	30.3	726.11	729.01	HDPE
5200	p1351	n1353	731.86	n1354	733.79	225	30.4	733.05	734.98	HDPE
7478	p3634	n3610	761.26	n3611	760.47	225	30.6	762.45	761.66	HDPE
3909	p58	n61	740.49	n62	742.5	225	30.7	741.68	743.69	HDPE
4541	p692	n698	720.58	n699	720.28	225	30.8	721.77	721.47	HDPE
3893	p42	n45	719.45	n46	720.04	225	30.9	720.64	721.23	HDPE
4615	p766	n772	744.54	n773	742.58	225	31.3	745.73	743.77	HDPE
6942	p3096	n3095	719.01	n3096	718.58	225	31.6	720.2	719.77	HDPE
4279	p430	n436	726.55	n437	726.34	225	31.6	727.74	727.53	HDPE
3894	p43	n46	720.04	n47	721.45	225	31.7	721.23	722.64	HDPE
4840	p991	n993	755.82	n994	755.39	225	31.9	757.01	756.58	HDPE
7173	p3327	n3315	724.19	n3316	726.41	225	32	725.38	727.6	HDPE
4976	p1127	n1128	756.73	n1129	757.41	225	32.2	757.92	758.6	HDPE
4060	p209	n217	733.7	n218	736.65	225	32.8	734.89	737.84	HDPE
4058	p207	n215	729.17	n216	731.32	225	33.4	730.36	732.51	HDPE
3904	p53	n56	733.28	n57	734.87	225	33.4	734.47	736.06	HDPE
7219	p3373	n240	750.53	n3357	751.99	225	33.7	751.72	753.18	HDPE
4163	p312	n319	730.4	n320	732.21	225	33.8	731.59	733.4	HDPE
7024	p3178	n3171	724	n3172	722.48	225	33.9	725.19	723.67	HDPE
4057	p206	n214	727.44	n215	729.17	225	34.3	728.63	730.36	HDPE
4041	p190	n197	752.73	n198	751.05	225	34.3	753.92	752.24	HDPE
4806	p957	n959	747.41	n960	749.09	225	34.4	748.6	750.28	HDPE
4395	p546	n552	762.31	n553	760.46	225	34.4	763.5	761.65	HDPE
7257	p3411	n3392	725.65	n3393	723.98	225	34.7	726.84	725.17	HDPE
4156	p305	n312	726.23	n313	726.77	225	34.8	727.42	727.96	HDPE
4257	p408	n414	737.43	n415	736.83	225	35.1	738.62	738.02	HDPE
4308	p459	n465	750.17	n466	748.99	225	35.3	751.36	750.18	HDPE
4984	p1135	n1136	759.18	n1137	755.95	225	35.3	760.37	757.14	HDPE
3896	p45	n48	722.66	n49	723.69	225	35.7	723.85	724.88	HDPE
4315	p466	n472	752.64	n473	748.08	225	35.8	753.83	749.27	HDPE
7285	p3439	n3418	739.96	n3419	742.77	225	35.9	741.15	743.96	HDPE
4455	p606	n613	722.19	n614	719.31	225	36	723.38	720.5	HDPE
4061	p210	n218	736.65	n219	739.96	225	36.2	737.84	741.15	HDPE
4282	p433	n439	725.81	n440	725.33	225	36.4	727	726.52	HDPE
4056	p205	n213	724.66	n214	727.44	225	36.5	725.85	728.63	HDPE
7025	p3179	n3172	722.48	n3173	722.14	225	36.9	723.67	723.33	HDPE
4139	p288	n295	735.86	n296	734.01	225	37.3	737.05	735.2	HDPE
3902	p51	n54	728.77	n55	731.2	225	37.4	729.96	732.39	HDPE
4815	p966	n968	751.75	n969	752.36	225	37.5	752.94	753.55	HDPE
4236	p387	n393	762.91	n394	758.85	225	37.7	764.1	760.04	HDPE
3983	p132	n138	738.6	n139	738.18	225	38.2	739.79	739.37	HDPE
7067	p3221	n3211	746.25	n3212	748.07	225	38.8	747.44	749.26	HDPE
4103	p252	n259	757.84	n260	757.65	225	38.8	759.03	758.84	HDPE
6939	p3093	n3092	720.96	n3093	720.31	225	39	722.15	721.5	HDPE
4273	p424	n430	729.85	n431	729.29	225	39.4	731.04	730.48	HDPE
4228	p378	n385	753.46	n195	755.53	225	39.4	754.65	756.72	HDPE

7014	p3168	n3162	719.75	n3163	722.21	225	39.6	720.94	723.4	HDPE
4805	p956	n958	745.6	n959	747.41	225	39.8	746.79	748.6	HDPE
5847	p1998	n2013	720.87	n2014	721.65	225	40	722.06	722.84	HDPE
7201	p3355	n3340	754.35	n3341	756.38	225	40.2	755.54	757.57	HDPE
4142	p291	n298	732.04	n299	730.34	225	40.7	733.23	731.53	HDPE
7282	p3436	n3415	727.11	n3416	733.04	225	41.1	728.3	734.23	HDPE
4274	p425	n431	729.29	n432	728.44	225	42.7	730.48	729.63	HDPE
7015	p3169	n3163	722.21	n3164	725.15	225	43.3	723.4	726.34	HDPE
3930	p79	n83	750.04	n84	746.47	225	43.3	751.23	747.66	HDPE
7105	p3259	n3248	752.93	n3249	756.08	225	43.5	754.12	757.27	HDPE
7057	p3211	n3203	738.66	n3204	738.83	225	43.8	739.85	740.02	HDPE
3968	p117	n123	746.98	n124	753.93	225	43.8	748.17	755.12	HDPE
7832	p990(2)	MH-9	756.68	n993	755.82	225	45	757.87	757.01	HDPE
7479	p3635	n3611	760.47	n3612	759.56	225	45.1	761.66	760.75	HDPE
4247	p398	n404	761.21	n405	755.14	225	45.2	762.4	756.33	HDPE
4816	p967	n969	752.36	n970	753.92	225	46.7	753.55	755.11	HDPE
4277	p428	n434	727.49	n435	726.93	225	49.1	728.68	728.12	HDPE
7477	p3633	n3609	763.21	n3610	761.26	225	51.5	764.4	762.45	HDPE
4224	p373	n380	745.47	n381	750.4	225	53.9	746.66	751.59	HDPE
7962	CO-388	n197	752.73	n177	751.42	225	23	753.92	752.61	HDPE
7777	CO-118	n1359	743.31	n1361	744.05	225	29.1	744.5	745.24	HDPE
7796	CO-156	n919	737.17	n917	733.66	225	20.1	738.36	734.85	HDPE
7846	CO-198	n1357	739.41	n1355	735.16	225	36.6	740.6	736.35	HDPE
7848	CO-202	n1158	736.18	n1160	733.25	225	30	737.37	734.44	HDPE
7858	CO-216	n1134	761	n1136	759.18	225	33.4	762.19	760.37	HDPE
7869	CO-226	n3142	718.93	n2179	718.26	225	33.6	720.12	719.45	HDPE
7891	CO-270	n1016	754.13	n988	753.5	225	18	755.32	754.69	HDPE
7895	CO-278	n996	755.06	n462	754.92	225	12.7	756.25	756.11	HDPE
7904	CO-296	n680	726	n682	725.16	225	20.2	727.19	726.35	HDPE
7916	CO-308	n417	735.4	n419	734.76	225	26.6	736.59	735.95	HDPE
7918	CO-312	n1282	765.25	n1284	765.76	225	21.5	766.44	766.95	HDPE
7933	CO-336	n92	742.78	n90	739.75	225	40.9	743.97	740.94	HDPE
7934	CO-338	n92	742.78	n94	743.63	225	8.8	743.97	744.82	HDPE
7953	CO-370	n3402	719.68	n3400	720.18	225	17.7	720.87	721.37	HDPE
7964	CO-392	n179	754.05	n177	751.42	225	22.4	755.24	752.61	HDPE
7977	CO-418	n608	737.64	n610	735.26	225	13.7	738.83	736.45	HDPE
7998	CO-454	n2021	721.02	n2019	721.27	225	16.3	722.21	722.46	HDPE
8004	CO-466	n3318	731.92	n3306	728.39	225	37.9	733.11	729.58	HDPE
8014	CO-480	n3245	761.93	n3247	761.66	225	13.3	763.12	762.85	HDPE
8015	CO-482	n1282	765.25	n1280	764.26	225	24.6	766.44	765.45	HDPE
8024	CO-494	n350	748.76	n231	748.05	225	15.4	749.95	749.24	HDPE
8025	CO-496	n236	749.5	n238	750.04	225	12.9	750.69	751.23	HDPE
8026	CO-498	n238	750.04	n999	750.67	225	18.5	751.23	751.86	HDPE
8028	CO-502	n734	740.05	n732	736.4	225	24.8	741.24	737.59	HDPE
8039	CO-516	n1085	753.14	n1083	752.64	225	19.6	754.33	753.83	HDPE
8043	CO-518	n1126	755.89	n973	755.27	225	8.4	757.08	756.46	HDPE
8170	CO-576	n135	742.43	n133	744.56	225	16.5	743.62	745.75	HDPE
4011	p160	n167	740.91	n168	741	225	5.3	742.1	742.19	HDPE
4431	p582	n590	742.25	n591	741.52	225	5.6	743.44	742.71	HDPE

4574	p725	n731	735.64	n732	736.4	225	6.7	736.83	737.59	HDPE
6983	p3137	n3135	721.26	n3136	721.15	225	6.7	722.45	722.34	HDPE
4430	p581	n589	743.16	n590	742.25	225	7.5	744.35	743.44	HDPE
4405	p556	n562	758.55	n563	759.42	225	8.6	759.74	760.61	HDPE
4449	p600	n607	739.06	n608	737.64	225	9.6	740.25	738.83	HDPE
4488	p639	n646	755.55	n647	755.28	225	9.8	756.74	756.47	HDPE
4043	p192	n199	750.05	n200	749.39	225	9.9	751.24	750.58	HDPE
4129	p278	n285	744.39	n286	744.06	225	10.5	745.58	745.25	HDPE
4481	p632	n639	754.27	n640	754.52	225	10.7	755.46	755.71	HDPE
7066	p3220	n3210	745.13	n3211	746.25	225	10.8	746.32	747.44	HDPE
7276	p3430	n3411	722.64	n3412	722.91	225	11.2	723.83	724.1	HDPE
4174	p323	n330	742.18	n331	742.76	225	11.5	743.37	743.95	HDPE
7262	p3416	n3397	721.29	n3398	720.79	225	11.7	722.48	721.98	HDPE
4243	p394	n399	769.25	n400	769.53	225	11.8	770.44	770.72	HDPE
4128	p277	n284	744.91	n285	744.39	225	11.8	746.1	745.58	HDPE
4522	p673	n679	726.52	n680	726	225	12.4	727.71	727.19	HDPE
4042	p191	n198	751.05	n199	750.05	225	12.5	752.24	751.24	HDPE
4032	p181	n167	740.91	n189	741.3	225	12.5	742.1	742.49	HDPE
7230	p3384	n3366	744.4	n3367	744.17	225	12.6	745.59	745.36	HDPE
4207	p356	n363	772.9	n364	774.29	225	13.3	774.09	775.48	HDPE
7063	p3217	n121	742.81	n3209	743.42	225	13.5	744	744.61	HDPE
4270	p421	n427	731.05	n428	730.79	225	14	732.24	731.98	HDPE
7035	p3189	n3182	721.89	n3183	722.14	225	14	723.08	723.33	HDPE
7044	p3198	n3191	723.63	n3192	724.92	225	14.5	724.82	726.11	HDPE
4089	p238	n245	753.17	n246	754.05	225	14.6	754.36	755.24	HDPE
4971	p1122	n1123	749.39	n1124	749.91	225	14.8	750.58	751.1	HDPE
4130	p279	n286	744.06	n287	743.55	225	15.1	745.25	744.74	HDPE
7270	p3424	n3405	719.27	n3406	719.43	225	15.6	720.46	720.62	HDPE
4956	p1107	n1108	738.53	n1109	742.15	225	15.8	739.72	743.34	HDPE
4269	p420	n426	731.31	n427	731.05	225	15.9	732.5	732.24	HDPE
7229	p3383	n3365	744.66	n3366	744.4	225	15.9	745.85	745.59	HDPE
6982	p3136	n3134	721.9	n3135	721.26	225	15.9	723.09	722.45	HDPE
7202	p3356	n3341	756.38	n3342	757.56	225	16.1	757.57	758.75	HDPE
4471	p622	n629	749.15	n630	748.53	225	16.2	750.34	749.72	HDPE
4232	p382	n388	759.42	n389	761.75	225	16.4	760.61	762.94	HDPE
7065	p3219	n133	744.56	n3210	745.13	225	16.5	745.75	746.32	HDPE
4934	p1085	n1086	753.64	n1087	753.92	225	16.6	754.83	755.11	HDPE
4090	p239	n246	754.05	n247	755.77	225	16.9	755.24	756.96	HDPE
4874	p1025	n1026	771.06	n1027	772.92	225	17.3	772.25	774.11	HDPE
4439	p590	n598	736.66	n581	738.78	225	17.4	737.85	739.97	HDPE
4440	p591	n581	738.78	n599	741.27	225	17.8	739.97	742.46	HDPE
4848	p999	n1000	751.25	n1001	751.78	225	17.9	752.44	752.97	HDPE
4935	p1086	n1087	753.92	n1088	754.29	225	17.9	755.11	755.48	HDPE
4165	p314	n321	733.38	n322	734.29	225	18	734.57	735.48	HDPE
4847	p998	n999	750.67	n1000	751.25	225	18	751.86	752.44	HDPE
4384	p535	n267	758.66	n542	759.54	225	18.4	759.85	760.73	HDPE
4490	p641	n648	754.89	n649	754.56	225	18.7	756.08	755.75	HDPE
7013	p3167	n3161	719.14	n3162	719.75	225	18.7	720.33	720.94	HDPE
7180	p3334	n3321	737.92	n3322	739.29	225	18.8	739.11	740.48	HDPE

4263	p414	n420	734.3	n421	733.91	225	18.9	735.49	735.1	HDPE
4195	p344	n351	751.15	n352	753.17	225	19.2	752.34	754.36	HDPE
6978	p3132	n3130	721.55	n3131	722.13	225	19.3	722.74	723.32	HDPE
4466	p617	n624	748.05	n625	748.66	225	19.4	749.24	749.85	HDPE
4842	p993	n995	755.15	n996	755.06	225	19.6	756.34	756.25	HDPE
4389	p540	n546	763.9	n547	764.68	225	20	765.09	765.87	HDPE
4995	p1146	n1147	737.26	n1148	737.04	225	20.3	738.45	738.23	HDPE
5204	p1355	n1357	739.41	n1358	741.66	225	20.7	740.6	742.85	HDPE
5008	p1159	n1160	733.25	n1161	731.56	225	21	734.44	732.75	HDPE
4489	p640	n647	755.28	n648	754.89	225	21.4	756.47	756.08	HDPE
7271	p3425	n3406	719.43	n3407	720.03	225	21.4	720.62	721.22	HDPE
4531	p682	n688	722.93	n689	722.77	225	21.5	724.12	723.96	HDPE
4141	p290	n297	733.04	n298	732.04	225	21.7	734.23	733.23	HDPE
4452	p603	n610	735.26	n611	731.53	225	21.7	736.45	732.72	HDPE
5201	p1352	n1354	733.79	n1355	735.16	225	22	734.98	736.35	HDPE
4453	p604	n611	731.53	n612	727.25	225	22.3	732.72	728.44	HDPE
4480	p631	n638	753.02	n639	754.27	225	22.4	754.21	755.46	HDPE
6972	p3126	n3124	719.25	n3125	719.4	225	22.6	720.44	720.59	HDPE
4147	p296	n303	726.79	n304	726.15	225	22.8	727.98	727.34	HDPE
7174	p3328	n3316	726.41	n3306	728.39	225	23.2	727.6	729.58	HDPE
3970	p119	n125	757.3	n126	760	225	23.3	758.49	761.19	HDPE
4977	p1128	n1129	757.41	n1130	757.8	225	23.3	758.6	758.99	HDPE
4388	p539	n545	763.05	n546	763.9	225	23.5	764.24	765.09	HDPE
4181	p330	n337	751.18	n338	752.27	225	23.5	752.37	753.46	HDPE
3969	p118	n124	753.93	n125	757.3	225	23.6	755.12	758.49	HDPE
4091	p240	n247	755.77	n248	756.91	225	23.6	756.96	758.1	HDPE
4850	p1001	n1002	752.56	n1003	753.3	225	23.7	753.75	754.49	HDPE
4012	p161	n168	741	n169	741.67	225	23.7	742.19	742.86	HDPE
4281	p432	n438	726.14	n439	725.81	225	23.8	727.33	727	HDPE
4617	p768	n774	741.66	n775	740.16	225	23.9	742.85	741.35	HDPE
4485	p636	n643	755.4	n644	756.5	225	24.1	756.59	757.69	HDPE
6940	p3094	n3093	720.31	n3094	719.55	225	24.2	721.5	720.74	HDPE
4618	p769	n775	740.16	n776	739.01	225	24.3	741.35	740.2	HDPE
4262	p413	n419	734.76	n420	734.3	225	24.3	735.95	735.49	HDPE
4150	p299	n306	725.43	n307	724.89	225	24.7	726.62	726.08	HDPE
4169	p318	n325	737.42	n326	738.54	225	24.8	738.61	739.73	HDPE
7206	p3360	n3247	761.66	n3345	762.18	225	24.9	762.85	763.37	HDPE
4208	p357	n364	774.29	n365	776.56	225	24.9	775.48	777.75	HDPE
6933	p3087	n3086	718.3	n3087	718.4	225	25	719.49	719.59	HDPE
4432	p583	n591	741.52	n592	739.63	225	25.4	742.71	740.82	HDPE
4394	p545	n551	764.28	n552	762.31	225	25.4	765.47	763.5	HDPE
4199	p348	n355	760.65	n356	762.91	225	26	761.84	764.1	HDPE
7207	p3361	n3345	762.18	n3346	762.41	225	26	763.37	763.6	HDPE
4385	p536	n542	759.54	n543	760.91	225	26	760.73	762.1	HDPE
4886	p1037	n1039	720.06	n1040	723.63	225	26	721.25	724.82	HDPE
4140	p289	n296	734.01	n297	733.04	225	26.8	735.2	734.23	HDPE
7023	p3177	n3170	725.42	n3171	724	225	27	726.61	725.19	HDPE
4307	p458	n464	751.4	n465	750.17	225	27.5	752.59	751.36	HDPE
4386	p537	n543	760.91	n544	761.88	225	27.5	762.1	763.07	HDPE

4798	p949	n951	739.42	n952	739.66	225	27.5	740.61	740.85	HDPE
5205	p1356	n1358	741.66	n1359	743.31	225	27.6	742.85	744.5	HDPE
6979	p3133	n3131	722.13	n3132	722.68	225	27.9	723.32	723.87	HDPE
7198	p3352	n3337	749.89	n3338	751.8	225	28	751.08	752.99	HDPE
4849	p1000	n1001	751.78	n1002	752.56	225	28.1	752.97	753.75	HDPE
4884	p1035	n1037	717.92	n1038	718.52	225	29	719.11	719.71	HDPE
7053	p3207	n3199	736.04	n3200	736.9	225	29.4	737.23	738.09	HDPE
4194	p343	n350	748.76	n351	751.15	225	30.2	749.95	752.34	HDPE
4256	p407	n413	738.05	n414	737.43	225	30	739.24	738.62	HDPE
3985	p134	n140	734.93	n141	730.66	225	30.1	736.12	731.85	HDPE
4885	p1036	n1038	718.52	n1039	720.06	225	30.2	719.71	721.25	HDPE
7269	p3423	n3404	719.52	n3405	719.27	225	30.4	720.71	720.46	HDPE
6941	p3095	n3094	719.55	n3095	719.01	225	31	720.74	720.2	HDPE
4529	p680	n686	723.64	n687	723.38	225	31.5	724.83	724.57	HDPE
4146	p295	n302	727.91	n303	726.79	225	31.5	729.1	727.98	HDPE
6973	p3127	n3125	719.4	n3126	720.52	225	32.4	720.59	721.71	HDPE
7179	p3333	n3320	735.04	n3321	737.92	225	32.5	736.23	739.11	HDPE
5025	p1176	n1177	740.27	n1178	744.16	225	32.7	741.46	745.35	HDPE
4830	p981	n983	751.55	n984	751.9	225	33.1	752.74	753.09	HDPE
4933	p1084	n1085	753.14	n1086	753.64	225	33.3	754.33	754.83	HDPE
4530	p681	n687	723.38	n688	722.93	225	33.4	724.57	724.12	HDPE
7283	p3437	n3416	733.04	n3417	737.89	225	34.5	734.23	739.08	HDPE
7055	p3209	n3201	737.92	n3202	738.29	225	34.9	739.11	739.48	HDPE
4175	p324	n331	742.76	n332	744.3	225	35.1	743.95	745.49	HDPE
4621	p772	n778	736.5	n779	735.26	225	35.2	737.69	736.45	HDPE
4841	p992	n994	755.39	n995	755.15	225	35.4	756.58	756.34	HDPE
4390	p541	n547	764.68	n548	765.17	225	35.7	765.87	766.36	HDPE
4978	p1129	n1130	757.8	n1131	758.91	225	36.1	758.99	760.1	HDPE
4532	p683	n689	722.77	n690	722.42	225	36.3	723.96	723.61	HDPE
7286	p3440	n3419	742.77	n3420	745.89	225	36.5	743.96	747.08	HDPE
3984	p133	n139	738.18	n140	734.93	225	37.5	739.37	736.12	HDPE
4838	p989	n991	755.41	n992	756.79	225	37.6	756.6	757.98	HDPE
7287	p3441	n3420	745.89	n3421	749.66	225	38	747.08	750.85	HDPE
7199	p3353	n3338	751.8	n3339	753.56	225	38.6	752.99	754.75	HDPE
4387	p538	n544	761.88	n545	763.05	225	38.8	763.07	764.24	HDPE
7238	p3392	n3374	735.8	n3375	734.15	225	39.9	736.99	735.34	HDPE
6980	p3134	n3132	722.68	n3133	724.43	225	40.4	723.87	725.62	HDPE
7482	p3639	n3614	758.01	n3615	757.77	225	41.5	759.2	758.96	HDPE
7208	p3362	n3346	762.41	n3347	762.89	225	42	763.6	764.08	HDPE
4278	p429	n435	726.93	n436	726.55	225	44.1	728.12	727.74	HDPE
7054	p3208	n3200	736.9	n3201	737.92	225	44.1	738.09	739.11	HDPE
4024	p173	n180	754.63	n181	754.39	225	44.3	755.82	755.58	HDPE
7016	p3170	n3164	725.15	n3165	728.4	225	44.8	726.34	729.59	HDPE
7480	p3636	n3612	759.56	n3454	758.52	225	48.7	760.75	759.71	HDPE
7056	p3210	n3202	738.29	n3203	738.66	225	48.6	739.48	739.85	HDPE
7481	p3638	n3454	758.52	n3614	758.01	225	50.3	759.71	759.2	HDPE
7890	CO-268	n980	751.44	n982	751.34	225	29	752.63	752.54	HDPE
7896	CO-280	n253	758.85	n251	758.6	225	25.4	760.05	759.79	HDPE
4829	p980	n982	751.34	n983	751.55	225	19.6	752.54	752.74	HDPE

4312	p463	n469	748.32	n470	748.6	225	29.4	749.53	749.79	HDPE
7793	CO-150	n634	748.52	n632	747.2	225	21.6	749.71	748.41	HDPE
7794	CO-152	n632	747.2	n630	748.53	225	20.3	748.41	749.72	HDPE
4937	p1088	n1089	754.81	n1090	754.84	225	9.7	756.02	756.03	HDPE
4288	p439	n445	723.36	n446	723.46	225	29.7	724.57	724.65	HDPE
6966	p3120	n3119	716.67	n3120	716.97	225	30.1	717.88	718.16	HDPE
4072	p221	n229	747.77	n230	747.96	225	54.2	748.98	749.15	HDPE
4883	p1034	n1036	717.86	n1037	717.92	225	19.2	719.07	719.11	HDPE
6944	p3098	n3097	717.81	n3098	717.54	225	19.5	719	718.75	HDPE
4438	p589	n597	735.9	n598	736.66	225	23.1	737.11	737.85	HDPE
4437	p588	n596	736.15	n597	735.9	225	24.3	737.34	737.11	HDPE
4936	p1087	n1088	754.29	n1089	754.81	225	36.5	755.48	756.02	HDPE
4098	p247	n254	758.88	n255	758.97	225	23.6	760.1	760.16	HDPE
7239	p3393	n3375	734.15	n3376	734.07	225	24.5	735.34	735.29	HDPE
4926	p1077	n1078	720.81	n1079	720.88	225	22	722.03	722.07	HDPE
4925	p1076	n1077	720.3	n1078	720.81	225	22.3	721.49	722.03	HDPE
4766	p917	n921	755.6	n922	754.45	225	22.4	756.79	755.68	HDPE
4097	p246	n253	758.85	n254	758.88	225	11.1	760.05	760.1	HDPE
4483	p634	n641	755.19	n642	755.31	225	23.4	756.38	756.54	HDPE
4392	p543	n549	766.6	n550	766.52	225	23.9	767.79	767.75	HDPE
8149	CO-558	n167	740.91	LS 15	740.87	225	12	742.1	742.1	HDPE
6932	p3086	n3085	718.21	n3086	718.3	225	26.7	719.44	719.49	HDPE
4484	p635	n642	755.31	n643	755.4	225	27.9	756.54	756.59	HDPE
6990	p3144	n3141	720.85	n3142	718.93	225	39.5	722.08	720.12	HDPE
4393	p544	n550	766.52	n551	764.28	225	40	767.75	765.47	HDPE
7919	CO-314	n3603	764.35	n3356	763.91	225	12.8	765.54	765.15	HDPE
4310	p461	n467	748.49	n468	748.21	225	22.1	749.68	749.45	HDPE
7920	CO-316	n3356	763.91	n3606	763.76	225	19.4	765.15	764.95	HDPE
7996	CO-450	n2011	720.7	n2009	720.6	225	27.5	721.89	721.85	HDPE
4492	p643	n650	754.5	n651	753.58	225	17.5	755.75	754.77	HDPE
7192	p3346	n3331	746.47	n3332	747.11	225	23.2	747.66	748.36	HDPE
4627	p778	n784	733.7	n785	733.62	225	23.8	734.89	734.87	HDPE
4538	p689	n695	721.45	n696	721.36	225	28.5	722.64	722.61	HDPE
8142	CO-556	n3405	719.27	LS 14	719.21	225	15.9	720.46	720.46	HDPE
4491	p642	n649	754.56	n650	754.5	225	16.2	755.75	755.75	HDPE
4609	p760	n766	745.17	n767	745.09	225	20.8	746.36	746.34	HDPE
4539	p690	n696	721.36	n697	721.03	225	35.3	722.61	722.22	HDPE
7829	CO-178	n982	751.34	LS 12	751.29	225	14.1	752.54	752.54	HDPE
4075	p224	n68	748.01	n232	748.07	225	6.5	749.27	749.26	HDPE
3915	p64	n67	747.94	n68	748.01	225	7.2	749.13	749.27	HDPE
7967	CO-398	n188	753.02	n3358	752.9	225	20.8	754.28	754.09	HDPE
4074	p223	n231	748.05	n68	748.01	225	11	749.24	749.27	HDPE
7886	CO-260	n965	751.07	n967	751.6	225	16.2	752.34	752.79	HDPE
8092	CO-538(1)	n794	731.88	MH-31	732.09	225	34	733.15	733.28	HDPE
4109	p258	n265	759.02	n266	759.11	225	26.3	760.29	760.3	HDPE
7885	CO-258	n1058	748.68	n965	751.07	225	21.8	749.87	752.34	HDPE
7887	CO-262	n963	751.15	n965	751.07	225	22.4	752.34	752.34	HDPE
7798	CO-160	n915	732.6	n913	732.53	225	20.4	733.79	733.81	HDPE

8160	CO-568	n1164	730.45	LS 8	730.36	225	25.8	731.64	731.64	HDPE
4818	p969	n971	754.86	n972	755.21	225	23.7	756.05	756.49	HDPE
4458	p609	n616	718.62	n617	718.74	225	32.5	719.9	719.93	HDPE
8083	CO-534(1)	n614	719.31	MH-29	718.53	225	27.2	720.5	719.81	HDPE
4856	p1007	n1008	754.51	n1009	754.56	225	14.7	755.79	755.75	HDPE
4819	p970	n972	755.21	n973	755.27	225	15.5	756.49	756.46	HDPE
6975	p3129	n3127	721.2	n3128	721.25	225	15.8	722.48	722.44	HDPE
6974	p3128	n3126	720.52	n3127	721.2	225	33.2	721.71	722.48	HDPE
7010	p3164	n3158	718.49	n3159	718.62	225	37.4	719.78	719.81	HDPE
4188	p337	n344	753.18	n345	753.24	225	18.7	754.47	754.43	HDPE
5855	p2006	n2021	721.02	n2022	720.94	225	23.7	722.21	722.23	HDPE
7789	CO-142	n489	746.89	n487	746.46	225	32.4	748.08	747.76	HDPE
7058	p3212	n3204	738.83	n3205	738.98	225	17.6	740.02	740.29	HDPE
7059	p3213	n3205	738.98	n3206	739.07	225	28.2	740.29	740.26	HDPE
5842	p1993	n2008	720.55	n2009	720.6	225	15.5	721.8	721.85	HDPE
7716	CO-8	n3187	722.62	n3185	722.53	225	26.6	723.81	723.85	HDPE
4610	p761	n767	745.09	n768	745.04	225	14.8	746.34	746.3	HDPE
7717	CO-10	n3185	722.53	n3183	722.14	225	24.8	723.85	723.33	HDPE
7790	CO-144	n487	746.46	n485	746.56	225	28.1	747.76	747.78	HDPE
4104	p253	n260	757.65	n261	757.55	225	27.3	758.84	758.88	HDPE
3923	p72	n76	752.02	n77	750.96	225	8.7	753.36	752.15	HDPE
4044	p193	n200	749.39	n201	749.33	225	18.7	750.58	750.67	HDPE
7738	p947(2)	MH-2	738.86	n950	739.37	225	27.9	740.05	740.71	HDPE
7032	p3186	n3179	721.43	n3180	721.57	225	39.8	722.77	722.76	HDPE
3933	p82	n76	752.02	n87	754.16	225	13.9	753.36	755.35	HDPE
6931	p3085	n3084	718.15	n3085	718.21	225	16	719.45	719.44	HDPE
4797	p948	n950	739.37	n951	739.42	225	16.3	740.71	740.61	HDPE
7474	p3630	n3606	763.76	n3607	763.69	225	21.3	764.95	765.04	HDPE
8069	CO-528	n800	733.95	MH-26	733.35	225	42.8	735.31	734.54	HDPE
4643	p794	n800	733.95	n729	733.97	225	6.3	735.31	735.16	HDPE
3919	p68	n72	752.17	n73	752.13	225	12.1	753.36	753.49	HDPE
4185	p334	n341	752.99	n342	753.03	225	12.4	754.21	754.36	HDPE
8032	CO-510	n3218	752.34	n3216	752.61	225	18.2	753.71	753.8	HDPE
8084	CO-534(2)	MH-29	718.53	n616	718.62	225	28.1	719.81	719.9	HDPE
4045	p194	n201	749.33	n202	749.3	225	9.4	750.67	750.52	HDPE
7074	p3228	n3218	752.34	n3219	752.47	225	38.6	753.71	753.66	HDPE
8169	CO-574	n3421	749.66	n3218	752.34	225	42.2	750.85	753.71	HDPE
4018	p167	n174	746.77	n175	746.84	225	19.9	748.15	748.03	HDPE
4017	p166	n173	745.21	n174	746.77	225	20.5	746.4	748.15	HDPE
5841	p1992	n2007	720.5	n2008	720.55	225	15.8	721.82	721.8	HDPE
4327	p478	n484	746.64	n485	746.56	225	24.3	747.99	747.78	HDPE
4182	p331	n338	752.27	n339	752.83	225	20.8	753.46	754.22	HDPE
7483	p3640	n3615	757.77	n3616	757.65	225	35.4	758.96	759.04	HDPE
6984	p3138	n3136	721.15	n3137	721.12	225	9	722.34	722.52	HDPE
7211	p3365	n3349	763.3	n3350	763.36	225	17.4	764.71	764.55	HDPE
4996	p1147	n1148	737.04	n1149	736.95	225	23.8	738.23	738.37	HDPE
4187	p336	n343	753.09	n344	753.18	225	27	754.41	754.47	HDPE
7028	p3182	n3175	721.89	n3176	721.76	225	38.1	723.31	722.96	HDPE

