LOCAL GOVERNMENT & COMMUNITY DEVELOPMENT DEPARTMENT

PUNJAB CITIES PROGRAM

AMENDED PC-I FORM

FOR

IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA CITY

ESTIMATED COST: RS 1483.63 MILLION

November 2023

Municipal Committee Kamalia

Punjab Cities Program
PC-I Form
Improvement of Sewerage System in Kamalia City
Table of contents

PC-I FORM
for
Improvement of Sewerage System in Kamalia City

Project Serial Number

Sector: Local Government & Community Development Department
Sub Sector: Social

<table>
<tr><td>1. Name of the project</td><td>Punjab Cities Program
Improvement of Sewerage System and Construction of Wastewater Treatment Plant (WWTP) Kamalia City</td></tr>
<tr><td>2.Location</td><td>Kamalia is situated 18 KM from Rajhana 34 KM from District Toba Tek Singh, 15 KM from Tehsil Pirmahal and 37 KM from Chichawatni. It is 14 KM away from M-4 Rajhana Interchange.

Location Map of the city is attached as Annexure-A</td></tr>
<tr><td colspan="2">3. Authorities responsible for</td></tr>
<tr><td>i- Sponsoring</td><td>Government of the Punjab (through World Bank funding)</td></tr>
<tr><td>ii- Execution</td><td>Municipal Committee Kamalia City</td></tr>
<tr><td>iii- Operation and Maintenance</td><td>Municipal Committee Kamalia City</td></tr>
<tr><td>iv-Concerned Provincial Department</td><td>Local Government and Community Development Department Punjab (LG & CD Department)</td></tr>
<tr><td>4a. Plan Provision</td><td></td></tr>
<tr><td>i. If the project is included in medium term/five-year plan, specify actual allocation</td><td>Punjab Cities Program (PCP) is a World Bank funded Program with a total cost of 236.00 million USD and comprises of below mentioned components.

<table>
<tr><td>Total loan from World Bank</td><td>200.00 million USD</td></tr>
<tr><td>Component-1 Infrastructure Development Program for Results (PforR)</td><td>180.00 million USD</td></tr>
<tr><td>Component-2 Technical Assistance</td><td>20.00 million USD</td></tr>
<tr><td>Municipal Committees share (20% of PforR component) equivalent to:</td><td>36.00 million USD</td></tr>
<tr><td>Total Program cost</td><td>236.00 million USD</td></tr>
</table>
The Project is funded in ADP 2023-24 at Serial No 1673 (TA component</td></tr>
</table>

		only) with current year allocation as Rs 537.66 million. Municipal Committee Kamalia City will get it due share from P4R funding depending upon the formula fixed by World Bank
ii- If not included in the current plan, what warrants its inclusion and how it is now proposed to be accommodated		Not applicable
iii If the project is proposed to be financed out of block provision indicate.		The Project is funded in ADP 2023-24 at Serial No 1673 (TA component only) with current year allocation as Rs 537.66 million (TA component only). Municipal Committee Kamalia City will get it due share from P4R funding depending upon the formula fixed by World Bank. The Project is being financed by World Bank as Donor along with 20% co-financing from the Program Municipal Committees and is not proposed to be financed out of Block Allocation.
4b- Provision in the current year PSDP/ADP		The Project is funded in ADP 2023-24 at Serial No 1673 (TA component only) with current year allocation as Rs 537.66 million
5. Project objectives and its relationship with sector objectives		**Sector Objectives** The sector objectives include: 1. Provision of efficient and effective municipality services to the masses. 2. Improvement of existing sewerage system in Kamalia City. 3. To improve existing environmental conditions by provision of wastewater treatment facilities in Kamalia City. **Objectives of the Project** The Program aims for improvement of Infrastructure of Municipal Services including Sewerage System to improve municipal service delivery. The Project comprises of the Replacement of old, outlived, damaged or worn-out components in existing infrastructure for; - ▪ The sewerage system of Kamalia was laid about 40 year ago, some sewer lines was replaced in PCP Programme. Due to ill O&M the sewerage system is not working properly. The central city is considered as low line areas, resultantly, the resident of central city facing sanitation and environmental problems. ▪ To improve the service delivery by replacement and laying of trunk sewer according to need base and topographic conditions. It will

	provide Improvement of service delivery level of the municipal services in the served areas of the city for provision of better basic urban services for improved livability of the citizen. ▪ The new system is proposed to reduce in annual O&M cost of the infrastructure due to reduced repairs in the forthcoming years because of repair or replacement of infrastructure components. ▪ The major areas like Kamalia Municipal Committee office, main bazar, Tehsil Headquarter and other areas will served with the system. Overflow on the roads are occurring resultantly, road network are damaging. Municipal Committee Kamalia spending huge funds for maintenance as well as reconstruction of road network. Municipal Wastewater has connected through open drains and this wastewater is going to the agriculture farm without any treatment. Furthermore, wastewater is also stagnating the streets, open plots and creating environmental pollution. ▪ On completion of scheme about one hundred and thirty thousand peoples will benefited with sewerage facility as well as improve the existing areas. It will cause in reduction and prompt addressal of the public complaints regarding municipal service delivery. ▪ The major areas are without sewer along the planned route of trunk sewer which will be benefited with sewerage facility and environmental condition will be improve. ▪ The provide the wastewater treatment facility for reduction of BOD to bring the effluent within permissible limits of the NEQSs and the treated water can used for irrigation. ▪ With the improvement of environmental standards, the growth potential and the local economy of the city will be improved. Hence, the objectives of the project are in line with the sector objectives mentioned above and the project forms integral part of the concerned sector.
6. Description, justification, technical parameters and technology transfer aspects	
i. Present Condition	Details are given at **Annexure-B** It is mentioned that the capacity of drain is sufficient upto 2032 after that raising of wall will require to enhance the discharge.
ii. Description of the subproject-	Details given in **Annexure-C** ➢ Municipal Committee shall ensure the use of treated water for irrigation purpose. ➢ Revenue Department approach to transfer the state land in favour of Municipal Committee Kamalia. It is mentioned here that said land is already in occupation of Municipal Committee Kamalia and remained in used as land fill site. The area of state land having 32.0 Acres for treatment of wastewater along with 3.7 kanal areas for disposal station is in process.
iii Detail of civil works, equipment &	The PC-I provides the below given components. **1. Rehabilitation of Existing Sewerage system** The rehabilitation of the system will comprise of below given

machinery and other physical facilities

components

SN	Components	Quantity
1	**RPC Manhole covers**	735 Nos

2-Comprehensive sewerage system in Kamalia City

The newly proposed system in **Kamalia City** will comprise of the below given components:

SN	Components	Quantity
1	**RCC sewers**	
	a) 09" I/d	11855 Rft
	b) 12" I/d	27385 Rft
	c) 15" I/d	15275 Rft
	d) 18" I/d	8821 Rft
	e) 21" I/d	1148 Rft
	f) 24" I/d	1615 Rft
	g) 27" I/d	1008 Rft
	h) 30" I/d	962 Rft
	i) 36" I/d	1937 Rft
	j) 42" I/d	150 Rft
2	**Disposal Station**	
	Screening chamber	1 No
	Collecting tanks	1 No
	Pump house	1 No
3	**Pumping machinery**	
	Non clogging cardon shaft sullage pumping units	
	8 Cusecs capacity	3 Nos
4	Force main 630mm dia	3.20 km
5	Transformer 400 KVA	1 No
6	Diesel Generating set 200 KVA	1 No
7	Change over switch	1 No
8	LT Control Panel with 5 MCUs	1 No

3-Waste water Treatment Plant comprising of:

a) Course Screening Chamber = 1 No
b) Grit Chamber = 1 No
c) Sullage Drains
d) Anaerobic ponds = 04 Nos.
e) Facultative ponds = 04 Nos.
f) Sludge drying beds = 03 No
g) Administration block = 01 No.
h) Floating plants = 5% of Facultative ponds area

<table>
<tr><td></td><td>i) Effluent drain = 01 No.
j) Staff Building = 01 No.</td></tr>
<tr><td>iv Indicate governess issues of the sector relevant to the project and strategy to resolve them</td><td>• Municipal Committee Kamalia City is facing acute shortage of local field staff. The operation & maintenance of the project after completion can only be assured when the required staff is available with Municipal Committee.
• The operation and maintenance of the municipal services in not up to the mark in the Municipal Committees. Capacity building under the Program, through trainings and seminars will be imparted by PMDFC to the officers as well as the field staff.</td></tr>
<tr><td>7- Capital Cost of Project</td><td>The summary of the works included in the project is given below; (All costs in million rupees)
<table>
<tr><th>Ser #</th><th>Description</th><th>Cost (RS.) In Millions</th></tr>
<tr><td>1</td><td>Package-1 Sewerage system</td><td>427.64</td></tr>
<tr><td>2</td><td>Package-2 Disposal station & Forcemain</td><td>365.88</td></tr>
<tr><td>3</td><td>Package-3 Providing and Fixing of RPC manhole Cover</td><td>10.99</td></tr>
<tr><td>4</td><td>Package-4 Construction of Wastewater Treatment Plant (WWTP)</td><td>474.79</td></tr>
<tr><td>5</td><td>Package-5 Supply of Liquid Waste Machinery</td><td>27.76</td></tr>
<tr><td></td><td>Total Cost (Rs.)</td><td>1307.06</td></tr>
<tr><td></td><td>E & S cost</td><td>7.50</td></tr>
<tr><td></td><td>ARAP Cost (To be paid from share of Municipal Committee)</td><td>13.98</td></tr>
<tr><td></td><td>Add 2% contingencies</td><td>26.14</td></tr>
<tr><td></td><td>Add 5% PST except item 5</td><td>63.59</td></tr>
<tr><td></td><td>Add 5% escalation</td><td>65.35</td></tr>
<tr><td></td><td>Grand Total Cost (Rs. In millions)</td><td>1483.63</td></tr>
</table>
Note: Keeping in view volume and nature of work it is proposed that estimate will get technical sanction on package basis. Accordingly, procurement will be carried out. Dismantled pipe to be auctioned later according to site conditions.
The detail of costs has been given in Annexure-D</td></tr>
<tr><td>i- Indicate date of estimation of the project cost</td><td>The project estimates have been framed during the month of November, 2023.</td></tr>
</table>

ii- Basis of determining the estimates be provided.	The cost estimates have been framed on the basis of bill of quantities actually measured at site and unit rates from the Market Rate System (MRS) issued by the Government of Punjab (District Toba Tek Singh 2nd biannual of year 2023). For items not available in the MRS, the same have been analyzed as per prevailing market rates.
Provide year wise estimation of physical activities	The physical and financial requirements, year wise are included in the following table:

Ser #	Detail of subheads	Year 23-24	Year 24-25
1	Package-1 Sewerage system	70%	30%
2	Package-2 Disposal station & Forcemain	70%	30%
3	Package-3 Providing and Fixing of RPC manhole Cover	100%	0
4	Package-4 Construction of Wastewater Treatment Plant (WWTP)	70%	30%
5	Package-5 Supply of Liquid Waste Machinery	100%	0
	Total Cost (Rs.)		
	E & S cost	70%	30%
	ARAP Cost (To be paid from share of Municipal Committee)	100%	0
	Add 2% contingencies	70%	30%
	Add 5% PST	70%	30%
	Add 5% escalation	70%	30%

iv- Phasing of capital cost on the basis of each item of work.

The phasing of capital cost of the project is included in the following table: (All figures are in million rupees)

Ser #	Detail of subheads	Total	Year 23-24	Year 24-25
1	Package-1 Sewerage system	427.64	299.35	128.29
2	Package-2 Disposal station & Forcemain	365.88	256.12	109.76
3	Package-3 Providing and Fixing of RPC manhole Cover	10.99	10.99	-
4	Package-4 Construction of Wastewater Treatment Plant (WWTP)	474.79	332.35	142.44

	5	Package-5 Supply of Liquid Waste Machinery	27.76	27.76	-
		Work outlay cost	**1307.06**	**926.57**	**38049**
		E & S cost	7.50	5.25	2.25
		ARAP Cost (To be paid from share of Municipal Committee)	13.98	13.98	-
		Add 2% contingencies	26.14	18.30	7.84
		Add 5% PST	63.59	44.51	19.08
		Add 5% escalation	65.35	45.75	19.61
		Total project Cost	**1483.63**	**1054.36**	**429.27**

The PC-I has been framed in 5 package as given in the above-mentioned table because of below mentioned issues:

1. The cost of this mega project is very high and one contactor will not be able to execute all items of work in parallel.
2. The time line available for the execution of the project is very narrow as the Punjab Cities Program has been extended up to December, 2024. For completion of the project within this timeline more than one contractor will have to be engaged.
3. The residents of Kamalia City are suffering from waste water flooding since long and they should be relieved from this panic as soon as possible. Engaging 5 contractors will get the project completed rapidly thus accruing early benefits to the public of Kamalia City.
4. Hence 5 package of the projects will be let out separately and the work will be completed in parallel on all parts

8-**Annual recurrent cost after completion of the project and source of financing**	The annual O&M cost will be around Rs. 6.70 million to run the system on sustainable basis. The source of financing O&M cost will be borne by Municipal Committee Kamalia City. O & M details have been attached in **Annexure-E.**
9- **Demand & Supply Analysis** i- Existing Capacity of services	**B. Existing supply level** ● Municipal Committee Kamalia City is unable to render satisfactory service to the entire area of the city because of degraded infrastructure wherein major replacements are direly needed but Municipal Committee could not be able to accomplish them because of low revenue recovery and funding constraints. As a result, major areas are deprived of the required level of the service. This is resulting in low credibility of the municipal services and citizen dissatisfaction. Further, the municipal infrastructure has not been extended keeping in pace with the growth of population which has impacted the service delivery level of Municipal Committee.

<table>
<tr><td>ii- Projected Demand for 10 years</td><td>For meeting the needs of population up to year 2050, the proposed sewerage system including Rehabilitation of the existing system, laying of 22.43 km sewer lines, construction of 1 new disposal stations, construction of wastewater treatment plant (WWTP) will address the required municipal infrastructure coping with demand of population up to planning horizon.</td></tr>
<tr><td>iii- Capacity of other similar projects being implemented in public/private sector</td><td>No other project of this nature is being implemented in public as well as private sector. However, Municipal Committee is trying to keep the services in operation with bare minimum repairs/replacements because of funding constraints.</td></tr>
<tr><td>iv- Supply and Demand gaps</td><td>The nature of supply and demand gap has been explained in the preceding paras which concludes;
The existing infrastructure has poor efficiency resulting in unsatisfactory service delivery level.
The O&M cost of the municipal services is very high because of low efficiency of the services infrastructure and high market rates while there in a large gap between the O&M expenditure and the revenue recovery.
Large subsidies are being injected by Municipal Committee to the keep the services in operation
Numerous public complaints are also registered on daily basis.
Hence, there is a large gap between the supply and demand which is to be bridged by improvement in the municipal infrastructure and its management.</td></tr>
<tr><td>v- Designed capacity and output of the project</td><td>Investments have been proposed for improvement of the existing infrastructure which will result in the under mentioned outputs;
The new disposal station, drain and wastewater treatment plants will be constructed. This will address the issue of waste water flooding and disposing of untreated sewage into agricultural field and it will help to meet the requirements of NEQS.
By implementation of proposed project, improved sanitation conditions will be developed leading to improved service delivery by Municipal Committee.</td></tr>
<tr><td>10. Financial Plan Sources of financing
<u>Debt</u>
a) Indicate the local and foreign debt Loan</td><td>The below given loan for the Punjab Cities Program has been funded by World Bank for 16 PCP cities in Punjab.
<table>
<tr><td>Total loan to Government of Pakistan/Punjab</td><td>200 million USD</td></tr>
<tr><td>Component-1 for Infrastructure Development</td><td>180 million USD</td></tr>
<tr><td>Component-2 for Investment Project Financing For capacity building of Municipal Committees & three Govt. organization and program management.</td><td>20 million USD</td></tr>
<tr><td>20% share of Municipalities is equivalent to</td><td>36 million USD</td></tr>
<tr><td>Total funds available for Infrastructure Development</td><td>216 million USD</td></tr>
</table>
Municipal Committee Kamalia city is getting its share from this funding and depositing its 20% share of the total funding allocated to the Municipal</td></tr>
</table>

<table>
<tr><td></td><td>Committee. The project will be funded out of this allocation.</td></tr>
<tr><td>b-Equity</td><td>A. Loan /Grant to Municipal Committee
The amount of loan converted to grant to Kamalia City will be Rs 1185.18 million. The financing of the project will be as given below:
<table><tr><td>Grant to Municipal Committee (Loan from WB)</td><td>PKR 1186.90 million</td></tr><tr><td>20% Co-finance by Municipal Committee</td><td>PKR 296.73 million</td></tr><tr><td>Total available funds
(Total cost of PC-I)</td><td>PKR 1483.63 million</td></tr></table>B. Project Cost: PKR 1483.63 million
*The loan is from World Bank to Government of Pakistan/Punjab, which will trickle down to Kamalia Municipal Committee as grant.</td></tr>
<tr><td>c) Grants</td><td>No grant is being given by Government of Punjab out of ADP funds. The World Bank loan to Government of Pakistan/Punjab will trickle down as grant to Municipal Committee from Government of Punjab.</td></tr>
<tr><td>d) Weighted cost of capital</td><td>Nil</td></tr>
<tr><td colspan="2">11-Project Benefits and Analysis</td></tr>
<tr><td>Financial:
Income to the project with assumption</td><td>● The project comprises construction of new components the existing Municipal Infrastructure to improve the service delivery of Municipal Committee and construction of new sewerage system in the unserved areas Presently, no user charges have been levied because of unsatisfactory service delivery but with improvement of service delivery, the consumers will be ready to pay user charges.
● It is proposed to levy user charges on the service which will increase the income of the Municipal Committee.
● However, it is a social sector project and the capital cost of the project is not intended to be recovered. The user charges will be recovered from the consumers for meeting the operation and maintenance charges of the services and to lower down the heavy subsidies being injected by Municipal Committee to keep the services in operation.</td></tr>
<tr><td>i.Social benefits to the target group</td><td>The completion of the project will result in:
● Up gradation of the municipal services infrastructure.
● Increase in efficiency of all infrastructure components
● Improved service delivery level
● Enhanced design life of the components.

This in turn will result the following social benefits:
● Improved hygienic conditions in the city
● Reduction in vector breeding and generated diseases
● Elimination of obnoxious smell
● Reduction in medical expenditures by Public</td></tr>
</table>

<table>
<tr><td>Environmental Impact negative/positive</td><td>There will be moderate to significant level negative environment impacts including temporary deterioration in air quality, water pollution, wastewater pollution, change of land use etc. during and after implementation of the project. The Environment and Social Screening Checklists have been developed and attached as Annexure-F. According to World Bank E&S screening and safeguards procedures and Punjab EPA Regulations, this project falls in the projects category where it requires to develop a detailed Environmental and Social Impact Assessment (ESIA) Report and obtain its NOC/Approval from PEPA.</td></tr>
<tr><td>Quantifiable project outputs</td><td>The social benefits to the citizen have been described at Sr. No-11(ii).</td></tr>
<tr><td>ii.Unit cost analysis</td><td>The unit Capital cost analysis is produced below;
<table>
<tr><td>Project capital cost of the Project</td><td>PKR 1483.63 million</td></tr>
<tr><td>Population in year 2023</td><td>95000 persons</td></tr>
<tr><td>Unit capital cost per capita</td><td>Rs. 15617</td></tr>
</table>
The Unit O&M cost per annum is given below
<table>
<tr><td>Project O&M cost per annum</td><td>PKR 6.70 million</td></tr>
<tr><td>Population in year 2023</td><td>95000 persons</td></tr>
<tr><td>Unit O&M cost per capita per annum</td><td>Rs. 70.53</td></tr>
</table></td></tr>
<tr><td>Employment generation direct and indirect)</td><td><u>Employment Analysis</u>
Direct Employment
a) Planning and Design of Projects
The Planning and Design of the project will be entrusted to local consultants who will be appointing staff and experts in different disciplines along with support staff. The Consultants will also appoint their staff for resident supervision of the Project to verify and certify the items of works to be executed under this PC-I.
b) Execution of the Project
a) PMDFC
PMDFC has the project monitoring and supervisory role and the company has enough experts and staff to complete this assignment. PMDFC has already deployed under mentioned staff for these projects:
● Civil Engineers
● Accounts, administration and audit personnel
● Urban planners
● GIS experts
● Support staff like computer operators, vehicle drivers, office boys and guards.
● Procurement experts
● Communication experts</td></tr>
</table>

	● Environmental and social experts ● Contract management experts ***b) Consultants*** PMDFC has employed (M/s MM PAKISTAN) as consultants for detailed design and resident supervision of the projects who will deploy their staff for execution of the project. ***c) Municipality*** Municipal committee has regular staff like engineers, sub engineers and other administrative & accounts keeping staff which will be responsible for execution of the project and contract management. No additional staff will be needed for execution of this project ***d) Contractor*** The contractor responsible for execution of the sub project will employ skilled and un-skilled labor on this work. **Indirect Employment** Indirect employment for production of material such as cement, steel, stone metal, bitumen, bricks etc. will be generated.
iii. Impacts of delays on project cost and viability	The impact of delay in project implementation will; ● Result in increased project cost due to escalation in cost of material and labor. ● Delay the benefits to the target group ● Result in further deterioration of the infrastructure and the service delivery level.
12-Implementation Schedule	
a) Indicate starting and completion date of the project	The project is anticipated to commence by November 2023 and to be completed by December 2024 with project implementation period of 14 months.
b) Item wise/year wise schedule in line chart	See Gant Chart attached as **Annex-G**
13- Management Structure and manpower requirements	
i. Administrative arrangements for the implementation of the project	**i. Planning & design of the project** The project has been designed by the consultants employed by PMDFC and will also carry out the resident supervision of the project. **ii. Preparation of cost estimation** The cost estimates have been prepared by the Design Consultants by actual measurements at site. The execution of the items of works included in these estimates /PC-I will be certified by these consultants.

iii. Execution of the project

- The project will be executed by Municipal Committee Kamalia and supervised by the Consultants appointed by PMDFC in resident supervision mode. The technical staff & experts in PMDFC will oversee, co-ordinate and collaborate in the project planning, design and implementation through their experts in head office located in Lahore and regional offices. The reporting of progress to LG & CDD & World bank and troubleshooting will also be responsibility of PMDFC.
- MO (I&S) of the Unit has been designated as Project Manager /Engineer in Charge of the project. The supervision of the works will also be carried out by these municipal officers along with their support engineering staff. All supervisory staff is available with Municipal Committee Kamalia.
- The Procurement Committee of Municipal Committee Kamalia will do the procurement of works and goods as per PPRA Rules.

ii- The manpower requirements by skills during execution and operation of the project and; The job description, qualification, experience, age and salary of each post

a) PMDFC experts and staff

For rendering assistance in implementation of infrastructure projects in 16 Municipal Committees, PMDFC has the experts and staff in the required fields. In order to facilitate the Program Units, three regional offices have been established by PMDFC at Gujranwala, Faisalabad and Multan/Daska.

b) Resident Supervision Consultants

The project will be supervised by consultants. The tentative staff to be employed/deployed by the consultants for the certification of quantities of works and resident supervision of the project is given below.

Sr. No.	Personnel	No.	Qualification
1	Chief Resident Engineer/Team Leader	01	BSc;/BE in Civil engineering with minimum 20 years' professional experience or MSC; Civil Engineering/Public Health Engineering/Environmental Engineering with Bachelor in Civil Engineering and minimum 15 years, experience, with 5 years on similar assignments in both cases
2	Senior Engineer	01	BSc/BE Civil engineering with minimum 08 years' relevant design experience or MSc engineering, with 5 years on similar assignments in both cases
3	Resident Engineer	01	BSc;/BE Civil engineering with minimum 10 years' experience in site supervision and execution for projects of similar nature.
4	Assistant Resident Engineer	01	Bachelor Degree in Civil engineering with minimum 8 years' experience in site supervision and execution for projects of similar nature

	5	Site Inspectors	01	DAE in Civil with minimum 10 years' experience in site supervision for projects of similar nature
	6	Quantity Surveyor	01	DAE in Civil Technology with minimum 10 years' experience in estimation & costing of projects of similar nature. The person having public sector projects will be preferred.
	7	AutoCAD Operator	01	DAE in Civil Technology with minimum 5 years' experience in preparation of drawings for projects of similar nature. (Situated at Lahore office)
	8	Environment Specialist	01	16 years of education in Environmental Sciences/Engineering with minimum 05 years of experience in environmental management and site-specific supervision of ESMMPs and EHS SOPs
	9	Social Safeguards /Resettlement Specialist	01	16 years of education in Sociology/Social Work or Anthropology with minimum 05 years of experience in social management and handling site specific social management plans and grievance management

c) Contractor's Technical Staff, Skilled & Non-Skilled Labor

The contractors will employ the supervisory technical staff and skilled & non skilled labor for execution of works. The works will be supervised by experienced Engineers and sub engineers and the number of slots for engineers and skilled and non-skilled will depend upon the type and quantity of work and its period of completion.

d) Repair & Maintenance of the Project

Municipal Committee has its own regular staff which has been deployed for Repair and maintenance of the municipal services infrastructure. However, it has been observed that the existing staff is not adequate to repair and maintain the services in a manner which can give good service delivery. Hence it is proposed to;

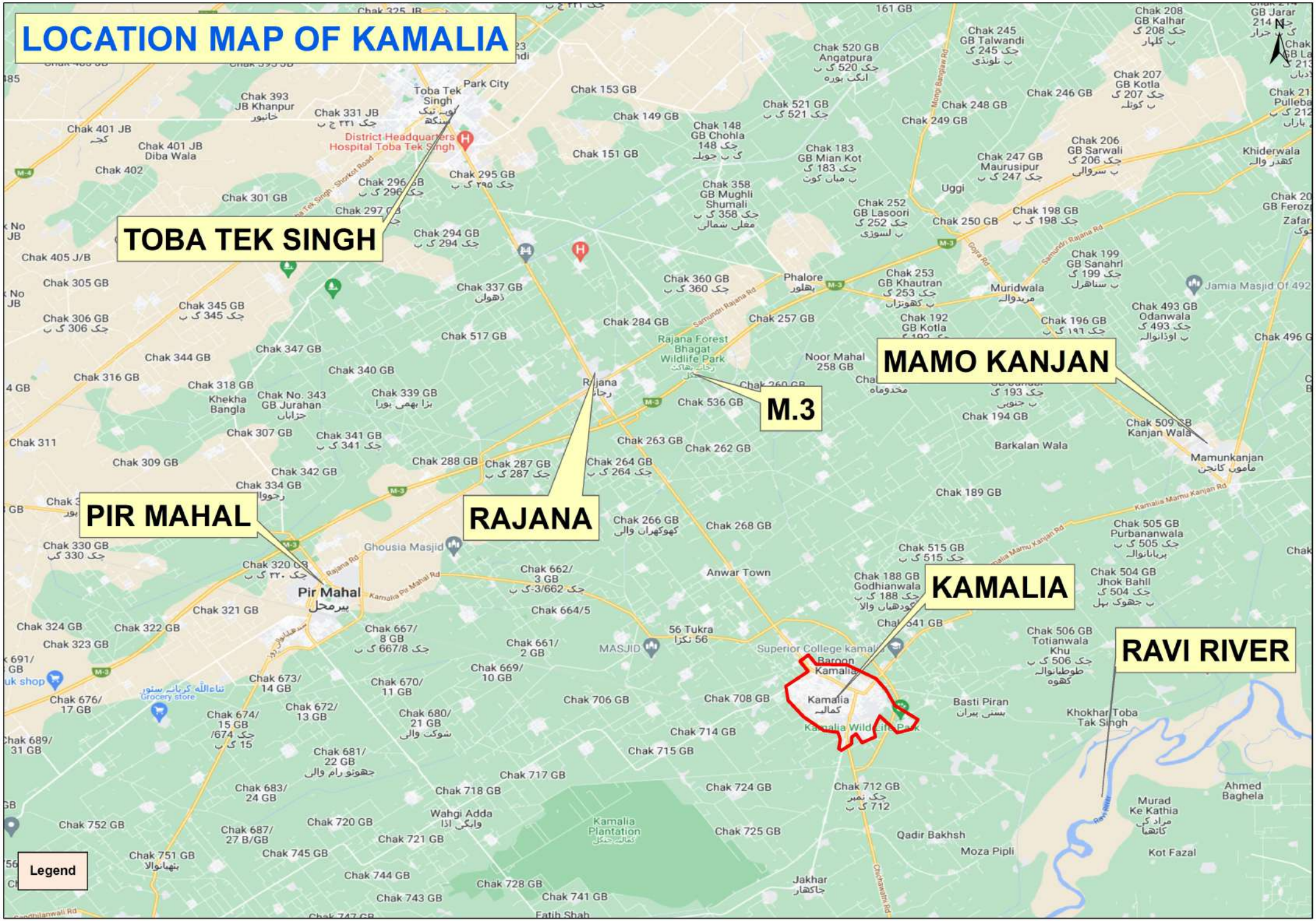
- Fill up the presently vacant slots
- Recruit additional staff as per need of the infrastructure after obtaining the sanctions from the competent authorities.

14-Additional projects /decisions required to optimize the investment being undertaken	**Shortage & frequent transfers of Provincially appointed staff** Municipal Committee is facing shortage in provincially appointed and locally appointed cadres. This will seriously affect the pace of progress of the program and the implementation of the infrastructure projects may be delayed. Provincial Government should fill-up the vacant staff immediately for optimizing the investments and capacity building in Municipal Committee.

15-Certificate		Certified that the project proposal has been prepared on the basis of guidelines provided by the Planning Commission for the preparation of PC-I for social sectors projects.

Prepared by		Stamp & Signatures	
Checked by	Municipal Officer (I&S) Municipal Committee Kamalia	Stamp & Signatures	
	Chief Officer Municipal Committee Kamalia	Stamp & Signatures	
Vetted by	Senior Program Officer (ID) PMDFC	Stamp & Signatures	
Submitted by	Administrator Municipal Committee Kamalia	Stamp & Signatures	
Forwarded by	Secretary LG & CD Department	Stamp & Signature	

ANNEXURE-A
LOCATION PLAN


LOCATION MAP OF KAMALIA
TOBA TEK SINGH
PIR MAHAL
RAJANA
M.3
MAMO KANJAN
KAMALIA
RAVI RIVER
Legend

ANNEXURE-B
Existing situation




SUSTAINABLE CITIES AND COMMUNITIES

CLEAN WATER AND SANITATION

GOOD HEALTH AND WELL-BEING

DECENT WORK AND ECONOMIC GROWTH




SECTORAL PLANNING REPORT FOR KAMALIA CITY

20th October 2023

Detailed Design of Infrastructure Sub-Projects Sectoral Planning and Resident Supervision in 16 Cities of Punjab (Package-III)

MM Pakistan (Pvt) Ltd.

Detailed Design of Infrastructure Sub-Projects Sectoral Planning and Resident Supervision in 16 Cities of Punjab (Package-III)

Sewerage System

Sectoral Plan/ Design Report of Kamalia City

20th October 2023

MM Pakistan (Pvt) Ltd.
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27 Empress Road, Lahore-54000 Pakistan,
Tel: +92 42-36300440, 36300460
http://www.mmpakistan.com

Issue and Revision Record

Document no. MMP-U&I- PCP-Reports-1075-219-2023

Rev	Date	Originator	Checked	Approved	Description
0	May 2023	Madiha Soomro Tuba Noman Mohsin Ali	Syed Aslam Sabzwari	Dr. Javed Iqbal	Sectoral Plan/ Design Report of Kamalia City
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AC	Asbestos Cement
ADB	Asian Development Bank
BOD	Biochemical Oxygen Demand
CI	Cast Iron
COD	Chemical Oxygen Demand
DS	Disposal Station
EDCM	Engineering Design and Construction Management
GIS	Geographic Information System
GoPb	Government of Punjab
GRP	Glass Fibre Reinforced Plastics
HDPE	High Density Poly Ethylene
JERS	Jers Consultancy (PVT) Ltd
JV	Joint Venture
LS	Lift Station
MC	Metropolitan / Municipal Corporation / Committee
MGD	Million British imperial gallons per day
ML(D)	Million Litres (per day)
NDC	National Development Consultants (Pvt.) Ltd
NEQS	National Environmental Quality Standards
NKE	National Key Expert
O&M	Operation and maintenance
OCL	Osmani & Company (Pvt.) Ltd
PDSSP	Punjab Devolved Social Services Programme
PEQ	Punjab Environmental Quality Standards
PHED	Public Health Engineering Department
PICIIP	Punjab Intermediate Cities Improvement Investment Program
PLGA	Punjab Local Government Act
PMU	Project Management Unit
PKR	Pakistani Rupees
PSs	Pumping Stations
PUDP	Punjab Urban Development Projects
RCC	Reinforced Cement Concrete
SC	Screening Chamber
STP	Sewerage Treatment Plant
TOR	Terms of Reference
UC	Union Council
WASA	Water and Sanitation Agency
WB	World Bank
WWTP	Wastewater Treatment Plant
WSP	Waste Stabilization ponds

1 INTRODUCTION

1.1 General

In order to improve the existing municipal infrastructure in Kamalia City, PMDFC has engaged M/s MMP for preparation of Master Plan of Sewerage System up to planning horizon 2050 along with identification of Priority Sub Projects for meeting immediate needs of MCs up to planning horizon year 2032 & 2050 respectively. This Report is mainly covering Sewerage Sectoral Plan of Kamalia City.

1.2 Background

The increased population and improved socio economic conditions have exerted immense pressure on Kamalia city sewerage system. As a result of it, a part of system is outlived and its capacity has decreased due to additional built up area and with little capacity available in sewer for which it was designed. As a result, sewer chocking causing unhygienic conditions is evident in the Kamalia city. In addition, existing situation of Kamalia sewerage system is far below acceptable standards. During last few decades' years, the city has grown considerably but necessary extensions to sewerage system have not been followed. The result has been that the inefficient system affects the living conditions and health of community residing in Kamalia City. This situation demands to develop new sewerage system and enhance the sewerage coverage in un-served areas. Eventually, it was felt that a comprehensive Master Plan for sewerage sector is needed as a first step to lay new sewerage system and to improve the prevailing sewerage situation in the said city. Considering the gravity of the problem, PMDFC engaged M/s MMP to provide consultancy services for preparation of Sector Plan of sewerage system for Kamalia city and detailed design of priority sub projects. The location Map of Kamila city is given in figure-01.

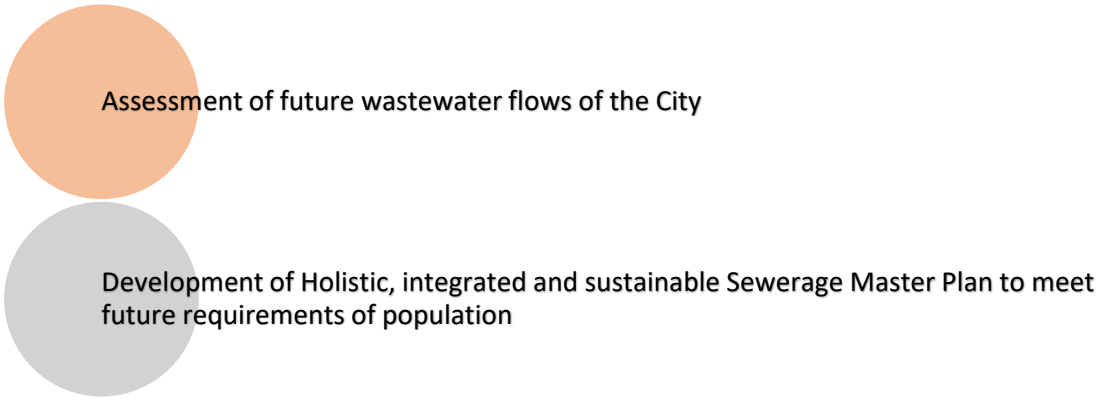
1.3 Project Objectives

Following are the main objectives of the Project:

- Newly sewerage system in Kamalia City.
- The new system would be full filled the future municipal infrastructure and making recommendations for its operation and maintenances.
- To cater future needs of sewerage system of Project Area over the stipulated design period.
- To design sewerage system in accordance with requirements of future population (Year 2050) including wastewater treatment plants.

1.4 Approach for Sectoral Planning

The Sector planning envisages planning and design of sewerage system of Kamalia city spanning over planning horizon of year 2022 to 2050. In view of TOR, the major study tasks for development of Sectoral Plan are as under:



1.5 Project Area

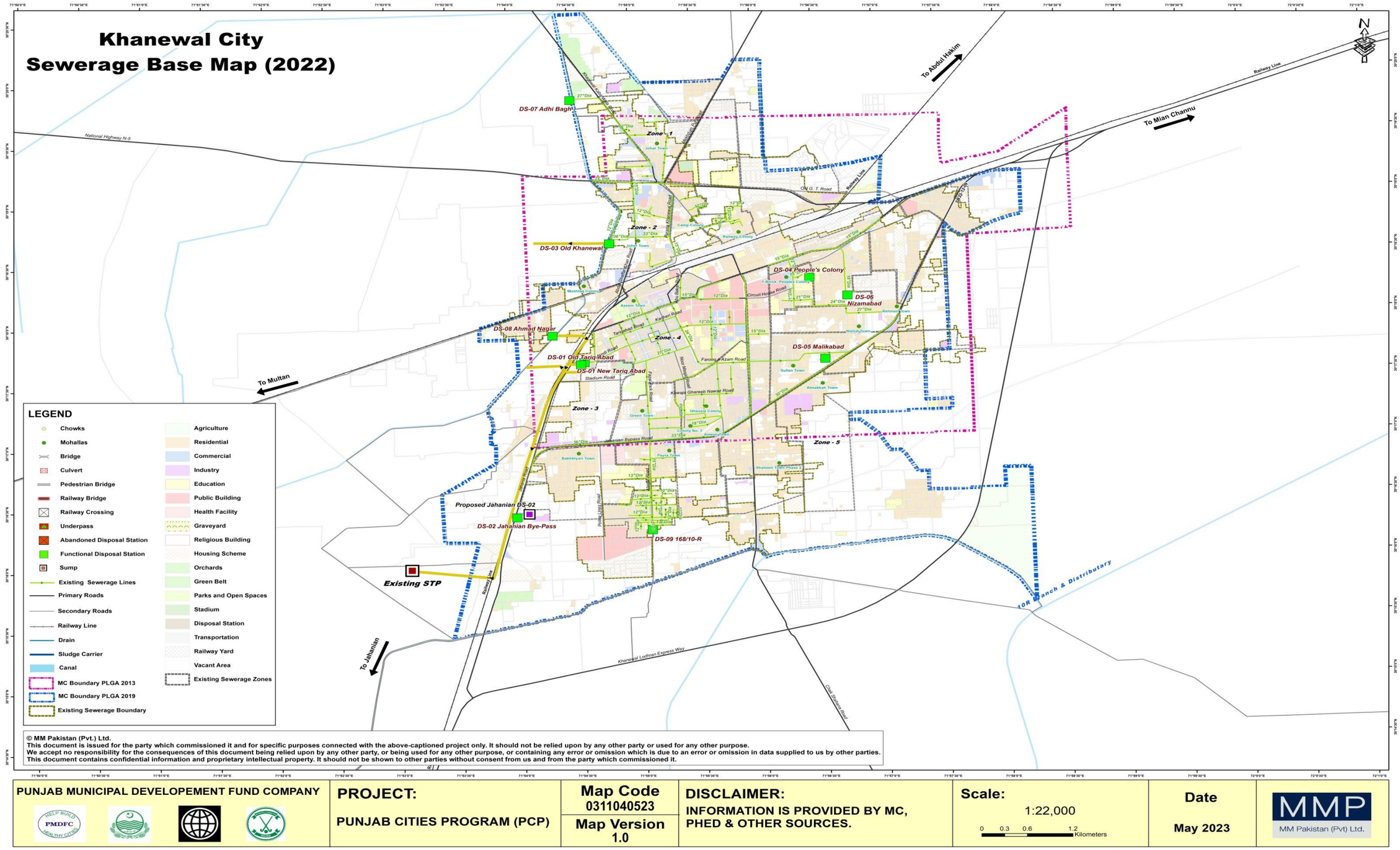
Kamalia is located at a distance of 105 km from Faisalabad, 240 km from Lahore, and 32 km from Toba Tek Singh. The area was inhabited by migrants from central Punjab after construction of irrigation system and Kamalia became the commercial center having grain markets and other commercial activities. The newly constructed motorway is passing at a distance of 15 Km at the north west of this town and the access to Lahore and other main cities has been eased out.

1.6 Topography

It is located at 72°39’ East longitude and 30°43' North latitude. About 46 to 61 meters above the sea level, the city is formed of a level plain with slope from east to west. There is no hill in the entire city. Kamalia is bounded in the South by River Ravi and Chichawatni, in the West by Pir Mahal, in the North by Rajana and Mamu Kanjan, and in the East by Harappa and Sahiwal.

1.7 Socio Economic Conditions

Kamalia’s population has increased around 6.34% over the past 20 years without any prominent improvement in the facilities, which has resulted in extra burden on available facilities for education, health, infrastructure and utilities. In Kamalia, 78% of the population is between the ages of 15 – 64; that is the most important and dominant segment of population as it is working age group. This group can play a very important role in the economic growth and development of the city/region if proper education and vocational training is provided. Approximately 22% of population belongs to dependent age group. Those in the 0-15 age bracket form 15% and those above 65 years are 6%. This group will need more access to playgrounds, schools and medical care facilities for old age people.
Average household size (6.35) and the number of earning members reflect that generally a large-sized family is dependent upon a single earning member, which in turn affects the living condition of the entire family in the long run. The literacy ratio of Kamalia city is 71.46%.



PUNJAB MUNICIPAL DEVELOPEMENT FUND COMPANY	PROJECT:	Map Code 0311040523	DISCLAIMER:	Scale:	Date
	PUNJAB CITIES PROGRAM (PCP)	Map Version 1.0	INFORMATION IS PROVIDED BY MC, PHED & OTHER SOURCES.	1:22,000 (0 0.3 0.6 1.2 Kilometers)	May 2023

Figure 1-1: Project Area / Base Map of Project

1.8 Existing Land-use and Future Trends

Kamalia city has expanded over the last few years. The trend of the development is in the South direction of the city. The railway line is passing from North-east direction towards the west. The THQ Hospital Kamalia is situated in the South of the city along Chichawatni Road. Main activities of the city are concentrating along Toba Chichawatni Road. All major shops, hotels, clinics etc. are located here. Major commercial activities are located in the center of the city near Dargahi Shah. A Municipal Committee park is also located in the city center. The railway station is located in the North-west direction. A major graveyard is located in the North of the city. Eid Gah is present in the South-west direction of the city. The city center is the hub of institutional activities. There are schools, Girls and Boys Degree College, Police station, courts, Tehsil office, Judge House, Civil Hospital, etc.

1.9 Administrative Setup

Under the PLGO 2021, The Municipal Committee has been converted into Unit, which consists of The Chief Officer, 4 Municipal Officers and other officials of the Local Council Service and officials of the offices delegated to the Municipal Committee. The Chief Officer is the head of Municipal Committee and exercises all functions and powers as have been assigned to him under the PLGO 2021.

1.10 Scope of Work

The scope of work covered under Consultancy Agreement is given hereunder:

i. Preparation of the Design Criteria.
ii. Total wastewater production in the planning horizon, quantity of wastewater presently being disposed-off at various points and in various water bodies and methods of its treatment.
iii. Extension of the existing sewerage system, if possible, to the proposed inhabitation under Sectoral Plan including all required components like sewers, disposal stations, sullage carriers or force mains and intermediate pumping stations (if unavoidable) along with their proposed location.
iv. Location, capacity and sizes of sewerage system in the areas to be developed in future in the Sectoral Plan horizon including main, branch and outfall sewers, intermediate pumping stations (if required), outfall disposal stations and force mains /sullage carriers and other structure required therein.
v. Capacity and proposed location of wastewater treatment plants and ultimate disposal arrangements of treated wastewater.
vi. Preparation of a comprehensive sewerage system design, analyzing different sewer pipes, disposal station and wastewater treatment plant in accordance with design population for year 2050.
vii. Approximate cost estimate for proposed sewerage system for year 2032 & 2050.

2 DATA COLLECTION AND STAKEHOLDER CONSULTATION

2.1 General

Field investigations are required for the evaluation and improvement of the current system. The Consultant's Project Team and MC authorities conducted joint site visits. Additionally, discussions were held about the perspectives and experiences of authorities on similar kinds of projects.

2.2 Data Collection

The detail of data collected from the Client and site visits include:

- Gap analysis report.
- GIS Maps of existing sewerage system.
- Population of cities, Towns and Villages as per 2017 Census.
- Detail of Existing disposal stations and Waste Treatment plant location.

2.3 Objective of Site Visit

The site visit was arranged in March 2022, by the consultant team, along with the senior design engineer, senior surveyor, and junior engineer, to assess the future conditions of the sewerage system in the city. The Client personnel from the DC office in Kamalia was involved in providing guidance to the consultant personnel.

Apparently, the existing sewerage system was found to be in a better condition. Some unserved areas were observed that would need to be served in the future. It was also noted that the Kamalia city had a sewerage system in 60% of its area. The city has been divided into several areas called "Zones" with respect to drainage.

It was also witnessed that some of the choked sewers, resulting in surcharging and overflowing of waste water thus damaging public as well as private property. These sewers will require properly cleaned / replacement. At present, two sewer lines of sizes 24” and 36” have been proposed in choked areas and are under replacement process (supervised by JERS). The new disposal works are located at Kamalia Toba Road, which will be fed by a 42" diameter outfall sewer. After pumping, the water will be discharged into an existing sullage carrier of size 3'x2.5', which will be used for broad irrigation.

Some of the main and branch sewers of this system have been constructed, but the disposal works are not yet complete, which is why the system has not been operated. The system will only be operated if the required funding is made available, and the two smaller disposal works mentioned above will be eliminated after the commissioning of the operation of the new system.

3 EXISTING SEWERAGE SYSTEM OF KAMALIA CITY

3.1 Purpose of Study

The Punjab Municipal Development Fund Company (PMDFC) has hired M/s MM Pakistan (Pvt.) Ltd. (Lead Firm), to meet the requirements of World Bank (WB) financing for the up-gradation of existing infrastructure and development of new infrastructure keeping in view the future requirements of the planning horizon.

3.2 Current Status of the Project

In this report the existing situation & gap analysis of the sewage works, wastewater treatment, and disposal system is discussed and subsequently, existing situation analysis report is prepared.

3.2.1 The Objective of the Existing Situation Analysis Report

The main objective of the existing situation analysis report is to analyse the existing condition of sewerage infrastructure in the project area, which is a pre-requisite of sectoral planning as the gaps identified in this report would be filled through the proposed sewerage sub-projects at the planning stage.

3.2.2 City Context

There are two central departments i.e. Housing Urban Development & Public Health Engineering Department (HUD & PHED) and Municipal Committee (MC) in Kamalia responsible for developing and operating water supply and sewerage systems.
In general, PHED is responsible for developing the Sewerage System, while MC is responsible for its operation and maintenance. The organogram of MC Kamalia is shown in Figure 3-1.

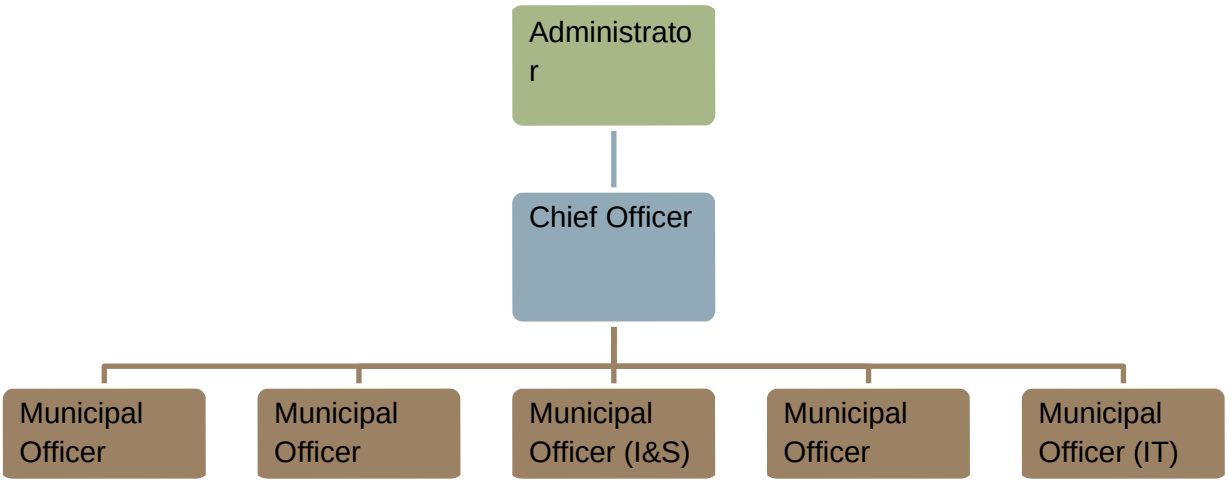


Figure 3-1 Organogram of Municipal Committee, Kamalia

The existing sewerage system of Kamalia city encompasses area under jurisdiction of MC. The existing sewerage system caters for about 0.118 million people which are about 80% of the MC's present population (0.148 Million). At present, the increased population and improved socio-economic conditions have exerted immense pressure on the city sewerage system. Apart of the system is outlived, its capacity has decreased due to additional built up area, and with little capacity available in sewers due to saturation of population for which it was designed. As a result, sewer-chocking causing unhygienic conditions are evident in the city. This situation warrants to improve existing sewerage system as well as to enhance the sewerage coverage in unserved areas. The detail of existing sewerage system in Kamalia city is discussed in the following sub sections:

3.3 Boundary of Existing Sewerage System

There exist two (02) boundaries in the Kamalia city such as MC boundary under PLGA 2019 and MC boundary under PLGA 2013 as shown in the figure 3.2. The previous MC boundary of year 2013 was extended considering the growth of the city. As informed, the MC boundary of year 2019 is the updated boundary for provision of sewerage facilities and other utilities in the city.

3.3.1 Sewerage System in Municipal Area

The existing sewerage system in Municipal Area consists of three sewerage zones namely Zone A, Zone B & Zone C are also shown in **Error! Reference source not found.**2. The detail of these zones is as under:

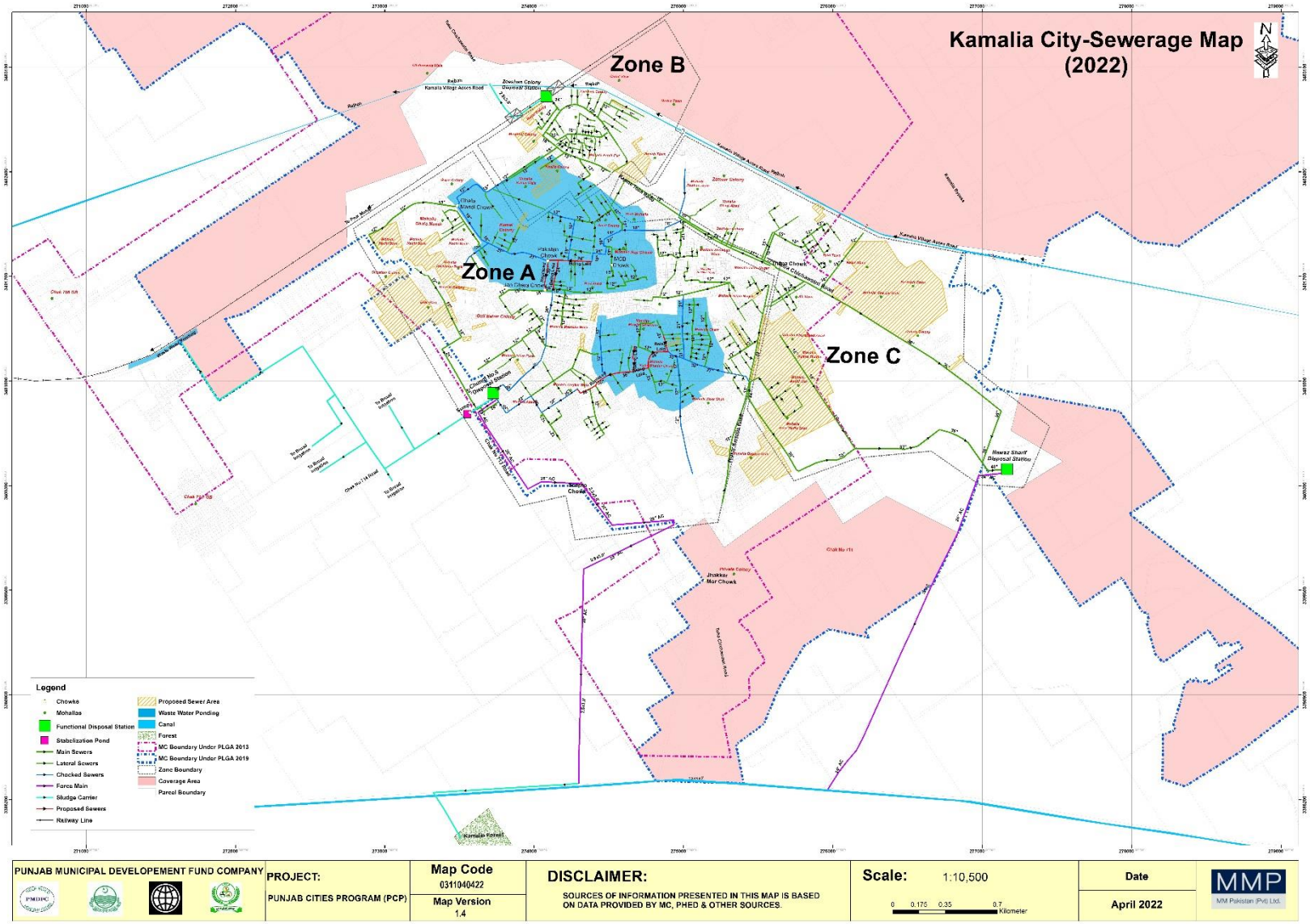


Figure 3-2 Existing Sewerage System & zones in Kamalia City

a) Zone A

The Zone A mainly comprises Mohalla Ghala Mandi, Gull Bahar Colony, Kamal Colony, Mohalla Haji Chowk etc. and is spread over an area of 4.43 km^2. This zone has a combined system-collecting domestic and storm water. The sewerage network comprises sewers varying in diameter from 9 to 42 inches with total length of 35 km to provide sewerage facilities to the people in this zone. The existing system laid by the MC in some of the areas is in poor condition and has outlived its life. At present, the discharge of trunk sewer under gravity is conveyed into Chungi No. 6 disposal station. From Chungi No. 6 disposal station, sewage is conveyed into sullage carrier through a force main. The wastewater from sullage carrier is further disposed of into kamlia forest for irrigation purpose. The detail of existing sewerage system in Zone A is given in Table 3-1 and the Plates show a view of the Chungi No. 6 disposal works in pictures

Table 3-1 EXISTING SEWERAGE SYSTEM IN ZONE A

Sr. No.	Description	Quantity
1	Trunk Sewers (21" - 42" dia.)	21.11 km
2	Sub Main & Lateral Sewers (9"- 15" dia.)	13.89 km
3	Sullage Carrier (2.5 ft. x 3.0 ft.)	120 m
4	Force main (28” dia.)	3.72 km

A view of screening chamber at Chungi no. 6 disposal station

A view of sewage pumping through Force main to sullage carrier

b) Zone B

The Zone B mainly comprises Zeeshan colony, Mohalla Fateh Pur, Bakar Colony, Maqbool Colony etc. that spreads over an area of 0.97 Km^2. The existing sewerage network comprises trunk sewers, and sub mains sewers varying from 9 to 24 inches diameter of 8.5 Km length to provide sewerage facilities to the people in Zone B. The Zeeshan Colony disposal station is pumping sewage across the railway track through a sullage carrier which is used to discharge wastewater in agricultural lands for irrigation purpose. The detail of existing sewerage system in Zone B is given in Table 3-2 and show a view of the Zeeshan Colony disposal works.

Table 3-2 Existing Sewerage System in Zone B

Sr. No.	Description	Quantity
1	Trunk Sewers (18" - 24" dia.)	2.0 km
2	Sub Main & Lateral Sewers (9"- 15" dia.)	6.5 km
3	Sullage Carrier (2.5 ft. x 3.0 ft.)	515 m

A view of collecting tanks at zeeshan colony disposal station

A view of dry well at Zeeshan colony disposal station

A view of mcc unit installed at Zeeshan colony disposal station

A view of force main discharging into sullage carrier

c) Zone C

The Zone C mainly comprises Zameer Colony, Basheer Colony, Ravi Town, Mohalla Gazi abad, Mohalla Roshan Shah etc. which spreads over an area of 2.84 Km2. At present, the discharge of trunk sewer under gravity is discharging into Nawaz Sharif disposal station which onward is disposed of into canal through force main (size 24 inches). The existing sewerage network comprises trunk sewers, sub mains and laterals sewers varying from 9 to 42 inches diameter of 13.2 Km length to provide sewerage facilities to the people in Zone C. The detail of existing sewerage system in Zone C is given in Table 3-3 and the pictures show a view of Nawaz Sharif disposal works.

Table 3-3 Existing Sewerage System in Zone C

Sr. No.	Description	Quantity
1	Trunk Sewers (21" - 42" dia.)	6.92 km
2	Sub main & Lateral Sewers (9"- 15" dia.)	6.28 km
3	Force main (24” dia.)	2.72 km


A view of collecting tank at nawaz sharif disposal station


A view of drywell at nawaz sharif disposal station


A view of mcc unit installed at nawaz sharif disposal station


A view of force main (size 24 inches) emanating from nawaz sharif disposal station


A view of sullage carrier from stabilization ponds to kamalia forest


A view of generator installed at nawaz sharif disposal station

3.4 DISPOSAL STATION

At present, MC is operating the sewerage system through 3 Nos. disposal Stations. These three (03) disposal stations are discharging the sewage for broad irrigation purpose. The detail of pumping machinery at existing Disposal stations in Kamalia city is given in Table 3-4**.**

Table 3-4 Detail of Pumping Machinery at Disposal Stations in Kamalia City

Zone	Location	Collection Tanks (No.)	Pumps (No.)	Discharge of each Pump (Cusecs)	Total Discharge (Cusecs)	Motor BHP	Working Status	Sullage Carriers Force Main	Present /Ultimate Disposal
A	Chungi No. 6 Dispsoal Station	3	5	6	30	60	Yes	28” dia.	Broad Irrigation
B	Zeeshan Colony Disposal Station	2	2	1(5 cusecs) 1(1 cusecs)	6	40 & 25	Yes	2.5’x 3.0’	Broad Irrigation
C	Nawaz Sharif Disposal Sation	2	4 (3+1)	3(5 cusecs) 1(3	18	60x2, 50x1 &	Yes	24” dia.	Canal

3.5 Wastewater Treatment

At present, no wastewater treatment plant exists in Kamalia city to treat the wastewater. The untreated wastewater from Nawaz Sharif Disposal station is directly discharged into canal through a force main (size 24 inches) and wastewater from chungi No. 6 disposal station is also discharged into sullage carrier (size 2.25 ft x 3 ft) which is ultimately discharging wastewater into Kamalia forest for irrigation purpose. The wastewater from zeeshan colony disposal station is also currently used for irrigation purpose. This untreated wastewater is a potential public hazard due to use of this contaminated wastewater for irrigation purposes and it is required to treat the wastewater before its ultimate disposal through construction of wastewater treatment plant.

3.5.1 Provision of Gully Grating Chamber

At present, gully grating chambers have been found in deteriorated conditions at junction of drains to sewers and need repair and maintenance. The drains are filled with debris, floating materials, plastic bags etc and are main cause of choking of sewers.

3.6 Operation and Maintenance of the System (O&M)

In order to facilitate the operation and maintenance of sewerage system, the city has been divided into three zones. The sewerage from these zones is carried through a network of trunk, sub main and lateral sewers. The operation & maintenance cost of the sewerage system for the years from 2013 to 2017 along with the revenue recovery. However, despite all the efforts of the Consultant, the detail of O&M expenditures and revenue recovery for the years 2018-19, 2019-20 and 2020-21 could not be obtained from MC due to non-availability of data.

Table 3-5 Detail of Operation and Maintenance (O&M) Expenditures

Year	2013-14	2014-15	2015-16	2016-17	2017-18
O&M expenditure (million PKR)	9.01	9.12	9.89	10.43	14.45
Revenue earned	0	0	0	0	0
Percentage recovery vs O&M cost	0	0	0	0	0
Subsidy given (million PKR)	9.01	9.12	9.89	10.43	14.45

From the above Table, it is evident that there is no revenue collection against O&M expenditures which is imposing additional burden on MC in the form of O&M expenditures and also on Govt. of the Punjab to provide subsidy to run the operations of sewerage system in the city. This situation demands that the revenue recovery by the MC should be improved by introducing billing system.

3.7 Sewerage Tariff

There exists no tariff system for sewerage system in the city and as a result, MC is facing difficulty in running operations of sewerage system. As a part of the strategy to improve MC's financial performance, levying of tariff is required this initially is to achieve full cost recovery of O&M costs from self-generated revenues and at a later stage, also to cover the capital cost. However, the tariffs to be levied on consumers shall have to reflect the true costs of providing the respective services. The condition is that the Public will be provided sewerage facilities at an affordable cost.

4 DESIGN CRITERIA

4.1 General

For every scheme, prior to its planning and designing, the design parameters and criteria have to be carefully established. These are based on existing system, availability of funds, living conditions, and climatic conditions, industrial and commercial activities. Considering the above factors, the design criteria for the project is given below:

4.2 Sewerage System

4.2.1 Design Period

The design horizon for the project is up to year 2050.
The design period as per TOR for sectoral planning is 30 years (up to Year 2050) whereas for priority projects, it is 10 years (up to Year 2032).

4.2.2 Design Life

As per PDSSP criteria clause 3.4.2,

- Civil works and Sewers - 25 Years
- Pumping Machinery - 10 to 15 Years

4.2.3 Per Capita Sewage Flow

Generally, about 80 to 90 percent of the per capita consumption of water becomes wastewater. Considering 39.6 gallons per capita water consumption and sewage flow of 85%, the per capita flow will be 33.66 gallons/capita/day as per Criteria approved by Consultants and Client (PMDFC).

4.2.4 Peak Factor

As per PDSSP criteria clause 3.4.3, Sewage flow in the system does not remain uniform; it varies from time to time. Sewerage network will be designed for the peak sewage flow. The peak factor will be calculated as follows:

Table 4-1 Sewerage Peak Flows

Population in Thousand	Peak Factor
Up to 5	4.50
5-10	4.00
10-25	3.50
25-50	3.00

50-100	2.50
More than 100	2.00

4.2.5 Infiltration

The infiltration rate will be taken as per PDSSP criteria clause 3.4.3:

i) Sewerage above sub-soil water level 350 gpd/inch dia/mile
ii) Sewerage below sub-soil water level 700 gpd/inch dia/mile

4.2.6 Storm water Allowance

As per PDSSP criteria clause 3.4.3,

i. For rural areas, Nil
ii. For urban areas, it will be as under

Take 50% of peak flow as storm water allowance in case of the Northern Zone; and take 33% of peak flow as storm water allowance in the Southern Zone.
Proper arrangements for connecting storm water drainage appurtenances and sewerage system are to be adequately provided.
For Kamalia, 33% of peak flow as storm water allowance

4.2.7 Design Flow

The Design Flow will be the sum of peak flow, infiltration and storm water allowance.

4.2.8 Flow Velocity

4.2.8.1 Sewerage Network

Minimum velocity in the sewer will be such that there should be no deposition in the sewer line. Minimum self-cleansing velocity is 2.5 ft/sec under flowing full condition as per PDSSP clause 3.4.4. However, maximum velocity will not be greater than 8 ft/sec.
Following Manning's equation will be used to determine the velocity in the sewer lines:

$$V = \frac{1.486}{n} R^{2/3} S^{1/2}$$

Where,

V = Flow velocity in ft/sec
R = Hydraulic Radius of pipe in ft
S = Slope of the pipe (ft/ft)
n = Manning's Coefficient of Roughness of the pipe

For RCC pipes, the adopted n value will be 0.013

4.2.8.2 Force Main

As per PDSSP criteria, in force main/pumping main, the minimum flow velocity will preferably be maintained at 4 ft/sec but not more than 8 ft/sec.

4.2.9 Slopes for Gravity Sewers

The sewer slopes depend upon the velocity in sewer, as the flow is generally maintained under gravity. Minimum slope will be provided in sewer lines at least to attain self-cleansing velocity.

4.2.10 Minimum Sewer Size

As per PDSSP clause 3.4.6, Minimum sewer pipe dia. will be 9 inches. All other pipe sizes will be determined from design flow calculations and velocity criteria.

4.2.11 Pipe Materials

The type of pipes to be used for sewerage system depends upon the following factors:

a) Corrosion resistance
b) Capital cost
c) Local availability
d) Ease of installation
e) Efficiency of joints
f) Load sustaining ability
g) Useful life

The pipe material for sewerage system will be Reinforced Cement Concrete (RCC) with Sulphate Resisting Cement and Epoxy lining inside. Further research will be conducted to enhance the performance of RCC Pipes.

4.2.12 Earth Cover to Sewers

As per PDSSP criteria, clause 3.4.7, a minimum earth cover of 3.0 ft will be provided over the pipes.

4.2.13 Bedding

For bedding, refer PDSSP criteria, clause 3.4.10
The detail of bedding is as under:

i. Above subsoil water level

For sewers 9 inches-12 inches - Sand
For sewers 15 inches dia and above - Crushed stones (1/4-1 inches size)

ii. Below subsoil water level

The bedding for sewer under sub-soil water shall be designed as per site conditions and get approved by PMDFC.

4.2.14 Location of Sewers

a) Sewers will be generally located keeping in view the natural ground slopes in order to minimize the depth of excavation.
b) Sewer will be positioned in accordance with the utility/service reservation requirements of the local Municipal Committee.

4.2.15 Crossings of Other Utilities

Where the proposed sewers cross the existing utilities, the sewer should be laid in such a way so as to avoid interference with these utilities. Sewers will be laid below water pipes wherever possible. If the water main underpasses any sewer line, it will be protected by sleeving or concrete encasement at the crossing to minimize the risk of contamination of water supply.

4.2.16 Manholes

In sewerage network, manholes constitute a vital component. These are used for inspection and cleaning, and are placed at points of change in direction, junction between sewer, change in pipe size or change in grade.

A. Spacing

Spacing of Manholes, in straight sewers depends on the diameter of sewers. Adopted spacing will be as shown in Table 4-2.

Table 4-2 Spacing of Manholes

Dia of the Sewer	Spacing between the Manholes
9 to 12 inches	100 – 150 ft.
15 to 24 inches	200 – 250 ft.
27 to 42 inches	300 ft.
42 to 60 inches	400 ft.
Above 60 inches	500 ft.

Maximum spacing between the manholes will not be more than 500 ft for cleaning by winch machines.

B. Drop Manhole

As per PDSSP criteria, clause 3.4.5, the drop connections to manholes will be provided if the difference in pipe invert elevation is greater than 2 ft otherwise no drop connection will be provided.

C. Ventilation

Ventilation of sewers is necessary to avoid the buildup of noxious gasses and to minimize septic conditions. For that purpose, ventilation stacks can be suggested as per requirement.

4.2.17 Sewage Lift/Pump Station

In the sewage system, these are avoided as far as possible. However, for flat terrain and low-lying areas, the gravitational flow is not feasible. Therefore, Sewage lift/pump station will be required to pump sewage collected from various areas into the trunk/ main sewers which will ultimately discharge into treatment plant(s). Sewage Pumps have been designed as per PDSSP criteria Clause 3.4.9.

4.2.17.1 Sewage Lift Station

Lift station will be provided where necessary. It will consist of a wet well and a dry well to house pumps with at least thirty three percent (33%) standby provision. The pumps will operate automatically as a function of waste water level in the sump (wet well). Provision of ventilation and odor control system will be made.

4.2.17.2 Sewage Pump Station

The sewage pump station (if required) will pump the wastewater collected from the entire project area to the screening chamber of the treatment plant(s). This will be a complete pump house building with a wet well and dry well.
Influent Chamber will be designed to carry full sewage flow. Bar screens opening size will be not more 2 inches to reduce entry of objects such as suspended rags, paper, plastics, and metals to prevent damage and clogging of downstream equipment, piping, and appurtenances.
Provision of ventilation and odor control system will be made. These will also be operating automatically depending upon the water level. Positive suction head will be provided to the pumps, stand by provision of pumps will be 50% of peak sewage flow.

4.2.18 Motors & Pumps

As per PDSSP Design Criteria, following are the components

4.2.18.1 Type of pumps

The selection of sewage pumping units should be made keeping in the following aspects/recommendations: -

- Use of horizontal pumps in the depressed chamber should be avoided as far as possible. Theses may be used for smaller discharges because the cordon shaft pumps of smaller discharges may not be available.
- ***Submersible pumps*** may be used where the system has no surface drains.
- ***Cordon shaft pumps*** may be used for greater discharge where the quality of sewage is not good and the system is connected to surface drains as well.

All such pumps will be discharged for passing solids of 2-3 inches size. These will be powered by AC electric connections. But after detailed discussions with client, it has been decided that Vertical Universal Shaft Pumps will be installed at Sewerage disposal stations.

Manual start up and shut down of pumps has now become obsolete in the operation of sewage Pumping Station. Water sensors will be provided. They will sense the water level and automatically switch on and off the pumps. These levels will be set in a way that the pump should not run dry by keeping it in minimum submergence, nor wastewater level in wet well is high enough to surcharge the contributing sewers.

4.2.19 Penstock Gates

Standard: AWWA C561 or BS EN 10088 or equivalent

- Material Leaf; SS
- Leaf Frame & Stem shall be constructed of 1/4" stainless steel type 304(L) or 316(L) reinforced with structural members to withstand maximum seating and unseating heads.
- Deflection of the leaf shall not exceed 1/720 of the span
- Leaf travel may vary from twelve (12) to fifteen (15) inches per minute.
- Gate and frame seat: EPDM seat mounted to the frame

4.2.20 Valves

4.2.20.1 Gate Valves

Standard	BSEN1174-2, EN 558-2 or AWWA C500-09 or ISO 5752
Body	DI
Type	Metal seated gate valves for wastewater applications
Disc/wedge	DI
DISC SEAT RING	SS or Copper alloy
Pressure rating	The minimum design working water pressure shall be 200 PSIG for 3-12-inch and 150 PSIG for 14- 36-in. sizes.
FLANGES	EN 1092, BS10, ISO 7005-2, ANSI B16.2
Testing	AWWA 508, ISO 5208
External Lever	To be provided
Certification	• NSF or • Notified Body under Pressure Equipment Directive (PED 97/23/EC) Of European Commission or • WRAS (Water regulations advisory Scheme) approval

4.2.20.2 CHECK VALVES

Standard	**AWWA C 508,** BSEN 1563 or BSEN 1074
SEAT	DI

Body	DI
Hinge pin	Brass or Bronze alloys
DISC SEAT RING	Brass or Bronze alloys
SPINDLE	SS,DI
FLANGES	EN 1092, BS10 ,ISO 7005-2, ANSI B16.2
Pressure rating	The minimum design working water pressure shall be 200 PSIG for 3-12-inch and 150 PSIG for 14- 36-in. sizes.
Testing	AWWA 508
External Lever	To be provided
Certification	• NSF or • Notified Body under Pressure Equipment Directive (PED 97/23/EC) Of European Commission or • WRAS (Water regulations advisory scheme) approval

4.2.20.3 Dewatering sets

Maximum flow	Not less than 3 cusec or 306 m^3/hr
Type	Fully automatic priming, battery started
Solid passing size	Not less than 75mm
Make	Europe, UK, US, Japan and Australia or equivalent
Impeller, Wear plate	Stainless steel 316 or equivalent
Shaft	SS 431 or equivalent
Shaft seal	Oil cooled mechanical seal of silicon carbide capable of extended dry running
Engine	3-cylinder air cooled electric start diesel engine of more than 30KW capacity
Suction and discharge size	150x150mm
Mounting	All mounted on a common fabricated steel base single axle trailer complete with two jack stands, wheels and Towing system
Fuel tank	8-10 hrs
Suction and Discharge	5 meters of 6-inch dia reinforced suction hose and 30 meters 6-inch dia rubber canvas delivery pipe including i/c Male/Female couplings.
Engine protection	Against high temperature, High RPM, Low oil pressure

4.2.21 Screens

Screen is designed on **peak flow**. Since no local design criteria (PHED or WASA) are available for screen design, hence, for such cases, one may adopt the internationally accepted/used design considerations[1]. Design criteria adopted for screens are shown in.Table 4-3

Table 4-3 Design Criteria for Manually Cleaned Bar Screen

Bar Size	Width: 0.2 to 0.6 inch (5 mm to 15 mm) Depth: 1 to 2 inch (25 mm x 50 mmm)
Spacing	0.5 inch to 1.5 inch (10mm to 40mm)
Angle from Horizontal	45º to 60 º
Maximum velocity through screens	1.5 to 2.0 ft/sec
Maximum allowable head losses through screens	<0.5 ft

4.2.22 Wet Well

As per PDSSP criteria clause 3.4.9, for the design of collecting tanks (Wet Well) following detention times will be used as shown in Table 4-4.

Table 4-4 Detention Time of Wet Well

Population up to 25,000	10 minutes
25,000---50,000	5 Minutes
50,000- 10,000	4 Minutes
100,000 – 200,000	3 Minutes
Above 200,000	2 Minutes

5 POPULATION, WATER DEMANDS AND WASTEWATER FLOWS

5.1 General

Population is the most important design aspect that has an effect on all the components of sectoral planning. Generally, projected population for the design horizon is not available hence it has to be projected on the basis of existing population data and planning already carried out by the government organizations regarding future population.

The population has been projected based on the population data for the years from 1972 to 2017 collected from Pakistan Bureau of Statistics (PBS) for MC of each city of the Package.

The water requirement for the Project Area considering per capita water demand has been estimated based on the projected population for the design horizon year 2050. In addition, wastewater flows will be estimated on the basis of projected population and water demands as per design criteria stated in the previous section.

5.2 Average Annual Growth Rate of Kamalia City

The estimation of total water requirement depends upon the population. It is therefore, important to estimate the population to be served up to the design horizon i.e. Year 2050.The records of past population and growth rates serve as a basis for projection of future population.

The Kamalia city lies in the Punjab Province and the previous population for the years 1972, 1981, 1998 & 2017 (available online) is presented in Table 5-1.

Table 5-1 Population Trend of Kamalia City

Year	Population
1972	50,934
1981	61,107
1998	97,324
2017	135,674

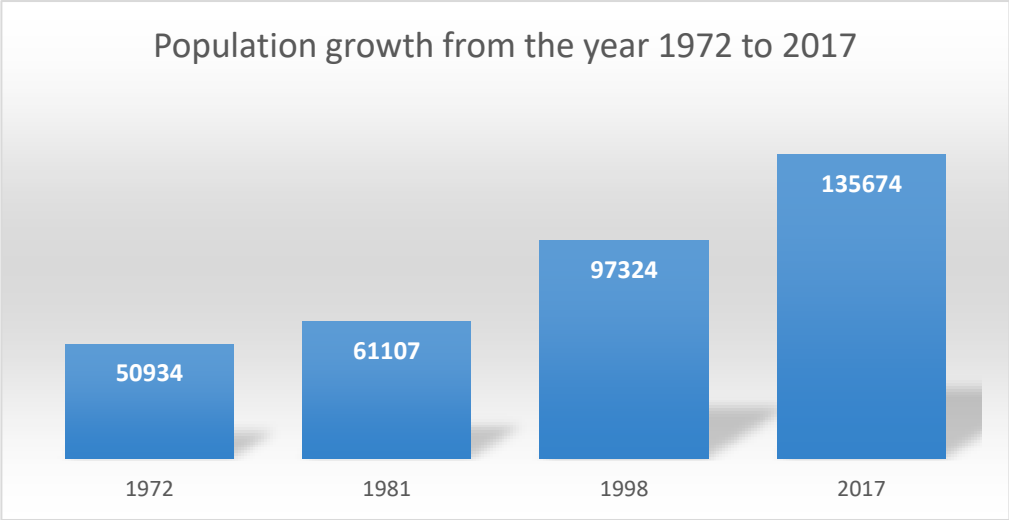


Figure 5-1 Trend of Population Growth as per Census

5.3 Proposed Average Annual Growth Rate of MC up to Year 2050

The population projection is an estimated calculation of the number of people expected to inhabit a particular place at a future date, based on data on the current population size and the expected natural-growth trends. These trends include births, deaths, fertility rates, occurrences of calamities or natural hazards; political developments, and migration. Population projections are set on a “conditional” future. These projections are a useful tool for policy dialogue and program planning. They help stakeholders plan for the near and distant future and identify potential issues for policy makers.