7922	CO-320	n556	758.57	n558	757.34	225	18.1	759.76	758.78	HDPE
8030	CO-506	n558	757.34	n921	755.6	225	36.3	758.78	756.79	HDPE
4401	p552	n558	757.34	n559	757.36	225	6.7	758.78	758.55	HDPE
7487	p3644	n3619	757.41	n559	757.36	225	10.6	758.85	758.55	HDPE
8100	CO-542	n794	731.88	LS 1	731.78	225	28.9	733.15	733.15	HDPE
4086	p235	n242	750.87	n243	751.69	225	11.8	752.32	752.88	HDPE
4782	p933	n936	750.97	n242	750.87	225	28.7	752.16	752.32	HDPE
7218	p3372	n3355	764.01	n3356	763.91	225	30.6	765.41	765.15	HDPE
7485	p3642	n3617	757.56	n3618	757.44	225	35.9	758.84	758.8	HDPE
7968	CO-400	n240	750.53	n242	750.87	225	29.4	751.72	752.32	HDPE
8105	CO-544	MH-29	718.53	LS 3	718.44	225	27.3	719.81	719.81	HDPE
4186	p335	n342	753.03	n343	753.09	225	17.5	754.36	754.41	HDPE
4790	p941	n943	731.2	n944	732.82	225	19.2	732.67	734.01	HDPE
4789	p940	n942	730.49	n943	731.2	225	19.4	731.68	732.67	HDPE
4952	p1103	n943	731.2	n1105	731.27	225	20.8	732.67	732.46	HDPE
4070	p219	n227	747.48	n228	747.63	225	44.2	748.67	749.1	HDPE
7216	p3370	n1280	764.26	n3354	764.18	225	24.7	765.45	765.65	HDPE
4184	p333	n340	752.91	n341	752.99	225	21.3	754.36	754.21	HDPE
7484	p3641	n3616	757.65	n3617	757.56	225	26.2	759.04	758.84	HDPE
4852	p1003	n1004	753.99	n1005	754.24	225	26	755.18	755.73	HDPE
4628	p779	n785	733.62	n786	733.53	225	25.1	734.87	734.96	HDPE
7026	p3180	n3173	722.14	n3174	722.01	225	38.4	723.33	723.5	HDPE
4071	p220	n228	747.63	n229	747.77	225	43.4	749.1	748.98	HDPE
7237	p3391	n3373	738.29	n3374	735.8	225	36	739.79	736.99	HDPE
4064	p213	n221	744.42	n222	745.78	225	22.6	745.61	747.29	HDPE
7277	p3431	n3412	722.91	n3413	723.13	225	7.2	724.1	724.65	HDPE
7880	CO-248	n1096	757.22	n1094	757	225	18.6	758.75	758.19	HDPE
4961	p1112	n1113	747.49	n1114	749.11	225	24.2	748.68	750.65	HDPE
4946	p1097	n1098	757.28	n1099	757.35	225	19	758.82	758.54	HDPE
7029	p3183	n3176	721.76	n3177	721.67	225	26.5	722.96	723.2	HDPE
7009	p3163	n3157	718.34	n3158	718.49	225	45.5	719.81	719.78	HDPE
7994	CO-446	n2007	720.5	n2005	720.42	225	20.9	721.82	721.87	HDPE
7862	CO-224	n1121	749.32	n1123	749.39	225	21.7	750.92	750.58	HDPE
7949	CO-362	n144	723.3	n146	723.26	225	11.7	724.49	724.86	HDPE
7957	CO-378	n3382	732.75	n159	733.85	225	12.8	733.94	735.45	HDPE
7486	p3643	n3618	757.44	n3619	757.41	225	9.1	758.8	758.85	HDPE
8005	CO-468	n74	752.08	n76	752.02	225	15.8	753.55	753.36	HDPE
7725	CO-26	n3145	718.15	n2179	718.26	225	31.6	719.78	719.45	HDPE
7194	p3348	n3333	747.2	n3334	747.3	225	30.3	748.83	748.49	HDPE
3920	p69	n73	752.13	n74	752.08	225	16.5	753.49	753.55	HDPE
7209	p3363	n3347	762.89	n3348	763.17	225	43.8	764.08	764.81	HDPE
4183	p332	n339	752.83	n340	752.91	225	24.3	754.22	754.36	HDPE
7031	p3185	n3178	721.29	n3179	721.43	225	42.8	722.79	722.77	HDPE
4611	p762	n768	745.04	n769	744.93	225	33.1	746.3	746.52	HDPE
5856	p2007	n2022	720.94	n2023	720.86	225	23.8	722.23	722.43	HDPE
4317	p468	n474	747.77	n475	747.62	225	42.4	748.96	749.29	HDPE
4286	p437	n443	724.08	n444	723.23	225	14.7	725.27	724.91	HDPE
7217	p3371	n3354	764.18	n3355	764.01	225	48.8	765.65	765.41	HDPE
7193	p3347	n3332	747.11	n3333	747.2	225	24.7	748.36	748.83	HDPE

4287	p438	n444	723.23	n445	723.36	225	38	724.91	724.57	HDPE
6930	p3084	n3083	718.05	n3084	718.15	225	28.9	719.64	719.45	HDPE
4855	p1006	n1007	754.42	n1008	754.51	225	25.6	756.04	755.79	HDPE
7027	p3181	n3174	722.01	n3175	721.89	225	33.5	723.5	723.31	HDPE
4105	p254	n261	757.55	n262	757.41	225	42.1	758.88	759	HDPE
5838	p1989	n2004	720.39	n2005	720.42	225	9.6	721.88	721.87	HDPE
4326	p477	n483	746.71	n484	746.64	225	22.2	748.31	747.99	HDPE
8136	p2000(1)	n2015	721.82	MH-40	721.93	225	31.5	723.58	723.12	HDPE
5848	p1999	n2014	721.65	n2015	721.82	225	31.7	722.84	723.58	HDPE
5027	p1178	n1179	745.01	n1180	745.08	225	20.9	746.79	746.27	HDPE
7476	p3632	n3608	763.52	n3609	763.21	225	25.7	765.3	764.4	HDPE
5026	p1177	n1178	744.16	n1179	745.01	225	23.4	745.35	746.79	HDPE
7907	CO-302	n312	726.23	n310	724.59	225	34	727.42	726.38	HDPE
7912	CO-306	n308	724.7	n310	724.59	225	30.4	725.89	726.38	HDPE
7910	CO-304(1)	n310	724.59	MH-13	724.29	225	29.5	726.38	725.48	HDPE
4028	p177	n184	753.26	n185	753.19	225	23.3	754.45	755.01	HDPE
8020	CO-486	n368	777.14	n365	776.56	225	16.9	778.97	777.75	HDPE
8021	CO-488	n370	777.28	n368	777.14	225	35.9	778.47	778.97	HDPE
7030	p3184	n3177	721.67	n3178	721.29	225	41	723.2	722.79	HDPE
7865	p3162(2)	MH-11	718.25	n3157	718.34	225	26.1	719.83	719.81	HDPE
7210	p3364	n3348	763.17	n3349	763.3	225	37.5	764.81	764.71	HDPE
7825	CO-176	n3178	721.29	LS 9	721.23	225	17.7	722.79	722.79	HDPE
6927	p3081	n3080	717.9	n3081	717.96	225	16.6	719.39	719.53	HDPE
7879	CO-246	n1098	757.28	n1096	757.22	225	18.8	758.82	758.75	HDPE
4997	p1148	n1149	736.95	n1150	736.86	225	27.1	738.37	738.52	HDPE
4614	p765	n771	744.79	n772	744.54	225	18.1	746.7	745.73	HDPE
7475	p3631	n3607	763.69	n3608	763.52	225	49.9	765.04	765.3	HDPE
4757	p908	n912	732.45	n913	732.53	225	24.5	734.31	733.81	HDPE
7167	p3321	n3310	719.71	n3311	720.73	225	34.3	721.67	721.92	HDPE
8156	CO-566	n3379	733.88	n159	733.85	225	8.8	735.44	735.45	HDPE
5857	p2008	n2023	720.86	n2024	720.74	225	35.8	722.43	722.38	HDPE
8168	CO-572(2)	MH-47	754.49	n263	757.34	225	24.8	755.68	759.4	HDPE
7729	CO-34	n1072	718.09	n1035	716.97	225	15.8	719.28	719.04	HDPE
7864	p3162(1)	n3156	718.16	MH-11	718.25	225	26	719.84	719.83	HDPE
6928	p3082	n3081	717.96	n3082	718	225	10.4	719.53	719.71	HDPE
4882	p1033	n1035	716.97	n1036	717.86	225	35.8	719.04	719.07	HDPE
6929	p3083	n3082	718	n3083	718.05	225	16.6	719.71	719.64	HDPE
4636	p787	n793	731.99	n794	731.88	225	32.3	734.03	733.15	HDPE
4067	p216	n224	746.05	n225	746.19	225	40.9	748.17	747.38	HDPE
7900	CO-288	n265	759.02	n263	757.34	225	23.5	760.29	759.4	HDPE
4238	p389	n395	755.46	n187	753.11	225	11	756.65	755.25	HDPE
4031	p180	n187	753.11	n188	753.02	225	26.8	755.25	754.28	HDPE
7960	CO-384	n191	743.7	n193	749.24	225	29.2	744.89	751.47	HDPE
8144	CO-386(1)	n193	749.24	MH-42	755.07	225	31.3	751.47	756.26	HDPE
8164	CO-570	n444	723.23	LS 2	723.14	225	25.7	724.91	724.91	HDPE

8154	CO-562	n202	749.3	n193	749.24	225	15.8	750.52	751.47	HDPE
4612	p763	n769	744.93	n770	744.84	225	26.1	746.52	746.71	HDPE
6926	p3080	n3079	717.74	n3080	717.9	225	47.1	719.72	719.39	HDPE
5005	p1156	n1157	736.39	n1158	736.18	225	18	738.69	737.37	HDPE
7242	p3396	n3378	733.9	n3379	733.88	225	6.2	735.85	735.44	HDPE
7995	CO-448	n2001	720.31	n2004	720.39	225	22.5	722.34	721.88	HDPE
5858	p2009	n2024	720.74	n2025	720.66	225	23	722.38	722.55	HDPE
7868	p3161(2)	MH-12	718.06	n3156	718.16	225	28.7	719.93	719.84	HDPE
7723	CO-22	n2188	717.64	n2185	719.88	225	44.8	720.01	721.07	HDPE
4853	p1004	n1005	754.24	n1006	754.32	225	23.7	755.73	756.42	HDPE
7236	p3390	n3372	738.36	n3373	738.29	225	21.1	740.45	739.79	HDPE
4106	p255	n262	757.41	n263	757.34	225	20.5	759	759.4	HDPE
6985	p3139	n3137	721.12	n3138	721.07	225	14.5	722.52	723.34	HDPE
4854	p1005	n1006	754.32	n1007	754.42	225	30	756.42	756.04	HDPE
3991	p140	n146	723.26	n147	723.21	225	14.8	724.86	725.34	HDPE
4065	p214	n222	745.78	n223	745.93	225	43.8	747.29	748.18	HDPE
4613	p764	n770	744.84	n771	744.79	225	15.5	746.71	746.7	HDPE
7278	p3432	n3413	723.13	n149	723.15	225	6.3	724.65	725.43	HDPE
5859	p2010	n2025	720.66	n2026	720.56	225	28.9	722.55	722.49	HDPE
7240	p3394	n3376	734.07	n3377	733.97	225	28.6	735.29	736.58	HDPE
7166	p3320	n3309	719.83	n3310	719.71	225	33.9	721.7	721.67	HDPE
7234	p3388	n3370	738.45	n3371	738.4	225	15.3	739.64	741.07	HDPE
7853	p1149(1)	n1150	736.86	MH-10	736.77	225	27.1	738.52	738.97	HDPE
4318	p469	n475	747.62	n476	747.51	225	33	749.29	749.71	HDPE
7867	p3161(1)	n3155	717.98	MH-12	718.06	225	24.6	720	719.93	HDPE
7999	CO-456	n2026	720.56	n2028	720.48	225	23.1	722.49	722.5	HDPE
7965	CO-394	n185	753.19	n187	753.11	225	20.9	755.01	755.25	HDPE
7165	p3319	n3308	719.9	n3309	719.83	225	22	722.02	721.7	HDPE
8134	CO-554	n3310	719.71	LS 13	719.63	225	23.9	721.67	721.67	HDPE
7873	CO-234	n1028	717.33	n3145	718.15	225	23.1	719.72	719.78	HDPE
7800	CO-164	n788	732.4	n786	733.53	225	23.1	735.11	734.96	HDPE
7006	p3160	n3154	717.82	n3155	717.98	225	46.7	719.96	720	HDPE
4325	p476	n482	746.82	n483	746.71	225	32.2	749.42	748.31	HDPE
7821	CO-174	n1035	716.97	LS 10	716.9	225	18.3	719.04	719.04	HDPE
5862	p2013	n2028	720.48	n2029	720.4	225	23.4	722.5	722.72	HDPE
7005	p3159	n3153	717.7	n3154	717.82	225	34.7	719.91	719.96	HDPE
7728	CO-32	n1033	717.07	n1035	716.97	225	29.7	719.36	719.04	HDPE
4066	p215	n223	745.93	n224	746.05	225	36.1	748.18	748.17	HDPE
7952	CO-368	n149	723.15	n147	723.21	225	15.6	725.43	725.34	HDPE
6989	p3143	n3140	720.97	n3141	720.85	225	35.4	724.18	722.08	HDPE
7000	p3154	n3149	717.42	n3150	717.53	225	32.4	719.67	719.73	HDPE
7735	CO-46	n1116	749.15	n1114	749.11	225	14	752.07	750.65	HDPE
5865	p2016	n2031	720.31	n2032	720.25	225	18.5	722.6	722.51	HDPE
7241	p3395	n3377	733.97	n3378	733.9	225	19.6	736.58	735.85	HDPE
7799	CO-162	n912	732.45	n788	732.4	225	15.3	734.31	735.11	HDPE
7722	CO-20	n3150	717.53	n2188	717.64	225	32.3	719.73	720.01	HDPE
7721	CO-18	n2188	717.64	n3153	717.7	225	18.3	720.01	719.91	HDPE

8000	CO-458	n2034	720.17	n2032	720.25	225	22.8	722.5	722.51	HDPE
7993	CO-444	n1999	720.26	n2001	720.31	225	16.6	722.84	722.34	HDPE
7871	CO-230	n3149	717.42	n1028	717.33	225	25.8	719.67	719.72	HDPE
8002	CO-462	n2038	720.02	n3308	719.9	225	34.2	722.56	722.02	HDPE
6925	p3079	n3078	717.59	n3079	717.74	225	44.6	720.29	719.72	HDPE
5864	p2015	n2030	720.36	n2031	720.31	225	14.3	722.76	722.6	HDPE
5863	p2014	n2029	720.4	n2030	720.36	225	13.5	722.72	722.76	HDPE
5819	p1970	n1985	719.29	n1986	719.34	225	14	721.75	721.6	HDPE
5820	p1971	n1986	719.34	n1987	719.39	225	15.1	721.6	721.88	HDPE
5868	p2019	n2034	720.17	n2035	720.11	225	17.8	722.5	722.53	HDPE
4879	p1030	n1032	717.15	n1033	717.07	225	25.2	719.61	719.36	HDPE
7235	p3389	n3371	738.4	n3372	738.36	225	10.9	741.07	740.45	HDPE
4635	p786	n792	732.07	n793	731.99	225	23.3	734.84	734.03	HDPE
7861	CO-222	n1119	749.24	n1121	749.32	225	22.9	752.52	750.92	HDPE
5869	p2020	n2035	720.11	n2036	720.07	225	11	722.53	722.66	HDPE
7854	p1149(2))	MH-10	736.77	n1151	736.66	225	31	738.97	739.47	HDPE
5821	p1972	n1987	719.39	n1988	719.47	225	22.7	721.88	722.1	HDPE
4055	p204	n212	721.01	n213	724.66	225	14.1	724.94	725.85	HDPE
8001	CO-460	n2036	720.07	n2038	720.02	225	15.6	722.66	722.56	HDPE
5818	p1969	n1984	719.18	n1985	719.29	225	32.2	721.89	721.75	HDPE
7850	CO-206	n1155	736.49	n1157	736.39	225	29.8	739.37	738.69	HDPE
7872	CO-232	n1031	717.27	n1028	717.33	225	19.1	720.14	719.72	HDPE
5826	p1977	n1992	719.77	n1993	719.85	225	24.2	722.36	722.54	HDPE
7988	CO-434	n1980	718.97	n1978	718.86	225	32.8	721.69	721.45	HDPE
4878	p1029	n1031	717.27	n1032	717.15	225	34.3	720.14	719.61	HDPE
5825	p1976	n1991	719.64	n1992	719.77	225	39.7	722.47	722.36	HDPE
7984	CO-426(2)	MH-17	717.5	n3078	717.59	225	28	720.26	720.29	HDPE
5814	p1965	n1980	718.97	n1981	719.05	225	21.7	721.69	721.81	HDPE
7989	CO-436	n1984	719.18	n1982	719.08	225	28.6	721.89	721.86	HDPE
7987	CO-432	n1978	718.86	n1976	718.77	225	28	721.45	721.69	HDPE
5832	p1983	n1998	720.21	n1999	720.26	225	14.1	723.16	722.84	HDPE
5815	p1966	n1981	719.05	n1982	719.08	225	10.5	721.81	721.86	HDPE
4319	p470	n476	747.51	n477	747.35	225	47.7	749.71	750.83	HDPE
6919	p3073	n3073	717.41	n3074	717.37	225	12.5	720.3	720.26	HDPE
6920	p3074	n3074	717.37	n3075	717.32	225	14	720.26	720.21	HDPE
5803	p1954	n1969	718.29	n1970	718.35	225	18	721.21	721.26	HDPE
5822	p1973	n1988	719.47	n1989	719.53	225	20.1	722.1	722.73	HDPE
7983	CO-426(1)	n34	717.15	MH-17	717.5	225	23.3	720.23	720.26	HDPE
5804	p1955	n1970	718.35	n1971	718.41	225	17.6	721.26	721.36	HDPE
5802	p1953	n1968	718.21	n1969	718.29	225	23.1	721.15	721.21	HDPE
4631	p782	n788	732.4	n789	732.31	225	26	735.11	735.47	HDPE
5801	p1952	n1967	718.16	n1968	718.21	225	14.3	721.16	721.15	HDPE
6921	p3075	n3075	717.32	n3076	717.2	225	34.7	720.21	720.25	HDPE
7851	CO-208	n1151	736.66	n1153	736.56	225	30	739.47	739.69	HDPE
7849	CO-204	n1155	736.49	n1153	736.56	225	20.9	739.37	739.69	HDPE
7990	CO-438	n1991	719.64	n1989	719.53	225	29.6	722.47	722.73	HDPE
5800	p1951	n1966	718.08	n1967	718.16	225	25.1	721.13	721.16	HDPE

6922	p3076	n3076	717.2	n34	717.15	225	15.9	720.25	720.23	HDPE
7734	CO-44	n1119	749.24	n1116	749.15	225	26.1	752.52	752.07	HDPE
7924	CO-324	n3138	721.07	n212	721.01	225	18.2	723.34	724.94	HDPE
5799	p1950	n1965	718.02	n1966	718.08	225	17.7	721.18	721.13	HDPE
5809	p1960	n1975	718.69	n1976	718.77	225	23.5	722.07	721.69	HDPE
6918	p3072	n3072	717.53	n3073	717.41	225	34.9	720.94	720.3	HDPE
4324	p475	n481	746.94	n482	746.82	225	35.2	750.67	749.42	HDPE
5827	p1978	n1993	719.85	n1994	719.97	225	34.5	722.54	723.67	HDPE
5831	p1982	n1997	720.16	n1998	720.21	225	16.3	723.63	723.16	HDPE
4634	p785	n791	732.14	n792	732.07	225	22.3	735.8	734.84	HDPE
5798	p1949	n1964	717.96	n1965	718.02	225	16.3	721.4	721.18	HDPE
5805	p1956	n1971	718.41	n1972	718.53	225	36.8	721.36	722.35	HDPE
5808	p1959	n1974	718.63	n1975	718.69	225	17.2	722.22	722.07	HDPE
5797	p1948	n1963	717.9	n1964	717.96	225	17.9	721.46	721.4	HDPE
4320	p471	n477	747.35	n478	747.25	225	30.3	750.83	750.77	HDPE
5830	p1981	n1996	720.06	n1997	720.16	225	29.2	723.67	723.63	HDPE
4322	p473	n479	747.17	n480	747.04	225	38.4	750.82	750.51	HDPE
6988	p3142	n212	721.01	n3140	720.97	225	11.1	724.94	724.18	HDPE
5796	p1947	n1962	717.87	n1963	717.9	225	9.9	721.45	721.46	HDPE
4632	p783	n789	732.31	n790	732.21	225	28.9	735.47	736.2	HDPE
4321	p472	n478	747.25	n479	747.17	225	23.4	750.77	750.82	HDPE
4323	p474	n480	747.04	n481	746.94	225	27.7	750.51	750.67	HDPE
6917	p3071	n1955	717.56	n3072	717.53	225	9.5	721.37	720.94	HDPE
5795	p1946	n1961	717.83	n1962	717.87	225	10.4	721.49	721.45	HDPE
7991	CO-440	n1996	720.06	n1994	719.97	225	25.1	723.67	723.67	HDPE
7986	CO-430	n1972	718.53	n1974	718.63	225	27.7	722.35	722.22	HDPE
4633	p784	n790	732.21	n791	732.14	225	19.2	736.2	735.8	HDPE
5794	p1945	n1960	717.77	n1961	717.83	225	18.9	721.86	721.49	HDPE
5789	p1940	n1955	717.56	n1956	717.59	225	7.9	721.37	721.57	HDPE
7985	CO-428	n1958	717.66	n1956	717.59	225	19.7	721.95	721.57	HDPE
5793	p1944	n1959	717.71	n1960	717.77	225	15.2	722.16	721.86	HDPE
5792	p1943	n1958	717.66	n1959	717.71	225	17.2	721.95	722.16	HDPE
4311	p462	n468	748.21	n469	748.32	250	23.8	749.45	749.53	HDPE
6965	p3119	n3118	716.61	n3119	716.67	250	17.9	717.86	717.88	HDPE
8120	CO-550	n632	747.2	LS 5	747.13	250	19.9	748.41	748.41	HDPE
8128	CO-552	n597	735.9	LS 4	735.82	250	22.9	737.11	737.11	HDPE
6945	p3099	n3098	717.54	n3099	717.43	250	31.1	718.75	718.9	HDPE
6946	p3100	n3099	717.43	n3100	717.3	250	40.3	718.9	718.67	HDPE
6947	p3101	n3100	717.3	n3101	717.25	250	13.7	718.67	718.8	HDPE
6948	p3102	n3101	717.25	n3102	717.14	250	33	718.8	718.91	HDPE
6949	p3103	n3102	717.14	n3103	717.03	250	32.9	718.91	719.11	HDPE
6952	p3106	n3105	716.81	n3106	716.7	250	31.1	718.87	718.75	HDPE
6951	p3105	n3104	716.91	n3105	716.81	250	30	719.01	718.87	HDPE
6950	p3104	n3103	717.03	n3104	716.91	250	35.2	719.11	719.01	HDPE
6953	p3107	n3106	716.7	n3107	716.62	250	24.3	718.75	718.8	HDPE
6960	p3114	n3113	716.15	n3114	716.04	250	33.8	718.44	718.08	HDPE
6954	p3108	n3107	716.62	n3108	716.55	250	19.1	718.8	718.73	HDPE
6955	p3109	n3108	716.55	n3109	716.41	250	43.1	718.73	718.78	HDPE
6956	p3110	n3109	716.41	n3110	716.35	250	16.9	718.78	718.78	HDPE

6959	p3113	n3112	716.19	n3113	716.15	250	12.4	718.83	718.44	HDPE
6957	p3111	n3110	716.35	n3111	716.24	250	30.3	718.78	718.84	HDPE
6958	p3112	n3111	716.24	n3112	716.19	250	15.1	718.84	718.83	HDPE
7980	CO-424	n36	717	n34	717.15	250	44.2	720.09	720.23	HDPE
7979	CO-422	n36	717	n38	716.87	250	38.8	720.09	720.51	HDPE
3890	p39	n41	716.71	LS 11	716.6	250	32.2	720.55	719.93	HDPE
3887	p36	n38	716.87	n39	716.85	250	6.4	720.51	720.8	HDPE
3889	p38	n40	716.81	n41	716.71	250	31.7	720.85	720.55	HDPE
3888	p37	n39	716.85	n40	716.81	250	9.1	720.8	720.85	HDPE
7923	CO-322	n924	756.05	n922	754.45	280	22.4	757.28	755.68	HDPE
4776	p927	n922	754.45	n931	753.81	280	15	755.68	755.04	HDPE
4777	p928	n931	753.81	n932	753.19	280	20	755.04	754.42	HDPE
4778	p929	n932	753.19	n933	752.64	280	18	754.42	753.88	HDPE
4769	p920	n924	756.05	n925	757.78	280	19.8	757.28	759.02	HDPE
4779	p930	n933	752.64	n934	751.36	280	48.1	753.88	752.59	HDPE
4770	p921	n925	757.78	n926	758.74	280	17.6	759.02	759.98	HDPE
4780	p931	n934	751.36	n935	750.97	280	23.3	752.59	752.24	HDPE
8153	CO-560	n468	748.21	LS 7	748.15	280	19.7	749.45	749.45	HDPE
8114	CO-546	LS 6	746.42	n487	746.46	280	13.8	747.76	747.76	HDPE
6964	p3118	n3117	716.5	n3118	716.61	280	32.9	718.18	717.86	HDPE
6963	p3117	n3116	716.4	n3117	716.5	280	34	718.25	718.18	HDPE
4772	p923	n927	759.59	n928	759.65	280	17.3	761.9	760.89	HDPE
4771	p922	n926	758.74	n927	759.59	280	50.8	759.98	761.9	HDPE
6962	p3116	n3115	716.35	n3116	716.4	280	16.5	718.09	718.25	HDPE
6961	p3115	n3114	716.04	n3115	716.35	280	21.3	718.08	718.09	HDPE
7817	CO-172	n935	750.97	STP	749.97	315	48.6	752.24	751.24	HDPE
7811	CO-170	n3114	716.04	LS 16	716.01	355	12.2	718.08	718.08	HDPE

APPENDIX VII: FLEX TABLE MANHOLE

ID	Label	Elevation (Ground) (m)	Elevation (Rim) (m)	Elevation (Invert) (m)	Hydraulic Grade Line (Out) (m)	Hydraulic Grade Line (In) (m)	Depth (Structure) (m)
74	n45	720.64	720.64	719.45	719.52	719.52	1.19
75	n46	721.23	721.23	720.04	720.11	720.11	1.19
76	n47	722.64	722.64	721.45	721.52	721.52	1.19
77	n48	723.85	723.85	722.66	722.73	722.73	1.19
78	n49	724.88	724.88	723.69	723.76	723.76	1.19
79	n50	726.26	726.26	725.07	725.14	725.14	1.19
80	n51	727.3	727.3	726.11	726.17	726.17	1.19
81	n52	728.26	728.26	727.07	727.13	727.13	1.19
82	n53	728.78	728.78	727.59	727.66	727.66	1.19
83	n54	729.96	729.96	728.77	728.84	728.84	1.19
84	n55	732.39	732.39	731.2	731.26	731.26	1.19
85	n56	734.47	734.47	733.28	733.35	733.35	1.19
86	n57	736.06	736.06	734.87	734.94	734.94	1.19
87	n58	737.25	737.25	736.06	736.13	736.13	1.19
88	n59	738.29	738.29	737.1	737.17	737.17	1.19
89	n60	740.63	740.63	739.44	739.51	739.51	1.19
90	n61	741.68	741.68	740.49	740.56	740.56	1.19
91	n62	743.69	743.69	742.5	742.56	742.56	1.19
92	n63	745.41	745.41	744.22	744.29	744.29	1.19
93	n64	745.98	745.98	744.79	744.86	744.86	1.19
94	n65	746.54	746.54	745.35	745.41	745.41	1.19
95	n66	748.17	748.17	746.98	747.04	747.04	1.19
96	n67	749.13	749.13	747.94	748	748	1.19
101	n72	753.36	753.36	752.17	752.18	752.18	1.19
106	n77	752.15	752.15	750.96	750.98	750.98	1.19
107	n78	751.06	751.06	749.87	749.87	749.87	1.19
108	n79	749.27	749.27	748.08	748.09	748.09	1.19
110	n81	746.22	746.22	745.03	745.07	745.07	1.19
112	n83	751.23	751.23	750.04	750.06	750.06	1.19
113	n84	747.66	747.66	746.47	746.48	746.48	1.19
115	n86	747.27	747.27	746.08	746.12	746.12	1.19
116	n87	755.35	755.35	754.16	754.16	754.16	1.19
117	n88	736.54	736.54	735.35	735.39	735.39	1.19
119	n90	740.94	740.94	739.75	739.77	739.77	1.19
121	n92	743.97	743.97	742.78	742.8	742.8	1.19
123	n94	744.82	744.82	743.63	743.65	743.65	1.19
126	n97	750.86	750.86	749.67	749.68	749.68	1.19
129	n100	752.88	752.88	751.69	751.71	751.71	1.19
131	n102	755.49	755.49	754.3	754.32	754.32	1.19
132	n103	758.05	758.05	756.86	756.87	756.87	1.19
133	n104	760.05	760.05	758.86	758.87	758.87	1.19
135	n106	761.08	761.08	759.89	759.9	759.9	1.19
146	n117	764.74	764.74	763.55	763.56	763.56	1.19

150	n121	744	744	742.81	742.83	742.83	1.19
152	n123	748.17	748.17	746.98	747	747	1.19
153	n124	755.12	755.12	753.93	753.94	753.94	1.19
154	n125	758.49	758.49	757.3	757.31	757.31	1.19
155	n126	761.19	761.19	760	760.01	760.01	1.19
156	n127	762.77	762.77	761.58	761.59	761.59	1.19
159	n130	765.03	765.03	763.84	763.85	763.85	1.19
162	n133	745.75	745.75	744.56	744.57	744.57	1.19
164	n135	743.62	743.62	742.43	742.45	742.45	1.19
166	n137	740.42	740.42	739.23	739.25	739.25	1.19
167	n138	739.79	739.79	738.6	738.62	738.62	1.19
168	n139	739.37	739.37	738.18	738.2	738.2	1.19
169	n140	736.12	736.12	734.93	734.95	734.95	1.19
170	n141	731.85	731.85	730.66	730.68	730.68	1.19
171	n142	726.88	726.88	725.69	725.71	725.71	1.19
173	n144	724.49	724.49	723.3	723.32	723.32	1.19
196	n167	742.1	742.1	740.91	740.99	740.99	1.19
197	n168	742.19	742.19	741	741.02	741.02	1.19
198	n169	742.86	742.86	741.67	741.69	741.69	1.19
199	n170	743.67	743.67	742.48	742.5	742.5	1.19
200	n171	744.3	744.3	743.11	743.13	743.13	1.19
201	n172	744.76	744.76	743.57	743.59	743.59	1.19
202	n173	746.4	746.4	745.21	745.23	745.23	1.19
204	n175	748.03	748.03	746.84	746.85	746.85	1.19
206	n177	752.61	752.61	751.42	751.43	751.43	1.19
208	n179	755.24	755.24	754.05	754.05	754.05	1.19
209	n180	755.82	755.82	754.63	754.63	754.63	1.19
210	n181	755.58	755.58	754.39	754.4	754.4	1.19
211	n182	755.26	755.26	754.07	754.09	754.09	1.19
212	n183	754.91	754.91	753.72	753.73	753.73	1.19
213	n184	754.45	754.45	753.26	753.28	753.28	1.19
218	n189	742.49	742.49	741.3	741.32	741.32	1.19
219	n190	743.56	743.56	742.37	742.39	742.39	1.19
220	n191	744.89	744.89	743.7	743.72	743.72	1.19
224	n195	756.72	756.72	755.53	755.55	755.55	1.19
226	n197	753.92	753.92	752.73	752.74	752.74	1.19
227	n198	752.24	752.24	751.05	751.06	751.06	1.19
228	n199	751.24	751.24	750.05	750.06	750.06	1.19
229	n200	750.58	750.58	749.39	749.41	749.41	1.19
233	n204	726.27	726.27	725.08	725.1	725.1	1.19
235	n206	727.65	727.65	726.46	726.47	726.47	1.19
236	n207	730.75	730.75	729.56	729.57	729.57	1.19
237	n208	733.13	733.13	731.94	731.95	731.95	1.19
242	n213	725.85	725.85	724.66	724.69	724.69	1.19
243	n214	728.63	728.63	727.44	727.47	727.47	1.19
244	n215	730.36	730.36	729.17	729.2	729.2	1.19
245	n216	732.51	732.51	731.32	731.35	731.35	1.19
246	n217	734.89	734.89	733.7	733.72	733.72	1.19
247	n218	737.84	737.84	736.65	736.67	736.67	1.19

248	n219	741.15	741.15	739.96	739.98	739.98	1.19
249	n220	743.63	743.63	742.44	742.46	742.46	1.19
250	n221	745.61	745.61	744.42	744.44	744.44	1.19
254	n225	747.38	747.38	746.19	746.21	746.21	1.19
255	n226	747.93	747.93	746.74	746.75	746.75	1.19
256	n227	748.67	748.67	747.48	747.49	747.49	1.19
259	n230	749.15	749.15	747.96	747.97	747.97	1.19
260	n231	749.24	749.24	748.05	748.09	748.09	1.19
261	n232	749.26	749.26	748.07	748.11	748.11	1.19
262	n233	749.4	749.4	748.21	748.26	748.26	1.19
263	n234	749.82	749.82	748.63	748.68	748.68	1.19
264	n235	750.31	750.31	749.12	749.17	749.17	1.19
265	n236	750.69	750.69	749.5	749.54	749.54	1.19
267	n238	751.23	751.23	750.04	750.08	750.08	1.19
268	n239	751.51	751.51	750.32	750.36	750.36	1.19
269	n240	751.72	751.72	750.53	750.56	750.56	1.19
272	n243	752.88	752.88	751.69	751.71	751.71	1.19
274	n245	754.36	754.36	753.17	753.2	753.2	1.19
275	n246	755.24	755.24	754.05	754.07	754.07	1.19
276	n247	756.96	756.96	755.77	755.78	755.78	1.19
277	n248	758.1	758.1	756.91	756.93	756.93	1.19
279	n250	759.27	759.27	758.08	758.09	758.09	1.19
280	n251	759.79	759.79	758.6	758.62	758.62	1.19
284	n255	760.16	760.16	758.97	758.97	758.97	1.19
285	n256	759.99	759.99	758.8	758.8	758.8	1.19
286	n257	759.77	759.77	758.58	758.59	758.59	1.19
287	n258	759.31	759.31	758.12	758.13	758.13	1.19
288	n259	759.03	759.03	757.84	757.85	757.85	1.19
289	n260	758.84	758.84	757.65	757.66	757.66	1.19
295	n266	760.3	760.3	759.11	759.12	759.12	1.19
296	n267	759.85	759.85	758.66	758.68	758.68	1.19
298	n269	758.65	758.65	757.46	757.48	757.48	1.19
299	n270	757.88	757.88	756.69	756.71	756.71	1.19
300	n271	756.8	756.8	755.61	755.63	755.63	1.19
301	n272	755.68	755.68	754.49	754.51	754.51	1.19
302	n273	754.26	754.26	753.07	753.1	753.1	1.19
303	n274	753.35	753.35	752.16	752.19	752.19	1.19
305	n276	752.43	752.43	751.24	751.27	751.27	1.19
306	n277	751.77	751.77	750.58	750.6	750.6	1.19
307	n278	750.84	750.84	749.65	749.68	749.68	1.19
308	n279	749.9	749.9	748.71	748.74	748.74	1.19
309	n280	749.33	749.33	748.14	748.17	748.17	1.19
310	n281	748.52	748.52	747.33	747.36	747.36	1.19
311	n282	747.44	747.44	746.25	746.28	746.28	1.19
312	n283	746.66	746.66	745.47	745.5	745.5	1.19
313	n284	746.1	746.1	744.91	744.94	744.94	1.19
314	n285	745.58	745.58	744.39	744.43	744.43	1.19
315	n286	745.25	745.25	744.06	744.1	744.1	1.19
316	n287	744.74	744.74	743.55	743.58	743.58	1.19