The population growth rate (PGR) is the increase in a region's population during a specified period of time, expressed as a percentage of the population at the start of that period. It reflects the number of births and deaths during the period as well as in- and out-migration figures. The importance of forecasting population growth lies in the need to provide a sound basis for development policy. The growth rate from Population and Housing Census Report of 2017 for Kamalia was 1.76. This growth rate is used for the population projection up to the year 2030. From the study of the past trends, it is expected to rise in future. Therefore, the growth rate used for the population projection of Kamalia MC from 2030 up to 2050 is taken as 2.00% p.a.

The base year population considered below is taken from 2017 census report as per the Kamalia MC 2013’s boundary to carry out the projection up to the year 2050. This projection will be revised after calculating the current study area’s population.

Table 5-2 Population Growth Rate of Kamalia City

Year	Growth Rate
2017	1.76%
2022	1.76%
2025	1.76%
2030	1.76%
2035	2.00%

2040	2.00%
2045	2.00%
2050	2.00%

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5.3.1 Projected Population of Kamalia MC

Accurate population projection is difficult because many factors influence the population growth or decline of a city. These factors are:

- Birth and Death rates;
- Migration from and in the locality;
- Urbanization and commercialization;
- Industrialization;
- Job opportunity:
- Living Standards: and
- Unforeseen factors, natural disaster or calamity or change of Government policy towards development.

The data on aforementioned factors is generally not available which contributes to population growth or decline. Therefore, under such situation the projection of future population of the Project Area (MC Kamalia and adjoining localities) up to the design horizon Year 2050 has been carried out based on the population and growth rates specified in available census from 1972 to 2017. The population projection has been worked out based on the following equation:

$P_n = P_o (1+r)^n$

Where;

P_n : Projected population for required year
P_o : Population of base year, year of known population
r : Annual population growth rate (%)
n : No. of years, counted from base year

The available cense data of MC Kamalia and adjoining localities was utilized for projection of future population. The average annual growth rate of MC Kamalia for the census period year 1998-2017 was 1.76%.

Keeping in view the aforesaid, it is inferred that the population of the Project Area will remain same up to the year 2030 with a growth rate 1.76%. However, it is assumed that growth rate may be increase to 2.0% for the project period from 2030 to 2050.

The projected population of the Project Area is presented in Table 5-3 and Figure 5-2**.**

Table 5-3 Projected Population of the Kamalia City for Year 2050

Year	Growth Rate	Population Projection

2022	1.76%	160,722
2025	1.76%	169,358
2030	1.76%	184,795
2035	2.00%	204,029
2040	2.00%	225,265
2045	2.00%	248,711
2050	2.00%	274,596

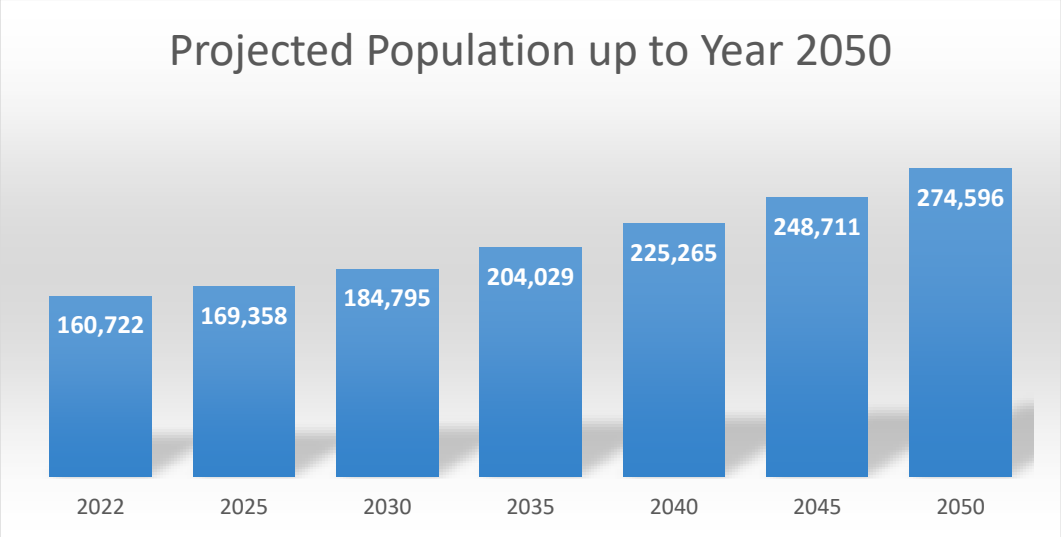


Figure 5-2 Projected Population of the Kamalia City for Year 2050

The population of the Kamalia city shall increase from 160,722 persons in year 2022 to 274,596 persons up to design horizon i.e. year 2050.

Specified the insistence of this Kamalia city and its high-priority status, the construction / Rehabilitation works for the trunk sewer and related facilities has been segmented into various stages. Some of the identified tasks mentioned in the respective PC-I have been noticeable as critical due to their significance and the availability of resources within the specified zone.

In this context, the population projection for the initial planned zone for upcoming 10 years has been estimated at 75,255 persons. Hence, the system has been designed to accommodate this estimated population growth respectively.

6 PROPOSED SEWERAGE SYSTEM FOR KAMALIA CITY

6.1 General

This section presents a proposed sewerage system for the Kamalia city that will develop a new sewage system for currently un-served areas as well as to rehabilitation for exiting sewer trunk main. This system will also improve the existing sewerage system and provide sewage facilities in un-served areas for the planning horizon initially for 10 year and til the year 2050. The proposed system comprising laying of new sewerage system to meet future requirements (year 2050) has been discussed as under:

6.2 Projected Wastewater Flows

The estimated wastewater flows based on projected population and per capita wastewater Flow (as per design criteria of total average waster demand per capita) has been provided in Sewage Hydraulic Statement and Water Gem analyses results in Annexure-A.

6.3 Proposed Sewerage System

For planning horizon 2050, the sewerage system has been proposed in in un-served areas and this will provide 100% coverage of sewerage facilities to the population up to the design horizon. Furthermore, this project has been designed to meet the future population requirements, spanning from the current year through 2032, 2032 to 2040, and 2040 to 2050. The construction of the Waste Water Treatment Plant (WWTP) has been planned to accommodate these population growth projections up to 2050.The proposed sewerage layout plan distributed in 2032, 2040 and 2050 is shown in Figure 3, Figure 4 Figure 5and Figure 5.

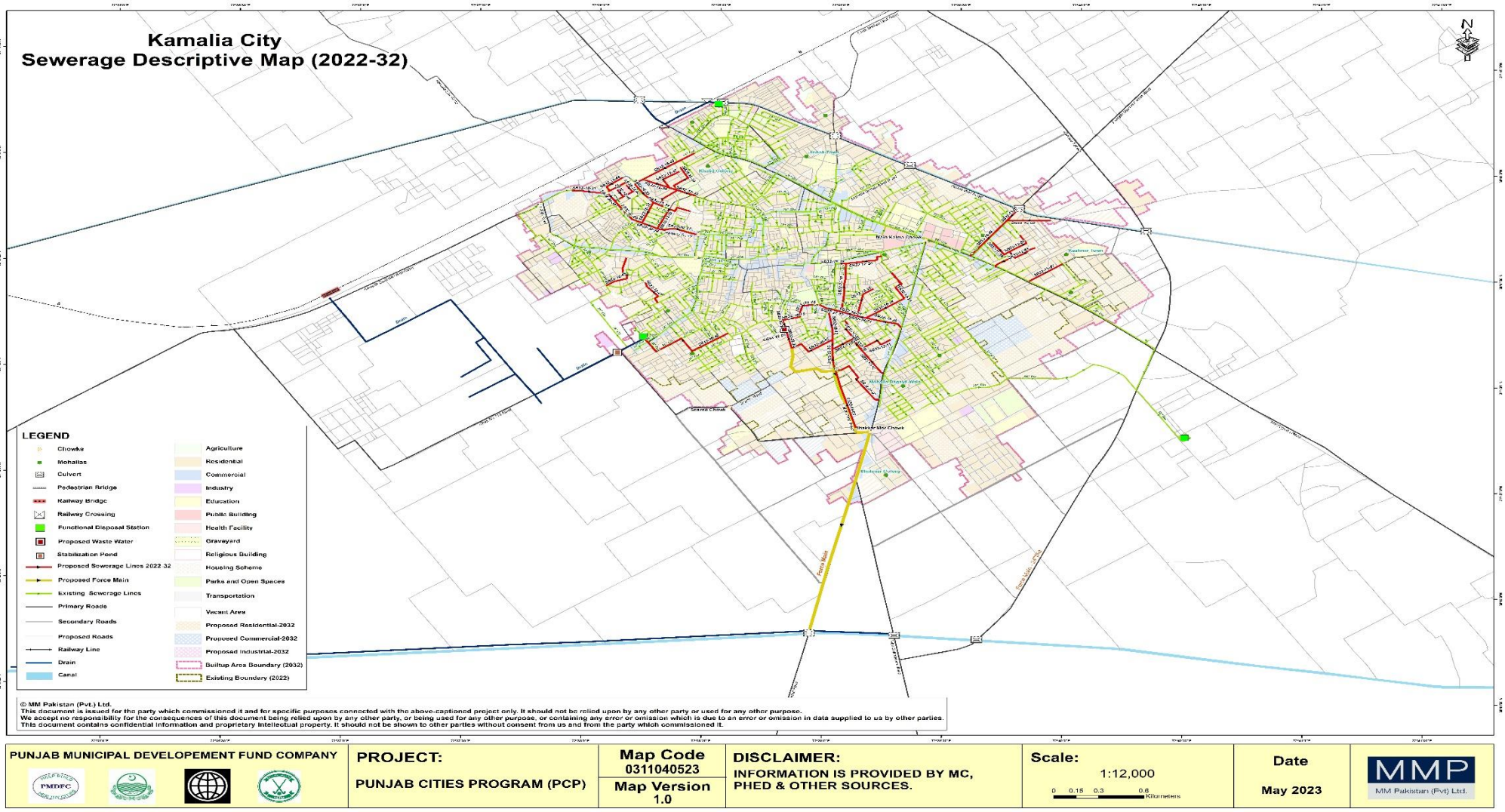


Figure 3 Descriptive map of Proposed Sewerage Plan up to year 2022-2032

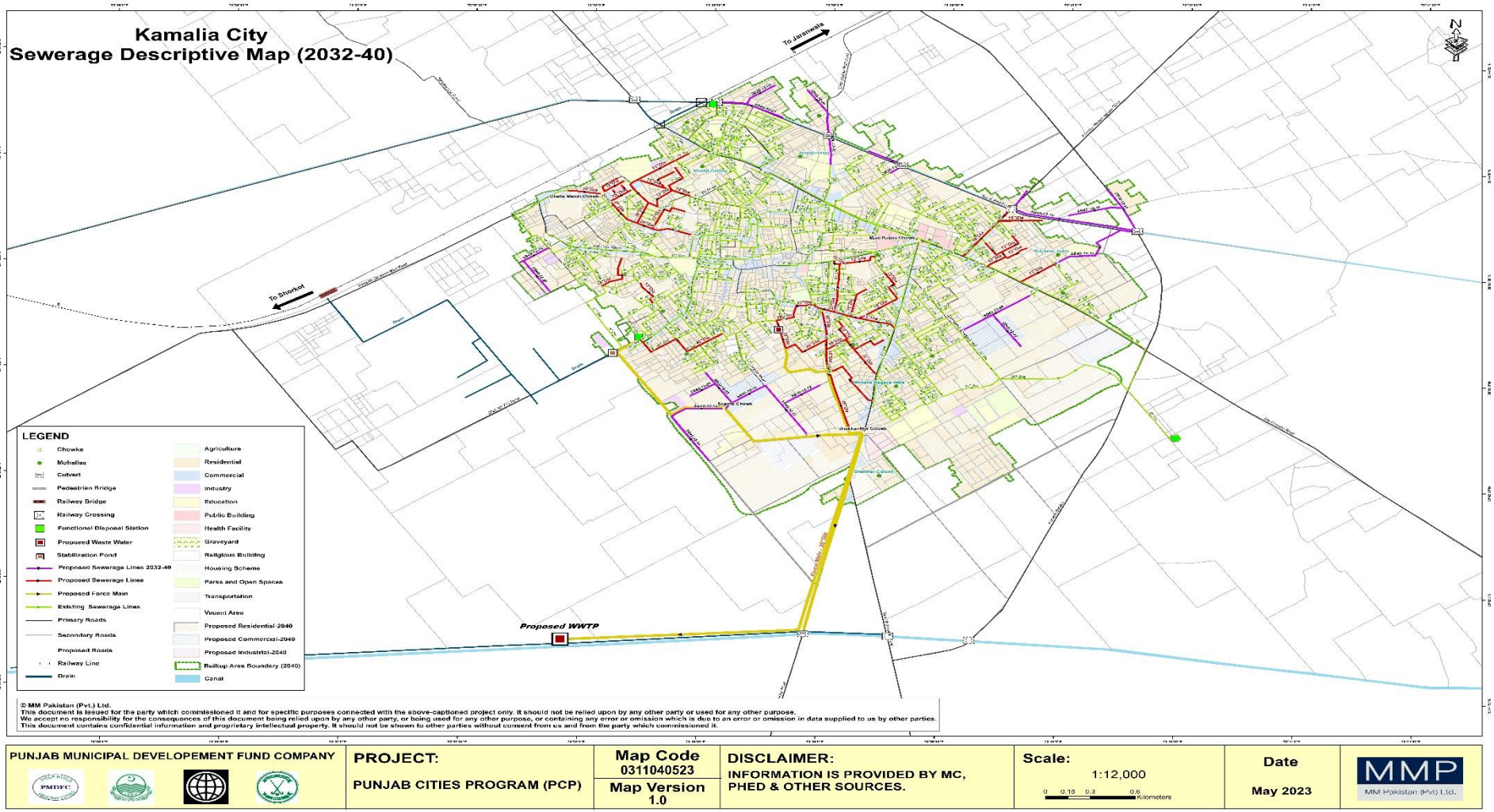


Figure 4 Descriptive map of Proposed Sewerage Plan up to year 2032-2040

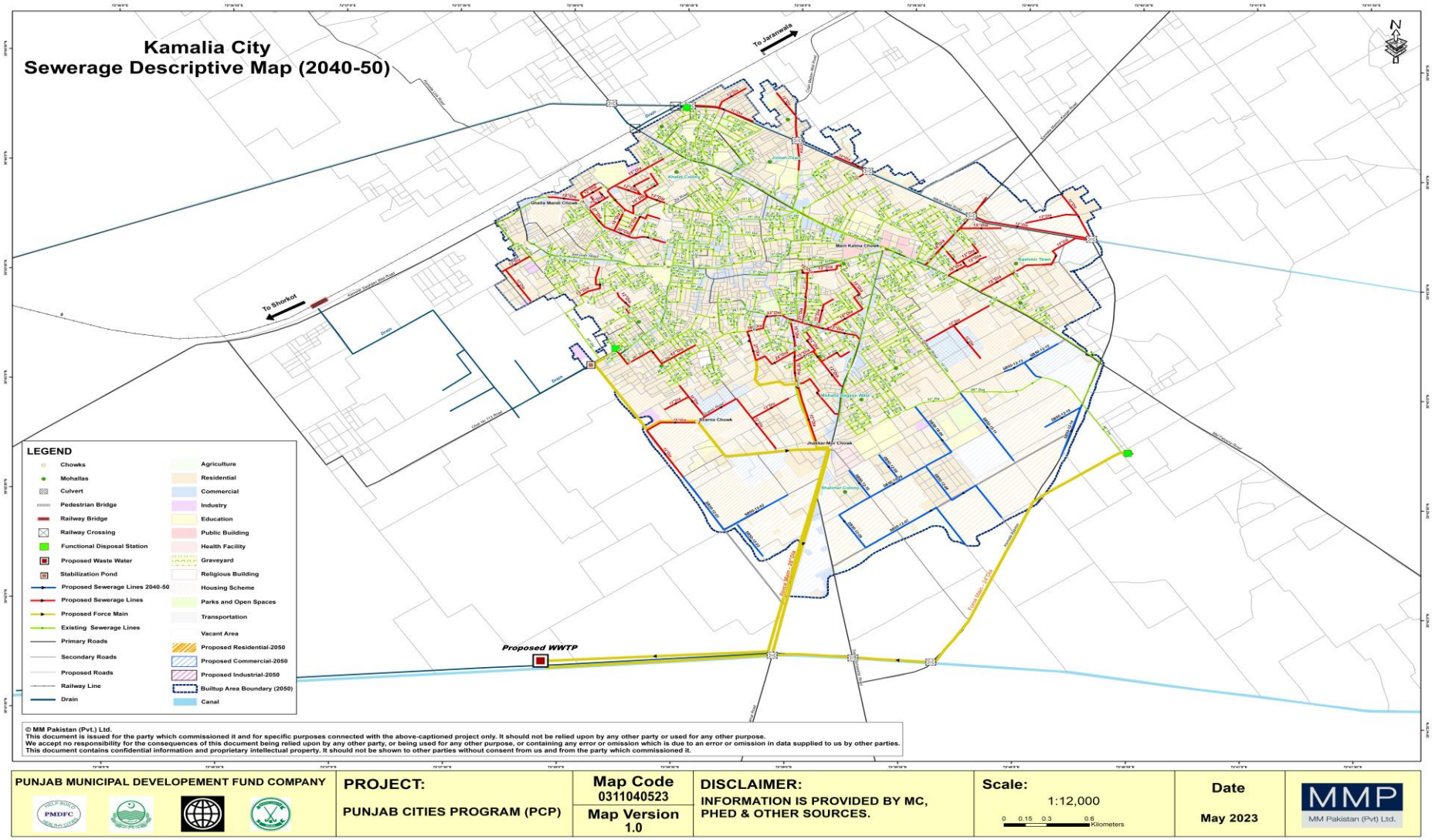


Figure 5: Descriptive map of Proposed Sewerage Plan up to year 2040-2050

6.1 Phasing of the projects

6.1.1 Phase-I: 2022 to 2032

The potential priority sub-projects to be carry out till 2032 and should be implemented in the given time frame. The lists of sewerage projects in 2032 are mentioned in below table:

Table 6-1 List of Sub-Projects in Phase-I (2022-2032)

Sr. No.	Name of Sub-Project	Size (in)	Sr. No.	Name of Sub-Project	Size (in)
1	SB32-01	42	29	SB32-29	24
2	SB32-02	27	30	SB32-30	24
3	SB32-03	24	31	SB32-31	18
4	SB32-04	21	32	SB32-32	12
5	SB32-05	18	33	SB32-33	15
6	SB32-06	15	34	SB32-34	15
7	SB32-07	15	35	SB32-35	18
8	SB32-08	15	36	SB32-36	18
9	SB32-09	12	37	SB32-37	12
10	SB32-10	15	38	SB32-38	12
11	SB32-11	12	39	SB32-39	18
12	SB32-12	12	40	SB32-40	15
13	SB32-13	15	41	SB32-41	15
14	SB32-14	36	42	SB32-42	12
15	SB32-15	36	43	SB32-43	12
16	SB32-16	33	44	SB32-44	15
17	SB32-17	27	45	SB32-45	12
18	SB32-18	21	46	SB32-46	15
19	SB32-19	18	47	SB32-47	12
20	SB32-20	12	48	SB32-48	36
21	SB32-21	18	49	SB32-49	18
22	SB32-22	15	50	SB32-50	15
23	SB32-23	18	51	SB32-51	15
24	SB32-24	18	52	SB32-52	18
25	SB32-25	15	53	SB32-53	12
26	SB32-26	30	54	SB32-54	15
27	SB32-27	30	55	SB32-55	12
29	SB32-29	24	56	SB32-56	12
30	SB32-30	24	57	SB32-57	15

6.1.2 Phase-II: 2032 to 2040

The potential priority sub-projects to be carry out till 2040 and should be implemented in the given time frame. The lists of sewerage projects in 2040 are mentioned in below table:
:

Table 6-2 List of Sub-Projects in Phase-II (2032-2040)

Sr. No.	Name of Sub-Project	Size (in)	Sr. No.	Name of Sub-Project	Size (in)
1	SB40-01	12	6	SB40-06	12
2	SB40-02	12	7	SB40-07	12
3	SB40-03	15	8	SB40-08	12
4	SB40-04	12	9	SB40-09	12
5	SB40-05	12	10	SB40-10	15
11	SB40-11	12	17	SB40-17	12
12	SB40-12	12	18	SB40-18	12
13	SB40-13	15	19	SB40-19	12
14	SB40-14	12	20	SB40-20	12
15	SB40-15	15	21	SB40-17	12
16	SB40-16	12			

6.1.3 Phase-III: 2040 to 2050

The potential priority sub-projects to be carry out till 2032 and should be implemented in the given time frame. The lists of sewerage projects in 2032 are mentioned in below table:

Table 6-3 List of Sub-Projects in Phase-III (2040-2050)

Sr. No.	Name of Sub-Project	Size (in)	Sr. No.	Name of Sub-Project	Size (in)
1	SB50-01	12	10	SB50-09	12
2	SB50-02	12	11	SB50-10	12
3	SB50-03	12	12	SB50-11	15
4	SB50-04	18	13	SB50-12	12
5	SB50-05	15	14	SB50-13	12
6	SB50-06	12	15	SB50-14	12
7	SB50-07	12	10	SB50-15	12

7 WASTEWATER TREATMENT PLANT

7.1 Background:

Wastewater treatment plants are facilities that treat wastewater to remove pollutants and make the water safe to release into the environment. The treatment process involves removing solid and liquid contaminants, such as organic matter, nutrients, pathogens, and chemicals. The purpose of wastewater treatment plants is to protect human health and the environment by ensuring that the wastewater is safe to release back into the water cycle.

The history of wastewater treatment dates back to ancient civilizations, where rudimentary methods were used to manage wastewater. In the 19th century, as urbanization and industrialization increased, the need for more sophisticated wastewater treatment methods became apparent. The first modern wastewater treatment plant was built in London in 1852. Since then, wastewater treatment technology has advanced significantly, and modern plants use a combination of physical, chemical, and biological processes to treat wastewater.

Today, wastewater treatment plants are essential infrastructure in urban and rural areas, providing a critical service to communities worldwide. They play a vital role in protecting public health and the environment, preventing the spread of diseases and reducing pollution in rivers, lakes, and oceans. The development of advanced treatment technologies has made it possible to recycle wastewater for non-potable uses, such as irrigation, industrial processes, and toilet flushing. This has the potential to reduce water demand and mitigate the impacts of water scarcity.

In summary, wastewater treatment plants are critical infrastructure that ensures the safe management and treatment of wastewater. They have a vital role in protecting public health and the environment, and their importance is only expected to grow as populations continue to increase and water resources become scarcer.

This report outlines the sectoral plan for the sewerage system in Kamalia, Pakistan. The objective of this plan is to improve the city's wastewater management to promote environmental sustainability and protect public health. The report provides an overview of the city, the current sewerage system, issues and challenges, objectives, design parameters, population and wastewater generation, proposed wastewater treatment plants, implementation plan and conclusion / recommendations.

7.2 Site Visit and Site Selection of WWTP

7.2.1 Site Selection

7.2.1.1 Criteria for site selection

The selection of a suitable site is a critical step in the design and implementation of a wastewater treatment plant. The following are the criteria for site selection:

- **Proximity to the source of wastewater** - The site should be located as close as possible to the source of wastewater to reduce the cost and energy required to transport the wastewater to the treatment plant.

- **Topography** - The site should have a level or gently sloping topography to minimize the cost of earthworks, excavation, and construction. A flat site also allows for easy access and operation of the treatment plant.
- **Geology** - The site should be located on stable geology with minimal risk of soil subsidence, landslides, or other geological hazards. The soil should also have good permeability to allow for efficient percolation of treated effluent.
- **Hydrogeology** - The site should be located in an area where groundwater is not easily contaminated by the treated effluent. The groundwater table should also be low enough to prevent flooding of the treatment plant and surrounding areas.
- **Access to utilities** - The site should be located near existing water, electricity, and gas utilities to minimize the cost of providing these services to the plant. The site should also be accessible by road or other means of transportation.
- **Environmental sensitivity** - The site should be located away from environmentally sensitive areas, such as wetlands, protected habitats, and areas prone to flooding or erosion. The site should also have adequate buffer zones to minimize the impact of odors and noise on neighboring communities.
- **Land availability** - The site should be large enough to accommodate the required infrastructure and allow for future expansion. The land should also be available for purchase or lease at a reasonable cost.

By considering these criteria for site selection, the project team has identified and selected a suitable site that meets the project's technical, economic, and environmental requirements.

7.2.1.2 Factors to consider when selecting a site

When selecting a site for a wastewater treatment plant, several factors must be considered to ensure that the site is suitable for the project's needs. The following are some factors that should be considered:

- **Environmental regulations** - It is important to consider local, state, and federal environmental regulations and restrictions when selecting a site. The site should comply with regulations and permit requirements related to water quality, air quality, waste management, and other environmental concerns.
- **Population density** - The population density in the surrounding area should be considered to minimize the impact of odors and noise from the treatment plant on nearby residents.
- **Land use** - The land use in the surrounding area should be evaluated to avoid conflicts with other land uses, such as residential, commercial, or industrial activities.
- **Accessibility** - The site should be accessible by road or other means of transportation to facilitate the transport of raw wastewater and treated effluent.
- **Topography** - The site's topography should be evaluated to ensure that the land is suitable for the construction of a treatment plant, including the excavation of ponds and basins.
- **Soil and geology** - The soil and geology of the site should be evaluated to ensure that the soil can support the construction of the treatment plant's infrastructure, and that the site is not susceptible to subsidence or other geological hazards.

- **Hydrogeology** - The site's hydrogeology should be evaluated to ensure that the groundwater is not easily contaminated by the treated effluent, and that the groundwater table is low enough to prevent flooding of the plant and surrounding areas.
- **Cost** - The cost of purchasing or leasing the land, constructing the treatment plant, and providing utilities and other infrastructure should be evaluated to ensure that the project is economically viable.

By considering these factors when selecting a site, the project team has identified a suitable location that meets the project's technical, economic, and environmental requirements.

7.2.1.3 Site visit for the wastewater treatment plant

A site visit for a wastewater treatment plant is an essential step in the project planning process. The purpose of the site visit is to assess the suitability of the proposed site and identify any potential challenges or issues that may need to be addressed during the project design and implementation phases.

During the site visit, the project team has conducted a detailed assessment of the site, including the following:

- The site for the treatment plant was evaluated based on various factors, including the topography, soil and geology, hydrogeology, accessibility, proximity to residential areas, availability of utilities, land use of the surrounding area, and environmental regulations.
- The topography of the site was assessed to determine its suitability for the construction of the treatment plant and excavation of ponds and basins. The soil and geology of the site were also evaluated to ensure that the soil could support the infrastructure and that the site was not susceptible to subsidence or other geological hazards.
- The hydrogeology of the site was assessed to ensure that the groundwater was not easily contaminated by the treated effluent and that the groundwater table was low enough to prevent flooding of the plant and surrounding areas.
- The accessibility of the site was evaluated to ensure that it was easily accessible by road or other means of transportation to facilitate the transport of raw wastewater and treated effluent. The proximity of the site to residential areas was also assessed to determine the impact of odors and noise from the treatment plant on nearby residents.
- The availability of utilities such as water, electricity, and gas were assessed to ensure that these services were easily accessible and could be provided to the treatment plant. The land use of the surrounding area was evaluated to ensure that there were no conflicts with other land uses, such as residential, commercial, or industrial activities.
- Finally, the environmental regulations and permit requirements for the site were assessed to ensure that the project complied with all applicable regulations related to water quality, air quality, waste management, and other environmental concerns.

By conducting a thorough site visit and assessment, the project team has identified potential challenges or issues that may need to be addressed during the project design and implementation phases. This information can then be used to make informed decisions about the suitability of the site and the design of the treatment plant.

The visit to Kamalia City on June 7th, 2022, aimed to assess the sewage treatment plant (STP) sites in the city. During the visit, a detailed discussion was held with MO (IS) to address concerns related to sewage disposal and land availability. Additionally, two operational disposal stations in Kamalia were thoroughly inspected.

The inspection aimed to evaluate the current state of the WWTP sites and identify any potential issues related to the wastewater disposal process. The visit included an assessment of the operational capacity of the WWTP sites and their compliance with regulatory standards.
Photographs were taken of the WWTP sites during the inspection to provide a visual record of the site conditions. These photographs will be useful in documenting the current state of the WWTP sites and identifying any necessary improvements.
Overall, the visit to Kamalia provided valuable insights into the current state of the city's WWTP sites and identified areas for improvement. The detailed discussion with MO (IS) helped to address any concerns related to wastewater disposal and land availability.

7.3 Wastewater Treatment Process

7.3.1 Treatment Technologies

The treatment process is the series of steps and processes that are used to treat wastewater and make it safe for disposal or reuse. The specific treatment process used depends on the characteristics of the wastewater and the desired level of treatment. There are several treatment processes available, each with its own advantages and disadvantages.

7.3.2 Stabilization Ponds

Stabilization ponds are shallow, man-made ponds that use natural processes to treat wastewater. They are designed to promote the growth of algae, bacteria, and other microorganisms that consume organic matter and nutrients in the wastewater. The wastewater is typically held in the ponds for several weeks, allowing for the growth of these microorganisms. Stabilization ponds are relatively simple and inexpensive to construct and operate. They can be effective at removing organic matter and nutrients from wastewater, but they require a large land area.

7.3.3 Facultative Ponds

Facultative ponds are similar to stabilization ponds but are deeper and have an aerobic layer on top and an anaerobic layer on the bottom. The aerobic layer promotes the growth of algae and other aerobic microorganisms, while the anaerobic layer promotes the growth of bacteria that consume organic matter in the absence of oxygen. Facultative ponds are effective at removing organic matter and nutrients from wastewater, but they require a larger land area than stabilization ponds.

7.3.4 Constructed Wetlands

Constructed wetlands are man-made systems that mimic the natural processes of wetlands to treat wastewater. The system typically consists of a series of shallow ponds or channels that are planted with wetland vegetation. The plants and microorganisms in the wetlands remove pollutants from the wastewater through a combination of physical, chemical, and biological processes. Constructed wetlands are effective at removing organic matter, nutrients, and pathogens from wastewater, but they require a large land area.

7.3.5 Aerated Lagoons

Aerated lagoons are large, shallow ponds that are aerated to promote the growth of aerobic microorganisms. The microorganisms consume organic matter and nutrients in the wastewater, producing carbon dioxide and water as by-products. The wastewater is typically held in the lagoons for several days to allow for the growth of the microorganisms. Aerated lagoons are effective at removing organic matter and nutrients from wastewater and are relatively inexpensive to construct and operate.

7.3.6 Trickling Filter

Trickling filters are fixed-film biological reactors that use a bed of rocks, gravel, or plastic media to support the growth of microorganisms. Wastewater is sprayed over the bed, allowing the microorganisms to consume organic matter and nutrients in the wastewater. The effluent is then collected and sent to a secondary clarifier for further treatment. Trickling filters are effective at removing organic matter and nutrients from wastewater but are less effective at removing pathogens.

7.3.7 Membrane Bioreactor

Membrane bioreactors (MBRs) combine a biological reactor with a membrane filtration system to treat wastewater. The biological reactor promotes the growth of microorganisms that consume organic matter and nutrients in the wastewater, while the membrane filtration system removes suspended solids and pathogens from the effluent. MBRs are effective at removing organic matter, nutrients, and pathogens from wastewater but are more expensive to construct and operate than other treatment processes.
In conclusion, the treatment process used for wastewater treatment depends on several factors such as the characteristics of the wastewater, the desired level of treatment, land availability, capital and operation cost, etc. The selection of the appropriate treatment process is crucial to achieving the desired level of treatment while maintaining cost-effectiveness.

7.3.8 Comparison of Treatment Technologies

The below table provides information on different treatment technologies used for wastewater treatment along with their BOD removal efficiency, area required, capital cost per MGD, and O&M cost per MGD.

Table 7-1 Comparison of Treatment Technologies

Sr. No.	Category	Treatment	Technology Type	BOD Removal Efficiency	Area required (Acre)	Capital Cost per MGD (PKR Million)	O&M Cost per MGD (PKR Million)
1.	Aquatic	Aerobic	Stabilization Ponds	90-95%	15	90	1.8
2.	Aquatic	Aerobic	Facultative Ponds	90-95%	25	105	2.4
3.	Aquatic	Aerobic	Constructed Wetland	60-70%	30	140	1.5
4.	Aquatic	Aerobic	Aerated Lagoons	90-95%	2.5	75	2.1
5.	Mechanical	Aerobic/Activated Sludge process	Trickling Filter (TF)	65-75%	0.4	70	2.4
6.	Mechanical	Aerobic/Activated Sludge process	Membrane bioreactor (MBR)	98.9-99.9%	0.1	220	6.5

- **Stabilization Ponds:** Stabilization ponds are low-cost treatment systems that use natural processes to treat wastewater. They require a large area of land and are therefore best suited for rural areas. They are simple to operate and maintain, and can remove up to 90-95% of BOD. However, they require a large area of land (15 acres per MGD) and are not suitable for areas with high land prices.
- **Facultative Ponds:** Facultative ponds are similar to stabilization ponds, but they are shallower and have a larger surface area. They are more efficient than stabilization ponds and can remove up to 90-95% of BOD. However, they require an even larger area of land (25 acres per MGD) and are not suitable for areas with high land prices.
- **Constructed Wetlands:** Constructed wetlands are engineered systems that use natural processes to treat wastewater. They are designed to mimic the natural treatment processes that occur in wetlands. They can remove up to 60-70% of BOD and require 30 acres per MGD of land. They are relatively low cost and are aesthetically pleasing, but require regular maintenance.
- **Aerated Lagoons:** Aerated lagoons are shallow basins that are aerated to promote the growth of aerobic bacteria. They can remove up to 90-95% of BOD and require only 2.5 acres per MGD of land. They are relatively low cost but require regular maintenance.
- **Trickling Filter (TF):** Trickling filters are mechanical systems that use a bed of rocks or other media to support the growth of bacteria that remove organic matter from wastewater. They can remove up to 65-75% of BOD and require only 0.4 acres per MGD of land. They are more expensive than stabilization and facultative ponds but are more efficient and require less land.
- **Membrane Bioreactor (MBR):** Membrane bioreactors are a type of activated sludge process that uses a membrane to filter out solids and bacteria. They can remove up to 98.9-99.9% of BOD and require only 0.1 acres per MGD of land. They are the most expensive treatment technology in the table but are the most efficient and require the least amount of land. They are also the most complex and require the highest level of maintenance.

In conclusion, the selection of a wastewater treatment process depends on various factors, including the BOD removal efficiency required, the available land area, the capital and O&M costs, and other site-specific factors such as local regulations and environmental concerns. A trade-off between these factors must be considered to select the most suitable treatment technology for a particular site.

7.4 Proposed Wastewater Treatment Plant

In this chapter, we will discuss the proposed wastewater treatment plants for the city of Kamalia. We will provide an overview of the proposed treatment plants, including their location, design, and capacity. We will also discuss the technology and processes that will be used in the treatment plants.

7.4.1 Proposed Wastewater Treatment Plants

Kamalia is in urgent need of a wastewater treatment plant to address the issues of untreated wastewater and overflows in the existing sewerage system. Based on our site visit and assessment, we recommend the construction of a wastewater treatment plant using the Wastewater Stabilization Ponds (WSP) technology. WSP is an effective and cost-efficient technology that uses a series of ponds to treat wastewater through natural processes of aerobic and facultative bacteria.

7.4.2 Location

Based on the technology being considered for the wastewater treatment plant proposed for this city, the estimated land requirement for treating 7.60 MGD of wastewater up to the year 2050 is approximately 95 acres. However, at present, the availability of land for the construction of the plant is limited.

This suggests that additional land will need to be acquired in order to meet the land requirement for the plant. Adequate land availability is crucial for the efficient and effective design of the wastewater treatment plant, as it will allow for the inclusion of necessary infrastructure and equipment, and provide sufficient space for the treatment process to be carried out effectively. Therefore, efforts will need to be made to identify and acquire suitable land for the wastewater treatment plant in Kamalia

7.4.3 Design and Capacity

The proposed wastewater treatment plant will have a design capacity of 7.60 MG till 2050 by catering all zones of city. The plant will be designed with a series of ponds, including aerobic ponds with a detention time of one day and facultative ponds with a detention time of six days. The ponds will be arranged in a cascading series to maximize treatment efficiency. The design of the plant will also include an efficient sludge removal system and an effective effluent disinfection system to ensure that the treated effluent meets the required quality standards.

To achieve the higher design WWTP capacity, the proposed plant will be designed with a larger footprint, accommodating a greater number of ponds, and with larger dimensions for each pond. The design will take into account the increased flow rates and ensure that the treatment process is optimized to effectively treat the higher volume of wastewater.

The aerobic and facultative ponds will be designed to provide optimal treatment conditions and to promote the growth of beneficial microorganisms that help break down organic matter. The cascading series of ponds will ensure that the treated effluent meets the required water quality standards before being discharged into the receiving water body.

The sludge removal system will be designed to efficiently remove and handle the sludge that accumulates during the treatment process. This will involve the use of specialized equipment and processes to dewater and dispose of the sludge in an environmentally safe manner.

The effluent disinfection system will ensure that the treated effluent is disinfected to the required level to prevent the spread of harmful pathogens. This will be achieved through the use of various disinfection methods, such as ultraviolet radiation, chlorine, or ozone, depending on the specific requirements and regulations.

Overall, the proposed 2050 wastewater treatment plant with a design capacity of 7.60 MGD will provide an effective and sustainable solution for treating the increasing volume of wastewater in Kamalia, while minimizing the environmental impact and promoting public health and safety.

7.4.4 Technology and Processes

WSP technology is a natural and sustainable method for treating wastewater. The wastewater is first treated in the aerobic ponds, where oxygen-loving bacteria break down organic matter. The effluent then flows into the facultative ponds, where a combination of aerobic and anaerobic bacteria further breaks down organic matter. The ponds are designed to mimic natural water treatment systems, such as wetlands and lakes, to create a habitat for bacteria and other microorganisms.

7.4.5 Land Requirement

The proposed plant will require approx. 95 acres of land to accommodate the 7.60MGD waste water by the year 2050. However, at present, no land is available for the plant. The MC will need to acquire land or identify suitable alternative sites for the construction of the plant.

7.4.6 Wastewater Sampling

In order to accurately design the treatment plant and determine the required treatment processes, it is essential to collect representative samples of the wastewater. The wastewater samples need to be collected from marked locations in the city to ensure that the characteristics of the wastewater are well understood and that the design of the plant is appropriate for the specific wastewater conditions in Kamalia.

7.4.7 Conclusion

The proposed wastewater treatment plant using Wastewater Stabilization Ponds technology is an effective and sustainable solution for the treatment of wastewater in Kamalia. The plant will address the issues of untreated wastewater and overflows in the existing sewerage system, and will provide a safe and clean environment for the residents of the city. However, the government will need to acquire land or identify suitable alternative sites for the construction of the plant, and wastewater sampling is essential to accurately design the treatment plant.

7.5 Implementation Plan

The implementation plan for the sectoral plan includes the following steps:

- Conduct a feasibility study to identify potential sites for the wastewater treatment plant and assess the costs and benefits of different options.
- Develop a detailed design for the wastewater treatment plant, including the type of treatment processes, capacity, and infrastructure required.
- Secure funding from the government or external sources to support the construction of the wastewater treatment plant (WWTP).
- Build the wastewater treatment plant according to the design specifications and ensure that it is operational before the expected completion date.

Monitor and evaluate the performance of the wastewater treatment plant to ensure that it is meeting the required standards.

8 ENVIRONMENTAL AND SOCIAL CONSIDERATIONS

8.1 Introduction

The Government of Punjab has realized the importance of making its cities, particularly the intermediate cities, more livable and has put the urban sector at the forefront of its national development strategy. Punjab's Vision 2030 and Framework for Economic Growth envisage livable cities as engines of national growth and centers of economic activity, culture, and knowledge. The framework also recognized the advantage of the local governments in managing the urban development on the ground, as they are closer to the beneficiary population with an informational advantage in identifying citizens' preferences, as well as essential flexibilities to respond rapidly to evolving city's needs. Under these circumstances, the government amended its constitution to decentralize the role of urban services to the provincial which will support key urban sectors including sewerage, sanitation, and urban infrastructure improvement in the cities of Punjab, Pakistan.

The present chapter has been prepared by focusing of environmental and social risks and benefits associated with proposed activities required to achieve the project goal and the improvement of the city, which apply to these activities and their risks and benefits

8.2 Consultant's Perspective

The review of the present assignment suggests that the fundamental logic behind the present multi-sectoral and multi-dimensional strategy for the project rests on the consultation process including participation, inclusion, ownership and equity of genuine development of national resources on a sustainable basis. The project has been designed keeping in view the following essentials;

a) Social acceptability,
b) Technical appropriateness,
c) Financial viability,
d) Environmental friendliness,
e) Pro-poverty reduction,
f) Gender positive and
g) Long-term sustainability prospects.

8.3 Specific Objectives of Sectoral Plan

A Sectoral Plan report for each sector will be prepared which will provide the location of the city, climatic conditions & rainfall data, connectivity, important and religious places, economic, cultural, or religious importance of the city, social infrastructure, educational facilities, government offices and administrative structure, commercial and industrial activities, culture and traditions of the area and other type of factors or activities attributed to the city which will impact municipal infrastructure and service delivery. The report for the Plan will reflect the ultimate effects on the city environments and benefits to be accrued to the inhabitants of the city after implementation of the Sectoral Plan.

8.4 Review of Laws and Regulations

According to the Constitution of Pakistan, water is a Provincial subject. More recently the Government of Pakistan (GOP) have issued the 'National Environmental Policy, 2005'; the 'National Drinking Water Policy, 2006' and the draft 'National Sanitation Policy, 2006. In response to national policy, Whilst the policies act as 'guiding principles', the water laws would need to clearly define roles and responsibilities for all 'actors' involved to ensure an 'integrated approach' to water resource management (IWRM), including the standards required for the supply of safe drinking water and disposal of waste water with due care for the environment.

Each provincial government has its own environmental protection institution responsible for pollution control. The provincial Environmental Protection Agencies or Environmental Protection Departments (EPA/EPD) are the provincial counterparts of Federal EPA, which is authorized to delegate powers to provincial EPA/EPD.
The reports covering IEEs and EIAs are submitted to the concerned provincial EPA/EPD for approval. For public works, responsibility for IEE and EIA management & review and granting or refusing environmental approval, will be vested in the provincial Planning and Development Departments (P&Ds) responsible for economic and development planning at provincial levels.
In conclusion, overall, there is sufficient legislation and policy pronouncement already in place, however, the motivation, coordination, resources, participation of beneficiaries and institutional capacity to effectively implement them appear to be sorely missing. Additionally, there would appear to be overlaps and lack of clarity in responsibilities for interrelated agencies and a lot of the legislation is very prescriptive and 'over-specified' which enforces strict bureaucratic routines and stifles the development of new ways of working.

8.5 Environmental and Social Considerations

The purpose of the Environmental and Social Considerations is to ensure that development options under consideration are environmentally and socially sound and sustainable and that the environmental consequences of the project are recognized early and taken into account in the project design. The procedures should follow the national and provincial laws and World Bank's Guidelines for Environmental and Social Considerations are also taken into account.

8.5.1 Potential Impacts, Risks and Benefits

Potential impacts, risks and benefits were done for sewerage and drainage projects to be planned for Sectoral Plan.

Table 8-1 Impacts Matrix

No.	Item	Project Phase	Rationale of Impact Assessment
Natural Environment			
1.	Climate/ Meteorological Phenomena	P	No impact is expected as no engineering work is carried work at this stage
		C&O	The impacts on micro-climate and micro meteorological phenomena are negligible because the project related structures will not disturb wind path.
2.	Topography	P	No impact is expected as no engineering work is carried work at this stage

No.	Item	Project Phase	Rationale of Impact Assessment
		C	Changes in topographic condition might occur due to excavation and filling works. Balancing the volume of excavation and filling is recommended to minimize the volume of surplus soil.
		O	Topographic condition will be stable after the completion of the facilities.
3.	Geology	P,C&O	No impact is expected as the project does not alter the geological condition of the area.
4.	Soil Erosion	P	No impact is expected as no engineering work is carried work at this stage
		C	Soil erosion might take place in the construction works of the facilities at rainy season.
		O	Soil erosion will not take place after the completion of the facilities.
5.	Hydrology	P	No impact is expected as no engineering work is carried work at this stage.
		C	Construction work might cause minor and temporally impact on hydrology.
		O	This project does not cause impact on hydrology.
6.	Groundwater	P	No impact is expected as no engineering work is carried work at this stage.
		C	Construction work of the facilities will not include groundwater abstraction.
		O	No impact is expected as groundwater abstraction will not be done in the operation of waste water treatment plant.
7.	Ecosystem, Flora, Fauna and Biodiversity	P	No impact is expected. No unique/endangered species do not inhabit in the project area.
		C	Trees and bushes will be cut during the construction work of the facilities. The quantity of tree and bush trimming should be kept to the minimum.
		O	No impact is expected in operation stage.
8.	Protected area/ Forest	P	There is no protected area and forest in the project area.
		C	Construction work of the facilities will demolish some part of plantation.
		O	No impact is expected in operation stage.
9.	Landscape	P	No impact is expected as no engineering work is carried work at this stage.
		C	Construction work might cause minor and temporally impact on landscape.
		O	No impact is expected in operation stage.
10.	Natural Disaster	P,C&O	This project will not induce natural disaster.
Living Environment (Pollution Control)			

No.	Item	Project Phase	Rationale of Impact Assessment
11.	Air Pollution	P	No impact is expected as no engineering work is carried work at this stage.
		C	A certain amount of air pollutants is expected to be emitted from the use of vehicles and heavy machines during construction work of the facilities.
		O	Waste water treatment plant will not discharge air pollutant.
12.	Offensive Odor	P and C	Offensive odor will not be generated on the water supply project because any source materials of odor will not be used.
		O	Waste water treatment plant may emit offensive odor, but its influence will be very limited because the plants will be constructed sub-urban area apart from the city.
13.	Water Pollution	P	No impact is expected as no engineering work is carried work at this stage.
		C	Turbid water from the construction sites may pollute neighbouring areas.
		O	There is some possibility of canal water pollution, if treated waste water including factory effluent will be discharge into the canal.
14.	Bottom Sediment Contamination	P,C&O	Sewerage and drainage project will not contaminate bottom sediment in the rivers and canals.
15.	Soil Contamination	P and C	Sewerage and drainage project will not contaminate soil in these stages.
		O	Sludge from waste water treatment plant may contaminate soil.
16.	Land Subsidence	P	No impact is expected as no engineering work is carried work at this stage.
		C	As groundwater abstraction will not be done in construction work of the facility, land subsidence will not take place.
		O	Sewerage and drainage project will not cause land subsidence because groundwater abstraction will not be done.
17.	Noise/Vibration	P	No impact is expected as no engineering work is carried work at this stage.
		C	Noise and vibration will be generated from the construction sites of the facilities.
		O	Although the operation of pumps and other machines will cause some noise and vibration, there will be no significant impact since such facilities are normally located away from the congested city zone.
18.	Sunshine Obstruction	P,C&O	Sewerage and drainage project will not cause sunshine obstruction.

No.	Item	Project Phase	Rationale of Impact Assessment
19.	Waste/Hazardous Materials	P	No impact is expected as no engineering work is carried work at this stage.
		C	Construction work of the facilities will generate surplus soil and construction debris.
		O	Waste water treatment plant will produce sludge contain in organic matters and hazardous materials such as heavy metals.
Socio-economic Environment			
20.	Involuntary Resettlement	P	Although main facilities are planned to be constructed in the plantation areas without houses, the plans are always subject to change depending on the conditions in future and involuntary resettlement may occur. Minimizing the resettlement should be the priority for facility design.
		C	Resettlement will be completed in pre-construction stage.
		O	No resettlement will occur in operation stage.
21.	Land Acquisition	P	Land acquisition of wide area from several land owners will be needed for the construction of waste water treatment plant. Width of the land acquisition will change depending on the scale, treatment method and other conditions.
		C	Land acquisition will be completed in pre-construction stage.
		O	No land acquisition will occur in operation stage.
22.	Utilization of Local Resources	P	No impact is expected as no engineering work is carried work at this stage.
		C	Mass scale use of local resources such as sand and quarrying for the construction of the facilities may obstruct these utilization by the local people for other purposes.
		O	No impact will be anticipated in operation stage.
23.	General, Regional/City Plans	P	No impact is expected
		C	No impact is expected in construction stage.
		O	Better infrastructure may cause economic development in the Project area.
24.	Social Institutions	P,C&O	No impact is expected as there will be no change in social institutions.
25.	Social Infrastructure and Services	P	No Impact is expected as no engineering work is carried work at this stage
		C	Access to social infrastructure and services may be temporarily affected due to construction work of the facilities as well as traffic jams due to the operation of construction vehicles.
		O	Sewerage and drainage project will highly improve the sanitary environment of the city.

No.	Item	Project Phase	Rationale of Impact Assessment
26.	Local Economy and Livelihood	P	Loss of income source and livelihood due to involuntary resettlement are expected to negatively affect the local economy and livelihood.
		C	Temporal traffic prohibition and traffic jam accompanied with construction work may give negative impact to the local economy. On the other hand, construction works of the facilities will have positive impact on local economy by creating employment and business opportunity in the project area.
		O	Sewerage and drainage project will greatly improve sanitary condition of the city and conclusively lead to the improvement of the livelihood.
27.	Unequal Distribution of Benefit and Damage	P	Land acquisition and involuntary resettlement will lead to unequal distribution of benefit and damage between groups who are directly affected by the project and who are not.
		C	While resettling households bear much of damage, other may get benefits from new business relating the construction works, resulting in unequal distribution of benefit and damage.
		O	No impact is expected in operation stage.
28.	Local Conflict and Inequity	P	No impact is expected.
		C	No impact is anticipated in construction stage.
		O	Sewerage and drainage project will start from priority area and areas other than priority area cannot receive beneficence that is environmental improvement. Such unequal distribution of the services may cause complaint among the people.
29.	Cultural and Historical Heritage	P	There is no cultural and historical heritage in the project area.
		C and O	No impact is expected as the project will not affect cultural and historical heritage.
30.	Religious Facilities	P	There are many mosques, Sikhism shrines and grave yards in the city which have a very sensitive religious and cultural significance in the society. Such religious facilities must not be included in the construction sites.
		C	Roadside religious facilities may be affected by noise and vibration during construction of the facilities.
		O	No impact is expected in operation stage.
31.	Sensitive Receptor (ex. Hospital, school)	P	Sensitive facilities will not be included in the construction sites in the planning.
		C	Roadside sensitive facilities may be affected by noise and vibration during construction of the facilities.
		O	No impact is expected in operation stage.

No.	Item	Project Phase	Rationale of Impact Assessment
32.	Vulnerable Groups	P	It is necessary to assess their ability to pay waste water charge and develop mitigation measures in the planning stage.
		C	They might be benefitted from employment opportunities during construction work.
		O	They may not be affordable to pay waste water charge and the mitigation measures must be needed.
33.	Ethnic Minorities /Indigenous People	P,C&O	There are no ethnic minorities and indigenous groups in the project area.
34.35.	Gender	P	No impact is expected.
		C	Equal opportunity should be sought for employment in construction work.
		O	No impact is expected in operation stage.
36.	Children's Rights	P	No impact is expected.
		C and O	Child labour is unlawful and only adult is eligible for employment opportunity created by the project.
37.	Public Health and Safety	P	No impact is expected.
		C	Influx of construction workers is likely to increase the health risk, particularly HIV/AIDS. However, the infection risk of HIV/AIDS is quite low as infection ratio of HIV/AIDS is 0.1% to 0.2% in Pakistan (UNAIDS 2014).
		O	Improvement of sewerage and drainage system will greatly contribute the improvement of public health in the project area. In case that the treated waste water will be planned to be discharged to irrigation canal, farmer's health may be damaged by the toxic substances included in the treated waste water.
38.	Occupational Health and Safety (OHS)	P	No impact is expected.
		C	Occupational Health and Safety of construction work should be properly managed through adequate labour management.
		O	Occupational Health and Safety of operation and maintenance work of the facilities should be properly managed through adequate labour management.
Others			
39.	Accidents	P	No impact is expected.
		C	Accidents associated with construction work should be properly managed through adequate labour management.
		O	Accidents associated with operation and maintenance work of the facilities should be properly managed through adequate labour management.
		P	No impact is expected.

No.	Item	Project Phase	Rationale of Impact Assessment
40.	Greenhouse Effect Gas (GHG) Emissions	C	The use of construction machines and operation of vehicles will result in increase in GHG emissions. However, its affection is temporal and negligible for the global climate change.
		O	GHG will not be emitted from the facilities because commercial electric power will be used for operation of the facilities.

Note: P: Pre-Construction, C: Construction, O: Operation

8.6 Mitigation Measures

8.6.1 Natural Environment

a) Ecosystem, Flora, Fauna and Biodiversity

The quantity of tree and bush trimming necessary for the construction work should be kept to minimum. New and good condition machinery with minimum noise will be used in construction. Plantation of trees and bushes will be done in the construction sites in order to regain the ecological habit

8.6.2 Living Environment (Pollution Control)

8.6.3 Air Pollution

Construction vehicles and heavy machines shall be properly maintained to minimize air pollutants. Safety devices to detect and neutralize chlorine leakage should be installed in chlorination facilities in the treatment plants, and operation manuals for related facilities should be properly formulated and distributed to the workers.

a) Offensive Odor

When designing sewage treatment facilities, it is necessary to arrange the design to prevent the leakage of offensive odor flowing outside of the premises. Waste water treatment facilities shall be properly maintained to minimize offensive odor.

b) Water Pollution

Materials and construction methods that reduce muddy water shall be adopted, and measures to prevent muddy water from directly flowing into the canals, such as construction of simplified weirs, shall be conducted.

With respect to discharged water from sewage treatment plants, facilities which have enough capacity to meet effluent standards need to be set up.

In case that the treated waste water will be discharged into the irrigation canals, pollution of canal water should be carefully examined, and if the pollution will be anticipated, idea of treated waste water discharging into the irrigation canal should be reconsidered.

c) Soil Contamination

Sewerage sludge needs to be disposed of in a way to prevent leakage in the sections surrounded by concrete or other impervious materials.

d) Noise and Vibration

Construction vehicles and heavy machines shall be properly maintained to minimize noise and vibration. Construction works in early morning and night should be avoided.

e) Waste/Hazardous Materials

Waste soil generated from construction sites should be used for back-filing. Construction companies and workers shall be guided not to leave waste soil and other waste in construction sites. Sludge from drinking water treatment plants without hazardous substances should be also used for back-filling.

8.6.4 Social Environment

a) Involuntary Resettlement

Although main facilities are planned to be constructed in the plantation areas without houses, the plans are always subject to change depending on the conditions in future and involuntary resettlement may occur. Minimizing the resettlement should be the priority for facility design.

It is necessary to conduct on-site investigation to identify the necessity of resettlement and its scale when planning individual projects. It is also necessary to coordinate with local residents to be affected, and obtain their consent. If large scale resettlement is expected, a resettlement action plan shall be formulated and released to the public based on the World Bank Guidelines for Environmental and Social Considerations. The action plan needs to include due compensation for relocation and support for re-establishment of the relocated resident's livelihoods. At the stage of Sectoral Plan in which details are not determined, a resettlement policy framework shall be formulated, and a survey on resettlement shall be performed when details of individual projects are put together.

The amount of compensation shall be calculated at full replacement cost including market price of the property, cost for ground levelling, registration fees and other related expenses. Support for re-establishment of livelihood shall be provided to improve the living standard or at least to restore it to the pre-project level.

b) Land Acquisition

On-site investigation shall be conducted to identify lands to be acquired and their right holders when planning individual projects. It is also necessary to coordinate with local residents to be affected, and obtain their consent. The amount of compensation will be determined based on the market price.

c) Unequal Distribution of Benefit and Damage

Sound arbitration and conflict resolution mechanism among benefitted people and damaged people such as resettled households by the project. Such mechanism should be formulated.

d) Local Conflict and Inequity

Local stakeholder meetings shall be held to coordinate with local residents, and the result of the meetings shall be properly reflected in a project plan.

e) Religious Facilities

Impacts on religious facilities shall be confirmed in local stakeholder meetings. Based on the result of the meeting, necessary measures shall be undertaken. If certain impacts on religious facilities are expected, it is necessary to consider mitigation measures such as piping route change in consultation with local residents, religious leaders and other stakeholders

f) Vulnerable Groups

Impacts on vulnerable groups who cannot afford to pay water and sewage fee shall be confirmed in local stakeholder meetings, necessary measures such as lowering of fees for poor people shall be undertaken.

g) Public Health

In case that the treated waste water will be planned to be discharged to irrigation canal, adverse effect to farmer's health must be examined in consultation with experts which is doing research on re-use of treated waste water for irrigation. If it will be inferred that canal water mingled with treated waste water may give adverse effect to farmer's health, necessary measures such as increment of treatment degree and withdrawal of the plan should be considered.

h) Occupational Health and Safety

Occupational health and safety of the construction works and operation works of the facilities should be managed properly through adequate labour management and education.

8.6.5 Others

i) Accident

Safety education shall be provided to construction workers and operation workers of the facilities to prevent accidents. Traffic safety education should be also provided to drivers of construction vehicles. Facilities shall be fenced to prevent the entry of local residents and livestock.

8.7 Environmental and Ecological Improvement Subject Plan

In the alignment with the notion of sustainable development, improving environmental profile of cities is imperative for the local government agencies. Cities are generating 75 percent of global carbon emissions. Environmental planning and management techniques and tools are necessitated to ensure protection and ecological based urban development.

8.8 Institutional Capacity Building

Institutional capacity building is a vital component of overall environmental and social development process for a given project. Until recent years institutions were acute, simple and local in nature. Now, institutions have become chronic, complex and global. Both formal and informal institution in public and private sectors are undergoing processes of transformation all over the world to meet the challenges of the new century. Pakistan, particularly urban development sector is no exception to this global phenomenon.

In this changing milieu, it would be prudent to improve the formal and informal institutions in urban development sector of Punjab for having sound base of policy planning to meet the challenges of effective institutional transformation in the province.

To respond adequately the concern about the impact of development programs, it is necessary to determine:

a) Whether the desired environmental, social and economic changes have occurred in the intended target population;
b) The extent to which these changes can be attributed to the development project rather than to other independent or exogenous factors; and
c) The direct and indirect impacts on other groups.

In a situation such as institutional capacity building in the urban development sector in Punjab, which will cause important changes in the lives of many people, rigorous evaluation design is required for impact assessment over an extended period of time.

8.8.1 Institutional Building:

It refers to the planning, structuring and guidance of new or reconstructed organizations which:

- In corporate, foster, encourage and protect normative (shared expectations) relationship and action patterns;
- Perform functions and services, which are valued in the (physical/engineering, biological, environmental, social and cultural); and
- Facilitate the accommodation of new physical/engineering and environmental and social technologies.

a) Salient features of institution building process

- **Leadership**: It refers to all those who are actively engaged in the formation of institution;
- **Ideology:** it pertains to the specifications of the values, objectives and operational methods of the institutions at various level,
- **Organization:** It is the instrument of planned change in which and through which leadership emerges, flourishes and protects the new values, norms and technologies; and
- **The Environment:** it is an essential component for performance of institutional functions and services. Leadership works towards the establishment of a social organization in a rational way and action patterns become normative order for other organizations and institutions in community.

8.8.2 Sustainability Thesis:

The focus of institutional development theory mainly rests on “sustainability”, which in turn has three basic elements of financial, social and economic attributes. The financial sustainability mainly depends on assets, income and cash flow status. Whereas social sustainability counts on human resources development, formal and informal social organizations, skill improvement, institutional building and appropriate legal framework in place. The economic sustainability rests around “social marketing” focused on products place, price, package and promotion centered on consumer demand and welfare. An organization is the primary unit of analysis and operation for any genuine institutional development and capacity building within the institution development required for its sustainability.

8.9 Site Specific Plans (SSP)

It will be most important responsibility of the contractor to prepare all SSP and submitted for approval. These Plans include:

❖ Site Specific Environmental Management Plans (SSEMP) ❖ Health and Safety Plans ❖ Waste Management Plan ❖ Storage and transportation of Fuels and Hazardous Substances.	❖ Checking the status of project drivers and the possession of necessary licenses. ❖ Checking speed limit signs in the project area.

❖ Barricading of Project Site in the populated areas. ❖ Road signage at appropriate locations to reduce traffic hazards.	❖ Facilities and Living conditions at Worker Camps / Barracks. ❖ Overall housekeeping at the Project Sites. ❖ Training plans

8.10 Grievance Redress Mechanism

Effectiveness compliant management system is important in every project but it become crucial in project located in densely urban environment. The effectiveness of complaint management system ensures uninterrupted project progress. The complaint may be between contractor and community or among people working on the project. Therefore, social and environmental team will watch and monitor the compliant management system established by the contractor to receive and address in a timely fashion specific concerns about compensation and relocation that are raised by displaced persons, including a recourse mechanism designed to resolve disputes in an impartial manner. It is anticipated that the nature of such complaints will relate to compensation and resettlement assistance matters, damages, mobility and access issues of general public or disruptions of services during civil works related to the project functionaries.

The main responsibility of consultant during construction phase will be to ensure that the Project Area and Affected People are not disadvantaged in any way. The arrangements for monitoring the resettlement and compensation activities are part of best practice. These are the main steps to be taken in this account during construction phase;

- Provides timely information about the asset valuation and negotiation process,
- Maintains records of any grievances lodged
- Documents regarding resettlement obligations i.e. payment of the agreed-upon sums, construction of new structures, etc., for all permanent and temporary loses, as well as unanticipated, additional construction damage.
- Updates the database with respect to changes that occur on the ground as ESMP, resettlement and compensation activities are being implemented.

However, in spite of best efforts, there is every chance that the individuals / households affected by the project or other stakeholders are dissatisfied with measures adopted to address social impacts of the project. To address, such situation an effective Grievance Redress Mechanism (GRM) will be established to ensure timely and successful implementation of the project.

8.11 Working Arrangement

The environmental and social designated team will keep close and proactive coordination with the client and will provide continuous support and assistance for smooth implementation of the Project's Environmental, Health and Safety requirements. Findings will be frequently submitted to the client in accordance with the frequency prescribed in the ESMP and following the guidelines mentioned in the TOR. In performing their duties the consultants may also need to work in coordination with other offices or organizations or those which will be contracted by Project Management to carry out specific assignments.

8.12 Communication with External and Internal Stakeholders

During the construction, the Team Leader will advise and assist the client and other related departments with media relations regarding the project and keep them properly informed on important matters of construction progress to build up an independent but close working relationship with the Client representative who is supervising project implementation. Our site offices and Project Offices will provide linkages and source of integration between World Bank, client, and field teams. Communication setup, reporting mechanism, and meeting schedules will be decided in consultation with the Client.

9 RECOMMENDATIONS

Rapid urbanization and population growth taking place nationwide has led to secondary cities to be growing as fast as the primate cities. Without definitive commitment to effectively plan and manage the emerging cities transition sustainably and inclusively, these cities would remain unprepared for the challenges associated with rapid urbanization. It would require consolidated efforts from all public and private stakeholders to leverage urbanization for a more sustainable, resilient and inclusive urban development.

This study was undertaken to prepare SWM specific sectoral plan to serve the growing generation of solid waste and associated infrastructure demand for the planning horizon, 2050. It provides an assessment of existing SWM practices and solutions that include up gradation of collection machinery, waste treatment and environment friendly disposal.

A strategic study was also conducted to provide inhabitants with clean and environmentally conscious city. In order to implement the holistic sectoral plan to respond to the urban challenges, it is envisaged to formulate city development strategies, institutional reforms, community engagement, sustainable financing and integrated planning. The guiding principles to be adopted for the effective implementation of the sectoral plan in order to orient MC to achieve the overarching goal as per below:

1. Waste Management Planning,
2. Institutional Capacity Building,
3. Institutional Improvements at Regional and Municipal Levels,
4. Development of Independent Organizational Structure,
5. Private Sector Engagement,
6. Implementation, Operation and Maintenance,
7. Use of Information Technology for Monitoring, and
8. Public Awareness.

9.1 Waste Management Planning

The Planning of waste management will include clear, quantitative targets, realistic actions for their financing and implementation and a process for monitoring and review of public involvement in the SWM sustainability.

9.2 Institutional Capacity Building

Beyond the need for infrastructure financing, the MC needs support for improving and building institutional and human resource capacities in order to be able to deliver the intended services and the operation and maintenance of the infrastructure assets. It is desired to bring policy and

institutional reform to improve the efficiency which will require the development and adoption of an integrated sector policy for SWM. Where appropriate, each development component should also include an element of capacity building, which may include provision of information communication technology (ICT), computer equipment and associated training programs. Capacity building encompasses three main activities:

(i) Skill upgrading, both general and specific,
(ii) Procedural improvements, and
(iii) Organizational strengthening.

(i) Skills Up gradation

MCs have low capacity and require a lot of guidance to advance their systems. Capacity building can be provided by an association of municipalities. In principle, associations of municipalities should be strengthened and their role institutionalized as a consultative partner. MC's staff should be interacted with the large organizations of similar capacity. These larger organizations can be the municipalities of larger cities or the public companies established in large cities.

ii. Procedural Improvements

Standard operating procedures have not been defined in the MC in regard to the SWM systems which cause less efficiencies and delays. Standard procedures should be developed and implemented to enhance the efficiencies of the municipalities. In this regard guidance may be taken from the consultants or larger municipalities where systems have been established.

iii. Organizational Strengthening

An institution can implement its policies only if it has considerable strengths. The MC should be strengthened by building their capacities and enhancing skilled professionals. Municipalities should be given powers to develop the local bylaws and enforce them.

9.3 Institutional Improvements at Regional and Municipal Levels

The Regional waste management plans should be prepared by consulting local governments and regional municipalities. When building new infrastructure and facilities, individual municipalities should be encouraged to follow the adopted plans to ensure cohesive development of the sector across the region. This would ensure the efficient use of limited public resources and the coordinated development of the sector. Inter-municipal cooperation in service provision should be promoted and could be supported by the central government through a variety of guidance tools and incentives, such as access to financial resources for capital investments.

9.4 Development of Independent Organizational Structure

An independent municipal waste collection organization should be considered where service delivery is not outsourced. In several of the studied countries, municipal enterprises perform various municipal services (waste collection, street cleaning, parks/green area maintenance, Beautification, etc.) and their financial statements are bundled. However, an accounting system for dedicated cost allocation is necessary but often missing. This system should have at least a

separate budget as well as annual financial statements for municipal waste services where such services form a significant share of the municipal budget.

9.5 Private Sector Engagement

The private sector is engaged in the collection and transportation, intermediate treatment, and final disposal of municipal waste through consignment contracts from municipal governments. The involvements of the private companies in larger cities in Pakistan have been a success story, and can be recommended in larger MCs after detailed cost benefit analysis.

9.6 Implementation, Operation and Maintenance

Whilst investment in up gradation of SWM sector will remain important to address the growing development challenges, particular attention should also be paid to the management of the existing and new assets. It will require the MC to adopt a complete life cycle asset management which should include maintenance and operational requirements. It will also require the MC to build resilient and sustainable infrastructure which can meet the current and future demands and environmental conditions and adopt strong asset management practices that will increase the life value of assets.

9.7 Use of Information Technology for Monitoring

The monitoring of all vehicles will be done primarily through an information technology (IT) based Vehicle Trip Counting System (VTCS). The pictorial evidence shall be taken using Android Mobiles and uploaded to the server for monitoring and analysis. In case of loss of signals or unavailability of the cell phone service, the pictures will be saved and uploaded once the signals or service is restored. MC should establish a control room for the awareness activity that will remain active 24/7 for a fixed period of two years. The awareness progress reporting shall be integrated with the operational progress reporting. A special helpline number shall be acquired and made accessible to the general public if the collection is not done on time or as per the schedule distributed to the community. Sub-Engineer will manage the monitoring and control room. The control room will function round the clock to monitor the operations and provide insights into the field operations. The control room will diagnose field operation problems and facilitate measures to perform mid-course corrections. In addition, actions would be taken to prevent the occurrence of problems. The control room will be the hub of monitoring and analysis; it will function round the clock to monitor and provide insights into the field operations.

9.8 Public Awareness

The MC should develop a comprehensive awareness campaign module for one year from start of the project. The methodology should be devised in a result-oriented manner and brings the community on board to successfully execute a solid waste management system in the city. The focus of this activity would be in the residential areas and with a strong presence in commercial areas as well. The residential areas are given more weightage to educate people not to waste before the collection vehicle comes for collection.

ANNEXURE-C

Project Proposal

Sector Objectives

The sector objectives include:

1. Provision of efficient and effective municipality services to the masses.
2. Improvement of existing sewerage system in Kamalia City.
3. To improve existing environmental conditions by provision of wastewater treatment facilities in Kamalia City.

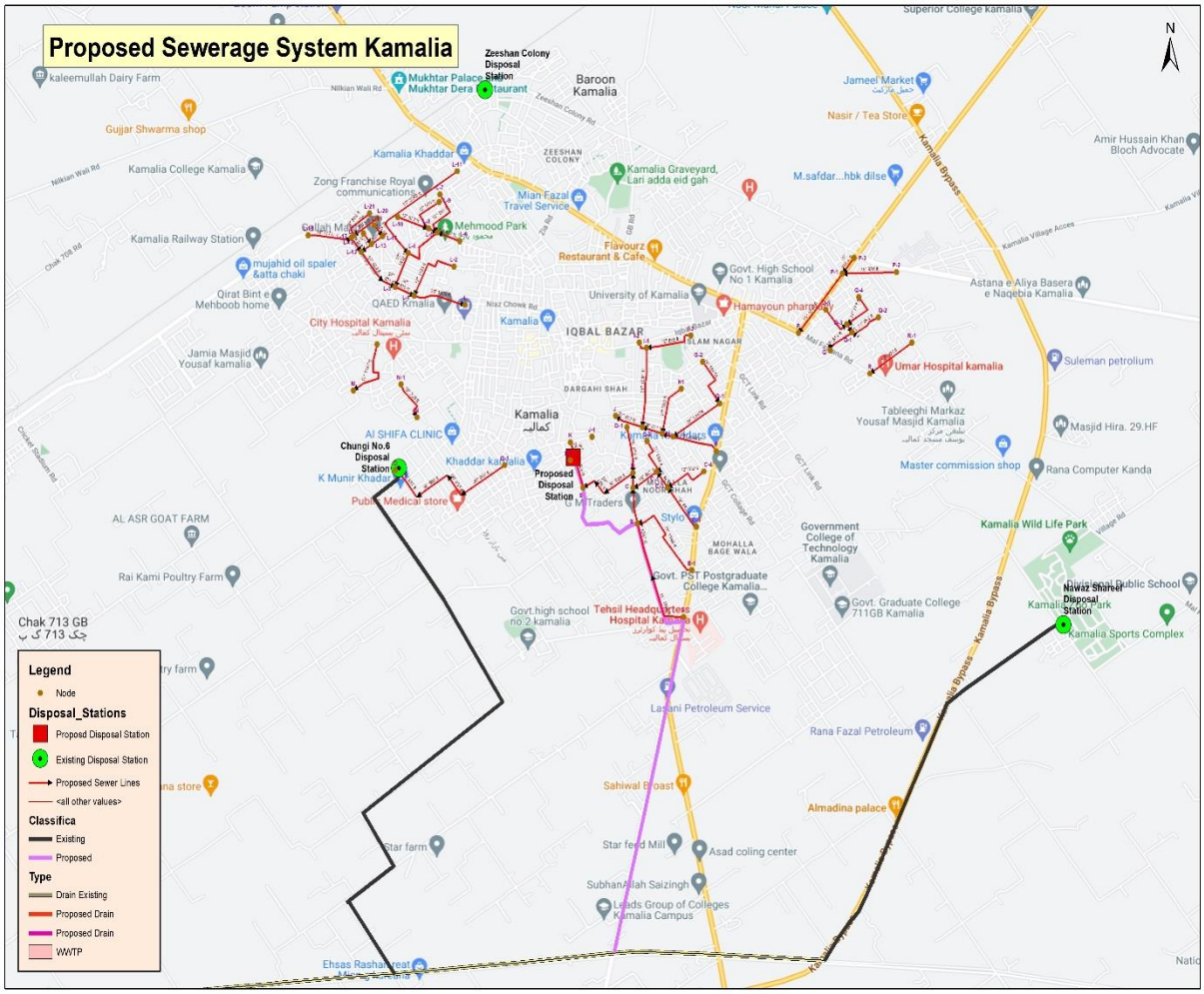
Objectives and Justification of the Project

The Program aims for improvement of Infrastructure of Municipal Services including Sewerage System to improve municipal service delivery.

The Project comprises of the Replacement of old, outlived, damaged or worn-out components in existing infrastructure for; -

- The sewerage system of Kamalia was laid about 40 year ago, some sewer lines was replaced in PCP Programme. Due to ill O&M the sewerage system is not working properly. The central city is considered as low line areas, resultantly, the resident of central city facing sanitation and environmental problems.
- To improve the service delivery by replacement and laying of trunk sewer according to need base and topographic conditions. It will provide Improvement of service delivery level of the municipal services in the served areas of the city for provision of better basic urban services for improved livability of the citizen.
- The new system is proposed to reduce in annual O&M cost of the infrastructure due to reduced repairs in the forthcoming years because of repair or replacement of infrastructure components.
- The major areas like Kamalia Municipal Committee office, main bazar, Tehsil Headquarter and other areas will served with the system. Overflow on the roads are occurring resultantly, road network are damaging. Municipal Committee Kamalia spending huge funds for maintenance as well as reconstruction of road network. Municipal Wastewater has connected through open drains and this wastewater is going to the agriculture farm without any treatment. Furthermore, wastewater is also stagnating the streets, open plots and creating environmental pollution.
- On completion of scheme about one hundred and thirty thousand peoples will benefited with sewerage facility as well as improve the existing areas. It will cause in reduction and prompt addressal of the public complaints regarding municipal service delivery.
- The major areas are without sewer along the planned route of trunk sewer which will be benefited with sewerage facility and environmental condition will be improve.
- The provide the wastewater treatment facility for reduction of BOD to bring the effluent within permissible limits of the NEQSs and the treated water can used for irrigation.
- With the improvement of environmental standards, the growth potential and the local economy of the city will be improved.

Hence, the objectives of the project are in line with the sector objectives mentioned above and the project forms integral part of the concerned sector.