317	n288	743.93	743.93	742.74	742.77	742.77	1.19
318	n289	742.84	742.84	741.65	741.68	741.68	1.19
319	n290	741.89	741.89	740.7	740.73	740.73	1.19
320	n291	741.04	741.04	739.85	739.89	739.89	1.19
321	n292	740.06	740.06	738.87	738.91	738.91	1.19
322	n293	738.78	738.78	737.59	737.62	737.62	1.19
323	n294	738.09	738.09	736.9	736.94	736.94	1.19
324	n295	737.05	737.05	735.86	735.9	735.9	1.19
325	n296	735.2	735.2	734.01	734.05	734.05	1.19
326	n297	734.23	734.23	733.04	733.08	733.08	1.19
327	n298	733.23	733.23	732.04	732.08	732.08	1.19
328	n299	731.53	731.53	730.34	730.38	730.38	1.19
329	n300	730.53	730.53	729.34	729.38	729.38	1.19
330	n301	729.64	729.64	728.45	728.49	728.49	1.19
331	n302	729.1	729.1	727.91	727.95	727.95	1.19
332	n303	727.98	727.98	726.79	726.83	726.83	1.19
333	n304	727.34	727.34	726.15	726.2	726.2	1.19
334	n305	726.91	726.91	725.72	725.77	725.77	1.19
335	n306	726.62	726.62	725.43	725.48	725.48	1.19
336	n307	726.08	726.08	724.89	724.93	724.93	1.19
337	n308	725.89	725.89	724.7	724.75	724.75	1.19
341	n312	727.42	727.42	726.23	726.27	726.27	1.19
342	n313	727.96	727.96	726.77	726.8	726.8	1.19
344	n315	728.28	728.28	727.09	727.13	727.13	1.19
346	n317	729.17	729.17	727.98	728.01	728.01	1.19
347	n318	730.3	730.3	729.11	729.15	729.15	1.19
348	n319	731.59	731.59	730.4	730.43	730.43	1.19
349	n320	733.4	733.4	732.21	732.24	732.24	1.19
350	n321	734.57	734.57	733.38	733.42	733.42	1.19
351	n322	735.48	735.48	734.29	734.33	734.33	1.19
352	n323	736.67	736.67	735.48	735.52	735.52	1.19
353	n324	737.77	737.77	736.58	736.61	736.61	1.19
354	n325	738.61	738.61	737.42	737.45	737.45	1.19
355	n326	739.73	739.73	738.54	738.58	738.58	1.19
356	n327	740.8	740.8	739.61	739.64	739.64	1.19
357	n328	741.96	741.96	740.77	740.8	740.8	1.19
358	n329	742.81	742.81	741.62	741.65	741.65	1.19
359	n330	743.37	743.37	742.18	742.21	742.21	1.19
360	n331	743.95	743.95	742.76	742.79	742.79	1.19
361	n332	745.49	745.49	744.3	744.33	744.33	1.19
362	n333	747.03	747.03	745.84	745.86	745.86	1.19
363	n334	748.85	748.85	747.66	747.68	747.68	1.19
364	n335	749.92	749.92	748.73	748.75	748.75	1.19
365	n336	751.04	751.04	749.85	749.87	749.87	1.19
366	n337	752.37	752.37	751.18	751.21	751.21	1.19
367	n338	753.46	753.46	752.27	752.29	752.29	1.19
374	n345	754.43	754.43	753.24	753.26	753.26	1.19
375	n346	754.54	754.54	753.35	753.36	753.36	1.19
376	n347	754.65	754.65	753.46	753.47	753.47	1.19

377	n348	754.93	754.93	753.74	753.75	753.75	1.19
379	n350	749.95	749.95	748.76	748.79	748.79	1.19
380	n351	752.34	752.34	751.15	751.18	751.18	1.19
381	n352	754.36	754.36	753.17	753.2	753.2	1.19
382	n353	756.29	756.29	755.1	755.13	755.13	1.19
383	n354	759.31	759.31	758.12	758.14	758.14	1.19
384	n355	761.84	761.84	760.65	760.67	760.67	1.19
385	n356	764.1	764.1	762.91	762.93	762.93	1.19
386	n357	765.41	765.41	764.22	764.24	764.24	1.19
387	n358	766.23	766.23	765.04	765.06	765.06	1.19
388	n359	767.41	767.41	766.22	766.24	766.24	1.19
390	n361	769.46	769.46	768.27	768.29	768.29	1.19
391	n362	771.04	771.04	769.85	769.87	769.87	1.19
392	n363	774.09	774.09	772.9	772.91	772.91	1.19
393	n364	775.48	775.48	774.29	774.3	774.3	1.19
394	n365	777.75	777.75	776.56	776.57	776.57	1.19
399	n370	778.47	778.47	777.28	777.29	777.29	1.19
401	n372	761.14	761.14	759.95	759.97	759.97	1.19
402	n373	762.35	762.35	761.16	761.17	761.17	1.19
403	n374	764.17	764.17	762.98	762.99	762.99	1.19
404	n375	765.55	765.55	764.36	764.37	764.37	1.19
405	n376	766.59	766.59	765.4	765.41	765.41	1.19
406	n377	767.39	767.39	766.2	766.21	766.21	1.19
409	n380	746.66	746.66	745.47	745.5	745.5	1.19
410	n381	751.59	751.59	750.4	750.42	750.42	1.19
411	n383	752.56	752.56	751.37	751.39	751.39	1.19
412	n384	753.45	753.45	752.26	752.28	752.28	1.19
413	n385	754.65	754.65	753.46	753.48	753.48	1.19
415	n387	758.41	758.41	757.22	757.24	757.24	1.19
416	n388	760.61	760.61	759.42	759.44	759.44	1.19
417	n389	762.94	762.94	761.75	761.77	761.77	1.19
418	n390	765.15	765.15	763.96	763.98	763.98	1.19
419	n391	766.13	766.13	764.94	764.95	764.95	1.19
420	n393	764.1	764.1	762.91	762.92	762.92	1.19
421	n394	760.04	760.04	758.85	758.86	758.86	1.19
422	n395	756.65	756.65	755.46	755.47	755.47	1.19
424	n397	767.04	767.04	765.85	765.86	765.86	1.19
425	n398	768.66	768.66	767.47	767.48	767.48	1.19
426	n399	770.44	770.44	769.25	769.26	769.26	1.19
427	n400	770.72	770.72	769.53	769.54	769.54	1.19
430	n403	765.3	765.3	764.11	764.12	764.12	1.19
431	n404	762.4	762.4	761.21	761.22	761.22	1.19
432	n405	756.33	756.33	755.14	755.15	755.15	1.19
433	n406	754.55	754.55	753.36	753.37	753.37	1.19
434	n407	747.28	747.28	746.09	746.1	746.1	1.19
435	n408	745.86	745.86	744.67	744.69	744.69	1.19
436	n409	743.79	743.79	742.6	742.62	742.62	1.19
438	n411	741.23	741.23	740.04	740.06	740.06	1.19
439	n412	740.68	740.68	739.49	739.51	739.51	1.19

440	n413	739.24	739.24	738.05	738.07	738.07	1.19
441	n414	738.62	738.62	737.43	737.45	737.45	1.19
442	n415	738.02	738.02	736.83	736.85	736.85	1.19
443	n416	737.17	737.17	735.98	736	736	1.19
444	n417	736.59	736.59	735.4	735.43	735.43	1.19
446	n419	735.95	735.95	734.76	734.79	734.79	1.19
447	n420	735.49	735.49	734.3	734.33	734.33	1.19
448	n421	735.1	735.1	733.91	733.94	733.94	1.19
449	n422	734.41	734.41	733.22	733.25	733.25	1.19
450	n423	733.88	733.88	732.69	732.72	732.72	1.19
451	n424	733.46	733.46	732.27	732.3	732.3	1.19
452	n425	732.93	732.93	731.74	731.77	731.77	1.19
453	n426	732.5	732.5	731.31	731.34	731.34	1.19
454	n427	732.24	732.24	731.05	731.08	731.08	1.19
455	n428	731.98	731.98	730.79	730.82	730.82	1.19
456	n429	731.53	731.53	730.34	730.37	730.37	1.19
457	n430	731.04	731.04	729.85	729.88	729.88	1.19
458	n431	730.48	730.48	729.29	729.33	729.33	1.19
459	n432	729.63	729.63	728.44	728.48	728.48	1.19
460	n433	729.1	729.1	727.91	727.95	727.95	1.19
461	n434	728.68	728.68	727.49	727.53	727.53	1.19
462	n435	728.12	728.12	726.93	726.97	726.97	1.19
463	n436	727.74	727.74	726.55	726.59	726.59	1.19
464	n437	727.53	727.53	726.34	726.38	726.38	1.19
465	n438	727.33	727.33	726.14	726.18	726.18	1.19
466	n439	727	727	725.81	725.85	725.85	1.19
467	n440	726.52	726.52	725.33	725.37	725.37	1.19
468	n441	726.19	726.19	725	725.04	725.04	1.19
469	n442	725.65	725.65	724.46	724.5	724.5	1.19
470	n443	725.27	725.27	724.08	724.12	724.12	1.19
473	n446	724.65	724.65	723.46	723.53	723.53	1.19
485	n458	759.65	759.65	758.46	758.47	758.47	1.19
486	n459	758.59	758.59	757.4	757.41	757.41	1.19
487	n460	757.43	757.43	756.24	756.25	756.25	1.19
488	n461	756.43	756.43	755.24	755.26	755.26	1.19
489	n462	756.11	756.11	754.92	754.94	754.94	1.19
490	n463	754.18	754.18	752.99	753.02	753.02	1.19
491	n464	752.59	752.59	751.4	751.43	751.43	1.19
492	n465	751.36	751.36	750.17	750.19	750.19	1.19
493	n466	750.18	750.18	748.99	749.02	749.02	1.19
494	n467	749.68	749.68	748.49	748.51	748.51	1.19
497	n470	749.79	749.79	748.6	748.71	748.71	1.19
498	n471	749.92	749.92	748.73	748.84	748.84	1.19
499	n472	753.83	753.83	752.64	752.64	752.64	1.19
500	n473	749.27	749.27	748.08	748.09	748.09	1.19
501	n474	748.96	748.96	747.77	747.78	747.78	1.19
516	n489	748.08	748.08	746.89	747	747	1.19
569	n542	760.73	760.73	759.54	759.55	759.55	1.19
570	n543	762.1	762.1	760.91	760.93	760.93	1.19

571	n544	763.07	763.07	761.88	761.89	761.89	1.19
572	n545	764.24	764.24	763.05	763.06	763.06	1.19
573	n546	765.09	765.09	763.9	763.91	763.91	1.19
574	n547	765.87	765.87	764.68	764.69	764.69	1.19
575	n548	766.36	766.36	765.17	765.18	765.18	1.19
576	n549	767.79	767.79	766.6	766.61	766.61	1.19
578	n551	765.47	765.47	764.28	764.29	764.29	1.19
579	n552	763.5	763.5	762.31	762.32	762.32	1.19
580	n553	761.65	761.65	760.46	760.48	760.48	1.19
581	n554	760.41	760.41	759.22	759.24	759.24	1.19
582	n555	760.07	760.07	758.88	758.9	758.9	1.19
583	n556	759.76	759.76	758.57	758.59	758.59	1.19
586	n559	758.55	758.55	757.36	757.4	757.4	1.19
589	n562	759.74	759.74	758.55	758.57	758.57	1.19
590	n563	760.61	760.61	759.42	759.43	759.43	1.19
591	n564	761.78	761.78	760.59	760.6	760.6	1.19
592	n565	764.28	764.28	763.09	763.09	763.09	1.19
593	n566	767.14	767.14	765.95	765.96	765.96	1.19
608	n581	739.97	739.97	738.78	738.87	738.87	1.19
612	n585	753.13	753.13	751.94	751.97	751.97	1.19
614	n587	751.6	751.6	750.41	750.43	750.43	1.19
615	n588	747.78	747.78	746.59	746.61	746.61	1.19
616	n589	744.35	744.35	743.16	743.19	743.19	1.19
617	n590	743.44	743.44	742.25	742.27	742.27	1.19
618	n591	742.71	742.71	741.52	741.55	741.55	1.19
619	n592	740.82	740.82	739.63	739.65	739.65	1.19
621	n594	739.64	739.64	738.45	738.48	738.48	1.19
623	n596	737.34	737.34	736.15	736.18	736.18	1.19
625	n598	737.85	737.85	736.66	736.75	736.75	1.19
626	n599	742.46	742.46	741.27	741.36	741.36	1.19
627	n600	743.14	743.14	741.95	742.04	742.04	1.19
628	n601	743.88	743.88	742.69	742.77	742.77	1.19
629	n602	745.05	745.05	743.86	743.86	743.86	1.19
632	n605	743.26	743.26	742.07	742.08	742.08	1.19
634	n607	740.25	740.25	739.06	739.07	739.07	1.19
635	n608	738.83	738.83	737.64	737.65	737.65	1.19
637	n610	736.45	736.45	735.26	735.27	735.27	1.19
638	n611	732.72	732.72	731.53	731.55	731.55	1.19
639	n612	728.44	728.44	727.25	727.26	727.26	1.19
640	n613	723.38	723.38	722.19	722.21	722.21	1.19
641	n614	720.5	720.5	719.31	719.33	719.33	1.19
644	n617	719.93	719.93	718.74	718.83	718.83	1.19
645	n618	720.68	720.68	719.49	719.57	719.57	1.19
647	n620	721.29	721.29	720.1	720.18	720.18	1.19
649	n622	748.55	748.55	747.36	747.47	747.47	1.19
650	n623	748.81	748.81	747.62	747.73	747.73	1.19
651	n624	749.24	749.24	748.05	748.16	748.16	1.19
652	n625	749.85	749.85	748.66	748.77	748.77	1.19
653	n626	751.17	751.17	749.98	749.98	749.98	1.19

654	n627	750.73	750.73	749.54	749.55	749.55	1.19
655	n628	750.55	750.55	749.36	749.37	749.37	1.19
656	n629	750.34	750.34	749.15	749.16	749.16	1.19
657	n630	749.72	749.72	748.53	748.54	748.54	1.19
661	n634	749.71	749.71	748.52	748.62	748.62	1.19
662	n635	750.41	750.41	749.22	749.32	749.32	1.19
663	n636	752.36	752.36	751.17	751.26	751.26	1.19
664	n637	753.15	753.15	751.96	752.05	752.05	1.19
665	n638	754.21	754.21	753.02	753.11	753.11	1.19
666	n639	755.46	755.46	754.27	754.37	754.37	1.19
667	n640	755.71	755.71	754.52	754.62	754.62	1.19
668	n641	756.38	756.38	755.19	755.29	755.29	1.19
670	n643	756.59	756.59	755.4	755.52	755.52	1.19
671	n644	757.69	757.69	756.5	756.6	756.6	1.19
672	n645	757.51	757.51	756.32	756.33	756.33	1.19
673	n646	756.74	756.74	755.55	755.56	755.56	1.19
674	n647	756.47	756.47	755.28	755.29	755.29	1.19
675	n648	756.08	756.08	754.89	754.9	754.9	1.19
676	n649	755.75	755.75	754.56	754.57	754.57	1.19
678	n651	754.77	754.77	753.58	753.6	753.6	1.19
679	n652	753.67	753.67	752.48	752.49	752.49	1.19
680	n653	753.37	753.37	752.18	752.2	752.2	1.19
706	n679	727.71	727.71	726.52	726.59	726.59	1.19
707	n680	727.19	727.19	726	726.08	726.08	1.19
709	n682	726.35	726.35	725.16	725.24	725.24	1.19
711	n684	725.56	725.56	724.37	724.45	724.45	1.19
712	n685	725.06	725.06	723.87	723.95	723.95	1.19
713	n686	724.83	724.83	723.64	723.71	723.71	1.19
714	n687	724.57	724.57	723.38	723.45	723.45	1.19
715	n688	724.12	724.12	722.93	723	723	1.19
716	n689	723.96	723.96	722.77	722.85	722.85	1.19
717	n690	723.61	723.61	722.42	722.5	722.5	1.19
718	n691	723.29	723.29	722.1	722.18	722.18	1.19
719	n692	723.03	723.03	721.84	721.92	721.92	1.19
720	n693	722.88	722.88	721.69	721.77	721.77	1.19
721	n694	722.7	722.7	721.51	721.6	721.6	1.19
722	n695	722.64	722.64	721.45	721.55	721.55	1.19
724	n697	722.22	722.22	721.03	721.11	721.11	1.19
725	n698	721.77	721.77	720.58	720.67	720.67	1.19
726	n699	721.47	721.47	720.28	720.37	720.37	1.19
756	n729	735.16	735.16	733.97	733.99	733.99	1.19
758	n731	736.83	736.83	735.64	735.66	735.66	1.19
759	n732	737.59	737.59	736.4	736.42	736.42	1.19
761	n734	741.24	741.24	740.05	740.06	740.06	1.19
763	n736	742.3	742.3	741.11	741.12	741.12	1.19
764	n737	743.5	743.5	742.31	742.32	742.32	1.19
765	n738	744.03	744.03	742.84	742.85	742.85	1.19
790	n763	747.29	747.29	746.1	746.1	746.1	1.19
792	n765	746.55	746.55	745.36	745.37	745.37	1.19

793	n766	746.36	746.36	745.17	745.18	745.18	1.19
799	n772	745.73	745.73	744.54	744.56	744.56	1.19
800	n773	743.77	743.77	742.58	742.6	742.6	1.19
801	n774	742.85	742.85	741.66	741.68	741.68	1.19
802	n775	741.35	741.35	740.16	740.18	740.18	1.19
803	n776	740.2	740.2	739.01	739.03	739.03	1.19
804	n777	738.64	738.64	737.45	737.47	737.47	1.19
805	n778	737.69	737.69	736.5	736.53	736.53	1.19
806	n779	736.45	736.45	735.26	735.29	735.29	1.19
807	n780	735.89	735.89	734.7	734.73	734.73	1.19
809	n782	735.36	735.36	734.17	734.19	734.19	1.19
810	n783	735.05	735.05	733.86	733.89	733.89	1.19
811	n784	734.89	734.89	733.7	733.73	733.73	1.19
942	n915	733.79	733.79	732.6	732.62	732.62	1.19
944	n917	734.85	734.85	733.66	733.67	733.67	1.19
946	n919	738.36	738.36	737.17	737.17	737.17	1.19
948	n921	756.79	756.79	755.6	755.64	755.64	1.19
956	n929	759.85	759.85	758.66	758.66	758.66	1.19
963	n936	752.16	752.16	750.97	750.98	750.98	1.19
965	n938	752.72	752.72	751.53	751.55	751.55	1.19
967	n940	730.16	730.16	728.97	729.01	729.01	1.19
969	n942	731.68	731.68	730.49	730.53	730.53	1.19
971	n944	734.01	734.01	732.82	732.85	732.85	1.19
972	n945	734.92	734.92	733.73	733.76	733.76	1.19
974	n947	736.73	736.73	735.54	735.56	735.56	1.19
975	n948	738.05	738.05	736.86	736.88	736.88	1.19
976	n949	739.39	739.39	738.2	738.22	738.22	1.19
978	n951	740.61	740.61	739.42	739.45	739.45	1.19
979	n952	740.85	740.85	739.66	739.68	739.68	1.19
980	n953	741.06	741.06	739.87	739.89	739.89	1.19
981	n954	741.38	741.38	740.19	740.21	740.21	1.19
982	n955	742.67	742.67	741.48	741.5	741.5	1.19
983	n956	743.92	743.92	742.73	742.75	742.75	1.19
984	n957	745.31	745.31	744.12	744.13	744.13	1.19
985	n958	746.79	746.79	745.6	745.62	745.62	1.19
986	n959	748.6	748.6	747.41	747.42	747.42	1.19
987	n960	750.28	750.28	749.09	749.1	749.1	1.19
989	n962	752.14	752.14	750.95	750.95	750.95	1.19
990	n963	752.34	752.34	751.15	751.18	751.18	1.19
994	n967	752.79	752.79	751.6	751.62	751.62	1.19
995	n968	752.94	752.94	751.75	751.78	751.78	1.19
996	n969	753.55	753.55	752.36	752.38	752.38	1.19
997	n970	755.11	755.11	753.92	753.94	753.94	1.19
998	n971	756.05	756.05	754.86	754.88	754.88	1.19
1000	n973	756.46	756.46	755.27	755.29	755.29	1.19
1001	n974	755.53	755.53	754.34	754.38	754.38	1.19
1003	n976	754.49	754.49	753.3	753.34	753.34	1.19
1004	n977	753.9	753.9	752.71	752.76	752.76	1.19
1006	n979	752.78	752.78	751.59	751.64	751.64	1.19

1007	n980	752.63	752.63	751.44	751.5	751.5	1.19
1009	n982	752.54	752.54	751.34	751.41	751.41	1.19
1010	n983	752.74	752.74	751.55	751.58	751.58	1.19
1011	n984	753.09	753.09	751.9	751.93	751.93	1.19
1012	n985	753.39	753.39	752.2	752.22	752.22	1.19
1013	n986	753.74	753.74	752.55	752.58	752.58	1.19
1014	n987	754.3	754.3	753.11	753.13	753.13	1.19
1015	n988	754.69	754.69	753.5	753.53	753.53	1.19
1017	n990	755.64	755.64	754.45	754.48	754.48	1.19
1018	n991	756.6	756.6	755.41	755.43	755.43	1.19
1019	n992	757.98	757.98	756.79	756.79	756.79	1.19
1020	n993	757.01	757.01	755.82	755.83	755.83	1.19
1021	n994	756.58	756.58	755.39	755.4	755.4	1.19
1022	n995	756.34	756.34	755.15	755.17	755.17	1.19
1023	n996	756.25	756.25	755.06	755.07	755.07	1.19
1026	n999	751.86	751.86	750.67	750.7	750.7	1.19
1027	n1000	752.44	752.44	751.25	751.27	751.27	1.19
1028	n1001	752.97	752.97	751.78	751.8	751.8	1.19
1029	n1002	753.75	753.75	752.56	752.59	752.59	1.19
1030	n1003	754.49	754.49	753.3	753.33	753.33	1.19
1031	n1004	755.18	755.18	753.99	754.02	754.02	1.19
1036	n1009	755.75	755.75	754.56	754.58	754.58	1.19
1037	n1010	756.02	756.02	754.83	754.85	754.85	1.19
1038	n1011	756.26	756.26	755.07	755.08	755.08	1.19
1039	n1012	756.59	756.59	755.4	755.41	755.41	1.19
1040	n1013	757.01	757.01	755.82	755.83	755.83	1.19
1041	n1014	756.87	756.87	755.68	755.69	755.69	1.19
1042	n1015	756.3	756.3	755.11	755.12	755.12	1.19
1043	n1016	755.32	755.32	754.13	754.14	754.14	1.19
1046	n1020	759.27	759.27	758.08	758.1	758.1	1.19
1047	n1021	761.36	761.36	760.17	760.19	760.19	1.19
1048	n1022	763.54	763.54	762.35	762.37	762.37	1.19
1049	n1023	765.39	765.39	764.2	764.21	764.21	1.19
1051	n1025	769.26	769.26	768.07	768.08	768.08	1.19
1052	n1026	772.25	772.25	771.06	771.07	771.07	1.19
1053	n1027	774.11	774.11	772.92	772.93	772.93	1.19
1063	n1037	719.11	719.11	717.92	717.98	717.98	1.19
1064	n1038	719.71	719.71	718.52	718.56	718.56	1.19
1065	n1039	721.25	721.25	720.06	720.1	720.1	1.19
1066	n1040	724.82	724.82	723.63	723.67	723.67	1.19
1068	n1042	727.05	727.05	725.86	725.91	725.91	1.19
1070	n1044	728.63	728.63	727.44	727.48	727.48	1.19
1071	n1045	729.05	729.05	727.86	727.9	727.9	1.19
1072	n1046	729.65	729.65	728.46	728.5	728.5	1.19
1073	n1047	732.25	732.25	731.06	731.1	731.1	1.19
1075	n1049	736.65	736.65	735.46	735.5	735.5	1.19
1076	n1050	738.73	738.73	737.54	737.58	737.58	1.19
1078	n1052	741.31	741.31	740.12	740.16	740.16	1.19
1079	n1053	744.24	744.24	743.05	743.08	743.08	1.19

1080	n1054	746.38	746.38	745.19	745.23	745.23	1.19
1081	n1055	747.14	747.14	745.95	745.98	745.98	1.19
1082	n1056	748.06	748.06	746.87	746.9	746.9	1.19
1084	n1058	749.87	749.87	748.68	748.71	748.71	1.19
1098	n1072	719.28	719.28	718.09	718.11	718.11	1.19
1100	n1074	719.94	719.94	718.75	718.77	718.77	1.19
1101	n1075	720.54	720.54	719.35	719.37	719.37	1.19
1102	n1076	721.16	721.16	719.97	719.98	719.98	1.19
1103	n1077	721.49	721.49	720.3	720.31	720.31	1.19
1105	n1079	722.07	722.07	720.88	720.89	720.89	1.19
1107	n1081	752.65	752.65	751.46	751.48	751.48	1.19
1109	n1083	753.83	753.83	752.64	752.66	752.66	1.19
1111	n1085	754.33	754.33	753.14	753.16	753.16	1.19
1112	n1086	754.83	754.83	753.64	753.66	753.66	1.19
1113	n1087	755.11	755.11	753.92	753.93	753.93	1.19
1114	n1088	755.48	755.48	754.29	754.3	754.3	1.19
1116	n1090	756.03	756.03	754.84	754.85	754.85	1.19
1118	n1092	754.3	754.3	753.11	753.13	753.13	1.19
1119	n1093	755.39	755.39	754.2	754.22	754.22	1.19
1120	n1094	758.19	758.19	757	757.01	757.01	1.19
1125	n1099	758.54	758.54	757.35	757.35	757.35	1.19
1131	n1105	732.46	732.46	731.27	731.3	731.3	1.19
1133	n1107	735.3	735.3	734.11	734.13	734.13	1.19
1134	n1108	739.72	739.72	738.53	738.55	738.55	1.19
1135	n1109	743.34	743.34	742.15	742.17	742.17	1.19
1137	n1111	746.8	746.8	745.61	745.63	745.63	1.19
1139	n1113	748.68	748.68	747.49	747.5	747.5	1.19
1149	n1123	750.58	750.58	749.39	749.41	749.41	1.19
1150	n1124	751.1	751.1	749.91	749.92	749.92	1.19
1152	n1126	757.08	757.08	755.89	755.9	755.9	1.19
1153	n1127	757.52	757.52	756.33	756.34	756.34	1.19
1154	n1128	757.92	757.92	756.73	756.74	756.74	1.19
1155	n1129	758.6	758.6	757.41	757.43	757.43	1.19
1156	n1130	758.99	758.99	757.8	757.81	757.81	1.19
1157	n1131	760.1	760.1	758.91	758.92	758.92	1.19
1159	n1133	761.53	761.53	760.34	760.34	760.34	1.19
1160	n1134	762.19	762.19	761	761.01	761.01	1.19
1162	n1136	760.37	760.37	759.18	759.19	759.19	1.19
1163	n1137	757.14	757.14	755.95	755.96	755.96	1.19
1164	n1138	755.51	755.51	754.32	754.33	754.33	1.19
1165	n1139	752.77	752.77	751.58	751.6	751.6	1.19
1167	n1141	748.81	748.81	747.62	747.64	747.64	1.19
1168	n1142	745.06	745.06	743.87	743.89	743.89	1.19
1169	n1143	742.77	742.77	741.58	741.6	741.6	1.19
1170	n1144	741.3	741.3	740.11	740.13	740.13	1.19
1171	n1145	739.51	739.51	738.32	738.34	738.34	1.19
1173	n1147	738.45	738.45	737.26	737.29	737.29	1.19
1174	n1148	738.23	738.23	737.04	737.06	737.06	1.19
1184	n1158	737.37	737.37	736.18	736.21	736.21	1.19

1186	n1160	734.44	734.44	733.25	733.28	733.28	1.19
1187	n1161	732.75	732.75	731.56	731.59	731.59	1.19
1188	n1162	731.79	731.79	730.6	730.63	730.63	1.19
1190	n1164	731.64	731.64	730.45	730.5	730.5	1.19
1191	n1165	731.73	731.73	730.54	730.57	730.57	1.19
1192	n1166	731.91	731.91	730.72	730.75	730.75	1.19
1194	n1168	732.16	732.16	730.97	731	731	1.19
1196	n1170	732.53	732.53	731.34	731.36	731.36	1.19
1197	n1171	734.81	734.81	733.62	733.64	733.64	1.19
1199	n1173	736.72	736.72	735.53	735.55	735.55	1.19
1202	n1176	739.03	739.03	737.84	737.86	737.86	1.19
1203	n1177	741.46	741.46	740.27	740.28	740.28	1.19
1204	n1178	745.35	745.35	744.16	744.17	744.17	1.19
1206	n1180	746.27	746.27	745.08	745.09	745.09	1.19
1306	n1280	765.45	765.45	764.26	764.27	764.27	1.19
1308	n1282	766.44	766.44	765.25	765.26	765.26	1.19
1310	n1284	766.95	766.95	765.76	765.77	765.77	1.19
1379	n1353	733.05	733.05	731.86	731.88	731.88	1.19
1380	n1354	734.98	734.98	733.79	733.81	733.81	1.19
1381	n1355	736.35	736.35	735.16	735.17	735.17	1.19
1383	n1357	740.6	740.6	739.41	739.43	739.43	1.19
1384	n1358	742.85	742.85	741.66	741.67	741.67	1.19
1385	n1359	744.5	744.5	743.31	743.33	743.33	1.19
1387	n1361	745.24	745.24	744.05	744.06	744.06	1.19
1389	n1363	745.88	745.88	744.69	744.7	744.7	1.19
1390	n1364	746.58	746.58	745.39	745.4	745.4	1.19
1391	n1365	748.05	748.05	746.86	746.87	746.87	1.19
2037	n2011	721.89	721.89	720.7	720.77	720.77	1.19
2038	n2012	721.95	721.95	720.76	720.83	720.83	1.19
2039	n2013	722.06	722.06	720.87	720.94	720.94	1.19
2040	n2014	722.84	722.84	721.65	721.71	721.71	1.19
2042	n2016	723.08	723.08	721.89	721.9	721.9	1.19
2044	n2018	722.93	722.93	721.74	721.75	721.75	1.19
2045	n2019	722.46	722.46	721.27	721.28	721.28	1.19
2047	n2021	722.21	722.21	721.02	721.04	721.04	1.19
2205	n2179	719.45	719.45	718.26	718.3	718.3	1.19
2211	n2185	721.07	721.07	719.88	719.89	719.89	1.19
2868	n2845	723.32	723.32	722.13	722.18	722.18	1.19
3109	n3086	719.49	719.49	718.3	718.35	718.35	1.19
3110	n3087	719.59	719.59	718.4	718.45	718.45	1.19
3112	n3089	720.63	720.63	719.44	719.48	719.48	1.19
3114	n3091	721.56	721.56	720.37	720.41	720.41	1.19
3115	n3092	722.15	722.15	720.96	721.06	721.06	1.19
3116	n3093	721.5	721.5	720.31	720.4	720.4	1.19
3117	n3094	720.74	720.74	719.55	719.64	719.64	1.19
3118	n3095	720.2	720.2	719.01	719.11	719.11	1.19
3119	n3096	719.77	719.77	718.58	718.68	718.68	1.19
3120	n3097	719	719	717.81	717.91	717.91	1.19
3143	n3120	718.16	718.16	716.97	717.08	717.08	1.19

3144	n3121	718.66	718.66	717.47	717.59	717.59	1.19
3145	n3122	719.34	719.34	718.15	718.27	718.27	1.19
3147	n3124	720.44	720.44	719.25	719.36	719.36	1.19
3148	n3125	720.59	720.59	719.4	719.49	719.49	1.19
3149	n3126	721.71	721.71	720.52	720.61	720.61	1.19
3151	n3128	722.44	722.44	721.25	721.36	721.36	1.19
3152	n3129	722.67	722.67	721.48	721.56	721.56	1.19
3153	n3130	722.74	722.74	721.55	721.64	721.64	1.19
3154	n3131	723.32	723.32	722.13	722.22	722.22	1.19
3155	n3132	723.87	723.87	722.68	722.76	722.76	1.19
3156	n3133	725.62	725.62	724.43	724.52	724.52	1.19
3157	n3134	723.09	723.09	721.9	721.9	721.9	1.19
3158	n3135	722.45	722.45	721.26	721.26	721.26	1.19
3159	n3136	722.34	722.34	721.15	721.17	721.17	1.19
3165	n3142	720.12	720.12	718.93	718.96	718.96	1.19
3182	n3159	719.81	719.81	718.62	718.68	718.68	1.19
3183	n3160	720.06	720.06	718.87	718.92	718.92	1.19
3184	n3161	720.33	720.33	719.14	719.19	719.19	1.19
3185	n3162	720.94	720.94	719.75	719.8	719.8	1.19
3186	n3163	723.4	723.4	722.21	722.26	722.26	1.19
3187	n3164	726.34	726.34	725.15	725.2	725.2	1.19
3188	n3165	729.59	729.59	728.4	728.45	728.45	1.19
3191	n3168	728.18	728.18	726.99	727.03	727.03	1.19
3192	n3169	727.43	727.43	726.24	726.28	726.28	1.19
3193	n3170	726.61	726.61	725.42	725.46	725.46	1.19
3194	n3171	725.19	725.19	724	724.04	724.04	1.19
3195	n3172	723.67	723.67	722.48	722.52	722.52	1.19
3196	n3173	723.33	723.33	722.14	722.18	722.18	1.19
3203	n3180	722.76	722.76	721.57	721.59	721.59	1.19
3205	n3182	723.08	723.08	721.89	721.91	721.91	1.19
3206	n3183	723.33	723.33	722.14	722.15	722.15	1.19
3210	n3187	723.81	723.81	722.62	722.63	722.63	1.19
3212	n3189	722.16	722.16	720.97	721.01	721.01	1.19
3213	n3190	722.68	722.68	721.49	721.53	721.53	1.19
3214	n3191	724.82	724.82	723.63	723.68	723.68	1.19
3215	n3192	726.11	726.11	724.92	724.96	724.96	1.19
3216	n3193	729.01	729.01	727.82	727.86	727.86	1.19
3217	n3194	731.26	731.26	730.07	730.11	730.11	1.19
3218	n3195	731.87	731.87	730.68	730.71	730.71	1.19
3219	n3196	732.13	732.13	730.94	730.98	730.98	1.19
3220	n3197	733.13	733.13	731.94	731.98	731.98	1.19
3221	n3198	735.15	735.15	733.96	734	734	1.19
3222	n3199	737.23	737.23	736.04	736.07	736.07	1.19
3223	n3200	738.09	738.09	736.9	736.93	736.93	1.19
3224	n3201	739.11	739.11	737.92	737.95	737.95	1.19
3225	n3202	739.48	739.48	738.29	738.32	738.32	1.19
3226	n3203	739.85	739.85	738.66	738.69	738.69	1.19
3227	n3204	740.02	740.02	738.83	738.86	738.86	1.19
3229	n3206	740.26	740.26	739.07	739.1	739.1	1.19

3230	n3207	740.63	740.63	739.44	739.46	739.46	1.19
3231	n3208	743.17	743.17	741.98	742	742	1.19
3232	n3209	744.61	744.61	743.42	743.43	743.43	1.19
3233	n3210	746.32	746.32	745.13	745.15	745.15	1.19
3234	n3211	747.44	747.44	746.25	746.26	746.26	1.19
3235	n3212	749.26	749.26	748.07	748.08	748.08	1.19
3239	n3216	753.8	753.8	752.61	752.62	752.62	1.19
3242	n3219	753.66	753.66	752.47	752.48	752.48	1.19
3243	n3220	753.8	753.8	752.61	752.62	752.62	1.19
3266	n3243	764.05	764.05	762.86	762.86	762.86	1.19
3267	n3244	763.51	763.51	762.32	762.33	762.33	1.19
3268	n3245	763.12	763.12	761.93	761.94	761.94	1.19
3270	n3247	762.85	762.85	761.66	761.69	761.69	1.19
3271	n3248	754.12	754.12	752.93	752.94	752.94	1.19
3272	n3249	757.27	757.27	756.08	756.09	756.09	1.19
3273	n3250	758.05	758.05	756.86	756.87	756.87	1.19
3274	n3251	758.16	758.16	756.97	756.97	756.97	1.19
3329	n3306	729.58	729.58	728.39	728.44	728.44	1.19
3334	n3311	721.92	721.92	720.73	720.78	720.78	1.19
3335	n3312	722.39	722.39	721.2	721.25	721.25	1.19
3337	n3314	723.81	723.81	722.62	722.67	722.67	1.19
3338	n3315	725.38	725.38	724.19	724.24	724.24	1.19
3339	n3316	727.6	727.6	726.41	726.46	726.46	1.19
3341	n3318	733.11	733.11	731.92	731.97	731.97	1.19
3342	n3319	734.68	734.68	733.49	733.54	733.54	1.19
3343	n3320	736.23	736.23	735.04	735.09	735.09	1.19
3344	n3321	739.11	739.11	737.92	737.97	737.97	1.19
3345	n3322	740.48	740.48	739.29	739.34	739.34	1.19
3346	n3323	740.93	740.93	739.74	739.78	739.78	1.19
3347	n3324	741.39	741.39	740.2	740.24	740.24	1.19
3348	n3325	741.81	741.81	740.62	740.66	740.66	1.19
3349	n3326	742.13	742.13	740.94	740.98	740.98	1.19
3350	n3327	742.66	742.66	741.47	741.51	741.51	1.19
3351	n3328	744.63	744.63	743.44	743.48	743.48	1.19
3354	n3331	747.66	747.66	746.47	746.5	746.5	1.19
3357	n3334	748.49	748.49	747.3	747.34	747.34	1.19
3358	n3335	748.77	748.77	747.58	747.61	747.61	1.19
3359	n3336	749.54	749.54	748.35	748.38	748.38	1.19
3360	n3337	751.08	751.08	749.89	749.92	749.92	1.19
3361	n3338	752.99	752.99	751.8	751.83	751.83	1.19
3362	n3339	754.75	754.75	753.56	753.59	753.59	1.19
3363	n3340	755.54	755.54	754.35	754.38	754.38	1.19
3364	n3341	757.57	757.57	756.38	756.41	756.41	1.19
3365	n3342	758.75	758.75	757.56	757.59	757.59	1.19
3366	n3343	760.43	760.43	759.24	759.27	759.27	1.19
3367	n3344	762.14	762.14	760.95	760.97	760.97	1.19
3368	n3345	763.37	763.37	762.18	762.2	762.2	1.19
3369	n3346	763.6	763.6	762.41	762.43	762.43	1.19
3370	n3347	764.08	764.08	762.89	762.91	762.91	1.19

3373	n3350	764.55	764.55	763.36	763.37	763.37	1.19
3374	n3351	764.79	764.79	763.6	763.61	763.61	1.19
3375	n3352	765.11	765.11	763.92	763.93	763.93	1.19
3380	n3357	753.18	753.18	751.99	752.01	752.01	1.19
3381	n3358	754.09	754.09	752.9	752.92	752.92	1.19
3384	n3361	748.87	748.87	747.68	747.69	747.69	1.19
3385	n3362	748.26	748.26	747.07	747.08	747.08	1.19
3387	n3364	746.06	746.06	744.87	744.89	744.89	1.19
3388	n3365	745.85	745.85	744.66	744.68	744.68	1.19
3389	n3366	745.59	745.59	744.4	744.42	744.42	1.19
3390	n3367	745.36	745.36	744.17	744.19	744.19	1.19
3391	n3368	744.16	744.16	742.97	742.99	742.99	1.19
3392	n3369	743.66	743.66	742.47	742.49	742.49	1.19
3393	n3370	739.64	739.64	738.45	738.48	738.48	1.19
3397	n3374	736.99	736.99	735.8	735.82	735.82	1.19
3398	n3375	735.34	735.34	734.15	734.18	734.18	1.19
3405	n3382	733.94	733.94	732.75	732.78	732.78	1.19
3406	n3383	732.79	732.79	731.6	731.63	731.63	1.19
3408	n3385	731.02	731.02	729.83	729.86	729.86	1.19
3410	n3387	729.26	729.26	728.07	728.1	728.1	1.19
3411	n3388	728.54	728.54	727.35	727.39	727.39	1.19
3413	n3390	727.94	727.94	726.75	726.78	726.78	1.19
3414	n3391	727.16	727.16	725.97	726.01	726.01	1.19
3415	n3392	726.84	726.84	725.65	725.69	725.69	1.19
3416	n3393	725.17	725.17	723.98	724.01	724.01	1.19
3417	n3394	724.4	724.4	723.21	723.24	723.24	1.19
3418	n3395	723.28	723.28	722.09	722.13	722.13	1.19
3419	n3396	722.52	722.52	721.33	721.37	721.37	1.19
3420	n3397	722.48	722.48	721.29	721.33	721.33	1.19
3421	n3398	721.98	721.98	720.79	720.83	720.83	1.19
3422	n3399	721.42	721.42	720.23	720.27	720.27	1.19
3423	n3400	721.37	721.37	720.18	720.22	720.22	1.19
3425	n3402	720.87	720.87	719.68	719.72	719.72	1.19
3426	n3403	720.78	720.78	719.59	719.63	719.63	1.19
3427	n3404	720.71	720.71	719.52	719.56	719.56	1.19
3428	n3405	720.46	720.46	719.27	719.34	719.34	1.19
3429	n3406	720.62	720.62	719.43	719.48	719.48	1.19
3430	n3407	721.22	721.22	720.03	720.07	720.07	1.19
3431	n3408	722.27	722.27	721.08	721.12	721.12	1.19
3432	n3409	722.67	722.67	721.48	721.52	721.52	1.19
3433	n3410	723.03	723.03	721.84	721.89	721.89	1.19
3434	n3411	723.83	723.83	722.64	722.68	722.68	1.19
3435	n3412	724.1	724.1	722.91	722.95	722.95	1.19
3438	n3415	728.3	728.3	727.11	727.14	727.14	1.19
3439	n3416	734.23	734.23	733.04	733.06	733.06	1.19
3440	n3417	739.08	739.08	737.89	737.91	737.91	1.19
3441	n3418	741.15	741.15	739.96	739.99	739.99	1.19
3442	n3419	743.96	743.96	742.77	742.8	742.8	1.19
3443	n3420	747.08	747.08	745.89	745.91	745.91	1.19

3444	n3421	750.85	750.85	749.66	749.68	749.68	1.19
3476	n3454	759.71	759.71	758.52	758.55	758.55	1.19
3622	n3601	766.53	766.53	765.34	765.35	765.35	1.19
3623	n3602	765.95	765.95	764.76	764.77	764.77	1.19
3624	n3603	765.54	765.54	764.35	764.36	764.36	1.19
3627	n3606	764.95	764.95	763.76	763.79	763.79	1.19
3630	n3609	764.4	764.4	763.21	763.23	763.23	1.19
3631	n3610	762.45	762.45	761.26	761.29	761.29	1.19
3632	n3611	761.66	761.66	760.47	760.49	760.49	1.19
3633	n3612	760.75	760.75	759.56	759.58	759.58	1.19
3634	n3614	759.2	759.2	758.01	758.04	758.04	1.19
3635	n3615	758.96	758.96	757.77	757.8	757.8	1.19
7736	MH-2	740.05	740.05	738.86	738.88	738.88	1.19
7830	MH-9	757.87	757.87	756.68	756.68	756.68	1.19
7909	MH-13	725.48	725.48	724.29	724.35	724.35	1.19
7913	MH-14	725.93	725.93	724.74	724.79	724.79	1.19
7927	MH-15	719.39	719.39	718.2	718.3	718.3	1.19
7940	MH-16	747.8	747.8	746.61	746.63	746.63	1.19
8011	MH-18	761.26	761.26	760.07	760.09	760.09	1.19
8016	MH-19	739.92	739.92	738.73	738.75	738.75	1.19
8054	MH-23	733.41	733.41	732.22	732.25	732.25	1.19
8066	MH-26	734.54	734.54	733.35	733.37	733.37	1.19
8071	MH-27	733.98	733.98	732.79	732.81	732.81	1.19
8091	MH-31	733.28	733.28	732.09	732.11	732.11	1.19
8108	MH-34	751.05	751.05	749.86	749.97	749.97	1.19
8122	MH-37	744.93	744.93	743.74	743.82	743.82	1.19
8135	MH-40	723.12	723.12	721.93	722	722	1.19
8143	MH-42	756.26	756.26	755.07	755.08	755.08	1.19
8166	MH-47	755.68	755.68	754.49	754.51	754.51	1.19
72	n43	720.41	720.41	719.22	719.33	719.33	1.2
3199	n3176	722.96	722.96	721.76	721.81	721.81	1.2
258	n229	748.98	748.98	747.77	747.79	747.79	1.21
282	n253	760.05	760.05	758.85	758.86	758.86	1.21
283	n254	760.1	760.1	758.88	758.9	758.9	1.21
472	n445	724.57	724.57	723.36	723.43	723.43	1.21
496	n469	749.53	749.53	748.32	748.44	748.44	1.21
624	n597	737.11	737.11	735.9	736.01	736.01	1.21
659	n632	748.41	748.41	747.2	747.33	747.33	1.21
1062	n1036	719.07	719.07	717.86	717.91	717.91	1.21
1115	n1089	756.02	756.02	754.81	754.82	754.82	1.21
3121	n3098	718.75	718.75	717.54	717.65	717.65	1.21
3142	n3119	717.88	717.88	716.67	716.8	716.8	1.21
231	n202	750.52	750.52	749.3	749.32	749.32	1.22
370	n341	754.21	754.21	752.99	753.01	753.01	1.22
1104	n1078	722.03	722.03	720.81	720.82	720.82	1.22
3399	n3376	735.29	735.29	734.07	734.1	734.1	1.22
512	n485	747.78	747.78	746.56	746.59	746.59	1.23
577	n550	767.75	767.75	766.52	766.53	766.53	1.23
669	n642	756.54	756.54	755.31	755.41	755.41	1.23

3164	n3141	722.08	722.08	720.85	720.89	720.89	1.23
495	n468	749.45	749.45	748.21	748.35	748.35	1.24
949	n922	755.68	755.68	754.45	754.58	754.58	1.24
951	n924	757.28	757.28	756.05	756.17	756.17	1.24
952	n925	759.02	759.02	757.78	757.91	757.91	1.24
953	n926	759.98	759.98	758.74	758.87	758.87	1.24
955	n928	760.89	760.89	759.65	759.8	759.8	1.24
958	n931	755.04	755.04	753.81	753.94	753.94	1.24
959	n932	754.42	754.42	753.19	753.32	753.32	1.24
960	n933	753.88	753.88	752.64	752.77	752.77	1.24
961	n934	752.59	752.59	751.36	751.49	751.49	1.24
3108	n3085	719.44	719.44	718.21	718.26	718.26	1.24
3379	n3356	765.15	765.15	763.91	763.93	763.93	1.24
97	n68	749.27	749.27	748.01	748.07	748.07	1.25
677	n650	755.75	755.75	754.5	754.52	754.52	1.25
723	n696	722.61	722.61	721.36	721.44	721.44	1.25
794	n767	746.34	746.34	745.09	745.11	745.11	1.25
812	n785	734.87	734.87	733.62	733.65	733.65	1.25
2034	n2008	721.8	721.8	720.55	720.62	720.62	1.25
2035	n2009	721.85	721.85	720.6	720.67	720.67	1.25
3141	n3118	717.86	717.86	716.61	716.74	716.74	1.25
3355	n3332	748.36	748.36	747.11	747.15	747.15	1.25
217	n188	754.28	754.28	753.02	753.05	753.05	1.26
795	n768	746.3	746.3	745.04	745.06	745.06	1.26
294	n265	760.29	760.29	759.02	759.03	759.03	1.27
821	n794	733.15	733.15	731.88	731.93	731.93	1.27
962	n935	752.24	752.24	750.97	751.17	751.17	1.27
992	n965	752.34	752.34	751.07	751.11	751.11	1.27
999	n972	756.49	756.49	755.21	755.23	755.23	1.27
3637	n3617	758.84	758.84	757.56	757.6	757.6	1.27
643	n616	719.9	719.9	718.62	718.73	718.73	1.28
940	n913	733.81	733.81	732.53	732.55	732.55	1.28
1035	n1008	755.79	755.79	754.51	754.53	754.53	1.28
3150	n3127	722.48	722.48	721.2	721.29	721.29	1.28
8082	MH-29	719.81	719.81	718.53	718.64	718.64	1.28
2048	n2022	722.23	722.23	720.94	720.96	720.96	1.29
3107	n3084	719.45	719.45	718.15	718.2	718.2	1.29
3181	n3158	719.78	719.78	718.49	718.55	718.55	1.29
373	n344	754.47	754.47	753.18	753.2	753.2	1.3
514	n487	747.76	747.76	746.46	746.59	746.59	1.3
3228	n3205	740.29	740.29	738.98	739	739	1.31
290	n261	758.88	758.88	757.55	757.57	757.57	1.32
372	n343	754.41	754.41	753.09	753.11	753.11	1.32
2033	n2007	721.82	721.82	720.5	720.57	720.57	1.32
3208	n3185	723.85	723.85	722.53	722.54	722.54	1.32
371	n342	754.36	754.36	753.03	753.05	753.05	1.33
105	n76	753.36	753.36	752.02	752.04	752.04	1.34
230	n201	750.67	750.67	749.33	749.35	749.35	1.34
3202	n3179	722.77	722.77	721.43	721.45	721.45	1.34

511	n484	747.99	747.99	746.64	746.67	746.67	1.35
977	n950	740.71	740.71	739.37	739.39	739.39	1.35
3628	n3607	765.04	765.04	763.69	763.72	763.72	1.35
102	n73	753.49	753.49	752.13	752.14	752.14	1.36
827	n800	735.31	735.31	733.95	733.97	733.97	1.36
3638	n3618	758.8	758.8	757.44	757.48	757.48	1.36
3123	n3100	718.67	718.67	717.3	717.41	717.41	1.37
3241	n3218	753.71	753.71	752.34	752.36	752.36	1.37
203	n174	748.15	748.15	746.77	746.78	746.78	1.38
368	n339	754.22	754.22	752.83	752.85	752.85	1.38
3636	n3616	759.04	759.04	757.65	757.69	757.69	1.39
3160	n3137	722.52	722.52	721.12	721.14	721.14	1.4
3378	n3355	765.41	765.41	764.01	764.03	764.03	1.4
3372	n3349	764.71	764.71	763.3	763.32	763.32	1.41
813	n786	734.96	734.96	733.53	733.56	733.56	1.42
1175	n1149	738.37	738.37	736.95	736.98	736.98	1.42
3198	n3175	723.31	723.31	721.89	721.94	721.94	1.42
2031	n2005	721.87	721.87	720.42	720.5	720.5	1.44
3639	n3619	758.85	758.85	757.41	757.44	757.44	1.44
271	n242	752.32	752.32	750.87	750.89	750.89	1.45
369	n340	754.36	754.36	752.91	752.94	752.94	1.45
585	n558	758.78	758.78	757.34	757.38	757.38	1.45
103	n74	753.55	753.55	752.08	752.09	752.09	1.47
257	n228	749.1	749.1	747.63	747.64	747.64	1.47
970	n943	732.67	732.67	731.2	731.24	731.24	1.47
3122	n3099	718.9	718.9	717.43	717.54	717.54	1.47
3180	n3157	719.81	719.81	718.34	718.4	718.4	1.47
3377	n3354	765.65	765.65	764.18	764.19	764.19	1.47
2030	n2004	721.88	721.88	720.39	720.47	720.47	1.48
3103	n3080	719.39	719.39	717.9	717.96	717.96	1.48
1032	n1005	755.73	755.73	754.24	754.26	754.26	1.49
3197	n3174	723.5	723.5	722.01	722.05	722.05	1.5
3201	n3178	722.79	722.79	721.29	721.34	721.34	1.5
3396	n3373	739.79	739.79	738.29	738.32	738.32	1.5
251	n222	747.29	747.29	745.78	745.8	745.8	1.51
3200	n3177	723.2	723.2	721.67	721.72	721.72	1.52
3436	n3413	724.65	724.65	723.13	723.17	723.17	1.52
1122	n1096	758.75	758.75	757.22	757.23	757.23	1.53
1124	n1098	758.82	758.82	757.28	757.29	757.29	1.54
1140	n1114	750.65	750.65	749.11	749.12	749.12	1.54
3124	n3101	718.8	718.8	717.25	717.36	717.36	1.54
3402	n3379	735.44	735.44	733.88	733.91	733.91	1.55
2049	n2023	722.43	722.43	720.86	720.88	720.88	1.57
3104	n3081	719.53	719.53	717.96	718.01	718.01	1.57
7863	MH-11	719.83	719.83	718.25	718.31	718.31	1.58
291	n262	759	759	757.41	757.43	757.43	1.59
796	n769	746.52	746.52	744.93	744.95	744.95	1.59
3106	n3083	719.64	719.64	718.05	718.1	718.1	1.59
175	n146	724.86	724.86	723.26	723.28	723.28	1.6

188	n159	735.45	735.45	733.85	733.88	733.88	1.6
510	n483	748.31	748.31	746.71	746.74	746.74	1.6
1147	n1121	750.92	750.92	749.32	749.33	749.33	1.6
1034	n1007	756.04	756.04	754.42	754.44	754.44	1.62
3168	n3145	719.78	719.78	718.15	718.19	718.19	1.63
3356	n3333	748.83	748.83	747.2	747.24	747.24	1.63
2050	n2024	722.38	722.38	720.74	720.76	720.76	1.64
3371	n3348	764.81	764.81	763.17	763.19	763.19	1.64
502	n475	749.29	749.29	747.62	747.64	747.64	1.66
1176	n1150	738.52	738.52	736.86	736.89	736.89	1.66
471	n444	724.91	724.91	723.23	723.32	723.32	1.68
3140	n3117	718.18	718.18	716.5	716.63	716.63	1.68
3179	n3156	719.84	719.84	718.16	718.22	718.22	1.68
3105	n3082	719.71	719.71	718	718.05	718.05	1.71
3138	n3115	718.09	718.09	716.35	716.46	716.46	1.74
2041	n2015	723.58	723.58	721.82	721.88	721.88	1.76
3125	n3102	718.91	718.91	717.14	717.25	717.25	1.77
1205	n1179	746.79	746.79	745.01	745.02	745.02	1.78
3629	n3608	765.3	765.3	763.52	763.54	763.54	1.78
339	n310	726.38	726.38	724.59	724.65	724.65	1.79
214	n185	755.01	755.01	753.19	753.2	753.2	1.82
397	n368	778.97	778.97	777.14	777.14	777.14	1.83
3139	n3116	718.25	718.25	716.4	716.53	716.53	1.85
797	n770	746.71	746.71	744.84	744.86	744.86	1.86
939	n912	734.31	734.31	732.45	732.47	732.47	1.86
7866	MH-12	719.93	719.93	718.06	718.12	718.12	1.86
3332	n3309	721.7	721.7	719.83	719.86	719.86	1.87
2051	n2025	722.55	722.55	720.66	720.68	720.68	1.9
798	n771	746.7	746.7	744.79	744.81	744.81	1.91
2052	n2026	722.49	722.49	720.56	720.58	720.58	1.93
3401	n3378	735.85	735.85	733.9	733.93	733.93	1.95
3333	n3310	721.67	721.67	719.71	719.78	719.78	1.96
3102	n3079	719.72	719.72	717.74	717.8	717.8	1.97
2027	n2001	722.34	722.34	720.31	720.39	720.39	2.02
2054	n2028	722.5	722.5	720.48	720.51	720.51	2.02
3178	n3155	720	720	717.98	718.04	718.04	2.02
820	n793	734.03	734.03	731.99	732.03	732.03	2.04
3137	n3114	718.08	718.08	716.04	716.21	716.21	2.04
3129	n3106	718.75	718.75	716.7	716.81	716.81	2.05
292	n263	759.4	759.4	757.34	757.36	757.36	2.06
3128	n3105	718.87	718.87	716.81	716.92	716.92	2.06
1061	n1035	719.04	719.04	716.97	717.07	717.07	2.08
3126	n3103	719.11	719.11	717.03	717.14	717.14	2.09
3395	n3372	740.45	740.45	738.36	738.39	738.39	2.09
1033	n1006	756.42	756.42	754.32	754.34	754.34	2.1
3127	n3104	719.01	719.01	716.91	717.02	717.02	2.1
253	n224	748.17	748.17	746.05	746.07	746.07	2.12
3331	n3308	722.02	722.02	719.9	719.93	719.93	2.12
176	n147	725.34	725.34	723.21	723.23	723.23	2.13

216	n187	755.25	755.25	753.11	753.14	753.14	2.14
3177	n3154	719.96	719.96	717.82	717.88	717.88	2.14
3130	n3107	718.8	718.8	716.62	716.73	716.73	2.18
3131	n3108	718.73	718.73	716.55	716.66	716.66	2.18
503	n476	749.71	749.71	747.51	747.53	747.53	2.2
3173	n3150	719.73	719.73	717.53	717.59	717.59	2.2
7852	MH-10	738.97	738.97	736.77	736.8	736.8	2.2
3176	n3153	719.91	719.91	717.7	717.76	717.76	2.21
222	n193	751.47	751.47	749.24	749.26	749.26	2.22
252	n223	748.18	748.18	745.93	745.95	745.95	2.25
3172	n3149	719.67	719.67	717.42	717.49	717.49	2.25
2012	n1986	721.6	721.6	719.34	719.42	719.42	2.26
178	n149	725.43	725.43	723.15	723.2	723.2	2.27
2058	n2032	722.51	722.51	720.25	720.27	720.27	2.27
3161	n3138	723.34	723.34	721.07	721.09	721.09	2.27
2057	n2031	722.6	722.6	720.31	720.34	720.34	2.29
3136	n3113	718.44	718.44	716.15	716.27	716.27	2.29
954	n927	761.9	761.9	759.59	759.72	759.72	2.3
1059	n1033	719.36	719.36	717.07	717.14	717.14	2.3
1183	n1157	738.69	738.69	736.39	736.42	736.42	2.3
2055	n2029	722.72	722.72	720.4	720.43	720.43	2.32
2060	n2034	722.5	722.5	720.17	720.2	720.2	2.33
2213	n2188	720.01	720.01	717.64	717.7	717.7	2.37
3132	n3109	718.78	718.78	716.41	716.52	716.52	2.37
1054	n1028	719.72	719.72	717.33	717.41	717.41	2.38
2056	n2030	722.76	722.76	720.36	720.38	720.38	2.4
2061	n2035	722.53	722.53	720.11	720.14	720.14	2.42
3133	n3110	718.78	718.78	716.35	716.46	716.46	2.43
1058	n1032	719.61	719.61	717.15	717.23	717.23	2.45
2011	n1985	721.75	721.75	719.29	719.37	719.37	2.46
2013	n1987	721.88	721.88	719.39	719.47	719.47	2.49
2064	n2038	722.56	722.56	720.02	720.05	720.05	2.54
2004	n1978	721.45	721.45	718.86	718.95	718.95	2.58
2025	n1999	722.84	722.84	720.26	720.33	720.33	2.58
509	n482	749.42	749.42	746.82	746.85	746.85	2.59
2018	n1992	722.36	722.36	719.77	719.85	719.85	2.59
2062	n2036	722.66	722.66	720.07	720.1	720.1	2.59
3134	n3111	718.84	718.84	716.24	716.36	716.36	2.6
3400	n3377	736.58	736.58	733.97	734	734	2.61
2014	n1988	722.1	722.1	719.47	719.54	719.54	2.63
3135	n3112	718.83	718.83	716.19	716.31	716.31	2.64
3394	n3371	741.07	741.07	738.4	738.43	738.43	2.66
2019	n1993	722.54	722.54	719.85	719.93	719.93	2.69
2010	n1984	721.89	721.89	719.18	719.26	719.26	2.7
3101	n3078	720.29	720.29	717.59	717.65	717.65	2.7
815	n788	735.11	735.11	732.4	732.44	732.44	2.71
2006	n1980	721.69	721.69	718.97	719.06	719.06	2.72
2007	n1981	721.81	721.81	719.05	719.13	719.13	2.76
7982	MH-17	720.26	720.26	717.5	717.55	717.55	2.76

819	n792	734.84	734.84	732.07	732.11	732.11	2.77
2008	n1982	721.86	721.86	719.08	719.16	719.16	2.78
1177	n1151	739.47	739.47	736.66	736.7	736.7	2.81
2017	n1991	722.47	722.47	719.64	719.72	719.72	2.83
1057	n1031	720.14	720.14	717.27	717.35	717.35	2.87
1181	n1155	739.37	739.37	736.49	736.53	736.53	2.87
3096	n3073	720.3	720.3	717.41	717.5	717.5	2.89
3097	n3074	720.26	720.26	717.37	717.46	717.46	2.89
3098	n3075	720.21	720.21	717.32	717.41	717.41	2.89
1996	n1970	721.26	721.26	718.35	718.43	718.43	2.91
1142	n1116	752.07	752.07	749.15	749.17	749.17	2.92
1995	n1969	721.21	721.21	718.29	718.37	718.37	2.92
2002	n1976	721.69	721.69	718.77	718.85	718.85	2.92
1994	n1968	721.15	721.15	718.21	718.29	718.29	2.94
1997	n1971	721.36	721.36	718.41	718.49	718.49	2.95
2024	n1998	723.16	723.16	720.21	720.28	720.28	2.95
1993	n1967	721.16	721.16	718.16	718.25	718.25	3
3099	n3076	720.25	720.25	717.2	717.29	717.29	3.04
1992	n1966	721.13	721.13	718.08	718.16	718.16	3.05
63	n34	720.23	720.23	717.15	717.26	717.26	3.08
65	n36	720.09	720.09	717	717.11	717.11	3.09
1179	n1153	739.69	739.69	736.56	736.6	736.6	3.13
816	n789	735.47	735.47	732.31	732.35	732.35	3.16
1991	n1965	721.18	721.18	718.02	718.1	718.1	3.17
2015	n1989	722.73	722.73	719.53	719.61	719.61	3.2
3163	n3140	724.18	724.18	720.97	721.01	721.01	3.21
1145	n1119	752.52	752.52	749.24	749.26	749.26	3.28
2001	n1975	722.07	722.07	718.69	718.77	718.77	3.39
3095	n3072	720.94	720.94	717.53	717.62	717.62	3.41
1990	n1964	721.4	721.4	717.96	718.05	718.05	3.44
2023	n1997	723.63	723.63	720.16	720.23	720.23	3.47
504	n477	750.83	750.83	747.35	747.37	747.37	3.48
507	n480	750.51	750.51	747.04	747.06	747.06	3.48
505	n478	750.77	750.77	747.25	747.27	747.27	3.52
1989	n1963	721.46	721.46	717.9	717.99	717.99	3.56
1988	n1962	721.45	721.45	717.87	717.95	717.95	3.59
2000	n1974	722.22	722.22	718.63	718.71	718.71	3.59
2022	n1996	723.67	723.67	720.06	720.13	720.13	3.61
67	n38	720.51	720.51	716.87	716.97	716.97	3.64
506	n479	750.82	750.82	747.17	747.19	747.19	3.65
818	n791	735.8	735.8	732.14	732.19	732.19	3.66
1987	n1961	721.49	721.49	717.83	717.92	717.92	3.66
2020	n1994	723.67	723.67	719.97	720.05	720.05	3.7
508	n481	750.67	750.67	746.94	746.97	746.97	3.72
1981	n1955	721.37	721.37	717.56	717.65	717.65	3.8
1998	n1972	722.35	722.35	718.53	718.62	718.62	3.82
70	n41	720.55	720.55	716.71	716.81	716.81	3.85
241	n212	724.94	724.94	721.01	721.05	721.05	3.93
68	n39	720.8	720.8	716.85	716.95	716.95	3.96

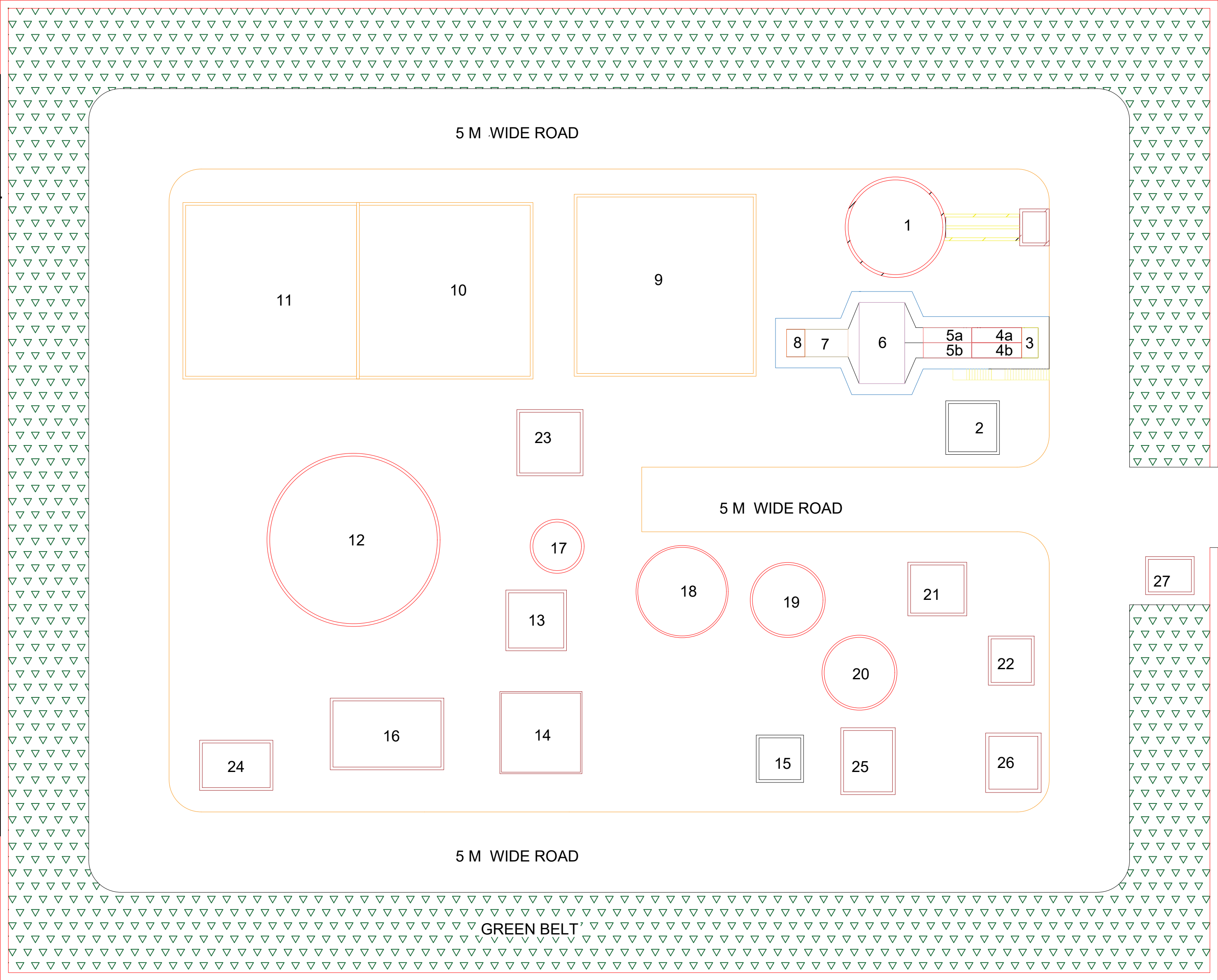
1982	n1956	721.57	721.57	717.59	717.68	717.68	3.98
817	n790	736.2	736.2	732.21	732.25	732.25	3.99
69	n40	720.85	720.85	716.81	716.92	716.92	4.04
1986	n1960	721.86	721.86	717.77	717.85	717.85	4.1
1984	n1958	721.95	721.95	717.66	717.75	717.75	4.29
1985	n1959	722.16	722.16	717.71	717.8	717.8	4.45

APPENDIX- VIII-POWER CALCULATION

Sl no.	Name	Pumpset Capacity in HP	Pumpset Capacity in KW	No of Pumpset	No of Stand by	Working Time	Power Consumpti on/ day	Power Consumpti on/ year	Power cost @Rs7/unit	Remarks
STP										
1	Raw Sewage Sump	22	16.412	2	1	24	393.888	143769.12	1006383.84	
2	Air Blower	90	67.14	4	1	24	4834.08	1764439.2	12351074.4	
3	Sludge Transfer to Thickner Pump	2	1.492	2	1	24	35.808	13069.92	91489.44	
4	Sludge Transfer to Centrifuge Pump	1	0.746	2	1	24	17.904	6534.96	45744.72	
5	Clarified water to ASF/PSF Pump	15	11.19	3	1	24	537.12	196048.8	1372341.6	
6	Mixer	3	2.238	2	1	24	53.712	19604.88	137234.16	
7	Clarifier to Sludge Sump Pump	2	1.492	2	1	24	35.808	13069.92	91489.44	
8	Centrate Sump to EQ Tank	2	1.492	2	1	24	35.808	13069.92	91489.44	
9	High Pressure Jet Pump	1	0.746	1	0	1	0.746	272.29	1906.03	
NET WORK										
1	LS1	2	1.492	2	1	24	35.808	13069.92	91489.44	
2	LS2	2	1.492	2	1	24	35.808	13069.92	91489.44	
3	LS3	6	4.476	2	1	24	107.424	39209.76	274468.32	
4	LS4	6	4.476	2	1	24	107.424	39209.76	274468.32	
5	LS5	2	1.492	2	1	24	35.808	13069.92	91489.44	
6	LS6	3	2.238	2	1	24	53.712	19604.88	137234.16	
7	LS7	7	5.222	2	1	24	125.328	45744.72	320213.04	
8	LS8	2	1.492	2	1	24	35.808	13069.92	91489.44	
9	LS9	1	0.746	2	1	24	17.904	6534.96	45744.72	
10	LS10	4	2.984	2	1	24	71.616	26139.84	182978.88	