HYDRAULIC STATEMENT TRUNK SEWER KAMALIA

Zone	NODE	Length of Line (in ft)	Area (acre)			Population (No's) @ 85 person/acre	Consumption in gallong @ 40 GPCD	Avg. Sew. Flow (in cusec)	Peak Factor	Peak Flow (in cusec)	Infilteration @ 5% of average flow (in cusec)	Storm Allow 50% of peak flow (in cusec)	Design Flow (in cusec)	Proposed Dia (inches)	Velocity ft/sec	Capacity of proposed dia (inch)	Grade of Sewer	Road Levels		Invert Elevation		Elev difference	
			online	Previous	TOTAL													u/s MH	d/s MH	u/s MH	d/s MH	u/s MH	d/s MH
																	ft/ft	ft	ft	s	ft	ft	ft
Kamalia City	A-B	1,992	49.21		49.21	4,183	167,314	0.26	4.50	1.19	0.01319	0.59	1.79	15	2.50	3.07	0.0022	509.97	507.17	*501.97*	497.59	8.00	9.58
	B1-B	1,598	41.56		41.56	3,533	141,304	0.22	4.50	1.00	0.01114	0.50	1.51	15	2.50	3.07	0.0022	511.97	507.17	*503.97*	500.45	8.00	6.72
	B-C	629	5.16	91	95.93	8,154	326,162	0.51	4.00	2.06	0.02571	1.03	3.11	18	2.50	4.42	0.0018	507.17	508.87	*497.34*	496.21	9.83	12.66
	C5-C3	862	10.54	-	10.54	896	35,836	0.06	4.50	0.25	0.00282	0.13	0.38	12	2.50	1.96	0.003	511.86	509.95	505.86	503.27	6.00	6.68
	C4-C3	832	11.15		11.15	948	37,910	0.06	4.50	0.27	0.00299	0.13	0.41	12	2.50	1.96	0.003	509.67	509.95	503.67	501.17	6.00	8.78
	C3-C1	*341*	*4.36*	*21.69*	26.05	2,214	88,570	0.14	4.50	0.63	0.00698	0.31	0.95	*15*	2.50	3.07	*0.0022*	*509.95*	*509.82*	*500.92*	500.17	9.03	9.65
	C2-C1	*688*	*7.87*		7.87	669	26,758	0.04	4.50	0.19	0.00211	0.09	0.29	*12*	2.50	1.96	*0.003*	*509.95*	*509.82*	*503.95*	501.89	6.00	7.93
	C1-C	*507*	*3.87*	*33.92*	37.79	3,212	128,486	0.20	4.50	0.91	0.01013	0.46	1.38	*15*	2.50	3.07	*0.0022*	*509.82*	*509.17*	*500.17*	499.06	9.65	10.11
	C-D	*262*	*2.03*	*133.72*	135.75	11,539	461,550	0.73	3.50	2.55	0.03638	1.27	3.86	*21*	2.50	6.01	*0.0014*	*509.17*	*509.89*	*495.96*	495.59	13.21	14.30
	D1-D	*803*	*41.97*		41.97	3,567	142,698	0.22	4.50	1.01	0.01125	0.51	1.53	*15*	2.50	3.07	*0.0022*	*510.24*	*509.89*	*501.24*	499.47	9.00	10.42
	D-E	*1,148*	*37.98*	*215.70*	253.68	21,563	862,512	1.36	3.50	4.76	0.06799	2.38	7.21	*24*	2.50	7.85	*0.00121*	*509.89*	*506.78*	*495.34*	493.95	14.55	12.83
	E-E1	*555*	*83.15*	*253.68*	336.83	28,631	1,145,222	1.81	3.50	6.32	0.09028	3.16	9.57	*27*	2.50	9.94	*0.00103*	*506.78*	*507.14*	*493.45*	492.88	13.33	14.26
	LINE F TO DW																						
	F-G	842	30.15		30.15	2,563	102,510	0.16	4.50	0.73	0.00808	0.36	1.10	15	2.50	3.07	0.0022	511.48	510.13	504.48	502.63	7.00	7.50
	G2-G1	934	31.17		31.17	2,649	105,978	0.17	4.50	0.75	0.00835	0.38	1.14	15	2.25	2.76	0.0018	511.12	512.95	502.13	500.45	5.00	12.50
	G1-G	1,009	33.11	31.17	64.28	5,464	218,552	0.34	4.50	1.55	0.01723	0.78	2.34	18	2.25	3.97	0.0014	512.95	510.13	500.20	498.78	12.75	11.35
	G-H	198	1.83	94.43	96.26	8,182	327,284	0.52	4.00	2.06	0.02580	1.03	3.12	18	2.25	3.97	0.0014	510.13	510.93	498.78	498.51	11.35	12.42
	H1-H	913	29.88		29.88	2,540	101,592	0.16	4.50	0.72	0.00801	0.36	1.09	15	2.25	2.76	0.0018	510.51	510.93	504.51	502.87	6.00	8.06
	H-I	371	3.07	126	129.21	10,983	439,314	0.69	3.50	2.42	0.03463	1.21	3.67	18	2.25	3.97	0.0014	510.93	510.93	498.51	497.99	12.42	12.94
	I3-I1	867	18.05		18.05	1,534	61,370	0.10	4.50	0.44	0.00484	0.22	0.66	12	2.25	1.77	0.0025	509.45	508.85	504.45	502.28	5.00	6.57
	I2-I1	202	4.55	85.45	90.00	7,650	306,000	0.48	4.00	1.93	0.02412	0.96	2.92	18	2.25	3.97	0.0014	511.21	508.85	503.20	502.92	8.01	5.93
	I1-I	1,388	61.35	108.05	169.40	14,399	575,960	0.91	3.50	3.18	0.04540	1.59	4.81	21	2.25	5.41	0.0012	508.85	510.93	502.67	501.00	6.18	9.93
	I-J	517	53.45	298.61	352.06	29,925	1,197,004	1.89	3.00	5.66	0.09436	2.83	8.59	27	2.25	8.94	0.00084	510.93	509.17	497.24	496.80	13.69	12.37
	J-J1	703	65.98	352.06	418.04	35,533	1,421,336	2.24	3.00	6.72	0.11204	3.36	10.20	33	2.25	13.36	0.00064	509.17	508.40	496.30	495.85	12.87	12.55
	J1-K	393	61.45	418.04	479.49	40,757	1,630,266	2.57	3.00	7.71	0.12851	3.86	11.69	36	2.25	15.90	0.00057	508.40	507.69	495.60	495.38	12.80	12.31
	K-E1	271	10.18	479.49	489.67	41,622	1,664,878	2.62	3.00	7.87	0.13124	3.94	11.94	36	2.50	17.66	0.0007	507.69	507.14	493.38	493.19	14.31	13.95
	E1-DW	35	11.18	826.50	837.68	71,203	2,848,112	4.49	2.50	11.23	0.22452	5.61	17.06	42	2.50	24.04	0.00057	507.69	507.14	491.63	491.61	16.06	15.53
	LINE L21 TO L																						
	L21-L19	567	37.47		37.47	3,185	127,398	0.20	4.50	0.90	0.01004	0.45	1.37	15	2.25	2.76	0.0018	509.18	508.20	501.23	500.21	7.95	7.99
	L20-L19	528	16.15		16.15	1,373	54,910	0.09	4.50	0.39	0.00433	0.19	0.59	12	2.25	1.77	0.0025	507.29	508.20	502.80	501.48	4.49	6.72
	L19-L17	53		53.62	53.62	4,558	182,308	0.29	4.50	1.29	0.01437	0.65	1.95	15	2.25	2.76	0.0018	508.20	508.03	500.21	500.11	7.99	7.92

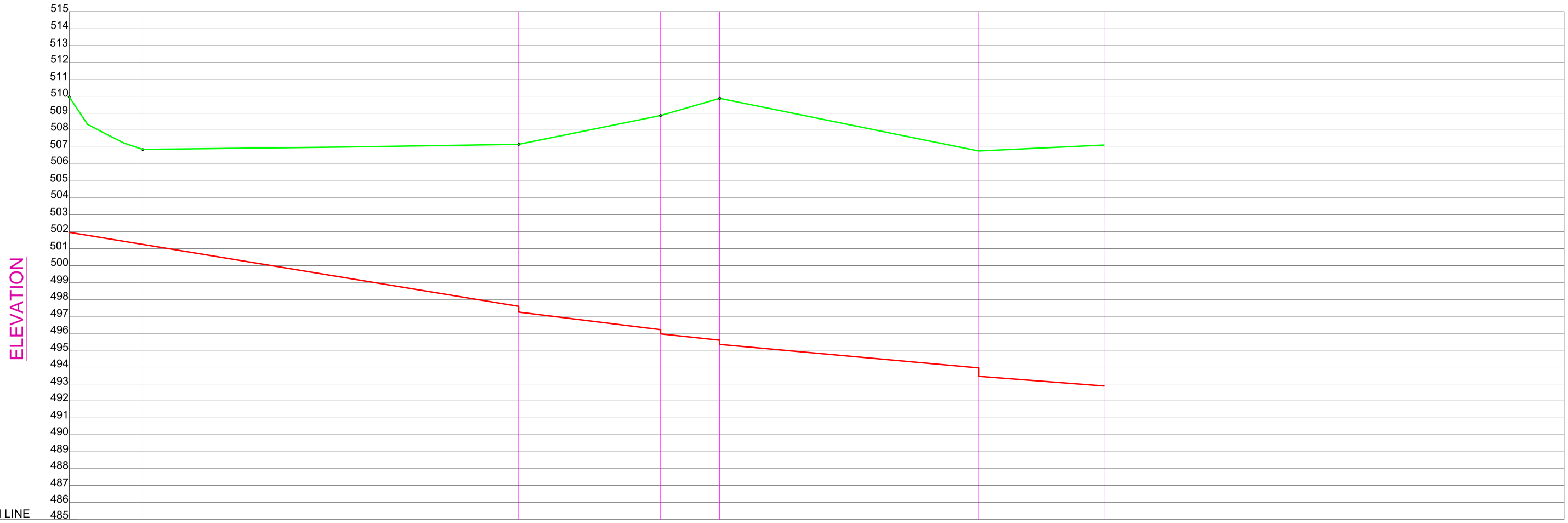
EXISTING

Kamalia City																						
	L18-L17	776	92.15		92.15	7,833	313,310	0.49	4.00	1.98	0.02470	0.99	2.99	18	2.25	3.97	0.0014	506.81	508.03	500.94	499.85	5.87	8.18
	L17-L12	299	3.15	145.77	148.92	12,658	506,328	0.80	3.50	2.79	0.03991	1.40	4.23	24	2.25	7.07	0.00098	508.03	507.25	499.35	499.06	8.68	8.19
	L16-L15	239	13.17		13.17	1,119	44,778	0.07	4.50	0.32	0.00353	0.16	0.48	12	2.25	1.77	0.00250	506.40	505.84	501.90	501.30	4.50	4.54
	L15-L13	247	6.37	13.17	19.54	1,661	66,436	0.10	4.50	0.47	0.00524	0.24	0.71	15	2.25	2.76	0.00180	505.84	505.66	501.05	500.61	4.79	5.05
	L14-L13	233	13.17		13.17	1,119	44,778	0.07	4.50	0.32	0.00353	0.16	0.48	12	2.25	1.77	0.00250	506.45	505.66	501.95	501.37	4.50	4.29
	L13-L12	223	2.68	32.71	35.39	3,008	120,326	0.19	4.50	0.85	0.00949	0.43	1.29	15	2.25	2.76	0.0018	505.66	507.25	500.61	500.21	5.05	7.04
	L12-L3	878	117.18	184.31	301.49	25,627	1,025,066	1.62	3.00	4.85	0.08081	2.42	7.35	27	2.25	8.94	0.00084	507.25	508.12	498.81	498.07	8.44	10.05
	L11-L11a	987	41.37		41.37	3,516	140,658	0.22	4.50	1.00	0.01109	0.50	1.51	15	2.25	2.76	0.00180	512.36	508.06	503.48	501.70	8.88	6.36
	L11a-L4	1,259	28.31	41.37	69.68	5,923	236,912	0.37	4.00	1.49	0.01868	0.75	2.26	18	2.25	3.97	0.00140	512.36	508.06	501.45	499.69	10.91	8.37
	L10-L8	572	11.93		11.93	1,014	40,562	0.06	4.50	0.29	0.00320	0.14	0.43	12	2.25	1.77	0.0025	508.54	508.56	503.60	502.17	4.94	6.39
	L9-L8	704	10.87		10.87	924	36,958	0.06	4.50	0.26	0.00291	0.13	0.40	12	2.25	1.77	0.0025	511.87	508.56	506.37	504.61	5.50	3.95
	L8-L5	184	1.15	22.80	23.95	2,036	81,430	0.13	4.50	0.58	0.00642	0.29	0.87	12	2.25	1.77	0.0025	508.56	508.66	502.17	501.71	6.39	6.95
	L7-L5	884	14.78		14.78	1,256	50,252	0.08	4.50	0.36	0.00396	0.18	0.54	12	2.25	1.77	0.0025	511.90	508.66	506.40	504.19	5.50	4.47
	L6-L5	427	12.12		12.12	1,030	41,208	0.06	4.50	0.29	0.00325	0.15	0.44	12	2.25	1.77	0.0025	508.21	508.33	503.21	502.14	5.00	6.19
	L5-L4	847	9.46	50.85	60.31	5,126	205,054	0.32	4.00	1.29	0.01616	0.65	1.96	15	2.25	2.76	0.0018	508.33	508.06	501.46	499.94	6.87	8.12
	L4-L3	635	5.07	129.99	135.06	11,480	459,204	0.72	3.50	2.53	0.03620	1.27	3.84	18	2.25	3.97	0.0014	508.06	508.12	499.69	498.80	8.37	9.32
	L3-L1	374	21.31	436.55	457.86	38,918	1,556,724	2.45	3.00	7.36	0.12272	3.68	11.17	30	2.25	11.04	0.00070	508.12	508.39	497.82	497.56	10.30	10.83
	L2-L1	1,183	18.17		18.17	1,544	61,778	0.10	4.50	0.44	0.00487	0.22	0.66	12	2.25	1.77	0.0025	505.97	508.39	500.97	498.01	5.00	10.38
	L1-L	938	67.37	476.03	543.40	46,189	1,847,560	2.91	3.00	8.74	0.14564	4.37	13.25	30	2.25	11.04	0.0007	508.39	510.29	497.56	496.90	10.83	13.39
	LINE M1-M																						
	M1-M	1,197	65.15		65.15	5,538	221,510	0.35	4.00	1.40	0.01746	0.70	2.11	15	2.50	3.07	0.0022	504.01	504.58	498.01	495.38	6.00	9.20
	LINE N1 TO N																						
	N1-N	729	22.22		22.22	1,889	75,548	0.12	4.50	0.54	0.00596	0.27	0.81	12	2.50	1.96	0.003	501.99	501.61	494.99	492.80	7.00	8.81
	LINE O1 TO O																						
	O1-O	2,635	97.32	495.87	593.19	50,421	2,016,846	3.18	2.50	7.95	0.15899	3.97	12.08	36	2.50	17.66	0.00070	507.63	505.69	495.84	494.00	11.79	11.69
	LINE P3 TO P																						
	P3-P1	344	37.33		37.33	3,173	126,922	0.20	4.50	0.90	0.01001	0.45	1.36	15	2.50	3.07	0.00220	516.40	515.87	507.40	506.64	9.00	9.23
	P2-P1	958	41.17		41.17	3,499	139,978	0.22	4.50	0.99	0.01103	0.50	1.50	15	2.50	3.07	0.00220	514.33	515.87	507.83	505.72	6.50	10.15
	P1-P	1,302	57.15	78.50	135.65	11,530	461,210	0.73	3.50	2.54	0.03636	1.27	3.85	18	2.50	4.42	0.00180	515.87	514.56	505.47	503.13	10.40	11.43
	LINE Q5 TO Q1																						
	Q5-Q3	569	18.17		18.17	1,544	61,778	0.10	4.50	0.44	0.00487	0.22	0.66	12	2.50	1.96	0.003	514.46	514.66	508.46	506.75	6.00	7.91
	Q4-Q3	713	19.15		19.15	1,628	65,110	0.10	4.50	0.46	0.00513	0.23	0.70	12	2.50	1.96	0.003	515.34	514.66	509.34	507.20	6.00	7.46
	Q3-Q1	171	9.87	37.32	47.19	4,011	160,446	0.25	4.50	1.14	0.01265	0.57	1.72	15	2.50	3.07	0.00220	514.66	515.50	506.95	506.57	7.71	8.93
	Q2-Q1	582	21.21		21.21	1,803	72,114	0.11	4.50	0.51	0.00568	0.26	0.77	12	2.50	1.96	0.003	512.86	515.50	506.86	505.11	6.00	10.39
	Q1-Q	512	24.15	68.40	92.55	7,867	314,670	0.50	4.00	1.98	0.02481	0.99	3.00	18	2.50	4.42	0.00180	515.50	514.00	504.61	503.69	10.89	10.31
	LINE R1 TO R																						
	R1-R	923	65.15		65.15	5,538	221,510	0.35	4.00	1.40	0.01746	0.70	2.11	15	2.50	3.07	0.00220	514.00	513.20	505.50	503.47	8.50	9.73

PROFILE OF MAIN SEWER Kamalia CITY.

SUB SOIL WATER LEVEL =43.75 ft

Line A To Line E1

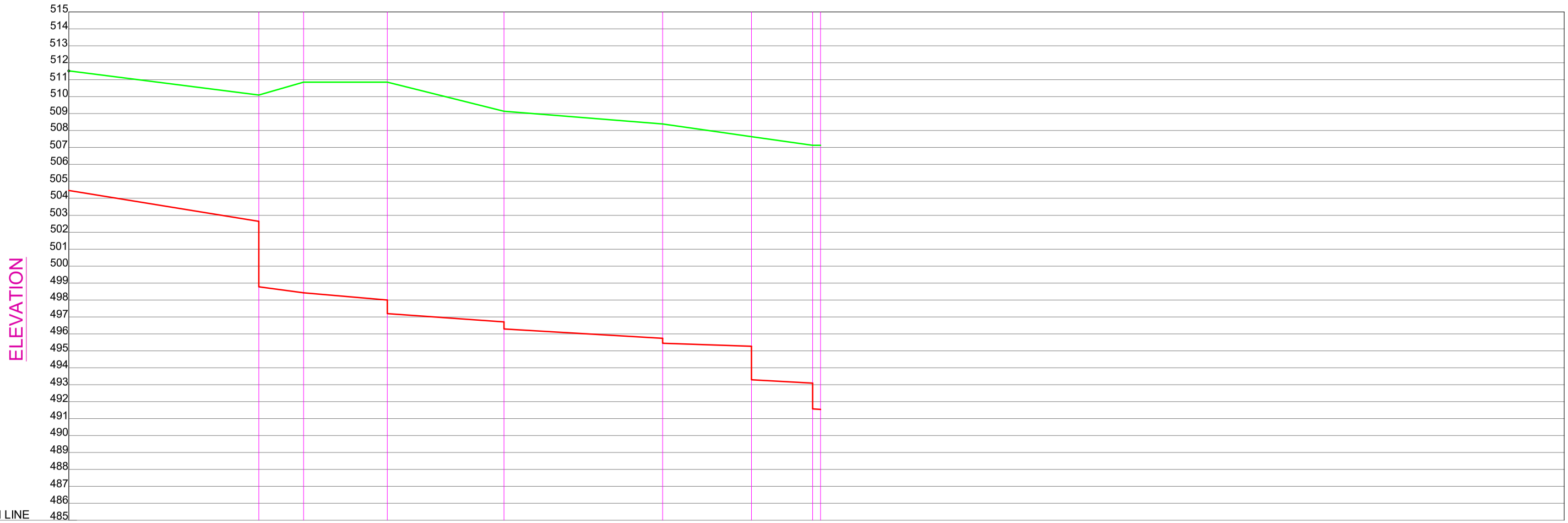


REDUCED DISTANCE	0+00'	326	1992	2621	2883	4031	4586
N.S.L	509.97	506.94	507.17	508.87	509.89	506.78	507.14
INVERT LEVEL	501.97	501.25	497.59 / 497.34	496.21 / 495.96	495.59 / 495.34	493.95 / 493.45	492.88
Velocity			2.50 ft/sec				
Slope		0.0022		0.0018	0.0014	0.00121	0.00103
DIA OF PIPE		15" Ø		18" Ø	21" Ø	24" Ø	27" Ø
REF. POINT	A		B	C	D	E	E1

PROFILE OF MAIN SEWER Kamalia CITY.

SUB SOIL WATER LEVEL =43.75 ft

Line F To Line DW



REDUCED DISTANCE	0+00'	842	1040	1411	1928	2631	3024	3295	3295				
N.S.L	511.48	510.13	510.93	510.93	509.17	508.40	507.69	507.14	507.14				
INVERT LEVEL	504.48	502.63	498.78	498.51	497.99	497.24	496.80	496.30	495.85	495.60	495.38	493.38	493.19	491.63	491.61
Velocity	2.50 ft/sec				2.25 ft/sec						2.50 ft/sec				
Slope	0.0022		0.0014		0.00084		0.00064		0.00057		0.0007		0.00057		
DIA OF PIPE	15" Ø		18" Ø		27" Ø		33" Ø		36" Ø				42" Ø		
REF. POINT	F	G	H	I	J	J1	K	E1	DW						

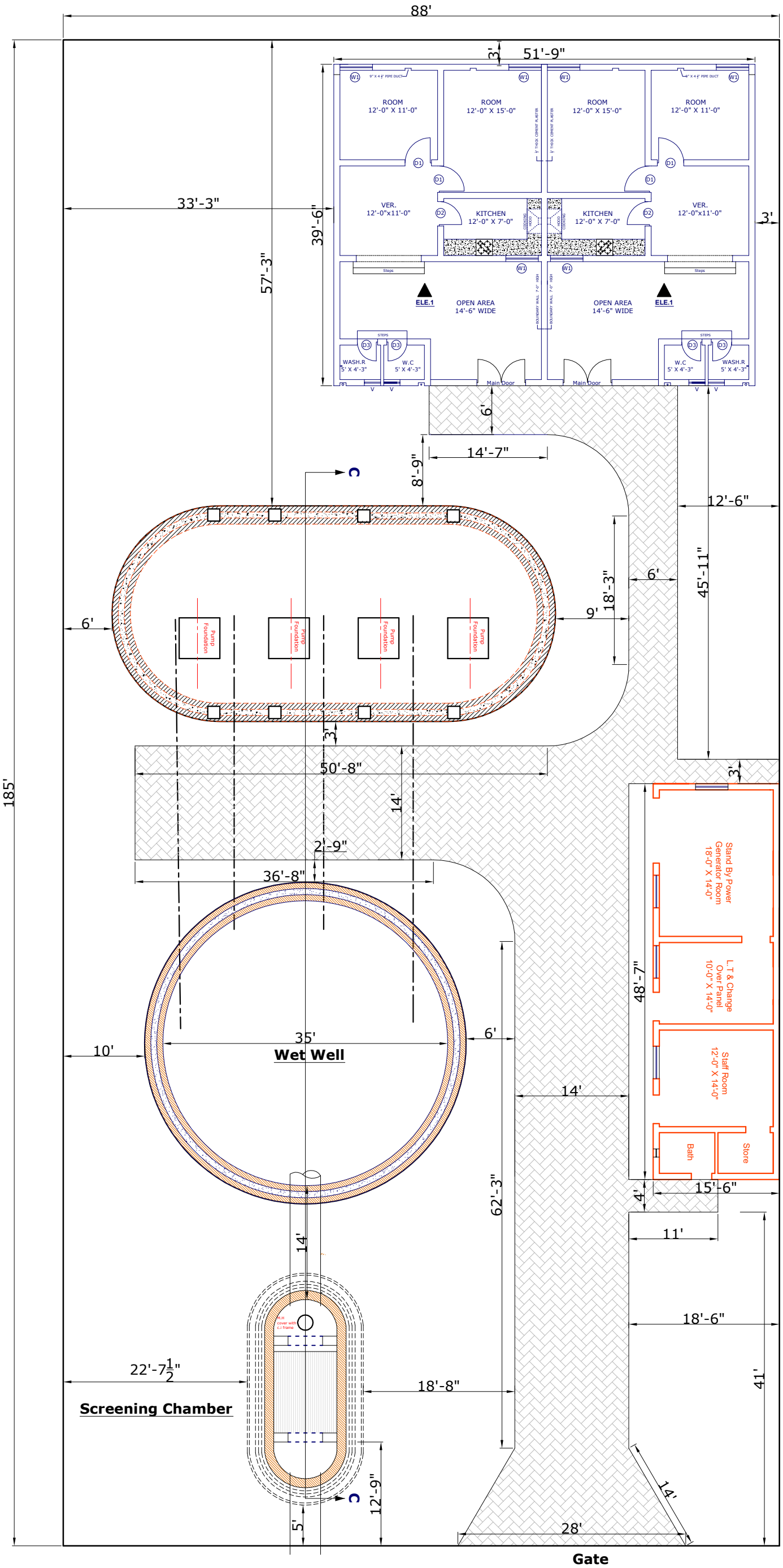
DESIGN OF SEWAGE PUMPING STATION KAMALIA

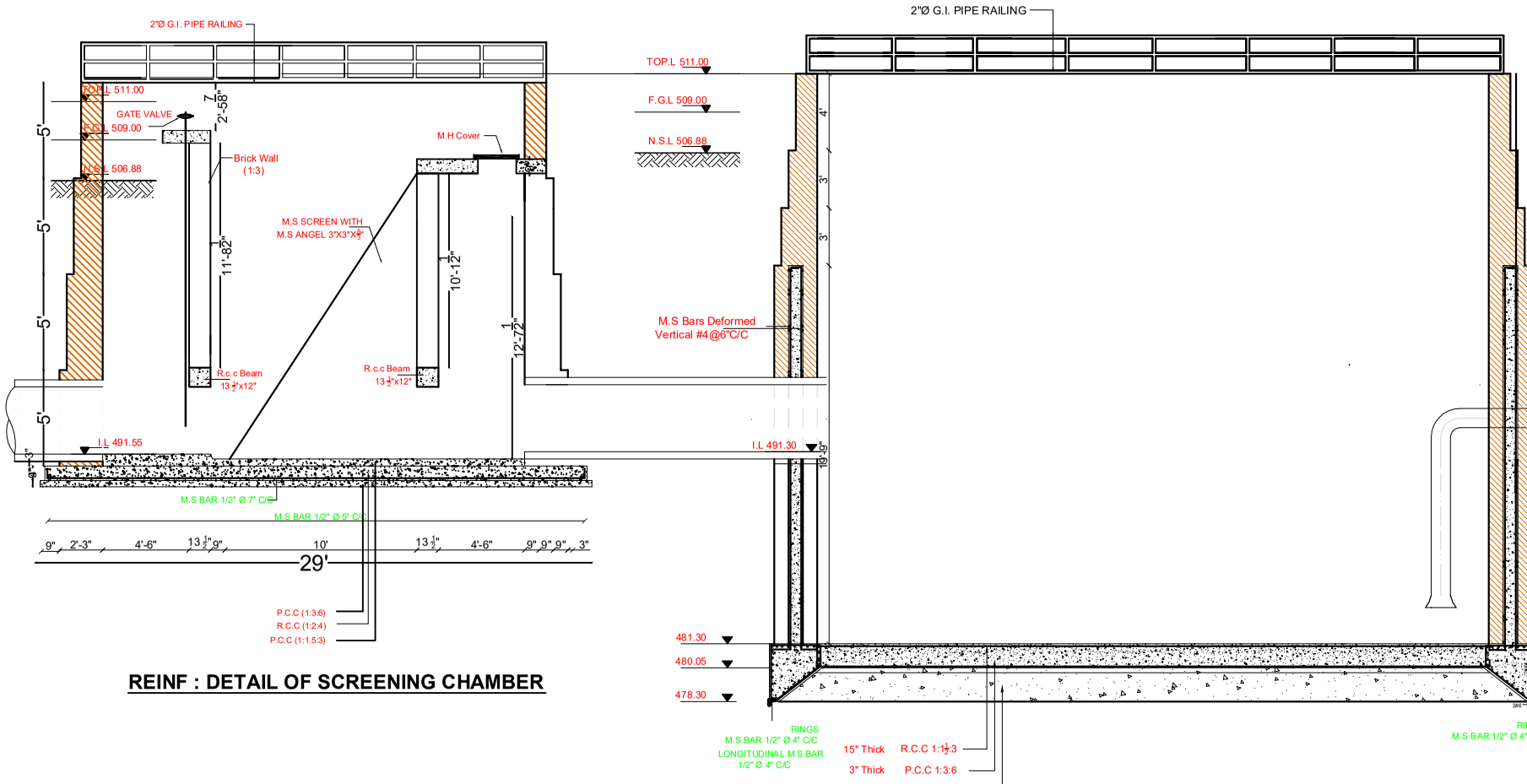
A	**FLOW**				
i	Population		85 P/Acre	75225	Person
ii	Av. Dry weather flow @ 40 GPCD	40		4.46	Cusec
iii	Peak factor			2.5	
iv	Peak flow			11.16	Cusec
v	Storm water allowance @50% of peak flow			5.58	Cusec
vi	Total			16.74	Cusec
vii	Say			17	Cusec
B	**SCREENING CHAMBER**				
i	Two time of flow area	$2*3.14*(d)^2/4$		19.23	ft^2
ii	Depth of water contact to screen			3.00	ft
iii	Clear width of screen			6.41	ft
iv	spacing of screen			2.00	Inch C/C
v	No. of opening			38.47	
	Say			38.00	
vi	Thickness of stirupps			0.38	inch
				14.25	inches
vii	Area covered by stirupps			1.19	ft
viii	Total			7.60	ft
ix	Say			8.00	ft
x	Depth of screen NSL to Bed level			16.85	ft
xi	Up to Top level				ft
C	**WET WELL**				
i	Peak flow			17.00	Cusec
ii	Proposed retention period			7	Minutes
iii	Miximum flow ft^3 per minuts			1020	
iv	Proposed capacity of Tank required for retention			7140	ft^3
v	Working depth			8.5	ft
vi	Surface area of Tank			840.00	ft^2
vii	No. of tank proposed			2	
viii	Dia of Tank	$d=\sqrt{A*4/3.14}$		27.61	ft
ix	Say			28	ft
x	Depth of Tank				
	NSL			507.14	ft
	Bed Level	491.61	8.5	483.11	
	Depth from NSL			24.03	ft
	Depth up to top level	509	511	27.89	ft
D	**FORCE MAIN**				
i	Discharge			17.00	Cusec
i	Proposed dia of line			630	mm
ii	Type of Material			HDPE	
	Classification of Pipe			PN-8	
iii	proposed veloscity			2.75	ft/sec
iv	Classification of Pipe				
v	Head Losses per ft run	$V=1.318*n*r^{0.63}*s^{0.54}$			
	V	6.41			

	n=	150	
	$r.^{63}$	0.646	
	$s^{0.54}$	0.505191841	
	s	0.0039	
vi	Length of force main	10485	Rft
vii	Head Losses	40.8915	ft
viii	Head losses specials, fixtures & others	2	
ix	Level difference	-2	ft
x	Total	40.89	ft
	Say	41.00	ft
E	**PUMPING MACHINERY**		
i	Proposed size of pump	8	Cusec
ii	Ultimate discharge	17	Cusec
iii	No. of Pump	3	
F	**HEAD OF MACHIERY**		
I	Suction lift	16	ft
ii	Depth from NSL to suction of pump	16	ft
iii	Fixtures and special losses	2	ft
iv	Losses of force main	41	ft
v	Total Losses	59	ft
vi	Proposed Head pump	60	ft

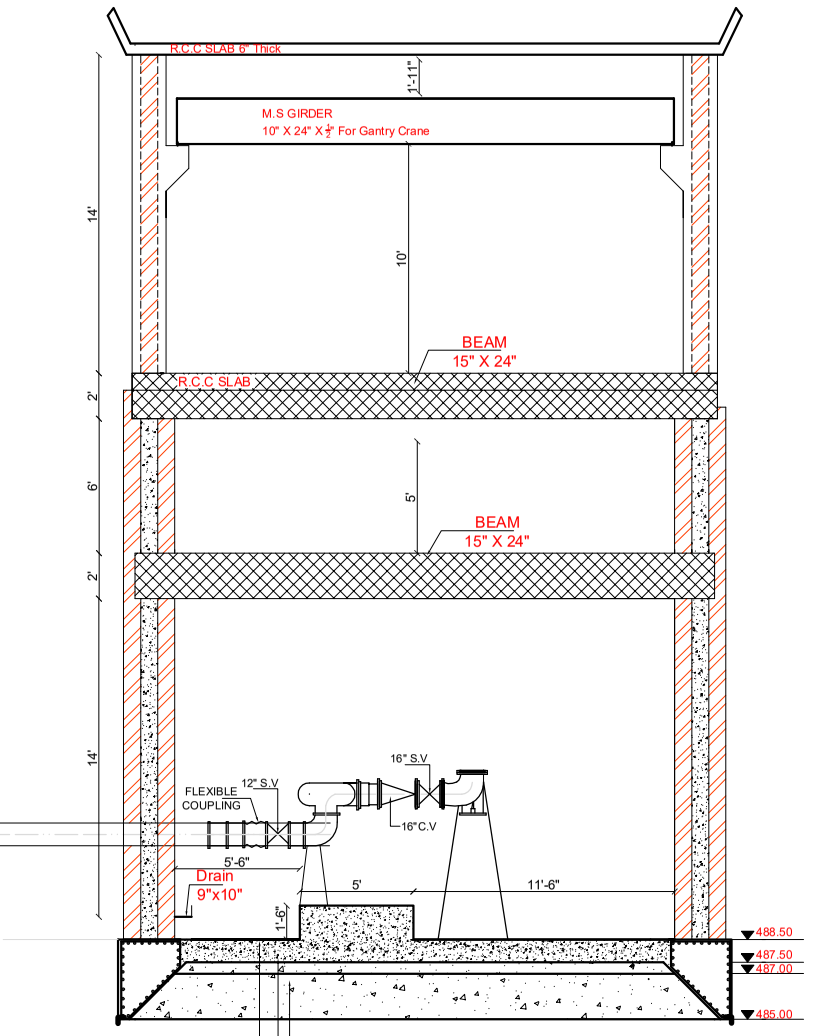
Layout Plan of Disposal Works Kamalia City

Sub Soil Water Level =43.75ft





REINF : DETAIL OF SCREENING CHAMBER



SECTION C-C

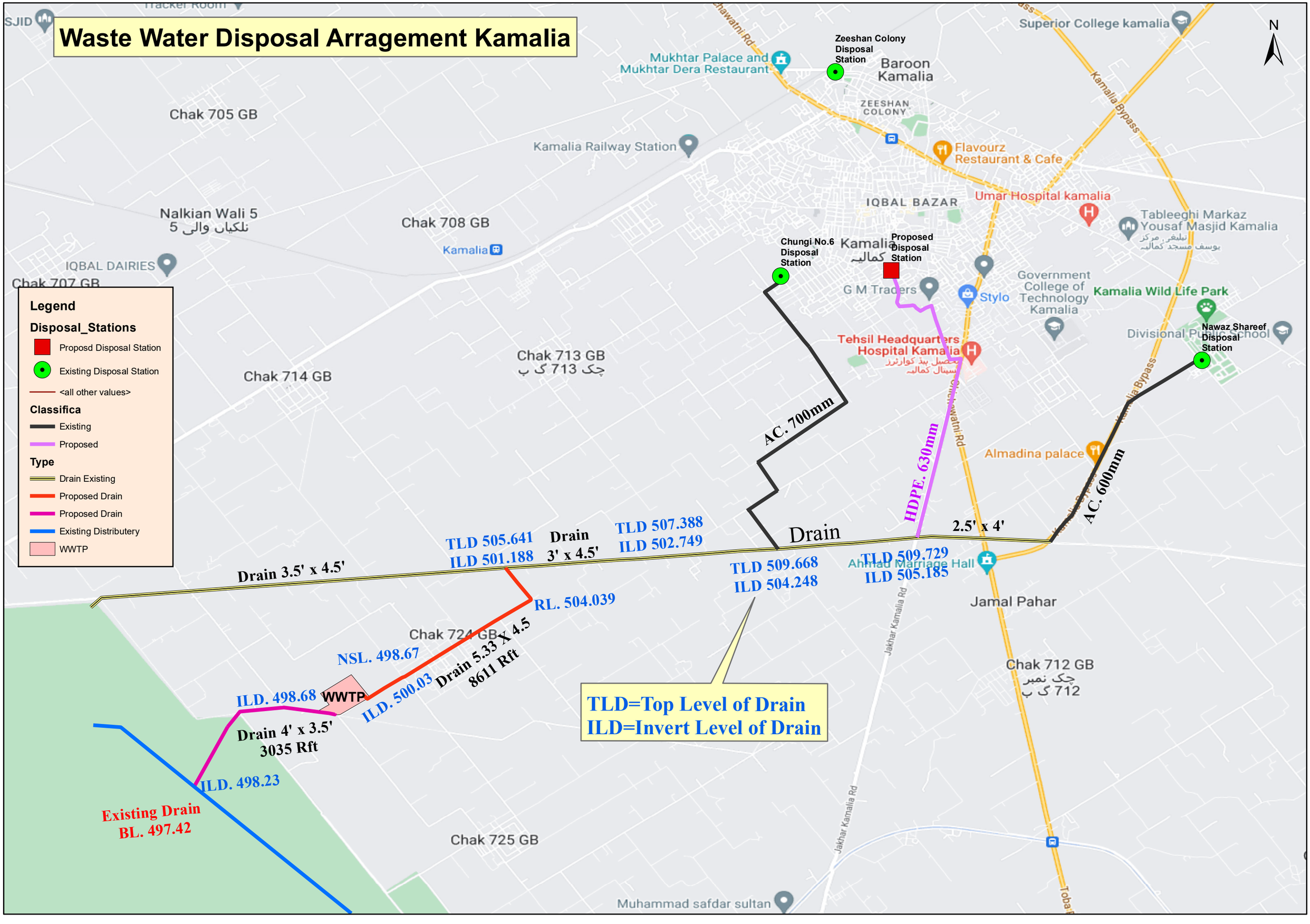
DESIGN OF WASTEWATER TREATMENT PLANT KAMALIA				
A	**FLOW**			
	Peak Flow		13.03	Cusec
	Peak Flow		26.05	Cusec
	Peak Flow		7.02	Mgd
	Peak Flow		16.15	Mgd
	INLET DRAIN			
	Width of drain		5.33	ft
	Water depth taken		3.25	ft
	velocity		1.50	ft/sec
B	**COURSE SCREEN**			
i	Capacity / Av. Flow		13.03	Cusec
ii	Peak Flow		26.05	Cusec
iv	Width of Screen		5.33	ft
v	Depth of water		3.25	ft
vi	Velocity		1.50	ft/sec
vii	Area contact to screen		23.985	ft^2
viii	X-sectional		17.3225	ft^2
ix	Clear width of channel		5.33	ft
x	Spacing of opening		63.96	inches
xi	Spacing of opening		2	inch c/c
xii	No. opening required		31.98	No.
xiii	Thickness of strip to be used		0.38	inch
xiv	Area required		11.99	inches
xv	Overall width		75.95	inches
			6.33	ft
	GRIT CHAMBER			
i	Peak discharge		26.0637	Cusec
	Q		0.738	m^3/s
ii	Depth of water		3	ft
	D		0.91	m
iii	In grit chamber taking constant velocity using proportionate weir for varrient discharge. Let us assume V_h Horizantal velocity Ranging from 0.15 to 0.3 m/s	0.2	0.2	m/s
iv	Detntion time		?	
v	Perticular size	0.15		mm
vi	Specific gravity	2.65		
vii	On basis of this assume V_s setting velocity	0.02		m/s
viii	Area Q=Area*veloscity (Hori)		3.69	m^2
ix	Free Board		0.3	m
x	Grit accumlation Ranging (0.15to 0.45)	0.45		m
xi	Area A= Width * Depth			
	W		4.04	m
	Total depth		1.66	m

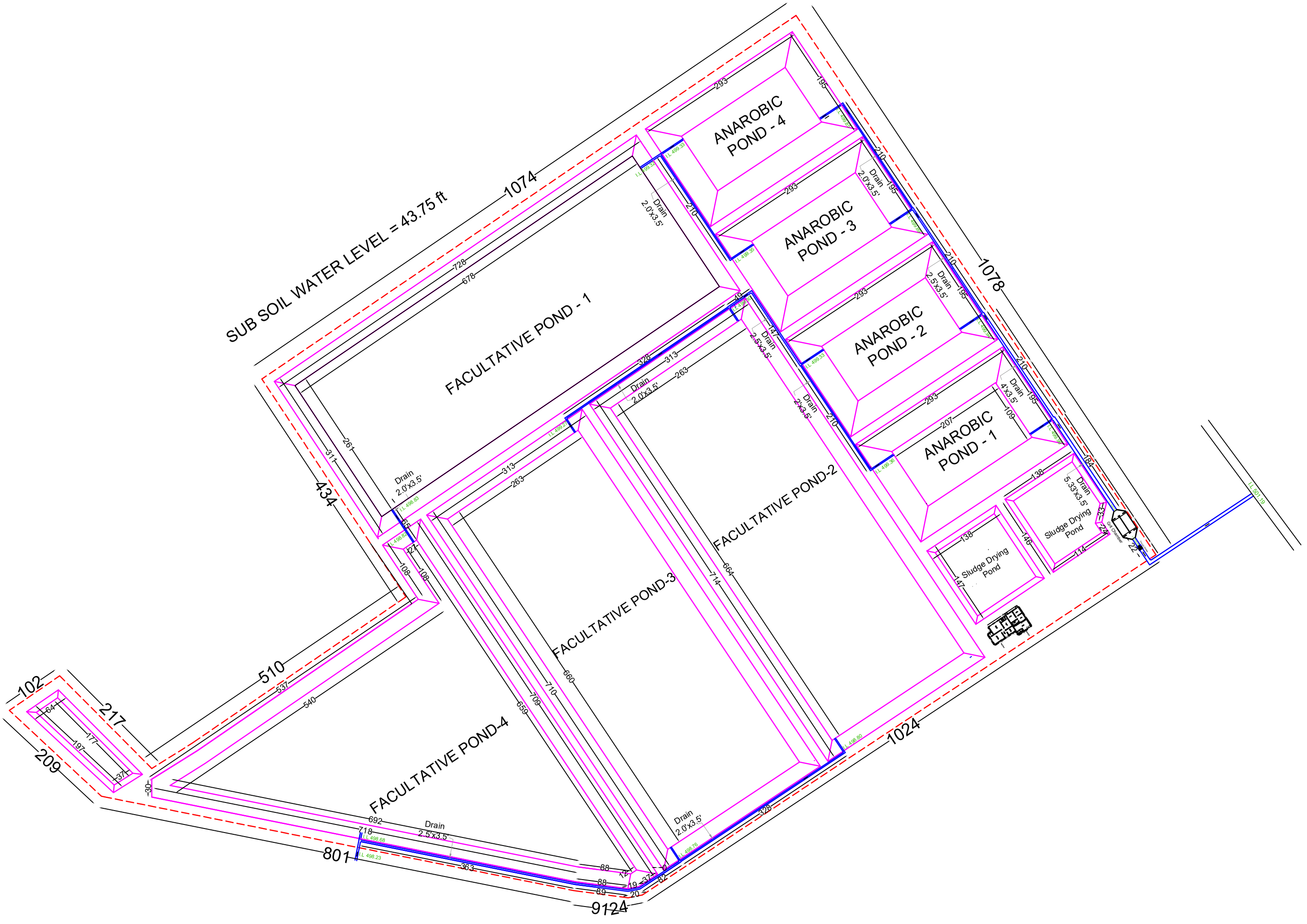
xii	For setting particular, depth in the distance, in setting veloscity V_s=depth of water/detention time			
	Detention time		45.72	sec
	Detention time should be ranging from 45 to 90 sec hence we taken		53	sec
xiii	Now Vh = Length/dentention time			
	Length		10.6	m
	Ref: Duncan Mara lenth ranging 10d to 20d i.e ok		ok	
D	**ANAROBIC PONDS**			
i	Discharge		13.02647198	cusec
ii	Total volume of sewage		1125487.179	ft^3/day
			31866	m^3/day
iii	Area of Anarobic Pond			
	$A_a = L_lQ/ð_s*D_a$			
	A_a			
	L_l = BOD i.e =128 mg/lit	140.8	141	
	Q = Volume of effluent 10.1			
	T= 20^o C Average in Pakistan during cold weather			
	ð = (20*20)- 100 = 300	300		
	Ref: Duncun Mara Book Table 10.1			
	$D_ϑ$ = Depth of effluent taken = 4.5 m	4.5		
	A_a		3323.54	m^2
			35774.60	ft^2
iv	To check the retention period			
	$ϑ_a = A_aD_a/Q$		0.47	day
	Minimum Retention period (Duncun Mara)	2		day
	Revised Area		13454.68	m^2
			144583.95	ft^2
	Removal of BOD (2T+20)	60%		
	Ref: Table 10.2 Duncan Mara Book			
v	No of Ponds	4		
	Area of each Anarobic pond		36145.99	ft^2
vi	Assume it Mid span area			
vii	Proposed Slop	2.5:1		
vii	Free board	2		ft
viii	proposed length in mid span		246	ft
ix	Width in mid span		147	ft
x	Water depth taken	4		m
		15		ft
xi	Free board	2		ft
xii	Depth above mid span	9		ft
xiii	one slop	23.45563		
xiv	Total slop	46.91125		
xv	Say	47		ft
xvi	Total length at top of pond		293	ft
xvii	Total width at top of pond		194	ft

	Total Length at bottom of pond		199	ft
	Total width at bottom of pond		100	ft
	Length on top of silt (taking depth of silt)	3	214	
	width on top of silt		115	
	Average area (bottom area of pond and top area of silt)		22185	
	Area at top		56797	ft^2
	Area at bottom		19887	
	area in acre		5.22	acre
	Li per annum		0.01	m^3/person year
	Population		219470	persons
	Accumulation of Silt per annum		2195	m3
			77515	ft3
	depth of silt		0.87	ft
	taking 4 years	4	3	ft
xviii	Depth of pond		17	ft
xvv	Total depth of Tank		20	ft
E	**FACULTATIVE PONDS**			
i	No of ponds		4	
ii	Discharge		13.02647198	cusec
vi	Total volume of sewage		1125487.179	ft^3/day
			31866.34	m^3/day
vi	$A_f = 10\ L_i\ Q\ /ð_s$			
	A_f = Area of faculative Ponds			
	L_i = BOD entering in Facultative Ponds	56.4		mg/l
	Q = Volume of effluent			
	T= 20^o Average in Pakistan during cold weather			
	$ð_s$= 350(1.107-0.002T)^(T-25)	253.0731		
vi	A_f		73175.00	m^2
	= Retention period			
	$ϑ_f = 2A_fD_f/2Q-(0.001eA_f)$			
	D = depth of Liquid	2		m
	e = 5	5		
vii	$ϑ_f$		5	days
ix	Area at mid span		73175.00	m^2
x	Area at mid span		786338.55	ft^2
	Area of each pond		196584.64	ft^2
xi	Proposed Length at mid span		686	ft
	Width at mid span		286.57	ft
	Slop	2.5:1		
	Depth of water from mid span	3.28		ft
	Free board	2		ft
xii	Total hiegt from mid depth	5.28		ft
xiii	one side slope	13.2		
xiv	Both side slope	26.4		
xv	Length at top of pond		712.4	ft
	Width at top of pond		312.97	ft

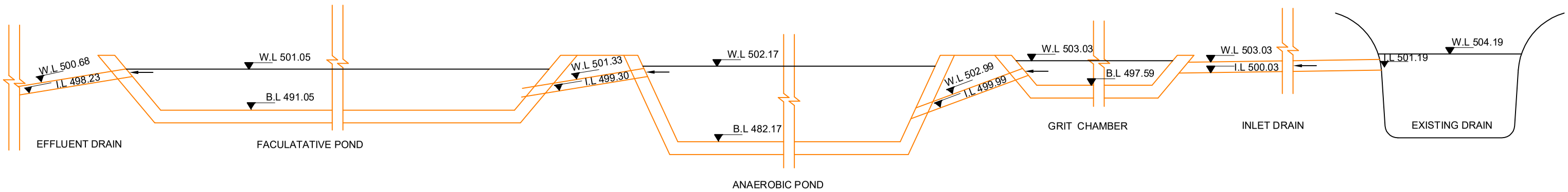
	Silt Allowance	1.44		ft
	Total Depth of pond		10.00	ft
	Removal of BOD			
	Le(unfiltered) = Li/(1+k_1 ϑf)			
	k_1 = 0.1 design value for secondary facultative pond	0.1		
	Le(unfiltered)		38.6	mg/l
	Le(filtered) = F_{na}*(Le(unfiltered))			
	F_{na} is non algal fraction of the BOD and it ranges between (0.1-0.3) , usual design value is 0.3	0.3		
	Le(filtered)		11.6	mg/l
			O.K.	
	Egg Removal : 75% removal in 1 day anaerobic pond and 93% in 4 days facultative pond			
	Design Parameter Value (Duncan Mara) of Human Intestinal Nematode Eggs/l, Ei=	500		egg/l
	R = 100(1-0.41exp(-0.49ϑ+0.0085ϑ^2)), Ref. Duncan Mara Eq 11.12			
	For Anaerobic Ponds, Egg removal %	83.3	0.83	
	For Facultative Ponds, Egg removal %	94.9	0.95	
	Ee = Ei(1-Egg Removal_a)(1-Egg Removal_f) ,(Ref Duncan Mara)		4.3	per litre

Waste Water Disposal Arragement Kamalia




SUB SOIL WATER LEVEL = 43.75 ft
ANAROBIC POND - 4
ANAROBIC POND - 3
ANAROBIC POND - 2
ANAROBIC POND - 1
FACULTATIVE POND - 1
FACULTATIVE POND-2
FACULTATIVE POND-3
FACULTATIVE POND-4
Sludge Drying Pond
Sludge Drying Pond
Drain 2.0'x3.5'
Drain 2.5'x3.5'
Drain 4'x3.5'
Drain 5.33'x3.5'
Drain 2x3.5'
1074
1078
1024
801
9124
510
434
217
209
102

Line Diagram Hydraulic Statement From Existing Drain To Effluent Drain of WWTP



N.T.S

ANNEXURE-D
COST ESTIMATE

IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA CITY

Ser #	Description	Cost (RS.) In Millions
1	Package-1 Sewerage system	427.64
2	Package-2 Disposal station & Forcemain	365.88
3	Package-3 Providing and Fixing of RPC manhole Cover	10.99
4	Package-4 Construction of Wastewater Treatment Plant (WWTP)	474.79
5	Package-5 Supply of Liquid Waste Machinery	27.76
	Total Cost (Rs.)	**1,307.06**
	E & S Cost	7.50
	ARAP Cost (To be paid from share of MC)	13.98
	Add 2% contingencies	26.14
	Add 5% PST	63.59
	Add 5% escalation	65.35
	Grand Total Cost (Rs. In millions)	**1,483.63**

IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA CITY

GENERAL ABSTRACT OF COST

Ser #	Description	Cost (RS.) In Millions
1	Providing and Laying Trunk Sewer	163.20
2	Restoration of Roads (Trunk Sewer Rute)	29.08
3	Providing and Laying Branch Sewer	216.25
4	Restoration of Roads (Branch Sewer Rute)	19.12
5	Supply of Liquid Waste Machinery	27.76
6	Providing & Fixing Of Reinforced Plastic Composite (Rpc) Manhole Covers 24" I/D With Rpc Frame	10.99
7	Construction of Disposal Station	163.54
8	Forcemain	202.34
9	Construction of WWTP	474.79
	Total Cost (Rs.)	**1,307.06**
	Enviromental & Social Cost	7.50
	ARAP Cost	13.98
	Add 2% contingencies	26.14
	Add 5% PST (Less serial No. 5, 10)	63.59
	Add 5% escalation(Less Serial no 5)	65.35
	Grand Total Cost (Rs. In millions)	**1,483.63**

DETAILED QUANTITY SEWER
FOR THE SCHEME
PROVIDING AND LAYING TRUNK SEWER IN KAMALIA CITY

Part-A

S.No.	Detail of Item/Work	No.	Measurements			Quantity
			L	B	H	
1	Dismantling and removing road pavement etc, including screening and stacking of by products upto chain (30m) lead.					
	21" dia		638.00	7.00	1.00	4,466.00
	24" dia		831.25	8.00	1.00	6,650.00
	30" dia		555.55	9.00	1.00	4,999.95
	36" dia		1,259.31	9.00	1.00	11,333.79
					Total:-	**27,449.74**
2	Dismentling of tuff tile					
	21" dia		319.00	7.00		2,233.00
	27" dia		363.15	8.50		3,086.78
	30" dia		542.00	9.00		4,878.00
					Total:-	**10,197.78**
3	Dismentling of sub base					
	21" dia		319.00	7.00	0.50	1,116.50
	27" dia		363.15	8.50	0.50	1,543.39
	30" dia		542.00	9.00	0.50	2,439.00
					Total:-	**5,098.89**
4	Dismentling of PCC					
	21" dia		638.00	7.00	0.33	1,473.78
	24" dia		1,543.75	8.00	0.33	4,075.50
	27" dia		981.85	8.50	0.33	2,754.09
	30" dia		257.45	9.00	0.33	764.63
	36" dia		1,969.69	9.00	0.33	5,849.98
					Total:-	**14,917.98**
5	Extra for slush or Daldal					
	21" dia		1,595.00	3.54	3.00	16,938.90
	30" dia		1,355.00	4.42	5.00	29,945.50
	36" dia		3,229.00	5.50	6.00	106,557.00
					Total:-	**153,441.40**
6	Bailing out water:- b) by pump 4x0.5x8x85x60x60					4,896,000.00
7	Earth work excavation in open cutting for sewers and manholes as shown in drawings including shuttering and timbering, dressing to correct sections and dimensions according to templates and levels, and removng surface water, in all types of soil except shingle gravel and rock.					
	0-7' depth					
	21" dia		1,148.40	7.00	7.00	56,271.60
	24" dia		1,615.00	8.00	7.00	90,440.00
	27" dia		1,008.75	8.50	7.00	60,020.63
	30" dia		962.05	9.00	7.00	60,609.15
	36" dia		1,937.40	9.00	7.00	122,056.20
	42" dia		150.00	9.50	7.00	9,975.00
					Total:-	**399,372.58**
	7-15' depth					
	21" dia		1,148.40	4.54	3.00	15,641.21
	24" dia		1,615.00	4.84	6.00	46,899.60
	27" dia		1,008.75	5.17	7.00	36,506.66
	30" dia		962.05	5.42	7.00	36,500.18
	36" dia		1,937.40	6.00	8.00	92,995.20
	42" dia		150.00	8.00	8.00	9,600.00
					Total:-	**238,142.85**
	Above 15' depth					
	42" dia		150.00	7.00	3.25	3,412.50
					Total:-	**3,412.50**
					G.Total:-	**640,927.92**
8	Earth work excavation in open cutting for sewers and manholes as shown in drawings excluding shuttering and timbering, dressing to correct sections and dimensions according to templates and levels, and removng surface water, in all types of soil except shingle gravel and rock.					
	0-7' depth					
	21" dia		446.60	4.25	7.00	13,286.35
	24" dia		760.00	4.50	7.00	23,940.00
	27" dia		336.25	4.79	7.00	11,274.46
	30" dia		392.95	5.16	7.00	14,193.35
	36" dia		1,291.60	5.67	7.00	51,263.60
					Total:-	**113,957.77**

S.No.	Detail of Item/Work	No.	Measurements			Quantity
			L	B	H	
	7-15' depth					
	21" dia		446.60	4.25	3.00	5,694.15
	24" dia		760.00	4.50	6.00	20,520.00
	27" dia		336.25	4.79	7.00	11,274.46
	30" dia		392.95	5.16	7.00	14,193.35
	36" dia		1,291.60	5.67	8.00	58,586.98
					Total:-	**110,268.94**
					G.Total	**224,226.71**
9	Disjoining R.C.C. pipes inside the trench and dismantling and removing the pipes from the trench and stacking them outside:-					
	b) 13" to 24" (325 to 600 mm) diameter	1	1,206.60			1,206.60
	c) 25" to 36" (625 to 900 mm) diameter	1	2,020.80			2,020.80
10	Carriage of 5 tons of all material like coal, stone lime (unslaked), etc. B.G. Rail fastenings, points and crossing, Bridge Girders, pipes, sheets, Rail, M.S. bars, etc. etc. by truck or any other means owned by the contractor.					
	5th Km		3,227.40	@ wt 1.25 tone per pipe		1,008.56
11	Transportation of earth all types when the total distance including the lead covered in the item of work, is more than 1000 ft. (300 m) lead upto 3 km					
	0-7' depth					
	21" dia		1,276.00	7.00	4.50	40,194.00
	24" dia		2,375.00	8.00	4.50	85,500.00
	27" dia		981.85	8.50	4.50	37,555.76
	30" dia		813.00	9.00	4.50	32,926.50
	36" dia		1,259.31	9.00	4.50	51,002.06
					Total:-	**247,178.32**
12	Providing and Laying R.C.C. pipe sewer moulded with cement concrete 1:1.5:3 conforming to ASTM specification C-76-79, Class-II, Wall-B, including carriage of pipe from factory to site of wor, lowering in trenches to correct alignment and grade, jointing with rubber ring, cutting pipes where necessary, testing etc. complete.					
	21" dia		1,595.00			1,595.00
	24" dia		2,375.00			2,375.00
	27" dia		1,345.00			1,345.00
13	Providing and Laying R.C.C. pipe sewer moulded with cement concrete 1:1.5:3 conforming to ASTM specification C-76-79, Class-III, Wall-B, including carriage of pipe from factory to site of wor, lowering in trenches to correct alignment and grade, jointing with rubber ring, cutting pipes where necessary, testing etc. complete.					
	30" dia		1,355.00			1,355.00
	36" dia		3,229.00			3,229.00
	42" dia		150.00			150.00
14	Providing of R.C.C. pipe sewer moulded with cement concrete 1:1.5:3 conforming to ASTM specification C-76-79, Class-III, Wall-B, including carriage of pipe from factory to site of wor, lowering in trenches to correct alignment and grade, jointing with rubber ring, cutting pipes where necessary, testing etc. complete.					
	27" dia		115.00			115.00
	30" dia		235.00			235.00
	36" dia		315.00			315.00
15	Laying of pipe by jacking method					
	27" dia		115.00			115.00
	30" dia		235.00			235.00
	36" dia		315.00			315.00
16	(i) Rehandling of earth work.					
	(a) Lead upto a single throw of Kassi, phaorah or shovel.		692,123.71	-	-	692,123.71
	(ii) Compaction of earth work.			-	-	
	(a) Mixing, moistening earth to optimum moisture content in layers for compaction etc. complete.		692,123.71			692,123.71
17	Supplying, laying, granular material crushed stone) 1/2" to 1" gauge under pipe line and up to half diameter of pipe.					
	21" dia		1,595.00	3.54	1.54	8,695.30
	24" dia		2,375.00	3.83	1.75	15,918.44
	27" dia		1,345.00	4.12	1.93	10,694.90
	30" dia		1,355.00	4.77	2.30	14,865.71
	36" dia		3,229.00	4.92	2.58	40,987.63
	42" dia		150.00	5.92	3.00	2,664.00
					Total	**93,825.98**
	Dedution of dia of pipe					
	21" dia		1,595.00	0.5*3.14*2.21*2.21*0.25		3057.63
	24" dia		2,375.00	0.5*3.14*2.50*2.50*0.25		5826.17
	27" dia		1,345.00	0.5*3.14*2.875*2.875*0.25		4363.53
	33" dia		1,355.00	0.5*3.14*3.23*3.23*0.25		5548.61
	36" dia		3,229.00	0.5*3.14*3.67*3.67*0.25		17070.25
	42" dia		150.00	0.5*3.14*4.25*4.25*0.25		1063.43
					Total	**36929.61**
					Net	**56896.37**

S.No.	Detail of Item/Work	No.	Measurements			Quantity
			L	B	H	
18	Providing and Installing C.I ventilating shaft painted with bituminous paint with foundation bolts as per PHED standard drawing STD/PD No. 4 of 1977, complete in all respect (except concrete foundation block)					
	6" (150 mm) i/d shaft, 24 ft. (7.30 metre) long					1500.00
	9" (225 mm) i/d shaft, 24 ft. (7.30 metre) long					3000.00
19	Left in place shuttering used for laying of pipe by jacking method					
	For jacking pti					684.95
	For laying of pipe (planks will be used alternatively. 2ft top and half dia of pipe will be without shuttering)		3,227.40	3.87		12490.04
					Total	**13174.99**
20	Providing and applying epoxy lining in the main sewer lines (24" and above dia)					
	24" dia		2,375.00		6.28	14,915.00
	27" dia		1,345.00		7.07	9,509.15
	30" dia		1,355.00		8.64	11,707.20
	36" dia		3,229.00		9.42	30,417.18
	42" dia		150.00		10.99	1,648.50
						68,197
21	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl, kankar lime (unslaked), surkhi, etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor.					
	(Ch.No. 1, Item.No. 1)					
	Ratio (1:3.6)	1	7558.87	0.92		6984.39
	Ratio (1:2.4)	1	19256.43	0.88		16945.65
						23930.05
	Restoration of tuff tile					
22	Re-Laying of Sub Base Course by using old material (received through dismentalling of road crust, compacted up to 100% modified AASHO dry density complete in all respect. (Labour Rate only) qty as per dismentling)					5,098.89
23	Providing and laying sand under and around the sewer pipe, including leveling, manual compaction, complete in all respect.					
	21" dia		319.00	7.00	0.17	**379.61**
	27" dia		363.15	8.50	0.17	**524.75**
	30" dia		542.00	9.00	0.17	**829.26**
					Total:-	**1,733.62**
24	Re-laying Tuff pavers, having 7000 PSI, crushing strength of approved manufacturer, over 2" to 3" sand cushion i/c grouting with sand in joints i/c finishing to require slope . complete in all respect (10-41)					10,197.78
25	Restoration of PCC 1:2:4					14,917.98

DETAILED QUANTITY MANHOLE
FOR THE SCHEME
PROVIDING AND LAYING TRUNK SEWER IN KAMALIA CITY

Part-B Manholes

S.No.	Name of Work	Nos.	Qty. of each Chamber	T.Quantity
1	Earth work excavation in open cutting for sewers and manhole as shown in drawings including shuttering and timbering, dressing to correct section and			
	0-7'ft. Depth.			
	21" dia	19	365	6,927.75
	24" dia	29	470	13,643.50
	27" dia	14	470	6,586.52
	30" dia	14	470	6,586.52
	36" dia	34	578	19,641.33
	42" dia	1	578	577.69
			Total:-	**53,963.29**
	7'-15'ft. Depth.			
	21" dia	19	279	5,301.00
	24" dia	29	538	15,592.57
	27" dia	14	538	7,527.45
	33" dia	14	538	7,527.45
	36" dia	34	660	22,447.23
	42" dia	1	660	660.21
			Total:-	**59,055.91**
	Above 15'ft. Depth.			
	36" dia	34	289	9,820.66
	42" dia	1	289	288.84
			Total:-	**10,109.51**
2	Dry rammed brick or stone ballast 1-1/2" to 2" (40mm to 50mm) gauge.			
	21" dia	19	44.18	839.50
	24" dia	29	67.21	1,949.07
	27" dia	14	67.21	940.93
	33" dia	14	67.21	940.93
	36" dia	34	82.53	2,805.90
	42" dia	1	82.53	82.53
			Total:-	**7,558.87**
3	Cement concrete plain including, placing compacting finishing and curing complete (including screening and washing of stone aggregate).			
	Ratio 1:3:6			
	21" dia	19	44.18	839.50
	24" dia	29	67.21	1,949.07
	27" dia	14	67.21	940.93
	33" dia	14	67.21	940.93
	36" dia	34	82.53	2,805.90
	42" dia	1	82.53	82.53
			Total:-	**7,558.87**
	Ratio 1:2:4			
	21" dia	19	27.13	515.47
	24" dia	29	38.64	1,120.56
	27" dia	14	38.64	540.96
	33" dia	14	38.64	540.96
	36" dia	34	46.30	1,574.20
	42" dia	1	46.30	46.30
			Total	**4,338.45**
4	Pucca brick work other than building upto 10' hieght. Cement sand mortar Ratio 1:3.			
		19	112.28	2,133.32
		29	288.14	8,356.06
		14	288.14	4,033.96
		14	288.14	4,033.96
		34	332.92	11,319.28
		1	332.92	332.92
			Total	**30,209.50**
5	Extra for pucca brick work in stening of wells or any other circular masonary.			**30,209.50**
6	Extra for making and finishing benching floor work in manhole chamber 1/8" (3mm) thick cement finish.			
	21" dia	19	12.56	238.64
	24" dia	29	15.71	455.59
	27" dia	14	15.71	219.94
	33" dia	14	15.71	219.94
	36" dia	34	28.27	961.18
	42" dia	1	28.27	28.27
			Total	**2,123.56**

S.No.	Name of Work	Nos.	Qty. of each Chamber	T.Quantity
7	C.I. step @ wt. 3kg each in manhole chambers I/c carriage setting the same in work to correct lines and levels.			
	21" dia	19	4	76.00
	24" dia	29	6	174.00
	27" dia	14	6	84.00
	33" dia	14	6	84.00
	36" dia	34	10	340.00
	42" dia	1	10	10.00
			Total	**768.00**
8	Cement plaster 1:3 up to 20' height 1/2" thick.			
	21" dia	19	133.65	2,539.35
	24" dia	29	645.84	18,729.36
	27" dia	14	645.84	9,041.76
	33" dia	14	645.84	9,041.76
	36" dia	34	749.91	25,496.94
	42" dia	1	749.91	749.91
			Total	**65,599.08**
9	P/F 6" (150mm) thick RCC manhole cover 22",(550mm) dia, with tee shaped C.I frame weighing 37.324Kg. as per standard drawing STD/PD No.6 of 1977 complete in all respects.	111	1.00	111

DETAILED ESTIMATE
FOR THE SCHEME
PROVIDING AND LAYING TRUNK SEWER IN KAMALIA CITY

Part-A (Govt. Notified Rates) July 2023 to December 2023

S#	Ref. CSR P/Item	Description	Unit	Quantity	Rate	Amount
1	C-4/46	Dismantling and removing road pavement etc, including screening and stacking of by products upto chain (30m) lead.	100 Cft.	27,449.74	3468.00	951,956.98
2	N.S	Dismentling of tuff tile	100 Cft.	10,197.78	942.50	96,114.03
3	C-4/46	Dismentling of sub base	100 Cft.	5,098.89	3,468.00	176,829.42
4	C-4/19	Dismantling of PCC 1:2:4	100 Cft.	14,917.98	14,287.70	2,131,435.52
5	C-3/27	Extra for slush or Daldal	1000 Cft	153,441.40	10,391.05	1,594,417.26
6	C-26-35	Bailing out water:- b) by pump	1000 Cft	4,896,000.00	1,037.95	5,081,803.20
7	C-3/42	Earth work excavation in open cutting for sewers and manholes as shown in drawings including shuttering and timbering, dressing to correct sections and dimensions according to templates and levels, and removng surface water, in all types of soil except shingle gravel and rock.				
		(i) 0 ft to 7 ft. Depth	1000 Cft.	453,335.87	15688.05	7,111,955.74
		(ii) 7 ft to 15 ft. Depth	1000 Cft.	297,198.75	22379.80	6,651,248.69
		(iii) Above 15 ft. Depth	1000 Cft.	13,522.01	23589.85	318,982.13
8	C-3/42	Earth work excavation in open cutting for sewers and manholes as shown in drawings excluding shuttering and timbering, dressing to correct sections and dimensions according to templates and levels, and removng surface water, in all types of soil except shingle gravel and rock.				
		(i) 0 ft to 7 ft. Depth	1000 Cft.	113,957.77	10746.31	1,224,626.01
		(ii) 7 ft to 15 ft. Depth	1000 Cft.	110,268.94	16628.19	1,833,573.08
9	C-4/31	Disjoining R.C.C. pipes inside the trench and dismantling and removing the pipes from the trench and stacking them outside:-				
		b) 13" to 24" (325 to 600 mm) diameter	Per Rft	1,206.60	68.85	83,074.41
		c) 25" to 36" (625 to 900 mm) diameter	Rft	2,020.80	80.65	162,977.52
10	C-1/2	Carriage of 5 tons of all material like coal, stone lime (unslaked), etc. B.G. Rail fastenings, points and crossing, Bridge Girders, pipes, sheets, Rail, M.S. bars, etc. etc. by truck or any other means owned by the contractor.				
		5th Km	5 tone	1,008.56	957.85	193,210.32
11	C-3/17	Transportation of earth all types when the total distance including the lead covered in the item of work, is more than 1000 ft. (300 m) lead upto 3 km	1000 Cft.	247,178.32	6649.35	1,643,575.15
12	C-21/3	Providing and Laying R.C.C. pipe sewer moulded with cement concrete 1:1.5:3 conforming to ASTM specification C-76-79, Class-II, Wall-B, including carriage of pipe from factory to site of wor, lowering in trenches to correct alignment and grade, jointing with rubber ring, cutting pipes where necessary, testing etc. complete.				
		21" dia	Rft	1,595.00	1,761.65	2,809,831.75
		24" dia	Rft	2,375.00	2,034.05	4,830,868.75
		27" dia	Rft	1,345.00	3,041.10	4,090,279.50
13	C-21/4	Providing and Laying R.C.C. pipe sewer moulded with cement concrete 1:1.5:3 conforming to ASTM specification C-76-79, Class-III, Wall-B, including carriage of pipe from factory to site of wor, lowering in trenches to correct alignment and grade, jointing with rubber ring, cutting pipes where necessary, testing etc. complete.				
		30" dia	Rft	1,355.00	4,507.10	6,107,120.50
		36" dia	Rft	3,229.00	5,666.30	18,296,482.70
		42" dia	Rft	150.00	6,601.05	990,157.50
14	C-21/4	Providing of R.C.C. pipe sewer moulded with cement concrete 1:1.5:3 conforming to ASTM specification C-76-79, Class-III, Wall-B, including carriage of pipe from factory to site of work, lowering in trenches to correct alignment and grade, jointing with rubber ring, cutting pipes where necessary, testing etc. complete.				
		27" dia		115.00	2,975.20	342,148.00
		30" dia	Rft	235.00	4,090.75	961,326.25
		36" dia	Rft	315.00	5,025.80	1,583,127.00
15	RA	Laying of pipe by jacking method				
		27" dia	Rft	115.00	2,234.00	256,910.00
		30" dia	Rft	235.00	2,571.84	604,382.40
		36" dia	Rft	315.00	3,006.00	946,890.00
16	C-3/13	(i) Rehandling of earth work. (a) Lead upto a single throw of Kassi, phaorah or shovel.	1000 Cft.	692,123.71	3,247.20	2,247,464.11
17	C-3/24a,c	(ii) Compaction of earth work. (a) Mixing, moistening earth to optimum moisture content in layers for compaction etc. complete.	1000 Cft.	692,123.71	1,541.85	1,067,150.94

S#	Ref. CSR P/Item	Description	Unit	Quantity	Rate	Amount
18	N.S	Providing/fixing RPC manhole cover with cover with tee shaped frame 22" I/d (frame atleast 50 kg) as per standard drg. & specifications.	- P.set	111	11592.00	1,286,712.00
19	C-21/9	Extra for making and finishing benching floor work in manhole chamber with 1/8" thick cement finish.	100 Sft.	2,123.56	3,541.50	75,205.88
20	C-6/5	Cement concrete plain including, placing, compacting, finishing, and curing complete (including screening and washing of stone aggregate.				
		(I) P.C.C. 1:3:6	100 Cft.	7,558.87	38,182.80	2,886,186.88
		(II) P.C.C. 1:2:4	100 Cft.	4,338.45	43,837.20	1,901,855.00
		Restoration of PCC 1:2:4	100 Cft.	14,917.98	43,837.20	6,539,622.56
21	C-7/7	Pacca brick work other than building upto 10 ft height in 1:3 cement sand mortor.	100 Cft.	30,209.50	35,504.50	10,725,731.93
22	C-7/10	Extra for pacca brick work in steining of wells or any other circular masonary.	100 Cft.	30,209.50	3145.20	950,149.19
23	C-11/8	Cement plaster 1/2" thick (1:3) cement sand mortor upto 20' height.	100 Sft.	65,599.08	4,132.80	2,711,078.78
24	C-21/13	Providing and fixing 1¼"x1¼"x3/16" (31x31x5 mm) angle iron step, in manhole chambers, including carriage and setting the same in work to correct lines and levels.	- Each	768.00	700.50	537,984.00
25	C-21/23	Providing and laying crushed stone aggregate of 1/4" to 1" guage under and around the sewer pipe, including leveling, manual compaction, complete in all respects	100 Cft	93,825.98	11437.20	10731065.09
26	C-6/2	Dry rammed bricks or stone ballast 1.5" to 2" gauge.	100 Cft.	7,558.87	11,008.80	832,140.50
27	C-1/1	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl, kankar lime (unslaked), surkhi, etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor.				
		(Ch.No. 1, Item.No. 1)	100 Cft	23930.05	10918.32	2,612,758.12
28	C-21/21	Providing and Installing C.I ventilating shaft painted with bituminous paint with foundation bolts as per PHED standard drawing STD/PD No. 4 of 1977, complete in all respect (except concrete foundation block):-6" (150 mm) i/d shaft iv) 36 ft. (11 metre) long				
		6" (150 mm) i/d shaft, 24 ft. (7.30 metre) long	100 Kg.	1,500.00	37,297.25	559,458.75
		9" (225 mm) i/d shaft, 24 ft. (7.30 metre) long	100 Kg.	3,000.00	37,077.80	1,112,334.00
		Restoration of tuff tile				
29	C-18/3a-II	Re-Laying of Sub Base Course by using old material (received through dismentalling of road crust, compacted up to 100% modified AASHO dry density complete in all respect. (Labour Rate only)18/3a-II	100 Cft.	5,098.89	6,815.25	347,501.93
30	C-21/24	Providing andlaying sand under and around the sewer pipe, including leveling, manual compaction, complete in all respect	100 Cft.	1,733.62	4,143.60	71,834.35
31	C-10/42	Re-laying Tuff pavers, having 7000 PSI, crushing strength of approved manufacturer, over 2" to 3" sand cushion i/c grouting with sand in joints i/c finishing to require slope . complete in all respect. (50% Grey / 50% Coloured				
		a) 50-mm thick	P Sft	10,197.78	31.20	318,170.58
32	N.S	Providing and applying epoxy lining in the main sewer lines (24" and above dia) complete in all respects	1 Sft	68,197.03	153.00	10,434,145.59
				Total:- (A)	**Rs.**	**129,023,853.97**

T.S ESTIMATE

FOR THE SCHEME

PROVIDING AND LAYING TRUNK SEWER IN KAMALIA CITY

Part-A (Govt. Notified Rates) January 2023 to July 2023

S #	Ref. CSR P/Item	Description	Unit	Quantity	Rate	Amount
1	N.S	Making connections of sewer line with manhole of existing sewer line complete in all respect.				
		(i) 9" to 18" dia with 21" to 36" dia	- Job	55.00	31,450.00	1,729,750.00
		(ii) 21" to 36" dia with 21" to 42" dia	- Job	24.00	57,410.00	1,377,840.00
2		Left in place shuttering used for laying of pipe by jacking method		13,174.99	1,950.00	25,691,226.60
3	N.S	Provision for Shifting of existing services.	L.S	1.00	5,375,000.00	5,375,000.00
				Total:- (B)	**Rs.**	**34,173,816.60**
				Total:- (A+B)	**Rs.**	**163,197,670.57**
				Say:-	**Rs.**	**163.20**
						Million

RATE ANALYSIS PROVIDING & FIXING OF REINFORCED PLASTIC COMPOSITE (RPC) MANHOLE COVERS 24" I/D WITH RPC FRAME

4	RPC Manhole Cover Manufactured with 100% Recycled Plastic Composite Material, 650 mm (26"dia) with clear opening size 600 mm (24" dia) and RPC manhole frame having dia meter 790 mm (31.1") with average breaking load capacity of 10 Ton and weight including frame of 50 kg (Minimum).						
		100	No. @ Rs.	9660.00	Each	Rs. 966,000	/-
					Total:-	Rs. 966,000	/-
	Add 20 % Contract profit & OHC					Rs. 193,200	/-
					Total:-	**Rs. 1,159,200**	**/-**
	Rate Per Number				**Say**	**Rs. 11,592**	**/-**

RATE ANALYSIS FOR 27" DIA SEWER PIPE BY JACKING METHOD.

Unit = (100 Rft. For 27" Dia)

Ser. No.	Description	Unit	Qty	Rate	Amount (Rs.)
1	Lowering of 27" dia pipe by crane for jaking to save the bilt up stracture built up structure Length (100ft 12.50 pipe,8' long)				
a).	**Hire Charges of Crane Capacity 20 Ton.**				
Input Rates	Hire charges of crane @ Rs. 4793/ Hour (for 3-Days) 8 working hour a day =24 hours (According to RCC Pipe weight Capacity).	P.Hour	24.00	4793	115,032
b).	**Labour Charges**				
Input Rates	Skilled labour 4 person per day (for 3-Days) 12-Person	P.No	12.00	1400	16,800
Input Rates	Sami-skilled labour 5 person per day (for 3-Days) 15-Person	P.No	15.00	1050	15,750
Input Rates	Un-skilled labour 5 person per day (for 3-Days) 15-Person	P.No	15.00	1050	15,750
2	Hire charges of heavy R.S Joist, wooden planks, struts, 10 KVA generator i/c cost of POL, wages for generator operator i/c freight charges of all T&P from market to site of work and back from site of work to market. For 3 days	P.Day	3.00	2800	8,400
3	Jaking appratus required i/c cost of hydraulic oil and freight charges of appratus from market to site of work and from site of work to market/store i/c wages of operator.2 sets @ Rs.2400/set	P.Day	3.00	4800	14,400
				Total : -	**186,132.00**
				Add 10% Over-head Charges : -	18,613.20
				Add 10% Contractor's Profit : -	18,613.20
				Grand Total : -	**223,358.40**
			Rate Per Rft : -	**223,358.40 /100**	**2,233.58**
				Say Rs. : -	**2,234**

RATE ANALYSIS FOR 30" DIA SEWER PIPE BY JACKING METHOD.

Unit = (100 Rft. For 30" Dia)

Ser. No.	Description	Unit	Qty	Rate	Amount (Rs.)
1	Lowering of 30" dia pipe by crane for jaking to save the bilt up stracture built up structure Length (100ft 12.50 pipe,8' long)				
a).	**Hire Charges of Crane Capacity 20 Ton.**				
Input Rates	Hire charges of crane @ Rs. 5607/ Hour (for 3-Days) 8 working hour a day =24 hours (According to RCC Pipe weight Capacity).	P.Hour	24.00	5270	126,480
b).	**Labour Charges**				
Input Rates	Skilled labour 5 person per day (for 3-Days) 15-Person	P.No	15.00	1600	24,000
Input Rates	Sami-skilled labour 6 person per day (for 3-Days) 18-Person	P.No	18.00	1050	18,900
Input Rates	Un-skilled labour 6 person per day (for 3-Days) 18-Person	P.No	18.00	1230	22,140
2	Hire charges of heavy R.S Joist, wooden planks, struts, 10 KVA generator i/c cost of POL, wages for generator operator i/c freight charges of all T&P from market to site of work and back from site of work to market. For 3 days	P.Day	3.00	2800	8,400
3	Jaking appratus required i/c cost of hydraulic oil and freight charges of appratus from market to site of work and from site of work to market/store i/c wages of operator.2 sets @ Rs.2400/set	P.Day	3.00	4800	14,400
				Total : -	**214,320.00**
				Add 10% Over-head Charges : -	21,432.00
				Add 10% Contractor's Profit : -	21,432.00
				Grand Total : -	**257,184.00**
			Rate Per Rft : -	**257,184.00 /100**	**2,571.84**
				Say Rs. : -	**2,572**

RATE ANALYSIS FOR 36" DIA SEWER PIPE BY JACKING METHOD.

Unit = (100 Rft. For 36" Dia)

Ser. No.	Description	Unit	Qty	Rate	Amount (Rs.)
1	Lowering of 36" dia pipe by crane for jaking to save the bilt up stracture built up structure Length (100ft 12.50 pipe,8' long)				
a).	**Hire Charges of Crane Capacity 20 Ton.**				
Input Rates	Hire charges of crane @ Rs. 5607/ Hour (for 4-Days) 8 working hour a day =32 hours (According to RCC Pipe weight Capacity).	P.Hour	32.00	5270	168,640
b).	**Labour Charges**				
Input Rates	Skilled labour 3 person per day (for 4-Days) 12-Person	P.No	12.00	1600	19,200
Input Rates	Sami-skilled labour 3 person per day (for 4-Days) 12-Person	P.No	12.00	1050	12,600
Input Rates	Un-skilled labour 4 person per day (for 4-Days) 16-Person	P.No	16.00	1230	19,680
2	Hire charges of heavy R.S Joist, wooden planks, struts, 10 KVA generator i/c cost of POL, wages for generator operator i/c freight charges of all T&P from market to site of work and back from site of work to market. For 4 days	P.Day	4.00	2800	11,200
3	Jaking appratus required i/c cost of hydraulic oil and freight charges of appratus from market to site of work and from site of work to market/store i/c wages of operator.2 sets @ Rs.2400/set	P.Day	4.00	4800	19,200
				Total : -	**250,520.00**
				Add 10% Over-head Charges : -	25,052.00
				Add 10% Contractor's Profit : -	25,052.00
				Grand Total : -	**300,624.00**
				Rate Per Rft : - 300,624.00 /100	**3,006.24**
				Say Rs. : -	**3,006**

Restoration of Roads (Trunk Sewer Rute)

S.No.	Detail of Item/Work	Measurements			Quantity
		L	B	H	
1	Supplying and filling sand under floor; or plugging in wells.				
	21" dia	1,276.00	7.00	4.50	40,194.00
	24" dia	2,375.00	8.00	4.50	85,500.00
	33" dia	813.00	9.00	4.50	32,926.50
	36" dia	1,259.31	9.00	4.50	51,002.06
				Total:-	**209,622.56**
2	Re-Laying of Sub Base Course by using old material (received through dismentalling of road crust, compacted up to 100% modified AASHO dry density complete in all respect. (Labour Rate only)18/3a-II				
	21" dia	1,276.00	7.00	0.75	6,699.00
	24" dia	2,375.00	8.00	0.75	14,250.00
	30" dia	813.00	9.00	0.75	5,487.75
	36" dia	1,259.31	9.00	0.75	8,500.34
				Total:-	**34,937.09**
3	Providing and laying of road edging of 3" wide and 9" deep brick on end complete in all respect. 18/5				
	21" dia	1,276.00	2.00		2,552.00
	24" dia	2,375.00	2.00		4,750.00
	30" dia	813.00	2.00		1,626.00
	36" dia	1,259.31	2.00		2,518.62
				Total:-	**11,446.62**
4	Providing & Laying (Water Bound macadam) Base Course of crushed stone aggregate form Kirana quarry of required thickness of approved quality and grade, and supply and spreading of stone screening , including placing, mixing, spreading and compaction of base course material to required depth, camber and grade to achieve 100% maximum modifed AASHO dry density, including carriage of all materials to site of work, complete in all respect. 18/4a				
	21" dia	1,276.00	7.00	0.67	5,984.44
	24" dia	2,375.00	8.00	0.67	12,730.00
	30" dia	813.00	9.00	0.67	4,902.39
	36" dia	1,259.31	9.00	0.67	7,593.64
				Total:-	**31,210.47**
5	Providing and Laying bitumenious priming coat, using 10 Lbs kerosin oil and 10 lbs binder per 100 Sft or 0.5 Kg Kerosene and 0.5 Kg binder per square metre.				
	21" dia	1,276.00	7.00		8,932.00
	24" dia	2,375.00	8.00		19,000.00
	30" dia	813.00	9.00		7,317.00
	36" dia	1,259.31	9.00		11,333.79
				Total:-	**46,582.79**
6	Providing ana laying Plant Premixed bitumenious carpt i/c compaction and finishing to required grade camber and density with 4.5 % bitumen 2" thick. (AWC)				
	21" dia	1,276.00	7.00		8,932.00
	24" dia	2,375.00	8.00		19,000.00
	30" dia	813.00	9.00		7,317.00
	36" dia	1,259.31	9.00		11,333.79
				Total:-	**46,582.79**

Restoration of Roads (Trunk Sewer Rute)

Sr. No:	Description of items	Quantity	Rate	Unit	Amount
1	Supplying and filling sand under floor; or plugging in wells.. (10/3)	209,622.56	3,061.20	P.% Cft	6,416,966.00
2	Re-Laying of Sub Base Course by using old material (received through dismentalling of road crust, compacted up to 100% modified AASHO dry density complete in all respect. (Labour Rate only)18/3a-II	34937.09	6,815.25	P.% Cft	2,381,050.00
3	Providing and laying of road edging of 3" wide and 9" deep brick on end complete in all respect. 18/5	11446.62	57.40	P.Rft	657,036.00
4	Providing & Laying (Water Bound macadam) Base Course of crushed stone aggregate form Kirana quarry of required thickness of approved quality and grade, and supply and spreading of stone screening , including placing, mixing, spreading and compaction of base course material to required depth, camber and grade to achieve 100% maximum modifed AASHO dry density, including carriage of all materials to site of work, complete in all respect. 18/4a	31210.47	34,028.20	P.% Cft	10,620,360.00
5	Providing and Laying bitumenious priming coat, using 10 Lbs kerosin oil and 10 lbs binder per 100 Sft or 0.5 Kg Kerosene and 0.5 Kg binder per square metre.C-18/6	46582.79	2,101.05	P.% Sft	978,728.00
6	Providing ana laying Plant Premixed bitumenious carpt i/c compaction and finishing to required grade camber and density with 4.5 % bitumen 2" thick. (AWC)	46582.79	17,224.65	P.% Sft	8,023,723.00
				Total	**29,077,863.00**
					29.08

IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA CITY

Rate Analysis for Asphalt Wearing Course

AWC

Providing and laying plant premixed bituminous carpet, including compaction and finishing to required camber, grade and density. (2 inch thick)
(iv) 4.5% Bitumen

Sr. No.	Description	Unit	Lead (Km)	Qty	Rate (Rs)	Amount (Rs.)
1	Providing and laying plant premixed bituminous carpet, including compaction and finishing to required camber, grade and density. (2 inch thick) (iv) 4.5% Bitumen	per inch thickness per 100Sft.		1.00	15,867.50	15,867.50
2	Carriage of 100 cft of all materials like stone aggregate spawl kanker lime surkhi etc or 150 cft of timber by truck or by any other means owned by the contratcor.					
	1st KM	100 Cft	1	0.1243	334.80	41.62
	2nd KM	100 Cft	1	0.1243	160.30	19.93
	3rd KM	100 Cft	1	0.1243	126.40	15.71
	4th KM	100 Cft	1	0.1243	90.55	11.26
	5th KM	100 Cft	1	0.1243	84.65	10.52
	6th KM	100 Cft	1	0.1243	83.30	10.35
	7th KM	100 Cft	1	0.1243	77.85	9.68
	8th KM	100 Cft	1	0.1243	77.05	9.58
	9th KM	100 Cft	1	0.1243	72.55	9.02
	10th KM	100 Cft	1	0.1243	68.20	8.48
	10th Km to 173.88 Km / 173.88 - 10 = 163.88 Km	100 Cft	163.88	0.1243	59.45	1,211.01
	Total.					**17,224.65**
	Total Amount per 100 Sft					**17,224.65**
	Total cast for Per Sft					**172.25**

DETAILED QUANTITY SEWER
FOR THE SCHEME
PROVIDING AND LAYING BRANCH SEWER IN KAMALIA CITY

Part-A

S.No.	Detail of Item/Work	No.	Measurements			Quantity
			L	B	H	
1	Dismantling and removing road pavement etc, including screening and stacking of by products upto chain (30m) lead.					
	15" dia		3,055.00	4.00	0.83	10,142.60
	18" dia		1,764.20	4.50	0.83	6,589.29
					Total:-	**16,731.89**
2	Dismantling brick or flagged flooring without concrete foundation					
	09" dia		7,113.00	2.75		19,560.75
	12" dia		16,431.00	3.50		57,508.50
	15" dia		9,165.00	4.00		36,660.00
	18" dia		5,292.60	4.50		23,816.70
					Total:-	**137,545.95**
	Dismentling of PCC 1:2:4					
	09" dia		4,742.00	2.75	0.33	4,303.37
	12" dia		10,954.00	3.50	0.33	12,651.87
	15" dia		3,055.00	4.00	0.33	4,032.60
	18" dia		1,764.20	4.50	0.33	2,619.84
					Total:-	**23,607.67**
3	Earth work excavation in open cutting for sewers and manholes as shown in drawings including shuttering and timbering, dressing to correct sections and dimensions according to templates and levels, and removng surface water, in all types of soil except shingle gravel and rock.					
	0-7' depth					
	09" dia		11,855.00	2.75	5.00	163,006.25
	12" dia		27,385.00	3.50	6.00	575,085.00
	15" dia		15,275.00	4.00	6.50	397,150.00
	18" dia		8,821.00	4.50	6.50	258,014.25
					Total:-	**1,393,255.50**
	7-15' depth					
	15" dia		7,637.50	2.96	2.25	50,865.75
	18" dia		4,410.50	3.25	4.75	68,087.09
					Total:-	**118,952.84**
						1,512,208.34
4	Transportation of earth all types when the total distance including the lead covered in the item of work, is more than 1000 ft. (300 m) lead upto 3 km					
	0-7' depth					
	09" dia		4,742.00	2.75	3.00	39,121.50
	12" dia		10,954.00	3.50	3.00	115,017.00
	15" dia		6,110.00	4.00	3.00	73,320.00
	18" dia		3,528.40	4.50	3.00	47,633.40
					Total:-	**275,091.90**
5	Providing and Laying R.C.C. pipe sewer moulded with cement concrete 1:1.5:3 conforming to ASTM specification C-76-79, Class-II, Wall-B, including carriage of pipe from factory to site of wor, lowering in trenches to correct alignment and grade, jointing with rubber ring, cutting pipes where necessary, testing etc. complete.					
	09" dia		11,855.00			11,855.00
	12" dia		27,385.00			27,385.00
	15" dia		15,275.00			15,275.00
	18" dia		8,821.00			8,821.00
6	(i) Rehandling of earth work.					
	(a) Lead upto a single throw of Kassi, phaorah or shovel.		1,209,766.68	-	-	1,209,766.68
	(ii) Compaction of earth work.			-	-	
	(a) Mixing, moistening earth to optimum moisture content in layers for compaction etc. complete.		1,209,766.68			1,209,766.68
21	Providing and laying sand under and around the sewer pipe, including leveling, manual compaction, complete in all respect.					
	09" dia		11,855.00	1.48		17,545.40
	12" dia		27,385.00	1.96		53,674.60
					Total:-	**71,220.00**
7	Supplying, laying, granular material crushed stone) 1/2" to 1" gauge under pipe line and up to half diameter of pipe.					
	15" dia		15,275.00	2.96	-	45,202.80
	18" dia		8,821.00	3.77	-	33,230.55
					Total	**78,433.35**

S.No.	Detail of Item/Work	No.	Measurements			Quantity
			L	B	H	
8	Constructing standard gully grating chamber, 3'x2½' (900x750 mm), with chinaware trap as per PHED Drawing STD/PD No. 3 of 1977, complete in all respects.		70.00			70.00
9	Restoration of PCC 1:2:4					23,607.67
9	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl, kankar lime (unslaked), surkhi, etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor. (Ch.No. 1, Item.No. 1)					
	Ratio (1:3.6)	1	27261.76	0.92		25189.87
	Ratio (1:2.4)	1	48084.56	0.88		42314.41
						67504.28

DETAILED QUANTITY MANHOLE
FOR THE SCHEME
PROVIDING AND LAYING BRANCH SEWER IN KAMALIA CITY

Part-B Manholes

S.No.	Name of Work	Nos.	Qty. of each Chamber	T.Quantity
1	Earth work excavation in open cutting for sewers and manhole as shown in drawings including shuttering and timbering, dressing to correct section and			
	0-7'ft. Depth.			
	09" dia	212	232	49,177.21
	12" dia	428	287	122,920.93
	15" dia	239	287	68,640.43
	18" dia	138	365	50,317.33
			Total:-	**291,055.89**
	7'-15'ft. Depth.			
	15" dia	239	227	54,173.14
	18" dia	138	279	38,502.00
			Total:-	**92,675.14**
2	Dry rammed brick or stone ballast 1-1/2" to 2" (40mm to 50mm) gauge.			
	09" dia	212	16.57	3,512.66
	12" dia	428	16.57	7,091.59
	15" dia	239	44.18	10,560.07
	18" dia	138	44.18	6,097.44
			Total:-	**27,261.76**
3	Cement concrete plain including, placing compacting finishing and curing complete (including screening and washing of stone aggregate).			
	Ratio 1:3:6			
	09" dia	212	16.57	3,512.66
	12" dia	428	16.57	7,091.59
	15" dia	239	44.18	10,560.07
	18" dia	138	44.18	6,097.44
			Total:-	**27,261.76**
	Ratio 1:2:4			
	09" dia	212	19.16	4,061.92
	12" dia	428	23.15	9,908.20
	15" dia	239	27.13	6,484.07
	18" dia	138	29.15	4,022.70
			Total	**24,476.89**
4	Pucca brick work other than building upto 10' hieght. Cement sand mortar Ratio 1:3.			
	09" dia	212	50.75	10,759.00
	12" dia	428	50.75	21,721.00
	15" dia	239	112.28	26,834.92
	18" dia	138	112.28	15,494.64
			Total	**74,809.56**
5	Extra for pucca brick work in stening of wells or any other circular masonary.			**74,809.56**
6	Extra for making and finishing benching floor work in manhole chamber 1/8" (3mm) thick cement finish.			
	09" dia	212	12.56	2,662.72
	12" dia	428	12.56	5,375.68
	15" dia	239	12.56	3,001.84
	18" dia	138	12.56	1,733.28
			Total	**12,773.52**
7	Providing and fixing 1¼"x1¼"x3/16" (31x31x5 mm) angle iron step, in manhole chambers, including carriage and setting the same in work to correct lines and levels.			
	09" dia	212	2	424.00
	12" dia	428	2	856.00
	15" dia	239	4	956.00
	18" dia	138	4	552.00
			Total	**2,788.00**
8	Cement plaster 1:3 up to 20' height 1/2" thick.			
	09" dia	212	101.50	21,518.00
	12" dia	428	101.50	43,442.00
	15" dia	239	224.56	53,669.84
	18" dia	138	224.56	30,989.28
			Total	**149,619.12**
9	Providing/fixing PRC manhole cover with cover with tee shaped frame 22" I/d (frame atleast 50 kg) as per standard drg. & specifications.	1,017		1,017

DETAILED ESTIMATE
FOR THE SCHEME
PROVIDING AND LAYING BRANCH SEWER IN KAMALIA CITY

Part-A (Govt. Notified Rates) July 2023 to December 2023

S#	Ref. CSR P/Item	Description	Unit	Quantity	Rate	Amount
1	C-4/46	(i) Dismantling and removing road pavement etc, including screening and stacking of by products upto chain (30m) lead.	100 Cft.	16,731.89	3468.00	580,261.84
2	C-4/29	Dismantling brick or flagged flooring without concrete foundation	100 Sft.	137,545.95	1,104.05	1,518,576.06
3	C-4/19	Dismantling of PCC 1:2:4	100 Cft.	23,607.67	14,287.70	3,372,993.35
4	C-3/42	Earth work excavation in open cutting for sewers and manholes as shown in drawings including shuttering and timbering, dressing to correct sections and dimensions according to templates and levels, and removng surface water, in all types of soil except shingle gravel and rock.				
		(i) 0 ft to 7 ft. Depth	1000 Cft.	1,684,311.39	15688.05	26,423,561.34
		(ii) 7 ft to 15 ft. Depth	1000 Cft.	211,627.98	22379.80	4,736,191.88
5	C-3/17	Transportation of earth all types when the total distance including the lead covered in the item of work, is more than 1000 ft. (300 m) lead upto 3 km	1000 Cft.	275,091.90	6649.35	1,829,182.33
6	C-21/3	Providing and Laying R.C.C. pipe sewer moulded with cement concrete 1:1.5:3 conforming to ASTM specification C-76-79, Class-II, Wall-B, including carriage of pipe from factory to site of wor, lowering in trenches to correct alignment and grade, jointing with rubber ring, cutting pipes where necessary, testing etc. complete.				
		09" dia	Rft	11,855.00	568.60	6,740,753.00
		12" dia	Rft	27,385.00	849.35	23,259,449.75
		15" dia	Rft	15,275.00	1,134.55	17,330,251.25
		18" dia	Rft	8,821.00	1,477.80	13,035,673.80
7	C-3/13	(i) Rehandling of earth work. (a) Lead upto a single throw of Kassi, phaorah or shovel or shovel.	1000 Cft.	1,209,766.68	3,247.20	3,928,354.35
	C-3/24a,c	(ii) Compaction of earth work. (a) Mixing, moistening earth to optimum moisture content in layers for compaction etc. complete.	1000 Cft.	1,209,766.68	1,541.85	1,865,278.75
8	N.S	Providing/fixing PRC manhole cover with cover with tee shaped frame 22" I/d (frame atleast 50 kg) as per standard drg. & specifications.	- P.set	1,017.00	11592.00	11,789,064.00
9	C-21/9	Extra for making and finishing benching floor work in manhole chamber with 1/8" thick cement finish.	100 Sft.	12,773.52	3,541.50	452,374.21
10	C-6/5	Cement concrete plain including, placing, compacting, finishing, and curing complete (including screening and washing of stone aggregate.				
		(I) P.C.C. 1:3:6	100 Cft.	27,261.76	38,182.80	10,409,303.06
		(II) P.C.C. 1:2:4	100 Cft.	24,476.89	43,837.20	10,729,983.22
		Restoration of PCC 1:2:4	100 Cft.	23,607.67	43,837.20	10,348,942.39
11	C-21/10	Restoration of brick pavement on edge, over laid service line, with 2" (50 mm) sand cushion under soling	100 Sft	137,545.95	6,160.15	8,473,036.84
12	C-7/7	Pacca brick work other than building upto 10 ft height in 1:3 cement sand mortor.	100 Cft.	74,809.56	35,504.50	26,560,760.23
13	C-7/10	Extra for pacca brick work in steining of wells or any other circular masonary.	100 Cft.	74,809.56	3145.20	2,352,910.28
14	C-11/8	Cement plaster 1/2" thick (1:3) cement sand mortor upto 20' height.	100 Sft.	149,619.12	4,132.80	6,183,458.99
15	C-6/2	Dry rammed bricks or stone ballast 1.5" to 2" gauge.	100 Cft.	27,261.76	11,008.80	3,001,192.57
16	C-21/13	Providing and fixing 1¼"x1¼"x3/16" (31x31x5 mm) angle iron step, in manhole chambers, including carriage and setting the same in work to correct lines and levels.	- Each	2,788.00	700.50	1,952,994.00
17	C-21/23	Supplying, laying, granular material crushed stone) 1/2" to 1" gauge under pipe line and up to half diameter of pipe.	1000 Cft.	78,433.35	11437.20	897057.91
18	C-21/24	Providing andlaying sand under and around the sewer pipe, including leveling, manual compaction, complete in all respect	100 Cft.	71,220.00	4,143.60	2,951,071.92
19	C-21/8	Constructing standard gully grating chamber, 3'x2½' (900x750 mm), with chinaware trap as per PHED Drawing STD/PD No. 3 of 1977, complete in all respects.	1 Each	70.00	18,851.10	1,319,577.00

S#	Ref. CSR P/Item	Description	Unit	Quantity	Rate	Amount
20	C-1/1	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl, kankar lime (unslaked), surkhi, etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor.				
		(Ch.No. 1. Item.No. 1)	100 Cft	67504.28	10918.32	7,370,330.63
21	N.S	Making connections of sewer line with manhole of existing sewer line complete in all respect.				
		9" to 12" dia with 9" to 36"	- Job	45.00	21,720.00	977,400.00
		15" to 18" dia with 15" to 36"	- Job	35.00	31,450.00	1,100,750.00
22	N.S	Provision for Shifting of existing services.	L.S	1.00	4,758,000.00	4,758,000.00
				Total:- (B)	**Rs.**	**216,248,734.94**
				Say:-	**Rs.**	**216.25 Million**

Restoration of Roads (Branch Sewer Rute)

S.No.	Detail of Item/Work	Measurements			Quantity
		L	B	H	
1	Supplying and filling sand under floor; or plugging in wells.				
	15" dia	6,110.00	4.00	3.00	73,320.00
	18" dia	3,528.40	4.50	3.00	47,633.40
				Total:-	**120,953.40**
2	Re-Laying of Sub Base Course by using old material (received through dismentalling of road crust, compacted up to 100% modified AASHO dry density complete in all respect. (Labour Rate only)18/3a-II				
	15" dia	6,110.00	4.00	0.500	12,220.00
	18" dia	3,528.40	4.50	0.500	7,938.90
				Total:-	**20,158.90**
3	Providing and laying of road edging of 3" wide and 9" deep brick on end complete in all respect. 18/5				
	15" dia	6,110.00	2.00		12,220.00
	18" dia	3,528.40	2.00		7,056.80
				Total:-	**19,276.80**
4	Providing & Laying (Water Bound macadam) Base Course of crushed stone aggregate form Kirana quarry of required thickness of approved quality and grade, and supply and spreading of stone screening , including placing, mixing, spreading and compaction of base course material to required depth, camber and grade to achieve 100% maximum modifed AASHO dry density, including carriage of all materials to site of work, complete in all respect. 18/4a				
	15" dia	6,110.00	4.00	0.38	9,165.00
	18" dia	3,528.40	4.50	0.38	5,954.18
				Total:-	**15,119.18**
5	Providing and Laying bitumenious priming coat, using 10 Lbs kerosin oil and 10 lbs binder per 100 Sft or 0.5 Kg Kerosene and 0.5 Kg binder per square metre.				
	15" dia	6,110.00	4.00		24,440.00
	18" dia	3,528.40	4.50		15,877.80
				Total:-	**40,317.80**
6	Providing ana laying Plant Premixed bitumenious carpt i/c compaction and finishing to required grade camber and density with 4.5 % bitumen 2.00" thick. (AWC)				
	15" dia	6,110.00	4.00		24,440.00
	18" dia	3,528.40	4.50		15,877.80
				Total:-	**40,317.80**

Restoration of Roads (Branch Sewer Rute)

Sr. No:	Description of items	Quantity	Rate	Unit	Amount
1	Supplying and filling sand under floor; or plugging in wells.. (10/3)	120953.40	3,061.20	P.% Cft	3,702,625
2	Re-Laying of Sub Base Course by using old material (received through dismentalling of road crust, compacted up to 100% modified AASHO dry density complete in all respect. (Labour Rate only)18/3a-II	20158.90	6,815.25	P.% Cft	1,373,879
3	Providing and laying of road edging of 3" wide and 9" deep brick on end complete in all respect. 18/5	19276.80	57.40	P.Rft	1,106,488
4	Providing & Laying (Water Bound macadam) Base Course of crushed stone aggregate form Kirana quarry of required thickness of approved quality and grade, and supply and spreading of stone screening , including placing, mixing, spreading and compaction of base course material to required depth, camber and grade to achieve 100% maximum modifed AASHO dry density, including carriage of all materials to site of work, complete in all respect. 18/4a	15119.18	34,028.20	P.% Cft	5,144,783
5	Providing and Laying bitumenious priming coat, using 10 Lbs kerosin oil and 10 lbs binder per 100 Sft or 0.5 Kg Kerosene and 0.5 Kg binder per square metre.C-18/6	40317.80	2,101.05	P.% Sft	847,097
6	Providing ana laying Plant Premixed bitumenious carpt i/c compaction and finishing to required grade camber and density with 4.5 % bitumen 2" thick. (AWC)	40317.80	17,224.65	P.% Sft	6,944,600
				Total	**19,119,472.00**
					19.119

IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA CITY

Rate Analysis for Base Course

Sr. No.	Description	Unit		Quantity	Rate	Amount (Rs.)
A	a) Providing and laying base course of crushed stone aggregate of approved quality and grade, and supply and spreading of stone screening, including placing, mixing, spreading and compaction of base course material to required depth, camber and grade to achieve 100% maximum modified AASHO dry density, including carriage of all materials to site of work except gravel and aggregate. (C-18/4)	100	Cft	1	16,973.65	16,973.65
B	**Carraige**					
	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl, kankar lime (unslaked), surkhi, etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor.					
	Chapter No - 1 / Item no - 1					
	1st Km	100	Cft	1	334.80	334.80
	2nd Km	100	Cft	1	160.30	160.30
	3rd Km	100	Cft	1	126.40	126.40
	4th Km	100	Cft	1	90.55	90.55
	5th Km	100	Cft	1	84.65	84.65
	6th Km	100	Cft	1	83.30	83.30
	7th Km	100	Cft	1	77.85	77.85
	8th Km	100	Cft	1	77.05	77.05
	9th Km	100	Cft	1	72.55	72.55
	10th Km	100	Cft	1	68.20	68.20
	10th Km to 173.88 Km / 173.88 - 10 = 163.88 Km	100	Cft	163.88	59.45	9,742.67
						27,891.97
	Add 22% Loose Factor					6,136.23
					Total Cost of 100 Cft	**34,028.20**

UPGRADATION OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA CITY

Rate Analysis for Asphalt Wearing Course

AWC

Providing and laying plant premixed bituminous carpet, including compaction and finishing to required camber, grade and density. (2 inch thick)
(iv) 4.5% Bitumen

Sr. No.	Description	Unit	Lead (Km)	Qty	Rate (Rs)	Amount (Rs.)
1	Providing and laying plant premixed bituminous carpet, including compaction and finishing to required camber, grade and density. (2 inch thick) (iv) 4.5% Bitumen	per inch thickness per 100Sft.		1.00	15,867.50	15,867.50
2	Carriage of 100 cft of all materials like stone aggregate spawl kanker lime surkhi etc or 150 cft of timber by truck or by any other means owned by the					
	1st KM	100 Cft	1	0.1243	334.80	41.62
	2nd KM	100 Cft	1	0.1243	160.30	19.93
	3rd KM	100 Cft	1	0.1243	126.40	15.71
	4th KM	100 Cft	1	0.1243	90.55	11.26
	5th KM	100 Cft	1	0.1243	84.65	10.52
	6th KM	100 Cft	1	0.1243	83.30	10.35
	7th KM	100 Cft	1	0.1243	77.85	9.68
	8th KM	100 Cft	1	0.1243	77.05	9.58
	9th KM	100 Cft	1	0.1243	72.55	9.02
	10th KM	100 Cft	1	0.1243	68.20	8.48
	10th Km to 173.88 Km / 173.88 - 10 = 163.88 Km	100 Cft	163.88	0.1243	59.45	1,211.01
	Total.					**17,224.65**
	Total Amount per 100 Sft					**17,224.65**
	Total cast for Per Sft					**172.25**

DETAILED ESTIMATE
FOR THE SCHEME

SUPPLY OF LIQUID WASTE MACHINERY (Desilting Machine and Dewatering set)

S #	Ref. CSR P/Item	Description	Unit	Quantity	Rate	Amount
		Desiliting Machine				
1	N.S	Suzuki Pick up mounted desilting machine, capacity/ Container of the disiliting is 0.5 cubic meter, Grab Bucket can lift 5-10 kg silt at one time, can reach to the depth of 18' to 20' all steel part surfaces is free from rust and oil residue. One coat of red oxide and two coat of final paint is done with syenthitic enamal paint. Colour as per costumer choice	Each	1.00	5,425,000.00	5,425,000.00
2	N.S	Providing and fixing of sewer cleaning heavy duty pressure pipe (thermoplastic hydraulic Hose, reinforced with syntheic thread) 0.75" i/d inner dia complete in all respect.	Rft	500.00	2,196.00	1,098,000.00
		with following specifications:				
	i	Reinforced with syntheic thread				
	ii	Weather resistant synthetic thermoplast				
	iii	Min. working pressure: 300 bar				
	iv.	Flame resistance				
3	N.S	**Provision of Auto Priming Dewatering Sets having following specifications:** Fully Automatic Auto-prime solid handling dewatering pump sets (Europe, USA, UK, Japan, Australia origin or equivalent) Minimum 3" (75mm) solid handling capacity Pump Capacity: Min. 2 Cusec and above. Standard construction with SG iron casing SS316 impeller (255mm Diameter Impeller) and wear plates SS431 Shaft, fitted with oil cooled mechanical seal of Silicon Carbide capable of running dry for extended periods faces incorporating full automatic compressor primingfacility. Suction / Discharge connections 150mm x 150mm respectively (with Bauer quick connect couplers) close coupled with water cooled diesel engine having power not less than 35kw and above/45HP and above with RPM upto 1900 make Perkins/Deutz or equivalent, Electric start, battery and engine control panel with shut down protection again high engine Rpm, low oil pressure, high temperature complete with emergency stop. All mounted on a common fabricated steel base with single axle trailer complete with Two jack stands, Towing Minimum 10 hours fuel tank Pump should be able to develop a minimum head of 20M and flow of 450m3/hr Each unit shall be supplied with 5Mx6" reinforced rubber suction hose and 33Mx6" discharge canvas type hose complete with quick bauer type couplings.	Each	1	21,240,000.00	21,240,000.00
					Rs.	**27,763,000.00**
					Rs.	**27.76**
						Million

PROVIDING & FIXING OF REINFORCED PLASTIC COMPOSITE (RPC) MANHOLE COVERS 24" I/D WITH RPC FRAME							
Sr. #	**Description of items**	**Quantity**		**Rate**	**Unit**	**Amount**	
1	Providing & Fixing of Reinforced Plastic Composite (RPC) Manhole Covers 24" I/D with RPC Frame urban area kamalia City	735.00	No	14948.04	P No	10,986,808.70	/-
					Total:	**10,986,809**	/-
					Say Rs.	**10.99**	**/-**

RATE ANALYSIS PROVIDING & FIXING OF REINFORCED PLASTIC COMPOSITE (RPC) MANHOLE COVERS 24" I/D WITH RPC FRAME

1 Dismantling cement conceret 1:2:4 (C-4/19c)

	1	3.14	x	2.13	x	0.75	x	0.38		=	1.91	Cft.
						1.91	Cft @ Rs	14287.70		%Cft	Rs.	272.3 /-

2 Pacca Brick Work Cement Sand Mortor 1:3:3 i/c extra for circuler masonary (C-7/7)

	1	3.14	x	2.58	x	0.75	x	0.25		=	1.52	Cft.
						1.52	Cft @ Rs	35504.50		%Cft	Rs.	539.3 /-

3 Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone aggregate):

(c) Ratio 1:2:4	1	3.14	x	2.58	x	0.75	x	0.79		=	4.80	Cft.
						4.80	Cft @ Rs	43837.20		%Cft	Rs.	2,104.2 /-

4 RPC Manhole Cover Manufactured with 100% Recycled Plastic Composite Material, 650 mm (26"dia) with clear opening size 600 mm (24" dia) and RPC manhole frame having dia meter 790 mm (31.1") with average breaking load capacity of 10 Ton and weight including frame of 50 kg (Minimum).

1 No. @ Rs.	11592.00	Each		Rs.	11,592.0 /-

5 Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl, kankar lime (unslaked), surkhi, etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor.

Concrete 1:1.5:3	4.80 x	0.84 =	4.03		=	4.03	Cft	
	4.03			10,918.32	P.%Cft		Rs.	440.2

	Total:-	Rs. 14,948 /-
Rate Per Number	**Total:-**	**Rs. 14,948.04 /-**

RATE ANALYSIS PROVIDING & FIXING OF REINFORCED PLASTIC COMPOSITE (RPC) MANHOLE COVERS 22" I/D WITH RPC FRAME

1	RPC Manhole Cover Manufactured with 100% Recycled Plastic Composite Material, 650 mm (26"dia) with clear opening size 600 mm (22" dia) and RPC manhole frame having dia meter 790 mm (31.1") with average breaking load capacity of 10 Ton and weight including frame of 50 kg (Minimum).					
		100 No. @ Rs.	9660.00	Each	Rs.	966,000 /-
				Total:-	Rs.	966,000 /-
	Add 20 % Contract profit & OHC				Rs.	193,200 /-
				Total:-	**Rs.**	**1,159,200 /-**
	Rate Per Number			**Say**	**Rs.**	**11,592 /-**

IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA CITY

GENERAL ABSTRACT OF COST OF DISPOSAL STATION

MRS 2nd bi annual July-2023 to December-2023

S #	Description		Amount
1	**Sub Head-A Civil Works**		
A	Construction of Screening Chamber.	Rs.	4,876,972.00
B	Construction of Wet Wells.	Rs.	13,415,738.00
C	Construction of Pump House.	Rs.	37,560,004.00
D	Providing and Laying R.C.C Pipe 42" dia screen chamber to wet well	Rs.	922,185.00
E	Supply and Installation of Valves and Delivery Pipes	Rs.	4,833,891.00
F	Construction of Electrical Sub-Station.	Rs.	2,804,674.00
G	Construction of Other Allied Works.		
	i. Boundary Wall.	Rs.	3,371,582.00
	ii. Main Gate.	Rs.	1,215,339.00
H	Construction of Staff Quarters	Rs.	6,310,548.00
	Sub Head-B Electrical & Mechanical Works		
I	Providing and Installation of Pumping Machinery	Rs.	56,992,131.00
J	Supply and Installation of 400 KVA Transformer.	Rs.	3,821,528.40
K	Supply and Installation of 200 KVA Diesel Generator	Rs.	12,889,139.00
L	LT Change Over Pannel with PFI	Rs.	4,952,337.00
M	External & Internal electrification and cabling work	Rs.	7,476,277.00
N	Provision for FESCO charges	Rs.	2,100,000.00
	Total:-	**Rs.**	**163542345.40**
			163.54 millions

QUANTITY SHEET

IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA CITY

Sub Head # A: Construction of screening Chamber:

S #	Ref Sor Item/Page	Description	No.	Measurements			Quantity
				L	B	H	
1	C-26-35	Bailing out water:-					
		b) by pump	1	185.00	88.00	7.75	126,170.00
3	C-22/1	Excavation of well in dry upto 20' (6 metre) below ground level, and disposal of soil within one chain 30 metre					
		0' to 5.0 ft. Depth **(Sami circular area)**	2x1/2	3.14x18.75x18.75x0.25		5.00	1379.88
			1	13.25	18.50	5.00	1225.63
						Total	**2605.51**
		5.01' to 10.0 ft. Depth	2x1/2	3.14x16.75x16.75x0.25		5.00	1101.21
			1	13.25	16.50	5.00	1093.13
							2194.33
		10.01' to 15.0 ft. Depth	2x1/2	3.14x14.75x14.75x0.25		4.67	797.57
			1	13.25	16.50	4.67	1020.98
						Total	**1818.55**
6	C6-1-5	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone aggregate).					
		Ratio (1:3:6)	2x1/2	3.14x14.75x14.75x0.25		0.33	56.36
			1	13.25	14.75	0.33	64.49
						Total	**120.85**
9	C6-1-6	P/L reinforced cement concrete (including prestressed concrete), using coarse sand and aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing,rendering and finishing exposed surface, complete.					
		(a) Reinforced cement concrete in slab of Raft/strip foundation; base slab of column and retaining walls; etc. and other structural members other than those mentioned in 5(a) (i) above not requiring from work, complete in all respects:-					
		Ratio 1:2:4					
		Bed of screening chamber	2x1/2	3.14x14x14x0.25		0.75	115.40
			2	13.25	14.00	0.75	278.25
						Total	**393.65**
		(a) (i) Reinforced cement concrete in roof slab, beams, columns, lintels, girders and other structural members laid in situ or precast laid in position, or prestressed members cast in situ, complete in all respects:-					
		Slab 1:2:4					
		Top screen	1x1/2	3.14x9.50x9.50x0.25		0.67	23.73
		Gate valve	1	9.25	3.00	0.67	18.59
		Lintle	2	10.00	1.125	1.00	22.50
						Total	**64.83**

S #	Ref Sor Item/Page	Description	No.	Measurements			Quantity
				L	B	H	
10	C-6/12	Fabrication of mild steel reinforcement for cement concrete including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust).					
		(b) deformed bars.		1x 458.47x3			1375.41
11	C-7/7	Pucca brick work other then building:-					
		(i) Cement sand mortar 1:3					
		Circular masonry					
		Outer wall	2x1/2	3.14x10.25	2.25	5.00	360.32
		Straight wall	1	13.50	2.25	5.00	151.88
		Wall above NSL	2x1/2	3.14x9.875	1.875	5.00	290.70
			2	13.50	1.875	5.00	253.13
			2x1/2	3.14x9.50	1.50	5.00	223.73
			2	13.50	1.50	5.00	202.50
			2x1/2	3.14x9.125	1.125	5.08	163.75
			2	13.50	1.125	5.08	154.31
		Inter walls	1	8.00	1.125	11.75	105.75
			1	8.00	1.125	9.25	83.25
						Total	**1989.29**
		Deduction					
		Opening	2	4.00	1.125	3.50	31.50
		Pipe	2	$3.14x(4.25)/^2x0.25$	1.50		42.54
						Total	**74.04**
						Net	**1915.25**
12	C-7/10	Extre for circular massonery					1915.25
13	C-11/9	Cement plaster 1:3 upto 20' height.					
		b) 1/2" thick.					
		Circular masonry					
		Outer wall	2x1/2	3.14x12.50		5.00	196.25
		Inner side	2x1/2	3.14x8		5.00	125.60
		Straight wall	4	13.50		5.00	270.00
			2x1/2	3.14x11.75		5.00	184.48
			2x1/2	3.14x8		5.00	125.60
			4	13.50		5.00	270.00
			2x1/2	3.14x11		5.00	172.70
			2x1/2	3.14x8		5.00	125.60
			4	13.50		5.00	270.00
			2x1/2	3.14x10.25		5.08	163.50
			2x1/2	3.14x8		5.08	127.61
			4	13.50		5.08	274.32
		Inter walls	2	8.00		11.75	188.00
			2	8.00		9.25	148.00
						Total	**2641.65**
		Deduction					
		Opening	2	4.00		3.50	28.00
		Pipe	2	$3.14x(4.25)/^2x0.25$		3.50	99.25
						Total	**127.25**
						Net	**2514.40**
14	C-21/13	Providing and fixing 1¼"x1¼"x3/16" (31x31x5 mm) angle iron step, in manhole chambers, including carriage and setting the same in work to correct lines and levels.	15				15.00
15	C-13/9	Bitumen coating to plastered or cement concrete surfaces.					
		(i) 20 lbs per 100 sq.ft.	2x1/2	3.14x12.50		15.50	608.38
			2	13.50		15.50	418.50
						Total	**1026.88**
16	C6-1-5	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone aggregate).					
		Ratio (1:1.5:3)	1/2	3.14x8x8x0.25		0.83	41.70
			1/2	3.14x8x8x0.25		0.58	29.14
			1	13.50	8.00	0.58	62.64
						Total	**133.48**
17		RPC Manhole Cover Manufactured with 100% Recycled Plastic Composite Material, 650 mm (26"dia) with clear opening size 600 mm (22" dia) and RPC manhole frame having dia meter 790 mm (31.1") with average breaking load capacity of 10 Ton and weight including frame of 50 kg (Minimum).	1				1.00

S #	Ref Sor Item/Page	Description	No.	Measurements			Quantity
				L	B	H	
18	C-6/30	Providing & fixing 12" (150mm) wide G.I 18 SWG stopper to expansion joint.	2	77.25			154.50
19	C-25/39	Providing and fixing stair railing of 2 1/2" (63mm) i/d G.I pipe, welded with 5/8"x5/8" (16x16) square M.S Bars 2'-9" (838 mm) high, fixed in each step, complete in all respects, including painting, polishing three coats.	1	55.65			55.65
20	N.S	**Penstock outer size 48"x48"** Supply Installation and commissioning of Penstock size 4'x4' comprises of following parts:- (i) Stainless Steel "U" guide channel length 9ft thickness 16 SWG channel size 3". (ii) Gate frame shall be cast iron steel using 1" thick enforcement ribs 2"x1/2" plate supported with 1.5" x 1" around the plate and across the plate. (iii) Gate frame equipped with rubber channel and rubber mate to control water flow / speege. (iv) Lifting & lowering and lifted through gear head motor operated, spindle length 22' spindle 2.50" dia mounted over the slab and shall be operated auto / manually.	1				1.00
21	C25/ I 10	Fabrication of heavy steel work, with angl, tees, flat iron, rounded iron and sheet iron for making trasses, girders, tanks etc. including cutting, drilling, revetting, handling, amembling and fixing but excluding errection in position (of darwing).	1	1334			1334.00
22	C25/ I 11	Erection in position iron trasses, staging of water tank etc.					1334.00
23	C-1/1	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl, kankar lime (unslaked), surkhi, etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor. (Ch.No. 1, Item.No. 1)					
		Ratio (1:2.4)	1	458.47	0.88		403.45
		Ratio (1:1.5.3)	1	527.12	0.84		442.78
		Ratio (1:3.6)	1	120.85	0.92		111.67
						Total	**957.91**
24	C3/13b	Rehandling of earth work upto lead of 50'.	1				4424.06
25	C-3/24	(ii) Compaction of earth work. (a) Mixing, moistening earth to optimum moisture content in layers for compaction etc. complete.					4424.06

COST ESTIMATE

IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA CITY

Sub Head # A: Construction of screening Chamber:

S#	Ref. CSR P/Item	Description	Unit	Quantity	Rate	Amount
1	C-26-35	Bailing out water:-				
		b) by pump	1000 Cft	126,170.00	1,037.95	130,958.15
3	C-22/1	Excavation of well in dry upto 20' (6 metre) below ground level, and disposal of soil within one chain (30 metre).				
		0' to 5.0 ft. Depth	1000 Cft.	2605.51	9,650.70	25,144.97
		5.01' to 10.0 ft. Depth	1000 Cft.	2194.33	10,079.30	22,117.34
		10.01' to 15.0 ft. Depth	1000 Cft.	1818.55	11,339.20	20,620.92
6	C6-1-5	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone aggregate).				
		Ratio (1:3:6)	100 Cft.	120.85	38,182.80	46,145.42
9	C6-1-6	P/L reinforced cement concrete (including prestressed concrete), using coarse sand and aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing,rendering and finishing exposed surface, complete.				
		(a) Reinforced cement concrete in slab of Raft/strip foundation; base slab of column and retaining walls; etc. and other structural members other than those mentioned in 5(a) (i) above not requiring from work, complete in all respects:-				
		Ratio 1:2:4	P.Cft	393.65	538.30	211,899.10
		(a) (i) Reinforced cement concrete in roof slab, beams, columns, lintels, girders and other structural members laid in situ or precast laid in position, or prestressed members cast in situ, complete in all respects:-				
		(3) Type C (nominal mix 1:2:4)	P.Cft	64.83	674.30	43,712.17
10	C-6/12	Fabrication of mild steel reinforcement for cement concrete including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust).				
		(b) deformed bars. 60 grade	100 Kg	1375.41	35,068.45	482,336.01
11	C-7/7	Pucca brick work other then building:-				
		(i) Cement sand mortar 1:3	100 Cft	1915.25	35,504.50	680,000.70
12	C-7/10	Extre for circular massonery				
		Quantity as per circular massonery in above item	100 Cft	1915.25	3,145.20	60,238.51
13	C-11/1-8	Cement plaster 1:3 upto 20' height.				
		b) 1/2" thick.	100 Sft	2514.40	4,132.80	103,915.16
14	C-21/13	Providing and fixing 1¼"x1¼"x3/16" (31x31x5 mm) angle iron step, in manhole chambers, including carriage and setting the same in work to correct lines and levels.	1 No	15.00	700.50	10,507.50
15	C-13/19	Bitumen coating to plastered or cement concrete surfaces.				
		(i) 20 lbs per 100 sq.ft.	100 Sft	1026.88	2,697.05	27,695.33
16	C-6/1-5	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone aggregate).				
		Ratio (1:1.5:3)	100 Cft	133.48	49,884.00	66,584.37

S#	Ref. CSR P/Item	Description	Unit	Quantity	Rate	Amount
17	C-21/16	RPC Manhole Cover Manufactured with 100% Recycled Plastic Composite Material, 650 mm (26"dia) with clear opening size 600 mm (22" dia) and RPC manhole frame having dia meter 790 mm (31.1") with average breaking load	1 No	1.00	21,280.75	21,280.75
18	C-6/30	Providing & fixing 12" (150mm) wide G.I 18 SWG stopper to expansion joint.	1 Rft	154.50	222.85	34,430.33
19	C-25/39	Providing and fixing stair railing of 2 1/2" (63mm) i/d G.I pipe, welded with 5/8"x5/8" (16x16) square M.S Bars 2'-9" (838 mm) high, fixed in each step, complete in all respects, including painting, polishing three coats.	Per Rft	55.65	2,248.90	125,151.29
20	N.S	**Penstock outer size 48"x48"** Supply Installation and commissioning of Penstock size 4'x4' comprises of following parts:- (i) Stainless Steel "U" guide channel length 9ft thickness 16 SWG channel size 3". (ii) Gate frame shall be cast iron steel using 1" thick enforcement ribs 2"x1/2" plate supported with 1.5" x 1" around the plate and across the plate. (iii) Gate frame equipped with rubber channel and rubber mate to control water flow / speege. (iv) Lifting & lowering and lifted through gear head motor operated, spindle length 22' spindle 2.50" dia mounted over the slab and shall be operated auto / manually.	1 Job	1.00	2,092,500.00	2,092,500.00
21	C25/10	Fabrication of heavy steel work, with angl, tees, flat iron, rounded iron and sheet iron for making trasses, girders, tanks etc. including cutting, drilling, revetting, handling, amembling and fixing but excluding errection in position.	100 Kg	1334.00	38861.65	518,414.41
22	C25/11	Erection in position iron trasses, staging of water tank etc.	100 Kg	1334.00	1634.10	21,798.89
23	C-1/1	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl, kankar lime (unslaked), surkhi, etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor. (Ch.No. 1, Item.No. 1)	100 Cft	957.91	10918.32	104,587.33
24	C3/13b	Rehandling of earth work upto lead of 50'.	1000 Cft.	4424.06	4546.10	20,112.22
25	C-3/24(a)	(ii) Compaction of earth work. (a) Mixing, moistening earth to optimum moisture content in layers for compaction etc. complete.	1000 Cft	4424.059809	1541.85	6,821.24
					Total:- (Rs.)	**4,876,972.12**
					Say Rs.	**4,876,972.00**

QUANTITY SHEET

IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA CITY

Sub Head # B: Construction of Wet Well:

S #	Ref Sor Item/Page	Description	No.	Measurements			Quantity
				L	B	H	
1	C-22/1	Excavation of well in dry upto 20' (6 metre) below ground level, and disposal of soil within one chain 30 metre.					
		0' to 5.0 ft. Depth **(Sami circular area)**	1	3.14x45x45x0.25		5.00	7948.13
		5.01' to 10.0 ft. Depth	1	3.14x43x43x0.25		5.00	7257.33
	C-22/2	Dry sinking of well, including loading, and removing excavated material within one chain (30 m):-					
		0' to 5.0 ft. Depth	1	3.14x40x40x0.25		5.00	6280.00
		5.01' to 10.0 ft. Depth	1	3.14x40x40x0.25		5.00	6280.00
		10.01' to 15.0 ft. Depth	1	3.14x40x40x0.25		5.00	6280.00
		15.01' to 20.0 ft. Depth	1	3.14x40x40x0.25		3.00	3768.00
	C-21/23	Providing and laying crushed stone aggregate of 1/4" to 1" guage under and around the sewer pipe, including leveling, manual compaction, complete in all respects	1	3.14x39x39x0.25		2.50	2984.96
11	C6-1-5	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone aggregate).					
		Ratio (1:3:6)	1	3.14x35*35*0.25		0.75	721.22
	C25/ I 10	Fabrication of heavy steel work, with angl, tees, flat iron, rounded iron and sheet iron for making trasses, girders, tanks etc. including cutting, drilling, revetting, handling, amembling and fixing but excluding errection in position (of drawing).					
		Angle iron 3"x3"x3/8" for cutting edge	1	128.74	9.37		1206.29
	C25/ I 11	Erection in position iron trasses, staging of water tank etc.					1206.29
2	C6-1-6	P/L reinforced cement concrete (including prestressed concrete), using coarse sand and aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing,rendering and finishing exposed surface, complete.					
		(a) Reinforced cement concrete in slab of Raft/strip foundation; base slab of column and retaining walls; etc. and other structural members other than those mentioned in 5(a) (i) above not requiring from work, complete in all respects:-					
		Ratio 1:1.5:3					
		Core Wall	1	3.14x36.5	0.75	20.75	1783.62
		Bed of wet well	1	3.14x35.25x35.25x0.25		1.50	1463.12
						Total	**3246.74**
		(a) (i) Reinforced cement concrete in roof slab, beams, columns, lintels, girders and other structural members laid in situ or precast laid in position, or prestressed members cast in situ, complete in all respects:-					
		Ratio 1:1.5:3					
		Curve Angle	1	3.14x37.75	2.75	1.00	325.97
			1	3.14x37.75	(2.75+0.75)/2	2.75	570.45
						Total	**896.42**
							4143.16
3	C-6/12	Fabrication of mild steel reinforcement for cement concrete including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust).					
		(b) deformed bars.		1x4143.16x3			12429.47
4	C-7/7	Pucca brick work other then building:-					
		(i) Cement sand mortar 1:3					
		Circular masonry					
		Outer wall	1	3.14x38.75	0.75	20.75	1893.57
		Inner Wall	1	3.14x35.75	0.75	20.75	1746.97
		Wall above NSL	1	3.14x36.875	1.875	3.00	651.30
			1	3.14x36.50	1.500	3.00	515.75
			1	3.14x36.125	1.125	4.00	510.45
						Total	**5318.03**
		Deduction					
		Pipe	1	$3.14x(4.25)^2x0.25$	1.50		21.27
						Total	**21.27**
						Net	**5296.76**

S #	Ref Sor Item/Page	Description	No.	Measurements			Quantity
				L	B	H	
5	C-7/10	Extre for circular massonery					5296.76
6	C-11/9	Cement plaster 1:3 upto 20' height.					
		b) 1/2" thick.					
		Circular masonry					
		Outer wall	1	3.14x39.50		20.75	2573.62
		Inner Wall	1	3.14x35		30.75	3379.43
		Wall above NSL	1	3.14x38.75		3.00	365.03
			1	3.14x38		3.00	357.96
			1	3.14x37.25		4.00	467.86
						Total	**7143.89**
		Pipe	1	3.14x(4.25)/2x0.25			14.18
						Net	**7129.71**
7	C-21/13	Providing and fixing 1¼"x1¼"x3/16" (31x31x5 mm) angle iron step, in manhole chambers, including carriage and setting the same in work to correct lines and levels.	27				27.00
8	C-13/9	Bitumen coating to plastered or cement concrete surfaces.					
		(i) 20 lbs per 100 sq.ft.	1	3.14x41		23.75	3057.58
			1	3.14x38.75		3.00	365.03
			1	3.14x38		3.00	357.96
			1	3.14x37.25		4.00	467.86
						Total	**4248.42**
11	C6-1-5	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone aggregate).					
		Ratio (1:2:4)	1	3.14x35*35*0.25		0.25	240.41
12	C-6/30	Providing & fixing 12" (150mm) wide G.I 18 SWG stopper to expansion joint.	4	113.43			453.72
13	C-25/39	Providing and fixing stair railing of 2 1/2" (63mm) i/d G.I pipe, welded with 5/8"x5/8" (16x16) square M.S Bars 2'-9" (838 mm) high, fixed in each step, complete in all respects, including painting, polishing three coats.	1	3.14x35.50			111.47
16		Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl, kankar lime (unslaked), surkhi, etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor.					
		(Ch.No. 1, Item.No. 1)					
		Ratio (1:2.4)	1	240.41	0.88		211.56
		Ratio (1:1.5.3)	1	4143.16	0.84		3480.25
		Ratio (1:3.6)	1	721.22	0.92		666.41
						Total	**4358.22**
17	C3/13b	Rehandling of earth work upto lead of 50'.	1				37813.45
18	C-3/24	(ii) Compaction of earth work.					
		(a) Mixing, moistening earth to optimum moisture content in layers for compaction etc. complete.					37813.45

COST ESTIMATE

IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA CITY

Sub Head # B: Construction of Wet Well:

S#	Ref. CSR P/Item	Description	Unit	Quantity	Rate	Amount
1	C-22/1	Excavation of well in dry upto 20' (6 metre) below ground level, and disposal of soil within one chain (30 metre).				
		0' to 5.0 ft. Depth	1000 Cft.	7948.13	9,650.70	76,704.97
		5.01' to 10.0 ft. Depth	1000 Cft.	7257.33	10,079.30	73,148.76
	C-22/2	Dry sinking of well, including loading, and removing excavated material within one chain (30 m):-				
		0' to 5.0 ft. Depth	1000 Cft.	6280.00	51,955.20	326,278.66
		5.01' to 10.0 ft. Depth	1000 Cft.	6280.00	64,944.00	407,848.32
		10.01' to 15.0 ft. Depth	1000 Cft.	6280.00	77,932.80	489,417.98
		15.01' to 20.0 ft. Depth	1000 Cft.	3768.00	90,921.60	342,592.59
	C-21/23	Providing and laying crushed stone aggregate of 1/4" to 1" guage under and around the sewer pipe, including leveling, manual compaction, complete in all respects	100 Cft.	2984.96	11,437.20	341,396.13
	C6-1-5	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone aggregate).				
		Ratio (1:3:6)	100 Cft.	721.22	38,182.80	275,381.51
13	C25/ I 10	Fabrication of heavy steel work, with angl, tees, flat iron, rounded iron and sheet iron for making trasses, girders, tanks etc. including cutting, drilling, revetting, handling, amembling and fixing but excluding errection in position.	100 Kg	1206.29	38,861.65	468,785.67
14	C25/11	Erection in position iron trasses, staging of water tank etc.	100 Kg	1206.29	1,634.10	19,712.05
3	C6-1-6	P/L reinforced cement concrete (including prestressed concrete), using coarse sand and aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing,rendering and finishing exposed surface, complete.				
		(a) Reinforced cement concrete in slab of Raft/strip foundation; base slab of column and retaining walls; etc. and other structural members other than those mentioned in 5(a) (i) above not requiring from work, complete in all respects:-				
		Ratio 1:1.5:3	P.Cft	3246.74	597.40	1,939,599.77
		(a) (i) Reinforced cement concrete in roof slab, beams, columns, lintels, girders and other structural members laid in situ or precast laid in position, or prestressed members cast in situ, complete in all respects:-				
		Ratio 1:1.5:3	P.Cft	896.42	733.45	657,479.94
4	C-6/12	Fabrication of mild steel reinforcement for cement concrete including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust).				
		(b) deformed bars. 60 grade	100 Kg	12429.47	35,068.45	4,358,822.20
5	C-7/7	Pucca brick work other then building:-				
		(i) Cement sand mortar 1:3	100 Cft	5296.76	35,504.50	1,880,589.21
6	C-7/10	Extre for circular massonery				
		Quantity as per circular massonery in above item	100 Cft	5296.76	3,145.20	166,593.79
7	C-11/1-8	Cement plaster 1:3 upto 20' height.				
		b) 1/2" thick.	100 Sft	7129.71	4,132.80	294,656.80
8	C-21/13	Providing and fixing 1¼"x1¼"x3/16" (31x31x5 mm) angle iron step, in manhole chambers, including carriage and setting the same in work to correct lines and levels.	1 No	27.00	700.50	18,913.50
9	C-13/1-9	Bitumen coating to plastered or cement concrete surfaces.				
		(i) 20 lbs per 100 sq.ft.	100 Sft	4248.42	2,697.05	114,582.01
10	C-6/1-5	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone aggregate).				
		Ratio (1:2:4)	100 Cft	240.41	43,837.20	105,387.37
11	C-6/30	Providing & fixing 12" (150mm) wide G.I 18 SWG stopper to expansion joint.	1 Rft	453.72	222.85	101,111.50
12	C-25/39	Providing and fixing stair railing of 2 1/2" (63mm) i/d G.I pipe, welded with 5/8"x5/8" (16x16) square M.S Bars 2'-9" (838 mm) high, fixed in each step, complete in all respects, including painting, polishing three coats.	Per Rft	111.47	2,248.90	250,684.88

S#	Ref. CSR P/Item	Description	Unit	Quantity	Rate	Amount
15	C-1/1	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl, kankar lime (unslaked), surkhi, etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor. (Ch.No. 1, Item.No. 1)	100 Cft	4358.22	10,918.32	475,843.69
16	C3/13b	Rehandling of earth work upto lead of 50'.	1000 Cft.	37813.45	4,546.10	171,903.73
17	C-3/24(a)	(ii) Compaction of earth work. (a) Mixing, moistening earth to optimum moisture content in layers for compaction etc. complete.	1000 Cft	37813.45	1,541.85	58,302.67
					Total:- (Rs.)	**13,415,737.68**
					Say Rs.	**13,415,738.00**

QUANTITY SHEET

IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA CITY

Sub Head # C: Construction of pump house:

S #	Ref Sor Item/Page	Description	No.	Measurements L	B	H	Quantity
1	C-22/1	Excavation of well in dry upto 20' (6 metre) below ground level, and disposal of soil within one chain 30 metre.					
		0' to 5.0 ft. Depth **(Sami circular area)**	0.5x2	3.14x34x34x0.25		5.00	4537.30
			1	34.00	34.00	5.00	5780.00
						Total	**10317.30**
		5.01 to 10ft. Depth	0.5x2	3.14x32.5x32.5x0.25		3.00	2487.47
			1	32.50	32.50	3.00	3168.75
						Total	**5656.22**
2	C-22/2	Dry sinking of well, including loading, and removing excavated material within one chain (30 m):-					
		0' to 5.0 ft. Depth	0.5x2	3.14x29x29x0.25		5.00	3300.93
			1	28.00	29.00	5.00	4060.00
							7360.93
		5.01' to 10.0 ft. Depth	0.5x2	3.14x29x29x0.25		5.00	3300.93
			1	28.00	29.00	5.00	4060.00
							7360.93
		10.01' to 15.0 ft. Depth	0.5x2	3.14x29x29x0.25		2.00	1320.37
			1	28.00	29.00	2.00	1624.00
							2944.37
							17666.22
3	C-21/23	Providing and laying crushed stone aggregate of 1/4" to 1" guage under and around the sewer pipe, including leveling, manual compaction, complete in all respects	0.5x2	3.14x27x27x0.25		3.25	1859.86
			1	28.00	29.00	3.25	2639.00
							4498.86
4	C6-1-5	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone aggregate).					
		Ratio (1:3:6)	0.5x2	3.14x22x22x0.25		0.50	189.97
			1	28.00	22.00	0.50	308.00
							497.97
5	C25/ I 10	Fabrication of heavy steel work, with angl, tees, flat iron, rounded iron and sheet iron for making trasses, girders, tanks etc. including cutting, drilling, revetting, handling, amembling and fixing but excluding errection in position (of drawing).					
		Angle iron 3"x3"x3/8" for cutting edge	1	133.72	9.37		1252.96
6	C25/ I 11	Erection in position iron trasses, staging of water tank etc.					1252.96
7	C6-1-6	P/L reinforced cement concrete (including prestressed concrete), using coarse sand and aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing,rendering and finishing exposed surface, complete. (a) Reinforced cement concrete in slab of Raft/strip foundation; base slab of column and retaining walls; etc. and other structural members other than those mentioned in 5(a) (i) above not requiring from work, complete in all respects:-					
		Ratio 1:1.5:3					
		Core Wall	0.5x2	3.14x24.25	0.75	24.25	1384.89
			2	28.00	0.75	24.25	1018.50
		Bed of wet well	0.5x2	3.14x22x22x0.25		1.00	379.94
			1	28.00	22.00	1.00	616.00
		Foundation	4	5.00	5.00	1.50	150.00
						Total	**3549.33**
		(a) (i) Reinforced cement concrete in roof slab, beams, columns, lintels, girders and other structural members laid in situ or precast laid in position, or prestressed members cast in situ, complete in all respects:-					
		Ratio 1:1.5:3					
		Curve	2x0.5	3.14x25	2.75	1.00	215.88
			2x0.5	3.14x25	(2.75+0.75)/2	2.50	343.44
		Straight portion	2	28.00	2.75	1.0	154.00
			2	28.00	(2.75+0.75)/2	2.50	245.00
		Column from ground floor to roof	8	1.50	1.50	39.00	702.00
		stub for gentry rail beam	4	1.50	1.00	1.00	6.00
			4	1.50	0.50	1.00	3.00
		Stair	1	47.50	3.50	0.42	69.83
			1	40.00		0.55	22.00
						Total	**1761.14**

S #	Ref Sor Item/Page	Description	No.	Measurements			Quantity
				L	B	H	
		Ratio 1:2:4					
		Pump House Beem	4	25.25	1.25	1.75	220.94
		Pump House Roof	0.5x2	3.14x26.50x26.50x0.25		0.75	413.45
			1	28.00	26.50	0.75	556.50
		Roof Beem	4	26.50	1.25	1.25	165.63
		Tie Beam at level of 10 ft.	2	30.00	0.75	1.00	45.00
			0.5x2	3.14x26.5	0.75	1.00	62.41
		Gentery Crane Beam	2	30.00	1.00	1.50	90.00
		Ground floor roof	0.5x2	3.14x28.50x28.50x0.25		0.50	318.81
			1	28.00	27.75	0.50	388.50
		Beams	4	26.50	1.00	1.00	106.00
		Parapit	1	140.78	0.33	1.00	46.46
							2413.69
8	C-6/12	Fabrication of mild steel reinforcement for cement concrete including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust).					
		(b) deformed bars.			1x7724.15x3		23172.45
9	C-7/7	Pucca brick work other then building:-					
		(i) Cement sand mortar 1:3					
		Circular masonry pump house					
		Outer wall	0.5x2	3.14x25.75	0.75	24.25	1470.55
			2	28.00	0.75	24.25	1018.50
		Inner Wall	0.5x2	3.14x22.75	0.75	24.25	1299.22
			2	28.00	0.75	24.25	1018.50
		Ground Floor					
		Wall	0.5x2	3.14x23.875	0.75	14.25	801.22
			2	28.00	0.75	14.25	598.50
						Total	**6206.49**
		Deduction					
		Opening					
		Gates	1	10.50	0.750	9.00	70.88
			7	4.00	0.75	6.0	126.00
						Total	**196.88**
						Net	**6009.61**
10	C-7/10	Extre for circular massonery					6009.61
11	C-11/9	Cement plaster 1:3 upto 20' height.					
		b) 1/2" thick.					
		Pump House					
		Circular masonry					
		Outer wall	0.5x2	3.14x26.5		24.25	2017.84
			2	28.00		24.25	1358.00
		Inner Wall	0.5x2	3.14x22		24.25	1675.19
			2	28.00		24.25	1358.00
		Ground floor					
		Wall	0.5x2	3.14x25		14.25	1118.63
			4	28.00		14.25	1596.00
						Total	**9123.66**
		Deduction					
		Opening					
		Gates	4	10.50		9.00	378.00
			7	4.00		6.00	168.00
						Total	**546.00**
						Net	**8577.66**
12	C-13/9	Bitumen coating to plastered or cement concrete surfaces.					
		(i) 20 lbs per 100 sq.ft.	0.5x2	3.14x26.5		27.75	2309.08
			2	28.00		27.75	1554.00
						Total	**3863.08**
13	C6-1-5	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone aggregate).					
		Ratio (1:2:4)	0.5x2	3.14x23*23*0.25		0.50	207.63
			1	28.00	22.00	0.50	308.00
			0.5x2	3.14x22*22*0.25		0.25	94.99
			1	28.00	22.00	0.25	154.00
						Total	**764.62**

S #	Ref Sor Item/Page	Description	No.	Measurements			Quantity
				L	B	H	
14	C-1/1	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl, kankar lime (unslaked), surkhi, etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor. (Ch.No. 1, Item.No. 1)					
		Ratio (1:2.4)	1	3178.30	0.88		2796.91
		Ratio (1:1.5.3)	1	5310.46	0.84		4460.79
		Ratio (1:3:6)	1	497.97	0.92		460.12
						Total	**7717.82**
15	C3/13b	Rehandling of earth work upto lead of 50'.	1				33639.74
16	C-3/24	(ii) Compaction of earth work.					
		(a) Mixing, moistening earth to optimum moisture content in layers for compaction etc. complete.					33639.74
17	C-9/20	Cast iron rain water down pipe fixed in position, excluding heads and shoes, but including painting and clamps, etc.:-					
		(a) 4" dia cast iron down pipe.	2	15.00			30.00
18	C-9/21	Rain water down pipe cast iron head fixed in place, including cost of clamp holdfast and painting.	2	2.00			4.00
19	C-9/22	Shoes, bends or offsets for cast iron rain water down pipe, including fixing and painting.	2	2.00			4.00
20	C-10/37	Mosaic skirting with one part of cement and marble powder in the ratio of 3:1 and two parts of marble chips, laid over 1/2" thick cement plaster 1:3, including rubbing and polishing, complete with finishing:					
		(a) Using grey cement					
		(ii) 1/2" thick	2	133.72	0.50		133.72
21	C-10/22(a)	1-1/2" thick mosaic flooring consisting of 1/2" mosaic toping of one part of cement and marble powder in the ratio of 3:1 and two parts of marble chips, laid over 1" thick floor of 1:2:4 cement concrete including rubbing and polishing complete with finish					
		(a) Using grey cement	0.5x2	3.14x22*22*0.25			379.94
			2	28.00	22.00		1232.00
			0.5x2	3.14x23*23*0.25			415.27
			2	28.00	22.00		1232.00
						Total	**3259.21**
22	C-7/32	First class brick tiles lead by laying tiles in strecher course in cement sand mortar reinforced with 18 SWG hoop iron strips placed at 2' apart horizontally and 1' interval vertically in 1:3 ratio.	1	86.35	22.00		1899.70
23	C-10/39	P/F glass strip 5 mm thick and 1-1/2" wide for dividing the mosaic flooring into panesl approximate size (3'x3').	14	22.00			308.00
			5	68.00			340.00
							648.00
24	C-9/15	Khuras on roof 2'x2'x6"	2				2.00
25	C-13/5	Preparing surface and painting of doors & windows, guard bar gates etc.					
		i) Priming coat	2	10.00		9.0	180.00
		ii) Each subsequent coat of paint (two coats).	7	4.00		6.0	168.00
							348.00
		ii) Each subsequent coat of paint (two coats).		Qty as above			348.00
26	C-25/32	Making and fixing grating in opening, including fixing at site with flat iron 2"x3/8" and 3/4" square bars, at 4" centre to centre.	7	4.00		6.0	168.00
27	C-9/5	Single laying of tiles 9"x4-12"x1-1/2" laid over 4" earth and 1" mud plaster without bhoosa grouted with cement sand 1:3 on top or R.C.C. roof slab, provided with 34 lbs. Bitumen coating sand blinded.	0.5x2	3.14x25*25*0.25			490.63
			2	28.00	24.00		1344.00
						Total	**1834.63**
28	C-11/22	Priming coat of chalk under distemper.	1	3.14x22		33.50	2314.18
			1	28.00		33.50	938.00
						Total	**3252.18**
29	C-11/23(a)	Distempering.					
		(iii) 3 coats.	1	3.14x22		33.50	2314.18
			1	28.00		33.50	938.00
						Total	**3252.18**

S #	Ref Sor Item/Page	Description	No.	Measurements			Quantity
				L	B	H	
30	C-13/32	Prepare surface and painting with water proof coloured cement finish like duracem, buxeem or other finished with similar specifications on walls etc.					
		(a) New surface					
		(b) Ist Coat	1	3.14x26.5		15.00	1248.15
		(c) 2nd and subsequent coat	2	28.00		15.00	840.00
						Total	**2088.15**
31	C-25/41	P/F steel windows with openable glazed pannels, using mild steel box sections 1-1/2"x1-1/2"x18 SWG glass panels, M.S channel 1/2"x1/2"x1/16" duly screwed with leaves, & filled with rubber felt in between glass & M.S channel brass fittings, holdfast, duly					
		(a) Fixed with wire gauze, 22 SWG & glass pane 5 mm thick.	7	4.00		6.0	168.00
32	C-25/30	Making and fixing steel grated doors complete with locking arrangement, angle iron frame 2"x2"x3/8" and 3/4" square walls 4" center to center.	1	10.00		10.0	100.00
33	N.S	Providing and installation of Ganti crane of 10-ton capacity with steel roap of of 3/4" dia 100 Rft, M.S girder 10"x24"x1/2" of 23ft long cast also includes both side M.S railing of suitable size to be fixed an R.C.C beam bolting clumping complete in all respect, shipment document should be provided is client before payment.	1				1.00

COST ESTIMATE

IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA CITY

Sub Head # C: Construction of pump house:

S#	Ref. CSR P/Item	Description	Unit	Quantity	Rate	Amount
1	C-22/1	Excavation of well in dry upto 20' (6 metre) below ground level, and disposal of soil within one chain (30 metre).				
		0' to 5.0 ft. Depth	1000 Cft.	10317.30	9,650.70	99,569.17
		5.01' to 10.0 ft. Depth	1000 Cft.	5656.22	10,079.30	57,010.73
2	C-22/2	Dry sinking of well, including loading, and removing excavated material within one chain (30 m):-				
		0' to 5.0 ft. Depth	1000 Cft.	7360.93	51,955.20	382,438.33
		5.01' to 10.0 ft. Depth	1000 Cft.	7360.93	64,944.00	478,047.91
		10.01' to 15.0 ft. Depth	1000 Cft.	2944.37	77,932.80	229,463.00
3	C-21/23	Providing and laying crushed stone aggregate of 1/4" to 1" guage under and around the sewer pipe, including leveling, manual compaction, complete in all respects	100 Cft.	4498.86	11,437.20	514,543.76
4	C6-1-5	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone aggregate).				
		Ratio (1:3:6)	100 Cft.	497.97	38,182.80	190,138.89
5	C25/ I 10	Fabrication of heavy steel work, with angl, tees, flat iron, rounded iron and sheet iron for making trasses, girders, tanks etc. including cutting, drilling, revetting, handling, amembling and fixing but excluding errection in position.	100 Kg	1252.96	38,861.65	486,919.53
6	C25/11	Erection in position iron trasses, staging of water tank etc.	100 Kg	1252.96	1,634.10	20,474.56
7	C6-1-6	P/L reinforced cement concrete (including prestressed concrete), using coarse sand and aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing,rendering and finishing exposed surface, complete.				
		(a) Reinforced cement concrete in slab of Raft/strip foundation; base slab of column and retaining walls; etc. and other structural members other than those mentioned in 5(a) (i) above not requiring from work, complete in all respects:-				
		Ratio 1:1.5:3	P.Cft	3549.33	597.40	2,120,368.06
		(a) (i) Reinforced cement concrete in roof slab, beams, columns, lintels, girders and other structural members laid in situ or precast laid in position, or prestressed members cast in situ, complete in all respects:-				
		Ratio 1:1.5:3	P.Cft	1761.14	733.45	1,291,706.30
		Ratio 1:2:4	P.Cft	2413.69	674.30	1,627,547.94
8	C-6/12	Fabrication of mild steel reinforcement for cement concrete including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust).				
		(b) deformed bars. 60 grade	100 Kg	23172.45	35,068.45	8,126,218.94
9	C-7/7	Pucca brick work other then building:-				
		(i) Cement sand mortar 1:3	100 Cft	6009.61	35,504.50	2,133,683.59
10	C-7/10	Extre for circular massonery				
		Quantity as per circular massonery in above item	100 Cft	6009.61	3,145.20	189,014.40
11	C-11/1-8	Cement plaster 1:3 upto 20' height.				
		b) 1/2" thick.	100 Sft	8577.66	4,132.80	354,497.43
12	C-13/1-9	Bitumen coating to plastered or cement concrete surfaces.				
		(i) 20 lbs per 100 sq.ft.	100 Sft	3863.08	2,697.05	104,189.13
13	C-6/1-5	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone aggregate).				
		Ratio (1:2:4)	100 Cft	764.62	43,837.20	335,186.90
14	C-1/1	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl, kankar lime (unslaked), surkhi, etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor.				
		(Ch.No. 1, Item.No. 1)	100 Cft	7717.82	10,918.32	842,656.09
15	C3/13b	Rehandling of earth work upto lead of 50'.	1000 Cft.	33639.74	4,546.10	152,929.62
16	C-3/24(a)	(ii) Compaction of earth work.				
		(a) Mixing, moistening earth to optimum moisture content in layers for compaction etc. complete.	1000 Cft	33639.74	1,541.85	51,867.43

S#	Ref. CSR P/Item	Description	Unit	Quantity	Rate	Amount
17	C-9/20	Cast iron rain water down pipe fixed in position, excluding heads and shoes, but including painting and clamps, etc.:-				
		(a) 4" dia cast iron down pipe.	Rft.	30.00	500.00	15,000.00
18	C-9/21	Rain water down pipe cast iron head fixed in place, including cost of clamp holdfast and painting.	No.	4.00	1,258.20	5,032.80
19	C-9/22	Shoes, bends or offsets for cast iron rain water down pipe, including fixing and painting.	No.	4.00	666.00	2,664.00
20	C-10/38	Mosaic skirting with one part of cement and marble powder in the ratio of 3:1 and two parts of marble chips, laid over 1/2" thick cement plaster 1:3, including rubbing and polishing, complete with finishing:				
		(a) Using grey cement				
		(ii) 1/2" thick	100 Sft	133.72	28,238.40	37,760.39
21	C-10/22(a)	1-1/2" thick mosaic flooring consisting of 1/2" mosaic toping of one part of cement and marble powder in the ratio of 3:1 and two parts of marble chips, laid over 1" thick floor of 1:2:4 cement concrete including rubbing and polishing complete with finish				
		(a) Using grey cement	100 Sft	3259.21	25,985.25	846,912.57
22	C-7/31	First class brick tiles lead by laying tiles in strecher course in cement sand mortar reinforced with 18 SWG hoop iron strips placed at 2' apart horizontally and 1' interval vertically in 1:3 ratio.	100 Sft	1899.70	19,106.35	362,963.33
23	C-10/39	P/F glass strip 5 mm thick and 1-1/2" wide for dividing the mosaic flooring into panesl approximate size (3'x3').	P/Rft.	648.00	7.90	5,119.20
24	C-9/15	Khuras on roof 2'x2'x6"	Each.	2.00	1,036.65	2,073.30
25	C-13/5c	Preparing surface and painting of doors & windows, guard bar gates etc.				
		i) Priming coat	100 Sft	348.00	1,063.80	3,702.02
		ii) Each subsequent coat of paint (two coats).	100 Sft	348.00	1,480.20	5,151.10
26	C-25/32	Making and fixing grating in opening, including fixing at site with flat iron 2"x3/8" and 3/4" square bars, at 4" centre to centre.	P/Sft.	168.00	1,139.80	191,486.40
27	C-9/5	Single laying of tiles 9"x4-12"x1-1/2" laid over 4" earth and 1" mud plaster without bhoosa grouted with cement sand 1:3 on top or R.C.C. roof slab, provided with 34 lbs. Bitumen coating sand blinded.	100 Sft	1834.63	12,818.25	235,166.82
28	C-11/22	Priming coat of chalk under distemper.	100 Sft	3252.18	348.00	11,317.59
29	C-11/23(a)	Distempering.				
		(iii) 3 coats.	100 Sft	3252.18	1,665.90	54,178.07
30	C-13/32	Prepare surface and painting with water proof coloured cement finish like duracem, buxeem or other finished with similar specifications on walls etc.				
		(a) New surface				
		(b) Ist Coat	100 Sft	2088.15	1,024.30	21,388.92
		(c) 2nd and subsequent coat	100 Sft	2088.15	1,649.30	34,439.86
31	C-25/41	P/F steel windows with openable glazed pannels, using mild steel box sections 1-1/2"x1-1/2"x18 SWG glass panels, M.S channel 1/2"x1/2"x1/16" duly screwed with leaves, & filled with rubber felt in between glass & M.S channel brass fittings, holdfast, duly				
		(a) Fixed with wire gauze, 22 SWG & glass pane 5 mm thick.	P Sft	168.00	1,393.10	234,040.80
32	C-25/30	Making and fixing steel grated doors complete with locking arrangement, angle iron frame 2"x2"x3/8" and 3/4" square walls 4" center to center.	P Sft	100.00	2,331.35	233,135.00
33	N.S	Providing and installation of Ganti crane of 10-ton capacity with steel roap of of 3/4" dia 100 Rft, M.S girder 10"x24"x1/2" of 23ft long cast also includes both side M.S railing of suitable size to be fixed an R.C.C beam bolting clumping complete in all respect, shipment document should be provided is client before payment.	Each	1.00	15,470,000.00	15,470,000.00
					Total	**37,560,003.85**
					Say Rs.	**37,560,004.00**