Sl no.	Name	Pumpset Capacity in HP	Pumpset Capacity in KW	No of Pumpset	No of Stand by	Working Time	Power Consumpti on/ day	Power Consumpti on/ year	Power cost @Rs7/unit	Remarks
11	LS11	3	2.238	2	1	24	53.712	19604.88	137234.16	
12	LS12	2	1.492	2	1	24	35.808	13069.92	91489.44	
13	LS13	1	0.746	2	1	24	17.904	6534.96	45744.72	
14	LS14	1	0.746	2	1	24	17.904	6534.96	45744.72	
15	LS15	3	2.238	2	1	24	53.712	19604.88	137234.16	
16	LS16	27	20.142	2	1	24	483.408	176443.92	1235107.44	
17	Collection well in STP to Receiving chamber	22	16.412	2	1	24	393.888	143769.12	1006383.84	
18	Septage tank to Receiving chamber	1	0.746	2	1	24	17.904	6534.96	45744.72	
19	STP Ligting		15			24	360	131400	919800	
20	Ligting-Well and Lifting stations		17			24	408	148920	1042440	
								2914181.2	20399268.2	

NO	DESCRIPTION
1	RAW SEWAGE WELL
2	SEPTAGE TANK
3	RECVING CHAMBER
4 a	COARSE SCREEN CHANNEL-MECHANICAL
4 b	COARSE SCREEN CHANNEL-MANUAL
5 a	FINE SCREEN CHANNEL-MECHANICAL
5 b	FINESCREEN CHANNEL-MANUAL
6	GRIT CHAMBER
7	PARSHALL FLUME
8	DISTRIBUTION CHAMBER
9	EQUALISATION TANK
10	MBBR 1
11	MBBR 2
12	SECONDARY SETTING TANK
13	FILTER FEED TANK
14	PSF/ACF
15	DG ROOM
16	TREATED WATER TANK
17	SLUDGE SUMP
18	SLUDGE THICKNER
19	CENTRATE SUMP
20	THICKNED SLUDGE SUMP
21	CENTRIFUGE BUILDING
22	SLUDGE SHED
23	AIR BLOWER ROOM
24	CHLORINATION ROOM
25	TRANSFORMER YARD
26	ADMINISTRATIVE BUILDING
27	SECURITY ROOM



GENERAL NOTES

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- DIMENSIONS NOT IN SCALE
- FOR ESTIMATION PURPOSE ONLY

No.	Rivision/ Issue	Date



PPD & SEWERAGE CIRCLE,
KERALA WATER AUTHORITY,
KOZHIKODE

PROJECT NAME

Sewerage scheme to Mananthavady
Municipality Construction of 2MLD
capacity sewage Treatment plant and
laying sewerage network of
Mananthavady Municipality

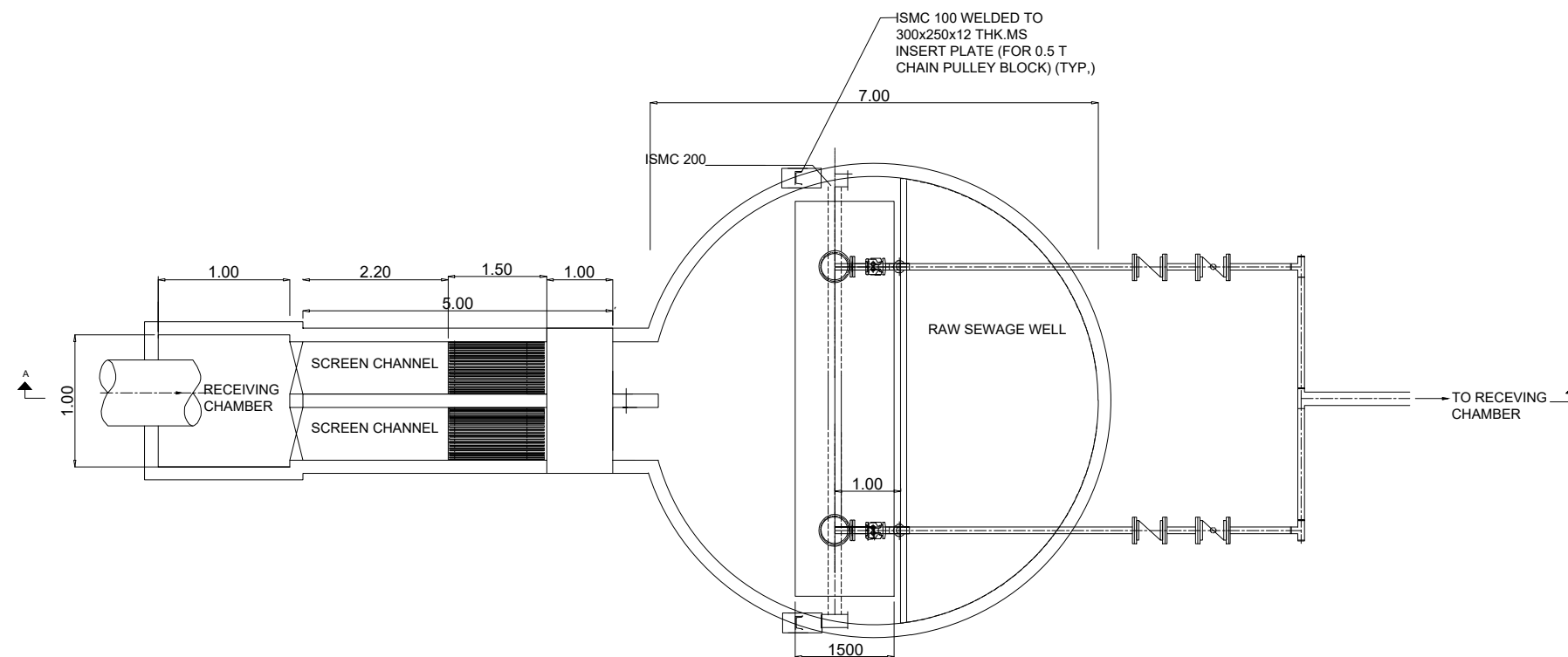
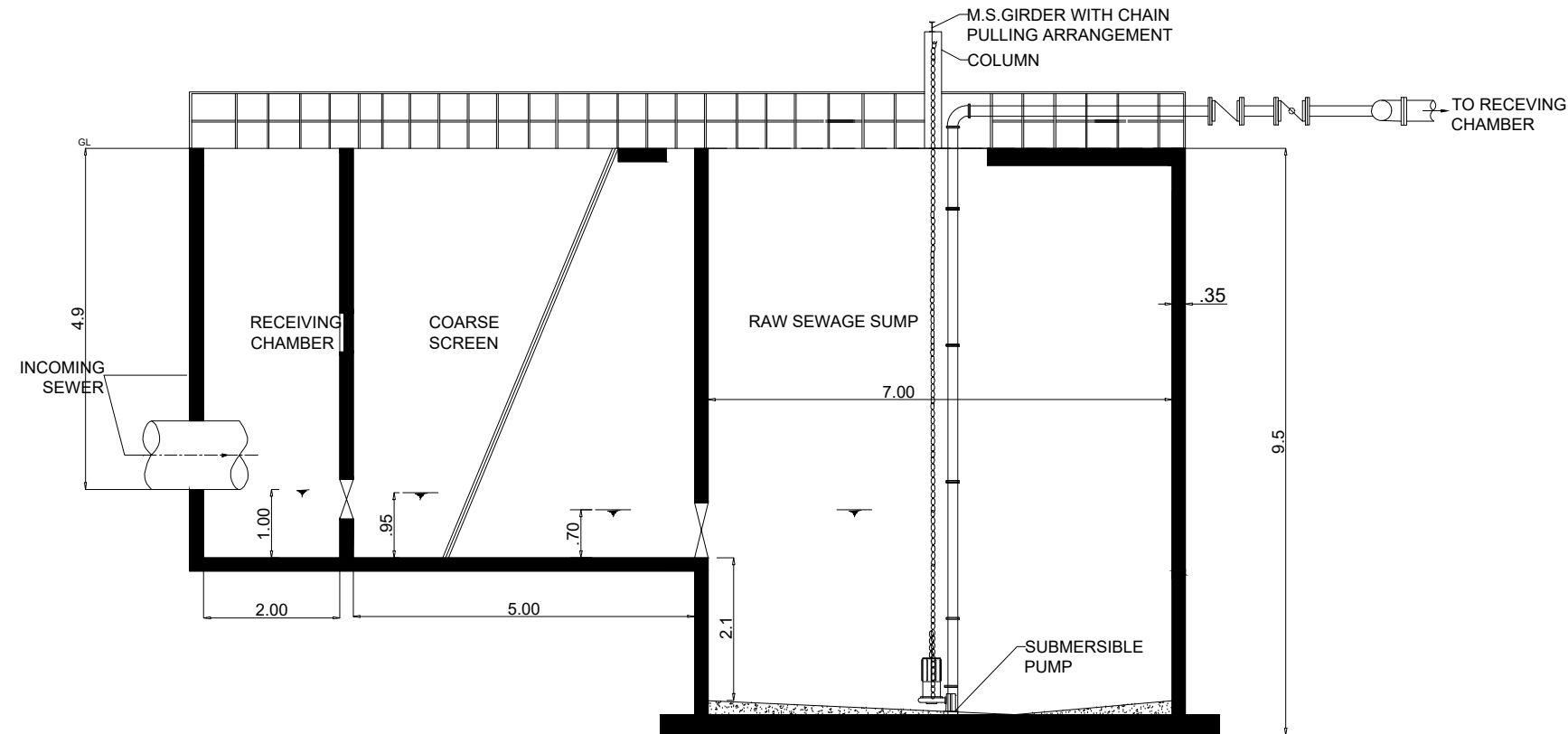
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LAYOUT

1/ MANANTHAVADY /ZONE 1

Not in scale

AE	AEE	EE	SE	CE



GENERAL NOTES

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PPD & SEWERAGE CIRCLE,
KERALA WATER AUTHORITY,
KOZHIKODE

PROJECT NAME

Sewerage scheme to Mananthavady Municipality Construction of 2 MLD capacity sewage treatment plant and laying Sewerage network of Mananthavady Municipality

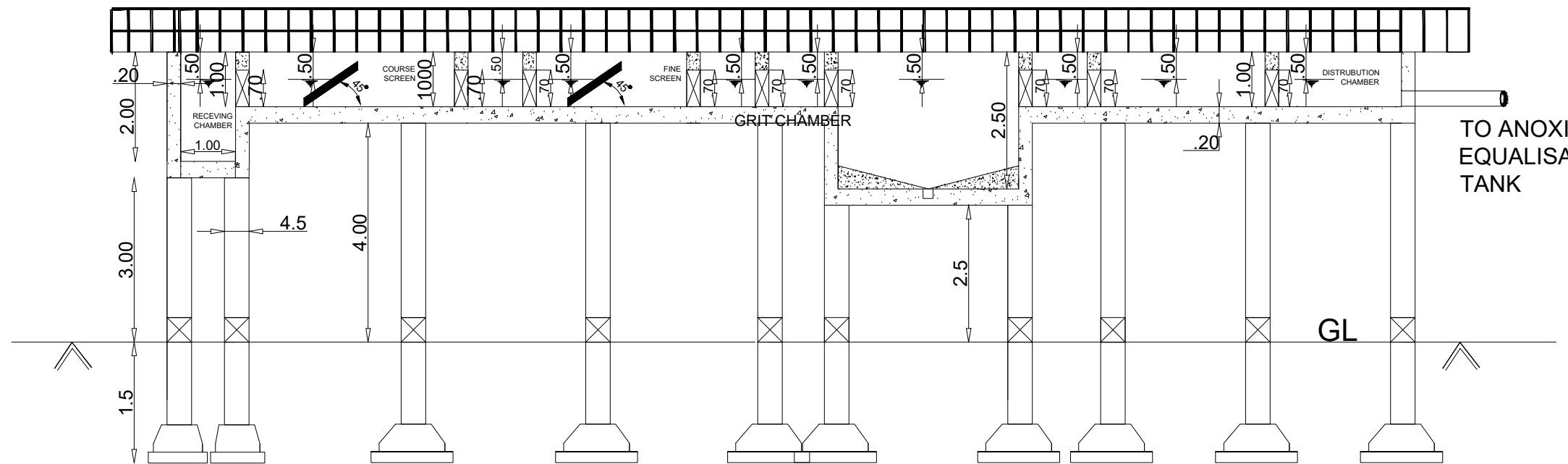
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DETAILS OF RECEIVING CHAMBER
SCREEN RAW SEWAGE WELL

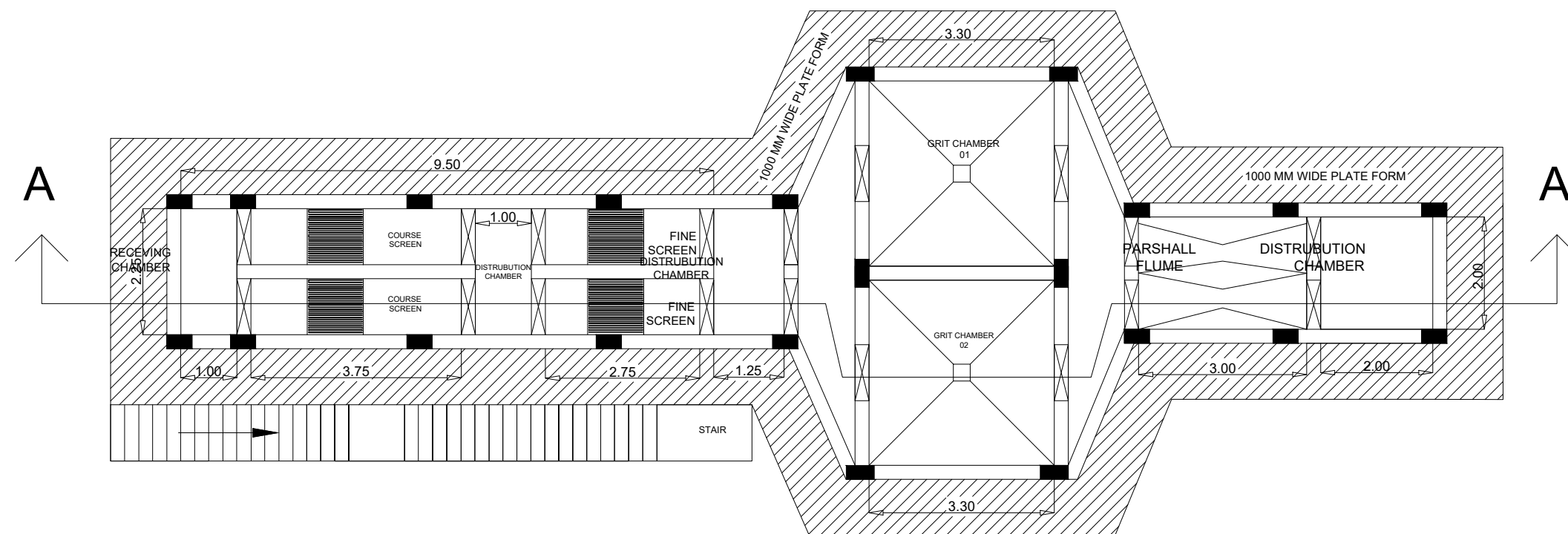
2/MANANTHAVADY/ZONE 1

Not in scale

AE	AEE	EE	SE	CE



SECTION: A-A



PLAN

GENERAL NOTES

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No.	Revision/ Issue	Date



**PPD & SEWERAGE CIRCLE,
KERALA WATER AUTHORITY,
KOZHIKODE**

PROJECT NAME

Sewerage scheme to Mananthavady Municipality Construction of 2 MLD capacity sewage treatment plant and laying Sewerage network of Mananthavady Municipality

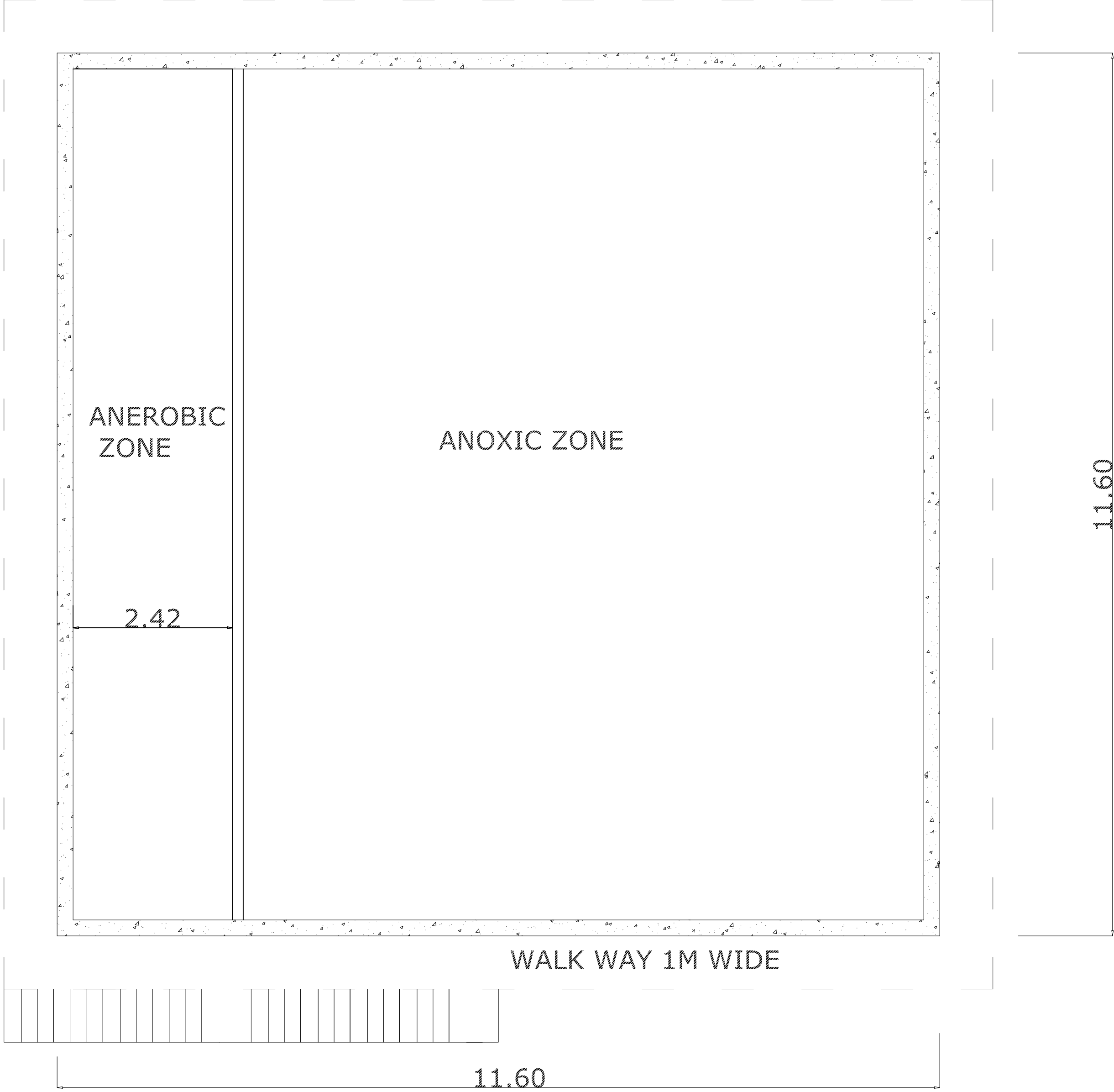
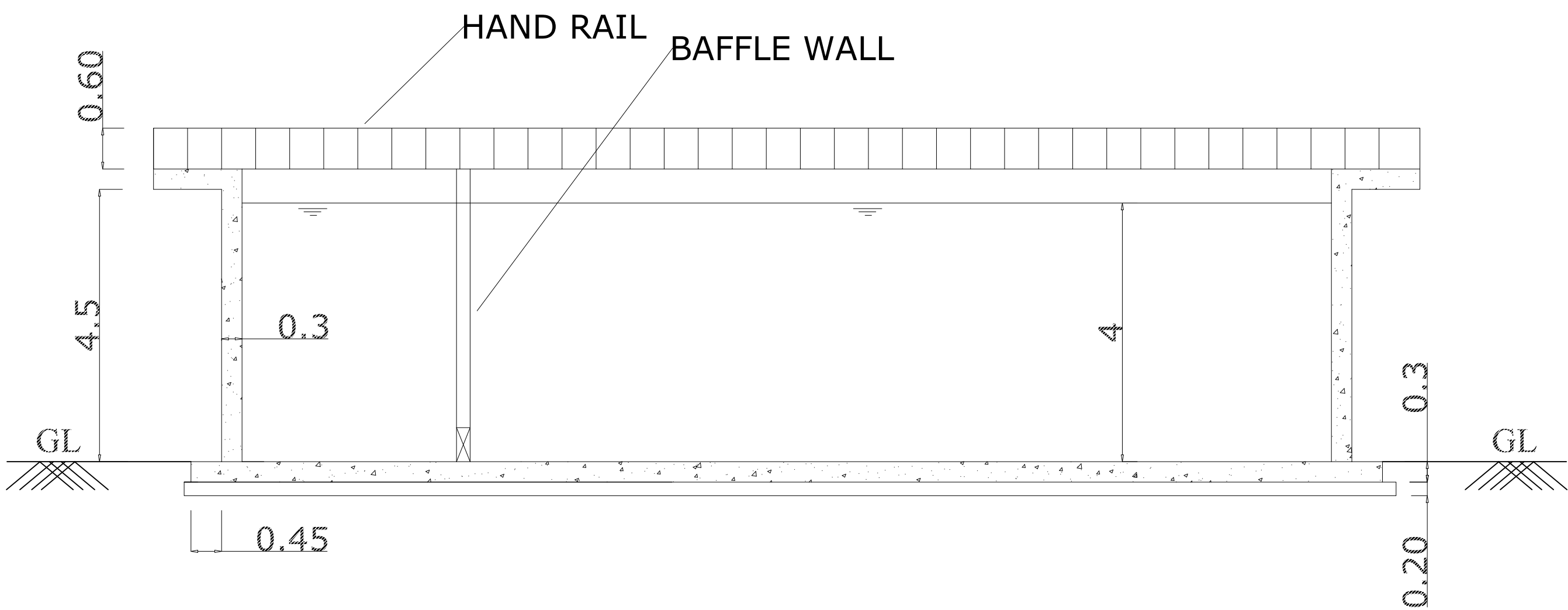
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DETAILS OF RECEIVING CHAMBER
SCREEN RAW SEWAGE WELL

3/MANANTHAVADY/ZONE 1

Not in scale

AE	AEE	EE	SE	CE



GENERAL NOTES

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- FOR ESTIMATION PURPOSE ONLY

No.	Rivision/ Issue	Date



PPD & SEWERAGE CIRCLE, KERALA
WATER AUTHORITY, KOZHIKODE

PROJECT NAME

Sewerage scheme to Mananthavady Municipality
Construction of 2MLD capacity sewage Treatment
plant and laying sewerage network of
Mananthavady Municipality

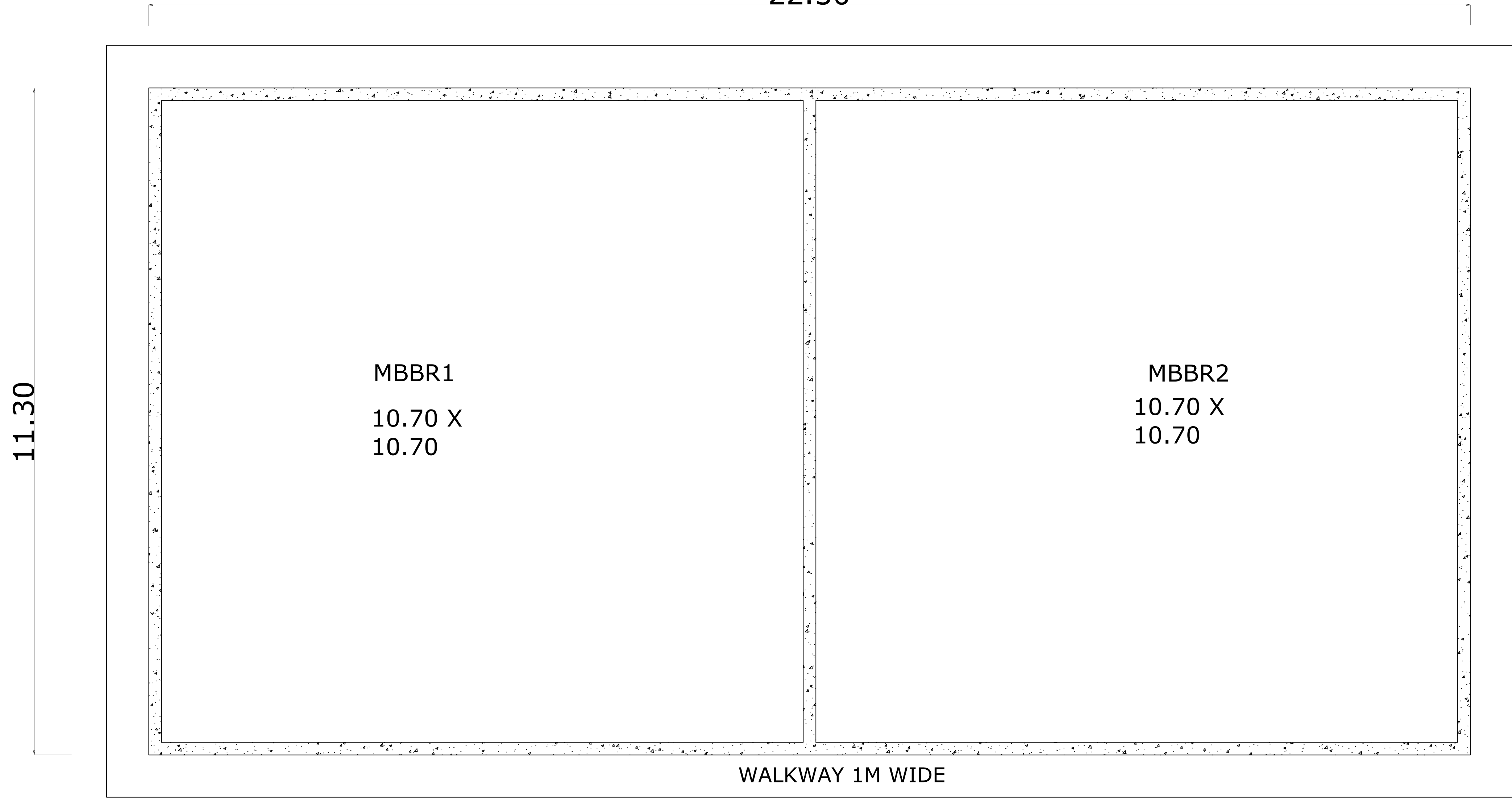
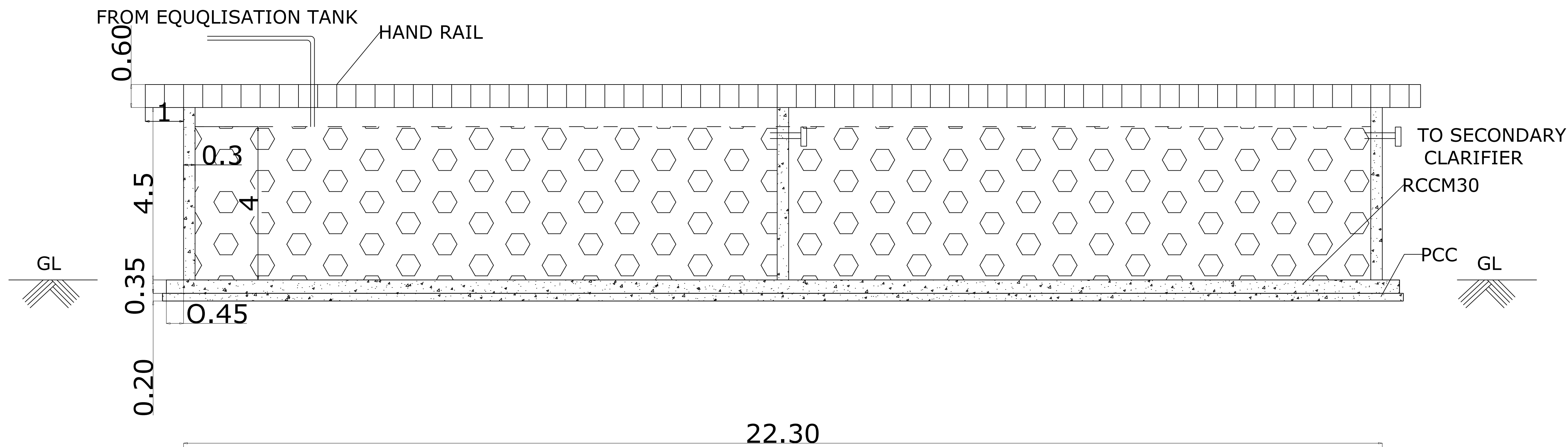
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Equalisation Tanks

4 MANANTHAVADY ZONE 1

Not in scale

AE	AEE	EE	SE	CE



GENERAL NOTES

- ALL DIMENSIONS ARE IN METERS
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No.	Rivision/ Issue	Date



PPD & SEWERAGE CIRCLE, KERALA
WATER AUTHORITY, KOZHIKODE

PROJECT NAME

Sewerage scheme to Mananthavady Municipality
Construction of 2MLD capacity sewage Treatment
plant and laying sewerage network of
Mananthavady Municipality

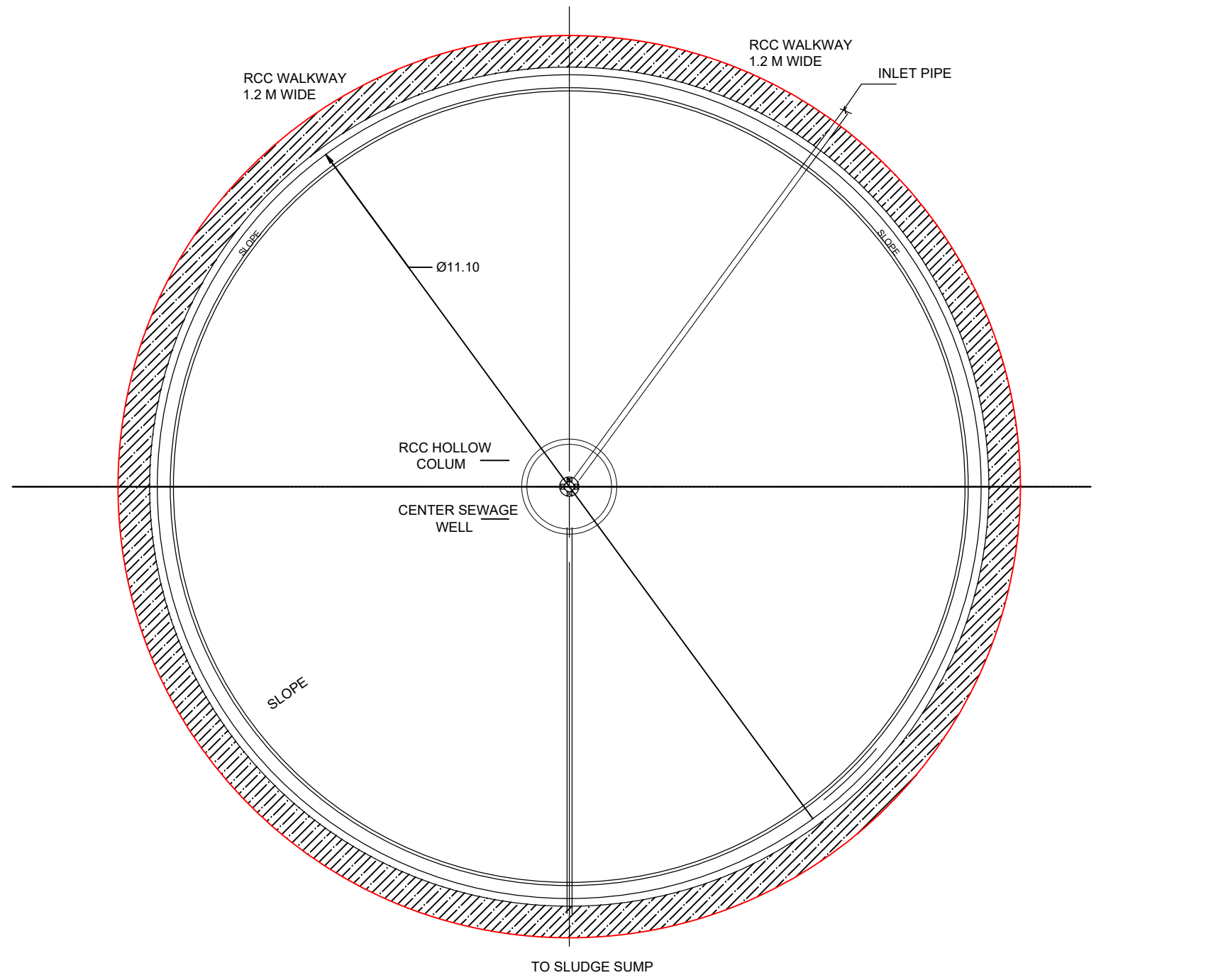
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MBBR