QUANTITY FOR SEWER

IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA CITY

Sub Head # D: Providing and Laying R.C.C. Pipe 42" dia:

S.No.	Detail of Item/Work	No.	Measurements			Quantity
			L	B	H	
1	Earth work excavation in open cutting for sewers and manholes as shown in drawings including shuttering and timbering, dressing to correct sections and dimensions according to templates and levels, and removng surface water, in all types of soil except shingle gravel and rock.					
	0-7' depth					
	42"	1	30.00	12.00	7.00	2520.00
	9"	1	210.00	3.00	5.00	3150.00
						5670.00
	7-15' depth					
	42"	1	30.00	10.00	8.00	2400.00
						8070.00
2	Providing and Laying R.C.C. pipe sewer moulded with cement concrete 1:1.5:3 conforming to ASTM specification C-76-79, Class-III, Wall-B, including carriage of pipe from factory to site of wor, lowering in trenches to correct alignment and grade, jointing with rubber ring, cutting pipes where necessary, testing etc. complete.					
	42" i/d.		30.00	-	-	30.00
3	Providing and Laying R.C.C. pipe sewer moulded with cement concrete 1:1.5:3 conforming to BS5911 specification , Class-L, Wall-B, including carriage of pipe from factory to site of wor, lowering in trenches to correct alignment and grade, jointing with rubber ring, cutting pipes where necessary, testing etc. complete.					
	9" i/d.	1	210.00			210.00
4	(i) Rehandling of earth work.					
	(a) Lead upto a single throw of Kassi, phaorah or shovel.		8070.00	-	-	8070.00
	(ii) Compaction of earth work.					
	(a) Mixing, moistening earth to optimum moisture content in layers for compaction etc. complete.		8070.00	-	-	8070.00
5	Providing and laying crushed stone aggregate of 1/4" to 1" guage under and around the sewer pipe, including leveling, manual compaction, complete in all respects					
	60" i/d.	1	30.00	6.25	3.00	562.50
	Deduction	1	30.00	0.5*3.14*4.25*4.25*0.25		212.69
					Net	**349.81**
6	Providing and laying sand under and around the sewer pipe, including leveling, manual compaction, complete in all respect.					
			210.00	1.48		310.80
7	Making connection with screening chamber and wet well including dismentling of brick work and RCC core wall, erection and position and PCC block 6'x6'x2' complete in all respect.					
		3				3.00

QUANTITY FOR MANHOLE

IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA CITY

Sub Head # D: Providing and Laying R.C.C. Pipe 42" dia:

S #	Name of Work			Nos.	Qty. of each Chamber	T.Quantity
1	Earth work excavation in open cutting for sewers and manholes as shown in drawings including shuttering and timbering, dressing to correct sections and dimensions according to templates and levels, and removng surface water, in all types of soil except shingle gravel and rock.					
	0-7'ft. Depth.	9" dia		6	225.00	1350.00
2	Dry rammed brick or stone ballast 1-1/2" to 2" (40mm to 50mm) gauge.	9" dia		6	16.50	99.00
3	Cement concrete plain including, placing compacting finishing and curing complete (including screening and washing of stone aggregate).					
	Ratio 1:3:6	9" dia		6	16.58	99.48
	Ratio 1:2:4	9" dia		6	18.58	111.48
4	Pucca brick work other than building upto 10' height Cement sand mortar Ratio 1:3.	9" dia		6	48.53	291.18
5	Extra for pucca brick work in stening of wells or any other circular masonary.					291.18
6	Extra for making and finishing benching floor work in manhole chamber 1/8" (3mm) thick cement finish.	9" dia		6	12.56	75.36
7	Providing and fixing 1¼"x1¼"x3/16" (31x31x5 mm) angle iron step, in manhole chambers, including carriage and setting the same in work to correct lines and levels.			6	2.00	12.00
8	Cement plaster 1:3 up to 20' height 1/2" thick.	9" dia		6	67.52	405.12
9	Providing/fixing PRC manhole cover with cover with tee shaped frame 22" l/d (frame atleast 50 kg) as per standard drg. & specifications.			6	1.00	6.00
10	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl, kankar lime (unslaked), surkhi, etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor. (Ch.No. 1, Item.No. 1)					
	Ratio (1:3:6)		99.48	0.92		91.92
	Ratio (1:2.4)		111.48	0.88		98.10
						190.02

COST ESTIMATE

IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA CITY

Sub Head # D: Providing and Laying R.C.C. Pipe 42" dia:

S#	Ref. CSR P/Item	Description	Unit	Quantity	Rate	Amount
1	C-3/42	Earth work excavation in open cutting for sewers and manholes as shown in drawings including shuttering and timbering, dressing to correct sections and dimensions according to templates and levels, and removng surface water, in all types of soil except shingle gravel and rock.				
		(i) 0 ft to 7 ft. Depth	1000 Cft	7020.00	15688.05	110,130.11
		(ii) 7 ft. to 15ft. Depth	1000 Cft	2400.00	22379.80	53,711.52
2	C-21/4	Providing and Laying R.C.C. pipe sewer moulded with cement concrete 1:1.5:3 conforming to ASTM specification C-76-79, Class-III, Wall-B, including carriage of pipe from factory to site of wor, lowering in trenches to correct alignment and grade, jointing with rubber ring, cutting pipes where necessary, testing etc. complete.				
		42" i/d.	1 Rft.	30	6,601.05	198,031.50
3	C-21/1	Providing and Laying R.C.C. pipe sewer moulded with cement concrete 1:1.5:3 conforming to ASTM specification C-76-79, Class-II, Wall-B, including carriage of pipe from factory to site of wor, lowering in trenches to correct alignment and grade, jointing with rubber ring, cutting pipes where necessary, testing etc. complete.				
		9" i/d.	1 Rft.	210	568.60	119,406.00
4	C-3/13a	(i) Rehandling of earth work.				
		(a) Lead upto a single throw of Kassi, phaorah or shovel.	1000 Cft	8070	3,247.20	26,204.90
	C-3/24(a)	(ii) Compaction of earth work.				
		(a) Mixing, moistening earth to optimum moisture content in layers for compaction etc. complete.	1000 Cft	8070	1,541.85	12,442.73
5	N.S	Providing/fixing RPC manhole cover with cover with tee shaped frame 22" l/d (frame atleast 50 kg) as per standard drg. & specifications.	1 set.	6	11592.00	69,552.00
6	C-21/9	Extra for making and finishing benching floor work in manhole chamber with 1/8" thick cement finish.	100 Sft	75.36	3,541.50	2,668.87
7	C-6/5	Cement concrete plain including, placing, compacting, finishing, and curing complete (including screening and washing of stone aggregate.				
		(I) P.C.C. 1:3:6	100 Cft	99.48	38182.80	37,984.25
		(II) P.C.C. 1:2:4	100 Cft	111.48	43837.20	48,869.71
8	C-7/7i	Pacca brick work other than building upto 10 ft height in 1:3 cement sand mortar.	100 Cft	291.18	35504.50	103,382.00
9	C-7/10	Extra for pacca brick work in steining of wells or any other circular masonary.	100 Cft	291.18	3145.20	9,158.19
10	C-11/8b	Cement plaster 1/2" thick (1:3) cement sand mortar upto 20' height.	100 Sft	405.12	4132.80	16,742.80
11	C-6/2	Dry rammed bricks or stone ballest 1.5" to 2" gauge.	100 Cft	99	11008.80	10,898.71
12	C-21/23	Providing and laying crushed stone aggregate of 1/4" to 1" guage under and around the sewer pipe, including leveling, manual compaction, complete in all respects.	100 Cft	562.5	11437.20	64,334.25

S#	Ref. CSR P/Item	Description	Unit	Quantity	Rate	Amount
13	C-10/3	Supplying and filling sand under floor; or plugging in wells.. (10/3)	100 Cft	310.8	3,061.20	9,514.21
14	C-1/1	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl, kankar lime (unslaked), surkhi, etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor. (Ch.No. 1, Item.No. 1)	100 Cft	190.02	10918.32	20,747.19
15	C-21/13	Providing and fixing 1¼"x1¼"x3/16" (31x31x5 mm) angle iron step, in manhole chambers, including carriage and setting the same in work to correct lines and levels.	1 Each	12	700.50	8,406.00
					Total:- (Rs.)	**922,184.96**
					Say:- (Rs.)	**922,185.00**

IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA CITY

Sub Head # E: Supply and Installation of Valves and Delivery Pipes:

S.No.	Description	Unit	Qty.	Rate (Rs.)	Amount (Rs.)
1	Supplying, fixing and testing ductile iron pipe with flange including the cost of specials, (teepu pipe / alpine steel or approved equivalent) complying Class K-12, ISO - 2531 & BS-4772, & jointing material with all fittings and accessories complete in all respect as approved by the Engineer Incharge (C-23/61				
	12" dia	Rft	85	16,963.55	1,441,901.75
2	P/F C.I Flanged Flexible/dressing coupling of complete.				
	12" dia	No.	6	42,000.00	252,000.00
3	Providing and fixing heavy duty Gate valve of specified diameter and material for pressure rating PN-16 mde of Crane (USA), Hatersly (UK) or Scon (Pakistan) i/c the cost of all accessories flanges,nut/bolt and gaskit where required complete in all respect as approved and directed by the Engineer Incharg (C-23/52b)				
	12" dia	No.	7	202,496.00	1,417,472.00
4	Providing and fixing non return valve C.I Body having full flow with stainless steel body seat / ring & synthatic imported rubber sheet on other side and imported stain less steel shaft pin openable type complete.				
	12" dia	No.	7	118,300.00	828,100.00
5	Providing, laying, cutting, jointing, testing and disinfecting High Density Polyethylene Pipe (HDPE-100) working presure pipe, Beta/ Dadex/ Popular/ IIL or equivalent including the cost of specials, in trenches, as approved & directed by the engineer incharge, complete in all respects (C-23/43 d)				
	315mm PN-12.5	Rft	50	5,621.80	281,090.00
6	P/F M.S dead plate / tapper flange3/4" including nut bolt and rubber sheet.				
	12" dia	Each	12	9,081.00	108,972.00
R.A	Providing and fixing M.S header 30" 8ft long one end blind and other end to be fixed with HDPE Pipe including cost of welding of M.S pipe 12" dia for connection of delivery pipes.				
		Each	1	504,355.00	504,355.00
				Total:-(Rs.)	**4,833,890.75**
				Say:-(Rs.)	**4,833,891.00**

Rate analysis for providing and fixing M.S header 30" dia 8ft long dully paint with epoxy 2 coat internal and external

S.No.	Description	Unit	Qty.	Rate (Rs.)	Amount (Rs.)
1	M.S Pipe 30" dia 3/8" thick including cutting, molding, welding complete in all respect. Wt @ 55.50 kg/Rft	Each	8.00	36075	288,600.00
2	Reducer 30x24, 2ft long inlcuding welding	Each	1.00	32407	32,407.00
3	Flenged pipe 12" dia 1ft long to be welding with header	Each	1.00	16257	16,257.00
4	Dead plate 30" dia 3/4" thick	Each	1.00	39057	39,057.00
5	Painting of epoxy paint 2 coat internal and external	Sft	165.00	115	18,975.00
6	Carriage and labour charges for fixing	Each	1.00	25000	25,000.00
					420,296.00
	Add 20% overhead and contractor profit				84,059.20
					504,355.20
				Say Rs,	**504,355.00**

QUANTITY SHEET

IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA CITY

Sub Head # F: Construction of Electrical Sub-Station:

S.No.	Detail of Item/Work	No.	Measurements			Quantity
			L	B	H	
1	Excavation in foundation of buildings, bridges and other structures including dagbelling, dressing, refilling around structures with excavated earth watering and ramming lead upto one chain and lift.					
	(i) 0 ft. to 5.0 ft. depth.	2	39.75	2.875	2.25	514.27
		5	14.75	2.875	2.25	477.07
		1	5.75	1.500	2.25	19.41
	Ramp	2	10.00	2.875	2.25	129.38
	Step	2	5.00	1.500	1.25	18.75
					Total	**1158.87**
2	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone aggregate).					
	Ratio (1:4:8)					
	Under Foundation	2	39.75	2.875	0.33	75.43
		5	14.75	2.875	0.33	69.97
		1	5.75	1.500	0.33	2.85
		2	10.00	2.875	0.33	18.98
		2	5.00	1.500	0.33	4.95
					Total	**172.17**
	Under Floor	1	39.75	14.750	0.250	146.58
	deduction	2	39.75	0.750	0.125	7.45
		5	14.75	0.750	0.125	6.91
					Net	**132.21**
3	P/L reinforced cement concrete (including prestressed concrete), using coarse sand and aggregate, in required shapge and design, including forms, moulds, shuttering, lifting, compacting, curing,rendering and finishing exposed surface, complete.					
	(a) (i) Reinforced cement concrete in roof slab, beams, columns, lintels, girders and other structural members laid in situ or precast laid in position, or prestressed members cast in situ, complete in all respects:-					
	(3) Type C (nominal mix 1:2:4)					
	Ramp	2	10.00	10.00	0.42	84.00
	lintles	2	39.75	0.75	0.75	44.72
	Roof	1	42.75	18.50	0.42	332.17
	Parapit	1	123.00	0.33	1.25	50.74
					Total	**511.62**
4	Fabrication of mild steel reinforcement for cement concrete including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust					
	(b) deformed bars.	1	511.62	5.50	2.204	1276.74
6	Cast iron rain water down pipe fixed in position, excluding heads and shoes, but including painting and clamps, etc.:-					
	(a) 4" dia cast iron down pipe.	2	50.00			100.00
7	Rain water down pipe cast iron head fixed in place, including cost of clamp holdfast and painting.	2	2.000			4.00
8	Shoes, bends or offsets for cast iron rain water down pipe, including fixing and painting.	2	2.000			4.00
9	P/L damp proof course of cement concrete 1:2:4 (using cement, sand and shingle), including bitumen coating:					
	(b) With two coats of bitumen	2	39.75	0.75		59.63
	(ii) 2" thick	5	14.75	0.75		55.31
						114.94
10	P/L vertical damp proof course with cement sand plaster and bitumen coating.					
	(b) with two coats of bitumen					
	(i) Ratio 1:4					
	(b) 3/4" thick	2	39.75	2.00		159.00

S.No.	Detail of Item/Work	No.	Measurements			Quantity
			L	B	H	
11	Pucca brick work in foundation and plinth in:-					
	(i) Cement sand mortar (1:5)					
	Wall	2	39.75	1.88	0.50	74.53
		2	14.75	1.875	0.50	27.66
		2	39.75	1.50	0.50	59.63
		2	14.75	1.500	0.50	22.13
		2	39.75	1.13	1.00	89.44
		2	14.75	1.125	1.00	33.19
		2	39.75	0.75	5.00	298.13
		2	14.75	0.750	5.00	110.63
		1	5.75	0.750	7.25	31.27
	Steps	6	5.00	2.000	2.50	150.00
		6	5.00	1.500	0.67	30.15
					Total	**926.73**
12	Pucca brick work in ground floor:-					
	(i) Cement sand mortor (1:4)	2	39.75	0.75	11.00	655.88
		2	14.75	0.75	11.00	243.38
		1	5.75	0.38	11.00	23.72
					Total	**922.97**
	Deduction (Area of door & window)	6	6.00	0.75	6.00	162.00
		6	3.500	0.75	7.00	110.25
		2	2.500	0.75	7.00	26.25
		2	2.000	0.75	2.50	7.50
					Total	**306.00**
					Net	**616.97**
13	Mosaic skirting with one part of cement and marble powder in the ratio of 3:1 and two parts of marble chips, laid over 1/2" thick cement plaster 1:3, including rubbing and polishing, complete with finishing:					
	(a) Using grey cement					
	(ii) 1/2" thick	2	39.75		0.50	39.75
		6	14.00		0.50	42.00
	Door Jambs	6	5.00		2.00	60.00
		6	5.00		1.50	45.00
					Total	**186.75**
	Deduction	8	3.50		0.50	14.00
					Net	**172.75**
14	First class brick tiles elad by laying tiles in strecher course in cement sand mortar reinforced with 18 SWG hoop iron strips placed at 2' apart horizontally and 1' interval vertically in 1:3 ratio.	1	25.00	2.00	2.00	100.00
15	P/F glass strip 5 mm thick and 1-1/2" wide for dividing the mosaie flooring into panesl approximate siae (3'x3').	1	265.00			265.00
16	Cement plaster 1:4 upto 20' height.					
	b) 1/2" thick.	4	39.75		11.00	1749.00
		12	14.75		11.00	1947.00
		2	5.75		11.00	126.50
					Total	**3822.50**
	Deduction	3	6.00		6.00	108.00
		1	3.500		7.00	24.50
		1	2.500		7.00	17.50
		1	2.000		2.50	5.00
					Total	**155.00**
					Net	**3667.50**
18	Painting new surfces: Preparing surface and painting of doors & windows, any type (including edges)"-					
	i) Priming coat (Door)	3	3.50		7.00	73.50
	(Window)	2	2.50		7.00	35.00
		3	6.00		6.00	108.00
		2	2.00		2.50	10.00
		1	8.00		8.00	64.00
					Total	**290.50**
	ii) Each subsequent coat of paint (two coats).				290.50	**581.00**
19	Single laying of tiles 9"x4-12"x1-1/2" laid over 4" earth and 1" mud plaster without bhoosa grouted with cement sand 1:3 on top or R.C.C. roof slab, provided with 34 lbs. Bitumen coating sand blinded.	1	39.75	14.92		593.07
20	Priming coat of chalk under distemper.					
	Quantity as per internal cement plaster		3667.500			3667.50
21	Distempering.					
	(iii) 2 coats.					3667.50

S.No.	Detail of Item/Work	No.	Measurements			Quantity
			L	B	H	
22	Supplying filling sand under floor.					
		1	39.00	14.00	0.33	180.18
23	Filling, watering & ramming earth under floor.					
	(i) With surplus earth from foundation etc.					
	Total Area of floor = 1164	1	39.00	14.00	6.00	3276.00
	under ramp		9.50	6.00	3.00	171.00
						3447.00
24	1-1/2" thick mosaic flooring consisting of 1/2" mosaie toping of one part of cement and marble powder in the ratio of 3:1 and two parts of marble chips, laid over 1" thick floor of 1:2:4 cement concrete including rubbing and polishing complete with finish					
	(a) Using grey cement	1	39.00	14.00		546.00
25	P/F steel windows with openable glazed pannels, using Beam section for frame 1-1/2"x1" x5/8"-x1/8" Z section for leaves 3/4" x1"x3/4"x1/8", T section shashes 1"x1"x1/8" glass panes, Wooden screed for glazing etc.					
	(a) fixed with wire gause, 24 SWG & glass pane 5 mm thick.					
		6	6.00		6.00	216.00
26	Making and fixing steel grated door with 1/16" inches thick sheeting surrounding by angle iron 1"x1"x1/8" including angle iron frame 2"x2"x3/16" and flat iron 2"x1/8" with looking arrangement completed in all respect as shown in the drawings and specified					
		5	3.50		7.00	122.50
		1	8.00		8.00	64.00
						186.50
27	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl, kankar lime (unslaked), surkhi, etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor.					
	(Ch.No. 1, Item.No. 1)					
	Ratio (1:4:8)	1	132.21	0.95		125.30
	Ratio (1:2:4)	1	511.62	0.88		450.23
					Total	**575.52**

COST ESTIMATE

IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA CITY

Sub Head # F: Construction of Electrical Sub-Station:

S#	Ref. CSR P/Item	Description	Unit	Quantity	Rate	Amount
1	C-3/21	Excavation in foundation of buildings, bridges and other structures including dagbelling, dressing, refilling around structures with excavated earth watering and ramming lead upto one chain and lift. (i) 0 ft. to 5.0 ft. depth.	1000 Cft	1158.87	13669.90	15,841.60
2	C-6/I-5	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone aggregate). **Ratio (1:4:8)**	100 Cft	132.21	34098.00	45,081.29
3	C-6/I-6	P/L reinforced cement concrete (including prestressed concrete), using coarse sand and aggregate, in required shapge and design, including forms, moulds, shuttering, lifting, compacting, curing,rendering and finishing exposed surface, complete. (a) (i) Reinforced cement concrete in roof slab, beams, columns, lintels, girders and other structural members laid in situ or precast laid in position, or prestressed members cast in situ, complete in all respects:- (3) Type C (nominal mix 1:2:4)	1 Cft	511.62	674.30	344,987.89
4	C-6/12	Fabrication of mild steel reinforcement for cement concrete including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust). (b) deformed bars. 60 grade	100 Kg	1276.74	35068.45	447,732.24
6	C-9/1-20	Cast iron rain water down pipe fixed in position, excluding heads and shoes, but including painting and clamps, etc.:- (a) 4" dia cast iron down pipe.	1 Rft	100.00	500.00	50,000.00
7	C-9/1-21	Rain water down pipe cast iron head fixed in place, including cost of clamp holdfast and painting.	1 Each	4.00	1258.20	5,032.80
8	C-9/1-22	Shoes, bends or offsets for cast iron rain water down pipe, including fixing and painting.	1 Each	4.00	666.00	2,664.00
9	C-6/36	P/L damp proof course of cement concrete 1:2:4 (using cement, sand and shingle), including bitumen coating: (b) With two coats of bitumen (ii) 2" thick	100 Sft	114.94	12315.15	14,154.73
10	C-6/38	P/L vertical damp proof course with cement sand plaster and bitumen coating. (b) with two coats of bitumen (i) Ratio 1:4 (b) 3/4" thick	100 Sft	159.00	7415.30	11,790.33
11	C-7/4-i	Pucca brick work in foundation and plinth in:- (i) Cement sand mortar (1:5)	100 Cft	926.73	31566.45	292,535.17
12	C-7/I-5	Pucca brick work in ground floor:- (i) Cement sand mortor (1:5)	100 Cft	616.97	34359.60	211,987.99
13	C-10/38	Mosaic skirting with one part of cement and marble powder in the ratio of 3:1 and two parts of marble chips, laid over 1/2" thick cement plaster 1:3, including rubbing and polishing, complete with finishing: (a) Using grey cement	100 Sft	172.75	28238.40	48,781.84
14	C-7/I-31	First class brick tiles clad by laying tiles in strecher course in cement sand mortar reinforced with 18 SWG hoop iron strips placed at 2' apart horizontally and 1' interval vertically in 1:3 ratio.	100 Sft	100.00	19106.35	19,106.35
15	C-10/39	P/F glass strip 5 mm thick and 1-1/2" wide for dividing the mosaic flooring into panesl approximate siae (3'x3').	1 Rft	265.00	7.90	2,093.50
16	C-11/9(b)	Cement plaster 1:4 upto 20' height. b) 1/2" thick. (Internal)	100 Sft	3667.50	3941.65	144,560.01
18	C-13/1-5	Painting new surfces: Preparing surface and painting of doors & windows, any type (including edges)"- ii) Each subsequent coat of paint (two coats).	100 Sft 100 Sft	290.50 581.00	1661.25 2217.00	4,825.93 12,880.77

S#	Ref. CSR P/Item	Description	Unit	Quantity	Rate	Amount
19	C-9/I-5	Single laying of tiles 9"x4-12"x1-1/2" laid over 4" earth and 1" mud plaster without bhoosa grouted with cement sand 1:3 on top or R.C.C. roof slab, provided with 34 lbs. Bitumen coating sand blinded.	100 Sft	593.07	12,818.25	76,021.20
20	C-11/I-22	Priming coat of chalk under distemper.	100 Sft	3667.50	348.00	12,762.90
21	C-11/I-23	Distempering. (iii) 3 coats.	100 Sft	3667.50	1,665.90	61,096.88
22	C-10/3	Supplying and filling sand under floor; or plugging in wells.	100 Cft	180.18	3,061.20	5,515.67
23	C-3/15	Filling, watering & ramming earth under floor. (i) With surplus earth from foundation etc.	1000 Cft	3447.00	6,526.10	22,495.47
24	C-10/37	1-1/2" thick mosaic flooring consisting of 1/2" mosaie toping of one part of cement and marble powder in the ratio of 3:1 and two parts of marble chips, laid over 1" thick floor of 1:2:4 cement concrete including rubbing and polishing complete with finish (a) Using grey cement	100 Sft	546.00	28,238.40	154,181.66
25	C-25/41	P/F steel windows with openable glazed pannels, using Beam section for frame 1-1/2"x1" x5/8"-x1/8" Z section for leaves 3/4" x1"x3/4"x1/8", T section shashes 1"x1"x1/8" glass panes, Wooden screed for glazing etc. (a) fixed with wire gause, 22 SWG & glass pane 5 mm thick.	1 Sft	216.00	1,393.10	300,909.60
26	C-25/30	Making and fixing steel grated door with 1/16" inches thick sheeting surrounding by angle iron 1"x1"x1/8" including angle iron frame 2"x2"x3/16" and flat iron 2"x1/8" with looking arrangement completed in all respect as shown in the drawings and specified.	1 Sft	186.50	2,331.35	434,796.78
27	C-1/1	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl, kankar lime (unslaked), surkhi, etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor. (Ch.No. 1, Item.No. 1)	100 Cft	575.52	10918.32	62,837.55
					Total:- (Rs.)	**2,804,674.14**
					Say:- (Rs.)	**2,804,674.00**

QUANTITY SHEET

IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA CITY

Sub Head # G.I: Construction of Boundary Wall Around Pumping Station:

Item No.	Description	No	Measurements			Quantity
			L	B	D	
1	Excavation in foundation of bulidings, bridges and other structures including dagbelling, dressing, refiling around structures with excavated earth watering and reamming lead upto one chain and lift ordinary soil.					
	0' to 5.0 ft. Depth	1	546	2.50	2.25	3071.25
2	Cement concrete brick or stone ballast 1.5" to 2" guage in foundation plinth .					
	Ratio (1:4:8)	1	546	2.50	0.375	511.875
3	Pacca brick work other than building upto					
	10 ft height in 1:5 cement sand mortor.	1	546	1.50	0.50	409.50
		1	546	1.125	0.50	307.125
		1	546	0.75	5.50	2252.25
	for column	55	1.13	0.375	5.50	127.62
						3096.49
4	P/L damp proof course with cement concrete 1:2:4 using cement sand and shingle including bitumen coating					
	with 2 coats of bitumen 1.5" thick	1	546.00	0.75		409.50
		55	1.13	0.375		23.20
						432.70
5	Pacca brick work other than building upto					
	10 ft height in 1:4 cement sand mortor.	1	546	0.75	6.00	2457.00
6	Cement pointing struck joints on walls, upto 20' height:					
	b) ratio 1:3	1	546		6.00	3276.00
7	Cement plaster 1:4 upto 20' (6.00mm) height					
	(b) 1/" thick	1	546		6.00	3276.00
8	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone aggregate). On top of wall and columns.					
	Ratio (1:2:4)	1	546	0.75	0.17	69.62
9	Providing & fixing fencing 2' height conssiting upon three row of steel boarbed wire and angle iron 2" x2"x1/4" post at 5' center to center grouted in PCC 1:2:4 top of wall.	1	546			546.00
10	Providing and laying sub-base course of stone product 5-2 of approved quality and grade, including placing, mixing, spreading and compaction of sub-base material to required depth, camber, grade to achieve 100% maximum modified AASHO dry density, including carriage of all material to site of work except gravel and. aggregate.					
	i) Pit run or bed run gravel	1	21.00	11.00	0.50	115.50
		1	126.00	15.00	0.50	945.00
		1	11.00	4.50	0.50	24.75
		1	11.00	3.50	0.50	19.25
		1	85.00	7.00	0.50	297.50
						1402.00
11	Providing and laying Tuff pavers, having 7000 PSI, crushing strength of approved manufacturer, over 2" to 3" sand cushion i/c grouting with sand in joints i/c finishing to require slope . complete in all respect. (50% Grey / 50% Coloured)					
	b) 60-mm thick	1	21.00	11.00		231.00
		1	126.00	15.00		1890.00
		1	11.00	4.50		49.50
		1	11.00	3.50		38.50
		1	85.00	7.00		595.00
						2804.00
12	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl, kankar lime (unslaked), surkhi, etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor. (Ch.No. 1, Item.No. 1)					
	Ratio (1:2:4)	1	69.62	0.88		61.26
	i) Pit run or bed run gravel					1402.00
						1463.26

COST ESTIMATE

IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA CITY

Sub Head # G.I: Construction of Boundary Wall Around Pumping Station:

For 100 Rft

Item No.	Ref Sor Item/Page	Description	Unit	Qty.	Rate (Rs.)	Amount (Rs.)
1	C-3/21	Excavation in foundation of bulidings, bridges and other structures including dagbelling, dressing, refiling around structures with excavated earth watering and reamming lead upto one chain and lift ordinary soil. 0' to 5.0 ft. Depth	1000 Cft	3071.25	13669.90	41983.68
2	C-7/7	Pacca brick work other than building upto 10 ft height in 1:5 cement sand mortor.	100 Cft	511.88	32951.50	168670.49
3	C-7/4-a	Pucca brick work in foundation and plinth in:- (i) Cement sand mortar 1:5	100 Cft	3096.49	31566.45	977452.66
4	C-6/36	P/L damp proof course with cement concrete (1½") using cement sand and shingle including bitumen coating with 2 coats of bitumen	100 Sft	432.70	12315.15	53288.04
5	C-7/1-5	Pacca brick work other than building upto 10 ft height in 1:4 cement sand mortor.	100 Cft	2457.00	35380.80	869306.26
6	C-11/18	Cement pointing struck joints on walls, upto 20' height: b) ratio 1:3	100 Sft	3276.00	4075.20	133503.55
7	C-11/9	Cement plaster 1:4 upto 20' (6.00mm) height (b) 1/2" thick	100 Sft	3276.00	3941.65	129128.45
8	C-6/1-5	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone aggregate). On top of wall and columns. Ratio (1:2:4)	100 Cft	69.62	43837.20	30517.27
9	C-25/49	Providing & fixing fencing 2' height conssiting upon three row of steel boarbed wire and angle iron 2" x2"x1/4" post at 5' center to center grouted in PCC 1:2:4 top of wall.	100 Rft.	546.00	30085.00	164264.10
10	C-18/3	Providing and laying sub-base course of stone product 5-2 of approved quality and grade, including placing, mixing, spreading and compaction of sub-base material to required depth, camber, grade to achieve 100% maximum modified AASHO dry density, including carriage of all material to site of work except gravel and. aggregate. i) Pit run or bed run gravel	100 Cft	1402.00	7283.25	102111.17
11	12	Providing and laying Tuff pavers, having 7000 PSI, crushing strength of approved manufacturer, over 2" to 3" sand cushion i/c grouting with sand in joints i/c finishing to require slope . complete in all respect. (50% Grey / 50% Coloured) b) 60-mm thick	P Sft	2804.00	193.15	541592.60
10	C-1/1	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl, kankar lime (unslaked), surkhi, etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor. (Ch.No. 1, Item.No. 1)	100 Cft	1463.26	10918.32	159,763.48
					Total:- (Rs.)	**3,371,581.74**
					Say Rs.	3,371,582.00

QUANTITY SHEET

IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA CITY

Sub Head # G-II: Construction of Main Gate:

S.No.	Detail of Item/Work	No.	Measurements			Quantity
			L	B	H	
1	Excavation in foundation of bulidings, bridges and other structures including dagbelling, dressing, refiling around structures with excavated earth watering and reamming lead upto one chain and lift ordinary soil.					
	0' to 5.0 ft. Depth	1	3.00	3.00	2.50	22.50
2	Cement concrete brick or stone ballast 1-1/2" to 2" (40mm to 50 mm guage in foundation and plinth					
	Ratio (1:4:8)	1	3.00	3.00	0.25	2.25
3	Pacca brick work other than building upto					
	10 ft height in 1:5 cement sand mortor.	2	3.00	0.75	1.25	5.63
		2	1.50	0.75	1.25	2.81
		2	3.00	0.38	5.50	12.38
		2	2.25	0.38	5.50	9.28
						30.09
4	P/L damp proof course with cement concrete 1:2:4 using cement sand and shingle including bitumen coating					
	with 2 coats of bitumen 2" thick	2	3.00	0.38		2.25
		2	2.25	0.38		1.69
						3.94
5	Pucca brick work in ground floor:-					
	(i) Cement sand mortar 1:4	2	3.00	0.38	7.00	15.75
		2	2.25	0.38	7.00	11.81
						27.56
6	Cement pointing struck joints on walls, upto 20' height:					
	b) ratio 1:2	2	3.00		7.00	42.00
		2	2.25		7.00	31.50
						73.50
7	P/L reinforced cement concrete (including prestressed concrete), using coarse sand and aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing,rendering and finishing exposed surface, complete.					
	(a) Reinforced cement concrete in slab of Raft/strip foundation; base slab of column and retaining walls; etc. and other structural members other than those mentioned in 5(a) (i) above not requiring from work, complete in all respects:-					
	Type C (nominal mix 1:2: 4)	1	3.00	3.00	0.67	6.03
	2x4	4	1.88	1.125	0.17	1.44
		1	0.75	0.75	14.75	8.30
						15.77
8	Fabrication of mild steel reinforcement for cement concrete including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust).					
	(b) deformed bars. # 6	5	3.25	16.25	1.5/2.204	179.72
		7	3.25	22.75	1.5/2.204	352.24
		4	13.75	55.00	1.5/2.204	2058.76
	# 2	13	3.17	41.21	0.17/2.204	130.99
						2721.71
9	Making and fixing steel grated doors complete with locking arrangement, angle iron frame 2"x2"x3/8" and 3/4" square walls 4" center to center.	1	16	6		96.00
10	Preparing surface and painting guard bars , gates of iron bars					
	priming coat	1	16	6		96
	each subsequent coat	1	16	6		96
11	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl, kankar lime (unslaked), surkhi, etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor.					
	(Ch.No. 1, Item.No. 1)					
	Ratio (1:4:8)	1	2.25	0.95		2.13
	Ratio (1:2:4)	1	15.77	0.88		13.87
						16.01

COST ESTIMATE

IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA CITY

Sub Head # G-II: Construction of Main Gate:

S#	Ref. CSR P/Item	Description	Unit	Quantity	Rate	Amount
1	C-3/21	Excavation in foundation of bulidings, bridges and other structures including dagbelling, dressing, refiling around structures with excavated earth watering and reamming lead upto one chain and lift ordinary soil. 0' to 5.0 ft. Depth	1000 Cft	22.50	13669.90	307.57
2	C-6/3	Cement concrete brick or stone ballast 1-1/2" to 2" (40mm to 50 mm guage in foundation and plinth Ratio (1:4:8)	100 Cft	2.25	34098.00	767.21
3	C-7/7	Pacca brick work other than building upto 10 ft height in 1:5 cement sand mortor.	100 Cft	30.09	32951.50	9,916.34
4	C-6/36	P/L damp proof course with cement concrete 1:2:4 using cement sand and shingle including bitumen coating with 2 coats of bitumen 2" thick	100 Sft	3.94	12315.15	484.91
5	C-7/5	Pucca brick work in ground floor:- (i) Cement sand mortar 1:4	100 Cft	27.56	35380.80	9,751.83
6	C-11/18	Cement pointing struck joints on walls, upto 20' height: b) ratio 1:2	100 Sft	73.50	4305.60	3,164.62
7	C6-6-a-ii	P/L reinforced cement concrete (including prestressed concrete), using coarse sand and aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing,rendering and finishing exposed surface, complete. (a) Reinforced cement concrete in slab of Raft/strip foundation; base slab of column and retaining walls; etc. and other structural members other than those mentioned in 5(a) (i) above not requiring from work, complete in all respects:- Type C (nominal mix 1:2: 4)	1 Cft	15.77	538.30	8,486.34
8	C-6/12	Fabrication of mild steel reinforcement for cement concrete including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust (b) deformed bars. 60 grade	100 Kg	2721.71	35068.45	954,460.49
9	C-25/30	Making and fixing steel grated doors complete with locking arrangement, angle iron frame 2"x2"x3/8" and 3/4" square walls 4" center to center.	1 Sft	96.00	2,331.35	223,809.60
10	C-13/5	Preparing surface and painting guard bars , gates of iron bars priming coat	100 Sft	96.00	1063.80	1,021.25
		each subsequent coat (Two Coats)	100 Sft	96.00	1480.20	1,420.99
11	C-1/1	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl, kankar lime (unslaked), surkhi, etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor. (Ch.No. 1, Item.No. 1)	100 Cft	16.01	10918.32	1,747.54
					Total:- (Rs.)	**1,215,338.68**
		No. of Gate 1				**1,215,338.68**
					Say:- (Rs.)	**1,215,339.00**

QUANTITY SHEET

IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA CITY

Sub Head H:Construction of Staff

S.No.	Detail of Item/Work	No.	Measurements			Quantity
			L	B	H	
1	Excavation in foundation of buildings, bridges and other structures including dagbelling, dressing, refilling around structures with excavated earth watering and ramming lead upto one chain and lift.					
	(i) 0 ft. to 5.0 ft. depth.	1	197.75	3.00	2.25	1334.81
		1	38.87	2.25	2.25	196.78
						1531.59
2	Cement concrete brick or stone ballast 1 1/2" to 2" gauge in foundation and plinth.					
	Ratio (1:4:8)	1	197.75	3.00	0.38	222.47
		1	38.87	2.25	0.37	32.36
						254.83
3	P/L reinforced cement concrete (including prestressed concrete), using coarse sand and aggregate, in required shapge and design, including forms, moulds, shuttering, lifting, compacting, curing,rendering and finishing exposed surface, complete.					
	(a) (i) Reinforced cement concrete in roof slab, beams, columns, lintels, girders and other structural members laid in situ or precast laid in position, or prestressed members cast in situ, complete in all respects:-					
	(3) Type C (nominal mix 1:2:4)	1	26.25	24.50	0.42	270.11
		1	11.87	6.50	0.33	25.46
		2	4.50	0.75	0.50	3.38
		1	4.00	0.75	0.50	1.50
		1	5.00	0.75	0.50	1.88
		2	3.50	0.75	0.50	2.63
		3	5.00	0.75	0.50	5.63
		2	3.00	0.75	0.50	2.25
		1	6.00	0.75	0.50	2.25
		1	17.00	2.00	0.17	5.78
						320.85
4	Fabrication of mild steel reinforcement for cement concrete including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust.					
	(b) deformed bars.			320.85 x 5.5 /2.204		800.68
5	Cast iron rain water down pipe fixed in position, excluding heads and shoes, but including painting and clamps, etc.:-					
	(a) 4" dia cast iron down pipe.	2	11.00			22.00
6	Rain water down pipe cast iron head fixed in place, including cost of clamp holdfast and painting.	2				2.00
7	Shoes, bends or offsets for cast iron rain water down pipe, including fixing and painting.	2				2.00
8	P/L damp proof course of cement concrete 1:2:4 (using cement, sand and shingle), including bitumen coating:					
	(b) With two coats of bitumen					
	(i) 1.5" thick	1	197.00	0.75		147.75
		1	38.00	0.75		28.50
						176.25
9	Pucca brick work in foundation and plinth in:-					
	(i) Cement sand mortar (1:5)	1	197.75	1.88	0.50	185.39
		1	197.37	1.50	0.50	148.03
		1	38.50	1.50	0.50	28.88
		1	197.38	1.13	0.50	111.03
		1	38.50	1.13	0.50	21.66
		1	197.00	0.75	5.50	812.63
		1	38.50	0.75	5.50	158.81
						1466.41
10	Pucca brick work in ground floor:-					
	(i) Cement sand mortor (1:5)	1	197.00	0.75	11.00	1625.25
		1	38.00	0.75	7.00	199.50
						1824.75
11	Providing and laying sand under floor	2	11.00	12.00	0.33	87.12
		1	12.00	15.00	0.33	59.40
		1	7.00	12.00	0.33	27.72
		2	5.00	5.50	0.33	18.15
		1	24.75	9.75	0.33	79.63
		1	14.75	6.00	0.33	29.21
						301.23

S.No.	Detail of Item/Work	No.	Measurements			Quantity
			L	B	H	
12	Dry reamed brick or stone ballast 1.5" to 2"	2	11.00	12.00	0.33	87.12
		1	12.00	15.00	0.33	59.40
		1	7.00	12.00	0.33	27.72
		2	5.00	5.50	0.33	18.15
		1	24.75	9.75	0.33	79.63
		1	14.75	6.00	0.33	29.21
						301.23
13	1-1/2" thick mosaic flooring consisting of 1/2" mosaic toping of one part of cement and marble powder in the ratio of 3:1 and two parts of marble chips, laid over 1" thick floor of 1:2:4 cement concrete including rubbing and polishing complete with finish					
	(a) Using grey cement	2	11.00	12.00		264.00
		1	12.00	15.00		180.00
		1	7.00	12.00		84.00
		2	5.00	5.50		55.00
		1	24.75	9.75		241.31
		1	14.75	6.00		88.50
						912.81
14	Mosaic skirting with one part of cement and marble powder in the ratio of 3:1 and two parts of marble chips, laid over 1/2" thick cement plaster 1:3, including rubbing and polishing, complete with finishing:					
	(a) Using grey cement					
	(ii) 1/2" thick	4	11.00	0.50		22.00
		4	12.00	0.50		24.00
		2	12.00	0.50		12.00
		2	15.00	0.50		15.00
		2	12.00	0.50		12.00
		2	7.00	0.50		7.00
		2	24.75	0.50		24.75
		2	10.25	0.50		10.25
						127.00
15	P/F glass strip 5 mm thick and 1-1/2" wide for dividing the mosaic flooring into panels approximate siae (3'x3').					300.00
16	Cement plaster 1:4 upto 20' height.					
	b) 1/2" thick.	2	27.00		11.00	594.00
		4	23.00		11.00	1012.00
		2	19.00		11.00	418.00
		4	9.25		11.00	407.00
		1	40.00		7.00	280.00
						2711.00
17	Cement pointing struck joints on walls, upto 20' height:					
	b) ratio 1:2					2711.00
18	Single laying of tiles 9"x4-12"x1-1/2" laid over 4" earth and 1" mud plaster without bhoosa grouted with cement sand 1:3 on top or R.C.C. roof slab, provided with 34 lbs. Bitumen coating sand blinded.	1	24.75	22.75		563.06
		1	10.37	5.00		51.85
						614.91
19	Khuras on roof 2'x2'x6"	2				2.00
20	P/F steel windows with openable glazed pannels, using milad steel box sections 1-1/2"1-1/2"x18 SWG glass panes, M.S channel 1/2"x1/2"x1/16" duly serenwd with leaves, & filled with rubber feld in between glass & M.S channel brass fitting, holdfast, duly painted	4	6.00	4.00		96.00
		2	2.00	2.00		8.00
						104.00
21	(a) fixed with wire gause, 24 SWG & glass pane 5 mm thick.					104.00
22	Providing and fixing 1 1/2" thick hollow flush door and window with commercial ply 3 ply on both faces deodar wood shutter frame 1 1/4" thick and partal wood braces at about 3" apart and deodar wood lipping 1 1/2" X3/8" fixed with MS chowkhat including chromium plated fittings etc. complete in all respects with out sliding bolt or lock	2	3.50	7.00		49.00
		1	5.00	7.00		35.00
		1	3.00	7.00		21.00
		2	2.50	7.00		35.00
						140.00

S.No.	Detail of Item/Work	No.	Measurements			Quantity
			L	B	H	
23	Painting new surfces: Preparing surface and painting of doors & windows, any type (including edges)"-				Sides	
	i) Priming coat	2	3.50	7.00	2.00	98.00
		1	5.00	7.00	2.00	70.00
		1	3.00	7.00	2.00	42.00
		2	2.50	7.00	2.00	70.00
		4	6.00	4.00	2.00	192.00
		2	2.00	2.00	2.00	16.00
						488.00
	ii) Each subsequent coat of paint (two coats).					488.00
24	Priming coat of chalk under distemper.	2	27.00		11.00	594.00
		4	23.00		11.00	1012.00
		2	19.00		11.00	418.00
		4	9.25		11.00	407.00
		1	40.00		7.00	280.00
						2711.00
25	Distempering.					
	(iii) 3 coats.					2711.00
26	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl, kankar lime (unslaked), surkhi, etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor. (Ch.No. 1, Item.No. 1)					
	Ratio (1:2:4)	1	320.85	0.88		282.35
	Ratio (1:4:8)	1	254.83	0.95		241.50
						523.85
	PLUMBING AND SANITARY FITTINGS					
1	P/F brass stop cock / bib cock.					
	1/2 " dia	5				5.00
2	P/F Floor trap of cast iron including concrete chamber alround and C.I grating.					
	4" x 3"	3				3.00
3	P/F G.I pipe line.					
	3/4" dia	1	75.00			75.00
	1/2" dia	1	100.00			100.00
4	P/F plastic made low down cistern including bracket set etc complete.					
	white	1				1.00
5	P/F chromium plated shower rose.					
	1/2" dia	1				1.00
6	P/F chromium plated or brass oxidised swan neck cock.	1				1.00
7	P/F angle iron brackets for sinks.	2				2.00
8	P/F stainless stlle sink with drain board including bracket set waste pipe and waste coupling	1				1.00
9	P/F chromium plated stop cock.	2				2.00
10	P/F cast iron man hole cover.					
	18" dia	1				1.00
11	P/F PVC Pipe.					
	4" dia	1	10.00			10.00
	3" dia	1	20.00			20.00
12	P/F 1/2" dia connection check nut copper.	4				4.00
13	Providing and fixing wash hand basin	1				1.00
14	Providing and fixing piller cock 1/2"	1				1.00
15	P/F white glazed earthen ware water closet	1				1.00
	ELECTRIFICATION					
1	Supply and erection of PVC pipe for recessed wiring including bends and specials etc. in wall or trenches					
	(i)20mm dia	1	150.00			150.00
2	Supply and erection of single core PVC insulated copper conductor cables in prelaid PVC pipes					
	3/0.029 "	1	1200.00			1200.00
	7/0.029 "	1	300.00			300.00
3	Supply and erection of M.S sheet box of 16 16SWG 10 cm deep					
	8"X10"	1				1.00
	7"X4"	2				2.00
	4"X4"	5				5.00

S.No.	Detail of Item/Work	No.	Measurements			Quantity
			L	B	H	
4	Supply and erection of Iron /Aluminium clad 500 V main switch with kitkat fuses on angle iron board with 3 mm thick 15/20 amp	1				1.00
5	Supply and erection of Iron /Aluminium clad branch distribution board 250 volts on angle frame of suitable size with 3 mm sheet covering 3 way 15 amp per way	1				1.00
6	Supply and erection of 3/8 dia M.S fan hook	4				4.00
7	Supply and erection of bracket of M.S channel 75X40X6 mm section 2' long for 2 lights	2				2.00
8	Supply and erection of ceiling rose bakelite	8				8.00
9	Supply and erection of switches 5 amp piano type	25				25.00
10	Supply and erection of house service pipe	3				3.00
11	Supply and erection of 48" DIA fan (ASIA ,ROYAL) with regulators and canopy complete in all respects	4				4.00
12	Supply and erection of energy meter including meter testing fee single phase130amp 250 volts	1				1.00

COST ESTIMATE

IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA CITY

Sub Head # H: Construction of Staff Quarter:

S#	Ref. CSR P/Item	Description	Unit	Quantity	Rate	Amount
1	C-3/21	Excavation in foundation of buildings, bridges and other structures including dagbelling, dressing, refilling around structures with excavated earth watering and ramming lead upto one chain and lift.				
		(i) 0 ft. to 5.0 ft. depth.	1000 Cft	1531.59	13669.90	20,936.71
2	C-6/I-3	Cement concrete brick or stone ballast 1 1/2" to 2" gauge in foundation and plinth.				
		Ratio (1:4:8)	100 Cft	254.83	28594.20	72,866.04
3	C-6/I-6	P/L reinforced cement concrete (including prestressed concrete), using coarse sand and aggregate, in required shapge and design, including forms, moulds, shuttering, lifting, compacting, curing,rendering and finishing exposed surface, complete.				
		(a) (i) Reinforced cement concrete in roof slab, beams, columns, lintels, girders and other structural members laid in situ or precast laid in position, or prestressed members cast in situ, complete in all respects:-				
		(3) Type C (nominal mix 1:2:4)	1 Cft	320.85	674.30	216,351.62
4	C-6/12)	Fabrication of mild steel reinforcement for cement concrete including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust).				
		(b) deformed bars. 60 grade	100 Kg	800.68	35068.45	280,785.49
5	C-9/1-20	Cast iron rain water down pipe fixed in position, excluding heads and shoes, but including painting and clamps, etc.:-				
		(a) 4" dia cast iron down pipe.	1 Rft	22.00	500.00	11,000.00
6	C-9/1-21	Rain water down pipe cast iron head fixed in place, including cost of clamp holdfast and painting.	1 Each	2.00	1258.20	2,516.40
7	C-9/1-22	Shoes, bends or offsets for cast iron rain water down pipe, including fixing and painting.	1 Each	2.00	666.00	1,332.00
8	C-6/36	P/L damp proof course of cement concrete 1:2:4 (using cement, sand and shingle), including bitumen coating:				
		(b) With two coats of bitumen				
		(i) 2" thick	100 Sft	176.25	12315.15	21,705.45
9	C-7/I-4	Pucca brick work in foundation and plinth in:-				
		(i) Cement sand mortar (1:5)	100 Cft	1466.41	31566.45	462,894.57
10	C-7/I-5	Pucca brick work in ground floor:-				
		(i) Cement sand mortor (1:5)	100 Cft	1824.75	34359.60	626,976.80
11	C-10/3	Supplying and filling sand under floor; or plugging in wells.	100 Cft	301.23	3,061.20	9,221.20
12	C-6/2	Dry reamed brick or stone ballast 1.5" to 2"	100 Cft	301.23	11008.80	33,161.60
13	C-10/22	1-1/2" thick mosaic flooring consisting of 1/2" mosaic toping of one part of cement and marble powder in the ratio of 3:1 and two parts of marble chips, laid over 1" thick floor of 1:2:4 cement concrete including rubbing and polishing complete with finish				
		(a) Using grey cement	100 Sft	912.81	25985.25	237,196.61
14	C-10/1-37	Mosaic skirting with one part of cement and marble powder in the ratio of 3:1 and two parts of marble chips, laid over 1/2" thick cement plaster 1:3, including rubbing and polishing, complete with finishing:				
		(a) Using grey cement				
		(ii) 1/2" thick	100 Sft	127.00	28238.40	35,862.77
15	C-10/1-39	P/F glass strip 5 mm thick and 1-1/2" wide for dividing the mosaic flooring into panels approximate siae (3'x3').	1 Rft	300.00	7.90	2,370.00
16	C-11/1-9(b)	Cement plaster 1:4 upto 20' height.				
		b) 1/2" thick.	100 Sft	2711.00	3941.65	106,858.13
17	C-11/1-18(b)	Cement pointing struck joints on walls, upto 20' height:				
		b) ratio 1:2	100 Sft	2711.00	4305.60	116,724.82
18	C-9/I-5	Single laying of tiles 9"x4-12"x1-1/2" laid over 4" earth and 1" mud plaster without bhoosa grouted with cement sand 1:3 on top or R.C.C. roof slab, provided with 34 lbs. Bitumen coating sand blinded.	100 Sft	614.91	12818.25	78,821.02

S#	Ref. CSR P/Item	Description	Unit	Quantity	Rate	Amount
19	C-9/1-15	Khuras on roof 2'x2'x6"	1 Each	2.00	1036.65	2,073.30
20	C-25/41	P/F steel windows with openable glazed pannels, using milad steel box sections 1-1/2"1-1/2"x18 SWG glass panes, M.S channel 1/2"x1/2"x1/16" duly serenwd with leaves, & filled with rubber feld in between glass & M.S channel brass fitting, holdfast, duly painted				
		(a) fixed with wire gause, 22 SWG & glass pane 5 mm thick.	1 Sft	104.00	1393.10	144,882.40
21	C-12/50a	Providing and fixing 1 1/2" thick hollow flush door and window with commercial ply 3 ply on both faces deodar wood shutter frame 1 1/4" thick and partal wood braces at about 3" apart and deodar wood lipping 1 1/2" X3/8" fixed with MS chowkhat including chromium plated fittings etc. complete in all respects with out sliding bolt or lock.				
		M.S Angle iron 1 1/2"x1.5"x1/4" welded with M.S Flate 2"x1/4"	1 Sft	140.00	2015.90	282,226.00
23	C-13/1-5	Painting new surfces: Preparing surface and painting of doors & windows, any type (including edges)"-				
		i) Priming coat	100 Sft	488.00	1661.25	8,106.90
		ii) Each subsequent coat of paint (2 coats).	100 Sft	488.00	2217.00	10,818.96
24	C-11/I-22	Priming coat of chalk under distemper.	100 Sft	2711.00	348.00	9,434.28
25	1-11/I-23	Distempering.				
		(iii) 3 coats.	100 Sft	2711.00	1665.90	45,162.55
26	C-1/1	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl, kankar lime (unslaked), surkhi, etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor. (Ch.No. 1, Item.No. 1)	100 Cft	523.85	10918.32	57,195.57
		PLUMBING AND SANITARY FITTINGS				
1	C 19/45a	P/F brass stop cock / bib cock.				
		1/2 " dia	1 each	5.00	968.00	4,840.00
2	C 19/34ii	P/F Floor trap of cast iron including concrete chamber alround and C.I grating.				
		4" x 3"	1 each	3.00	1128.45	3,385.35
3	C 23/23	P/F G.I pipe line BSS 1387-1967 heavy quality				
		3/4" dia	1 Rft	75.00	355.35	26,651.25
		1/2" dia	1 Rft	100.00	278.75	27,875.00
4	C 19/13	P/F plastic made low down cistern including bracket set etc complete.	1 each	1.00	4550.55	4,550.55
5	C 19/29	P/F chromium plated shower rose.				
		1/2" dia	1 each	1.00	1078.40	1,078.40
6	C 19/32	P/F chromium plated or brass oxidised swan neck cock.	1 each	1.00	730.40	730.40
7	C 19/R6	P/F angle iron brackets for sinks.	1 each	2.00	513.60	1,027.20
8	C 19/08	P/F stainless stlle sink with drain board including bracket set waste pipe and waste coupling	1 each	1.00	11750.65	11,750.65
9	C 19/25	P/F chromium plated stop cock.	1 each	2.00	1390.40	2,780.80
10	C19/40	P/F cast iron man hole cover.				
		18" dia	1 each	1.00	2265.60	2,265.60
11	C-23/27	P/F PVC Pipe.				
		4" dia	1 Rft	10.00	548.65	5,486.50
		3" dia	1 Rft	20.00	365.95	7,319.00
12	C 19/R7	P/F 1/2" dia connection check nut copper.	1 each	4.00	552.25	2,209.00
13	C-19/7	Providing and fixing wash hand basin 22"x16" with pedestal.	1 each	1.00	9573.90	9,573.90
14	C-19/24	Providing and fixing piller cock 1/2"	1 each	1.00	2710.40	2,710.40
15	C-19/4	P/F white glazed earthen ware water closet	1 each	1.00	3609.85	3,609.85
		ELECTRIFICATION				
1	C 24/3	Supply and erection of PVC pipe for recessed wiring including bends and specials etc. in wall or trenches				
		20mm dia	1 Rft	150.00	104.75	15,712.50
2	C 24/10	Supply and erection of single core PVC insulated copper conductor cables in prelaid PVC pipes				
		3/0.029 "	1 Rft	1200.00	32.00	38,400.00
		7/0.029 "	1 Rft	300.00	55.70	16,710.00

S#	Ref. CSR P/Item	Description	Unit	Quantity	Rate	Amount
3	C 24/17	Supply and erection of M.S sheet box of 16 16SWG 10 cm deep				
		8"X10"	1 each	1.00	898.35	898.35
		7"X4"	1 each	2.00	479.55	959.10
		4"X4"	1 each	5.00	348.70	1,743.50
4	C 24/21	Supply and erection of Iron /Aluminium clad 500 V main switch with kitkat fuses on angle iron board with 3 mm thick 15/20 amp	1 each	1.00	3873.45	3,873.45
5	C 24/23	Supply and erection of Iron /Aluminium clad branch distribution board 250 volts on angle frame of suitable size with 3 mm sheet covering 3 way 15 amp per way	1 each	1.00	1763.60	1,763.60
6	C 24/52	Supply and erection of 3/8 dia M.S fan hook	1 each	4.00	88.95	355.80
7	C 24/54	Supply and erection of bracket of M.S channel 75X40X6 mm section				
		2' long for 2 lights	1 each	2.00	1332.65	2,665.30
8	C 24/33	Supply and erection of ceiling rose bakelite	1 each	8.00	90.35	722.80
9	C 24/34	Supply and erection of switches 5 amp piano type	1 each	25.00	97.00	2,425.00
10	C 24/58	Supply and erection of house service pipe	1 Rft	3.00	819.15	2,457.45
11	N/S	Supply and erection of 48" DIA fan with regulators and canopy complete in all respects	1 each	4.00	11500.00	46,000.00
12	C 24/80	Supply and erection of energy meter including meter testing fee				
		single phase130amp 250 volts	1 each	1.00	5262.00	5,262.00
					Total:- (Rs.)	**3,155,273.87**
		For 2 quarters				6,310,547.74
					Say:- (Rs.)	**6,310,548.00**

IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA CITY

Sub Head # I: Providing & Installation of Pumping Machinery

S #	Description	Qty	Unit	Rate	Cost
1	Providing, Installing, Testing and commissioning of non clogging Vertical sewage pumps cardon shaft vertical pumps with C.I impeller, shaft, with 65ft head, gross efficiency not less than 72% coupled with suitable electric vertical motor 3 phase, 400 volts, 50 Hz, insulation class F, voltage tolerance up to (+/-) 5%, IP-55, cast iron casing with integral hand hole, speed should not be excess then 1000 RPM for permanent installation in Dry well, electrical cable upto 100 ft., control cable upto 100 ft, alongwith motor control unit (consisting of metallic box, circuit breaker, magnetic contactor, on/off switch, contorl fuse, control wire, under / over voltage relay, high temperature protection, electonic over current relay, indication lamps, ampere meter, volt meter, hour run meter, auto star delta starter, dry running protection and automatic operation with level reuglators, phase reversal protection with phase projector an each phase and indication lamps.				
	8 cusec	3	Each	18,877,377.00	56,632,131.00
2	Design and construction of pump foundation and making other modification in the existing structure for installation of equipment complete.				
	8 cusec	3	Each	120,000.00	360,000.00
				Total:	**56,992,131.00**
				Say:	**56,992,131.00**

IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA CITY

Sub Head # J: Supply and Installation of 400 KVA Transformer.

Sr.#	Description	Unit	Qty.	Rate	Amount
1	Supply, insatllation, commissioning and testing of oil cooled type, Step down Power Transformer of specified rating,11/0.415 kV, i/c the cost of lifting hooks, thermometers, LT & HT bushing 5-steps, tap changer, imported double float buchholz relay, 2 earthing terminals, roller wheels, connecting terminals for cables M.S box on transformer in order to cover complete L.T side, all necessary materials required for connections on H.T & L.T side, rated voltage 11000/415/240 V impedance 6.25% or as specified by WAPDA/IEC system earth: Delta / Star, neutral solidly earthed, i/c Wapda testing charges,complete in all respects made of PEL, Siemens, as approved and directed by the Engineer Incharge				3,821,528.40
	Total:-				**3,821,528.40**

IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA CITY

Sub Head # K: Supply and Installation of 200 KVA Generator.

Sr.#	Description	Unit	Qty.	Rate	Amount
1	Supply of 200 KVA 380/415v 3-Phase 4 wire diesel generating set complete with braker panel, exhuasut silencer and deep sea control panel complete with all necessary accessories with sound and weather proof conopy.	Each	1	10,214,139.00	10,214,139.00
	ATS panel with MOR (TP)	Each	1	2,640,000.00	2,640,000.00
	(iv) Transportation from Lahore to Kamalia i/c loading and unloading etc.	L.S			35,000.00
		Total:-			**12,889,139.00**

IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA CITY

Sub Head # L: LT Change Over Pannel with PFI

S #	Description		Qty	Unit	Rate	Cost
1	600A 440VAC MANUAL CHANGEOVER PANEL WITH MCCBs 01 Set. 14 SWG MS sheet fabricated, free standing/floor mounting, indoor type, IP-44, front access as per required dimensions to compensate the given components, insulation class of 600 Volts, connections from top or buttom as per site requirment, suitable for 440 VAC, 3 phase 4 wire, 50Hz TPN&E system, complete with 1250A TPN&E Electrolytic copper bus bar, powder painted of color RAL 7032 baked at 200 deg cg complete in all respect as per given specification/requirement equipped as under:					4,952,337.00
1	MCCB, 3-Pole, 1250A, Icu/Ics 100/50KA, Hyundai/Eqv.	Nos.	2			
2	Mechanical Interlock System 2 in 1 Changeover	Nos.	1			
3	Phase Indication Lights 25mm (Red, Yellow, Blue)	Nos.	6			
4	Digital Power Meter 96x96 Tense/Eqv.	Nos.	1			
5	Current Transformer 1200/5A, Tense/Eqv.	Nos.	3			
6	MCB, 1-Pole, 6A, Hyundai/Eqv.	Nos.	3			
7	SPD, 4-Pole, Europe	Nos.	1			
8	MCB, 4-Pole, 63A, Hyundai/Eqv.	Nos.	1			
B	**Outgoing Section**					
1	MCCB, 3-Pole, 300A, Icu/Ics 45/45KA, Hyundai/Eqv.	Nos.	3			
2	MCCB, 3-Pole, 125A, Icu/Ics 26/26KA, Hyundai/Eqv.	Nos.	2			
3	MCCB, 3-Pole, 250A, Icu/Ics 45/45KA, Hyundai/Eqv.	Nos.	1			
B	**Auto PFI Section 350Kvar**					
1	Power Capacitor 50Kvar, 440VAC Electronicon Germany	Nos.	5			
2	Power Capacitor 25Kvar, 440VAC Electronicon Germany	Nos.	3			
3	Power Capacitor 12.5Kvar, 440VAC Electronicon Germany	Nos.	2			
4	MCCB, 100A, 3-Pole, 16KA, Hyundai/Eqv.	Nos.	5			
5	MCCB, 50A, 3-Pole, 16KA, Hyundai/Eqv.	Nos.	3			
6	MCCB, 30A, 3-Pole, 16KA, Hyundai/Eqv.	Nos.	2			
8	Magnetic Contactor 3-Pole, AC3~105A, Hyundai/Eqv.	Nos.	5			
9	Magnetic Contactor 3-Pole, 50A, Hyundai/Eqv.	Nos.	3			
10	Magnetic Contactor 3-Pole, 32A, Hyundai/Eqv.	Nos.	2			
12	Power Factor Controller 12-Step, Entes/Tense/Eqv.	Nos.	1			
13	On-Off Selector Switch Camsco/Eqv.	Nos.	1			
14	Auto-Off-Manual Selector Switch Camsco/Eqv.	Nos.	12			
15	ON Push Button Telemechanique/Eqv.	Nos.	12			
16	On Indication Lights Green Telemechanique/Eqv.	Nos.	12			
17	Current Transformer 1200/5A, Tense	Nos.	1			
18	MCB, 6A, 1-Pole, Hyundai/Eqv.	Nos.	3			
C	**Housing Of Panel Box**					
1	Panel Size in Millimeters: (2400 W x 2200 H x 700 D)	No.	1			
	Using of GI Sheet 14 Guage					
	With Powder Coating Paint RAL-7032					
	With Also Included Protection Sheet					
	Internal Plates Are Blue Powder Coating Paint					
	With Clear In All Aspects					
D	**Copper Busbar 99.9% Purity**					
1	Using of copper bus bar R,Y,B, Earth & Neutral	No.	1			
	With Clear In All Aspects					
E	**Power and Control Wiring**					
1	Using of copper cable power and control wiring	No.	1			
	With Clear in all Aspects					
F	**Making of Copper Busbar**					
1	Using of PLC Operated Machnies & Mechanical Tools	No.	1			
	Copper Making Bending & Holing with clear in all aspect					

Total: 4,952,337.00

IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA CITY

Sub Head # M: External & Internal electrification and cabling work

S #	Ref. CSR P/Item	Description	Qty	Unit	Rate	Cost
1		Providing and installation of electric cable copper conducter, PVC/PVC insulation				
	C-24/12	Transfer to metering Pannel. single core 91/0.103 (500mm)	72	Meter	22287.05	1,604,667.60
	C-24/12	Metering panel & Generator to LT Pannel single core 91/0.103	72	Meter	22287.05	1,604,667.60
	C-24/12	LT panel to sub pannel (MCB) single core 19/0.083	234	Meter	3126.50	731,601.00
		P/ F M.S cable tray 16 swg. Perforated 6" x 4".	380	Kg	550.00	209,000.00
		Providing solidering of thimble copper made heavy duty with required size of cable				
		i. 91/0.103	30	Each	945.00	28,350.00
		ii. 19/0.083	46	Each	585.00	26,910.00
		Earthing of electric motors, pannels	3	Each	210513.00	631,539.00
2	C-24/10	Supply and erection single core PVC insulated copper conductor cable 250/440 volts grad cable.				
		7/0.036	500	Meter	230.75	115,375.00
		3/0.029	711	Meter	104.9	74,583.90
3	C-24/34	Supply and erection of Switches 5 Amp piano Type.	60	Each	97.00	5,820.00
4	C-24/37	Supply and Erection of of 3 pin socket	20	Each	118.45	2,369.00
5	C-24/33	Supply and erection of ceiling rose	15	Each	90.35	1,355.25
6	C-24/80	Supply and erection of holder for energy meter.	28	Each	5235.60	146,596.80
7	C-24/16	supply and erection of teak wood board.				
		i) 7"x4"	3	Each	188.50	565.50
		ii) 9"x4"	6	Each	204.10	1,224.60
	N.S	iii) 4"x4"	15	Each	110.20	1,653.00
8		Supply and fitting of LED using complete with choke set.				
		i) 60 watt lamp	4	Each	25115.00	100,460.00
9	C-24/71	Supplying, installation testing and commissioning of Octagonal shape electric street light pole, made of hot dipped 4.5 mm thick (7 SWG) galvanized steel, tappered from 225 mm at bottom to 100 mm at top, with 1500 mm x 60 mm x 4mm thick dia. arm for luminaire installation, duly G.I.welded with 470x470x20 mm base plate with the help of 4 no triangular stiffeners 100x350x20 mm of GI sheet, with built in junction box with shutter, i/c the cost of nuts & J-rag bolts, duly fixed in prelaid concrete foundation, foundation will be paid additionally as approved and directed by the Engineer In charge.				
		a) Single Arm				
		(i) 10 mtr height	6	Each	150866.95	905,201.70
	C-24/72	Supplying, installation and commissioning of LED Cobra-head Luminaries of specified wattage and lumens conforming to IP 66 & IK 08 or above Philips/Osram/Thorn or equivalent with corrosion resistant die casted Aluminum housing, silicon gasket in special groove, UV stable & scratch resistant synthetic materials, thermally hardened glass complete with LED Chip (Philips Lumiled / Cree / Nichia / Osram make or equivalent), programmable LED driver (Harvard/TCI/Lumotech/Philips/VOSSLOH Schwabe/Lightech make or equivalent), minimum 10kV surge protection rating i/c the cost of all accessories / components required for proper operation, fully flexible for future upgradation and easy replacements for maintenance purposes, bucket elevator charges as approved and directed by the Engineer Incharge				
		a) 140 Lm/Watt				
		(iii) 60 Watt with 8400 lumens	6	Each	77,219.15	463,314.90
		c) 120 Lm/Watt				
		(i) 30 Watt with 3600 lumens	10	Each	51,620.90	516,209.00

10	C-24/3	PVC Pipe 20 mm	700	Rft	104.75	73,325.00
		25 mm	690	Rft	125.50	86,595.00
12	N.S	Providing and fixing Copper winded Exhaust fan with louver and shutter made of Pak/Younas/G.F.C. i/c the cost of necessary cable and hardware for connection from ceiling rose complete as approved and directed by Engineer Incharge.				
		(b) Steel body				
		(ii) 18" sweep	4	Each	4,810.85	19,243.40
13	N.S	Ceiling fan 54"	9	Each	11500	103,500.00
14	N.S	Providing and installation of distribution box of M.S Sheet with 6 No. circuit breaker of 10 amp & earth leakage circuit breaker.	1	Each	22150	22,150.00
					Total:	**7,476,277.25**
					Say:	**7,476,277.00**

DETAILED QUANTITY SEWER
FOR THE SCHEME
PROVIDING AND LAYING FORCEMAIN FROM DISPOSAL STATION TO WWTP KAMALIA CITY

Part-A

S #	Description	No.	Measurements			Quantity
			L	B	H	
1	Dismantling and removing road pavement etc, including screening and stacking of by products upto chain (30m) lead.					
	630 mm dia		215.00	3.50	2.00	1,505.00
2	Earth work excavation in open cutting forsewers and manholes as shown in draw -ings including shuttering and timbering, dressing to correct sections and dimensionsaccording to templates and levels, and removing surface water, in all types of soilexcept shingle gravel and rock.					
	630 mm dia		11,485.00	3.50	5.50	221,086.25
3	Providing, laying, cutting, jointing, testing and disinfecting High Density Polyethylene Pipe (HDPE-100) working presure pipe, Beta/ Dadex/ Popular/ IIL or equivalent including the cost of specials, in trenches, as approved & directed by the engineer incharge, complete in all respects.					
	630 mm dia PN-8		11,485.00			11,485.00
4	(i) Rehandling of earth work.					
	(a) Lead upto a single throw of Kassi, phaorah or shovel.		176,869.00	-	-	176,869.00
	(ii) Compaction of earth work.			-	-	
	(a) Mixing, moistening earth to optimum moisture content in layers for compaction etc. complete.		176,869.00			176,869.00
5	Supplying and filling sand under floor; or plugging in wells.					
	630 mm dia		11,485.00	3.50	0.50	20,098.75
6	Providing and fixing heavy duty Pressure Relief Valve of specified diameter and material for pressure rating PN-16 made of Crane (USA), Hatersly (UK) or Scon (Pakistan) integral device with a pressure setting, a restrictor and a sensor all in the one body, i/c the cost of all accessories flanges,nut/bolt and gaskit where required complete in all respect as approved and directed by the Engineer Incharge					
	2-1/2" dia					-
7	Providing and fixing heavy duty Gate valve of specified diameter and material for pressure rating PN-16 mde of Crane (USA), Hatersly (UK) or Scon (Pakistan) i/c the cost of all accessories flanges,nut/bolt and gaskit where required complete in all respect as approved and directed by the engineer incharge (Flange ended ductile iron valve)					
	630 mm		3.00			3.00
8	Providing and \fixing Non-Return Valve Flange with S.S Plate and fitting Complete in all respect					
	630 mm dia		3.00			3.00
9	Construction of Drain for interception with existing drain 2ftx3.75ft		270.00			270.00
10	Construction of outlet chamber 6ft dia		1.00			1.00
11	P.C.C 1:2:4 for Trust Block		400.00			400.00
12	Construction of Air valve / Sluice valve chamber		4.00			4.00
13	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl, kankar lime (unslaked), surkhi, etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor. (Ch.No. 1, Item.No. 1)					
	Ratio (1:2.4)	1	400.00	0.88		352.00

DETAILED ESTIMATE
FOR THE SCHEME
PROVIDING AND LAYING FORCEMAIN FROM DISPOSAL STATION TO WWTP KAMALIA CITY

Part-A (Govt. Notified Rates) January 2023 to July 2023

S#	Ref. CSR P/Item	Description	Unit	Quantity	Rate	Amount
1	C-4/46	(i) Dismantling and removing road pavement etc, including screening and stacking of by products upto chain (30m) lead.	100 Cft.	1,505.00	3,468.00	52,193.40
2	C-3/42	Earth work excavation in open cutting for sewers and manholes as shown in drawings including shuttering and timbering, dressing to correct sections and dimensions according to templates and levels, and removng surface water, in all types of soil except shingle gravel and rock. (i) 0 ft to 7 ft. Depth	1000 Cft.	221,086.25	15,688.05	3,468,412.14
3	C-23/43	Providing, laying, cutting, jointing, testing and disinfecting High Density Polyethylene Pipe (HDPE-100) working presure pipe, Beta/ Dadex/ Popular/ IIL or equivalent including the cost of specials, in trenches, as approved & directed by the engineer incharge, complete in all respects. 630 mm dia (PN-8)	1 Rft	11,485.00	16,116.15	185,093,982.75
4	C-3/13	(i) Rehandling of earth work. (a) Lead upto a single throw of Kassi, phaorah or shovel or shovel.	1000 Cft.	176,869.00	3,247.20	574,329.02
	C-3/24a,c	(ii) Compaction of earth work. (a) Mixing, moistening earth to optimum moisture content in layers for compaction etc. complete.	1000 Cft.	176,869.00	1,308.40	231,415.40
5	C-10/3	Supplying and filling sand under floor; or plugging in wells.	100 Cft.	20,098.75	3,061.20	615,262.94
6	C-23/56	Providing and fixing heavy duty Pressure Relief Valve of specified diameter and material for pressure rating PN-16 made of Crane (USA), Hatersly (UK) or Scon (Pakistan) integral device with a pressure setting, a restrictor and a sensor all in the one body, i/c the cost of all accessories flanges,nut/bolt and gaskit where required complete in all respect as approved and directed by the Engineer Incharge **2-1/2" dia**	Per Job	-	70,233.60	-
7	C-23/52 xx	Providing and fixing heavy duty Gate valve of specified diameter and material for pressure rating PN-16 mde of Crane (USA), Hatersly (UK) or Scon (Pakistan) i/c the cost of all accessories flanges,nut/bolt and gaskit where required complete in all respect as approved and directed by the engineer incharge (Flange ended ductile iron valve) **630 mm**	Per Job	3.00	1,533,384.00	4,600,152.00
8	N.S	Providing and \fixing Non-Return Valve Flange with S.S Plate and fitting Complete in all respect **630 mm dia**	Per Job	3.00	1,350,000.00	4,050,000.00
9	RA	Construction of Drain for interception with existing drain 2ftx3.75ft	Rft	270.00	9,859.00	2,661,930.00
10	RA	Construction of outlet chamber 6ft dia	Job	1.00	311,235.00	311,235.00
11	C-6/5	Cement concrete plain including, placing, compacting, finishing, and curing complete (including screening and washing of stone aggregate. (II) P.C.C. 1:2:4	100 Cft.	400.00	43,837.20	175,348.80
12	C-1/1	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl, kankar lime (unslaked), surkhi, etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor. (Ch.No. 1, Item.No. 1)	100 Cft	352.00	10,918.32	38,432.47
13	N.S	Construction of Air valve / Sluice valve chamber	100 Cft.	4.00	74,135.00	2,965.40
				Total:- (B)	**Rs.**	**201,875,659.32**
				Say:-	**Rs.**	**201.88 Million**

RATE ANALYSIS

CONSTRUCTION OF COLLECTING SUMP 6FT DIA

Unit =1

Sr.#	Chap # / Item #	Description	No.	Measurement L	W	D	Qty	Unit
1	C-3/7	Earthwork excavation in open cutting upto 1.5m depth for storm water channels, drains, sullage drains, in open areas, roads, streets, lanes, including under pining of walls and shoring to protect existing works, shuttering and timbering the trenches, dressed to designed levels and dimensions, trimming, removal of surface water from trenches, backfilling and surplus excavated material disposed of and dressed within 15m lead:-	1	3.14x13x13x0.25		6.00	795.99	Cft
2	C-10/3	Supplying and filling sand under floor; or plugging in wells. (20% of excavation)					159.20	Cft
3	6/5	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone aggregate).						
		(h) Ratio 1: 3: 6	1	3.14x8.83x8.83x0.25		0.33	20.20	Cft
4	6/6	Providing and laying reinforced cement concrete (including prestressed concrete), using Ordinary Portland Cement / Sulphate resisting cement / Slag cement as may be required; coarse sand screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (but excluding the cost of steel reinforcement, its fabrication and placing in position, etc.):-						
	6/6	(a)(iii) Reinforced cement concrete in slab of rafts / strip foundation, base slab of column and retaining walls; etc and footing beams, other structural members other than those mentioned in 6(a) (i)& (ii) above not requiring form work (i.e. horizontal shuttering) complete in all respects:-						
		(1) Type A (nominal mix 1: 1.5: 3)	1	3.14x8.33x8.33x0.25		0.67	36.50	Cft
		(a) (i) Reinforced cement concrete in roof slab, beams, columns lintels, girders and other structural members laid in situ or precast laid in position, or prestressed members cast in situ, complete in all respects:- (1) Type A (nominal mix 1:1.5:3	1	3.14x6.67	0.67	6.5	91.21	Cft
			1	3.14x7.33x7.33x0.25		0.58	24.46	
							152.17	
	6/12	Fabrication of mild steel reinforcement for cement concrete, including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust from bars):- ('c) Deformed bars (Grade-60)			2.5 kg/cft		319.26	Kg

Sr.#	Chap # / Item #	Description	No.	Measurement			Qty	Unit
				L	W	D		
6	C-1/1	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl, kankar lime (unslaked), surkhi, etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor.						
		(Ch.No. 1, Item.No. 1)						
		Ratio (1:3.6)	1	20.20	0.92		18.66	
		Ratio (1:1.5.3)	1	188.66	0.84		158.48	
							177.14	
7	6/31A	Providing and embedding 10" (250mm) wide PVC water stopper in expansion joints of RCC structures (Retaining walls, water tanks, Slabs) complete in all respect.						
		i) 10"wide 6 mm thick	1	3.14x6.67			20.94	Rft
8		RPC Manhole Cover Manufactured with 100% Recycled Plastic Composite Material, 650 mm (26"dia) with clear opening size 600 mm (22" dia) and RPC manhole frame having dia meter 790 mm (31.1") with average breaking load capacity of 10 Ton and weight including frame of 50 kg (Minimum).	1				1.00	Each
9	13/9	Bitumen coating to plastered or cement concrete surface:-						
		i) 20 lbs. per 100 Sft. (9.07 Kg per Sq.m)	1	3.14x7.33		7.25	166.87	Sft

RATE ANALYSIS

CONSTRUCTION OF COLLECTING SUMP 6FT DIA

Sr. No.	Ref. CSR	Description	Unit		Quantity	Rate (Rs)	Amount (Rs)
1	C-3/7	Earthwork excavation in open cutting upto 1.5m depth for storm water channels, drains, sullage drains, in open areas, roads, streets, lanes, including under pining of walls and shoring to protect existing works, shuttering and timbering the trenches, dressed to designed levels and dimensions, trimming, removal of surface water from trenches, backfilling and surplus excavated material disposed of and dressed within 15m lead:-	1000	Cft	795.99	11,558.50	9,200.45
2	C-10/3	Supplying and filling sand under floor; or plugging in wells.	100	Cft	159.20	3,061.20	4,873.37
3	6/5	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone (h) Ratio 1: 3: 6	100	Cft	20.20	38,182.80	7,712.10
4	6/6	Providing and laying reinforced cement concrete (including prestressed concrete), using Ordinary Portland Cement / Sulphate resisting cement / Slag cement as may be required; coarse sand screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (but excluding the cost of steel reinforcement, its fabrication and placing in position, etc.):-					
		(a)(iii) Reinforced cement concrete in slab of rafts / strip foundation, base slab of column and retaining walls; etc and footing beams, other structural members other than those mentioned in 6(a) (i)& (ii) above not requiring form work (i.e. horizontal shuttering) complete in all respects:-					
		(1) Type A (nominal mix 1: 1.5: 3)	Per	Cft	36.50	597.40	21,802.17
		(a) (i) Reinforced cement concrete in roof slab, beams, columns lintels, girders and other structural members laid in situ or precast laid in position, or prestressed members cast in situ, complete in all respects:-					
		(1) Type A (nominal mix 1:1.5:3)	Per	Cft	152.17	733.45	111,607.70
5	6/12	Fabrication of mild steel reinforcement for cement concrete, including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust from bars):-					
		('c) Deformed bars (Grade-60)	100	Kg	319.26	35068.45	111,960.71
6	1/1	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl , kankar lime (unslaked), surkhi , etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor. Lead From nearest quarry (173.88km)	100	Cft	177.14	10,918.32	19,340.69

Sr. No.	Ref. CSR	Description	Unit		Quantity	Rate (Rs)	Amount (Rs)
7	6/31A	Providing and embedding 10" (250mm) wide PVC water stopper in expansion joints of RCC structures (Retaining walls, water tanks, Slabs) complete in all respect.					
		i) 10"wide 6 mm thick	Per	Rft	20.94	412.80	8,645.60
		RPC Manhole Cover Manufactured with 100% Recycled Plastic Composite Material, 650 mm (26"dia) with clear opening size 600 mm (22" dia) and RPC manhole frame having dia meter 790 mm (31.1") with average breaking load capacity of 10 Ton and weight including frame of 50 kg (Minimum).		Each	1.00	11592.00	11,592.00
8	13/9	Bitumen coating to plastered or cement concrete surface:-					
		i) 20 lbs. per 100 Sft. (9.07 Kg per Sq.m)	100	Sft	166.87	2697.05	4,500.50
						Total	**311,235.29**
						Say Rs.	**311,235.00**

RATE ANALYSIS

CONSTRUCTION OF DRAIN 2'X3.75'

Unit =10'

Sr.#	Chap # / Item #	Description	No.	Measurement			Qty	Unit
				L	W	D		
1	C-3/7	Earthwork excavation in open cutting upto 1.5m depth for storm water channels, drains, sullage drains, in open areas, roads, streets, lanes, including under pining of walls and shoring to protect existing works, shuttering and timbering the trenches, dressed to designed levels and dimensions, trimming, removal of surface water from trenches, backfilling and surplus excavated material disposed of and dressed within 15m lead:-	1	10	4.50	3.25	146.25	Cft
2	7/30	Supplying and filling sand under floor; or plugging in wells. (20% of excavation)					29.25	Cft
3	6/5	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone aggregate).						
		(h) Ratio 1: 3: 6	1	10	4.5	0.25	11.25	Cft
4	6/6	Providing and laying reinforced cement concrete (including prestressed concrete), using Ordinary Portland Cement / Sulphate resisting cement / Slag cement as may be required; coarse sand screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (but excluding the cost of steel reinforcement, its fabrication and placing in position, etc.):-						
		(a) (i) Reinforced cement concrete in roof slab, beams, columns lintels, girders and other structural members laid in situ or precast laid in position, or prestressed members cast in situ, complete in all respects:-						
		(1) Type A (nominal mix 1:1.5:3	2	10	0.5	3.5	35.00	Cft
	6/6	(a)(iii) Reinforced cement concrete in slab of rafts / strip foundation, base slab of column and retaining walls; etc and footing beams, other structural members other than those mentioned in 6(a) (i)& (ii) above not requiring form work (i.e. horizontal shuttering) complete in all respects:-						
		(1) Type A (nominal mix 1: 1.5: 3)	1	10	4	0.5	20.00	Cft
5	6/12	Fabrication of mild steel reinforcement for cement concrete, including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust from bars):-						
		('c) Deformed bars (Grade-60)			2.0 kg/cft		110.00	Kg
6	C-1/1	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl, kankar lime (unslaked), surkhi, etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor.						
		(Ch.No. 1, Item.No. 1)						
		Ratio (1:3.6)	1	11.25	0.92		10.40	
		Ratio (1:1.5.3)	1	55.00	0.84		46.20	
							56.60	
7	6/31A	Providing and embedding 10" (250mm) wide PVC water stopper in expansion joints of RCC structures (Retaining walls, water tanks, Slabs) complete in all respect.						
		i) 10"wide 6 mm thick	2	10			20.00	Rft
8	13/9	Bitumen coating to plastered or cement concrete surface:-						
		i) 20 lbs. per 100 Sft. (9.07 Kg per Sq.m)	1	10		4	40.00	Sft

RATE ANALYSIS

CONSTRUCTION OF DRAIN 2'X3.75'

Sr. No.	Ref. CSR	Description	Unit		Quantity	Rate (Rs)	Amount (Rs)
1	C-3/7	Earthwork excavation in open cutting upto 1.5m depth for storm water channels, drains, sullage drains, in open areas, roads, streets, lanes, including under pining of walls and shoring to protect existing works, shuttering and timbering the trenches, dressed to designed levels and dimensions, trimming, removal of surface water from trenches, backfilling and surplus excavated material disposed of and dressed within 15m lead:-	1000	Cft	146.25	11,558.50	1,690.43
2	7/30	Supplying and filling sand under floor; or plugging in wells. (Provisional as Slect Fill)	100	Cft	29.25	3,061.20	895.40
3	6/5	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone aggregate).					
		(h) Ratio 1: 3: 6	100	Cft	11.25	38,182.80	4,295.57
4	6/6	Providing and laying reinforced cement concrete (including prestressed concrete), using Ordinary Portland Cement / Sulphate resisting cement / Slag cement as may be required; coarse sand screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (but excluding the cost of steel reinforcement, its fabrication and placing in position, etc.):-					
		(a)(iii) Reinforced cement concrete in slab of rafts / strip foundation, base slab of column and retaining walls; etc and footing beams, other structural members other than those mentioned in 6(a) (i)& (ii) above not requiring form work (i.e. horizontal shuttering) complete in all respects:-					
		(1) Type A (nominal mix 1: 1.5: 3)	Per	Cft	20.00	597.40	11,948.00
		(a) (i) Reinforced cement concrete in roof slab, beams, columns lintels, girders and other structural members laid in situ or precast laid in position, or prestressed members cast in situ, complete in all respects:-					
		(1) Type A (nominal mix 1:1.5:3)	Per	Cft	35.00	733.45	25,670.75
5	6/12	Fabrication of mild steel reinforcement for cement concrete, including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust from bars):-					
		('c) Deformed bars (Grade-60)	100	Kg	110.00	35068.45	38,575.30
6	1/1	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl , kankar lime (unslaked), surkhi , etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor. Lead From nearest quarry (173.88km)	100	Cft	56.60	10,918.32	6,179.22
7	6/31A	Providing and embedding 10" (250mm) wide PVC water stopper in expansion joints of RCC structures (Retaining walls, water tanks, Slabs) complete in all respect.					
		i) 10"wide 6 mm thick	Per	Rft	20.00	412.80	8,256.00
8	13/9	Bitumen coating to plastered or cement concrete surface:-					
		i) 20 lbs. per 100 Sft. (9.07 Kg per Sq.m)	100	Sft	40.00	2,697.05	1,078.82
						Total	**98,589.48**
						Rate P/Rft	**9,858.95**
						Say Rs.	**9859.00**

Restoration of Roads (Forcemain)

S.No.	Detail of Item/Work	Measurements			Quantity
		L	B	H	
1	2	3	4	5	6
1	Supplying and filling sand under floor; or plugging in wells. 30" dia forcemain	215.00	3.50	2.00	1,505.00
2	Re-Laying of Sub Base Course by using old material (received through dismentalling of road crust, compacted up to 100% modified AASHO dry density complete in all respect. (Labour Rate only)18/3a-II 30" dia forcemain	215.00	3.50	1.50	1,128.75
3	Providing and laying of road edging of 3" wide and 9" deep brick on end complete in all respect. 18/5	215.00	2.00		430.00
4	Providing & Laying (Water Bound macadam) Base Course of crushed stone aggregate form Kirana quarry of required thickness of approved quality and grade, and supply and spreading of stone screening , including placing, mixing, spreading and compaction of base course material to required depth, camber and grade to achieve 100% maximum modifed AASHO dry density, including carriage of all materials to site of work, complete in all respect. 18/4a	215.00	3.50	0.67	504.18
5	Providing and Laying bitumenious priming coat, using 10 Lbs kerosin oil and 10 lbs binder per 100 Sft or 0.5 Kg Kerosene and 0.5 Kg binder per square metre.	215.00	3.50		752.50
6	Providing ana laying Plant Premixed bitumenious carpt i/c compaction and finishing to required grade camber and density with 4.5 % bitumen 2.00" thick. (AWC)	215.00	3.50		752.50

Restoration of Roads (Forcemain)

Sr. No:	Description of items	Quantity	Rate	Unit	Amount
1	Providing and laying sand under and around the sewer pipe, including leveling, manual compaction, complete in all respect.	1505.00	3,061.20	P.% Cft	46,071
2	Re-Laying of Sub Base Course by using old material (received through dismentalling of road crust, compacted up to 100% modified AASHO dry density complete in all respect. (Labour Rate only)18/3a-II	1128.75	6,815.25	P.% Cft	76,927
3	Providing and laying of road edging of 3" wide and 9" deep brick on end complete in all respect. 18/5	430.00	57.40	P.Rft	24,682
4	Providing & Laying (Water Bound macadam) Base Course of crushed stone aggregate form Kirana quarry of required thickness of approved quality and grade, and supply and spreading of stone screening , including placing, mixing, spreading and compaction of base course material to required depth, camber and grade to achieve 100% maximum modifed AASHO dry density, including carriage of all materials to site of work, complete in all respect. 18/4a	504.18	34,028.20	P.% Cft	171,562
5	Providing and Laying bitumenious priming coat, using 10 Lbs kerosin oil and 10 lbs binder per 100 Sft or 0.5 Kg Kerosene and 0.5 Kg binder per square metre.C-18/6	752.50	2,101.05	P.% Sft	15,810
6	Providing ana laying Plant Premixed bitumenious carpt i/c compaction and finishing to required grade camber and density with 4.5 % bitumen 2" thick. (AWC)	752.50	17,224.65	P.% Sft	129,615
				Total	**464,667.00**
					0.46

DETAILED QUANTITIES

RATE ANALYSIS FOR CONSTRUCTION OF AIR / SLUICE VALVE CHAMBER

Sr.No.	C.S.R.	Description	No.	L	B	H	Quantity
1	C-3/21,b	Excavation in foundation of building, bridges and other structures, including dagbelling, dressing, refilling aroung structure with excavated earth, watering and ramming lead upto one chain and lift upto 5 ft.					
		b.in ordinary soil.	1	7.5	7.5	7.5	**421.88**
2	C-6/3-b	Cement concrete brick or ballast 1 1/2" to 2" gauge in foundation and plinth Ratio (1:4:8)	1	7.5	7.5	0.50	**28.13**
3	C-6/5	P.C.C. (1:2:4)	1	4.0	4.0	0.25	**4.00**
4	C-7/7,i	Pacca brick work other than building upto 10 ft height)1:3) cement sand mortor.	2	6.25	1.125	6.00	84.38
			2	4	1.125	6.00	54.00
							138.38
5	C-11/8-b	Cement plaster 1/2" thick (1:3) thick.	4	6.3		6.00	150.00
			4	4.0		6.00	96.00
							246.00
6	C-6/6-a-1	R.C.C. Slab (1:2:4)	1	6.25	6.25	0.67	26.17
		Deduction	1	3.14x1.83x1.83/4		0.67	1.76
						Net	**24.41**
7	C-6/9,b	Fabrication of mild steel reinforcement of cement concrete inclduing cutting, bending, laying in position, making joints and fastenings, including cost of binding reinfrocmeent (also includes removal of rust form bars.					
		b) Deformed bars (Grade-60)	1	24.41x6.75/2.204			**74.76**
8	Rate analysis	Providing/fixing RPC manhole cover with cover with tee shaped frame 22" I/d (frame atleast 50 kg) as per standard drg. & specifications.	1				**1.00**

DETAILED COST

RATE ANALYSIS FOR CONSTRUCTION OF AIR / SLUICE VALVE CHAMBER

Sr.No.	C.S.R.	Description	Unit	Quantity	Rate	Amount
1	C-3/21,b	Excavation in foundation of building, bridges and other structures, including dagbelling, dressing, refilling aroung structure with excavated earth, watering and ramming lead upto one chain and lift upto 5 ft. b.in ordinary soil.	1000 Cft	269.50	13669.90	3,684.04
2	C-6/3-b	Cement concrete brick or ballast 1 1/2" to 2" gauge in foundation and plinth Ratio (1:4:8)	100 Cft	24.50	28594.20	7,005.58
3	C-6/5	P.C.C. (1:2:4)	100 Cft	4	43837.20	1,753.49
4	C-7/7,i	Pacca brick work other than building upto 10 ft height)1:3) cement sand mortor.	100 Cft	68.53	35504.50	24,331.23
5	C-11/8-b	Cement plaster 1/2" thick (1:3) thick.	100 Sft	72	4132.80	2,975.62
6	C-6/6-a-1	R.C.C. Slab (1:2:4)	1 Cft.	13.28	674.30	8,954.70
7	C-6/12,b	Fabrication of mild steel reinforcement of cement concrete incldluing cutting, bending, laying in position, making joints and fastenings, including cost of binding reinfrocmeent (also includes removal of rust form bars. b) Deformed bars (Grade-60)	100 Kg	39.46	35068.45	13,838.01
8	Rate analysis	Providing/fixing RPC manhole cover with cover with tee shaped frame 22" I/d (frame atleast 50 kg) as per standard drg. & specifications.	1 Each	1	11592.00	11,592.00
					Total:-Rs.	**74,134.67**
					Say: Rs:	**74,135.00**

IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA CITY

Rate Analysis for Lead

Ser	Description	Unit	Quantity	Rate	Amount (Rs.)
A	**Carraige** Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl, kankar lime (unslaked), surkhi, etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor. Chapter No - 1 / Item no - 1				
	1st Km	100 Cft	1	334.80	334.80
	2nd Km	100 Cft	1	160.30	160.30
	3rd Km	100 Cft	1	126.40	126.40
	4th Km	100 Cft	1	90.55	90.55
	5th Km	100 Cft	1	84.65	84.65
	6th Km	100 Cft	1	83.30	83.30
	7th Km	100 Cft	1	77.85	77.85
	8th Km	100 Cft	1	77.05	77.05
	9th Km	100 Cft	1	72.55	72.55
	10th Km	100 Cft	1	68.20	68.20
	10th Km to 173.88 Km / 173.88 - 10 = 163.88 Km	100 Cft	163.88	59.45	9,742.67
				Total Cost of 100 Cft	**10,918.32**

IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA CITY

GENERAL ABSTRACT OF COST OF WWTP

S #	Description	Amount (Rs.)	
1	**Sub Head-11 WWTP**		
A	**Anearobic, Facultative and Sludge Drying Pond (MRS)**		
A-1	Anearobic, Facultative and Sludge Drying Pond (MRS)	Rs.	135.67
A-2	Anearobic, Facultative and Sludge Drying Pond (Non MRS)	Rs.	40.16
A-3	Floating wetland in Facultative ponds	Rs.	51.98
B	**Collecting sump, Drains, course screen, fine screen, grit Chamber, Distribution Chambers, Inlet Chamber & OutLet chamber**		
B-1	Inlet/Outlet Channels & Collection/ Distribution Chambers (MRS)	Rs.	155.42
B-2	Inlet/Outlet Channels & Collection/ Distribution Chambers (NON MRS)	Rs.	37.50
C	Transformer 50 KVA & Fesco Connection	Rs.	2.02
D	Office Building	Rs.	7.81
E	Staff building	Rs.	3.38
F	Area Lighting works of WWTP	Rs.	36.36
G	Provision of Crossing of Distributory	Rs.	4.50
		Rs.	**474.79 millions**

IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA CITY

Sub Head # A-1: Anearobic, Facultative and Sludge Drying Pond

Sr. No.	Chap # / Item #	Description	Unit	Quantity	Rate (Rs)	Amount (Rs)
1	3/52	Earthwork in excavation of drains, irrigation channels through excavator / drag lines in all kind of soil and conditions(dry, slush,daldal and under water) including its disposal and preparation of working pad for operation of machinery. (Rates includes 100 ft lead)	1000 Cft	8,718,158.00	4,676.00	40,766,106.81
2	3/25	Compaction of earthwork with power road roller, including ploughing, mixing, moisturing earth to optimum moisture content in layers, etc, complete:- i) 95% to 100% maximum modified AASHO dry density. (Qunatity of compaction includes embankments and in bed of ponds from excavated earth within site. (Contractor will stack the excavated earth from site at suitable places and then will use it for embankments. Quantity of excavated material	1000 Cft	1,976,804.40	1,664.75	3,290,885.12
3	C-3/20	Dressing of earthwork (done by machinery or otherwise and left undressed) to designed section.	100 Sft	425,251.75	306.10	1,301,695.61
4	C-3/17	Transportation of earth all types when the total distance, including the lead covered in the item of work, is more than 1000 ft. (300 m) (This is provisional quantity and will be paid as per actual lead chart to be approved by the Engineer) b) for every 330 ft. (100 m) additional lead or part thereof, beyond ¼ mile (400 m) upto one mile. (1 Km.)	1000 Cft	6,741,353.60	5387.6	36,319,716.66
5	18/20	Providing and laying dry brick pavement /soling in streets or roads, etc. sand grounted, laid in proper camber, including preparation, watering, compaction of bed to proper camber, and sand cushion.	100 Cft	43,507.50	25,513.15	11,100,133.74
6	26/42	Providing and fixing barbed wire fencing, with 4 horizontal and two cross wires, with R.C.C. 1:2:4 posts, 5.5'x6"x9" (1.68mx150mmx225 mm) at 8 ft. (2.45 m) centre to centre, reinforced with 4 No. 3/8" (10 mm) dia vertical bars and 1/8" (3 mm) dia stirrups 12" (300 mm) centre to centre, complete in all respects.. ii) in cement concrete 1:4:8 base of size 12"x12"x21" (300x300x525 mm).	100 Rft	5449.00	66,900.60	3,645,413.69
7	Analysis attached	Construction of gate Making and fixing steel grated doors, complete with locking arrangement, angle iron frame 2"x2"x3/8" 50x50x10 mm) and ¾" (20 mm) square bars 4" (100 mm) centre to centre.	No.	2.00	343,749.00	687,498.00
8	16/31i+iii	Providing and laying stone pitching, hand packed, with surface levelled off to the correct section and voids filled in 1:8 cement, sand mortar, in floors of bridges along banks and in appons etc i) top layer on slope	100 Cft	150782.25	17,119.50	25,813,167.29
9	C-26/37 misc	Supplying and laying polythene sheet over D.P.C. under floors and on roofs, etc. ii) 500 gauge (.005" thick)	1 Sft	1249183.50	10.20	12,741,671.70
		Total Amount MRS Items				**135,666,288.61**
					Say Rs.	**135.67 Million**

RATE ANALYSIS FOR CONSTRUTION OF GATE

Item No.	Description	No	Measurements			Quantity
			L	B	D	
1	Excavation in foundation of bulidings, bridges and other structures including dagbelling, dressing, refiling around structures with excavated earth watering and reamming lead upto one chain and lift ordinary soil.					
	0' to 5.0 ft. Depth	2	3.00	3.00	2.50	45.00
2	Cement concrete brick or stone ballast 1-1/2" to 2" (40mm to 50 mm guage in foundation and plinth					
	Ratio (1:4:8)	2	3.00	3.00	0.25	4.50
3	Pacca brick work other than building upto					
	10 ft height in 1:5 cement sand mortor.	4	3.00	0.75	1.25	11.25
		4	1.50	0.75	1.25	5.63
		4	3.00	0.38	5.00	22.50
		4	2.25	0.38	5.00	16.88
						56.25
4	P/L damp proof course with cement concrete 1:2:4 using cement sand and shingle including bitumen coating					
	with 2 coats of bitumen 2" thick	4	3.00	0.38		4.50
		4	2.25	0.38		3.38
						7.88
5	Pucca brick work in ground floor:-					
	(i) Cement sand mortar 1:4	4	3.00	0.38	7.00	31.50
		4	2.25	0.38	7.00	23.63
						55.13
6	Cement pointing struck joints on walls, upto 20' height:					
	b) ratio 1:2	4	3.00		7.00	84.00
		4	2.25		7.00	63.00
						147.00
7	P/L reinforced cement concrete (including prestressed concrete), using coarse sand and aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing,rendering and finishing exposed surface, complete.					
	(a) Reinforced cement concrete in slab of Raft/strip foundation; base slab of column and retaining walls; etc. and other structural members other than those mentioned in 5(a) (i) above not requiring from work, complete in all respects:-					
	Type C (nominal mix 1:2: 4)	2	3.00	3.00	0.67	12.06
	2x4	8	1.88	1.125	0.17	2.88
		2	0.75	0.75	14.75	16.59
						31.53
8	Fabrication of mild steel reinforcement for cement concrete including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust).					
	(b) deformed bars. # 6	10	3.25	32.50	1.5/2.204	22.12
		14	3.25	45.50	1.5/2.204	30.97
		8	13.75	110.00	1.5/2.204	74.86
	# 2	26	3.17	82.42	0.17/2.204	6.36
						134.31
9	Making and fixing steel grated doors complete with locking arrangement, angle iron frame 2"x2"x3/8" and 3/4" square walls 4" center to center.	1	16	6		96.00
10	Preparing surface and painting guard bars , gates of iron					
	priming coat	2	16	6		192
	each subsequent coat	2	16	6		192
11	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl, kankar lime (unslaked), surkhi, etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor. (Ch.No. 1, Item.No. 1)					
	Ratio (1:4:8)	1	4.50	0.95		4.26
	Ratio (1:2:4)	1	31.53	0.88		27.75
						32.01

RATE ANALYSIS FOR CONSTRUTION OF GATE

Sub Head # I-II: Construction of Main Gate:

Item No.	Ref Sor Item/Page	Description	Unit	Qty.	Rate (Rs.)	Amount (Rs.)
1	C-3/21	Excavation in foundation of bulidings, bridges and other structures including dagbelling, dressing, refiling around structures with excavated earth watering and reamming lead upto one chain and lift ordinary soil.				
		0' to 5.0 ft. Depth	1000 Cft	45.00	13669.90	615.15
2	C-6/3	Cement concrete brick or stone ballast 1-1/2" to 2" (40mm to 50 mm guage in foundation and plinth				
		Ratio (1:4:8)	100 Cft	4.50	34098.00	1,534.41
3	C-7/7	Pacca brick work other than building upto				
		10 ft height in 1:5 cement sand mortor.	100 Cft	56.25	32951.50	18,535.22
4	C-6/36	P/L damp proof course with cement concrete 1:2:4 using cement sand and shingle including bitumen coating				
		with 2 coats of bitumen 2" thick	100 Sft	7.88	12315.15	969.82
5	C-7/5	Pucca brick work in ground floor:-				
		(i) Cement sand mortar 1:4	100 Cft	55.13	35380.80	19,503.67
6	C-11/18	Cement pointing struck joints on walls, upto 20' height:				
		b) ratio 1:2	100 Sft	147.00	4305.60	6,329.23
7	C6-6-a-ii	P/L reinforced cement concrete (including prestressed concrete), using coarse sand and aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing,rendering and finishing exposed surface, complete.				
		(a) Reinforced cement concrete in slab of Raft/strip foundation; base slab of column and retaining walls; etc. and other structural members other than those mentioned in 5(a) (i) above not requiring from work, complete in all respects:-				
		Type C (nominal mix 1:2: 4)	1 Cft	31.53	538.30	16,972.68
8	C-6/12	Fabrication of mild steel reinforcement for cement concrete including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust				
		(b) deformed bars. 60 grade	100 Kg	134.31	35068.45	47,099.19
9	C-25/30	Making and fixing steel grated doors complete with locking arrangement, angle iron frame 2"x2"x3/8" and 3/4" square walls 4" center to center.				
			1 Sft	96.00	2,331.35	223,809.60
10	C-13/5	Preparing surface and painting guard bars , gates of iron bars				
		priming coat	100 Sft	192.00	1063.80	2,042.50
		each subsequent coat (Two Coats)	100 Sft	192.00	1480.20	2,841.98
11	C-1/1	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl, kankar lime (unslaked), surkhi, etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor.				
		(Ch.No. 1, Item.No. 1)	100 Cft	32.01	10918.32	3,495.08
					Total:- (Rs.)	**343,748.52**
					Say Rs.	**343,749.00**

IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA CITY

Sub Head # A-1: Anearobic, Facultative and Sludge Drying Pond

Sr.#	Chp #	Description	No.	Measurement			Qty	Unit
				L	W	D		
1	3/52	Earthwork in excavation of drains, irrigation channels through excavator / drag lines in all kind of soil and conditions(dry, slush,daldal and under water) including its disposal and preparation of working pad for operation of machinery. (Rates includes 100 ft lead)						
		Anearobic	4	250.00	152.00	15.75	2,394,000.00	
		Facultiative	1	703.00	286.00	8.00	1,608,464.00	
			2	689.00	288.00	8.00	3,174,912.00	
			1	108.00	52.00	8.00	44,928.00	
			0.5	540.00	606.00	8.00	1,308,960.00	
		Sludge drying pond	2.0	147.00	138.00	3.00	121,716.00	
			1.0	213.00	102.00	3.00	65,178.00	
						Total	**8,718,158.00**	Cft
2	3/25	Compaction of earthwork with power road roller, including ploughing, mixing, moisturing earth to optimum moisture content in layers, etc, complete:- i) 95% to 100% maximum modified AASHO dry (Qunatity of compaction includes embankments and in bed of ponds from excavated earth within site. (Contractor will stack the excavated earth from site at suitable places and then will use it for embankments. Quantity of excavated material may increase or decrease.)						
		Anarobic pond	1	1371.00	39.71	15.00	816,636.15	
			1	3675.00	27.50	8.00	808,500.00	
			2	714.00	27.50	8.00	314,160.00	
			1	714.00	30.50	8.00	174,216.00	
			2	312.00	30.50	8.00	152,256.00	
			1	728.00	30.50	8.00	177,632.00	
			4	244.00	42.50	8.00	331,840.00	
			1	1078.00	42.50	8.00	366,520.00	
			1	142.00	23.00	4.00	13,064.00	
			2	133.00	23.00	4.00	24,472.00	
			2	203.00	23.00	4.00	37,352.00	
			2	97.00	23.00	4.00	17,848.00	
						Total	**3,234,496.15**	Cft
		Compaction of bed	4	172500.00		0.50	345,000.00	
			4	207.00	109.00	0.50	45,126.00	
			2	137.00	128.00	0.50	17,536.00	
			1	177.00	64.00	0.50	5,664.00	
						Total	**413,326.00**	
						G.Total	**3,647,822.15**	
		Deduction quantity of clay lining on slopes						
		Volume of caly lining					1,520,235.50	
		Volume of stone pitching					150,782.25	
						Total	**1,671,017.75**	
						Net	**1,976,804.40**	

IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA CITY

Sub Head # A-1: Anearobic, Facultative and Sludge Drying Pond

Sr.#	Chp #	Description	No.	Measurement			Qty	Unit
3	C-3/20	Dressing of earthwork (done by machinery or otherwise and left undressed) to designed section.						
			8	250.00	55.00		110,000.00	
			8	152.00	55.00		66,880.00	
			2	703.00	28.25		39,719.50	
			2	186.00	28.25		10,509.00	
			4	689.00	28.25		77,857.00	
			4	288.00	28.25		32,544.00	
			1	606.00	28.25		17,119.50	
			2	108.00	28.25		6,102.00	
			1	540.00	28.25		15,255.00	
			1	951.00	28.25		26,865.75	
			4	142.00	14.00		7,952.00	
			4	133.00	14.00		7,448.00	
			2	192.00	14.00		5,376.00	
			2	58.00	14.00		1,624.00	
						Total	**425,251.75**	Sft
4		Transportation of earth all types when the total distance, including the lead covered in the item of work, is more than 1000 ft. (300 m) (This is provisional quantity and will be paid as per actual lead chart to be approved by the Engineer)						
		b) for every 330 ft. (100 m) additional lead or part thereof, beyond ¼ mile (400 m) upto one mile. (1					6,741,353.60	Cft
5	18/20	Providing and laying dry brick pavement /soling in streets or roads, etc. sand grounted, laid in proper camber, including preparation, watering, compaction of bed to proper camber, and sand cushion.						
			1	1371.00	10.00	0.375	5,141.25	
			1	3675.00	10.00	0.375	13,781.25	
			2	714.00	10.00	0.375	5,355.00	
			1	714.00	10.00	0.375	2,677.50	
			2	312.00	10.00	0.375	2,340.00	
			1	728.00	10.00	0.375	2,730.00	
			4	244.00	10.00	0.375	3,660.00	
			1	1078.00	10.00	0.375	4,042.50	
			1	142.00	10.00	0.375	532.50	
			2	133.00	10.00	0.375	997.50	
			2	203.00	10.00	0.375	1,522.50	
			2	97.00	10.00	0.375	727.50	
						Total	**43,507.50**	Cft
6	26/42	Providing and fixing barbed wire fencing, with 4 horizontal and two cross wires, with R.C.C. 1:2:4 posts, 5.5'x6"x9" (1.68mx150mmx225 mm) at 8 ft. (2.45 m) centre to centre, reinforced with 4 No. 3/8" (10 mm) dia vertical bars and 1/8" (3 mm) dia stirrups 12" (300 mm) centre to centre, complete in all respects..						
		ii) in cement concrete 1:4:8 base of size 12"x12"x21" (300x300x525 mm).	1	5449			5,449.00	Rft
7	RA	Construction of gate including Pillars						
		Making and fixing steel grated doors, complete with locking arrangement, angle iron frame 2"x2"x3/8" 50x50x10 mm) and ¾" (20 mm) square bars 4" (100mm) centre to centre.	2				2.00	No.

IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA CITY

Sub Head # A-1: Anearobic, Facultative and Sludge Drying Pond

Sr.#	Chp #	Description	No.	Measurement			Qty	Unit
8	16/31i+iii	Providing and laying stone pitching, hand packed, with surface levelled off to the correct section and voids filled in 1:8 cement, sand mortar, in floors of bridges along banks and in appons etc.i) top layer on slope iii) stone pitching/filling on slope or on level (other than top layer).						
		Anarobic slop	8	242.50	47.50	0.50	46,075.00	
			8	144.50	47.50	0.50	27,455.00	
		Facultative	2	695.50	20.75	0.50	14,431.63	
			2	278.50	20.75	0.50	5,778.88	
			4	681.50	20.75	0.50	28,282.25	
			4	280.50	20.75	0.50	11,640.75	
			2	108.00	20.75	0.50	2,241.00	
			1	606.00	20.75	0.50	6,287.25	
			1	703.00	20.75	0.50	7,293.63	
			1	88.00	20.75	0.50	913.00	
			1	37.00	20.75	0.50	383.88	
						Total	**150,782.25**	Cft
9	C-26/37 misc	Supplying and laying polythene sheet over D.P.C. under floors and on roofs, etc. ii) 500 gauge (.005" thick)						
		Sullage ponds	2	137.00	128.00		35,072.00	
			1	197.00	64.00		12,608.00	
			4	142.00	14.00		7,952.00	
			4	133.00	14.00		7,448.00	
			2	187.00	14.00		5,236.00	
			2	62.00	14.00		1,736.00	
		Anarobic	4	207.00	109.00		90,252.00	
		Facultative	1	678.00	261.00		176,958.00	
			2	664.00	263.00		349,264.00	
			1	108.00	57.50		6,210.00	
			0.5	606.00	567.00		171,801.00	
		Anarobic slop	8	242.50	57.50		111,550.00	
			8	144.50	57.50		66,470.00	
		Facultative	2	695.50	27.75		38,600.25	
			2	278.50	27.75		15,456.75	
			4	681.50	27.75		75,646.50	
			4	280.50	27.75		31,135.50	
			2	108.00	27.75		5,994.00	
			1	606.00	27.75		16,816.50	
			1	703.00	27.75		19,508.25	
			1	88.00	27.75		2,442.00	
			1	37.00	27.75		1,026.75	
						Total	**1,249,183.50**	Sft

IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA CITY

Sub Head # A-2: Anearobic, Facultative and Sludge Drying Pond

SR. NO.	NON MRS	DESCRIPTION	UNIT	QUANTITY	RATE (Rs)	AMOUNT (Rs)
1	RA	Providing, laying to designed section and compacting (to at least 90% of the maximum modified Proctor dry density) clay as liner (source to be approved by the Engineer),complete in all respects. Liner material should be compected in layers not exceeding 6"(150mm). Liner material should be compacted slightly wet of optimum. Scarify the top of already compected liner layer to a minimum depth of 1.0 inch before placing the next layer. Clods more then 5.0 mm size must be present in liner material, these must be pulverized before placing. (both in bed & slope) The material suitable to be used for compacted soil liner shall meet the following specifications: Vertical in-situ hydraulic conductivity in compacted state ≤ 1 x 10-7 cm/sec Fines (particles passing 0.075 mm sieve) ≥ 30% Plasticity index = 8 – 30 % Gravels (particles passing 75 mm sieve and retaining 4.75 mm sieve) ≤ 20 % Maximum particle size ≤ 10 mm (Item rate include lead from any source within district up to WWTP)	Cft	1,520,236	25.10	38,157,911.05
2		Providing, testing, commissioning and training of wastewater sampling and testing equipment for measuring wastewater pollution parameters like temperature, pH, BOD, COD, TSS, TDS, VSS, Oil & Grease, Turbidity and Alkalinity including all relevant instruments, meters and glass wares complete in all respects as per satisfaction of the Engineer	LS	1.00	2000000.00	2,000,000.00
					Total Amount Non MRS Items	**40,157,911.05**

Say Rs. 40.16 Million

IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA CITY

Sub Head # A-2: Anearobic, Facultative and Sludge Drying Pond

Sr.#	Chap # / Item #	Description	No.	Measurement			Qty	Unit
				L	W	D		
1	RA-02	Providing, laying to designed section and compacting (to at least 90% of the maximum modified Proctor dry density) clay as liner (source to be approved by the Engineer),complete in all respects. Liner material should be compected in layers not exceeding 6"(150mm). Liner material should be compacted slightly wet of optimum. Scarify the top of already compected liner layer to a minimum depth of 1.0 inch before placing the next layer. Clods more then 5.0 mm size must be present in liner material, these must be pulverized before placing. (both in bed & slope)						
		The material suitable to be used for compacted soil liner shall meet the following specifications: Vertical in-situ hydraulic conductivity in compacted state ≤ 1 x 10-7 cm/sec Fines (particles passing 0.075 mm sieve) ≥ 30% Plasticity index = 8 – 30 % Gravels (particles passing 75 mm sieve and retaining 4.75 mm sieve) ≤ 20 % Maximum particle size ≤ 10 mm (Item rate include lead from any source within district up to WWTP)						
		Anarobic	4	207.00	109.00	1.50	135,378.00	
		Facultative	1	678.00	261.00	1.50	265,437.00	
			2	664.00	263.00	1.50	523,896.00	
			1	108.00	27.00	1.50	4,374.00	
			0.5	606.00	567.00	1.50	257,701.50	
		Sludge drying pond	2	137.00	128.00	0.50	17,536.00	
			1	177.00	37.00	0.50	3,274.50	
		Anarobic slop	8	242.50	47.50	1.00	92,150.00	
			8	144.50	47.50	1.00	54,910.00	
		Facultative	2	695.50	20.75	1.00	28,863.25	
			2	278.50	20.75	1.00	11,557.75	
			4	681.50	20.75	1.00	56,564.50	
			4	280.50	20.75	1.00	23,281.50	
			2	108.00	20.75	1.00	4,482.00	
			1	606.00	20.75	1.00	12,574.50	
			1	703.00	20.75	1.00	14,587.25	
			1	88.00	20.75	1.00	1,826.00	
			1	37.00	20.75	1.00	767.75	
			4	142.00	14.00	0.50	3,976.00	
			4	133.00	14.00	0.50	3,724.00	
			2	187.00	14.00	0.50	2,618.00	
			2	54.00	14.00	0.50	756.00	
						Total	**1,520,235.50**	Cft
2		Providing, testing, commissioning and training of wastewater sampling and testing equipment for measuring wastewater pollution parameters like temperature, pH, BOD, COD, TSS, TDS, VSS, Oil & Grease, Turbidity and Alkalinity including all relevant instruments, meters and glass wares complete in all respects as per satisfaction of the Engineer.					1.00	LS

IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA CITY

Sub Head # A-3: Floating wetland in Facultative ponds

Sr. No	Decsription	Unit				Quantity	Rate per Unit (PKR)	Total Amount (PKR)
	Floating wetland		2 2	690 708	293 291	404340 412056 816396 81640	600.00	48,983,760
2	Mainteance of floating		8			8.00	375000.00	3,000,000.00
Total								**51,983,760**

Say Rs. 51.98 Million

IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA CITY

Sub Head # B.1: Inlet/Outlet Channels & Collection/ Distribution Chambers (MRS)

Sr. No.	MRS 2nd Bi-Annual 2023 Chap# / Item#	Description	Unit	Quantity	Rate (Rs)	Amount (Rs)
1		Construction of Intake drain 5.33x4.50				
		Open	1 Rft	5824.00	8,018.00	46,696,832.00
		Culvert / walkway	1 Rft	288.00	19,776.00	5,695,488.00
		Covring of village	1 Rft	978.00	14,015.00	13,706,670.00
2	R.A	Construction of distribution chamber	1 Each	1.00	179796.00	179,796.00
3	R.A	Course Screen	1 Each	1.00	219,675.00	219,675.00
4	R.A	Grit Chamber	1 Each	1.00	3,336,478.00	3,336,478.00
5	R.A	Internal Drains				
		5.33x4.50	1 Rft	223.00	16,414.00	3,660,322.00
		4.00x4.75	1 Rft	238.00	15,166.00	3,609,508.00
		3x4.75	1 Rft	85.00	14,211.00	1,207,935.00
		2.50x4.75	1 Rft	995.00	12,283.00	12,221,585.00
		2.00x4.75	1 Rft	1385.00	11,541.00	15,984,285.00
6	R.A	Construction of Inlet chamber Anarobic pond	1 Each	4.00	872,104.00	3,488,416.00
7	R.A	Construction of Outlet of Anarobic pond	1 Each	4.00	916,068.00	3,664,272.00
8	R.A	Construction of Inlet Chamber of Facultative pond	1 Each	4.00	799,789.00	3,199,156.00
9	R.A	Construction of Outlet Chamber Facultative pond	1 Each	4.00	244,272.00	977,088.00
10		**Covering of drain** Providing and laying reinforced cement concrete (including prestressed concrete), using Ordinary Portland Cement / Sulphate resisting cement / Slag cement as may be required; coarse sand screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (but excluding the cost of steel reinforcement, its fabrication and placing in position, etc.):-				
	6/6	(a) (i) Reinforced cement concrete in roof slab, beams, columns lintels, girders and other structural members laid in situ or precast laid in position, or prestressed members cast in situ, complete in all respects:-				
		(1) Type A (nominal mix 1:2:4	Cft	1,001.13	674.30	675,058.59

IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA CITY

Sub Head # B.1: Inlet/Outlet Channels & Collection/ Distribution Chambers (MRS)

Sr. No.	MRS 2nd Bi-Annual 2023 Chap# / Item#	Description	Unit	Quantity	Rate (Rs)	Amount (Rs)
11	6/12	Fabrication of mild steel reinforcement for cement concrete, including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust from bars):-				
		('c) Deformed bars (Grade-60)	## Kg	30,033.75	35,068.45	10,532,370.60
12	1/1	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl , kankar lime (unslaked), surkhi , etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor. Lead From nearest quarry (95km)	## Cft	880.99	10,918.32	96,189.27
13	RA	Construction of Effluent drain 3.0x4.50	1 Rft	3,435.00	7,132.00	24,498,420.00
			1 Rft	125.00	14,144.00	1,768,000.00
					Total Amount MRS Items	**155,417,544.46**

Say Rs. **155.42 Million**

IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA CITY

Sub Head # B.1: Collecting sump, Drains, course screen, fine screen, grit Chamber, Distribution Chambers, Inlet Chamber & OutLet chamber

Sr.#	Chap # / Item #	Description	Unit	No.	Measurement			Qty
					L	W	D	
1		Construction of Intake drain						
		5.33x4.50						
		Open	Rft	1	5824.00			5824.00
		Culvert / walkway	Rft	1	288.00			288.00
		Covring of village	Rft	1	978.00			978.00
2	R.A	Construction of distribution chamber	Each	1				1.00
3	R.A	Course Screen	Each	1				1.00
4	R.A	Grit Chamber	Each	1				1.00
5	R.A	Internal Drains						
		5.33x4.50	Rft	1	223.00			223.00
		4.00x4.75	Rft	1	238.00			238.00
		3x4.75	Rft	1	85.00			85.00
		2.50x4.75	Rft	1	995.00			995.00
		2.00x4.75	Rft	1	1385.00			1385.00
6	R.A	Construction of Inlet chamber Anarobic pond	Each	4				4.00
7	R.A	Construction of Outlet of Anarobic pond	Each	4				4.00
8	R.A	Construction of Inlet Chamber of Facultative pond	Each	4				4.00
9	R.A	Construction of Outlet Chamber Facultative pond	Each	4				4.00
10		**Covering of drain**						
		Providing and laying reinforced cement concrete (including prestressed concrete), using Ordinary Portland Cement / Sulphate resisting cement / Slag cement as may be required; coarse sand screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (but excluding the cost of steel reinforcement, its fabrication and placing in position, etc.):-						
	6/6	(a) (i) Reinforced cement concrete in roof slab, beams, columns lintels, girders and other structural members laid in situ or precast laid in position, or prestressed members cast in situ, complete in all respects:-						
		(1) Type A (nominal mix 1:2:4		1	150.00	3.00	0.58	261.00
				1	85.00	3.50	0.68	202.30
				1	85.00	4.17	0.75	265.84
				1	45.00	5.17	0.75	174.49
				1	20.00	6.50	0.75	97.50
							Total	**1001.13**
11	6/12	Fabrication of mild steel reinforcement for cement concrete, including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust from bars):- ('c) Deformed bars (Grade-60)						
			Kg			3.0 kg/cft		30033.75
12	C-1/1	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl, kankar lime (unslaked), surkhi, etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor.						
		(Ch.No. 1, Item.No. 1)						
		Ratio (1:2.4)	Cft	1	1001.13	0.88		880.99
13		Construction of Effluent drain 3.0x4.50	Rft	1	3435.00			3435.00
			Rft	1	125.00			125.00

IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA CITY

Sub Head # B.1: Collecting sump, Drains, course screen, fine screen, grit Chamber, Distribution Chambers, Inlet Chamber & OutLet chamber

Sr.#	Chap # / Item #	Description	Unit	No.	Measurement	Qty

RATE ANALYSIS

CONSTRUCTION OF DISTRIBUTION CHAMBER

Unit =1

Sr.#	Chap # / Item #	Description	No.	Measurement			Qty	Unit
				L	W	D		
1	C-3/7	Earthwork excavation in open cutting upto 1.5m depth for storm water channels, drains, sullage drains, in open areas, roads, streets, lanes, including under pining of walls and shoring to protect existing works, shuttering and timbering the trenches, dressed to designed levels and dimensions, trimming, removal of surface water from trenches, backfilling and surplus excavated material disposed of and dressed within 15m lead:-						
			1	11.83	9.50	4.00	449.54	Cft
2	7/30	Supplying and filling sand under floor; or plugging in wells. (30% of excavation)					134.86	Cft
3	6/5	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone						
		(h) Ratio 1: 3: 6	1	8.83	7.50	0.25	16.56	Cft
4	6/6	Providing and laying reinforced cement concrete (including prestressed concrete), using Ordinary Portland Cement / Sulphate resisting cement / Slag cement as may be required; coarse sand screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (but excluding the cost of steel reinforcement, its fabrication and placing in position, etc.):-						
	6/6	(a)(iii) Reinforced cement concrete in slab of rafts / strip foundation, base slab of column and retaining walls; etc and footing beams, other structural members other than those mentioned in 6(a) (i)& (ii) above not requiring form work (i.e. horizontal shuttering) complete in all respects:-						
		(1) Type A (nominal mix 1:2:4)	1	8.33	7	0.58	33.82	Cft
		(a) (i) Reinforced cement concrete in roof slab, beams, columns lintels, girders and other structural members laid in situ or precast laid in position, or prestressed members cast in situ, complete in all respects:- (1) Type A (nominal mix 1:1.5:3						
			2	6.91	0.58	4.50	36.07	
			2	5.58	0.58	4.50	29.13	
			1	7.5	2.5	0.58	10.88	
			1	6.17	2.5	0.58	8.95	
						Total	**85.02**	
		Deduction	1	3.5	0.58	3.5	7.11	
			1	5.33	0.58	3.5	10.82	
						Total	**17.92**	
						Net	**67.09**	Cft
5	6/12	Fabrication of mild steel reinforcement for cement concrete, including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust from bars):-						
		('c) Deformed bars (Grade-60)			2.0kg/cft		201.83	Kg

Sr.#	Chap # / Item #	Description	No.	Measurement			Qty	Unit
				L	W	D		
6	C-1/1	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl, kankar lime (unslaked), surkhi, etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor.						
		Ratio (1:3.6)	1	16.56	0.92		15.30	
		Ratio (1:1.5.3)	1	67.09	0.84		56.36	
		Ratio (1:2.4)	1	33.82	0.88		29.76	
							101.42	Cft
7	6/31A	Providing and embedding 10" (250mm) wide PVC water stopper in expansion joints of RCC structures (Retaining walls, water tanks, Slabs) complete in all respect.						
		i) 10"wide 6 mm thick	2	7.91			15.82	
			2	5.58			11.16	
							26.98	Rft
8	13/9	Bitumen coating to plastered or cement concrete surface:-						
		i) 20 lbs. per 100 Sft. (9.07 Kg per Sq.m)	2	7.5		5.08	76.20	
			2	6.17		5.08	62.69	
							138.89	Sft

RATE ANALYSIS

CONSTRUCTION OF DISTRIBUTION CHAMBER

Sr. No.	Ref. CSR	Description	Unit	Quantity	Rate (Rs)	Amount (Rs)
1	C-3/7	Earthwork excavation in open cutting upto 1.5m depth for storm water channels, drains, sullage drains, in open areas, roads, streets, lanes, including under pining of walls and shoring to protect existing works, shuttering and timbering the trenches, dressed to designed levels and dimensions, trimming, removal of surface water from trenches, backfilling and surplus excavated material disposed of and dressed within 15m lead:-	1000 Cft	449.54	11,558.50	5,196.01
2	C-10/3	Supplying and filling sand under floor; or plugging in wells. (Provisional as Slect Fill)	100 Cft	134.86	3,061.20	4,128.40
3	6/5	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone (h) Ratio 1: 3: 6	100 Cft	16.56	38,182.80	6,321.64
4	6/6	Providing and laying reinforced cement concrete (including prestressed concrete), using Ordinary Portland Cement / Sulphate resisting cement / Slag cement as may be required; coarse sand screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (but excluding the cost of steel reinforcement, its fabrication and placing in position, etc.):-				
		(a)(iii) Reinforced cement concrete in slab of rafts / strip foundation, base slab of column and retaining walls; etc and footing beams, other structural members other than those mentioned in 6(a) (i)& (ii) above not requiring form work (i.e. horizontal shuttering) complete in all respects:-				
		(1) Type A (nominal mix 1:2:4)	Per Cft	33.82	538.30	18,205.20
		(a) (i) Reinforced cement concrete in roof slab, beams, columns lintels, girders and other structural members laid in situ or precast laid in position, or prestressed members cast in situ, complete in all respects:- (1) Type A (nominal mix 1:1.5:3)	Per Cft	67.09	733.45	49,210.39
5	6/12	Fabrication of mild steel reinforcement for cement concrete, including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust from bars):- ('c) Deformed bars (Grade-60)	100 Kg	201.83	35068.45	70,778.09
6	1/1	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl , kankar lime (unslaked), surkhi , etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor. Lead From nearest quarry (95km)	100 Cft	101.42	10,918.32	11,073.21

Sr. No.	Ref. CSR	Description	Unit	Quantity	Rate (Rs)	Amount (Rs)
7	6/31A	Providing and embedding 10" (250mm) wide PVC water stopper in expansion joints of RCC structures (Retaining walls, water tanks, Slabs) complete in all respect.				
		i) 10"wide 6 mm thick	Per Rft	26.98	412.80	11,137.34
8	13/9	Bitumen coating to plastered or cement concrete surface:-				
		i) 20 lbs. per 100 Sft. (9.07 Kg per Sq.m)	100 Sft	138.89	2,697.05	3,745.86
					Total	**179,796.14**
					Say Rs.	**179,796.00**

RATE ANALYSIS

CONSTRUCTION OF COURSE SCREEN

Unit =1

Sr.#	Chap # / Item #	Description	No.	Measurement			Qty	Unit
				L	W	D		
1	6/6	Providing and laying reinforced cement concrete (including prestressed concrete), using Ordinary Portland Cement / Sulphate resisting cement / Slag cement as may be required; coarse sand screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (but excluding the cost of steel reinforcement, its fabrication and placing in position, etc.):-						
		(a) (i) Reinforced cement concrete in roof slab, beams, columns lintels, girders and other structural members laid in situ or precast laid in position, or prestressed members cast in situ, complete in all respects:- (1) Type A (nominal mix 1:2:4	1	6.33	3.00	0.58	72.39	Cft
2	6/12	Fabrication of mild steel reinforcement for cement concrete, including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust from bars):-						
		('c) Deformed bars (Grade-60)			2.0kg/cft		144.79	Kg
3	C25/ I 10	Fabrication of heavy steel work, with angl, tees, flat iron, rounded iron and sheet iron for making trasses, girders, tanks etc. including cutting, drilling, revetting, handling, amembling and fixing but excluding errection in position (of darwing).						
		2x3/8" flate patti	32	4.85	@ wt of 1.18 kg /Rft		183.14	Kg
4	C25/ I 11	Erection in position iron trasses, staging of water tank etc.					183.14	Kg
5	C-1/1	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl, kankar lime (unslaked), surkhi, etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor.						
		(Ch.No. 1, Item.No. 1)						
		Ratio (1:2.4)	1	72.39	0.88		63.71	Cft

RATE ANALYSIS

CONSTRUCTION OF COURSE SCREEN

Sr. No.	Ref. CSR	Description	Unit	Quantity	Rate (Rs)	Amount (Rs)
1	6/6	Providing and laying reinforced cement concrete (including prestressed concrete), using Ordinary Portland Cement / Sulphate resisting cement / Slag cement as may be required; coarse sand screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (but excluding the cost of steel reinforcement, its fabrication and placing in position, etc.):-				
		(a)(iii) Reinforced cement concrete in slab of rafts / strip foundation, base slab of column and retaining walls; etc and footing beams, other structural members other than those mentioned in 6(a) (i)& (ii) above not requiring form work (i.e. horizontal shuttering) complete in all respects:-				
		(1) Type A (nominal mix 1:2:4)	Per Cft	72.39	538.30	38,968.99
		(a) (i) Reinforced cement concrete in roof slab, beams, columns lintels, girders and other structural members laid in situ or precast laid in position, or prestressed members cast in situ, complete in all respects:- (1) Type A (nominal mix 1:2:4)	Per Cft	72.39	674.30	48,814.40
2	6/12	Fabrication of mild steel reinforcement for cement concrete, including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust from bars):-				
		('c) Deformed bars (Grade-60)	100 Kg	144.79	35068.45	50,774.00
3	C25/ I 10	Fabrication of heavy steel work, with angl, tees, flat iron, rounded iron and sheet iron for making trasses, girders, tanks etc. including cutting, drilling, revetting, handling, amembling and fixing but excluding errection in position.	100 Kg	183.14	38861.65	71,169.67
4	C25/11	Erection in position iron trasses, staging of water tank etc.	100 Kg	183.14	1634.10	2,992.63
5	1/1	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl , kankar lime (unslaked), surkhi , etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor. Lead From	100 Cft	63.71	10,918.32	6,955.58
					Total	**219,675.26**
					Say Rs.	**219,675.00**

RATE ANALYSIS

CONSTRUCTION OF GRIT CHAMBER

Unit =1

Sr.#	Chap # / Item #	Description	No.	Measurement			Qty	Unit
				L	W	D		
1	C-3/7	Earthwork excavation in open cutting upto 1.5m depth for storm water channels, drains, sullage drains, in open areas, roads, streets, lanes, including under pining of walls and shoring to protect existing works, shuttering and timbering the trenches, dressed to designed levels and dimensions, trimming, removal of surface water from trenches, backfilling and surplus excavated material disposed of and dressed within 15m lead:-						
			1	57.00	33.75	5.75	11,061.56	Cft
2	C-10/3	Supplying and filling sand under floor; or plugging in wells.					3,318.47	Cft
3	6/5	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone						
		(h) Ratio 1: 3: 6	1	57	29.75	0.25	423.94	Cft
4	6/6	Providing and laying reinforced cement concrete (including prestressed concrete), using Ordinary Portland Cement / Sulphate resisting cement / Slag cement as may be required; coarse sand screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (but excluding the cost of steel reinforcement, its fabrication and placing in position, etc.):-						
	6/6	(a)(iii) Reinforced cement concrete in slab of rafts / strip foundation, base slab of column and retaining walls; etc and footing beams, other structural members other than those mentioned in 6(a) (i)& (ii) above not requiring form work (i.e. horizontal shuttering) complete in all respects:-						
		(1) Type A (nominal mix 1: 1.5: 3)	1	35.00	29.25	0.75	767.81	
			2	11	18.29	0.75	301.79	
						Total	**1,069.60**	Cft
		(a) (i) Reinforced cement concrete in roof slab, beams, columns lintels, girders and other structural members laid in situ or precast laid in position, or prestressed members cast in situ, complete in all respects:-						
		(1) Type A (nominal mix 1:1.5:3	2	67.5	0.75	4.75	480.94	
			1	35	0.75	4.75	124.69	
			2	26.75	0.75	4.75	190.59	
			2	28.25	3	0.68	115.26	
							911.48	
		Deduction	4	5.33	0.75	3.5	55.97	
						Net	**855.51**	Cft
5	6/12	Fabrication of mild steel reinforcement for cement concrete, including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust from bars):-						
		('c) Deformed bars (Grade-60)			2.0kg/cft		3,850.22	Kg

Sr.#	Chap # / Item #	Description	No.	Measurement			Qty	Unit
				L	W	D		
6	C-1/1	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl, kankar lime (unslaked), surkhi, etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor. (Ch.No. 1, Item.No. 1)						
		Ratio (1:3.6)	1	423.94	0.92		391.72	
		Ratio (1:1.5.3)	1	1925.11	0.84		1,617.09	
							2,008.81	Cft
7	6/31A	Providing and embedding 10" (250mm) wide PVC water stopper in expansion joints of RCC structures (Retaining walls, water tanks, Slabs) complete in all respect.						
		i) 10"wide 6 mm thick	2	67.50			135.00	
			1	35.00			35.00	
			2	26.75			53.50	
							223.50	Rft
8	13/9	Bitumen coating to plastered or cement concrete surface:-						
		i) 20 lbs. per 100 Sft. (9.07 Kg per Sq.m)	2	57		5.50	627.00	Sft

RATE ANALYSIS

CONSTRUCTION OF GRIT CHAMBER

Sr. No.	Ref. CSR	Description	Unit	Quantity	Rate (Rs)	Amount (Rs)
1	C-3/7	Earthwork excavation in open cutting upto 1.5m depth for storm water channels, drains, sullage drains, in open areas, roads, streets, lanes, including under pining of walls and shoring to protect existing works, shuttering and timbering the trenches, dressed to designed levels and dimensions, trimming, removal of surface water from trenches, backfilling and surplus excavated material disposed of and dressed within 15m lead:-	1000 Cft	11061.56	11,558.50	127,855.07
2	C-10/3	Supplying and filling sand under floor; or plugging in wells.	100 Cft	3318.47	3,061.20	101,584.97
3	6/5	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone aggregate).				
		(h) Ratio 1: 3: 6	100 Cft	423.94	38,182.80	161,871.21
4	6/6	Providing and laying reinforced cement concrete (including prestressed concrete), using Ordinary Portland Cement / Sulphate resisting cement / Slag cement as may be required; coarse sand screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (but excluding the cost of steel reinforcement, its fabrication and placing in position, etc.):-				
		(a)(iii) Reinforced cement concrete in slab of rafts / strip foundation, base slab of column and retaining walls; etc and footing beams, other structural members other than those mentioned in 6(a) (i)& (ii) above not requiring form work (i.e. horizontal shuttering) complete in all respects:-				
		(1) Type A (nominal mix 1: 1.5: 3)	Per Cft	1,069.60	597.40	638,977.55
		(a) (i) Reinforced cement concrete in roof slab, beams, columns lintels, girders and other structural members laid in situ or precast laid in position, or prestressed members cast in situ, complete in all respects:- (1) Type A (nominal mix 1:1.5:3)	Per Cft	855.51	733.45	627,476.56
5	6/12	Fabrication of mild steel reinforcement for cement concrete, including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust from bars):-				
		('c) Deformed bars (Grade-60)	100 Kg	3,850.22	35068.45	1,350,213.35
6	1/1	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl , kankar lime (unslaked), surkhi , etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor. Lead From nearest quarry (95km)				
			100 Cft	2,008.81	10,918.32	219,328.41

7	6/31A	Providing and embedding 10" (250mm) wide PVC water stopper in expansion joints of RCC structures (Retaining walls, water tanks, Slabs) complete in all respect.				
		i) 10"wide 6 mm thick	Per Rft	223.50	412.80	92,260.80
8	13/9	Bitumen coating to plastered or cement concrete surface:-				
		i) 20 lbs. per 100 Sft. (9.07 Kg per Sq.m)	100 Sft	627.00	2,697.05	16,910.50
					Total	**3,336,478.41**
					Say Rs.	**3,336,478.00**

RATE ANALYSIS

CONSTRUCTION OF INTAKE DRAIN 5.33'X4.50'

Unit =10'

Sr.#	Chap # / Item #	Description	No.	Measurement			Qty	Unit
				L	W	D		
1	C-3/7	Earthwork excavation in open cutting upto 1.5m depth for storm water channels, drains, sullage drains, in open areas, roads, streets, lanes, including under pining of walls and shoring to protect existing works, shuttering and timbering the trenches, dressed to designed levels and dimensions, trimming, removal of surface water from trenches, backfilling and surplus excavated material disposed of and dressed within 15m lead:-	1	10.00	9.33	4.00	373.20	Cft
2	6/5	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone						
		(h) Ratio 1: 3: 6	1	10.00	9.33	0.375	34.99	Cft
3	C-7/7	Pacca brick work other than building upto 10 ft height in 1:3 cement sand mortor.	2	10	1.5	1.5	45.00	
			2	10	1.125	3	67.50	
						Total	**112.50**	Cft
4	C-11/8	Cement plaster 1/2" thick (1:3) cement sand mortor upto 20' height.	2	10		4.5	90.00	Sft
5	C-11/18	Cement pointing struck joints, on walls, upto 20' (6.00 m) hiehgt:- a) ratio 1:2	2	10		4.5	90.00	Sft
6	6/5	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone						
		(h) Ratio 1: 2: 4	2	10.00	1.13	0.170	3.83	
			1	10	5.33	0.33	17.59	
						Total	**21.41**	Cft
7	C-1/1	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl, kankar lime (unslaked), surkhi, etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor. (Ch.No. 1, Item.No. 1)						
		Ratio (1:3.6)	1	34.99	0.92		32.33	
		Ratio (1:2.4)	1	21.41	0.88		18.84	
						Total	**51.17**	
		Covered portion (culverts)						
1	6/5	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone aggregate).						
		(h) Ratio 1: 2: 4	2	10.00	1.13	0.330	7.43	Cft
2	6/6	Providing and laying reinforced cement concrete (including prestressed concrete), using Ordinary Portland Cement / Sulphate resisting cement / Slag cement as may be required; coarse sand screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (but excluding the cost of steel reinforcement, its fabrication and placing in position, etc.):-						

Sr.#	Chap # / Item #	Description	No.	Measurement			Qty	Unit
				L	W	D		
		(a) (i) Reinforced cement concrete in roof slab, beams, columns lintels, girders and other structural members laid in situ or precast laid in position, or prestressed members cast in situ, complete in all respects:- (1) Type A (nominal mix	1	10	7.58	0.82	62.16	Cft
3	6/12	Fabrication of mild steel reinforcement for cement concrete, including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust from bars):- ('c) Deformed bars (Grade-60)			3.0 kg/cft		186.47	Kg
4	C-1/1	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl, kankar lime (unslaked), surkhi, etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor. (Ch.No. 1, Item.No. 1)						
		Ratio (1:2:4)	1	69.58	0.92		64.29	Cft
		Covered portion (Covering in village)						
1	6/5	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone aggregate)						
		(h) Ratio 1: 2: 4	2	10.00	1.13	0.33	7.43	Cft
2	6/6	Providing and laying reinforced cement concrete (including prestressed concrete), using Ordinary Portland Cement / Sulphate resisting cement / Slag cement as may be required; coarse sand screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (but excluding the cost of steel reinforcement, its fabrication and placing in position, etc.):-						
		(a) (i) Reinforced cement concrete in roof slab, beams, columns lintels, girders and other structural members laid in situ or precast laid in position, or prestressed members cast in situ, complete in all respects:- (1) Type A (nominal mix	1	10	7.58	0.50	37.90	Cft
3	6/12	Fabrication of mild steel reinforcement for cement concrete, including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust from bars):- ('c) Deformed bars (Grade-60)			2 kg/cft		75.80	Kg
4	C-1/1	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl, kankar lime (unslaked), surkhi, etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor. (Ch.No. 1, Item.No. 1)						
		Ratio (1:2:4)	1	45.33	0.92		41.88	

RATE ANALYSIS

CONSTRUCTION OF INTAKE DRAIN 5.33'X4.50'

Sr. No.	Ref. CSR	Description	Unit		Quantity	Rate (Rs)	Amount (Rs)
1	C-3/7	Earthwork excavation in open cutting upto 1.5m depth for storm water channels, drains, sullage drains, in open areas, roads, streets, lanes, including under pining of walls and shoring to protect existing works, shuttering and timbering the trenches, dressed to designed levels and dimensions, trimming, removal of surface water from trenches, backfilling and surplus excavated material disposed of and dressed within 15m lead:-	1000	Cft	373.20	11,558.50	4,313.63
2	6/5	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone aggregate) (h) Ratio 1: 3: 6	100	Cft	34.99	38,182.80	13,359.21
3	C-7/7	Pacca brick work other than building upto 10 ft height in 1:3 cement sand mortor.	100	Cft	112.50	35,504.50	39,942.56
4	C-11/8	Cement plaster 1/2" thick (1:3) cement sand mortor upto 20' height.	100	Cft	90.00	4,132.80	3,719.52
5	C-11/18	Cement pointing struck joints, on walls, upto 20' (6.00 m) hiehgt:- a) ratio 1:2	100	Cft	90.00	4,305.60	3,875.04
6	6/5	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone aggregate) (h) Ratio 1: 2: 4	100	Cft	21.41	43,837.20	9,387.30
7	C-1/1	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl, kankar lime (unslaked), surkhi, etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor. (Ch.No. 1, Item.No. 1)	100	Cft	51.17	10,918.32	5,587.20
		Cost of Per Rft of open portion				**Total** **Say Rs.**	**80,184.46** **8,018.45** **8018.00**
		Covered Portion (Culverts)					
1	6/5	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone aggregate) (h) Ratio 1: 2: 4	100	Cft	7.43	43,837.20	3,254.91
2	6/6	Providing and laying reinforced cement concrete (including prestressed concrete), using Ordinary Portland Cement / Sulphate resisting cement / Slag cement as may be required; coarse sand screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (but excluding the cost of steel reinforcement, its fabrication and placing in position, etc.):-					

Sr. No.	Ref. CSR	Description	Unit		Quantity	Rate (Rs)	Amount (Rs)
		(a) (i) Reinforced cement concrete in roof slab, beams, columns lintels, girders and other structural members laid in situ or precast laid in position, or prestressed members cast in situ, complete in all respects:- (1) Type A (nominal mix 1:2:4)	Per	Cft	62.16	674.30	41,911.79
3	6/12	Fabrication of mild steel reinforcement for cement concrete, including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust from bars):- ('c) Deformed bars (Grade-60)	100	Kg	186.47	35068.45	65,391.44
4	1/1	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl , kankar lime (unslaked), surkhi , etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor. Lead From nearest quarry (95km)	100	Cft	64.29	10,918.32	7,019.70
						Total	**117,577.84**
		Cost of covering only Per Rft					**11,757.78**
							11758.00
		Accumulative cost				Say Rs.	**19,776.00**
		Covered portion (Covering in village)					
1	6/5	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone (h) Ratio 1: 2: 4	100	Cft	7.43	43,837.20	3,254.91
2	6/6	Providing and laying reinforced cement concrete (including prestressed concrete), using Ordinary Portland Cement / Sulphate resisting cement / Slag cement as may be required; coarse sand screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (but excluding the cost of steel reinforcement, its fabrication and placing in position, etc.):- (a) (i) Reinforced cement concrete in roof slab, beams, columns lintels, girders and other structural members laid in situ or precast laid in position, or prestressed members cast in situ, complete in all respects:- (1) Type A (nominal mix	Per	Cft	37.90	674.30	25,555.97
3	6/12	Fabrication of mild steel reinforcement for cement concrete, including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust from bars):- ('c) Deformed bars (Grade-60)	100	Kg	75.80	35068.45	26,581.89
4	1/1	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl , kankar lime (unslaked), surkhi , etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor. Lead From nearest quarry (95km)	100	Cft	41.88	10,918.32	4,572.62
		Cost of Covering / culverts slab					**59,965.39**
		Per Rft					**5,996.54**
							5,997.00
							14,015.00
		Accumulative rate					**14015.00**

RATE ANALYSIS

CONSTRUCTION OF INTERNAL DRAIN 5.33'X4.50'

Unit =10'

Sr.#	Chap # / Item #	Description	No.	Measurement			Qty	Unit
				L	W	D		
1	C-3/7	Earthwork excavation in open cutting upto 1.5m depth for storm water channels, drains, sullage drains, in open areas, roads, streets, lanes, including under pining of walls and shoring to protect existing works, shuttering and timbering the trenches, dressed to designed levels and dimensions, trimming, removal of surface water from trenches, backfilling and surplus excavated material disposed of and dressed within 15m lead:-	1	10.00	10.00	4.00	400.00	Cft
2	C-10/3	Supplying and filling sand under floor; or plugging in wells.					80.00	Cft
3	6/5	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone aggregate).						
		(h) Ratio 1: 3: 6	1	10.00	8.00	0.25	20.00	Cft
4	6/6	Providing and laying reinforced cement concrete (including prestressed concrete), using Ordinary Portland Cement / Sulphate resisting cement / Slag cement as may be required; coarse sand screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (but excluding the cost of steel reinforcement, its fabrication and placing in position, etc.):-						
	6/6	(a)(iii) Reinforced cement concrete in slab of rafts / strip foundation, base slab of column and retaining walls; etc and footing beams, other structural members other than those mentioned in 6(a) (i)& (ii) above not requiring form work (i.e. horizontal shuttering) complete in all respects:-						
		(1) Type A (nominal mix 1:2:4)	1	10	7.5	0.58	43.50	Cft
		(a) (i) Reinforced cement concrete in roof slab, beams, columns lintels, girders and other structural members laid in situ or precast laid in position, or prestressed members cast in situ, complete in all respects:- (1) Type A (nominal mix 1:1.5:3	2	10	0.58	4.5	52.20	Cft
5	6/12	Fabrication of mild steel reinforcement for cement concrete, including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust from bars):-						
		('c) Deformed bars (Grade-60)			2.5 kg/cft		191.40	Kg

Sr.#	Chap # / Item #	Description	No.	Measurement			Qty	Unit
				L	W	D		
6	C-1/1	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl, kankar lime (unslaked), surkhi, etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor. (Ch.No. 1, Item.No. 1)						
		Ratio (1:3.6)	1	20.00	0.92		18.48	
		Ratio (1:2.4)	1	43.50	0.88		38.28	
		Ratio (1:1.5.3)	1	52.20	0.84		43.85	
							100.61	Cft
7	6/31A	Providing and embedding 10" (250mm) wide PVC water stopper in expansion joints of RCC structures (Retaining walls, water tanks, Slabs) complete in all respect.						
		i) 10"wide 6 mm thick	2	10			20.00	Rft
8	13/9	Bitumen coating to plastered or cement concrete surface:- i) 20 lbs. per 100 Sft. (9.07 Kg per Sq.m)	1	10		5.08	50.80	Sft

RATE ANALYSIS

CONSTRUCTION OF INTERNAL DRAIN 5.33'X4.50'

Sr. No.	Ref. CSR	Description	Unit		Quantity	Rate (Rs)	Amount (Rs)
1	C-3/7	Earthwork excavation in open cutting upto 1.5m depth for storm water channels, drains, sullage drains, in open areas, roads, streets, lanes, including under pining of walls and shoring to protect existing works, shuttering and timbering the trenches, dressed to designed levels and dimensions, trimming, removal of surface water from trenches, backfilling and surplus excavated material disposed of and dressed within 15m lead:-	1000	Cft	400.00	11,558.50	4,623.40
2	C-10/3	Supplying and filling sand under floor; or plugging in wells.	100	Cft	80.00	3,061.20	2,448.96
3	6/5	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone (h) Ratio 1: 3: 6	100	Cft	20.00	38,182.80	7,636.56
4	6/6	Providing and laying reinforced cement concrete (including prestressed concrete), using Ordinary Portland Cement / Sulphate resisting cement / Slag cement as may be required; coarse sand screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (but excluding the cost of steel reinforcement, its fabrication and placing in position, etc.):-					
		(a)(iii) Reinforced cement concrete in slab of rafts / strip foundation, base slab of column and retaining walls; etc and footing beams, other structural members other than those mentioned in 6(a) (i)& (ii) above not requiring form work (i.e. horizontal shuttering) complete in all respects:-					
		(1) Type A (nominal mix 1:2:4)	Per	Cft	43.50	538.30	23,416.05
		(a) (i) Reinforced cement concrete in roof slab, beams, columns lintels, girders and other structural members laid in situ or precast laid in position, or prestressed members cast in situ, complete in all respects:-					
		(1) Type A (nominal mix 1:1.5:3)	Per	Cft	52.20	733.45	38,286.09
5	6/12	Fabrication of mild steel reinforcement for cement concrete, including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust from bars):-	100	Kg	191.40	35068.45	67,121.01
6	1/1	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl , kankar lime (unslaked), surkhi , etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor. Lead From nearest quarry (95km)	100	Cft	100.61	10,918.32	10,984.70

Sr. No.	Ref. CSR	Description	Unit		Quantity	Rate (Rs)	Amount (Rs)
7	6/31A	Providing and embedding 10" (250mm) wide PVC water stopper in expansion joints of RCC structures (Retaining walls, water tanks, Slabs) complete in all respect.					
		i) 10"wide 6 mm thick	Per	Rft	20.00	412.80	8,256.00
8	13/9	Bitumen coating to plastered or cement concrete surface:-					
		i) 20 lbs. per 100 Sft. (9.07 Kg per Sq.m)	100	Sft	50.80	2,697.05	1,370.10
						Total	**164,142.87**
						Rate P/Rft	**16,414.29**
						Say Rs.	**16414.00**

RATE ANALYSIS

CONSTRUCTION OF INTERNAL DRAIN 4.00'X4.75'

Unit =10'