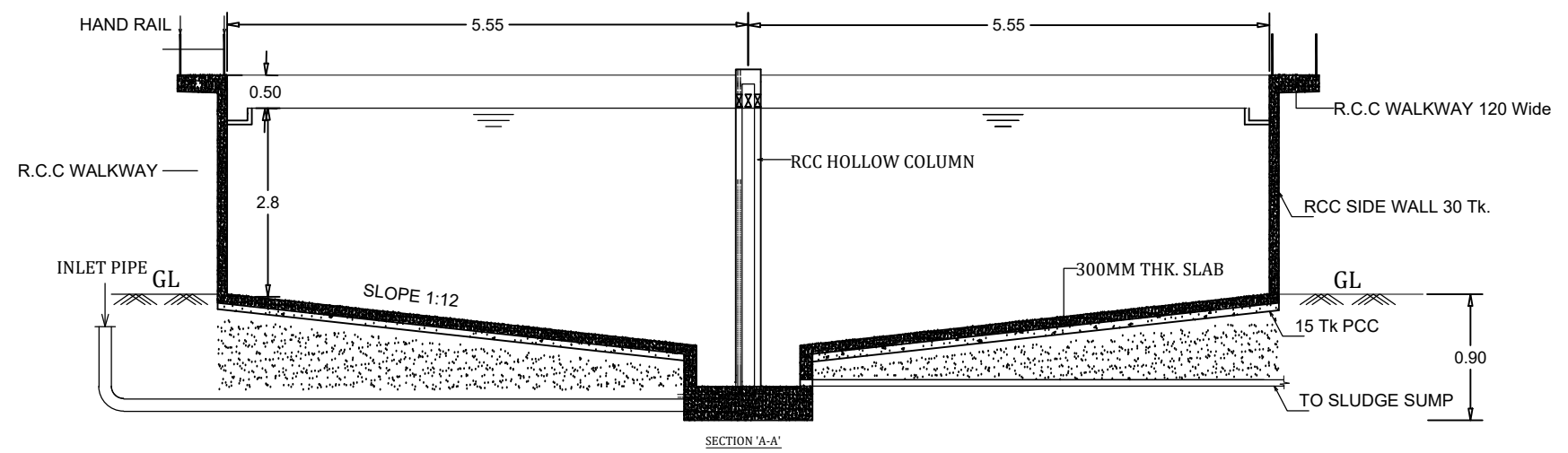
5 MANANTHAVADY ZONE 1

Not in scale

AE	AEE	EE	SE	CE



PLAN



SECTION 'A-A'

GENERAL NOTES

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- DIMENSIONS NOT IN SCALE
- FOR ESTIMATION PURPOSE ONLY

No.	Rivision/ Issue	Date



PPD & SEWERAGE CIRCLE,
KERALA WATER AUTHORITY,
KOZHIKODE

PROJECT NAME

Sewerage scheme to Mananthavady
Municipality
Construction of 2MLD capacity sewage
Treatment
plant and laying sewerage network of
Mananthavady Municipality

DRAWING TITLE

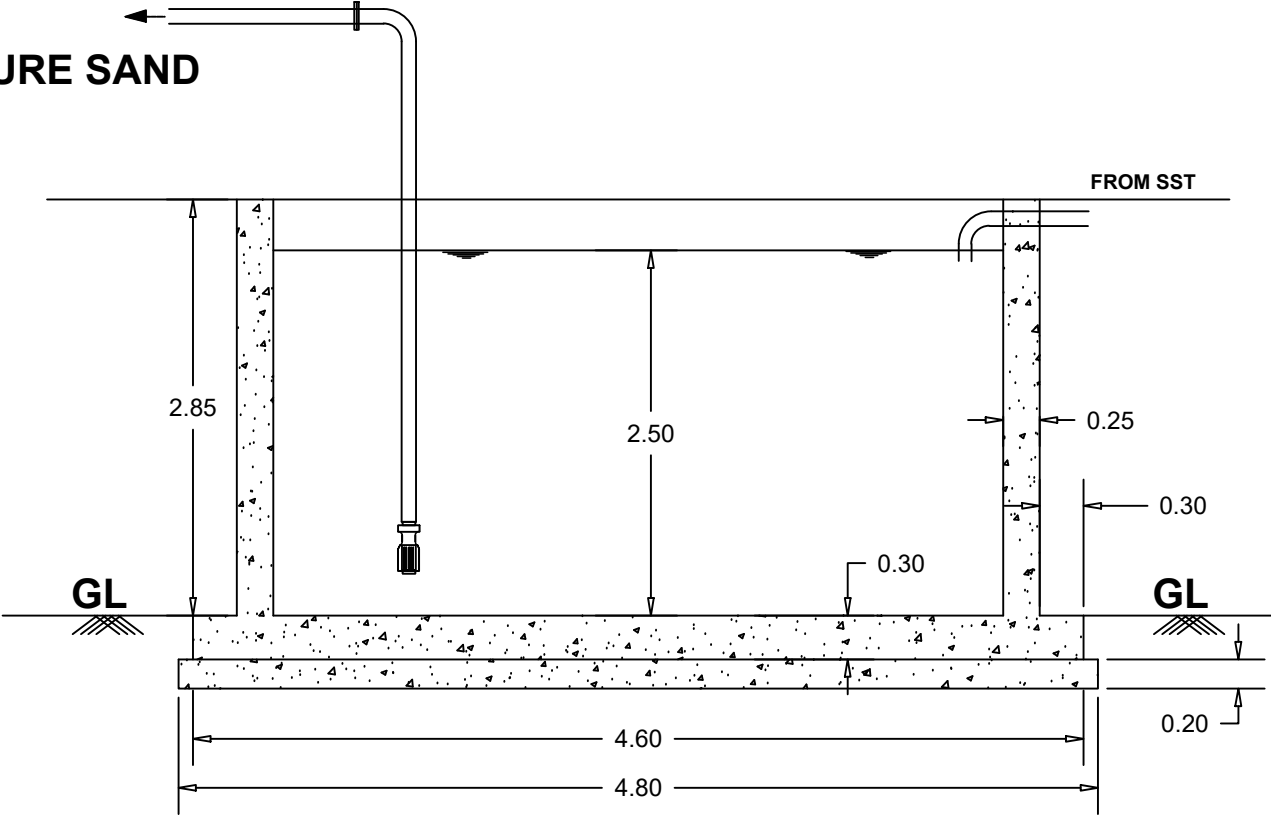
SECONDARY CLARIFIER TANK

7/MANANTHAVADY/ZONE 1

Not in scale

AE	AEE	EE	SE	CE

TO PRESSURE SAND
FILTER



SECTION AA



**FILTER FEED TANK
3.5X3.5X2.85**

PLAN

GENERAL NOTES

- ALL DIMENSIONS ARE IN METERS
- DIMENSIONS NOT IN SCALE
- FOR ESTIMATION PURPOSE ONLY

No.	Rivision/ Issue	Date



**PPD & SEWERAGE CIRCLE,
KERALA WATER AUTHORITY,
KOZHIKODE**

PROJECT NAME

Sewerage scheme to Mananthavady
Municipality
Construction of 2MLD capacity sewage
Treatment
plant and laying sewerage network of
Mananthavady Municipality

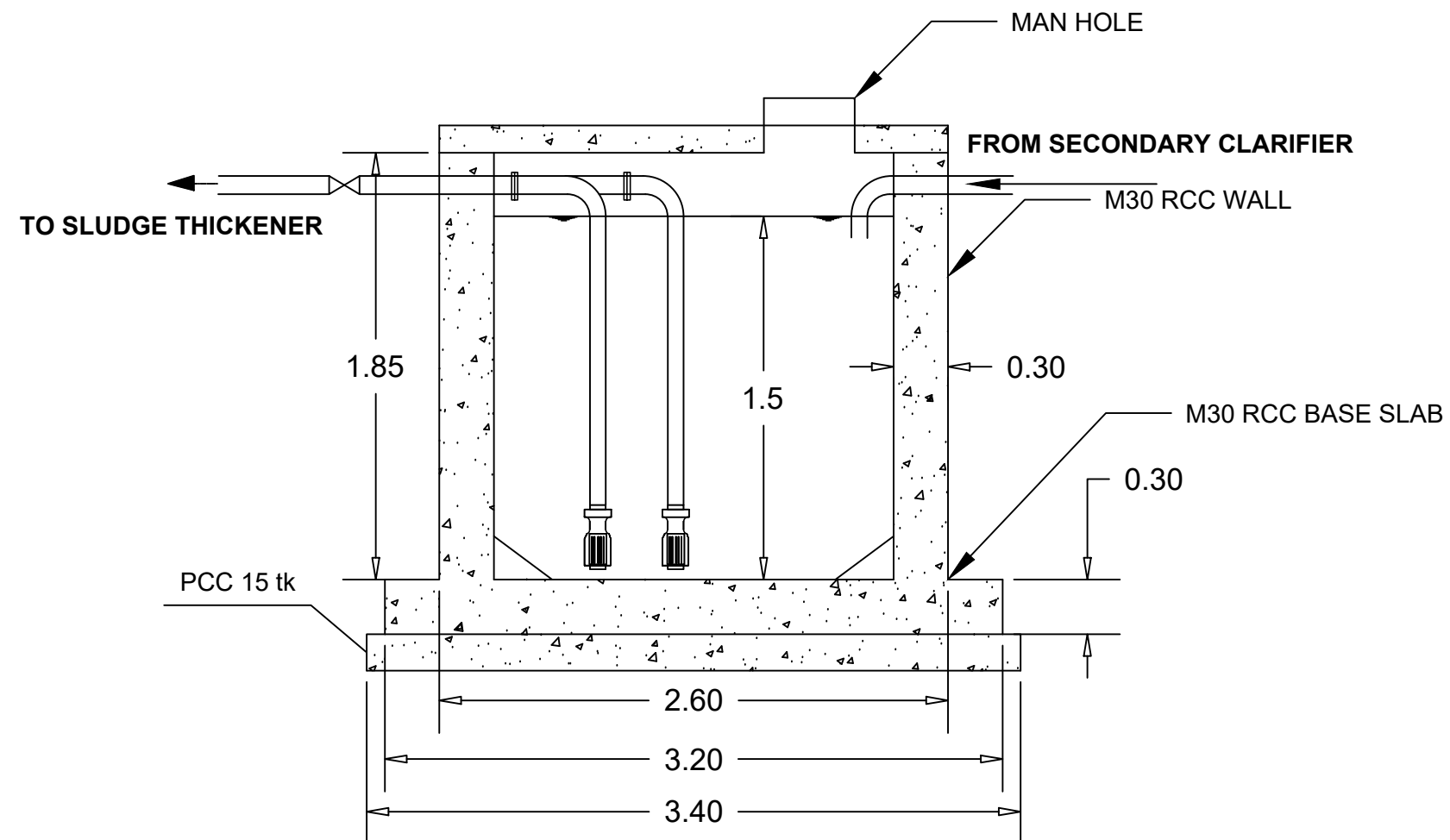
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FILTER FEED TANK

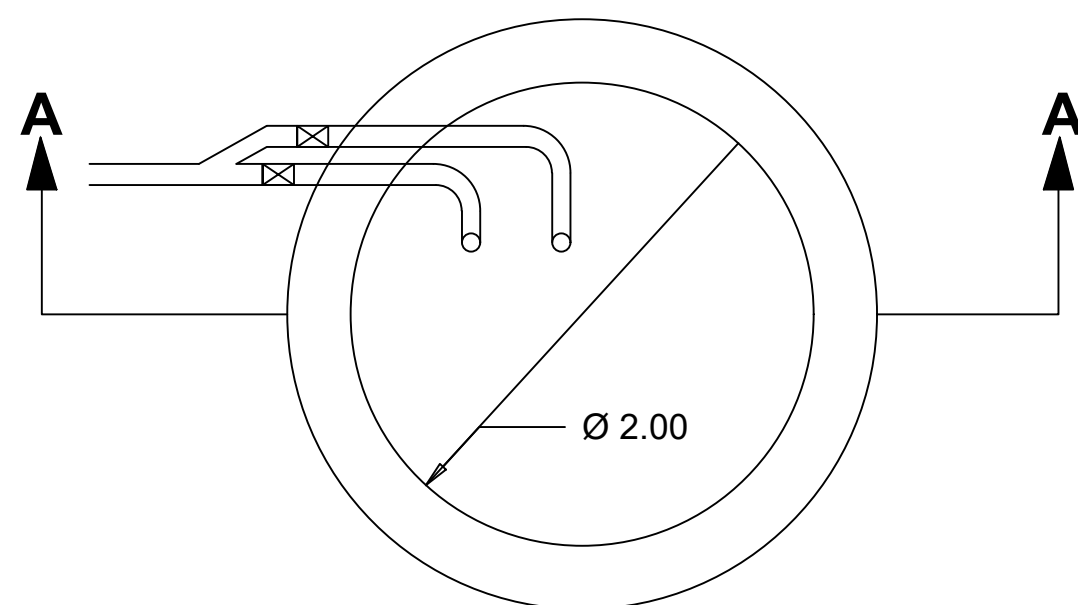
8/MANANTHAVADY/ZONE 1

Not in scale

AE	AEE	EE	SE	CE



SECTION AA



PLAN

GENERAL NOTES

- ALL DIMENSIONS ARE IN METERS
- DIMENSIONS NOT IN SCALE
- FOR ESTIMATION PURPOSE ONLY

No.	Rivision/ Issue	Date



PPD & SEWERAGE CIRCLE,
KERALA WATER AUTHORITY,
KOZHIKODE

PROJECT NAME

Sewerage scheme to Mananthavady
Municipality
Construction of 2MLD capacity sewage
Treatment
plant and laying sewerage network of
Mananthavady Municipality

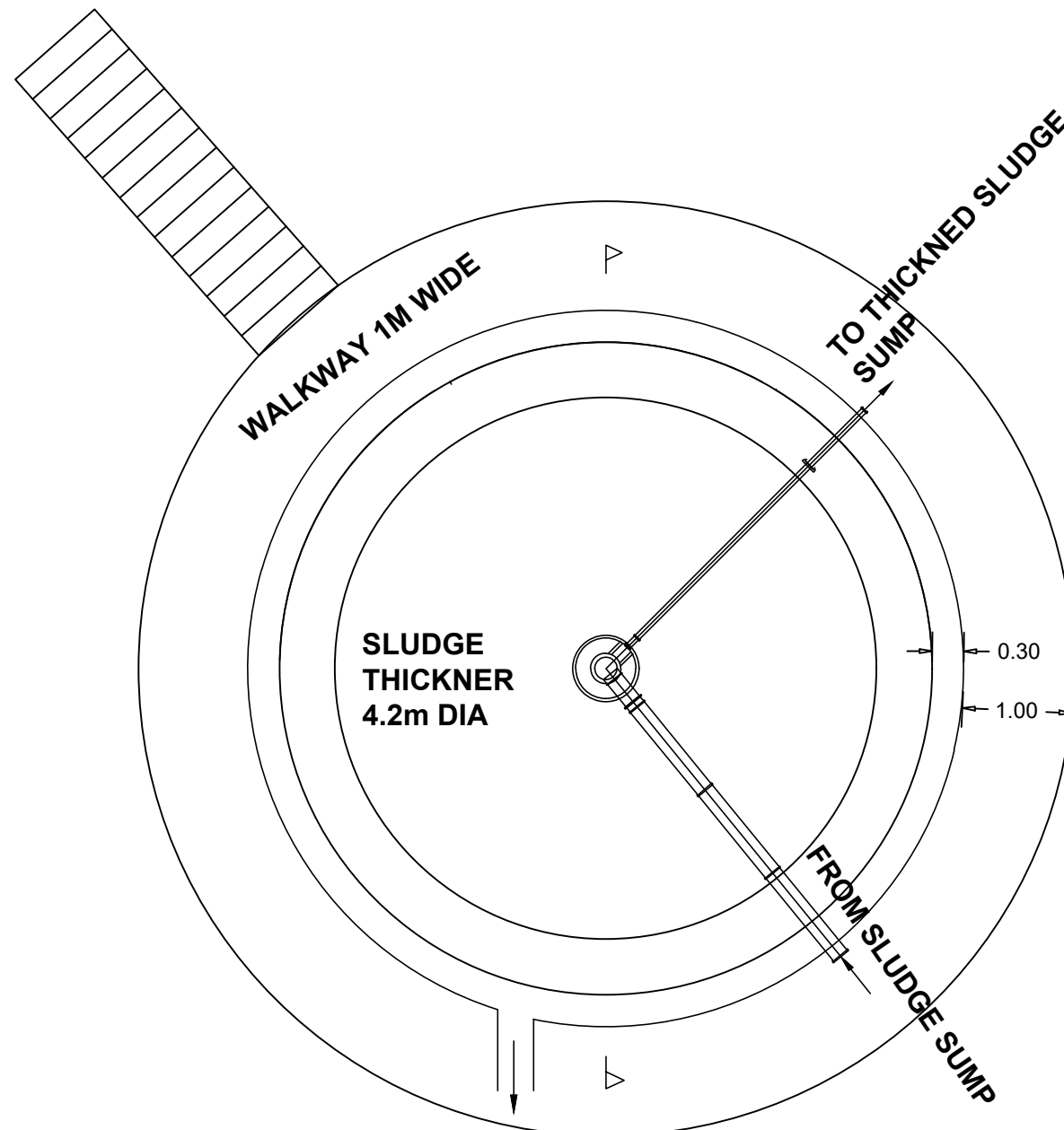
DRAWING TITLE

SLUDGE SUMP

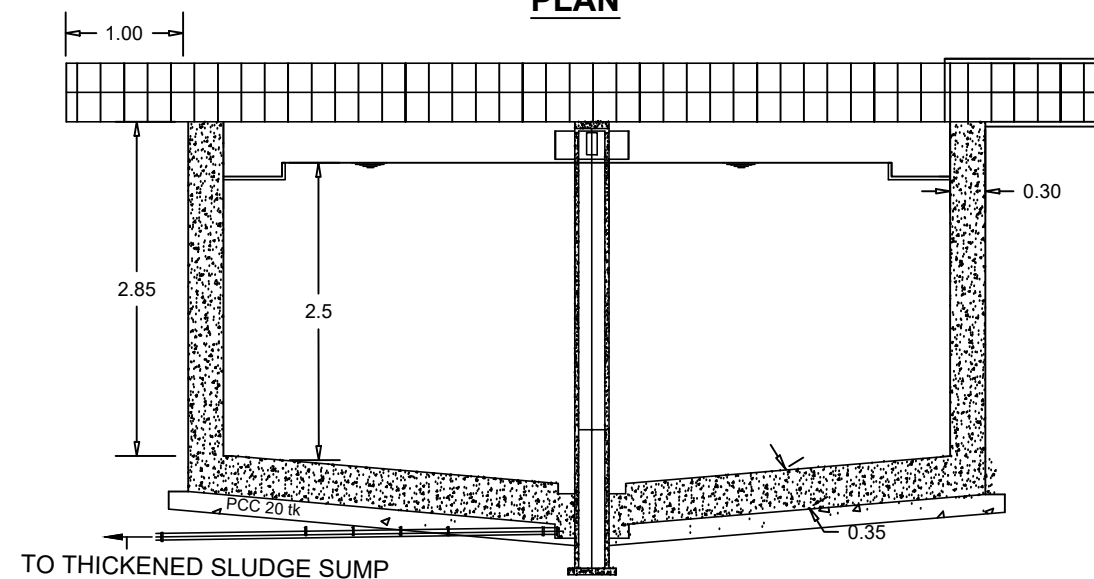
9/MANANTHAVADY/ZONE 1

Not in scale

AE	AEE	EE	SE	CE



PLAN



SECTION AA

GENERAL NOTES

- ALL DIMENSIONS ARE IN METERS
- DIMENSIONS NOT IN SCALE
- FOR ESTIMATION PURPOSE ONLY

No.	Rivision/ Issue	Date



**PPD & SEWERAGE CIRCLE,
KERALA WATER AUTHORITY,
KOZHIKODE**

PROJECT NAME

Sewerage scheme to Mananthavady Municipality
Construction of 2MLD capacity sewage Treatment plant and laying sewerage network of Mananthavady Municipality

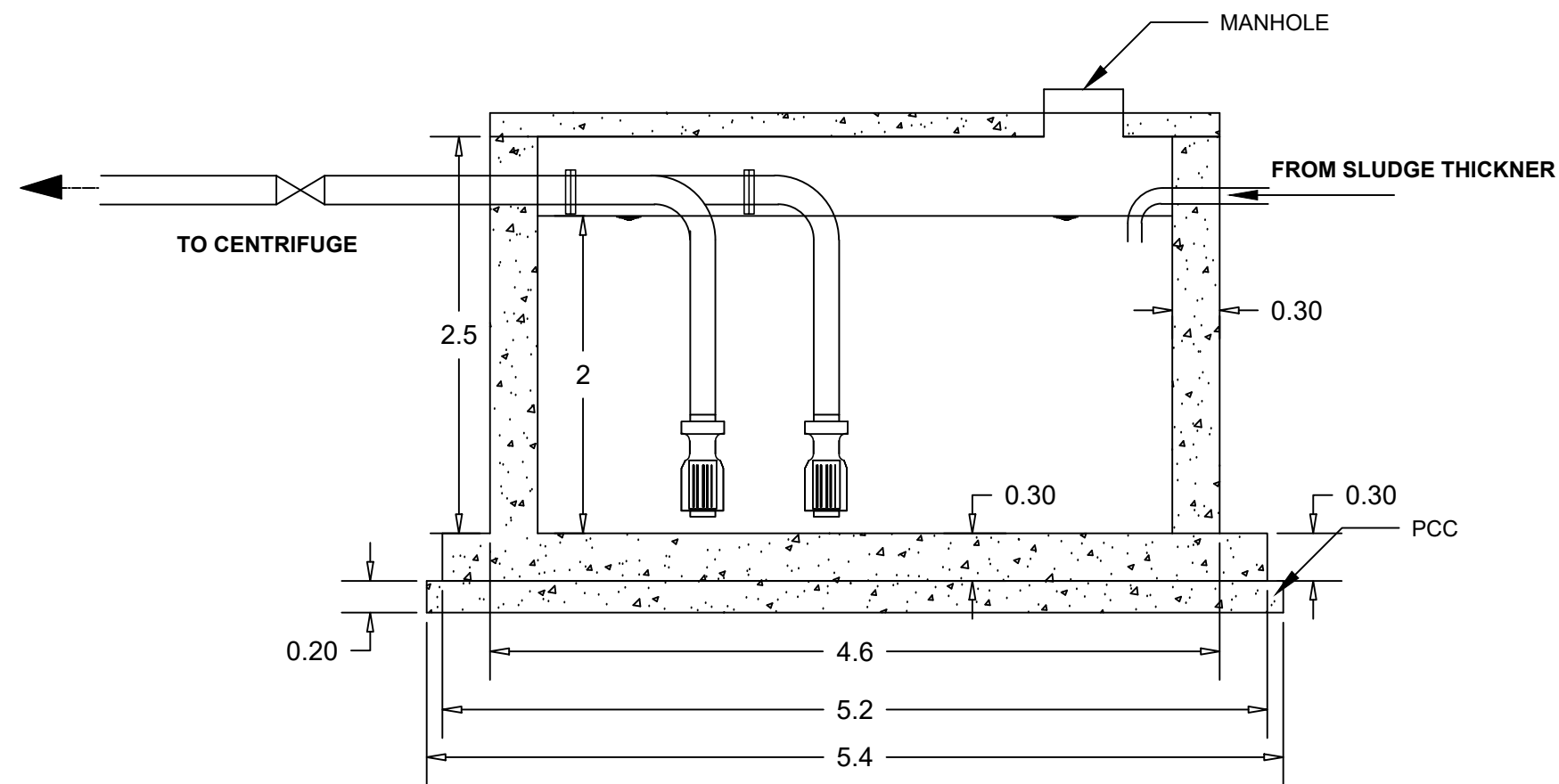
DRAWING TITLE

SLUDGE THICKNER

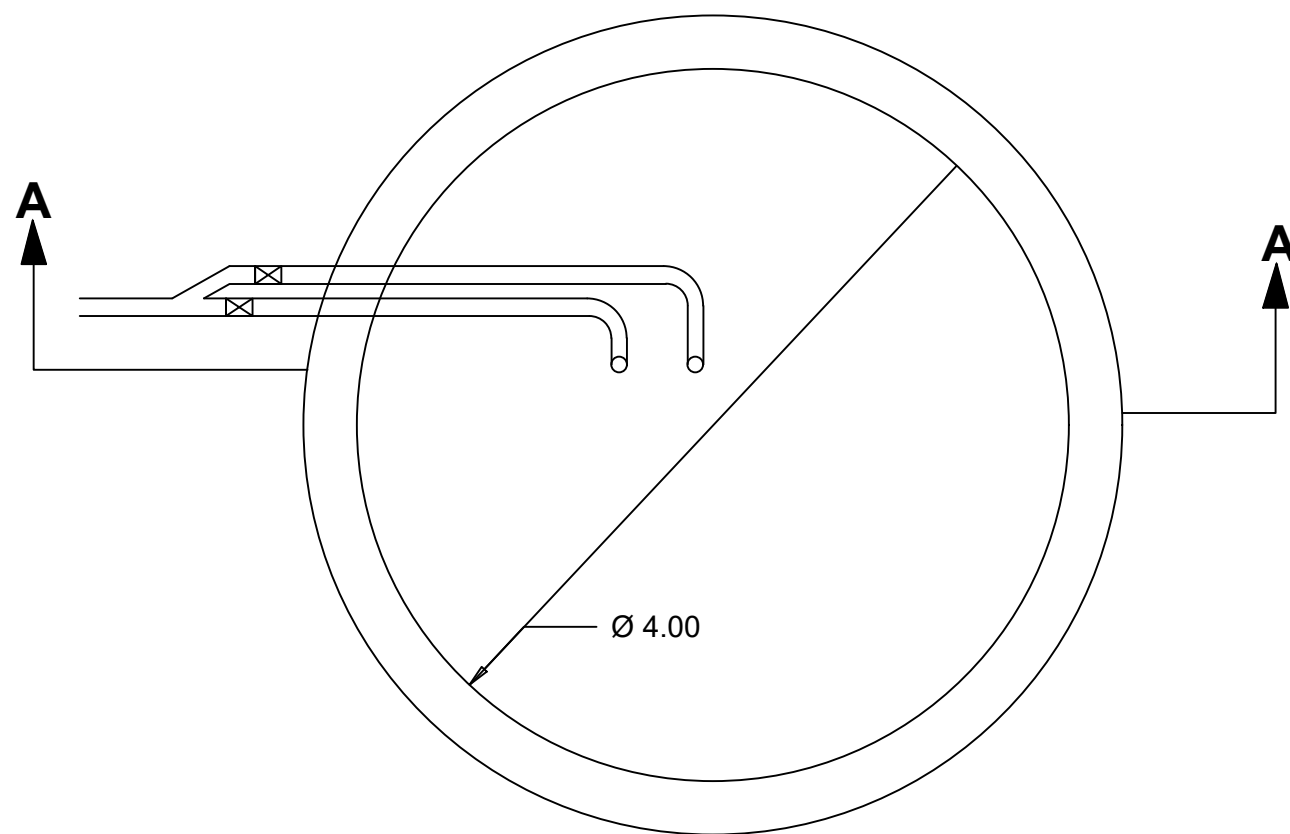
10/MANANTHAVADY/ZONE 1

Not in scale

AE	AEE	EE	SE	CE



SECTION AA



PLAN

GENERAL NOTES

- ALL DIMENSIONS ARE IN METERS
- DIMENSIONS NOT IN SCALE
- FOR ESTIMATION PURPOSE ONLY

No.	Rivision/ Issue	Date



**PPD & SEWERAGE CIRCLE,
KERALA WATER AUTHORITY,
KOZHIKODE**

PROJECT NAME

Sewerage scheme to Mananthavady Municipality
Construction of 2MLD capacity sewage Treatment plant and laying sewerage network of Mananthavady Municipality

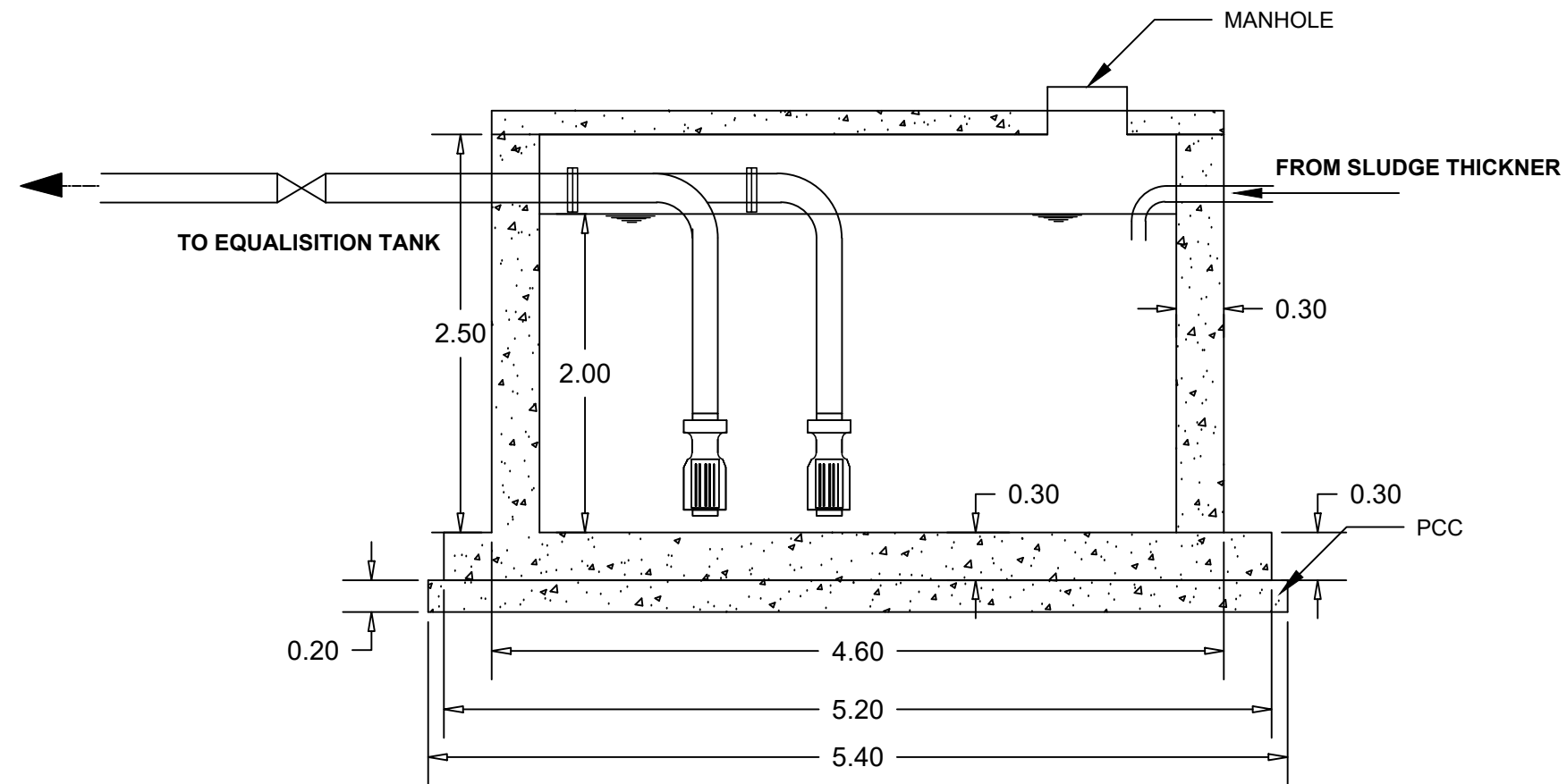
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THICKNED SLUDGE SUMP

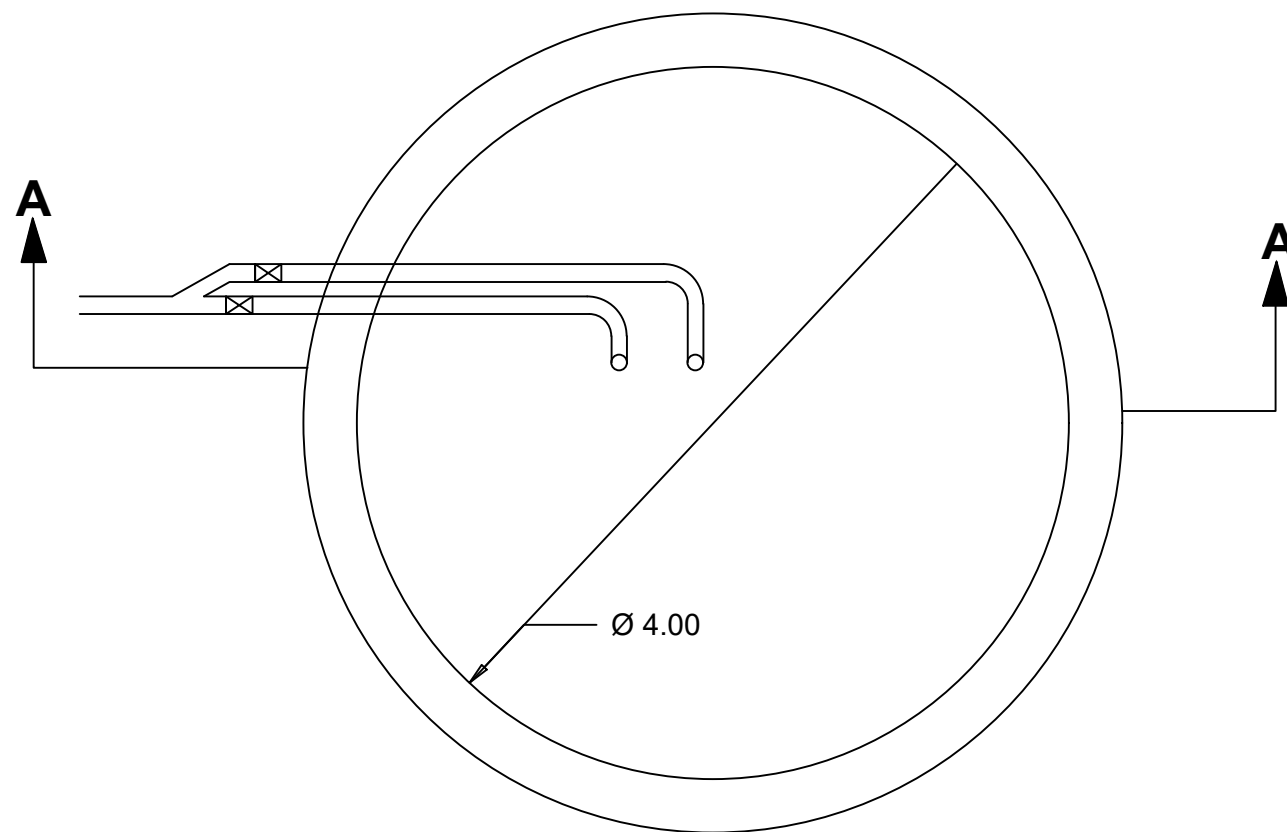
11/MANANTHAVADY/ZONE 1

Not in scale

AE	AEE	EE	SE	CE



SECTION AA



PLAN

GENERAL NOTES

- ALL DIMENSIONS ARE IN METERS
- DIMENSIONS NOT IN SCALE
- FOR ESTIMATION PURPOSE ONLY

No.	Rivision/ Issue	Date



**PPD & SEWERAGE CIRCLE,
KERALA WATER AUTHORITY,
KOZHIKODE**

PROJECT NAME

Sewerage scheme to Mananthavady
Municipality
Construction of 2MLD capacity sewage
Treatment
plant and laying sewerage network of
Mananthavady Municipality