Sr.#	Chap # / Item #	Description	No.	Measurement			Qty	Unit
				L	W	D		
1	C-3/7	Earthwork excavation in open cutting upto 1.5m depth for storm water channels, drains, sullage drains, in open areas, roads, streets, lanes, including under pining of walls and shoring to protect existing works, shuttering and timbering the trenches, dressed to designed levels and dimensions, trimming, removal of surface water from trenches, backfilling and surplus excavated material disposed of and dressed within 15m lead:-						
			1	10.00	8.58	4.00	343.20	Cft
2	C-10/3	Supplying and filling sand under floor; or plugging in wells.					68.64	Cft
3	6/5	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone aggregate).						
		(h) Ratio 1: 3: 6	1	10	6.58	0.25	16.45	Cft
4	6/6	Providing and laying reinforced cement concrete (including prestressed concrete), using Ordinary Portland Cement / Sulphate resisting cement / Slag cement as may be required; coarse sand screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (but excluding the cost of steel reinforcement, its fabrication and placing in position, etc.):-						
	6/6	(a)(iii) Reinforced cement concrete in slab of rafts / strip foundation, base slab of column and retaining walls; etc and footing beams, other structural members other than those mentioned in 6(a) (i)& (ii) above not requiring form work (i.e. horizontal shuttering) complete in all respects:-						
		(1) Type A (nominal mix 1:2:4)	1	10	6.08	0.58	35.26	Cft
		(a) (i) Reinforced cement concrete in roof slab, beams, columns lintels, girders and other structural members laid in situ or precast laid in position, or prestressed members cast in situ, complete in all respects:-						
		(1) Type A (nominal mix 1:1.5:3	2	10	0.58	4.75	55.10	Cft
5	6/12	Fabrication of mild steel reinforcement for cement concrete, including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust from bars):-						
		('c) Deformed bars (Grade-60)			2.0 kg/cft		180.73	Kg

Sr.#	Chap # / Item #	Description	No.	Measurement			Qty	Unit
				L	W	D		
6	C-1/1	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl, kankar lime (unslaked), surkhi, etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor.						
		(Ch.No. 1, Item.No. 1)						
		Ratio (1:3.6)	1	16.45	0.92		15.20	
		Ratio (1:2.4)	1	35.26	0.88		31.03	
		Ratio (1:1.5.3)	1	55.10	0.84		46.28	
							92.52	Cft
7	6/31A	Providing and embedding 10" (250mm) wide PVC water stopper in expansion joints of RCC structures (Retaining walls, water tanks, Slabs) complete in all respect.						
		i) 10"wide 6 mm thick	2	10			20.00	Rft
8	13/9	Bitumen coating to plastered or cement concrete surface:-						
		i) 20 lbs. per 100 Sft. (9.07 Kg per Sq.m)	1	10		5.33	53.30	Sft

RATE ANALYSIS

CONSTRUCTION OF INTERNAL DRAIN 4.00'X4.75'

Sr. No.	Ref. CSR	Description	Unit		Quantity	Rate (Rs)	Amount (Rs)
1	C-3/7	Earthwork excavation in open cutting upto 1.5m depth for storm water channels, drains, sullage drains, in open areas, roads, streets, lanes, including under pining of walls and shoring to protect existing works, shuttering and timbering the trenches, dressed to designed levels and dimensions, trimming, removal of surface water from trenches, backfilling and surplus excavated material disposed of and dressed within 15m lead:-	1000	Cft	343.20	11,558.50	3,966.88
2	C-10/3	Supplying and filling sand under floor; or plugging in wells.	100	Cft	68.64	3,061.20	2,101.21
3	6/5	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone (h) Ratio 1: 3: 6	100	Cft	16.45	38,182.80	6,281.07
4	6/6	Providing and laying reinforced cement concrete (including prestressed concrete), using Ordinary Portland Cement / Sulphate resisting cement / Slag cement as may be required; coarse sand screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (but excluding the cost of steel reinforcement, its fabrication and placing in position, etc.):-					
		(a)(iii) Reinforced cement concrete in slab of rafts / strip foundation, base slab of column and retaining walls; etc and footing beams, other structural members other than those mentioned in 6(a) (i)& (ii) above not requiring form work (i.e. horizontal shuttering) complete in all respects:-					
		(1) Type A (nominal mix 1:2:4)	Per	Cft	35.26	538.30	18,982.61
		(a) (i) Reinforced cement concrete in roof slab, beams, columns lintels, girders and other structural members laid in situ or precast laid in position, or prestressed members cast in situ, complete in all respects:- (1) Type A (nominal mix 1:1.5:3)	Per	Cft	55.10	674.30	37,153.93
5	6/12	Fabrication of mild steel reinforcement for cement concrete, including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust from bars):- ('c) Deformed bars (Grade-60)	100	Kg	180.73	35068.45	63,378.51
6	1/1	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl , kankar lime (unslaked), surkhi , etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor. Lead From nearest quarry (95km)	100	Cft	92.52	10,918.32	10,101.20

Sr. No.	Ref. CSR	Description	Unit	Quantity	Rate (Rs)	Amount (Rs)
7	6/31A	Providing and embedding 10" (250mm) wide PVC water stopper in expansion joints of RCC structures (Retaining walls, water tanks, Slabs) complete in all respect.				
		i) 10"wide 6 mm thick	Per Rft	20.00	412.80	8,256.00
8	13/9	Bitumen coating to plastered or cement concrete surface:-				
		i) 20 lbs. per 100 Sft. (9.07 Kg per Sq.m)	100 Sft	53.30	2,697.05	1,437.53
					Total	**151,658.93**
					Rate P/Rft	**15,165.89**
					Say Rs.	**15166.00**

RATE ANALYSIS

CONSTRUCTION OF INTERNAL DRAIN 3.00'X4.75'

Unit =10'

Sr.#	Chap # / Item #	Description	No.	Measurement			Qty	Unit
				L	W	D		
1	C-3/7	Earthwork excavation in open cutting upto 1.5m depth for storm water channels, drains, sullage drains, in open areas, roads, streets, lanes, including under pining of walls and shoring to protect existing works, shuttering and timbering the trenches, dressed to designed levels and dimensions, trimming, removal of surface water from trenches, backfilling and surplus excavated material disposed of and dressed within 15m lead:-						
			1	10.00	7.58	4.00	303.20	Cft
2	C-10/3	Supplying and filling sand under floor; or plugging in wells.					60.64	Cft
3	6/5	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone aggregate).						
		(h) Ratio 1: 3: 6	1	10	5.67	0.25	14.18	Cft
4	6/6	Providing and laying reinforced cement concrete (including prestressed concrete), using Ordinary Portland Cement / Sulphate resisting cement / Slag cement as may be required; coarse sand screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (but excluding the cost of steel reinforcement, its fabrication and placing in position, etc.):-						
	6/6	(a)(iii) Reinforced cement concrete in slab of rafts / strip foundation, base slab of column and retaining walls; etc and footing beams, other structural members other than those mentioned in 6(a) (i)& (ii) above not requiring form work (i.e. horizontal shuttering) complete in all respects:-						
		(1) Type A (nominal mix 1:2:4)	1	10	5.08	0.58	29.46	Cft
		(a) (i) Reinforced cement concrete in roof slab, beams, columns lintels, girders and other structural members laid in situ or precast laid in position, or prestressed members cast in situ, complete in all respects:-						
		(1) Type A (nominal mix 1:1.5:3						
			2	10	0.58	4.75	55.10	Cft
5	6/12	Fabrication of mild steel reinforcement for cement concrete, including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust from bars):-						
		('c) Deformed bars (Grade-60)						
					2.0 kg/cft		169.13	Kg

Sr.#	Chap # / Item #	Description	No.	Measurement			Qty	Unit
				L	W	D		
6	C-1/1	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl, kankar lime (unslaked), surkhi, etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor.						
		(Ch.No. 1, Item.No. 1)						
		Ratio (1:3.6)	1	14.18	0.92		13.10	
		Ratio (1:2.4)	1	29.46	0.88		25.93	
		Ratio (1:1.5.3)	1	55.10	0.84		46.28	
							85.31	Cft
7	6/31A	Providing and embedding 10" (250mm) wide PVC water stopper in expansion joints of RCC structures (Retaining walls, water tanks, Slabs) complete in all respect.						
		i) 10"wide 6 mm thick	2	10			20.00	Rft
8	13/9	Bitumen coating to plastered or cement concrete surface:-						
		i) 20 lbs. per 100 Sft. (9.07 Kg per Sq.m)	1	10		5.33	53.30	Sft

RATE ANALYSIS

CONSTRUCTION OF INTERNAL DRAIN 4.00'X4.75'

Sr. No.	Ref. CSR	Description	Unit		Quantity	Rate (Rs)	Amount (Rs)
1	C-3/7	Earthwork excavation in open cutting upto 1.5m depth for storm water channels, drains, sullage drains, in open areas, roads, streets, lanes, including under pining of walls and shoring to protect existing works, shuttering and timbering the trenches, dressed to designed levels and dimensions, trimming, removal of surface water from trenches, backfilling and surplus excavated material disposed of and dressed within 15m lead:-	1000	Cft	303.20	11,558.50	3,504.54
2	C-10/3	Supplying and filling sand under floor; or plugging in wells.	100	Cft	60.64	3,061.20	1,856.31
3	6/5	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone aggregate). (h) Ratio 1: 3: 6	100	Cft	14.18	38,182.80	5,412.41
4	6/6	Providing and laying reinforced cement concrete (including prestressed concrete), using Ordinary Portland Cement / Sulphate resisting cement / Slag cement as may be required; coarse sand screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (but excluding the cost of steel reinforcement, its fabrication and placing in position, etc.):- (a)(iii) Reinforced cement concrete in slab of rafts / strip foundation, base slab of column and retaining walls; etc and footing beams, other structural members other than those mentioned in 6(a) (i)& (ii) above not requiring form work (i.e. horizontal shuttering) complete in all respects:- (1) Type A (nominal mix 1:2:4)	Per	Cft	29.46	538.30	15,860.47
		(a) (i) Reinforced cement concrete in roof slab, beams, columns lintels, girders and other structural members laid in situ or precast laid in position, or prestressed members cast in situ, complete in all respects:- (1) Type A (nominal mix 1:1.5:3)	Per	Cft	55.10	674.30	37,153.93
5	6/12	Fabrication of mild steel reinforcement for cement concrete, including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust from bars):- ('c) Deformed bars (Grade-60)	100	Kg	169.13	35068.45	59,310.57
6	1/1	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl , kankar lime (unslaked), surkhi , etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor. Lead From nearest quarry (95km)	100	Cft	85.31	10,918.32	9,314.42

Sr. No.	Ref. CSR	Description	Unit	Quantity	Rate (Rs)	Amount (Rs)
7	6/31A	Providing and embedding 10" (250mm) wide PVC water stopper in expansion joints of RCC structures (Retaining walls, water tanks, Slabs) complete in all respect.				
		i) 10"wide 6 mm thick	Per Rft	20.00	412.80	8,256.00
8	13/9	Bitumen coating to plastered or cement concrete surface:-				
		i) 20 lbs. per 100 Sft. (9.07 Kg per Sq.m)	100 Sft	53.30	2,697.05	1,437.53
					Total	**142,106.18**
					Rate P/Rft	**14,210.62**
					Say Rs.	**14211.00**

RATE ANALYSIS

CONSTRUCTION OF INTERNAL DRAIN 2.50'X4.75'

Unit =10'

Sr.#	Chap # / Item #	Description	No.	Measurement			Qty	Unit
				L	W	D		
1	C-3/7	Earthwork excavation in open cutting upto 1.5m depth for storm water channels, drains, sullage drains, in open areas, roads, streets, lanes, including under pining of walls and shoring to protect existing works, shuttering and timbering the trenches, dressed to designed levels and dimensions, trimming, removal of surface water from trenches, backfilling and surplus excavated material disposed of and dressed within 15m lead:-						
			1	10.00	7.50	4.00	300.00	Cft
2	C-10/3	Supplying and filling sand under floor; or plugging in wells.					60.00	Cft
3	6/5	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone aggregate).						
		(h) Ratio 1: 3: 6	1	10	5	0.25	12.50	Cft
4	6/6	Providing and laying reinforced cement concrete (including prestressed concrete), using Ordinary Portland Cement / Sulphate resisting cement / Slag cement as may be required; coarse sand screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (but excluding the cost of steel reinforcement, its fabrication and placing in position, etc.):-						
	6/6	(a)(iii) Reinforced cement concrete in slab of rafts / strip foundation, base slab of column and retaining walls; etc and footing beams, other structural members other than those mentioned in 6(a) (i)& (ii) above not requiring form work (i.e. horizontal shuttering) complete in all respects:-						
		(1) Type A (nominal mix 1:2:4)	1	10	4.5	0.5	22.50	Cft
		(a) (i) Reinforced cement concrete in roof slab, beams, columns lintels, girders and other structural members laid in situ or precast laid in position, or prestressed members cast in situ, complete in all respects:-						
		(1) Type A (nominal mix 1:1.5:3						
			2	10	0.5	4.75	47.50	Cft
5	6/12	Fabrication of mild steel reinforcement for cement concrete, including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust from bars):-						
		('c) Deformed bars (Grade-60)						
					2.0 kg/cft		140.00	Kg

Sr.#	Chap # / Item #	Description	No.	Measurement			Qty	Unit
				L	W	D		
6	C-1/1	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl, kankar lime (unslaked), surkhi, etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor.						
		(Ch.No. 1, Item.No. 1)						
		Ratio (1:3.6)	1	12.50	0.92		11.55	
		Ratio (1:2.4)	1	22.50	0.88		19.80	
		Ratio (1:1.5.3)	1	70.00	0.84		58.80	
							90.15	Cft
7	6/31A	Providing and embedding 10" (250mm) wide PVC water stopper in expansion joints of RCC structures (Retaining walls, water tanks, Slabs) complete in all respect.						
		i) 10"wide 6 mm thick	2	10			20.00	Rft
8	13/9	Bitumen coating to plastered or cement concrete surface:-						
		i) 20 lbs. per 100 Sft. (9.07 Kg per Sq.m)	1	10		5.25	52.50	Sft

RATE ANALYSIS

CONSTRUCTION OF DRAIN 2.50'X3.25'

Sr. No.	Ref. CSR	Description	Unit		Quantity	Rate (Rs)	Amount (Rs)
1	C-3/7	Earthwork excavation in open cutting upto 1.5m depth for storm water channels, drains, sullage drains, in open areas, roads, streets, lanes, including under pining of walls and shoring to protect existing works, shuttering and timbering the trenches, dressed to designed levels and dimensions, trimming, removal of surface water from trenches, backfilling and surplus excavated material disposed of and dressed within 15m lead:-	1000	Cft	300.00	11,558.50	3,467.55
2	C-10/3	Supplying and filling sand under floor; or plugging in wells.	100	Cft	60.00	3,061.20	1,836.72
3	6/5	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone (h) Ratio 1: 3: 6	100	Cft	12.50	38,182.80	4,772.85
4	6/6	Providing and laying reinforced cement concrete (including prestressed concrete), using Ordinary Portland Cement / Sulphate resisting cement / Slag cement as may be required; coarse sand screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (but excluding the cost of steel reinforcement, its fabrication and placing in position, etc.):-					
		(a)(iii) Reinforced cement concrete in slab of rafts / strip foundation, base slab of column and retaining walls; etc and footing beams, other structural members other than those mentioned in 6(a) (i)& (ii) above not requiring form work (i.e. horizontal shuttering) complete in all respects:-					
		(1) Type A (nominal mix 1:2:4)	Per	Cft	22.50	538.30	12,111.75
		(a) (i) Reinforced cement concrete in roof slab, beams, columns lintels, girders and other structural members laid in situ or precast laid in position, or prestressed members cast in situ, complete in all respects:- (1) Type A (nominal mix 1:1.5:3)	Per	Cft	47.50	674.30	32,029.25
5	6/12	Fabrication of mild steel reinforcement for cement concrete, including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust from bars):- ('c) Deformed bars (Grade-60)	100	Kg	140.00	35068.45	49,095.83
6	1/1	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl , kankar lime (unslaked), surkhi , etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor. Lead From nearest quarry (95km)	100	Cft	90.15	10,918.32	9,842.86

Sr. No.	Ref. CSR	Description	Unit	Quantity	Rate (Rs)	Amount (Rs)
7	6/31A	Providing and embedding 10" (250mm) wide PVC water stopper in expansion joints of RCC structures (Retaining walls, water tanks, Slabs) complete in all respect.				
		i) 10"wide 6 mm thick	Per Rft	20.00	412.80	8,256.00
8	13/9	Bitumen coating to plastered or cement concrete surface:-				
		i) 20 lbs. per 100 Sft. (9.07 Kg per Sq.m)	100 Sft	52.50	2,697.05	1,415.95
					Total	**122,828.76**
					Rate P/Rft	**12,282.88**
					Say Rs.	**12283.00**

RATE ANALYSIS

CONSTRUCTION OF INTERNAL DRAIN 2'X4.75'

Unit =10'

Sr.#	Chap # / Item #	Description	No.	Measurement			Qty	Unit
				L	W	D		
1	C-3/7	Earthwork excavation in open cutting upto 1.5m depth for storm water channels, drains, sullage drains, in open areas, roads, streets, lanes, including under pining of walls and shoring to protect existing works, shuttering and timbering the trenches, dressed to designed levels and dimensions, trimming, removal of surface water from trenches, backfilling and surplus excavated material disposed of and dressed within 15m lead:-						
			1	10	5.50	4.00	220.00	Cft
2	C-10/3	Supplying and filling sand under floor; or plugging in wells. (20% of excavation)					44.00	Cft
3	C-6/5	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone aggregate).						
		(h) Ratio 1: 3: 6	1	10	4.5	0.25	11.25	Cft
4	C-6/6	Providing and laying reinforced cement concrete (including prestressed concrete), using Ordinary Portland Cement / Sulphate resisting cement / Slag cement as may be required; coarse sand screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (but excluding the cost of steel reinforcement, its fabrication and placing in position, etc.):-						
	6/6	(a)(iii) Reinforced cement concrete in slab of rafts / strip foundation, base slab of column and retaining walls; etc and footing beams, other structural members other than those mentioned in 6(a) (i)& (ii) above not requiring form work (i.e. horizontal shuttering) complete in all respects:-						
		(1) Type A (nominal mix 1:2:4)	1	10	4	0.5	20.00	Cft
		(a) (i) Reinforced cement concrete in roof slab, beams, columns lintels, girders and other structural members laid in situ or precast laid in position, or prestressed members cast in situ, complete in all respects:-						
		(1) Type A (nominal mix 1:1.5:3	2	10	0.5	4.75	47.50	Cft
5	C-6/12	Fabrication of mild steel reinforcement for cement concrete, including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust from bars):-						
		('c) Deformed bars (Grade-60)			2.0 kg/cft		135.00	Kg

Sr.#	Chap # / Item #	Description	No.	Measurement			Qty	Unit
				L	W	D		
6	C-1/1	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl, kankar lime (unslaked), surkhi, etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor. (Ch.No. 1, Item.No. 1)						
		Ratio (1:3.6)	1	11.25	0.92		10.40	
		Ratio (1:2.4)	1	20.00	0.88		17.60	
		Ratio (1:1.5.3)	1	47.50	0.84		39.90	
							67.90	
7	C-6/31A	Providing and embedding 10" (250mm) wide PVC water stopper in expansion joints of RCC structures (Retaining walls, water tanks, Slabs) complete in all respect.						
		i) 10"wide 6 mm thick	2	10			20.00	Rft
8	C-13/9	Bitumen coating to plastered or cement concrete surface:-						
		i) 20 lbs. per 100 Sft. (9.07 Kg per Sq.m)	1	10		5.25	52.50	Sft

RATE ANALYSIS

CONSTRUCTION OF DRAIN 2'X3.75'

Sr. No.	Ref. CSR	Description	Unit		Quantity	Rate (Rs)	Amount (Rs)
1	C-3/7	Earthwork excavation in open cutting upto 1.5m depth for storm water channels, drains, sullage drains, in open areas, roads, streets, lanes, including under pining of walls and shoring to protect existing works, shuttering and timbering the trenches, dressed to designed levels and dimensions, trimming, removal of surface water from trenches, backfilling and surplus excavated material disposed of and dressed within 15m lead:-	1000	Cft	220.00	11,558.50	2,542.87
2	C-10/3	Supplying and filling sand under floor; or plugging in wells.	100	Cft	44.00	3,061.20	1,346.93
3	6/5	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone (h) Ratio 1: 3: 6	100	Cft	11.25	38,182.80	4,295.57
4	6/6	Providing and laying reinforced cement concrete (including prestressed concrete), using Ordinary Portland Cement / Sulphate resisting cement / Slag cement as may be required; coarse sand screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (but excluding the cost of steel reinforcement, its fabrication and placing in position, etc.):-					
		(a)(iii) Reinforced cement concrete in slab of rafts / strip foundation, base slab of column and retaining walls; etc and footing beams, other structural members other than those mentioned in 6(a) (i)& (ii) above not requiring form work (i.e. horizontal shuttering) complete in all respects:-					
		(1) Type A (nominal mix 1: 1.5: 3)	Per	Cft	20.00	538.30	10,766.00
		(a) (i) Reinforced cement concrete in roof slab, beams, columns lintels, girders and other structural members laid in situ or precast laid in position, or prestressed members cast in situ, complete in all respects:-					
		(1) Type A (nominal mix 1:1.5:3)	Per	Cft	47.50	674.30	32,029.25
5	6/12	Fabrication of mild steel reinforcement for cement concrete, including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust from bars):-					
		('c) Deformed bars (Grade-60)	100	Kg	135.00	35068.45	47,342.41
6	1/1	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl , kankar lime (unslaked), surkhi , etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor. Lead From nearest quarry (95km)	100	Cft	67.90	10,918.32	7,412.99

Sr. No.	Ref. CSR	Description	Unit		Quantity	Rate (Rs)	Amount (Rs)
7	6/31A	Providing and embedding 10" (250mm) wide PVC water stopper in expansion joints of RCC structures (Retaining walls, water tanks, Slabs) complete in all respect.					
		i) 10"wide 6 mm thick	Per	Rft	20.00	412.80	8,256.00
8	13/9	Bitumen coating to plastered or cement concrete surface:-					
		i) 20 lbs. per 100 Sft. (9.07 Kg per Sq.m)	100	Sft	52.50	2,697.05	1,415.95
						Total	**115,407.96**
						Rate P/Rft	**11,540.80**
						Say Rs.	**11541.00**

RATE ANALYSIS

CONSTRUCTION OF INLET CHAMBER ANAROBIC POND

Unit =1

Sr.#	Chap # / Item #	Description	No.	Measurement			Qty	Unit
				L	W	D		
1	C-3/7	Earthwork excavation in open cutting upto 1.5m depth for storm water channels, drains, sullage drains, in open areas, roads, streets, lanes, including under pining of walls and shoring to protect existing works, shuttering and timbering the trenches, dressed to designed levels and dimensions, trimming, removal of surface water from trenches, backfilling and surplus excavated material disposed of and dressed within 15m lead:-						
			1	8.46	8.46	5.00	357.86	
			1	6.5	6.5	4.00	169.00	
						Total	**526.86**	Cft
2	C-10/3	Supplying and filling sand under floor; or plugging in wells. (30% of excavation)					107.36	Cft
3	6/5	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone aggregate).						
		Ratio 1: 3: 6	1	7.67	7.67	0.25	14.71	
			1	6.5	6.5	0.25	10.56	
						Total	**25.27**	Cft
		Ratio 1: 2: 4					17.85	Cft
4	6/6	Providing and laying reinforced cement concrete (including prestressed concrete), using Ordinary Portland Cement / Sulphate resisting cement / Slag cement as may be required; coarse sand screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (but excluding the cost of steel reinforcement, its fabrication and placing in position, etc.):-						
	6/6	(a)(iii) Reinforced cement concrete in slab of rafts / strip foundation, base slab of column and retaining walls; etc and footing beams, other structural members other than those mentioned in 6(a) (i)& (ii) above not requiring form work (i.e. horizontal shuttering) complete in all respects:-						
		(1) Type A (nominal mix 1: 1.5: 3)	1	7.17	7.17	1.5	77.11	
			1	6	6	0.83	29.88	
			1	5.5	5.5	0.5	15.13	
						Total	**122.12**	
		(a) (i) Reinforced cement concrete in roof slab, beams, columns lintels, girders and other structural members laid in situ or precast laid in position, or prestressed members cast in situ, complete in all respects:- (1) Type A (nominal mix 1:1.5:3						
			1	4.67	0.67	6.25	19.56	
			2	4.67	0.67	6.25	39.11	
			1	4.67	0.67	3.25	10.17	
			1	25	0.83	1.33	27.60	
			1	25	2.27	0.68	38.59	
			1	1.5	1.5	8.83	19.87	
			1	5.34	2.67	0.58	8.27	
							163.16	
		Deduction	1	2.50	0.67	2.50	4.19	
						Net	**158.97**	Cft

Sr.#	Chap # / Item #	Description	No.	Measurement			Qty	Unit
				L	W	D		
5	6/12	Fabrication of mild steel reinforcement for cement concrete, including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust from bars):-			3.0kg/cft		843.27	Kg
6	C-1/1	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl, kankar lime (unslaked), surkhi, etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor.						
		(Ch.No. 1, Item.No. 1)						
		Ratio (1:3.6)	1	25.27	0.92		23.35	
		Ratio (1:1.5.3)	1	281.09	0.84		236.12	
		Ratio (1:2.4)	1	17.85	0.88		15.71	
							275.17	Cft
7	C-23/43d	Providing, laying, cutting, jointing, testing and disinfecting High Density Polyethylene Pipe (HDPE-100) working presure pipe, Beta/ Dadex/ Popular/ IIL or equivalent including the cost of specials, in trenches, as approved & directed by the engineer incharge, complete in all respects PN-8						
		560mm	1	25			25.00	Rft
8	6/31A	Providing and embedding 10" (250mm) wide PVC water stopper in expansion joints of RCC structures (Retaining walls, water tanks, Slabs) complete in all respect.						
		i) 10"wide 6 mm thick	4	4.67			18.68	Rft
9	13/9	Bitumen coating to plastered or cement concrete surface:-						
		i) 20 lbs. per 100 Sft. (9.07 Kg per Sq.m)	4	4.67		5.00	93.40	Sft

RATE ANALYSIS

CONSTRUCTION OF INLET CHAMBER ANAROBIC POND

Sr. No.	Ref. CSR	Description	Unit	Quantity	Rate (Rs)	Amount (Rs)
1	C-3/7	Earthwork excavation in open cutting upto 1.5m depth for storm water channels, drains, sullage drains, in open areas, roads, streets, lanes, including under pining of walls and shoring to protect existing works, shuttering and timbering the trenches, dressed to designed levels and dimensions, trimming, removal of surface water from trenches, backfilling and surplus excavated material disposed of and dressed within 15m lead:-	1000 Cft	526.86	11,558.50	6,089.69
2	C-10/3	Supplying and filling sand under floor; or plugging in wells. (Provisional as Slect Fill)	100 Cft	107.36	3,061.20	3,286.42
3	6/5	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone				
		Ratio 1:3:6	100 Cft	25.27	38,182.80	9,648.69
		Ratio 1:2:4	100 Cft	17.85	43,837.20	7,824.94
4	6/6	Providing and laying reinforced cement concrete (including prestressed concrete), using Ordinary Portland Cement / Sulphate resisting cement / Slag cement as may be required; coarse sand screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (but excluding the cost of steel reinforcement, its fabrication and placing in position, etc.):-				
		(a)(iii) Reinforced cement concrete in slab of rafts / strip foundation, base slab of column and retaining walls; etc and footing beams, other structural members other than those mentioned in 6(a) (i)& (ii) above not requiring form work (i.e. horizontal shuttering) complete in all respects:-				
		(1) Type A (nominal mix 1: 1.5: 3)	Per Cft	122.12	597.40	72,953.50
		(a) (i) Reinforced cement concrete in roof slab, beams, columns lintels, girders and other structural members laid in situ or precast laid in position, or prestressed members cast in situ, complete in all respects:- (1) Type A (nominal mix 1:1.5:3)	Per Cft	158.97	733.45	116,598.62
5	6/12	Fabrication of mild steel reinforcement for cement concrete, including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust from bars):-	100 Kg	843.27	35068.45	295,722.95
6	1/1	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl , kankar lime (unslaked), surkhi , etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor. Lead From nearest quarry (95km)	100 Cft	275.17	10,918.32	30,044.35

Sr. No.	Ref. CSR	Description	Unit	Quantity	Rate (Rs)	Amount (Rs)
7	C-23/43d	Providing, laying, cutting, jointing, testing and disinfecting High Density Polyethylene Pipe (HDPE-100) working presure pipe, Beta/ Dadex/ Popular/ IIL or equivalent including the cost of specials, in trenches, as approved & directed by the engineer incharge, complete in all respects				
		560mm	Rft	25.00	12,788.20	319,705.00
8	6/31A	Providing and embedding 10" (250mm) wide PVC water stopper in expansion joints of RCC structures (Retaining walls, water tanks, Slabs) complete in all respect.				
		i) 10"wide 6 mm thick	Per Rft	18.68	412.80	7,711.10
9	13/9	Bitumen coating to plastered or cement concrete surface:-				
		i) 20 lbs. per 100 Sft. (9.07 Kg per Sq.m)	100 Sft	93.40	2,697.05	2,519.04
					Total	**872,104.31**
					Say Rs.	**872,104.00**

RATE ANALYSIS

CONSTRUCTION OF OUTLET CHAMBER ANAROBIC POND

Unit =1

Sr.#	Chap # / Item #	Description	No.	Measurement			Qty	Unit
				L	W	D		
1	C-3/7	Earthwork excavation in open cutting upto 1.5m depth for storm water channels, drains, sullage drains, in open areas, roads, streets, lanes, including under pining of walls and shoring to protect existing works, shuttering and timbering the trenches, dressed to designed levels and dimensions, trimming, removal of surface water from trenches, backfilling and surplus excavated material disposed of and dressed within 15m lead:-	1	8.46	8.46	5.00	357.86	
			1	6.5	6.5	4.00	169.00	
						Total	**526.86**	Cft
2	C-10/3	Supplying and filling sand under floor; or plugging in wells. (30% of excavation)					107.36	Cft
3	6/5	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone aggregate).						
		Ratio 1: 3: 6	1	7.67	7.67	0.25	14.71	
			1	6.5	6.5	0.25	10.56	
						Total	**25.27**	
		Ratio 1: 2: 4					17.85	
4	6/6	Providing and laying reinforced cement concrete (including prestressed concrete), using Ordinary Portland Cement / Sulphate resisting cement / Slag cement as may be required; coarse sand screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (but excluding the cost of steel reinforcement, its fabrication and placing in position, etc.):-						
	6/6	(a)(iii) Reinforced cement concrete in slab of rafts / strip foundation, base slab of column and retaining walls; etc and footing beams, other structural members other than those mentioned in 6(a) (i)& (ii) above not requiring form work (i.e. horizontal shuttering) complete in all respects:-						
		(1) Type A (nominal mix 1: 1.5: 3)	1	7.17	7.17	1.5	77.11	
			1	6	6	0.83	29.88	
			1	5.5	5.5	0.5	15.13	
						Total	122.12	
		(a) (i) Reinforced cement concrete in roof slab, beams, columns lintels, girders and other structural members laid in situ or precast laid in position, or prestressed members cast in situ, complete in all respects:- (1) Type A (nominal mix 1:1.5:3	1	4.67	0.67	6.25	19.56	
			2	4.67	0.67	6.25	39.11	
			1	4.67	0.67	3.25	10.17	
			1	27	0.83	1.33	29.81	
			1	27	2.27	0.68	41.68	
			1	1.5	1.5	10.83	24.37	
			1	5.34	2.67	0.58	8.27	
							172.96	
		Deduction	1	2.50	0.67	2.50	4.19	
						Net	**168.77**	

Sr.#	Chap # / Item #	Description	No.	Measurement			Qty	Unit
				L	W	D		
5	6/12	Fabrication of mild steel reinforcement for cement concrete, including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust from bars):- ('c) Deformed bars (Grade-60)			3.0kg/cft		872.66	Kg
6	C-1/1	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl, kankar lime (unslaked), surkhi, etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor. (Ch.No. 1, Item.No. 1)						
		Ratio (1:3.6)	1	25.27	0.92		23.35	
		Ratio (1:1.5.3)	1	290.89	0.84		244.34	
		Ratio (1:2.4)	1	17.85	0.88		15.71	
							283.40	Cft
7	C-23/43d	Providing, laying, cutting, jointing, testing and disinfecting High Density Polyethylene Pipe (HDPE-100) working presure pipe, Beta/ Dadex/ Popular/ IIL or equivalent including the cost of specials, in trenches, as approved & directed by the engineer incharge, complete in all respects PN-8						
		560mm	1	27			27.00	Rft
8	6/31A	Providing and embedding 10" (250mm) wide PVC water stopper in expansion joints of RCC structures (Retaining walls, water tanks, Slabs) complete in all respect.						
		i) 10"wide 6 mm thick	4	4.67			18.68	Rft
9	13/9	Bitumen coating to plastered or cement concrete surface:-						
		i) 20 lbs. per 100 Sft. (9.07 Kg per Sq.m)	4	4.67		5.00	93.40	Sft

RATE ANALYSIS

CONSTRUCTION OF OUTLET CHAMBER ANAROBIC POND

Sr. No.	Ref. CSR	Description	Unit	Quantity	Rate (Rs)	Amount (Rs)
1	C-3/7	Earthwork excavation in open cutting upto 1.5m depth for storm water channels, drains, sullage drains, in open areas, roads, streets, lanes, including under pining of walls and shoring to protect existing works, shuttering and timbering the trenches, dressed to designed levels and dimensions, trimming, removal of surface water from trenches, backfilling and surplus excavated material disposed of and dressed within 15m lead:-	1000 Cft	526.86	11,558.50	6,089.69
2	C-10/3	Supplying and filling sand under floor; or plugging in wells. (Provisional as Slect Fill)	100 Cft	107.36	3,061.20	3,286.42
3	6/5	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone				
		Ratio 1:3:6	100 Cft	25.27	38,182.80	9,648.69
		Ratio 1:2:4	100 Cft	17.85	43,837.20	7,824.94
4	6/6	Providing and laying reinforced cement concrete (including prestressed concrete), using Ordinary Portland Cement / Sulphate resisting cement / Slag cement as may be required; coarse sand screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (but excluding the cost of steel reinforcement, its fabrication and placing in position, etc.):-				
		(a)(iii) Reinforced cement concrete in slab of rafts / strip foundation, base slab of column and retaining walls; etc and footing beams, other structural members other than those mentioned in 6(a) (i)& (ii) above not requiring form work (i.e. horizontal shuttering) complete in all respects:-				
		(1) Type A (nominal mix 1: 1.5: 3)	Per Cft	122.12	597.40	72,953.50
		(a) (i) Reinforced cement concrete in roof slab, beams, columns lintels, girders and other structural members laid in situ or precast laid in position, or prestressed members cast in situ, complete in all respects:- (1) Type A (nominal mix 1:1.5:3)	Per Cft	168.77	733.45	123,782.76
5	6/12	Fabrication of mild steel reinforcement for cement concrete, including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust from bars):- ('c) Deformed bars (Grade-60)	100 Kg	872.66	35068.45	306,027.82
6	1/1	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl , kankar lime (unslaked), surkhi , etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor. Lead From nearest quarry (95km)	100 Cft	283.40	10,918.32	30,942.68

Sr. No.	Ref. CSR	Description	Unit	Quantity	Rate (Rs)	Amount (Rs)
7	C-23/43d	Providing, laying, cutting, jointing, testing and disinfecting High Density Polyethylene Pipe (HDPE-100) working presure pipe, Beta/ Dadex/ Popular/ IIL or equivalent including the cost of specials, in trenches, as approved & directed by the engineer incharge, complete in all respects				
		560mm	Rft	27.00	12,788.20	345,281.40
8	6/31A	Providing and embedding 10" (250mm) wide PVC water stopper in expansion joints of RCC structures (Retaining walls, water tanks, Slabs) complete in all respect.				
		i) 10"wide 6 mm thick	Per Rft	18.68	412.80	7,711.10
9	13/9	Bitumen coating to plastered or cement concrete surface:-				
		i) 20 lbs. per 100 Sft. (9.07 Kg per Sq.m)	100 Sft	93.40	2,697.05	2,519.04
					Total	**916,068.05**
					Say Rs.	**916,068.00**

RATE ANALYSIS

CONSTRUCTION OF INLET CHAMBER OF FACULTATIVE POND

Unit =1

Sr.#	Chap # / Item #	Description	No.	Measurement			Qty	Unit
				L	W	D		
1	C-3/7	Earthwork excavation in open cutting upto 1.5m depth for storm water channels, drains, sullage drains, in open areas, roads, streets, lanes, including under pining of walls and shoring to protect existing works, shuttering and timbering the trenches, dressed to designed levels and dimensions, trimming, removal of surface water from trenches, backfilling and surplus excavated material disposed of and dressed within 15m lead:-	1	8.46	8.46	5.00	357.86	
			1	6.5	6.5	4.00	169.00	
						Total	**526.86**	Cft
2	C-10/3	Supplying and filling sand under floor; or plugging in wells. (30% of excavation)					107.36	Cft
3	6/5	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone aggregate).						
		Ratio 1: 3: 6	1	7.67	7.67	0.25	14.71	
			1	6.5	6.5	0.25	10.56	
						Total	**25.27**	
		Ratio 1: 2: 4					17.85	
4	6/6	Providing and laying reinforced cement concrete (including prestressed concrete), using Ordinary Portland Cement / Sulphate resisting cement / Slag cement as may be required; coarse sand screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (but excluding the cost of steel reinforcement, its fabrication and placing in position, etc.):-						
		(a) (i) Reinforced cement concrete in roof slab, beams, columns lintels, girders and other structural members laid in situ or precast laid in position, or prestressed members cast in situ, complete in all respects:- (1) Type A (nominal mix 1:1.5:3	1	4.67	0.67	6.25	19.56	
			2	4.67	0.67	6.25	39.11	
			1	4.67	0.67	3.25	10.17	
			1	22	0.83	1.00	18.26	
			1	22	2.27	0.68	33.96	
			1	1.5	1.5	7	15.75	
			1	5.34	2.67	0.58	8.27	
							145.07	
		Deduction	1	2.50	0.67	2.50	4.19	
						Net	**140.89**	
	6/6	(a)(iii) Reinforced cement concrete in slab of rafts / strip foundation, base slab of column and retaining walls; etc and footing beams, other structural members other than those mentioned in 6(a) (i)& (ii) above not requiring form work (i.e. horizontal shuttering) complete in all respects:-						
		(1) Type A (nominal mix 1: 1.5: 3)	1	7.17	7.17	1.5	77.11	
			1	6	6	0.83	29.88	
			1	5.5	5.5	0.5	15.13	
						Total	**122.12**	

Sr.#	Chap # / Item #	Description	No.	Measurement			Qty	Unit
				L	W	D		
5	6/12	Fabrication of mild steel reinforcement for cement concrete, including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust from bars):- ('c) Deformed bars (Grade-60)			3.0kg/cft		789.02	Kg
6	C-1/1	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl, kankar lime (unslaked), surkhi, etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor. (Ch.No. 1, Item.No. 1)						
		Ratio (1:3.6)	1	25.27	0.92		23.35	
		Ratio (1:1.5.3)	1	263.01	0.84		220.92	
		Ratio (1:2.4)	1	17.85	0.88		15.71	
							259.98	Cft
7	C-23/43d	Providing, laying, cutting, jointing, testing and disinfecting High Density Polyethylene Pipe (HDPE-100) working presure pipe, Beta/ Dadex/ Popular/ IIL or equivalent including the cost of specials, in trenches, as approved & directed by the engineer incharge, complete in all respects PN-8						
		560mm	1	22			22.00	Rft
8	6/31A	Providing and embedding 10" (250mm) wide PVC water stopper in expansion joints of RCC structures (Retaining walls, water tanks, Slabs) complete in all respect.						
		i) 10"wide 6 mm thick	4	4.67			18.68	Rft
9	13/9	Bitumen coating to plastered or cement concrete surface:-						
		i) 20 lbs. per 100 Sft. (9.07 Kg per Sq.m)	4	4.67		5.00	93.40	Sft

RATE ANALYSIS

CONSTRUCTION OF INLET CHAMBER OF FACULTATIVE POND

Sr. No.	Ref. CSR	Description	Unit	Quantity	Rate (Rs)	Amount (Rs)
1	C-3/7	Earthwork excavation in open cutting upto 1.5m depth for storm water channels, drains, sullage drains, in open areas, roads, streets, lanes, including under pining of walls and shoring to protect existing works, shuttering and timbering the trenches, dressed to designed levels and dimensions, trimming, removal of surface water from trenches, backfilling and surplus excavated material disposed of and dressed within 15m lead:-	1000 Cft	526.86	11,558.50	6,089.69
2	C-10/3	Supplying and filling sand under floor; or plugging in wells. (Provisional as Slect Fill)	100 Cft	107.36	3,061.20	3,286.42
3	6/5	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone				
		Ratio 1:3:6	100 Cft	25.27	38,182.80	9,648.69
		Ratio 1:2:4	100 Cft	17.85	43,837.20	7,824.94
4	6/6	Providing and laying reinforced cement concrete (including prestressed concrete), using Ordinary Portland Cement / Sulphate resisting cement / Slag cement as may be required; coarse sand screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (but excluding the cost of steel reinforcement, its fabrication and placing in position, etc.):-				
		(a)(iii) Reinforced cement concrete in slab of rafts / strip foundation, base slab of column and retaining walls; etc and footing beams, other structural members other than those mentioned in 6(a) (i)& (ii) above not requiring form work (i.e. horizontal shuttering) complete in all respects:- (1) Type A (nominal mix 1: 1.5: 3)	Per Cft	122.12	597.40	72,953.50
		(a) (i) Reinforced cement concrete in roof slab, beams, columns lintels, girders and other structural members laid in situ or precast laid in position, or prestressed members cast in situ, complete in all respects:- (1) Type A (nominal mix 1:1.5:3)	Per Cft	140.89	733.45	103,333.59
5	6/12	Fabrication of mild steel reinforcement for cement concrete, including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust from bars):- ('c) Deformed bars (Grade-60)	100 Kg	789.02	35068.45	276,695.72
6	1/1	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl , kankar lime (unslaked), surkhi , etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor. Lead From nearest quarry (95km)	100 Cft	259.98	10,918.32	28,385.63

Sr. No.	Ref. CSR	Description	Unit	Quantity	Rate (Rs)	Amount (Rs)
7	C-23/43d	Providing, laying, cutting, jointing, testing and disinfecting High Density Polyethylene Pipe (HDPE-100) working presure pipe, Beta/ Dadex/ Popular/ IIL or equivalent including the cost of specials, in trenches, as approved & directed by the engineer incharge, complete in all respects				
		560mm	Rft	22.00	12,788.20	281,340.40
8	6/31A	Providing and embedding 10" (250mm) wide PVC water stopper in expansion joints of RCC structures (Retaining walls, water tanks, Slabs) complete in all respect.				
		i) 10"wide 6 mm thick	Per Rft	18.68	412.80	7,711.10
9	13/9	Bitumen coating to plastered or cement concrete surface:-				
		i) 20 lbs. per 100 Sft. (9.07 Kg per Sq.m)	100 Sft	93.40	2,697.05	2,519.04
					Total	**799,788.73**
					Say Rs.	**799,789.00**

RATE ANALYSIS

CONSTRUCTION OF OUTLET CHAMBER OF FACULTATIVE POND

Unit =1

Sr.#	Chap # / Item #	Description	No.	Measurement			Qty	Unit
				L	W	D		
1	C-3/7	Earthwork excavation in open cutting upto 1.5m depth for storm water channels, drains, sullage drains, in open areas, roads, streets, lanes, including under pining of walls and shoring to protect existing works, shuttering and timbering the trenches, dressed to designed levels and dimensions, trimming, removal of surface water from trenches, backfilling and surplus excavated material disposed of and dressed within 15m lead:-	1	9.67	7.84	5.00	379.06	Cft
2	C-10/3	Supplying and filling sand under floor; or plugging in wells. (30% of excavation)					113.72	Cft
3	6/5	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone aggregate).						
		Ratio 1: 3: 6	1	8.84	6.84	0.25	15.12	Cft
4	6/6	Providing and laying reinforced cement concrete (including prestressed concrete), using Ordinary Portland Cement / Sulphate resisting cement / Slag cement as may be required; coarse sand screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (but excluding the cost of steel reinforcement, its fabrication and placing in position, etc.):-						
	6/6	(a)(iii) Reinforced cement concrete in slab of rafts / strip foundation, base slab of column and retaining walls; etc and footing beams, other structural members other than those mentioned in 6(a) (i)& (ii) above not requiring form work (i.e. horizontal shuttering) complete in all respects:-						
		(1) Type A (nominal mix 1: 1.5: 3)	1	8.34	6.34	0.58	30.67	Cft
		(a) (i) Reinforced cement concrete in roof slab, beams, columns lintels, girders and other structural members laid in situ or precast laid in position, or prestressed members cast in situ, complete in all respects:- (1) Type A (nominal mix 1:1.5:3	2	5.67	0.67	6.00	45.59	
			1	6.67	0.67	1.67	7.46	
			1	6.67	0.67	6.00	26.81	
			1	7.34	2.67	0.58	11.37	
							91.23	
		Deduction	1	2.50	0.67	2.50	4.19	
						Net	**87.04**	

Sr.#	Chap # / Item #	Description	No.	Measurement			Qty	Unit
				L	W	D		
5	6/12	Fabrication of mild steel reinforcement for cement concrete, including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust from bars):- ('c) Deformed bars (Grade-60)			3.0kg/cft		353.13	Kg
6	C-1/1	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl, kankar lime (unslaked), surkhi, etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor. (Ch.No. 1, Item.No. 1)						
		Ratio (1:3.6)	1	15.12	0.92		13.97	
		Ratio (1:1.5.3)	1	117.71	0.84		98.88	
							112.84	Cft
7	6/31A	Providing and embedding 10" (250mm) wide PVC water stopper in expansion joints of RCC structures (Retaining walls, water tanks, Slabs) complete in all respect.						
		i) 10"wide 6 mm thick	2	6.67			13.34	
			2	4.67			9.34	
							22.68	Rft
8	13/9	Bitumen coating to plastered or cement concrete surface:-						
		i) 20 lbs. per 100 Sft. (9.07 Kg per Sq.m)	1	7.34		6.08	44.63	
			2	5.34		6.08	64.93	
							109.56	Sft

RATE ANALYSIS

CONSTRUCTION OF OUTLET CHAMBER OF FACULTATIVE POND

Sr. No.	Ref. CSR	Description	Unit	Quantity	Rate (Rs)	Amount (Rs)
1	C-3/7	Earthwork excavation in open cutting upto 1.5m depth for storm water channels, drains, sullage drains, in open areas, roads, streets, lanes, including under pining of walls and shoring to protect existing works, shuttering and timbering the trenches, dressed to designed levels and dimensions, trimming, removal of surface water from trenches, backfilling and surplus excavated material disposed of and dressed within 15m lead:-	1000 Cft	379.06	11,558.50	4,381.41
2	C-10/3	Supplying and filling sand under floor; or plugging in wells. (Provisional as Slect Fill)	100 Cft	113.72	3,061.20	3,481.17
3	6/5	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone Ratio 1: 3: 6	100 Cft	15.12	38,182.80	5,771.86
4	6/6	Providing and laying reinforced cement concrete (including prestressed concrete), using Ordinary Portland Cement / Sulphate resisting cement / Slag cement as may be required; coarse sand screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (but excluding the cost of steel reinforcement, its fabrication and placing in position, etc.):-				
		(a)(iii) Reinforced cement concrete in slab of rafts / strip foundation, base slab of column and retaining walls; etc and footing beams, other structural members other than those mentioned in 6(a) (i)& (ii) above not requiring form work (i.e. horizontal shuttering) complete in all respects:- (1) Type A (nominal mix 1: 1.5: 3)	Per Cft	30.67	597.40	18,320.97
		(a) (i) Reinforced cement concrete in roof slab, beams, columns lintels, girders and other structural members laid in situ or precast laid in position, or prestressed members cast in situ, complete in all respects:- (1) Type A (nominal mix 1:1.5:3)	Per Cft	87.04	733.45	63,841.31
5	6/12	Fabrication of mild steel reinforcement for cement concrete, including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust from bars):- ('c) Deformed bars (Grade-60)	100 Kg	353.13	35068.45	123,837.57
6	1/1	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl , kankar lime (unslaked), surkhi , etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor. Lead From nearest quarry (95km)	100 Cft	112.84	10,918.32	12,320.69

Sr. No.	Ref. CSR	Description	Unit	Quantity	Rate (Rs)	Amount (Rs)
7	6/31A	Providing and embedding 10" (250mm) wide PVC water stopper in expansion joints of RCC structures (Retaining walls, water tanks, Slabs) complete in all respect.				
		i) 10"wide 6 mm thick	Per Rft	22.68	412.80	9,362.30
8	13/9	Bitumen coating to plastered or cement concrete surface:-				
		i) 20 lbs. per 100 Sft. (9.07 Kg per Sq.m)	100 Sft	109.56	2,697.05	2,954.93
					Total	**244,272.23**
					Say Rs.	**244,272.00**

RATE ANALYSIS

CONSTRUCTION OF EFFLUENT DRAIN 3.00'X4.50'

Unit =10'

Sr.#	Chap # / Item #	Description	No.	Measurement			Qty	Unit
				L	W	D		
1	C-3/7	Earthwork excavation in open cutting upto 1.5m depth for storm water channels, drains, sullage drains, in open areas, roads, streets, lanes, including under pining of walls and shoring to protect existing works, shuttering and timbering the trenches, dressed to designed levels and dimensions, trimming, removal of surface water from trenches, backfilling and surplus excavated material disposed of and dressed within 15m lead:-						
			1	10.00	8.50	4.00	340.00	Cft
2	6/5	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone aggregate).						
		(h) Ratio 1: 3: 6	1	10.00	7.00	0.375	26.25	Cft
3	C-7/7	Pacca brick work other than building upto 10 ft height in 1:3 cement sand mortor.						
			2	10	1.5	1.5	45.00	
			2	10	1.125	3	67.50	
						Total	**112.50**	Cft
4	C-11/8	Cement plaster 1/2" thick (1:3) cement sand mortor upto 20' height.	4	10		4.5	180.00	Sft
5	6/5	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone aggregate).						
		(h) Ratio 1: 2: 4	2	10.00	1.13	0.170	3.83	
			1	10	3	0.33	9.90	
						Total	**13.73**	Cft
6	C-1/1	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl, kankar lime (unslaked), surkhi, etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor. (Ch.No. 1, Item.No. 1)						
		Ratio (1:3.6)	1	26.25	0.92		24.26	
		Ratio (1:2.4)	1	13.73	0.88		12.08	
						Total	**36.33**	
		Covered portion						
7	6/5	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone aggregate).						
		(h) Ratio 1: 2: 4	2	10.00	1.13	0.33	7.43	Cft
8	6/6	Providing and laying reinforced cement concrete (including prestressed concrete), using Ordinary Portland Cement / Sulphate resisting cement / Slag cement as may be required; coarse sand screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (but excluding the cost of steel reinforcement, its fabrication and placing in position, etc.):-						

Sr.#	Chap # / Item #	Description	No.	Measurement			Qty	Unit
				L	W	D		
		(a) (i) Reinforced cement concrete in roof slab, beams, columns lintels, girders and other structural members laid in situ or precast laid in position, or prestressed members cast in situ, complete in all respects:- (1) Type A (nominal mix 1:2:4						
			1	10	5.25	0.82	43.05	Cft
9	6/12	Fabrication of mild steel reinforcement for cement concrete, including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust from bars):-						
		('c) Deformed bars (Grade-60)			2.5 kg/cft		86.10	Kg
10	C-1/1	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl, kankar lime (unslaked), surkhi, etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor. (Ch.No. 1, Item.No. 1)						
		Ratio (1:2:4)	1	50.48	0.92		46.64	

RATE ANALYSIS

CONSTRUCTION OF EFFLUENT DRAIN 3.00'X4.50'

Sr. No.	Ref. CSR	Description	Unit		Quantity	Rate (Rs)	Amount (Rs)
1	C-3/7	Earthwork excavation in open cutting upto 1.5m depth for storm water channels, drains, sullage drains, in open areas, roads, streets, lanes, including under pining of walls and shoring to protect existing works, shuttering and timbering the trenches, dressed to designed levels and dimensions, trimming, removal of surface water from trenches, backfilling and surplus excavated material disposed of and dressed within 15m lead:-					
			1000	Cft	340.00	11,558.50	3,929.89
3	6/5	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone aggregate).					
		(h) Ratio 1: 3: 6	100	Cft	26.25	38,182.80	10,022.99
	C-7/7	Pacca brick work other than building upto 10 ft height in 1:3 cement sand mortor.	100	Cft	112.50	35,504.50	39,942.56
	C-11/8	Cement plaster 1/2" thick (1:3) cement sand mortor upto 20' height.	100	Cft	180.00	4,132.80	7,439.04
	6/5	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone aggregate).					
		(h) Ratio 1: 2: 4	100	Cft	13.73	43,837.20	6,016.66
	C-1/1	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl, kankar lime (unslaked), surkhi, etc. or 150 Cft. (4.25	100	Cft	36.33	10,918.32	3,966.95
							71,318.08
		Cost of Per Rft of open portion					**7,131.81**
						Say Rs.	**7132.00**
		Covered Portion					
	6/5	Cement concrete plain including placing, compacting, finishing and curing complete (including screening and washing of stone aggregate).					
		(h) Ratio 1: 2: 4	100	Cft	7.43	43,837.20	3,254.91
4	6/6	Providing and laying reinforced cement concrete (including prestressed concrete), using Ordinary Portland Cement / Sulphate resisting cement / Slag cement as may be required; coarse sand screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (but excluding the cost of steel reinforcement, its fabrication and placing in position, etc.):-					
		(a) (i) Reinforced cement concrete in roof slab, beams, columns lintels, girders and other structural members laid in situ or precast laid in position, or prestressed members cast in situ, complete in all respects:-					
		(1) Type A (nominal mix 1:1.5:3)	Per	Cft	43.05	733.45	31,575.02

Sr. No.	Ref. CSR	Description	Unit		Quantity	Rate (Rs)	Amount (Rs)
5	6/12	Fabrication of mild steel reinforcement for cement concrete, including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust from bars):-	100	Kg	86.10	35068.45	30,193.94
6	1/1	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl , kankar lime (unslaked), surkhi , etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor. Lead From nearest quarry (95km)	100	Cft	46.64	10,918.32	5,092.18
		Cost of Covering / culverts slab					**70,116.05**
		Per Rft					**7,011.61**
		Accumulative rate					**14,143.61**
						Say Rs.	**14144.00**

IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA CITY

Sub Head # B.2: Inlet/Outlet Channels & Collection/ Distribution Chambers (MRS)

ITEM NO.	NON MRS	DESCRIPTION	UNIT	QUANTITY	UNIT RATE (Rs)	AMOUNT (Rs)
1	RA-04	Providing and fixing manual and wheel operated C.I penstock gate B.S.S 7775 of verious size with CI shutter and CI frame channel with interior brass channel on bottom and two sides through which gate travels i/c non-magnetic SS spindle with square thread CI head stock and wheel etc complete in all respect as per drawing and/or directed by the engineer incharge.				
		Penstock Gate Size 5.33' x 3.50' Clear Opening	Each	5.00	2,821,500.00	14,107,500
		Penstock Gate Size 3.50' x 3.50' Clear Opening	Each	1.00	2,007,500.00	2,007,500
		Penstock Gate Size 2.00' x 3.50' Clear Opening	Each	16.00	1,336,500.00	21,384,000
Total Amount Non MRS Items						**37,499,000**
					Say Rs.	**37.50 Million**

IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA CITY

Sub Head # B.2: Inlet/Outlet Channels & Collection/ Distribution Chambers (MRS)

Sr.#	Chap # / Item #	Description	No.	Measurement			Qty	Unit
				L	W	D		
1	RA-04	Providing and fixing manual and wheel perated C.I penstock gate B.S.S 7775 of verious size with CI shutter and CI frame channel with interior brass channel on bottom and two sides through which gate travels i/c non-magnetic SS spindle with square thread CI head stock and wheel etc complete in all respect as per drawing and/or directed by the engineer incharge.						
		Penstock Gate Size 5.33' x 3.50' Clear Opening	5.00				5.00	Each
		Penstock Gate Size 3.50' x 3.50' Clear Opening	1.00				1.00	Each
		Penstock Gate Size 2.00' x 3.50' Clear Opening	16.00				16.00	Each

IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA CITY

Sub Head # C: Supply and Installation of 50 KVA Transformer.

Sr.#	Description	Unit	Qty.	Rate	Amount
1	Supply, insatllation, commissioning and testing of oil cooled type, Step down Power Transformer of specified rating,11/0.415 kV, i/c the cost of lifting hooks, thermometers, LT & HT bushing 5-steps, tap changer, imported double float buchholz relay, 2 earthing terminals, roller wheels, connecting terminals for cables M.S box on transformer in order to cover complete L.T side, all necessary materials required for connections on H.T & L.T side, rated voltage 11000/415/240 V impedance 6.25% or as specified by WAPDA/IEC system earth: Delta / Star, neutral solidly earthed, i/c Wapda testing charges,complete in all respects made of PEL, Siemens, as approved and directed by the Engineer Incharge (C-24/105)	Each	1	1,020,128.40	1020128.40
2	FESCO Connection charges				1000000.00
				Total:-	**2,020,128.40**
				Say Rs.	**2.02 Million**

IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA CITY

Sub Head H:Construction of Office Building

S.No.	Detail of Item/Work	No.	Measurements			Quantity
			L	B	H	
1	Excavation in foundation of buildings, bridges and other structures including dagbelling, dressing, refilling around structures with excavated earth watering and ramming lead upto one chain and lift.					
	(i) 0 ft. to 5.0 ft. depth.	1	135.75	3.00	2.25	916.31
		1	91.25	2.25	2.25	461.95
						1378.27
2	Cement concrete brick or stone ballast 1 1/2" to 2" gauge in foundation and plinth.					
	Ratio (1:4:8)	1	135.75	3.00	0.38	152.72
		1	91.25	2.25	0.37	75.97
						228.68
3	Pucca brick work in foundation and plinth in:-					
	(i) Cement sand mortar (1:5)	1	135.75	1.88	0.50	127.27
		1	91.25	1.50	0.50	68.44
		1	135.75	1.50	0.50	101.81
		1	91.25	1.13	0.50	51.33
		1	91.25	1.13	0.50	51.33
		1	135.75	0.75	5.50	559.97
		1	91.25	0.75	6.00	410.63
						1370.77
4	P/L damp proof course of cement concrete 1:2:4 (using cement, sand and shingle), including bitumen coating:					
	(b) With two coats of bitumen					
	(i) 1.5" thick	1	135.75	0.75		101.81
		1	91.25	0.75		68.44
						170.25
5	Pucca brick work in ground floor:-					
	(i) Cement sand mortor (1:5)	1	135.75	0.75	11.00	1119.94
		1	91.25	0.75	11.00	752.81
						1872.75
6	P/L reinforced cement concrete (including prestressed concrete), using coarse sand and aggregate, in required shapge and design, including forms, moulds, shuttering, lifting, compacting, curing,rendering and finishing exposed surface, complete.					
	(a) (i) Reinforced cement concrete in roof slab, beams, columns, lintels, girders and other structural members laid in situ or precast laid in position, or prestressed members cast in situ, complete in all respects:-					
	(3) Type C (nominal mix 1:2:4)					
	Lintle	6	8.00	0.75	0.75	27.00
		3	3.00	0.75	0.50	3.38
		5	4.50	0.75	0.50	8.44
		3	3.50	0.75	0.50	3.94
		1	11.00	0.75	0.75	6.19
	Shad	6	8.00	2.50	0.33	39.60
		3	3.00	2.50	0.33	7.43
		1	14.00	6.00	0.50	42.00
	Roof	1	47.75	35.25	0.42	706.94
	Parapit	1	166.00	0.33	1.00	54.78
						899.68

S.No.	Detail of Item/Work	No.	Measurements			Quantity
			L	B	H	
7	Fabrication of mild steel reinforcement for cement concrete including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust.					
	(b) deformed bars.		320.85 x 5.5 /2.204			2245.12
8	Cast iron rain water down pipe fixed in position, excluding heads and shoes, but including painting and clamps, etc.:-					
	(a) 4" dia cast iron down pipe.	2	11.00			22.00
9	Rain water down pipe cast iron head fixed in place, including cost of clamp holdfast and painting.					
		2				2.00
10	Shoes, bends or offsets for cast iron rain water down pipe, including fixing and painting.	2				2.00
11	Providing and laying sand under floor	1	43.75	31.25	0.33	451.17
		1	161	3.00	0.33	159.39
		1	14	8.00	0.33	36.96
						647.52
12	Dry reamed brick or stone ballast 1.5" to 2"	1	43.75	31.25	0.33	451.17
		1	161	3.00	0.33	159.39
		1	14	8.00	0.33	36.96
					Total	**647.52**
13	Cement concrete brick or stone ballast 1 1/2" to 2" gauge in foundation and plinth.					
	Ratio (1:4:8)	1	43.75	31.25	0.33	451.17
		1	161	3.00	0.33	159.39
		1	14	8.00	0.33	36.96
					Total	**647.52**
	Ratio (1:2:4)	1	43.75	31.25	0.17	232.42
		1	161	3.00	0.17	82.11
		1	14	8.00	0.17	19.04
					Total	**333.57**
14	Providing and laying flooring with China Verona Marble having uniform texture (Spotless) of required size and specified thickness, with adhesive bond over 3/4" thick bedding of (1:2) cement sand mortor i/c the cost of matching sealer, cutting, grinding and chemical polishing complete in all respect as approved and directed by the Engineer Incharge.					
	i) 1/2" thick(12"x12"/12"x24")	1	43.75	31.25		1367.19
		1	161	3.00		483.00
		1	14	8.00		112.00
						1962.19
15	Providing and laying 3/8" thick Prepolished Marble skirting / risers having uniform texture (spotless) of size 24"x6" of approved quality and shade with adhesive bond over 3/4" thick (1:2) cement sand mortor complete in all respect i/c the cost of matching sealer to finish the joints as approved and directed by the Engineer Incharge.					
	i) China Verona	2	135.75	0.50		135.75
		2	91.25	0.50		91.25
						227.00

S.No.	Detail of Item/Work	No.	Measurements			Quantity
			L	B	H	
16	Cement plaster 1:4 upto 20' height.					
	b) 1/2" thick.	1	135.75		11.00	1493.25
		1	91.25		11.00	1003.75
		1	135.75		4.00	543.00
		1	91.25		4.00	365.00
						3405.00
17	Cement pointing struck joints on walls, upto 20' height:					
	b) ratio 1:2					2497.00
18	Single laying of tiles 9"x4-12"x1-1/2" laid over 4" earth and 1" mud plaster without bhoosa grouted with cement sand 1:3 on top or R.C.C. roof slab, provided with 34 lbs. Bitumen coating sand blinded.					
		1	47.75	35.25		1683.19
		1	14.00	6.00		84.00
						1767.19
19	Khuras on roof 2'x2'x6"	2				2.00
20	Providing and fitting all types of glazed aluminium windows of anodised/ powder coated partly fixed and partly sliding using delux sections of approved manufacturer having frame size of 100 x 30 mm (4"x1-1/4") and leaf frame sections of 50 x 20 mm (2"x¾"), all of 1.6mm thickness including 5 mm thick imported tinted glass with rubber gasket using approved standard latches, hardware etc., as approved by the Engineer in-charge.					
		6	8.00	6.00		288.00
		4	3.00	4.00		48.00
						336.00
21	Providing and fixing 1 1/2" thick hollow flush door and window with commercial ply 3 ply on both faces deodar wood shutter frame 1 1/4" thick and partal wood braces at about 3" apart and deodar wood lipping 1 1/2" X3/8" fixed with MS chowkhat including chromium plated fittings etc. complete in all respects with out sliding bolt or lock					
		5	3.50	7.00		122.50
		3	2.50	7.00		52.50
		1	8.00	9.00		72.00
						247.00
22	Providing and fixing Vin board cabinet 3/4" thick with drawers 3"deep in 'Kitchen including termite proofing and polishing with synthetic enamel as specified, with handles hinges,screws etc., complete in all respects.					
	ii) 1-1/2' deep,with back	1	14.00	2.00		28.00
	iii) 2' deep,without back	1	14.00	2.50		35.00
23	Providing and laying Prepolished Granite of specified thickness and shade of full width of approved quality laid with adhesive bondover 3/4" thick (1:2) cement sand mortorbed,complete in all respect as approved and directed by the Engineer Incharge.					
	(i) 3/4" thick	1	14.00	2.00		28.00
		1	20.00	2.00		40.00
		1	15.00	2.00		30.00
					Total	**98.00**
24	Painting new surfces: Preparing surface and painting of doors & windows, any type (including edges)"-					
					Sides	
	i) Priming coat	5	3.50	7.00	2.00	245.00
		3	2.50	7.00	2.00	105.00
		1	8.00	9.00	2.00	144.00
		1	14.00	2.00	4.00	112.00
		1	14.00	2.50	4.00	140.00
					Total	**746.00**

S.No.	Detail of Item/Work	No.	Measurements			Quantity
			L	B	H	
	ii) Each subsequent coat of paint (two coats).					746.00
25	Priming coat of chalk under distemper.	2	9.25		11.00	203.50
		6	13.00		11.00	858.00
		2	14.00		11.00	308.00
		4	5.00		11.00	220.00
		4	14.00		11.00	616.00
		2	7.00		11.00	154.00
		4	20.00		11.00	880.00
		4	15.00		11.00	660.00
		2	7.00		11.00	154.00
		4	10.00		11.00	440.00
						4493.50
26	Distempering.					
	(iii) 3 coats.					4493.50
27	Providing and laying superb quality Ceramic tile floors of Master brand of specified size, Glossy / Matt / Texture of approved Color and Shade as per approved design with adhesive bond, over 3/4" thick (1;2) cement sand plaster i/c the cost of sealer for finishing the joints i/c cutting grinding complete in all respects and as approved and directed by the Engineer Incharge.					
	i) 12"x18"/12"x24"/10"x24" /8"x24"/12"x36"	3	5.00	7.00		105.00
		1	15.00	8.00		120.00
		6	5.00		7.00	210.00
		6	7.00		7.00	294.00
		2	15.00		5.00	150.00
		2	8.00		5.00	80.00
		2	20.00		5.00	200.00
		2	15.00		5.00	150.00
					Total	**1309.00**
28	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl, kankar lime (unslaked), surkhi, etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor. (Ch.No. 1, Item.No. 1)					
	Ratio (1:2:4)	1	1233.25	0.88		1085.26
	Ratio (1:4:8)	1	876.21	0.95		830.37
						1915.64
	PLUMBING AND SANITARY FITTINGS					
1	P/F brass stop cock / bib cock.					
	1/2 " dia	9				9.00
2	P/F Floor trap of cast iron including concrete chamber alround and C.I grating.					
	4" x 3"	6				6.00
3	Providing, laying, testing and commissioning of POLYPROPYLENE RANDOM COPOLYMER (PPRC) water supply pipe (Dadex / Popular / Beta or equivalent) with specified pressure rating PN (PRESSURE NOMINAL) and conforming to DIN8077-8078 codei / cost of solvent, specials, making jharries complete in all respect as approved and directed by Engineer Incharge.(Internal/External Diameters mentioned).					
	a) PN-16 pipe					
	(i)(1/2") 20 mm	3	82.00			246.00
	(ii)(3/4") 25 mm	3	105.00			315.00
	(iii)(1") 32 mm	1	150.00			150.00

S.No.	Detail of Item/Work	No.	Measurements			Quantity
			L	B	H	
4	P/F plastic made low down cistern including bracket set etc complete.					
	white	4				4.00
5	P/F chromium plated shower rose.					
	1/2" dia	3				3.00
6	P/F chromium plated or brass oxidised swan neck cock.	3				3.00
7	P/F angle iron brackets for sinks.	6				6.00
8	P/F stainless stlle sink with drain board including bracket set waste pipe and waste coupling	3				3.00
9	P/F chromium plated stop cock.	6				6.00
10	P/F cast iron man hole cover.					
	18" dia	4				4.00
11	P/F PVC Pipe.					
	4" dia	1	40.00			40.00
	3" dia	1	60.00			60.00
12	P/F 1/2" dia connection check nut copper.	12				12.00
13	Providing and fixing wash hand basin	4				4.00
14	Providing and fixing piller cock 1/2"	6				6.00
15	P/F white glazed earthen ware water closet	2				2.00
16	Providing and fitting one piece Europeon Coupled set of Water Closet (WC) and flushing Cistern of PORTA brand (full size) i/c the cost of CP / rubber connection, thimble, normal seat cover and rawal bolts complete in all respects as approved and directed by the Engineer Incharge.	2				2.00
	ELECTRIFICATION					
1	Supply and erection of PVC pipe for recessed wiring including bends and specials etc. in wall or trenches					
	(i)20mm dia	1	450.00			450.00
2	Supply and erection of single core PVC insulated copper conductor cables in prelaid PVC pipes					
	3/0.029 "	1	3200.00			3200.00
	7/0.029 "	1	785.00			785.00
3	Supply and erection of M.S sheet box of 16 16SWG 10 cm deep					
	8"X10"	3				3.00
	7"X4"	4				4.00
	4"X4"	10				10.00
4	Supply and erection of Iron /Aluminium clad 500 V main switch with kitkat fuses on angle iron board with 3 mm thick 15/20 amp	1				1.00
5	Supply and erection of Iron /Aluminium clad branch distribution board 250 volts on angle frame of suitable size with 3 mm sheet covering 3 way 15 amp per way	6				6.00

S.No.	Detail of Item/Work	No.	Measurements			Quantity
			L	B	H	
6	Supply and erection of 3/8 dia M.S fan hook	6				6.00
7	Supply and erection of bracket of M.S channel 75X40X6 mm section 2' long for 2 lights	6				6.00
8	Supply and erection of ceiling rose bakelite	18				18.00
9	Supply and erection of switches 5 amp piano type	35				35.00
10	Supply and erection of house service pipe	3				3.00
11	Supply and erection of 56" DIA fan (ASIA ,ROYAL) with regulators and canopy complete in all respects	9				9.00
12	Supply and erection of energy meter including meter testing fee single phase130amp 250 volts	1				1.00
C-24/105	ProvidingandfixingCopperWindedExhaustFanwithlouver andshuttermadeofPak/Younas/G.F.C.i/cthecostofneces sarycableandhardwareforconnectio a) Plastic body (i) 10" dia	6				6.00

COST ESTIMATE

IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA CITY

Sub Head # H: Construction of Staff Quarter:

S#	Ref. CSR P/Item	Description	Unit	Quantity	Rate	Amount
1	C-3/21	Excavation in foundation of buildings, bridges and other structures including dagbelling, dressing, refilling around structures with excavated earth watering and ramming lead upto one chain and lift.				
		(i) 0 ft. to 5.0 ft. depth.	1000 Cft	1378.27	13669.90	18,840.75
2	C-6/I-3	Cement concrete brick or stone ballast 1 1/2" to 2" gauge in foundation and plinth. Ratio (1:4:8)	100 Cft	228.68	28594.20	65,390.47
3	C-7/I-4	Pucca brick work in foundation and plinth in:- (i) Cement sand mortar (1:5)	100 Cft	1370.77	31566.45	432,702.05
4	C-6/36	P/L damp proof course of cement concrete 1:2:4 (using cement, sand and shingle), including bitumen coating:				
		(b) With two coats of bitumen (i) 2" thick	100 Sft	170.25	12315.15	20,966.54
5	C-7/I-5	Pucca brick work in ground floor:- (i) Cement sand mortor (1:5)	100 Cft	1872.75	34359.60	643,469.41
6	C-6/I-6	P/L reinforced cement concrete (including prestressed concrete), using coarse sand and aggregate, in required shapge and design, including forms, moulds, shuttering, lifting, compacting, curing,rendering and finishing exposed surface, complete. (a) (i) Reinforced cement concrete in roof slab, beams, columns, lintels, girders and other structural members laid in situ or precast laid in position, or prestressed members cast in situ, complete in all respects:-				
		(3) Type C (nominal mix 1:2:4)	1 Cft	899.68	674.30	606,655.07
7	C-6/12)	Fabrication of mild steel reinforcement for cement concrete including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust).				
		(b) deformed bars. 60 grade	100 Kg	2245.12	35068.45	787,329.17
8	C-9/1-20	Cast iron rain water down pipe fixed in position, excluding heads and shoes, but including painting and clamps, etc.:- (a) 4" dia cast iron down pipe.	1 Rft	22.00	500.00	11,000.00
9	C-9/1-21	Rain water down pipe cast iron head fixed in place, including cost of clamp holdfast and painting.	1 Each	2.00	1258.20	2,516.40
10	C-9/1-22	Shoes, bends or offsets for cast iron rain water down pipe, including fixing and painting.	1 Each	2.00	666.00	1,332.00
11	C-10/3	Supplying and filling sand under floor; or plugging in wells.	100 Cft	647.52	3,061.20	19,821.94
12	C-6/2	Dry reamed brick or stone ballast 1.5" to 2"	100 Cft	647.52	11008.80	71,284.39

S#	Ref. CSR P/Item	Description	Unit	Quantity	Rate	Amount
13	C-6/5	Cement concrete brick or stone ballast 1 1/2" to 2" gauge in foundation and plinth.				
		Ratio (1:4:8)	100 Cft	647.52	34098.00	220,792.01
		Ratio (1:2:4)	100 Cft	333.57	43837.20	146,228.57
14	C-10/45	Providing and laying flooring with China Verona Marble having uniform texture (Spotless) of required size and specified thickness, with adhesive bond over 3/4" thick bedding of (1:2) cement sand mortor i/c the cost of matching sealer, cutting, grinding and chemical polishing complete in all respect as approved and directed by the Engineer Incharge.				
		i) 1/2" thick(12"x12"/12"x24")	1 Sft	1962.19	528.05	1,036,133.11
15	C-10/46	Providing and laying 3/8" thick Prepolished Marble skirting / risers having uniform texture (spotless) of size 24"x6" of approved quality and shade with adhesive bond over 3/4" thick (1:2) cement sand mortor complete in all respect i/c the cost of matching sealer to finish the joints as approved and directed by the Engineer Incharge.				
		i) China Verona	1 Sft	227.00	311.90	70,801.30
16	C-11/1-9(b)	Cement plaster 1:4 upto 20' height.				
		b) 1/2" thick.	100 Sft	3405.00	3941.65	134,213.18
17	C-11/1-18(b)	Cement pointing struck joints on walls, upto 20' height:				
		b) ratio 1:2	100 Sft	2497.00	4305.60	107,510.83
18	C-9/I-5	Single laying of tiles 9"x4-12"x1-1/2" laid over 4" earth and 1" mud plaster without bhoosa grouted with cement sand 1:3 on top or R.C.C. roof slab, provided with 34 lbs. Bitumen coating sand blinded.	100 Sft	1767.19	12818.25	226,522.51
19	C-9/1-15	Khuras on roof 2'x2'x6"	1 Each	2.00	1036.65	2,073.30
20	C-25/52	Providing and fitting all types of glazed aluminium windows of anodised/ powder coated partly fixed and partly sliding using delux sections of approved manufacturer having frame size of 100 x 30 mm (4"x1-1/4") and leaf frame sections of 50 x 20 mm (2"x¾"), all of 1.6mm thickness including 5 mm thick imported tinted glass with rubber gasket using approved standard latches, hardware etc., as approved by the Engineer in-charge.	1 Sft	336.00	1488.65	500,186.40
21	C-12/50a	Providing and fixing 1 1/2" thick hollow flush door and window with commercial ply 3 ply on both faces deodar wood shutter frame 1 1/4" thick and partal wood braces at about 3" apart and deodar wood lipping 1 1/2" X3/8" fixed with MS chowkhat including chromium plated fittings etc. complete in all respects with out sliding bolt or lock.				
		M.S Angle iron 1 1/2"x1.5"x1/4" welded with M.S Flate 2"x1/4"	1 Sft	247.00	2015.90	497,927.30
22	C-12/59	Providing and fixing Vin board cabinet 3/4" thick with drawers 3"deep in 'Kitchen including termite proofing and polishing with synthetic enamel as specified, with handles hinges,screws etc., complete in all respects.				
		ii) 1-1/2' deep,with back	1 Sft	28.00	1751.40	49,039.20
		iii) 2' deep,without back	1 Sft	35.00	1747.85	61,174.75
23	C-10/51	Providing and laying Prepolished Granite of specified thickness and shade of full width of approved quality laid with adhesive bondover 3/4" thick (1:2) cement sand mortorbed,complete in all respect as approved and directed by the Engineer Incharge.				
		(i) 3/4" thick	1 Sft	98.00	1873.95	183,647.10