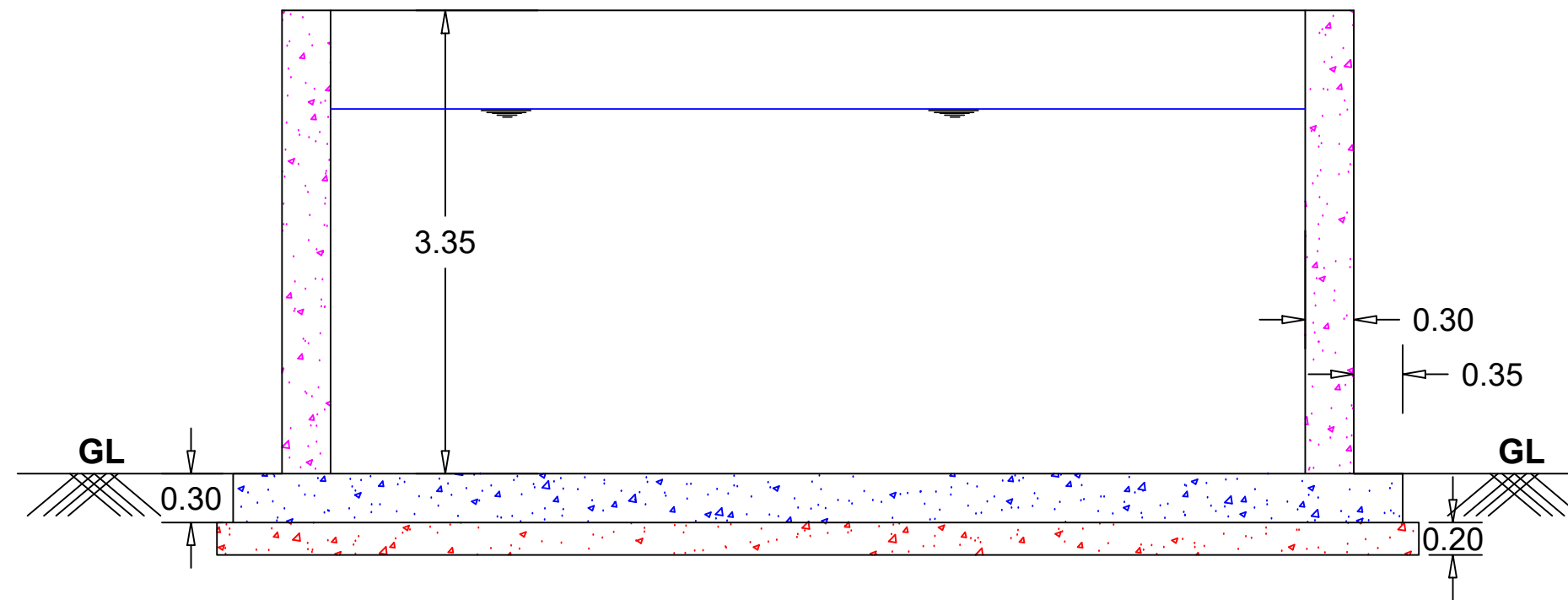
DRAWING TITLE

CENTRATE SUMP

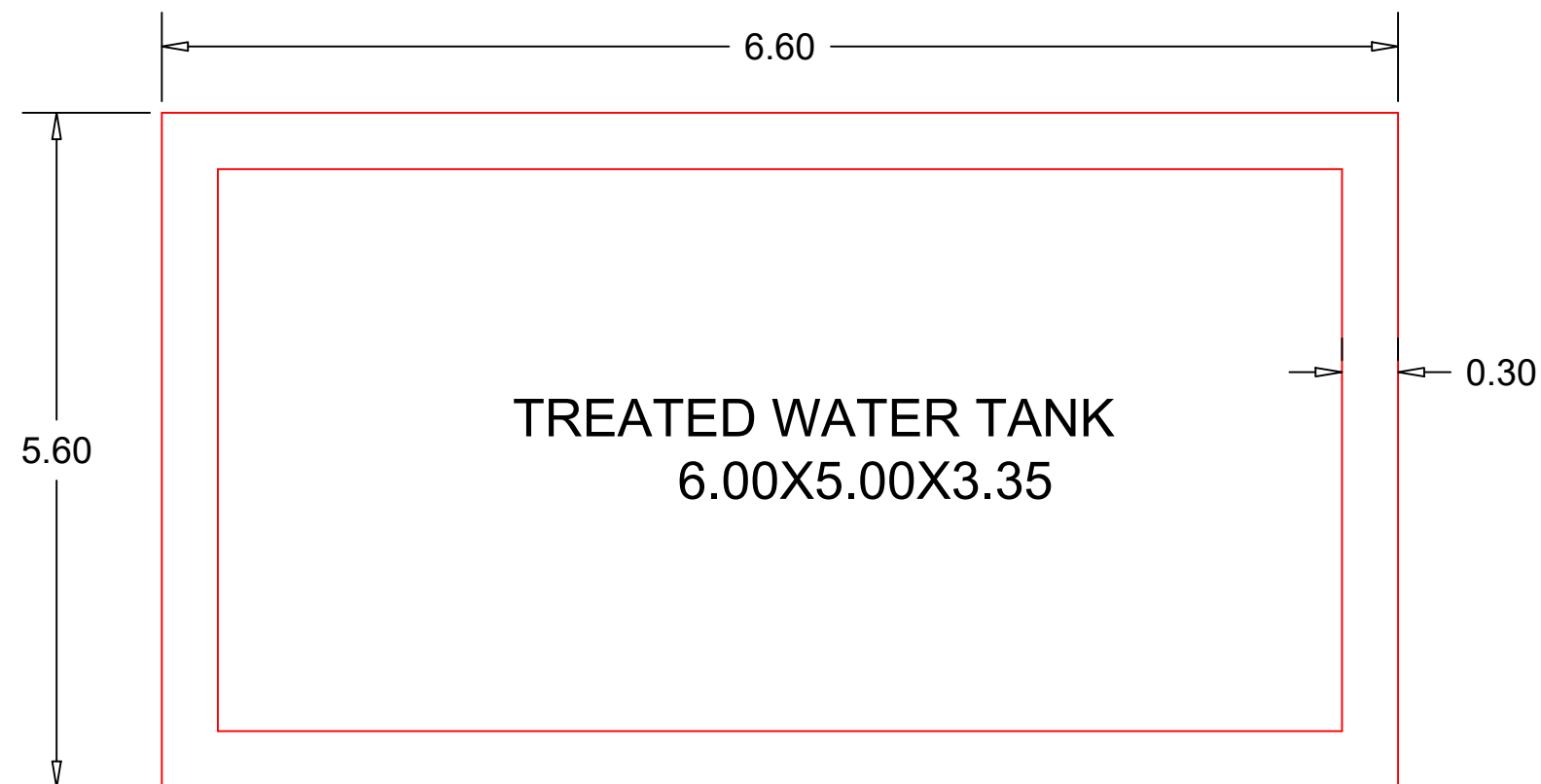
12/MANANTHAVADY/ZONE 1

Not in scale

AE	AEE	EE	SE	CE



SECTION



PLAN

GENERAL NOTES

- ALL DIMENSIONS ARE IN METERS
- DIMENSIONS NOT IN SCALE
- FOR ESTIMATION PURPOSE ONLY

No.	Rivision/ Issue	Date



PPD & SEWERAGE CIRCLE,
KERALA WATER AUTHORITY,
KOZHIKODE

PROJECT NAME

Sewerage scheme to Mananthavady
Municipality
Construction of 2MLD capacity sewage
Treatment
plant and laying sewerage network of
Mananthavady Municipality

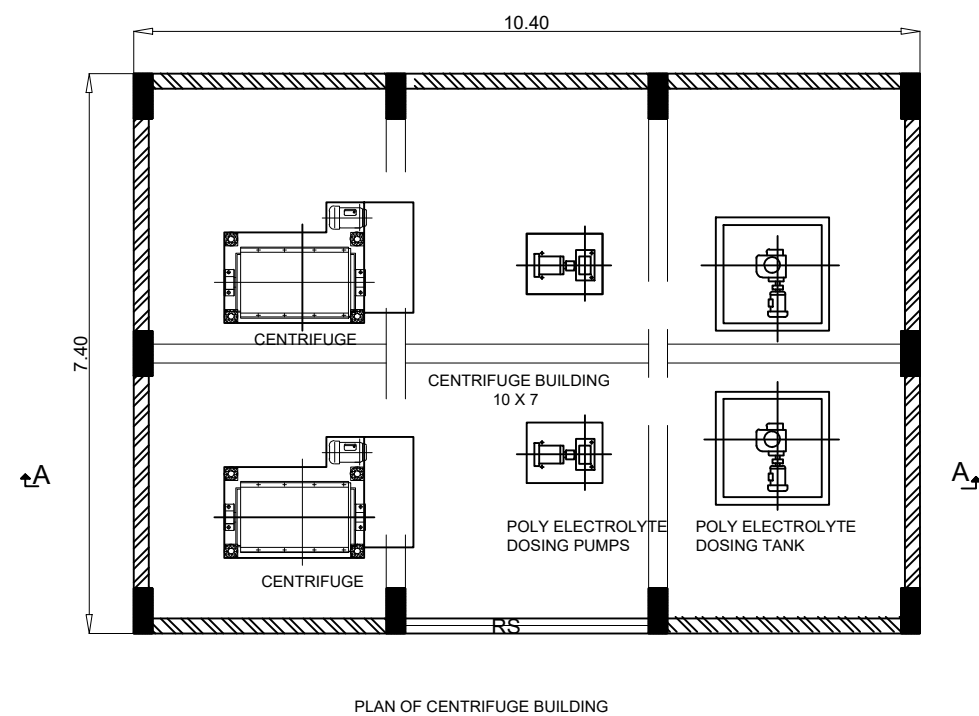
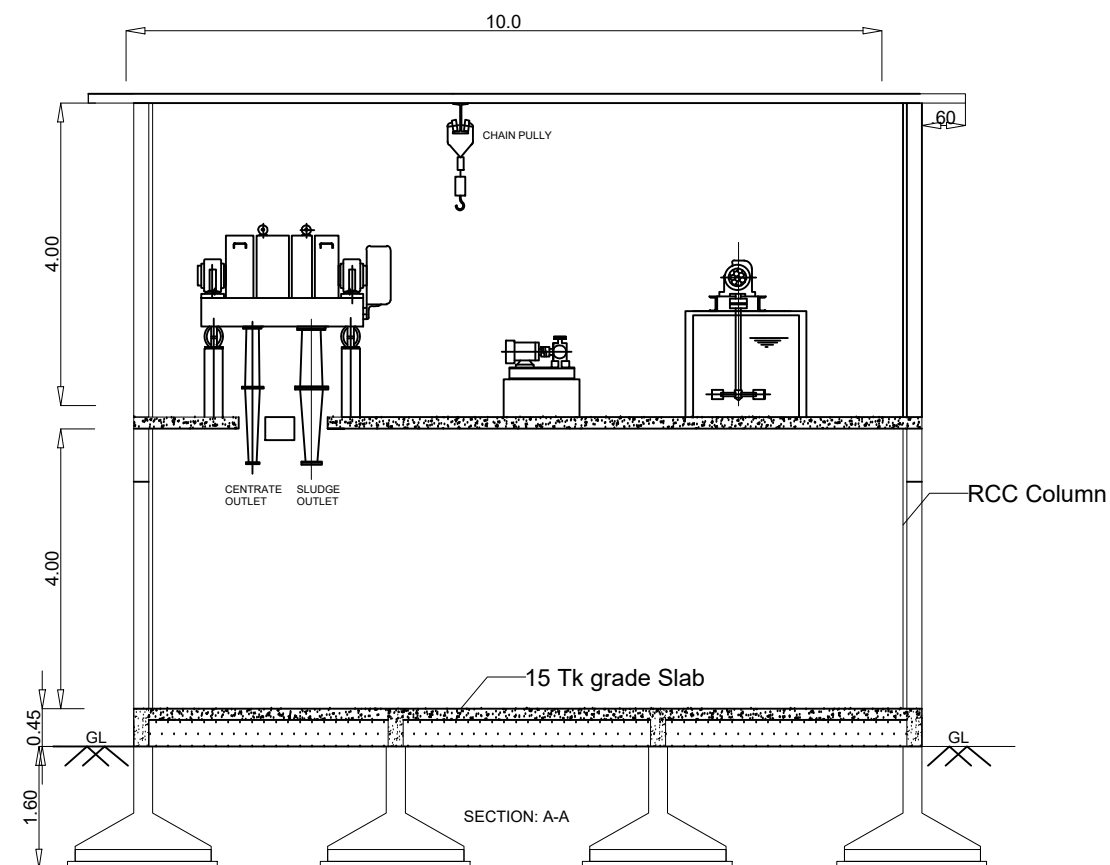
DRAWING TITLE

TREATED WATER TANK

13/MANANTHAVADY/ZONE 1

Not in scale

AE	AEE	EE	SE	CE



GENERAL NOTES

- ALL DIMENSIONS ARE IN METERS
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- FOR ESTIMATION PURPOSE ONLY

No.	Rivision/ Issue	Date



**PPD & SEWERAGE CIRCLE,
KERALA WATER AUTHORITY,
KOZHIKODE**

PROJECT NAME

Sewerage scheme to Mananthavady
Municipality
Construction of 2MLD capacity sewage
Treatment
plant and laying sewerage network of
Mananthavady Municipality

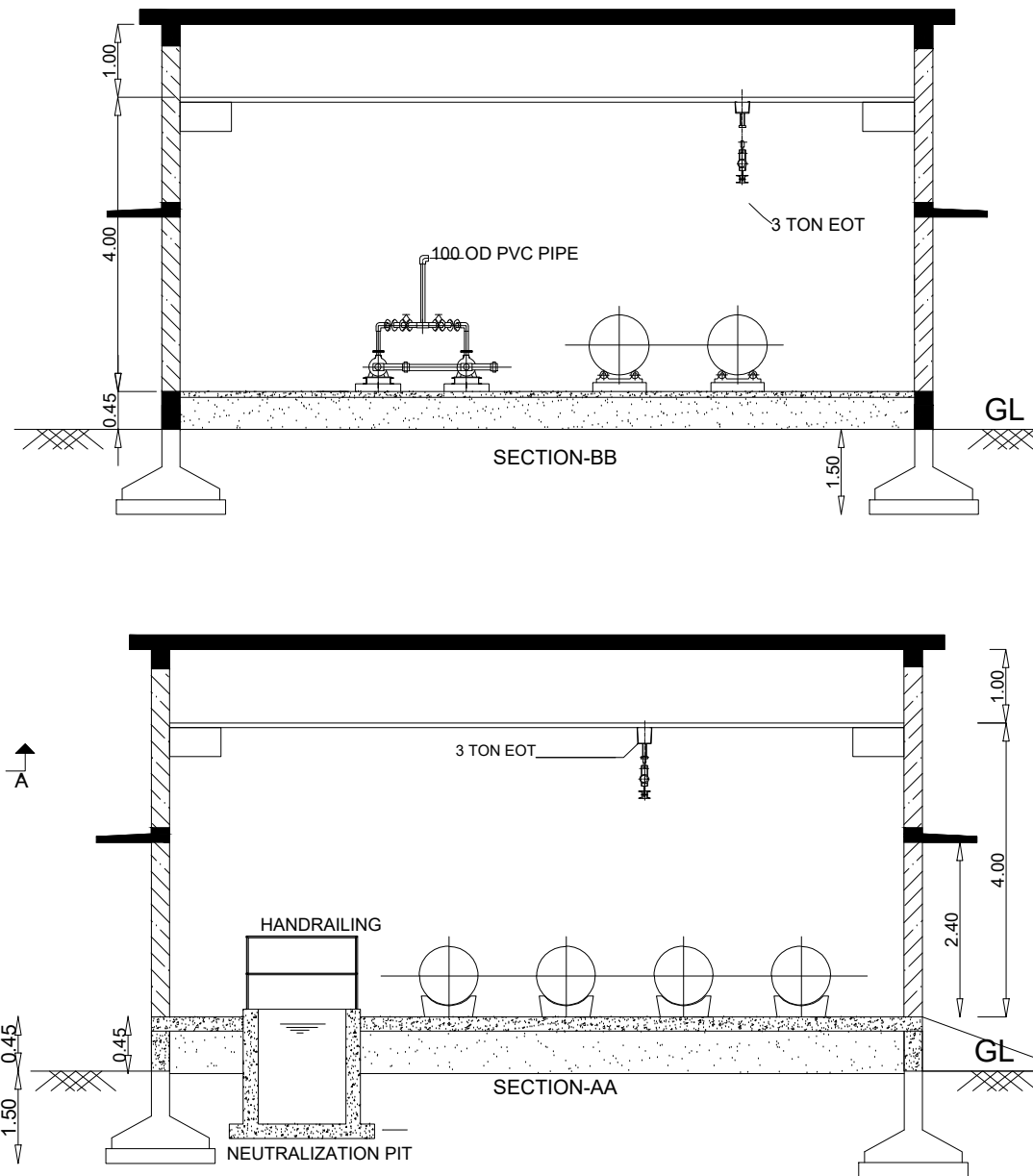
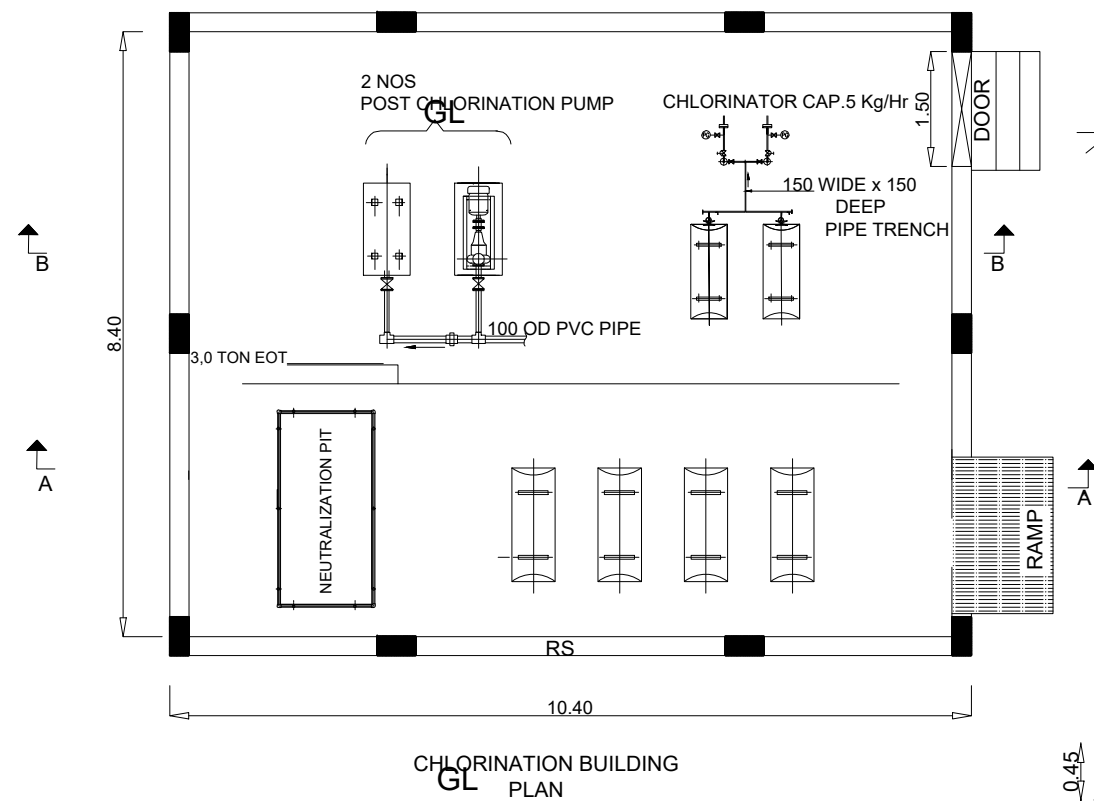
DRAWING TITLE

CENTRIFUGE BUILDING

14/MANANTHAVADY/ZONE 1

Not in scale

AE	AEE	EE	SE	CE



GENERAL NOTES

- ALL DIMENSIONS ARE IN METERS
- DIMENSIONS NOT IN SCALE
- FOR ESTIMATION PURPOSE ONLY

No.	Rivision/ Issue	Date



PPD & SEWERAGE CIRCLE,
KERALA WATER AUTHORITY,
KOZHIKODE

PROJECT NAME

Sewerage scheme to Mananthavady Municipality
Construction of 2MLD capacity sewage Treatment plant and laying sewerage network of Mananthavady Municipality

DRAWING TITLE

CHLORINATION ROOM

15/MANANTHAVADY/ZONE 1

Not in scale

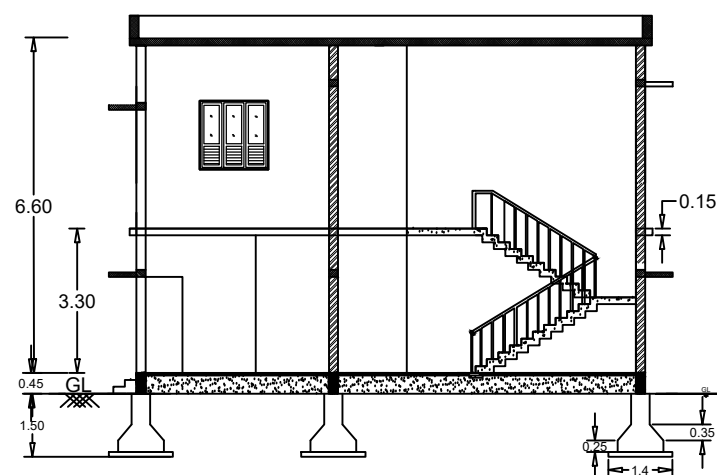
AE	AEE	EE	SE	CE



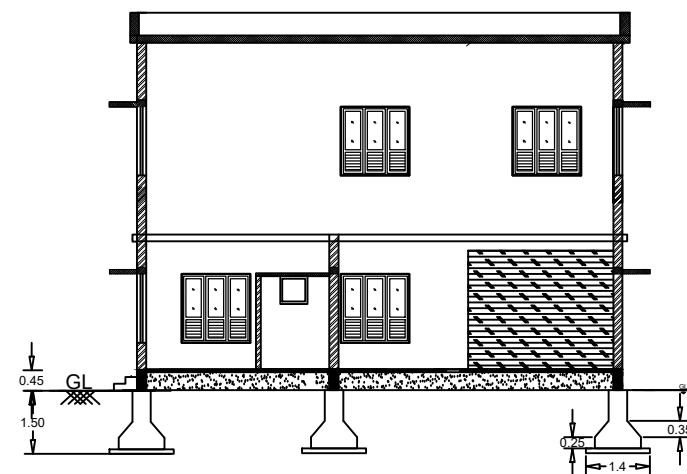
FRONT ELEVATION



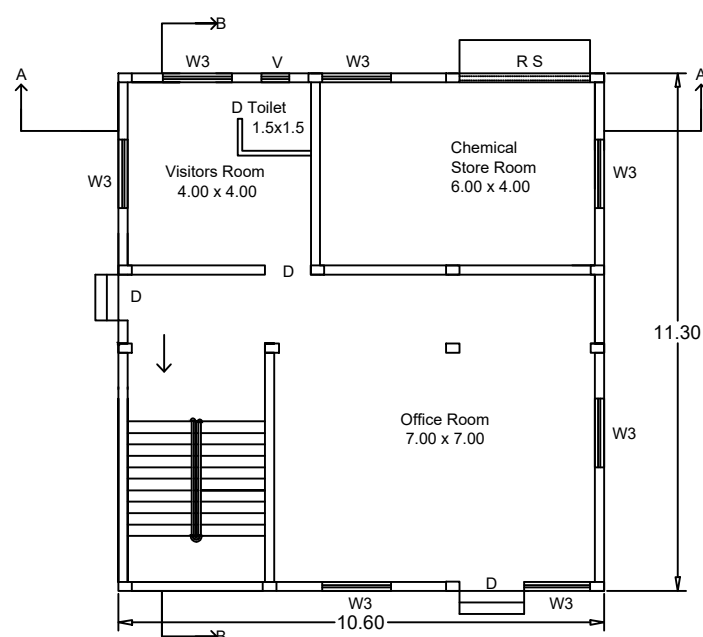
SIDE ELEVATION



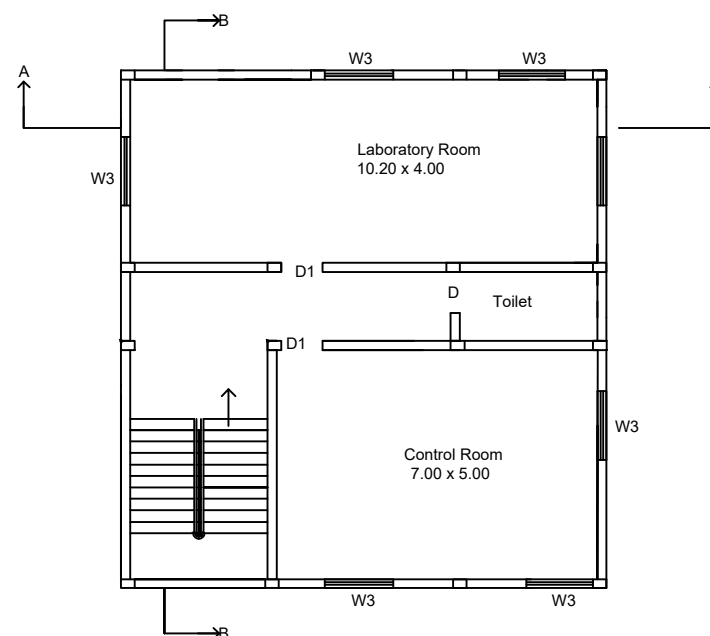
SECTION BB



SECTION BB



GROUND FLOOR PLAN



FIRST FLOOR PLAN

GENERAL NOTES

- ALL DIMENSIONS ARE IN METERS
- DIMENSIONS NOT IN SCALE
- FOR ESTIMATION PURPOSE ONLY

No.	Revision/ Issue	Date



PPD & SEWERAGE CIRCLE,
KERALA WATER AUTHORITY,
KOZHIKODE

PROJECT NAME

Sewerage scheme to Mananthavady
Municipality
Construction of 2MLD capacity sewage
Treatment
plant and laying sewerage network of
Mananthavady Municipality

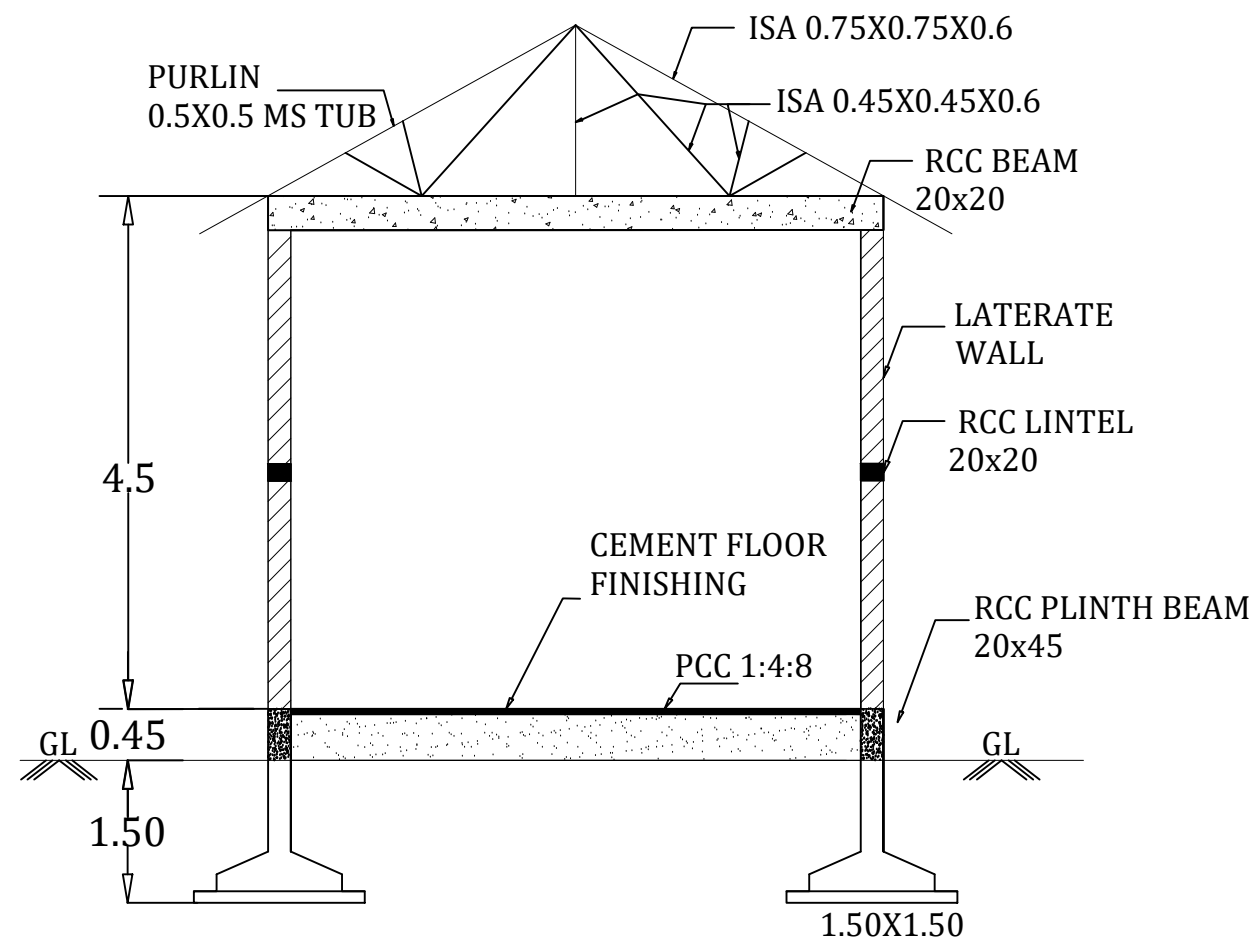
DRAWING TITLE

ADMINISTRATIVE BUILDING
MCC AND LAB

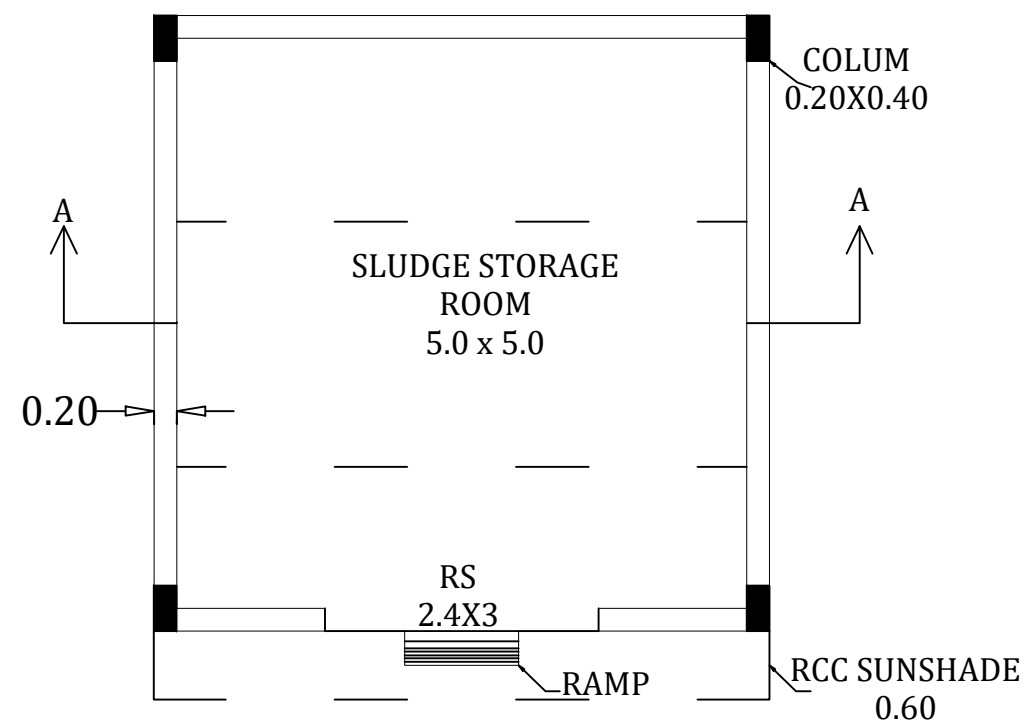
17/MANANTHAVADY/ZONE 1

Not in scale

AE	AEE	EE	SE	CE



SECTION



PLAN

GENERAL NOTES

- ALL DIMENSIONS ARE IN METERS
- DIMENSIONS NOT IN SCALE
- FOR ESTIMATION PURPOSE ONLY

No.	Revision/ Issue	Date



**PPD & SEWERAGE CIRCLE,
KERALA WATER AUTHORITY,
KOZHIKODE**

PROJECT NAME

Sewerage scheme to Mananthavady Municipality
Construction of 2MLD capacity sewage Treatment plant and laying sewerage network of Mananthavady Municipality

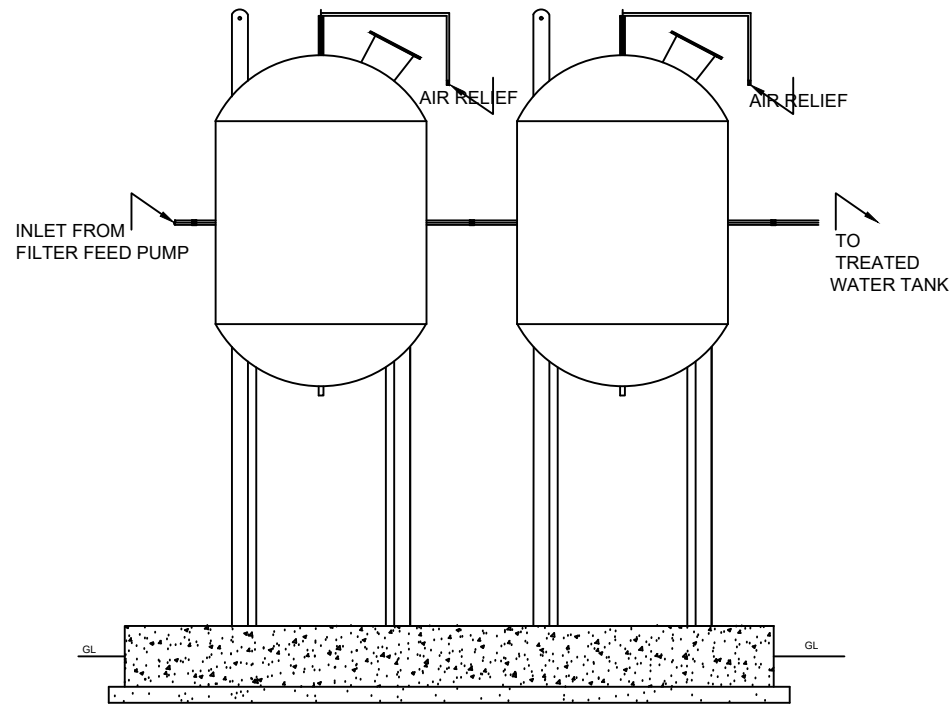
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SLUDGE STORAGE ROOM

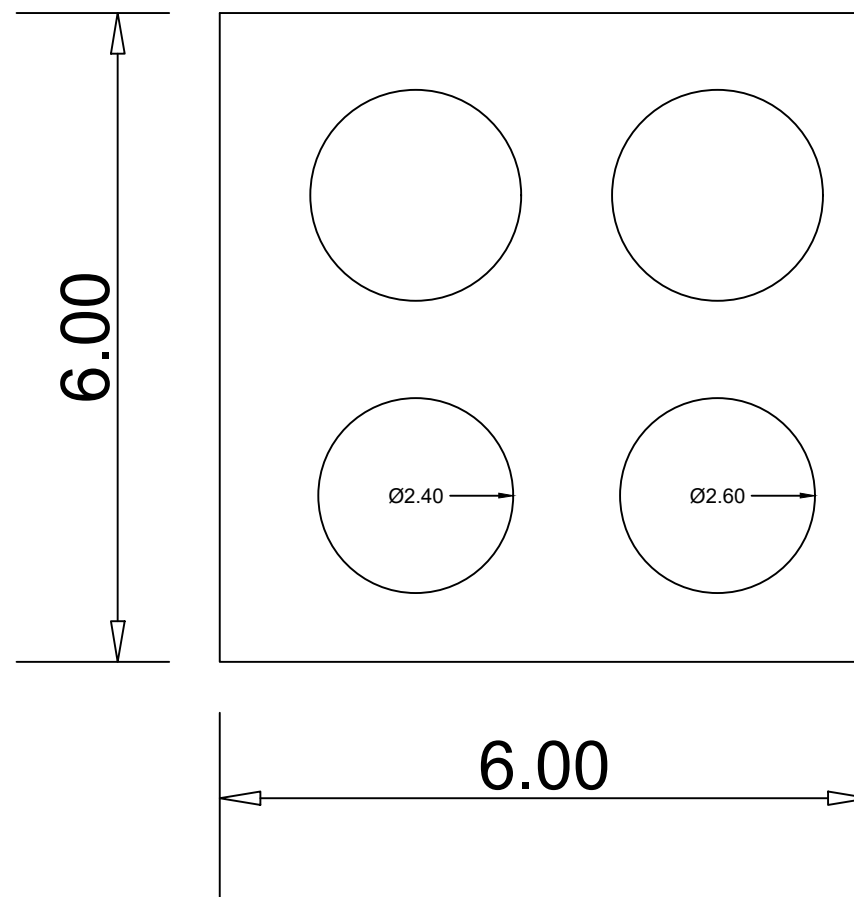
18/MANANTHAVADY/ZONE 1

Not in scale

AE	AEE	EE	SE	CE



SECTION A A



PLAN

GENERAL NOTES

- ALL DIMENSIONS ARE IN METERS
- DIMENSIONS NOT IN SCALE
- FOR ESTIMATION PURPOSE ONLY

No.	Rivision/ Issue	Date



**PPD & SEWERAGE CIRCLE,
KERALA WATER AUTHORITY,
KOZHIKODE**

PROJECT NAME

Sewerage scheme to Mananthavady
Municipality
Construction of 2MLD capacity sewage
Treatment
plant and laying sewerage network of
Mananthavady Municipality

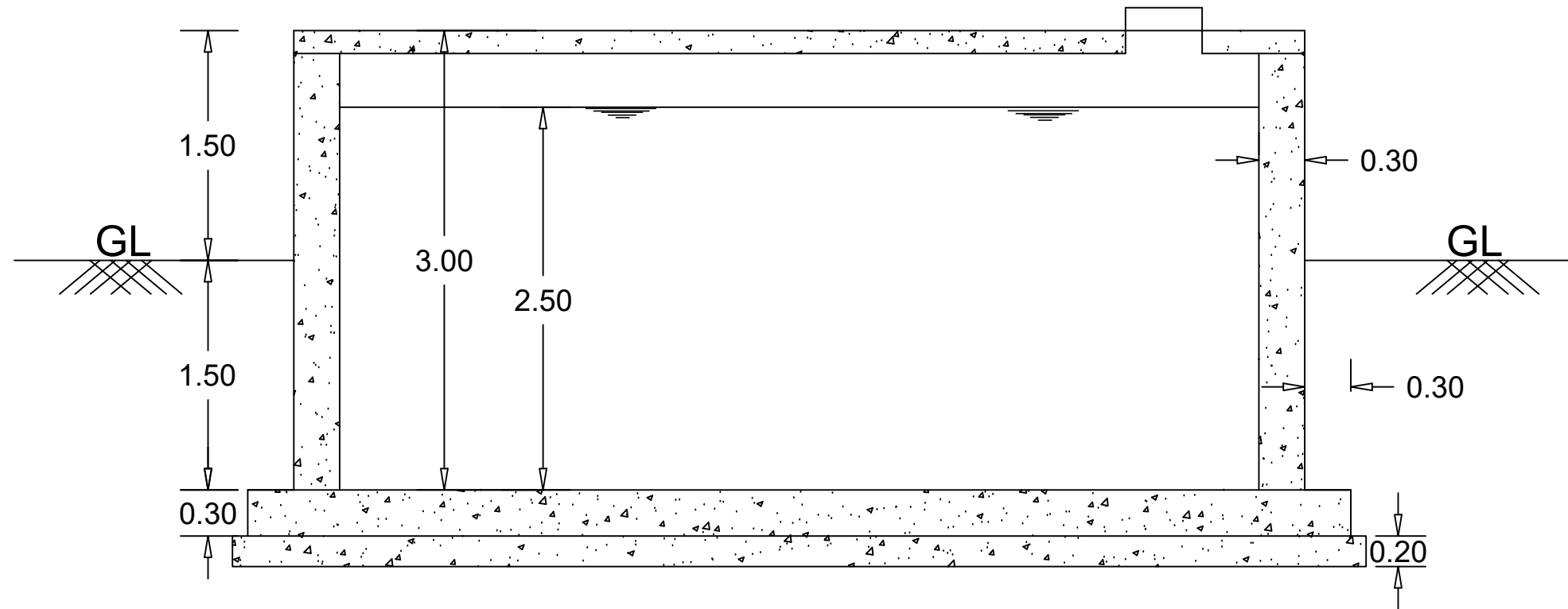
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PSF/ACF/ UNIT

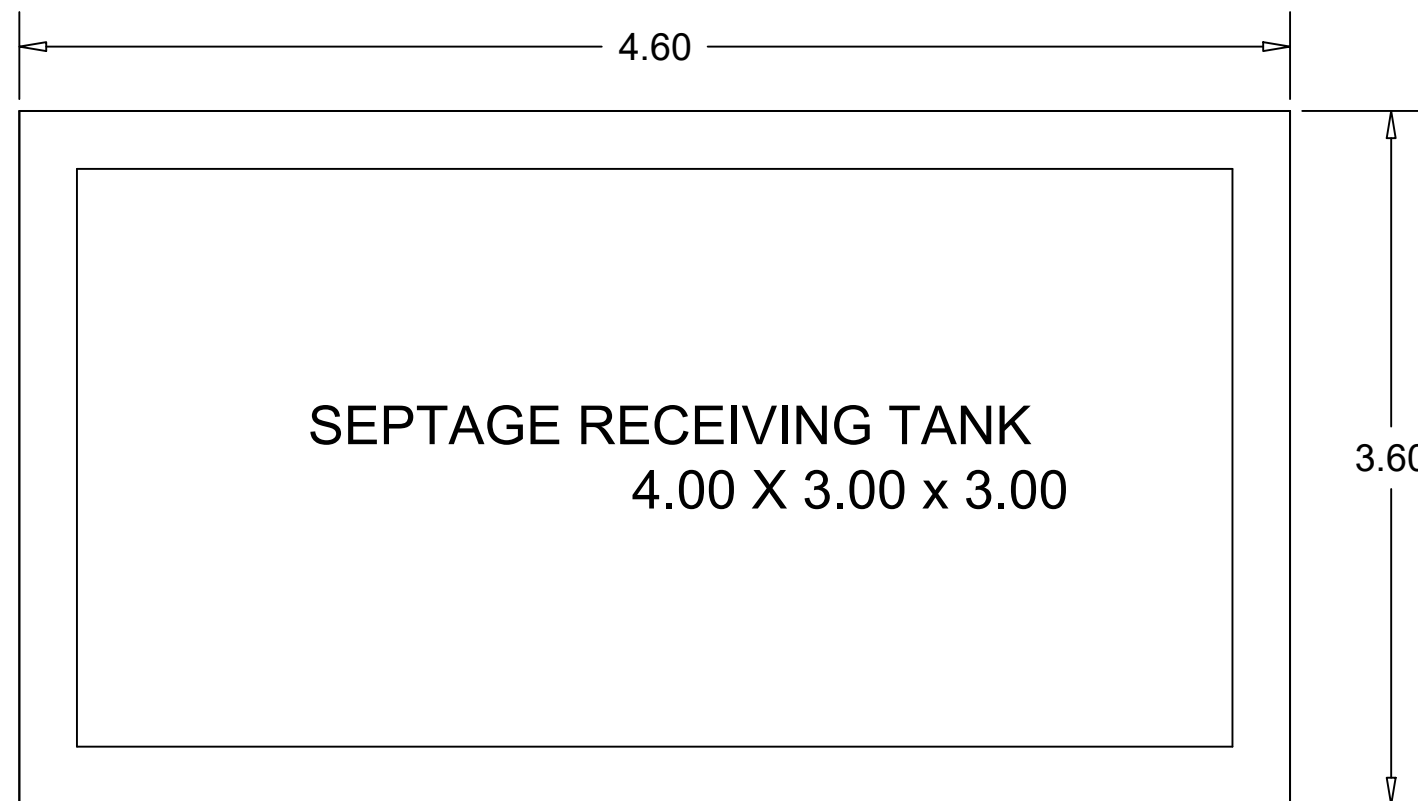
19/MANANTHAVADY/ZONE 1

Not in scale

AE	AEE	EE	SE	CE



SECTION



PLAN

GENERAL NOTES

- ALL DIMENSIONS ARE IN METERS
- DIMENSIONS NOT IN SCALE
- FOR ESTIMATION PURPOSE ONLY

No.	Rivision/ Issue	Date



PPD & SEWERAGE CIRCLE,
KERALA WATER AUTHORITY,
KOZHIKODE

PROJECT NAME

Sewerage scheme to Mananthavady
Municipality
Construction of 2MLD capacity sewage
Treatment
plant and laying sewerage network of
Mananthavady Municipality

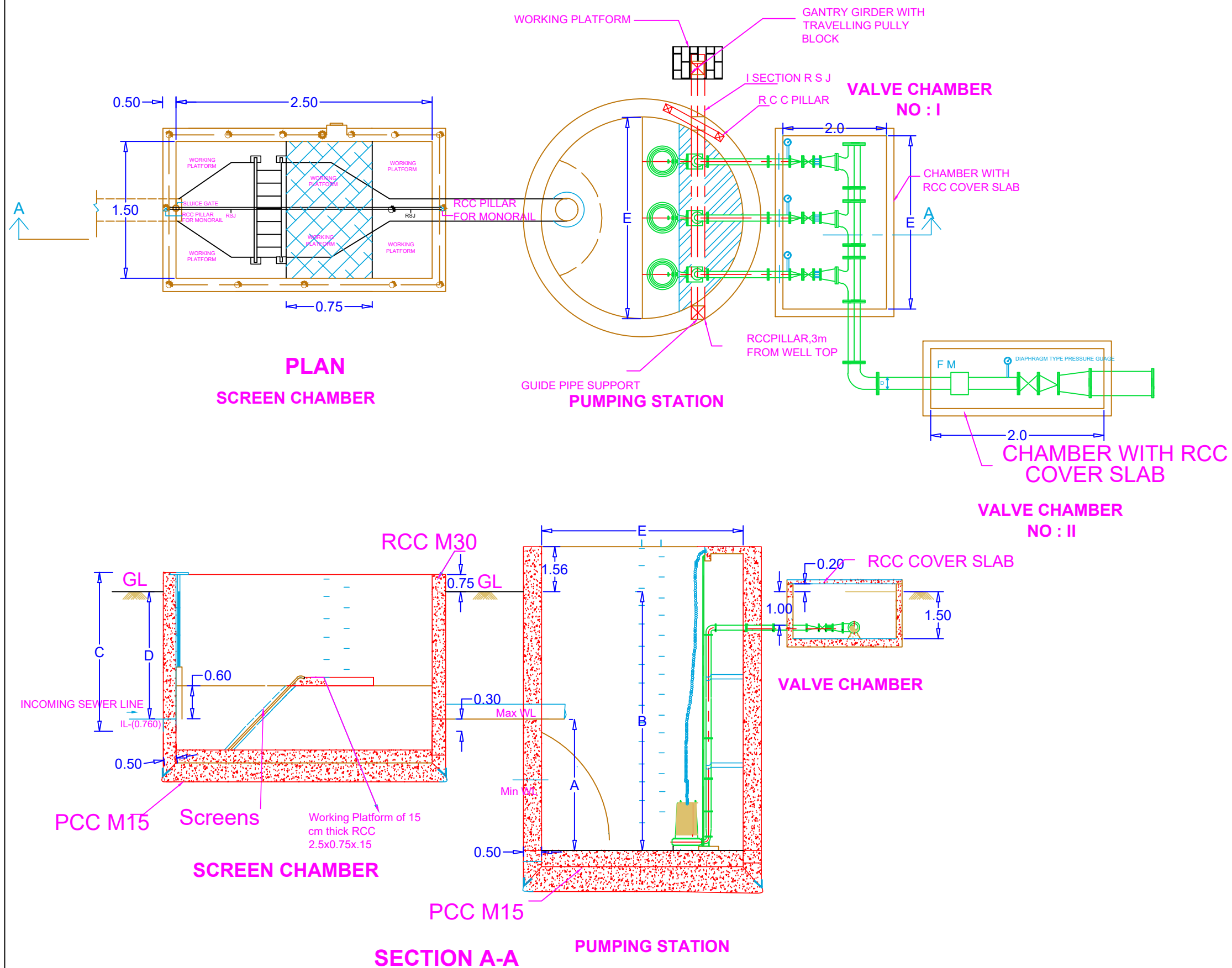
DRAWING TITLE

SEPTAGE RECEIVING TANK

22/MANANTHAVADY/ZONE 1

Not in scale

AE	AEE	EE	SE	CE



GENERAL NOTES

- ALL DIMENSIONS ARE IN METERS
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No.	Revision/ Issue	Date



PPD & SEWERAGE CIRCLE,
KERALA WATER AUTHORITY,
KOZHIKODE

PROJECT NAME

Sewerage scheme to Mananthavady
Municipality
Construction of 2MLD capacity sewage
Treatment
plant and laying sewerage network of
Mananthavady Municipality

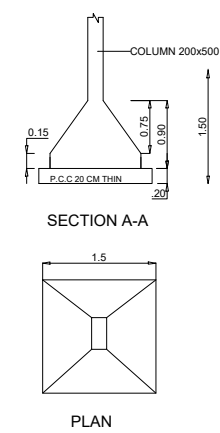
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GENERAL ARRANGEMENT OF
PUMPING STATION

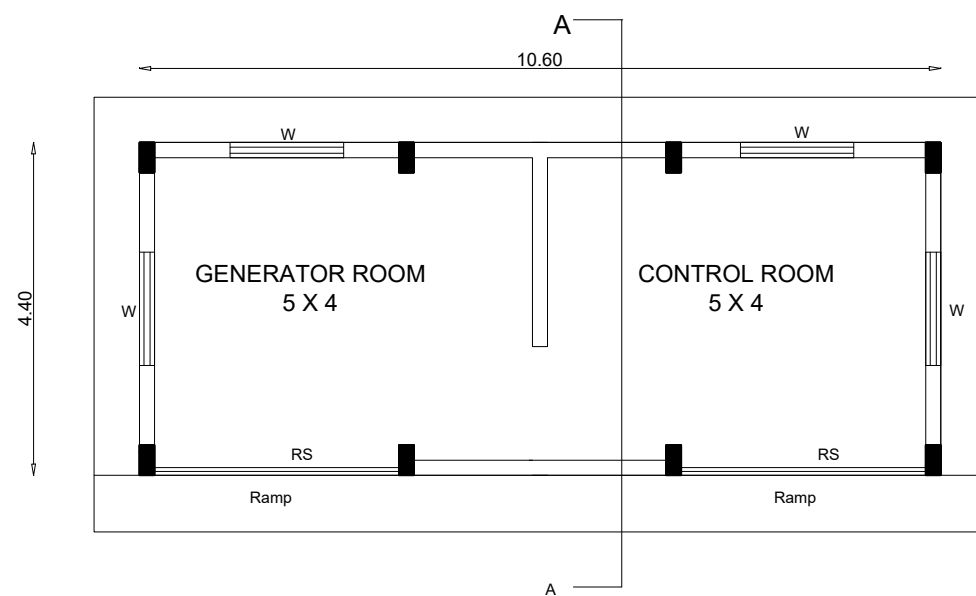
A/MANANTHAVADY/ZONE 1

Not in scale

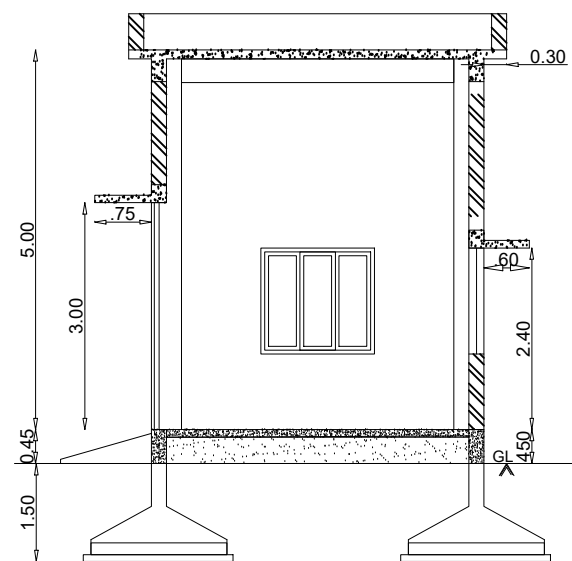
AE	AEE	EE	SE	CE



AE	AEE	EE	SE	CE



PLAN OF GENERATOR WITH CONTROL ROOM



SECTION A A

GENERAL NOTES

- ALL DIMENSIONS ARE IN METERS
- DIMENSIONS NOT IN SCALE
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No.	Rivision/ Issue	Date



**PPD & SEWERAGE CIRCLE,
KERALA WATER AUTHORITY,
KOZHIKODE**

PROJECT NAME

Sewerage scheme to Mananthavady Municipality
Construction of 2MLD capacity sewage Treatment plant and laying sewerage network of Mananthavady Municipality

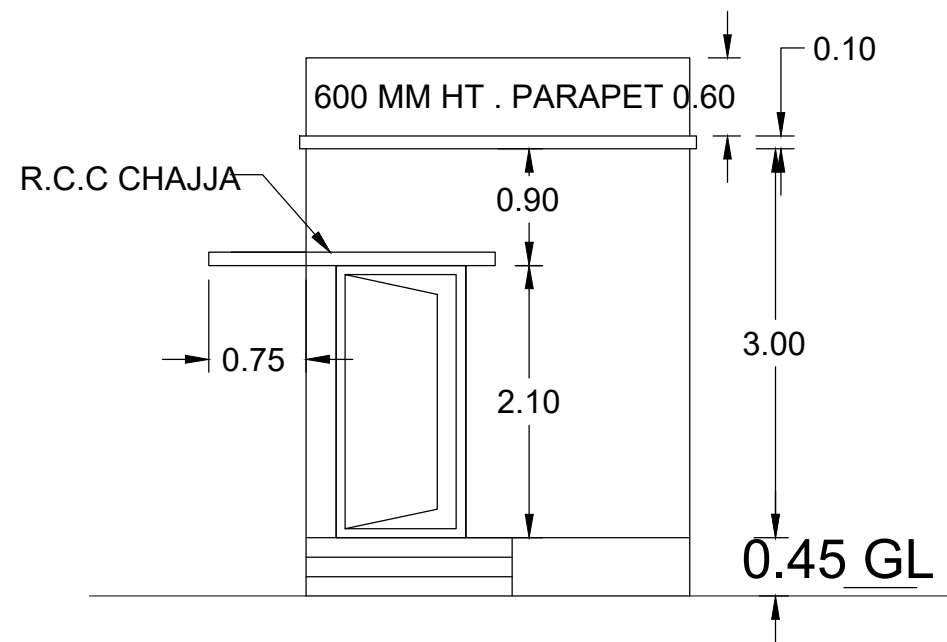
DRAWING TITLE

GENERATOR WITH CONTROL ROOM

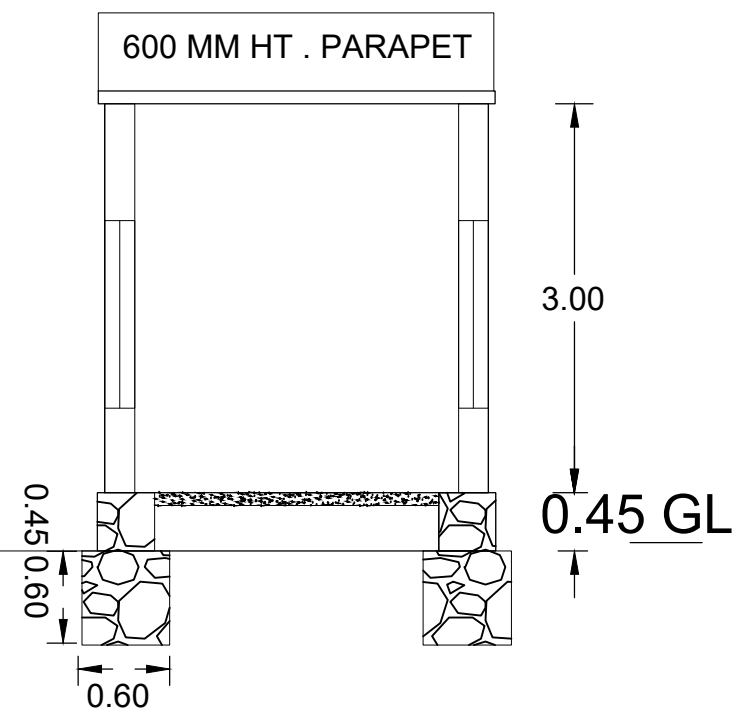
/MANANTHAVADY/ZONE 1

Not in scale

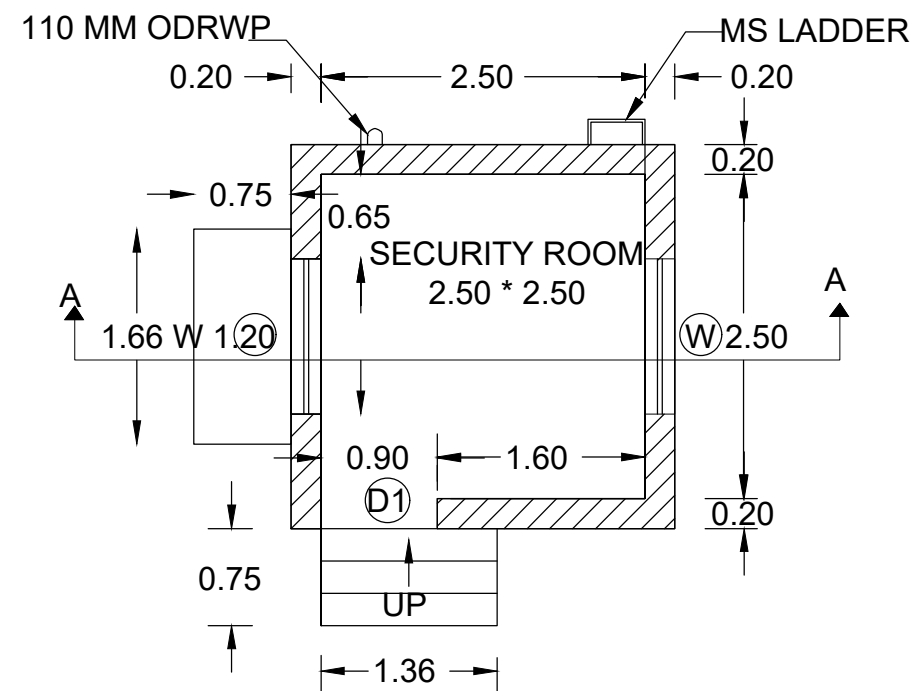
AE	AEE	EE	SE	CE



ELEVATION



SECTION



PLAN

GENERAL NOTES

- ALL DIMENSIONS ARE IN METERS
- DIMENSIONS NOT IN SCALE
- FOR ESTIMATION PURPOSE ONLY

No.	Rivision/ Issue	Date



**PPD & SEWERAGE CIRCLE,
KERALA WATER AUTHORITY,
KOZHIKODE**

PROJECT NAME

Sewerage scheme to Mananthavady
Municipality
Construction of 2MLD capacity sewage
Treatment
plant and laying sewerage network of
Mananthavady Municipality

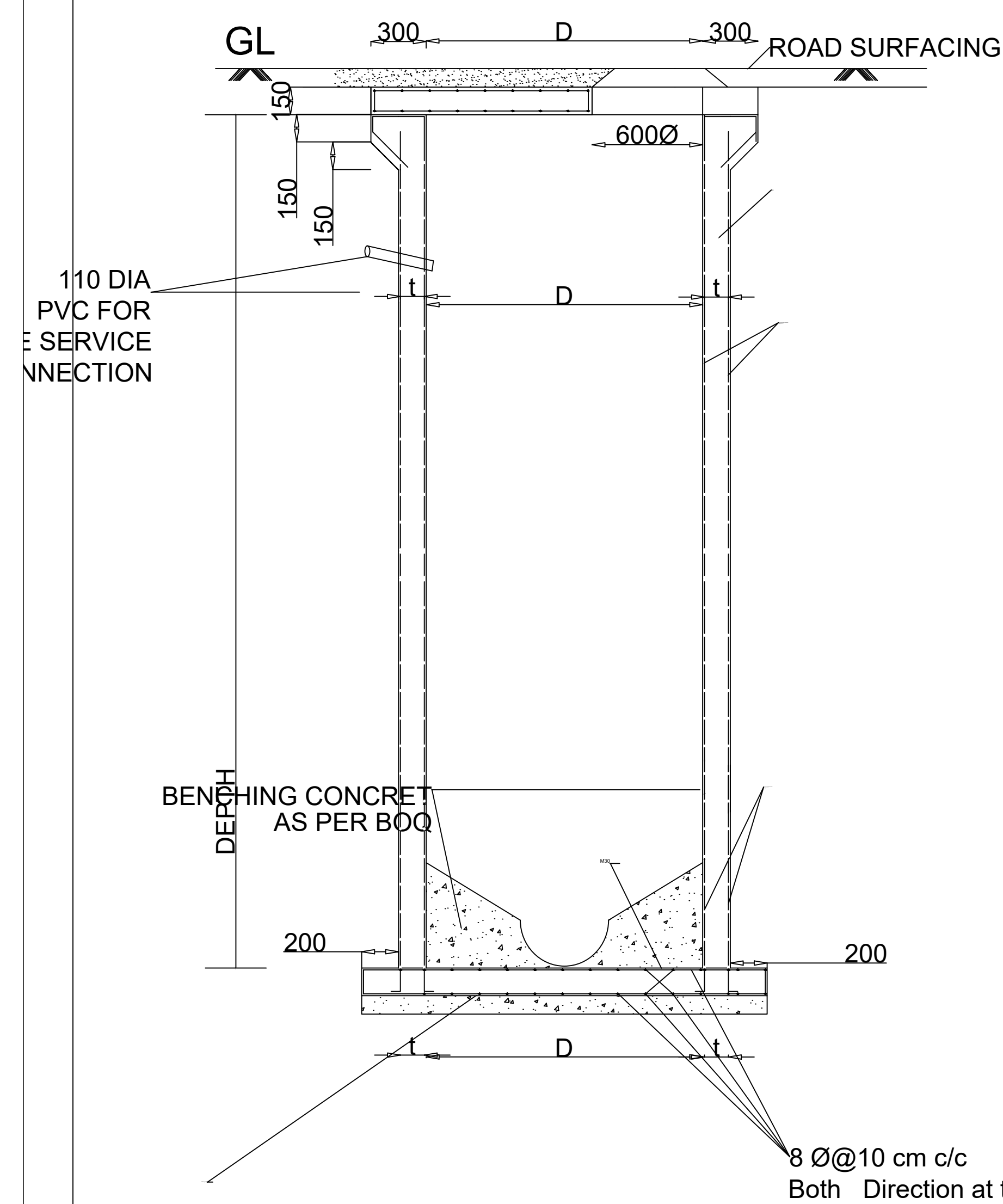
DRAWING TITLE

SECURITY ROOM

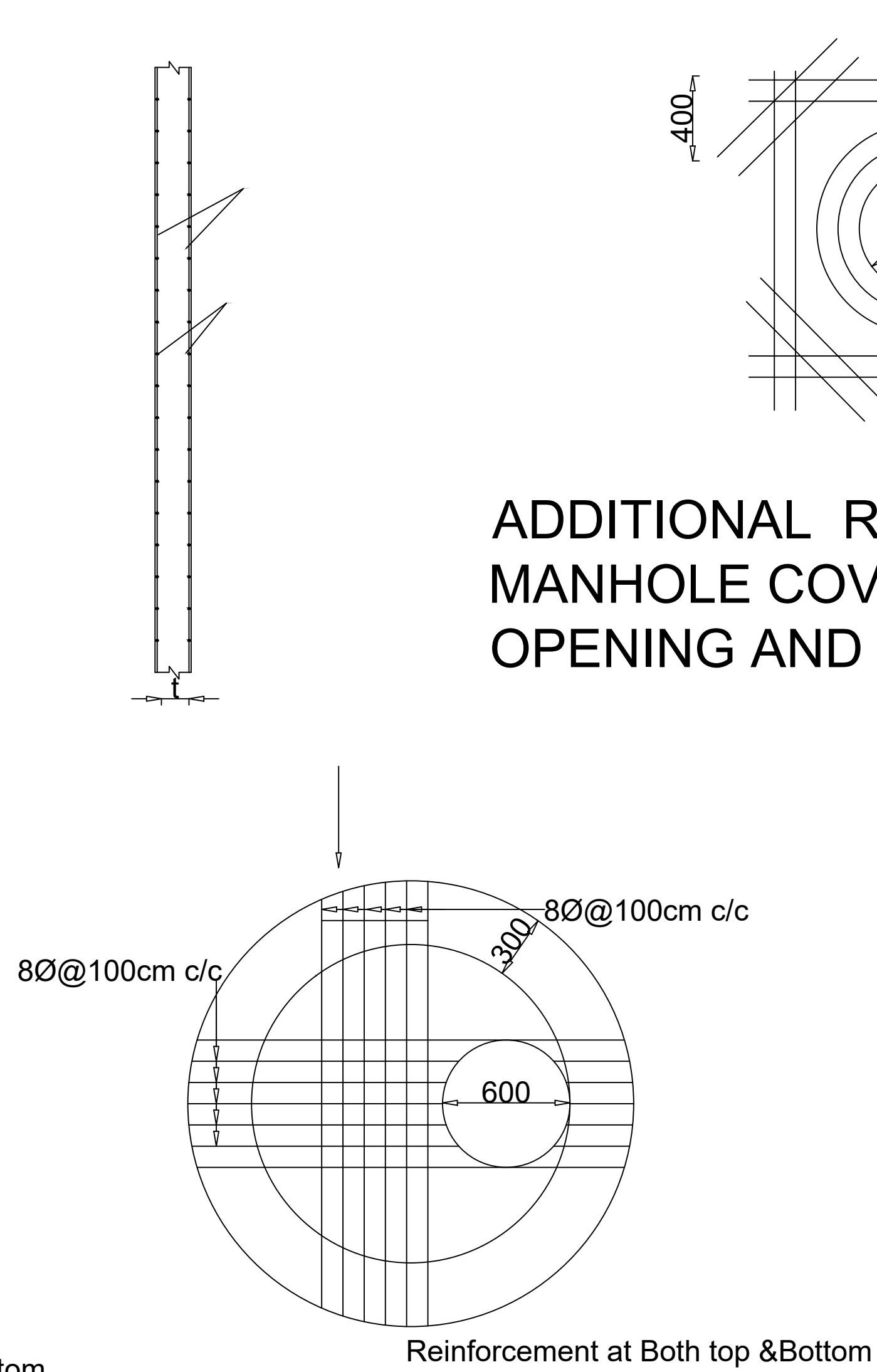
Date

Not in scale

AE	AEE	EE	SE	CE



SECTION



COVER SLAB

ADDITIONAL REINFORCEMENT AROUND MANHOLE COVER OPENING ,INLET OPENING AND OUTLET OPENING

GENERAL NOTES

- ALL DIMENSIONS ARE IN METERS
- DIMENSIONS NOT IN SCALE
- FOR ESTIMATION PURPOSE ONLY

DEPTH,H,(m)	DIA,D(m)	THICKNESS T(mm)
<1.5	1.2	150
1.5 to 2.5	1.2	150
2.5 to 6.0	1.5	200
6.0 to 7.5	1.8	250

No.	Rivision/ Issue	Date



PPD & SEWERAGE CIRCLE,
KERALA WATER AUTHORITY,
KOZHIKODE

PROJECT NAME

Sewerage scheme to Mananthavady
Municipality
Construction of 2MLD capacity sewage
Treatment
plant and laying sewerage network of
Mananthavady Municipality

DRAWING TITLE

TYPICAL MANHOLE DETAILS

C /MANANTHAVADY /ZONE 1

Not in scale

AE	AEE	EE	SE	CE

NETWORK LAYOUT