S#	Ref. CSR P/Item	Description	Unit	Quantity	Rate	Amount
24	C-13/1-5	Painting new surfces: Preparing surface and painting of doors & windows, any type (including edges)"-				
		i) Priming coat	100 Sft	746.00	1661.25	12,392.93
		ii) Each subsequent coat of paint (2 coats).	100 Sft	746.00	2217.00	16,538.82
24	C-11/I-22	Priming coat of chalk under distemper.	100 Sft	4493.50	348.00	15,637.38
25	1-11/I-23	Distempering.				
		(iii) 3 coats.	100 Sft	4493.50	1665.90	74,857.22
27	C-10/25	Providing and laying superb quality Ceramic tile floors of Master brand of specified size, Glossy / Matt / Texture of approved Color and Shade as per approved design with adhesive bond, over 3/4" thick (1;2) cement sand plaster i/c the cost of sealer for finishing the joints i/c cutting grinding complete in all respects and as approved and directed by the Engineer Incharge.				
		i) 12"x18"/12"x24"/10"x24" /8"x24"/12"x36"	1 Sft	1309.00	377.50	494,147.50
28	C-1/1	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl, kankar lime (unslaked), surkhi, etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor. (Ch.No. 1, Item.No. 1)	100 Cft	1915.64	10918.32	209,155.27
		PLUMBING AND SANITARY FITTINGS				
1	C 19/45a	P/F brass stop cock / bib cock.				
		1/2 " dia	1 each	9.00	968.00	8,712.00
2	C 19/34ii	P/F Floor trap of cast iron including concrete chamber alround and C.I grating.				
		4" x 3"	1 each	6.00	1128.45	6,770.70
3	C-23/47	Providing, laying, testing and commissioning of POLYPROPYLENE RANDOM COPOLYMER (PPRC) water supply pipe (Dadex / Popular / Beta or equivalent) with specified pressure rating PN (PRESSURE NOMINAL) and conforming to DIN8077-8078 codei / cost of solvent, specials, making jharries complete in all respect as approved and directed by Engineer Incharge.(Internal/External Diameters mentioned).				
		a) PN-16 pipe				
		(i)(1/2") 20 mm	1 Rft	246.00	61.85	15,215.10
		(ii)(3/4") 25 mm	1 Rft	315.00	86.35	27,200.25
		(iii)(1") 32 mm	1 Rft	150.00	131.75	19,762.50
4	C 19/13	P/F plastic made low down cistern including bracket set etc complete.	1 each	4.00	4550.55	18,202.20
5	C 19/29	P/F chromium plated shower rose.				
		1/2" dia	1 each	3.00	1078.40	3,235.20
6	C 19/32	P/F chromium plated or brass oxidised swan neck cock.	1 each	3.00	730.40	2,191.20
7	C 19/R6	P/F angle iron brackets for sinks.	1 each	6.00	513.60	3,081.60
8	C 19/08	P/F stainless stlle sink with drain board including bracket set waste pipe and waste coupling	1 each	3.00	11750.65	35,251.95
9	C 19/25	P/F chromium plated stop cock.	1 each	6.00	1390.40	8,342.40
10	C19/40	P/F cast iron man hole cover.				
		18" dia	1 each	4.00	2265.60	9,062.40

S#	Ref. CSR P/Item	Description	Unit	Quantity	Rate	Amount
11	C-23/27	P/F PVC Pipe.				
		4" dia	1 Rft	40.00	548.65	21,946.00
		3" dia	1 Rft	60.00	365.95	21,957.00
12	C 19/R7	P/F 1/2" dia connection check nut copper.	1 each	12.00	552.25	6,627.00
13	C-19/7	Providing and fixing wash hand basin 22"x16" with pedestal.	1 each	4.00	9573.90	38,295.60
14	C-19/24	Providing and fixing piller cock 1/2"	1 each	6.00	2710.40	16,262.40
15	C-19/4	P/F white glazed earthen ware water closet	1 each	2.00	3609.85	7,219.70
16	C-19/3	Providing and fitting one piece Europeon Coupled set of Water Closet (WC) and flushing Cistern of PORTA brand (full size) i/c the cost of CP / rubber connection, thimble, normal seat cover and rawal bolts complete in all respects as approved and directed by the Engineer Incharge.	1 each	2.00	53119.80	106,239.60
		ELECTRIFICATION				
1	C 24/3	Supply and erection of PVC pipe for recessed wiring including bends and specials etc. in wall or trenches				
		20mm dia	1 Rft	450.00	104.75	47,137.50
2	C 24/10	Supply and erection of single core PVC insulated copper conductor cables in prelaid PVC pipes				
		3/0.029 "	1 Rft	3200.00	32.00	102,400.00
		7/0.029 "	1 Rft	785.00	55.70	43,724.50
3	C 24/17	Supply and erection of M.S sheet box of 16 16SWG 10 cm deep				
		8"X10"	1 each	3.00	898.35	2,695.05
		7"X4"	1 each	4.00	479.55	1,918.20
		4"X4"	1 each	10.00	348.70	3,487.00
4	C 24/21	Supply and erection of Iron /Aluminium clad 500 V main switch with kitkat fuses on angle iron board with 3 mm thick 15/20 amp	1 each	1.00	3873.45	3,873.45
5	C 24/23	Supply and erection of Iron /Aluminium clad branch distribution board 250 volts on angle frame of suitable size with 3 mm sheet covering 3 way 15 amp per way	1 each	6.00	1763.60	10,581.60
6	C 24/52	Supply and erection of 3/8 dia M.S fan hook	1 each	6.00	88.95	533.70
7	C 24/54	Supply and erection of bracket of M.S channel 75X40X6 mm section				
		2' long for 2 lights	1 each	6.00	1332.65	7,995.90
8	C 24/33	Supply and erection of ceiling rose bakelite	1 each	18.00	90.35	1,626.30
9	C 24/34	Supply and erection of switches 5 amp piano type	1 each	35.00	97.00	3,395.00
10	C 24/58	Supply and erection of house service pipe	1 Rft	3.00	819.15	2,457.45

S#	Ref. CSR P/Item	Description	Unit	Quantity	Rate	Amount
11	C-24/107	Providing and fixing Copper winded ceiling fan made of Pak / Younas / G.F.C or NEECA approved equivalent i/c the cost of necessary cable and hardware for connection as approved and directed by Engineer Incharge.	1 each	9.00	9218.15	82,963.35
12	C 24/80	Supply and erection of energy meter including meter testing fee single phase130amp 250 volts	1 each	1.00	5262.00	5,262.00
					Total:- (Rs.)	**7,435,912.65**
		Nor Mrs				**370,826.00**
						7,806,738.65
					Say:- (Rs.)	**7,806,739.00**
						7.81

IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA CITY

Sub Head # D-2: Office Building

SR.	NON MRS	DESCRIPTION	QUANTITY	UNIT	RATE (Rs)	AMOUNT (Rs)
	RA-09	Supply, transportation at site, storage, installation, testing and commissioning of the following items of work (unless specifically stated otherwise) including all material, labour, tools and accessories etc. required for proper completion of each item as per specification and drawings and/or as directed by the Engineer.				
1.0		**LIGHT FITTINGS AND FANS**				
1.1		Following LED Luminaries of suitable wattage make Philips, GE, Pierlite or approved equivalent suitable for the project requirements. Contractor to submit lighting design calculation to determine the adequacy of the wattage and should adjust the number of LEDs/wattage as per project lighting requirements. The fitting shall be approved by the Engineer.				
(a)		Light Fixture Type LED Batten surface mounted, 18W complete in all respect with allied accessories make Philips, GE,Pierlite or approved equivalent. The fitting shall be approved by the Engineer.	8.00	Each	3,328	26,624
(b)		Light Fixture Type LED Batten surface mounted, 10W above mirror in toilets complete in all respect with allied accessories make Philips, GE,Pierlite or approved equivalent. The fitting shall be approved by the Engineer.	1.00	Each	2,341	2,341
1.2		Wall bracket Light Fixture Type LED 6W energy saving lamp with holder and complete in all respect with allied accessories make Philips, GE, Pierlite or approved equivalent. The fitting shall be approved by the Engineer.	8.00	Each	3,465	27,720
1.3		20W LED Water tight light fixture IP 65 complete in all respect with all allied accessories or approved equivalent. The fitting shall be approved by the Engineer.	6.00	Each	19,611	117,666
1.4		Light Fixture Type LED surface mounted down lighter, 6W complete in all respect with allied accessories make Philips, GE, Pierlite or approved equivalent. The fitting shall be approved by the Engineer.	1.00	Each	2,769	2,769
1.5		56" ceiling fan sweep (Climax, Pak, Millat) make or approved equivalent.	2.00	Each	9,420	18,840
1.6		Wall Bracket fan 20" sweep make (Royal, Pak, GFC or approved equivalent) capacitor type, copper winding complete with all required accessories etc.	2.00	Each	12,401	24,802
1.7		Exhaust fan 12" sweep make (Royal, Pak, Millat or approved equivalent) capacitor type ,copper winding complete with Plastic body and all accessories etc.	2.00	Each	6,315	12,630
2.0		**DISTRIBUTION BOARDS**				
		D.Bs with TP incoming adjustable moulded case circuit breaker and SP miniature outgoing circuit breakers, Panel box SWG 16 powder coated RAL colour 7032, IP class 44 and with all accessories. alongwith all installation and operational accessories as per specification or as shown on the drawings.				
2.1		**D B- Operator Quarter**				
		MATERIAL				
-		01 No. 32 Amps (Adj.) MCCB TP, RC=25kA, Icu	1.00	Each	80,890	80,890
-		06 No. outgoing 10A, MCB, SP, RC=10kA, Icu=100%Ics				
-		03 Nos.outgoing 20A, MCB, SP, RC=10kA, Icu=100%Ics				
-		03 Nos. Spare 10/20A, MCB, SP, RC=10kA, Icu=100%Ics				
-		02 Nos. Space for 10/20A, MCB				
-		Indication lights, push buttons, digital ammeter with selector switch, digital voltmeter with selector switch, Panel box SWG 16 powder coated RAL colour 7032, IP class 44 and with all accessories.				
3.0		**EARTHING AND BONDING**				
3.1		Earth point comprising of 10 ft. 5/8" dia. (16 mm dia) copper coated M.S. rods driven in ground. The earthing rods shall be completed with fixing clamps etc.	2.00	No.	28,272	56,544
		Total Amount NON MRS Items				**370,826**

IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA CITY

Sub Head H:Construction of Staff Building

S.No.	Detail of Item/Work	No.	Measurements			Quantity
			L	B	H	
1	Excavation in foundation of buildings, bridges and other structures including dagbelling, dressing, refilling around structures with excavated earth watering and ramming lead upto one chain and lift.					
	(i) 0 ft. to 5.0 ft. depth.	1	197.75	3.00	2.25	1334.81
		1	38.87	2.25	2.25	196.78
						1531.59
2	Cement concrete brick or stone ballast 1 1/2" to 2" gauge in foundation and plinth.					
	Ratio (1:4:8)	1	197.75	3.00	0.38	222.47
		1	38.87	2.25	0.37	32.36
						254.83
3	P/L reinforced cement concrete (including prestressed concrete), using coarse sand and aggregate, in required shapge and design, including forms, moulds, shuttering, lifting, compacting, curing,rendering and finishing exposed surface, complete.					
	(a) (i) Reinforced cement concrete in roof slab, beams, columns, lintels, girders and other structural members laid in situ or precast laid in position, or prestressed members cast in situ, complete in all respects:-					
	(3) Type C (nominal mix 1:2:4)	1	26.25	24.50	0.42	270.11
		1	11.87	6.50	0.33	25.46
		2	4.50	0.75	0.50	3.38
		1	4.00	0.75	0.50	1.50
		1	5.00	0.75	0.50	1.88
		2	3.50	0.75	0.50	2.63
		3	5.00	0.75	0.50	5.63
		2	3.00	0.75	0.50	2.25
		1	6.00	0.75	0.50	2.25
		1	17.00	2.00	0.17	5.78
						320.85
4	Fabrication of mild steel reinforcement for cement concrete including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust.					
	(b) deformed bars.		320.85 x 5.5 /2.204			800.68
5	Cast iron rain water down pipe fixed in position, excluding heads and shoes, but including painting and clamps, etc.:-					
	(a) 4" dia cast iron down pipe.	2	11.00			22.00
6	Rain water down pipe cast iron head fixed in place, including cost of clamp holdfast and painting.					
		2				2.00
7	Shoes, bends or offsets for cast iron rain water down pipe, including fixing and painting.	2				2.00
8	P/L damp proof course of cement concrete 1:2:4 (using cement, sand and shingle), including bitumen coating:					
	(b) With two coats of bitumen					
	(i) 1.5" thick	1	197.00	0.75		147.75
		1	38.00	0.75		28.50
						176.25

S.No.	Detail of Item/Work	No.	Measurements			Quantity
			L	B	H	
9	Pucca brick work in foundation and plinth in:-					
	(i) Cement sand mortar (1:5)	1	197.75	1.88	0.50	185.39
		1	197.37	1.50	0.50	148.03
		1	38.50	1.50	0.50	28.88
		1	197.38	1.13	0.50	111.03
		1	38.50	1.13	0.50	21.66
		1	197.00	0.75	5.50	812.63
		1	38.50	0.75	5.50	158.81
						1466.41
10	Pucca brick work in ground floor:-					
	(i) Cement sand mortor (1:5)	1	197.00	0.75	11.00	1625.25
		1	38.00	0.75	7.00	199.50
						1824.75
11	Providing and laying sand under floor	2	11.00	12.00	0.33	87.12
		1	12.00	15.00	0.33	59.40
		1	7.00	12.00	0.33	27.72
		2	5.00	5.50	0.33	18.15
		1	24.75	9.75	0.33	79.63
		1	14.75	6.00	0.33	29.21
						301.23
12	Dry reamed brick or stone ballast 1.5" to 2"	2	11.00	12.00	0.33	87.12
		1	12.00	15.00	0.33	59.40
		1	7.00	12.00	0.33	27.72
		2	5.00	5.50	0.33	18.15
		1	24.75	9.75	0.33	79.63
		1	14.75	6.00	0.33	29.21
						301.23
13	1-1/2" thick mosaic flooring consisting of 1/2" mosaic toping of one part of cement and marble powder in the ratio of 3:1 and two parts of marble chips, laid over 1" thick floor of 1:2:4 cement concrete including rubbing and polishing complete with finish					
	(a) Using grey cement	2	11.00	12.00		264.00
		1	12.00	15.00		180.00
		1	7.00	12.00		84.00
		2	5.00	5.50		55.00
		1	24.75	9.75		241.31
		1	14.75	6.00		88.50
						912.81
14	Mosaic skirting with one part of cement and marble powder in the ratio of 3:1 and two parts of marble chips, laid over 1/2" thick cement plaster 1:3, including rubbing and polishing, complete with finishing:					
	(a) Using grey cement					
	(ii) 1/2" thick	4	11.00	0.50		22.00
		4	12.00	0.50		24.00
		2	12.00	0.50		12.00
		2	15.00	0.50		15.00
		2	12.00	0.50		12.00
		2	7.00	0.50		7.00
		2	24.75	0.50		24.75
		2	10.25	0.50		10.25
						127.00

S.No.	Detail of Item/Work	No.	Measurements			Quantity
			L	B	H	
15	P/F glass strip 5 mm thick and 1-1/2" wide for dividing the mosaic flooring into panels approximate siae (3'x3').					300.00
16	Cement plaster 1:4 upto 20' height.					
	b) 1/2" thick.	2	27.00		11.00	594.00
		4	23.00		11.00	1012.00
		2	19.00		11.00	418.00
		4	9.25		11.00	407.00
		1	40.00		7.00	280.00
						2711.00
17	Cement pointing struck joints on walls, upto 20' height:					
	b) ratio 1:2					2711.00
18	Single laying of tiles 9"x4-12"x1-1/2" laid over 4" earth and 1" mud plaster without bhoosa grouted with cement sand 1:3 on top or R.C.C. roof slab, provided with 34 lbs. Bitumen coating sand blinded.					
		1	24.75	22.75		563.06
		1	10.37	5.00		51.85
						614.91
19	Khuras on roof 2'x2'x6"	2				2.00
20	P/F steel windows with openable glazed pannels, using milad steel box sections 1-1/2"1-1/2"x18 SWG glass panes, M.S channel 1/2"x1/2"x1/16" duly serenwd with leaves, & filled with rubber feld in between glass & M.S channel brass fitting, holdfast, duly painted					
	(a) fixed with wire gause, 24 SWG & glass pane 5 mm thick.	4	6.00	4.00		96.00
		2	2.00	2.00		8.00
						104.00
22	Providing and fixing 1 1/2" thick hollow flush door and window with commercial ply 3 ply on both faces deodar wood shutter frame 1 1/4" thick and partal wood braces at about 3" apart and deodar wood lipping 1 1/2" X3/8" fixed with MS chowkhat including chromium plated fittings etc. complete in all respects with out sliding bolt or lock					
		2	3.50	7.00		49.00
		1	5.00	7.00		35.00
		1	3.00	7.00		21.00
		2	2.50	7.00		35.00
						140.00
23	Painting new surfces: Preparing surface and painting of doors & windows, any type (including edges)"-					
					Sides	
	i) Priming coat	2	3.50	7.00	2.00	98.00
		1	5.00	7.00	2.00	70.00
		1	3.00	7.00	2.00	42.00
		2	2.50	7.00	2.00	70.00
		4	6.00	4.00	2.00	192.00
		2	2.00	2.00	2.00	16.00
						488.00
	ii) Each subsequent coat of paint (two coats).					488.00
24	Priming coat of chalk under distemper.	2	27.00		11.00	594.00
		4	23.00		11.00	1012.00
		2	19.00		11.00	418.00
		4	9.25		11.00	407.00
		1	40.00		7.00	280.00
						2711.00

S.No.	Detail of Item/Work	No.	Measurements			Quantity
			L	B	H	
25	Distempering.					
	(iii) 3 coats.					2711.00
26	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl, kankar lime (unslaked), surkhi, etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor. (Ch.No. 1, Item.No. 1)					
	Ratio (1:2:4)	1	320.85	0.88		282.35
	Ratio (1:4:8)	1	254.83	0.95		241.50
						523.85
	PLUMBING AND SANITARY FITTINGS					
1	P/F brass stop cock / bib cock.					
	1/2 " dia	5				5.00
2	P/F Floor trap of cast iron including concrete chamber alround and C.I grating.					
	4" x 3"	3				3.00
3	P/F G.I pipe line.					
	3/4" dia	1	75.00			75.00
	1/2" dia	1	100.00			100.00
4	P/F plastic made low down cistern including bracket set etc complete.					
	white	1				1.00
5	P/F chromium plated shower rose.					
	1/2" dia	1				1.00
6	P/F chromium plated or brass oxidised swan neck cock.	1				1.00
7	P/F angle iron brackets for sinks.	2				2.00
8	P/F stainless stlle sink with drain board including bracket set waste pipe and waste coupling	1				1.00
9	P/F chromium plated stop cock.	2				2.00
10	P/F cast iron man hole cover.					
	18" dia	1				1.00
11	P/F PVC Pipe.					
	4" dia	1	10.00			10.00
	3" dia	1	20.00			20.00
12	P/F 1/2" dia connection check nut copper.	4				4.00
13	Providing and fixing wash hand basin	1				1.00
14	Providing and fixing piller cock 1/2"	1				1.00
15	P/F white glazed earthen ware water closet	1				1.00
	ELECTRIFICATION					
1	Supply and erection of PVC pipe for recessed wiring including bends and specials etc. in wall or trenches					
	(i)20mm dia	1	150.00			150.00

S.No.	Detail of Item/Work	No.	Measurements			Quantity
			L	B	H	
2	Supply and erection of single core PVC insulated copper conductor cables in prelaid PVC pipes					
	3/0.029 "	1	1200.00			1200.00
	7/0.029 "	1	300.00			300.00
3	Supply and erection of M.S sheet box of 16 16SWG 10 cm deep					
	8"X10"	1				1.00
	7"X4"	2				2.00
	4"X4"	5				5.00
4	Supply and erection of Iron /Aluminium clad 500 V main switch with kitkat fuses on angle iron board with 3 mm thick 15/20 amp	1				1.00
5	Supply and erection of Iron /Aluminium clad branch distribution board 250 volts on angle frame of suitable size with 3 mm sheet covering 3 way 15 amp per way	1				1.00
6	Supply and erection of 3/8 dia M.S fan hook	4				4.00
7	Supply and erection of bracket of M.S channel 75X40X6 mm section					
	2' long for 2 lights	2				2.00
8	Supply and erection of ceiling rose bakelite	8				8.00
9	Supply and erection of switches 5 amp piano type	25				25.00
10	Supply and erection of house service pipe	3				3.00
11	Supply and erection of 48" DIA fan (ASIA ,ROYAL) with regulators and canopy complete in all respects	4				4.00
12	Supply and erection of energy meter including meter testing fee					
	single phase130amp 250 volts	1				1.00

COST ESTIMATE

IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA CITY

Sub Head # H: Construction of Staff Quarter:

S#	Ref. CSR P/Item	Description	Unit	Quantity	Rate	Amount
1	C-3/21	Excavation in foundation of buildings, bridges and other structures including dagbelling, dressing, refilling around structures with excavated earth watering and ramming lead upto one chain and lift.				
		(i) 0 ft. to 5.0 ft. depth.	1000 Cft	1531.59	13669.90	20,936.71
2	C-6/I-3	Cement concrete brick or stone ballast 1 1/2" to 2" gauge in foundation and plinth.				
		Ratio (1:4:8)	100 Cft	254.83	28594.20	72,866.04
3	C-6/I-6	P/L reinforced cement concrete (including prestressed concrete), using coarse sand and aggregate, in required shapge and design, including forms, moulds, shuttering, lifting, compacting, curing,rendering and finishing exposed surface, complete.				
		(a) (i) Reinforced cement concrete in roof slab, beams, columns, lintels, girders and other structural members laid in situ or precast laid in position, or prestressed members cast in situ, complete in all respects:-				
		(3) Type C (nominal mix 1:2:4)	1 Cft	320.85	674.30	216,351.62
4	C-6/12)	Fabrication of mild steel reinforcement for cement concrete including cutting, bending, laying in position, making joints and fastenings, including cost of binding wire and labour charges for binding of steel reinforcement (also includes removal of rust).				
		(b) deformed bars. 60 grade	100 Kg	800.68	35068.45	280,785.49
5	C-9/1-20	Cast iron rain water down pipe fixed in position, excluding heads and shoes, but including painting and clamps, etc.:-				
		(a) 4" dia cast iron down pipe.	1 Rft	22.00	500.00	11,000.00
6	C-9/1-21	Rain water down pipe cast iron head fixed in place, including cost of clamp holdfast and painting.				
			1 Each	2.00	1258.20	2,516.40
7	C-9/1-22	Shoes, bends or offsets for cast iron rain water down pipe, including fixing and painting.	1 Each	2.00	666.00	1,332.00
8	C-6/36	P/L damp proof course of cement concrete 1:2:4 (using cement, sand and shingle), including bitumen coating:				
		(b) With two coats of bitumen				
		(i) 2" thick	100 Sft	176.25	12315.15	21,705.45
9	C-7/I-4	Pucca brick work in foundation and plinth in:-				
		(i) Cement sand mortar (1:5)	100 Cft	1466.41	31566.45	462,894.57
10	C-7/I-5	Pucca brick work in ground floor:-				
		(i) Cement sand mortor (1:5)	100 Cft	1824.75	34359.60	626,976.80
11	C-10/3	Supplying and filling sand under floor; or plugging in wells.	100 Cft	301.23	3,061.20	9,221.20
12	C-6/2	Dry reamed brick or stone ballast 1.5" to 2"	100 Cft	301.23	11008.80	33,161.60

S#	Ref. CSR P/Item	Description	Unit	Quantity	Rate	Amount
13	C-10/22	1-1/2" thick mosaic flooring consisting of 1/2" mosaic toping of one part of cement and marble powder in the ratio of 3:1 and two parts of marble chips, laid over 1" thick floor of 1:2:4 cement concrete including rubbing and polishing complete with finish				
		(a) Using grey cement	100 Sft	912.81	25985.25	237,196.61
14	C-10/1-37	Mosaic skirting with one part of cement and marble powder in the ratio of 3:1 and two parts of marble chips, laid over 1/2" thick cement plaster 1:3, including rubbing and polishing, complete with finishing:				
		(a) Using grey cement (ii) 1/2" thick	100 Sft	127.00	28238.40	35,862.77
15	C-10/1-39	P/F glass strip 5 mm thick and 1-1/2" wide for dividing the mosaic flooring into panels approximate siae (3'x3').	1 Rft	300.00	7.90	2,370.00
16	C-11/1-9(b)	Cement plaster 1:4 upto 20' height.				
		b) 1/2" thick.	100 Sft	2711.00	3941.65	106,858.13
17	C-11/1-18(b)	Cement pointing struck joints on walls, upto 20' height:				
		b) ratio 1:2	100 Sft	2711.00	4305.60	116,724.82
18	C-9/I-5	Single laying of tiles 9"x4-12"x1-1/2" laid over 4" earth and 1" mud plaster without bhoosa grouted with cement sand 1:3 on top or R.C.C. roof slab, provided with 34 lbs. Bitumen coating sand blinded.	100 Sft	614.91	12818.25	78,821.02
19	C-9/1-15	Khuras on roof 2'x2'x6"	1 Each	2.00	1036.65	2,073.30
20	C-25/41	P/F steel windows with openable glazed pannels, using milad steel box sections 1-1/2"1-1/2"x18 SWG glass panes, M.S channel 1/2"x1/2"x1/16" duly serenwd with leaves, & filled with rubber feld in between glass & M.S channel brass fitting, holdfast, duly painted				
		(a) fixed with wire gause, 22 SWG & glass pane 5 mm thick.	1 Sft	104.00	1393.10	144,882.40
21	C-12/50a	Providing and fixing 1 1/2" thick hollow flush door and window with commercial ply 3 ply on both faces deodar wood shutter frame 1 1/4" thick and partal wood braces at about 3" apart and deodar wood lipping 1 1/2" X3/8" fixed with MS chowkhat including chromium plated fittings etc. complete in all respects with out sliding bolt or lock. M.S Angle iron 1 1/2"x1.5"x1/4" welded with M.S Flate 2"x1/4"	1 Sft	140.00	2015.90	282,226.00
23	C-13/1-5	Painting new surfces: Preparing surface and painting of doors & windows, any type (including edges)"-				
		i) Priming coat	100 Sft	488.00	1661.25	8,106.90
		ii) Each subsequent coat of paint (2 coats).	100 Sft	488.00	2217.00	10,818.96
24	C-11/I-22	Priming coat of chalk under distemper.	100 Sft	2711.00	348.00	9,434.28
25	1-11/I-23	Distempering. (iii) 3 coats.	100 Sft	2711.00	1665.90	45,162.55

S#	Ref. CSR P/Item	Description	Unit	Quantity	Rate	Amount
26	C-1/1	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl, kankar lime (unslaked), surkhi, etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor. (Ch.No. 1, Item.No. 1)	100 Cft	523.85	10918.32	57,195.57
		PLUMBING AND SANITARY FITTINGS				
1	C 19/45a	P/F brass stop cock / bib cock.				
		1/2 " dia	1 each	5.00	968.00	4,840.00
2	C 19/34ii	P/F Floor trap of cast iron including concrete chamber alround and C.I grating.				
		4" x 3"	1 each	3.00	1128.45	3,385.35
3	C 23/23	P/F G.I pipe line BSS 1387-1967 heavy quality				
		3/4" dia	1 Rft	75.00	355.35	26,651.25
		1/2" dia	1 Rft	100.00	278.75	27,875.00
4	C 19/13	P/F plastic made low down cistern including bracket set etc complete.	1 each	1.00	4550.55	4,550.55
5	C 19/29	P/F chromium plated shower rose.				
		1/2" dia	1 each	1.00	1078.40	1,078.40
6	C 19/32	P/F chromium plated or brass oxidised swan neck cock.	1 each	1.00	730.40	730.40
7	C 19/R6	P/F angle iron brackets for sinks.	1 each	2.00	513.60	1,027.20
8	C 19/08	P/F stainless stlle sink with drain board including bracket set waste pipe and waste coupling	1 each	1.00	11750.65	11,750.65
9	C 19/25	P/F chromium plated stop cock.	1 each	2.00	1390.40	2,780.80
10	C19/40	P/F cast iron man hole cover.				
		18" dia	1 each	1.00	2265.60	2,265.60
11	C-23/27	P/F PVC Pipe.				
		4" dia	1 Rft	10.00	548.65	5,486.50
		3" dia	1 Rft	20.00	365.95	7,319.00
12	C 19/R7	P/F 1/2" dia connection check nut copper.	1 each	4.00	552.25	2,209.00
13	C-19/7	Providing and fixing wash hand basin 22"x16" with pedestal.	1 each	1.00	9573.90	9,573.90
14	C-19/24	Providing and fixing piller cock 1/2"	1 each	1.00	2710.40	2,710.40
15	C-19/4	P/F white glazed earthen ware water closet	1 each	1.00	3609.85	3,609.85
		ELECTRIFICATION				
1	C 24/3	Supply and erection of PVC pipe for recessed wiring including bends and specials etc. in wall or trenches				
		20mm dia	1 Rft	150.00	104.75	15,712.50
2	C 24/10	Supply and erection of single core PVC insulated copper conductor cables in prelaid PVC pipes				
		3/0.029 "	1 Rft	1200.00	32.00	38,400.00
		7/0.029 "	1 Rft	300.00	55.70	16,710.00
3	C 24/17	Supply and erection of M.S sheet box of 16 16SWG 10 cm deep				
		8"X10"	1 each	1.00	898.35	898.35
		7"X4"	1 each	2.00	479.55	959.10
		4"X4"	1 each	5.00	348.70	1,743.50

S#	Ref. CSR P/Item	Description	Unit	Quantity	Rate	Amount
4	C 24/21	Supply and erection of Iron /Aluminium clad 500 V main switch with kitkat fuses on angle iron board with 3 mm thick 15/20 amp	1 each	1.00	3873.45	3,873.45
5	C 24/23	Supply and erection of Iron /Aluminium clad branch distribution board 250 volts on angle frame of suitable size with 3 mm sheet covering 3 way 15 amp per way	1 each	1.00	1763.60	1,763.60
6	C 24/52	Supply and erection of 3/8 dia M.S fan hook	1 each	4.00	88.95	355.80
7	C 24/54	Supply and erection of bracket of M.S channel 75X40X6 mm section 2' long for 2 lights	1 each	2.00	1332.65	2,665.30
8	C 24/33	Supply and erection of ceiling rose bakelite	1 each	8.00	90.35	722.80
9	C 24/34	Supply and erection of switches 5 amp piano type	1 each	25.00	97.00	2,425.00
10	C 24/58	Supply and erection of house service pipe	1 Rft	3.00	819.15	2,457.45
11	C-24/107	Providing and fixing Copper winded ceiling fan made of Pak / Younas / G.F.C or NEECA approved equivalent i/c the cost of necessary cable and hardware for connection as approved and directed by Engineer Incharge.	1 each	4.00	9218.15	36,872.60
12	C 24/80	Supply and erection of energy meter including meter testing fee single phase130amp 250 volts	1 each	1.00	5262.00	5,262.00
					Total:- (Rs.)	**3,146,146.47**
		Total Non Mrs				**230,875.00**
						3,377,021.47
					Say:- (Rs.)	**3,377,021.00**
						3.38

IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA CITY

Sub Head # E: Staff Building (Non MRS)

SR. NO.	NON MRS	DESCRIPTION	QUANTITY	UNIT	RATE (Rs)	AMOUNT (Rs)
	RA-09	Supply, transportation at site, storage, installation, testing and commissioning of the following items of work (unless specifically stated otherwise) including all material, labour, tools and accessories etc. required for proper completion of each item as per specification and drawings and/or as directed by the Engineer.				
1.0		**LIGHT FITTINGS AND FANS**				
1.1		Following LED Luminaries of suitable wattage make Philips, GE, Pierlite or approved equivalent suitable for the project requirements. Contractor to submit lighting design calculation to determine the adequacy of the wattage and should adjust the number of LEDs/wattage as per project lighting requirements. The fitting shall be approved by the Engineer.				
(a)		Light Fixture Type LED Batten surface mounted, 18W complete in all respect with allied accessories make Philips, GE,Pierlite or approved equivalent. The fitting shall be approved by the Engineer.	7.00	Each	3,328.00	23,296
(b)		Light Fixture Type LED Batten surface mounted, 10W above mirror in toilets complete in all respect with allied accessories make Philips, GE,Pierlite or approved equivalent. The fitting shall be approved by the Engineer.	1.00	Each	2,341.00	2,341
1.2		Wall bracket Light Fixture Type LED 6W energy saving lamp with holder and complete in all respect with allied accessories make Philips, GE, Pierlite or approved equivalent. The fitting shall be approved by the Engineer.	4.00	Each	3,465.00	13,860
1.3		20W LED Water tight light fixture IP 65 complete in all respect with all allied accessories or approved equivalent. The fitting shall be approved by the Engineer.	5.00	Each	19,611.00	98,055
1.4		Light Fixture Type LED surface mounted down lighter, 6W complete in all respect with allied accessories make Philips, GE, Pierlite or approved equivalent. The fitting shall be approved by the Engineer.	2.00	Each	2,769.00	5,538
1.5		56" ceiling fan sweep (Climax, Pak, Millat) make or approved equivalent.	2.00	Each	9,420.00	18,840
1.6		Wall Bracket fan 20" sweep make (Royal, Pak, GFC or approved equivalent) capacitor type, copper winding complete with all required accessories etc.	1.00	Each	12,401.00	12,401
2.0		**DISTRIBUTION BOARDS** D.Bs with TP incoming adjustable moulded case circuit breaker and SP miniature outgoing circuit breakers, Panel box SWG 16 powder coated RAL colour 7032, IP class 44 and with all accessories. alongwith all installation and operational accessories as per specification or as shown on the drawings.				
2.1		**D B- Staff Building MATERIAL**				
-		03 Nos.outgoing 20A, MCB, SP, RC=10kA, Icu=100%Ics				
-		02 Nos. Space for 10/20A, MCB Indication lights, push buttons, digital ammeter with selector switch, digital voltmeter with selector switch, Panel box SWG 16 powder coated RAL colour 7032, IP class 44 and with all accessories.				
-						
-						
3.0		**EARTHING AND BONDING**				
3.1		Earth point comprising of 10 ft. 5/8" dia. (16 mm dia) copper coated M.S. rods driven in ground. The earthing rods shall be completed with fixing clamps etc.	2.00	No.	28,272.00	56,544
		Total Amount NON MRS Items (Electrical Works)				**230,875**

IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA CITY

Sub Head # F:Area Lighting works of WWTP

S #	NON MRS	DESCRIPTION	QUANTITY	UNIT	UNIT RATE (Rs)	AMOUNT (Rs)
	RA	Supply, transportation at site, storage, installation, testing and commissioning of the following items of work (unless specifically stated otherwise) including all material, labour, tools and accessories etc. required for proper completion of each item as per specification and drawings and/or as directed by the Engineer.				
1		**Road / Street Lighting Poles and Foundations**				
(a)		10 m high single arm conical octagonal (hot dip) galvanized steel pole with extension arm luminaire arrangement, base plate, 2Amp., (RC=10KA) circuit breaker, terminal blocks including end caps, base connection plates & end stopper etc. as shown on drawing.	45.00	Each	150,866.95	6,789,013
(b)		Road Lighting Pole Foundation (Bitchmen Coating)	45.00	Each	20,055.00	902,475
2		**LED Road Light Fixtures**				
a)		Road Lighting LED Luminaries 120 Watt make Philips, GE, or approved equivalent, fully in compliance with the specified requirements suitable for the project requirements, fully IP 66 with corrosion resistant die cast aluminum housing, silicon gas kit, thermally hardened glass complete with LED drivers, surge protection and all accessories/ components required for the proper operation of the system. The luminaries shall be fully flexible for future upgrades and easy replacements for maintenance purposes. Contractor to submit lighting design calculation to determine the adequacy of the wattage and should adjust the number of LEDs/wattage as per project lighting requirements.	45.00	No.	67,350.00	3,030,750
3		**Conduits / Pipes** PVC pipe/conduit with accessories suitable for laying multi-core cables on road crossings.				
a)		100 mm Class-B (Pole to pole)	15,836.40	Rft.	414.00	6,556,270
b)		100 mm Class-D (Road crossing)	2,595.60	Rft.	684.00	1,775,390
4		**Power Cables**				
a)		4-core 25 mm^2 PVC insulated and PVC overall sheathed 600/1000 Volt grade unarmoured copper cable from main power supply to LCP. (Imported copper shall be used. Verified documentary evidence for source of copper & PVC shall be furnished prior to manufacturing)	20,151.60	Rft.	490.00	9,874,284
b)		4-core 50 mm^2 PVC insulated and PVC overall sheathed 600/1000 Volt grade unarmoured copper cable from main power supply to LCP. (Imported copper shall be used. Verified documentary evidence for source of copper & PVC shall be furnished prior to manufacturing)	4,503.60	Rft.	881.00	3,967,672
c)		Single core 16 mm^2 PVC insulated and PVC overall sheathed 450/750 Volt grade copper cable from pole to pole as CPC. (Imported copper shall be used.Verified				

IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA CITY

Sub Head # F:Area Lighting works of WWTP

S #	NON MRS	DESCRIPTION	QUANTITY	UNIT	UNIT RATE (Rs)	AMOUNT (Rs)
		documentary evidence for source of copper & PVC shall be furnished prior to manufacturing)	20,942.40	Rft.	89.00	1,863,874
d)		Single core 25 mm^2 PVC insulated and PVC overall sheathed 450/750 Volt grade copper cable from pole to pole as CPC. (Imported copper shall be used.Verified documentary evidence for source of copper & PVC shall be furnished prior to manufacturing)	4,503.60	Rft.	129.00	580,964
e)		3 Nos. 1 core 2.5 mm^2 (Red+Black+Green) Cu. PVC 450/750 Volt grade copper cable including connections at ends. The cables shall be drawn from junction box to the light fitting through hollow of the pole (for street light pole). (Imported copper shall be used. Verified documentary evidence for source of copper & PVC shall be furnished prior to manufacturing)				
-		40 Rft. cable is required for each pole and the unit is taken as No.				
		Price per No.	45.00	No.	3,018.00	135,810
5		**Lighting Control Panels**				
a)		Road lighting control panel (LCP) with angle iron frame claded 16 SGW, sheet steel enclosure having high quality powder coated paint. The LCP shall be complete with incoming and outgoing MCCBs, Cu busbars, magnetic contactors, photo-electric switches, meters, indication lights, 16 SWG sheet steel construction with IP 43 protection class, door, locking arrangement etc. and all other accessories as required for quality work.	4.00	Each	208,631.00	834,524
		LCP Description				
-		1 No. incoming 63Amp.(adjust.) TP, MCCB, 25 kA, Icu=100%Ics				
-		4 Nos. outgoing 16 Amp .(Adj.) TP MCCBs, 18 kA, Icu=100%Ics				
-		2 No. spare 16 Amp. (Adj.) TP MCCBs, 18 kA, Icu=100%Ics				
-		4 Nos. 26 Amp. magnetic contactor, AC-3				
-		2 No. spare 26 Amp. magnetic contactor , AC-3				
-		3 Nos. photo-electric switches				
		a) 1 No. ammeters 0-40 Amp., with selector switch (04 position) and CT of 50/5 Amp				
		b) 09 Nos. indication lights				
		c) 1 No. voltmeter with fuse and 7 position selector switch.				
		d) 3 Ph, N & Earth copper busbars				
		e) Internal wiring & line-up terminals etc.				
		f) Brass cable glands/accessories				
		g) 3 Nos. Auto-Manual-OFF (3 position switches for operation in auto (with photocell) and normal (manual mode- photocell overide)				
		h) Panel steel grid painted alongwith locking arrangement				
		i) IP =44/54 panel shall be weather proof, dust proof with studded and shade arrangement on top.				

IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA CITY

Sub Head # F:Area Lighting works of WWTP

S #	NON MRS	DESCRIPTION	QUANTITY	UNIT	UNIT RATE (Rs)	AMOUNT (Rs)
6 a)		**Earthing Rod** Earth point comprising of 10 ft. 5/8" dia. (16 mm dia) copper coated M.S. rods driven in ground near each lighting control panel and civil works as per drawings The earthing rods shall be completed with fixing clamps etc.	6.00	No.	8,008.00	48,048
					Total Amount	**36,359,073**

Say Rs. 36.36 Million

RATE ANALYSIS PROVIDING & FIXING OF REINFORCED PLASTIC COMPOSITE (RPC) MANHOLE COVERS 22" I/D WITH RPC FRAME

4	RPC Manhole Cover Manufactured with 100% Recycled Plastic Composite Material, 650 mm (26"dia) with clear opening size 600 mm (22" dia) and RPC manhole frame having dia meter 790 mm (31.1") with average breaking load capacity of 10 Ton and weight including frame of 50 kg (Minimum).						
		100	No. @ Rs.	9660.00	Each	Rs.	966,000 /-
					Total:-	Rs.	966,000 /-
	Add 20 % Contract profit & OHC					Rs.	193,200 /-
					Total:-	**Rs.**	**1,159,200 /-**
	Rate Per Number				**Say**	**Rs.**	**11,592 /-**

IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA CITY

Rate Analysis for Lead

Ser	Description	Unit	Quantity	Rate	Amount (Rs.)
A	**Carraige**				
	Carriage of 100 Cft. (2.83 cu.m) of all materials like stone aggregate, spawl, kankar lime (unslaked), surkhi, etc. or 150 Cft. (4.25 cu.m) of timber, by truck or by any other means owned by the contractor.				
	Chapter No - 1 / Item no - 1				
	1st Km	100 Cft	1	334.80	334.80
	2nd Km	100 Cft	1	160.30	160.30
	3rd Km	100 Cft	1	126.40	126.40
	4th Km	100 Cft	1	90.55	90.55
	5th Km	100 Cft	1	84.65	84.65
	6th Km	100 Cft	1	83.30	83.30
	7th Km	100 Cft	1	77.85	77.85
	8th Km	100 Cft	1	77.05	77.05
	9th Km	100 Cft	1	72.55	72.55
	10th Km	100 Cft	1	68.20	68.20
	10th Km to 173.88 Km / 173.88 - 10 = 163.88 Km	100 Cft	163.88	59.45	9,742.67
				Total Cost of 100 Cft	**10,918.32**

ANNEXURE-E
ANNUAL O&M COST

ROUGH COST ESTIMATE FOR THE SEWERAGE SYSTEM BASED ON WASTE WATER TREATMENT PLANT FOR SOUTH EAST AREA WAZIRABAD CITY, DISTRICT WAZIRABAD.

Disposal Station

No,s of Pumps proposed to be installed at disposal station.

2 set Non clogginh Horizontal centrifugal sullage pumps	=	8.0		Cuscec	=	3.00						
	=	8.0		Cuscec	=	2.00	x	8.00	=	16.0	Cuscec	
BHP @ 62% effecency for each pump of 8 cusec against 55 ft.head	=	1.10	x	62.40	x	10.00	x	55.00	=	110.71	BHP	
		.		550	x	0.62		**Say**	=	100.0	BHP	

Maintinance Charges for operation of disposal Station for 12 months.

1	**Establishment charges for 1 year**		**Job**		**No,s**		**Month**		**Pay/ month**		Amount
	Pay of Pump operator for 12 month	=	1.00	x	2	x	12.0	x	32000	=	768000.0
	Pay of Electrition for 3 months month	=	1.00	x	1	x	3.0	x	32000	=	96000.0
	Pay of Chowkidar for 12 month	=	1.00	x	2	x	12.0	x	32000	=	768000.0
	Total amount	=							**Total**	=	**1632000.0**

2	**Electricity charges for 1 year**	**motor No,s**		**BHP**		**Hr,s**		**Watts**		**Days**		Units	
	Energy units for 2 No,s 100 BHP A.C Electric motors.	2.00	x	100	x	8.0	x	0.746	x	365	=	435664.0	
										Total	=	**435664.0**	**Units**
	Take 1/3 for the first & 2nd years					435664.0			x	0.333	=	**145221.3**	**Units**

			Unit No,s			**Rate**			Amount
	Amount	=	145221	Units	@	30.0		P.Unit	=	**4356640**
3	**Mechenical & lubricant charges for 1 year**									
i	**Repair of machinery**	**Amount**	=	**Lump Sump**					=	**200000**
ii	**Provision for lubricants .**									
3		**Amount**	=	**Lump Sump**					=	**50000**
								Total	=	**250000.0**

SUMMERY OF COST

1	**Establishment charges for 1 year**		**Rs.**	**1632000.0**
2	**Electricity charges for 1 year**		**Rs.**	**4356640.0**
3	**Mechenical & lubricant charges for 1 year**		**Rs.**	**250000.0**
		Total	**Rs.**	**6238640.0**
	Contigencies @ 2%		**Rs.**	**124772.8**
	PRA @ 5%		**Rs.**	**311932.0**
		Total	**Rs.**	**6675344.8**
		Say	**Rs.**	**6675300.0**
	Total in Million		**Rs.**	**6.7**

ANNEXURE-F
ENVIRONMENT IMPACT ASSESSMENT & ARAP COST

Environmental & Social Screening Checklist

1

Instructions: Environmental and Social Focal Persons (ESFPs)1 nominated by the MCs for PCP environmental and social management, will use this checklist in field for environmental and social screening and categorization of each and every sub-project proposed to be executed under the Program. Deputy Program Officers-Environmental and Social Management deputed by PMDFC in regional offices will technically assist and support the ESFPs/MCs in filling in of this Checklist It is to be attached with the main document2 of sub-projects at planning stage and will be duly signed by the relevant ESFP and endorsed by the respective DPO-ESM This checklist focuses on environmental issues and social concerns. To ensure that social dimensions are adequately considered, Involuntary Resettlement Screening Checklist will also be used (iii) The purpose of this E&S Screening Checklists is to identify potential "Negative" impacts of environmental and social attributes or to enhance the existing environmental & social benefits. Use the "remarks" section to discuss any anticipated mitigation measures.	
Name of ESFP:	Muhammad Umar Nawaz Khan (MOI)
Name of MC:	Kamalia
Sub-Project Sector:	Liquid Waste (Sewerage)
Sub-Project Title:	Improvement of Sewerage System and Construction of WWTP Kamalia
Sub- Project Categorization:	**E-1** ✓ **S-1** **E-2** **S-2**✓ **E-3** **S-3**
Date of Screening:	10-08-2023
Anticipated Project Activities	Laying of Trunk and sub main RCC sewers (18- 42 inch) and desilting of old sewerage lines, Kamalia
Estimated Cost of Subprojects	1592.52. million
Completion Time/Duration	1 year

CHECKLIST

Screening Questions	Yes	No	Remarks
A. Project Siting **Is the Sub-Project area adjacent to or within any of the following?**			
Environmentally sensitive areas?			
Legally protected Area		✓	No legally protected area lies within 200 meters jurisdiction of Sub-Project.

[1] In all MCs, ESFPs are notified by Local government; MO (I&S) are focal persons for environmental sector and MO(P) are focal persons for social sectors.

[2] It is meant as PC-I and/or engineering estimates of sub-project

Any surface water body (river, canal, stream, lake, wetland) within 200 meters of the proposed sub project		✓	No water body observed within 200 meters in the Sub-Project area
Estuarine		✓	Not observed in sub project area
Special area for protecting biodiversity		✓	Not observed in sub project area
Buffer zone of protected area		✓	Not observed in sub project area
Mangroves Forest		✓	Not observed in sub project area
Man-made forest /game reserve, orchid /crops or any other area of environmental importance		✓	Its urban area
Socially sensitive /important areas/communities/ people?			
Physical Cultural Resources (PCRs) and or any site of cultural/religious importance (Graveyard, Shrine, Mosque, Church, Gordwarah, Temple, Fort, archeological/historical site) within 100 m of the proposed subproject	✓		20 Mosques and 03 shrines are observed within 100 meters of the Sub-Project interventions but have no direct/indirect significant environmental & social impacts. There would be hindrance in the mobility of people during Sewerage construction phase. However, this will be a temporary impact and would be managed by proper controlling the traffic. No other significant adverse impacts on sensitive receptors are foreseen
Sensitive receptors (Schools, colleges, Shrine, Mosque, Church, hospitals and clinics) within 100 meters of the proposed sub project	✓		13 schools and 01 madrassa exists within 100 m of the subproject interventions There would be hindrance in the mobility of people during Sewerage construction phase. However, this will be a temporary impact and would be managed by proper controlling the traffic. No other significant adverse impacts on sensitive receptors are foreseen
Any graveyard of local community (Muslims or Christians)	✓		One Graveyard exist within 10 m of the subproject interventions along Kamalia Road. but have no direct/indirect significant environmental & social impacts
Any demographic or socio-economic aspects of the subproject area that are already vulnerable (e.g., high incidence of marginalized populations, rural-urban migrants, illegal settlements, squatters, ethnic minorities, people with disabilities, people in old age, socially isolated segments3 of the society and women or children)?		✓	No negative impact observed on vulnerable groups (e.g., high incidence of marginalized populations, rural-urban migrants, illegal settlements, squatters, ethnic minorities, people with disabilities) Sub-Project area
Already existing infrastructure (including public amenities) which may be required to dismantle or may be affected temporarily by any means?		✓	No infrastructure will be dismantling due to construction activities of sewerage system.
B. Potential Environmental Impacts Will the Sub-Project cause…			

[3] Due to caste, creed, religion or gender e.g. transgender

1. Disturbance to habitats/biodiversity of environmentally sensitive or protected areas?		✓	The proposed project site doesn't have any environmentally sensitive or protected areas.
2. Cutting of trees?		✓	No Cutting of trees involved during construction phase
3. Disruption to habitats/biodiversity of surrounding ecosystem/environment?		✓	No significant adverse impacts on environment.

4. Generation of wastewater during construction or operation?		✓	Construction activities on minor level so waste water generation activities on lower level
5. Pollution of surface water/ground water due to wastewater discharge from construction site or due to direct/indirect disposal of wastewater?		✓	No such impact anticipated as no wastewater will be generated during construction activities.
6. Alteration of surface water hydrology of waterways resulting in increased sediment in streams/rivers or due to increased soil erosion at construction site?		✓	No such impact foreseen, as work activities are limited level and away from the surface water bodies so no other significant adverse impacts on sensitive receptors are foreseen during construction Phase.
7. Deterioration of surface water quality due to silt runoff and sanitary wastes from worker-based camps and chemicals used in construction.		✓	No construction labor camps envisaged and a rental house is used as a labor camp. Due to limited scope of work under Sub-Project and un-skilled local labor will be engaged for the construction activities. Chemical storage activities monitor regularly.
8. Over pumping of ground water, leading to salinization and ground subsidence?		✓	No over pumping/pumping involved in scope of construction activities.
9. Serious contamination of soil due to construction works?		✓	Construction materials should be storage properly, no leakage or leaching Process involve so contamination of soil not observed
10. Aggravation of solid waste problems in the area?		✓	No aggravation of solid waste problems in the area is anticipated. The waste construction material will be collected and disposed at designated place on daily basis
11. Generation of hazardous waste?		✓	Bitumen containing solid waste will be generated during dismantling of existing road at some point during laying of sewerage line that will be disposed properly at designated place.
12. Increased air pollution due to sub-project construction and operation?		✓	The subproject interventions are on small scale that will not significantly increase air pollution
13. Noise and vibration due to sub-project construction or operation?	✓		Noise and vibration will be generated during excavation and pipe laying activities but the level is expected to be low. However, the noise will be monitored on regularly during construction by the contractor

14. Creation of temporary breeding habitats for diseases such as those transmitted by mosquitoes and rodents due to solid/liquid?		✓	No Temporary breeding habitats creates during Construction activities for diseases such as those transmitted by mosquitoes and rodents due to solid/liquid
15. Use of chemicals during construction?		✓	No chemicals will be used during construction activities
C: Potential Social Impacts Will the Sub-Project cause…			
1. Impairment of historical/cultural areas; disfiguration of landscape or potential loss/damage to Physical Cultural Resources (PCRs)?		✓	No impairment/damage to any PCR envisioned as per scope of construction activities
2. Displacement or involuntary resettlement of people? (physical displacement and/or economic displacement) (If "Yes", please also fill Involuntary Resettlement Screening Checklist)		✓	Not observed in sub project area
3. Disproportionate impacts on the poor, women and children and or other vulnerable groups 4(mentioned above)?		✓	There will be no Impact on the poor women, children and or other vulnerable groups
4. Temporary impediments in movements of people/transport and animals?	✓		There would be hindrance in the mobility of people during construction phase. However, this will be a temporary impact and would be managed by proper controlling the traffic. The Contractor in this context will ensure housekeeping.
5. Large population influx during sub-project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		✓	Due to Limited Scope of work activities, Local unskilled labor will be preferred by the Contractor
6. Social conflicts if workers from other areas are hired.	✓		Contractor will Hire local worker for unskilled construction activities
7. Risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation?	✓		Contractor will follow EHS SOPs to avoid physical hazards which are part of PC-I.
8. Risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel, and other chemicals during construction and operation?	✓		There would be some safety issues during martial transportation, during construction phase. The SOPs for health and safety have been included in the PC-I that have to be followed by the contractors

[4] Women, Children, Women headed households, People in old age, people having disabilities, socially isolated community groups and or people living below the poverty line

9. Community safety risks due to both accidental and natural causes, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation, and decommissioning.	✓		There would be safety issues in Construction phase, During storage of fuel and other chemicals and transport. The SOPs for health and safety have been included in the PC-I that have to be followed by the contractors
10. Any impact on sensitive receptors (mentioned above)		✓	Not observed in sub project area
11. Any impact of negative nature on already existing infrastructure including public amenities		✓	Not observed in sub project area

Prepared By: **Name:** Muhammad Imran **Designation:** Environment Specialist **Organization:** MM Pakistan **Signature:** **Date: 10**-08-2023	**Endorsed By:** **Name:** Muhammad Umar Khan **Designation:** Municipal Officer Infrastructure (MOI) **Organization:** MC **Signature** **Date: 10**-08-2023	**Reviewed By:** **Name: Tahmina Kiren** **Designation:** Program Officer ESM **Organization:** PMDFC **Signature:** **Date: 10**-08-2023

INVOLUNTARY RESETTLEMENT SCREENING CHECKLIST

Name of City/MC/LG: Kamalia

Sub-Project Sector: Liquid Waste(Sewerage)

Sub-Project Title: Improvement of Sewerage System and Construction of WWTP Kamalia

Date of Screening: 06-06-2023

SECTION 1	Yes	No	Expected	Remarks
Does the project require land acquisition? Yes/No		✓		Already Road exists and pipe line laying along center line of road. land owned by Govt so no land acquired for this sub project
If yes, then describe the type of land being acquired from the categories below:		✓		No Land acquired for this sub project
Has any AED been conducted at the proposed location by the government1? Yes/No		✓		Not observed in sub project area and confirm by MC Staff also
Land (Quantify and describe types of land being acquired in "remarks column".		✓		No Land acquired for this sub project
Government and LG owned land free of occupation (agriculture or settlement)		✓		Already land owned by govt so no land acquired for this sub project
Government or state-owned land (other than LG) free of occupation (agriculture or settlement)		✓		No Land acquired for this sub project. No government or state-owned land will be affected due to the implementation of the project
Private land		✓		Construction activities will be limited on streets, no additional private land will be required/ affect
Residential		✓		No residential structure or land will be affected due to the rehabilitation of sewerage lines
Commercial		✓		No Land acquired for this sub project
Agricultural		✓		No Land acquired for this sub project
Communal		✓		No Land acquired for this sub project
Others (specify in "remarks").		✓		Already land owned by govt so no land acquired for this sub project
Name of owner/owners and type of ownership document if available.		✓		Already land owned by govt so no land acquired for this sub project
If land is being acquired, describe any structures constructed on it		✓		No Land acquired for this sub project
Land-based assets:		✓		No Land acquired for this sub project
Residential structures		✓		No Land acquired for this sub project
Commercial structures (specify in "remarks")		✓		No Land acquired for this sub project
Community structures (specify in "remarks")		✓		No Land acquired for this sub project

Agriculture structures (specify in “remarks”)		✓		
Public utilities (specify in “remarks”)	✓			Already land owned by govt so no land acquired for this sub project. Ramps are away from ROW.
Others (specify in “remarks”)		✓		No Land acquired for this sub project
If agricultural land is being acquired, specify the following:		✓		No Land acquired for this sub project
Agriculture related impacts		✓		No Land acquired for this sub project
Crops and vegetables (specify types and cropping area in “remarks).		✓		No Land acquired for this sub project
Trees (specify number and types in “remarks”).		✓		No Land acquired for this sub project
Others (specify in “remarks”).		✓		No Land acquired for this sub project
Affected Persons (APs)		✓		No Persons Affected during this Project
Will any people be displaced from the land when acquired? Yes/No		✓		No Land acquired for this sub project
Number of APs		✓		No Persons Affected during this Project
Males		✓		No Persons Affected during this Project
Females		✓		No Persons Affected during this Project
Titled landowners		✓		No Land acquired for this sub project
Tenants and sharecroppers		✓		No Land acquired for this sub project
Leaseholders		✓		No Land acquired for this sub project
Agriculture wage laborers		✓		Not involved in this project
Encroachers and squatters (specify in remarks column)		✓		No Land acquired for this sub project
Vulnerable APs (e.g. women headed households, minors and aged, orphans, disabled persons, and those below the poverty line). Specify the number and vulnerability in “remarks”.		✓		No Land acquired for this sub project no one effected during this this intervention
Others (specify in “remarks”)		✓		Not involved in this project

Pictures of Field Visit

Public Consultation and pictoral view of Mohallah Charh, Kamalia

Public Consultation and pictoral view of Nadir Abad, Kamalia

Pictures of Field Visit

Public Consultation and pictoral view of Iqbal Bazar, Kamalia

Public Consultation and pictoral view of Noor Shah, Kamalia

Pictures of Field Visit

Public Consultation and Pictoral view of Zeeshan Colony and Fatah colony , Kamalia




Public Consultation and Pictoral view of Mohallah Sheikhan Wala, Kamalia


Public Consultation and Pictoral view of Khursheed Abad, Kamalia

Public Consultation and Pictoral view of Gallah Mandi, Kamalia






Public Consultation and Pictoral view of Raza Abad (Sabzi Mandi) Kamalia

Prepared By:	Endorsed By:	Reviewed By:
Name: Ihsan ul Haq Farooqi **Designation:** Senior Sociologist **Organization:** MM Pakistan **Signature:** **Date: 10**-08-2023	**Name:** Muhammad Umar Khan **Designation:** Municipal Officer Planning (MOI) **Organization:** MC Kamalia **Signature** **Date: 10**-08-2023	**Name:** Tahmina Kiran **Designation:** Program Officer ESM **Organization:** PMDFC **Signature:** **Date: 10**-08-2023

Package 1: Sewerage System			
Item	**Quantity**	**Tentative Cost/Item-PKR. /-**	**Total Cost**
A-PPEs for Health and Safety of Labor/Workers			
Face Masks (3 PLY) - box	8	300	2400
Safety Hard Helmets	8	3,000	24000
Safety Shoes	8	3,000	24000
Hand Gloves	8	1,000	8000
Ear Plugs	8	500	4000
Reflective Safety Vest	8	1,000	8000
Safety Goggles	8	500	4000
B-Community Health and Safety			0
First Aid Box Complete	1	5,000	5000
Safety Signs	2	15,000	30000
Safety Cones	8	1,000	8000
Safety Tapes	8	1,500	12000
Portable Delineator with chain	3	2,200	6600
Emergency Portable Lights	2	3,000	6000
Solid Waste Collection Drums with Cover	1	12,000	12000
Fire Fighting Equipment Purchase and refilling	1	5,000	5000
Hiring of Environmental Manager (for 03 months)	3	50,000	150000
Labor Campsite Management	1	100,000	100000
Water Sprinkling	1	50,000	50000
Ambient Air Quality-Before, during, and after construction	3	85,000	255000
Noise Quality-Before, during, and after construction	3	1000	3000
Water Quality-Before, during, and after construction	3	22,000	66000
Total (PKR)-A+B			**783,000**

Environmental & Social Screening Checklist

Instructions:
Environmental and Social Focal Persons (ESFPs)[5] nominated by the MCs for PCP environmental and social management, will use this checklist in field for environmental and social screening and categorization of each and every sub-project proposed to be executed under the Program.
Deputy Program Officers-Environmental and Social Management deputed by PMDFC in regional offices will technically assist and support the ESFPs/MCs in filling in of this Checklist
It is to be attached with the main document[6] of sub-projects at planning stage and will be duly signed by the relevant ESFP and endorsed by the respective DPO-ESM
This checklist focuses on environmental issues and social concerns. To ensure that social dimensions are adequately considered, Involuntary Resettlement Screening Checklist will also be used
(iii) The purpose of this E&S Screening Checklists is to identify potential "Negative" impacts of environmental and social attributes or to enhance the existing environmental & social benefits. Use the "remarks" section to discuss any anticipated mitigation measures.

Name of ESFP:	Muhammad Umar Nawaz Khan (MOI)
Name of MC:	Kamalia
Sub-Project Sector:	Sewerage
Sub-Project Title:	Improvement of Sewerage System and Construction of WWTP Kamalia
Sub- Project Categorization:	**E-1✓** **S-1** **E-2** **S-2✓** **E-3** **S-3**
Date of Screening:	**10**-08-2023
Anticipated Project Activities	➢ u
Estimated E&S Cost of Subprojects	**1,084,500**as environment management cost.
Completion Time/Duration	12 Month
Estimated Labor for Subproject	20

[5] In all MCs, ESFPs are notified by Local government; MO (I&S) are focal persons for environmental sector and MO(P) are focal persons for social sectors.
[6] It is meant as PC-I and/or engineering estimates of sub-project

E&S Screening Checklist

Screening Questions	Yes	No	Remarks
A. Project Siting **Is the Sub-Project area adjacent to or within any of the following?**			
Environmentally sensitive areas?			
Legally protected Area		✓	No legally protected area lies within 500 meters jurisdiction of Sub-Project.
Any surface water body (river, canal, stream, lake, wetland) within 250 meters of the proposed sub project		✓	No surface water body (river, canal, stream, lake, wetland) within 250 meters of the proposed sub project Sub-Project area
Estuarine		✓	Not observed in sub project area
Special area for protecting biodiversity		✓	Not observed in sub project area
Buffer zone of protected area		✓	Not observed in sub project area
Mangroves Forest		✓	Not observed in sub project area
Man-made forest /game reserve, orchid /crops or any other area of environmental importance		✓	Not observed in sub project area
Socially sensitive /important areas/communities/ people?			
Physical Cultural Resources (PCRs) and or any site of cultural/religious importance (Graveyard, Shrine, Mosque, Church, Gordwarah, Temple, Fort, archeological/historical site) within 100 m of the proposed subproject	✓		1 Mosque and 01 Shrine observed 500 meter area of this sub project, There would be hindrance in the mobility of people during road construction phase. However, this will be a temporary impact and would be managed by proper controlling the traffic. No other significant adverse impacts on sensitive receptors are foreseen
Sensitive receptors (Schools, colleges, Shrine, Mosque, Church, hospitals and clinics) within 100 meters of the proposed sub project		✓	Not observed in sub project area
Any graveyard of local community (Muslims or Christians)		✓	No graveyard observed under 500 meter of sub project alignment.
Any demographic or socio-economic aspects of the subproject area that are already vulnerable (e.g., high incidence of marginalized populations, rural-urban migrants, illegal settlements, squatters, ethnic minorities, people with disabilities, people in old age, socially isolated segments[7] of the society and women or children)?		✓	No negative impact observed on vulnerable groups (e.g., high incidence of marginalized populations, rural-urban migrants, illegal settlements, squatters, ethnic minorities, people with disabilities) sub project area
Already existing infrastructure (including public amenities) which may be required to dismantle or may be affected temporarily by any means?		✓	No existing infrastructure (including public amenities) present which may be required to dismantle.

[7] Due to caste, creed, religion or gender e.g. transgender

B. Potential Environmental Impacts Will the Sub-Project cause…			
1. Disturbance to habitats/biodiversity of environmentally sensitive or protected areas?		✓	Not observed in sub project area
2. Cutting of trees?		✓	No Cutting of trees involved during construction phase
3. Disruption to habitats/biodiversity of surrounding ecosystem/environment?		✓	No significant adverse impacts on environment.

4. Generation of wastewater during construction or operation?		✓	All construction activities are on minor level so wastewater generation during construction are limited. In operation, it's a collection point for sewerage and then disposed of to main sewerage drain through force main.
5. Pollution of surface water/ground water due to wastewater discharge from construction site or due to direct/indirect disposal of wastewater?		✓	No such impact anticipated as wastewater will be generated at Minor Level during construction activities
6. Alteration of surface water hydrology of waterways resulting in increased sediment in streams/rivers or due to increased soil erosion at construction site?		✓	No such impact foreseen, as work activities are limited level and within the boundary so no wastewater will be generated during construction activities.
7. Deterioration of surface water quality due to silt runoff and sanitary wastes from worker-based camps and chemicals used in construction.		✓	No construction labor camps envisaged due to limited scope of work under Sub-Project and un-skilled local labor will be engaged for the construction activities.
8. Over pumping of ground water, leading to salinization and ground subsidence?		✓	No over pumping/pumping involved in scope of construction activities.
9. Serious contamination of soil due to construction works.		✓	Land is already a pond of sewerage water so Keep in mind the soil condition before construction of disposal station structure. Construction materials should be storage properly, no leakage or leaching Process involve so contamination of soil not observed
10. Aggravation of solid waste problems in the area?		✓	No aggravation of solid waste problems in the area is anticipated. The waste construction material will be collected and disposed at designated place on daily basis
11. Generation of hazardous waste?		✓	No hazardous waste material generated during project activities
12. Increased air pollution due to sub-project construction and operation?		✓	The subproject interventions are on small scale and construction activities are within the boundary that will not significantly increase air pollution.in operation phase ,smell problem increase because it's a sewerage water collection place.

13. Noise and vibration due to sub-project construction or operation?	✓		Noise and vibration will be generated during excavation and pipe laying activities but the level is expected to be low. However, the noise will be monitored on regularly during construction by the contractor
14. Creation of temporary breeding habitats for diseases such as those transmitted by mosquitoes and rodents due to solid/liquid?		✓	During construction, Creation of temporary breeding habitats for diseases not anticipated but in the operation phase this problem is exceed because sewerage water collection ponds are breeding habitats for mosquitoes and other harmful insects.
15. Use of chemicals during construction?		✓	No chemicals will be used during construction activities
C: Potential Social Impacts Will the Sub-Project cause…			
1. Impairment of historical/cultural areas; disfiguration of landscape or potential loss/damage to Physical Cultural Resources (PCRs)?		✓	Not observed in sub project area
2. Displacement or involuntary resettlement of people? (physical displacement and/or economic displacement) (If "Yes", please also fill Involuntary Resettlement Screening Checklist)		✓	Not observed in sub project area
3. Disproportionate impacts on the poor, women and children and or other vulnerable groups 8(mentioned above)?		✓	There will be no Impact on the poor women, children and or other vulnerable groups
4. Temporary impediments in movements of people/transport and animals?		✓	No such impact foreseen as work activities are limited level and within the boundary
5. Large population influx during sub-project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems).		✓	Not observed in sub project area
6. Social conflicts if workers from other areas are hired.		✓	Contractor will Hire local worker for unskilled construction activities
7. Risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation.		✓	There would be some safety issues during martial transportation, and other construction activities.
8. Risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel, and other chemicals during construction and operation?	✓		There would be some safety issues during martial transportation, road compaction during construction phase. The SOPs for health and safety have been included in the

[8] Women, Children, Women headed households, People in old age, people having disabilities, socially isolated community groups and or people living below the poverty line

			PC-I that have to be followed by the contractors
9. Community safety risks due to both accidental and natural causes, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation, and decommissioning.	✓		There would be safety issues in Construction phase, During storage of fuel and other chemicals and transport. The SOPs for health and safety have been included in the PC-I that have to be followed by the contractors
10. Any impact on sensitive receptors (mentioned above)		✓	Not observed in sub project area
11. Any impact of negative nature on already existing infrastructure including public amenities		✓	Not observed in sub project area

Pictures of Field Visit

Pictoral view and Public Consultation of New Disposal Station Site, Kamalia

Pictoral view of Force main Line from New Disposal Station Site to Sewerage Drain, Kamalia

Prepared By:	Endorsed By:	Reviewed By:
Name: Muhammad Imran	**Name:** Muhammad Umar Khan	**Name: Tahmina Kiren**
Designation: Environment Specialist	**Designation:** Municipal Officer Infrastructure (MOI)	**Designation:** Program Officer ESM
Organization: MM Pakistan	**Organization:** MC	**Organization:** PMDFC
Signature:	**Signature**	**Signature:**
Date: 20-08-2023	**Date: 20**-08-2023	**Date: 20**-08-2023

INVOLUNTARY RESETTLEMENT SCREENING CHECKLIST

Name of City/MC/LG: Kamalia

Sub-Project Sector: Sewerage

Sub-Project Title: Improvement of Sewerage System and Construction of WWTP Kamalia

Sub- Project Categorization: E-1 & S-2

Date of Screening: 07-11-2022

SECTION 1	Yes	No	Expected	Remarks
Does the project require land acquisition? Yes/No		✓		Land is owned by Revenue Department and Transferring to MC for the purpose of construction of Disposal Station.
If yes, then describe the type of land being acquired from the categories below:		✓		Land is owned by Revenue Department and Transferring to MC for the purpose of construction of Disposal Station so no land acquired for this sub project
Has any AED been conducted at the proposed location by the government1? Yes/No		✓		No AED has been conducted at the proposed location by the government
Land (Quantify and describe types of land being acquired in "remarks column".		✓		Land is owned by Revenue Department and Transferring to MC for the purpose of construction of Disposal Station so no land acquired for this sub project
Government and LG owned land free of occupation (agriculture or settlement)		✓		Land owned by District Govt so no land acquired for this sub project for construction of disposal station.
Government or state-owned land (other than LG) free of occupation (agriculture or settlement)		✓		Yes, Govt Land exist at that area for construction of disposal station
Private land		✓		No private Land acquired for this project
Residential		✓		A sewerage water Pond Exist at project proposed site.
Commercial		✓		Not a commercial area
Agricultural		✓		No agricultural Land acquired for this project
Communal		✓		It's not a communal land required for this sub project
Others (specify in "remarks").		✓		Already a Sewerage water Pond occurred and land owned by MC so no land acquired for this sub project
Name of owner/owners and type of ownership document if available.		✓		Already a Sewerage water Pond occurred and land owned by MC so no land acquired for this sub project
If land is being acquired, describe any structures constructed on it		✓		Already a Sewerage water Pond occurred and land owned by MC so no land acquired for this sub project
Land-based assets:		✓		Already a Sewerage water Pond occurred and land owned by MC so no land acquired for this sub project

Residential structures		✓		It's a Residential area but almost 4 kanal area selected for disposal station is empty and no structure present at that site.
Commercial structures (specify in "remarks")		✓		No Commercial structures occurred at that land.
Community structures (specify in "remarks")		✓		No Community structures occurred on that land
Agriculture structures (specify in "remarks")		✓		Already a Sewerage water Pond occurred and land owned by MC so no land acquired for this sub project
Public utilities (specify in "remarks")	✓			No Public utility structures occurred on land.
Others (specify in "remarks")		✓		Already a Sewerage water Pond occurred and land owned by MC so no land acquired for this sub project
If agricultural land is being acquired, specify the following:		✓		Already a Sewerage water Pond occurred and land owned by MC so no land acquired for this sub project
Agriculture related impacts		✓		No agricultural related adverse impact observed.
Crops and vegetables (specify types and cropping area in "remarks).		✓		The project land is not used for agricultural purposes presently.
Trees (specify number and types in "remarks").		✓		No Tree cutting involved during this project.
Others (specify in "remarks").		✓		No Land acquired for this sub project
Affected Persons (APs)		✓		Land acquisition is not Required so no Person affected.
Will any people be displaced from the land when acquired? Yes/No		✓		land acquisition is not Required so no Person affected
Number of APs		✓		land acquisition is not Required so no Person affected
Males		✓		No person affected during this project
Females		✓		No person affected during this project
Titled landowners		✓		Land is owned by MC of Jaranwala
Tenants and sharecroppers		✓		Tenants and sharecroppers are not observed at that area.
Leaseholders		✓		Land is cleared and no leaseholder observed during site visit
Agriculture wage laborers		✓		Its not an agricultural Land so this problem are not observed at that area
Encroachers and squatters (specify in remarks column)		✓		No Encroachers and squatters present at land that required for this sub project
Vulnerable APs (e.g. women headed households, minors and aged, orphans, disabled persons, and those below the poverty line). Specify the number and vulnerability in "remarks".		✓		No Vulnerable APs (e.g. women headed households, minors and aged, orphans, disabled persons, and those below the poverty line) present at land that acquired for this sub project
Others (specify in "remarks")		✓		Not involved in this project

Prepared By:	Endorsed By:	Reviewed By:
Name: Ihsan ul Haq Farooqi **Designation:** Senior Sociologist **Organization:** MM Pakistan **Signature:** **Date: 10**-08-2023	**Name:** Muhammad Umar Khan **Designation:** Municipal Officer Planning (MOI) **Organization:** MC Kamalia **Signature** **Date: 10**-08-2023	**Name:** Tehmina Kiran **Designation:** Program Officer ESM **Organization:** PMDFC **Signature:** **Date: 10**-08-2023

Package -2 Disposal Station and Forcemain Estimated Budget			
Item	**Quantity**	**Tentative Cost/Item-PKR./-**	**Total Cost**
A-PPEs for Health and Safety of Labor/Workers			
Face Masks (3 PLY) - box	30	300	9000
Safety Hard Helmets	30	3,000	90000
Safety Shoes	30	3,000	90000
Hand Gloves	30	1,000	30000
Ear Plugs	30	500	15000
Reflective Safety Vest	30	1,000	30000
Safety Goggles	30	500	15000
B-Community Health and Safety			0
First Aid Box Complete	1	10,000	10000
Safety Signs	4	15,000	60000
Safety Cones	8	1,000	8000
Safety Tapes	8	1,500	12000
Portable Delineator with chain	4	2,000	8000
Emergency Portable Lights	5	3,000	15000
Solid Waste Collection Drums with Cover	2	12,000	24000
Fire Fighting Equipment Purchase and refilling	1	10,000	10000
Hiring of Environmental Manager (for 03 months)	3	50,000	150000
Labor Campsite Management	1	200,000	200000
Water Sprinkling	2	100,000	200000
Ambient Air Quality-Before, during, and after construction	6	85,000	510000
Noise Quality-Before, during, and after construction	6	1000	6000
Water Quality-Before, during, and after construction	6	22,000	132000
Total (PKR)-A+B			**1,624,000**

Instructions:
Environmental and Social Focal Persons (ESFPs)9 nominated by the MCs for PCP environmental and social management, will use this checklist in field for environmental and social screening and categorization of each and every sub-project proposed to be executed under the Program.
Deputy Program Officers-Environmental and Social Management deputed by PMDFC in regional offices will technically assist and support the ESFPs/MCs in filling in of this Checklist
It is to be attached with the main document10 of sub-projects at planning stage and will be duly signed by the relevant ESFP and endorsed by the respective DPO-ESM
This checklist focuses on environmental issues and social concerns. To ensure that social dimensions are adequately considered, Involuntary Resettlement Screening Checklist will also be used
(iii) The purpose of this E&S Screening Checklists is to identify potential "Negative" impacts of environmental and social attributes or to enhance the existing environmental & social benefits. Use the "remarks" section to discuss any anticipated mitigation measures.

Name of ESFP:	**Umar Nawaz Khan MOI (I&S)**
Name of MC:	**Kamalia**
Sub-Project Sector:	**Sewerage**
Sub-Project Title:	Improvement Of Sewerage System and Construction of Waste Water Treatment Plant (WWTP) Kamalia City
Sub- Project Categorization:	E-1 S-1 E-2 S-2 **E-3** **S-3**
Date of Screening:	10-08-2023
Anticipated Project Activities	Providing & Fixing of Manhole cover
Estimated Cost of Subprojects	1578.04 million PKR
Completion Time/Duration	4 Months

CHECKLIST

Screening Questions	Yes	No	Remarks
A. Project Siting **Is the Sub-Project area adjacent to or within any of the following?**			
Environmentally sensitive areas?			
Legally protected Area		✓	No legally protected area lies within 200 meters jurisdiction of Sub-Project.
Any surface water body (river, canal, stream, lake, wetland) within 200 meters of the proposed sub project		✓	No water body observed within 200 meters in the Sub-Project area

[9] In all MCs, ESFPs are notified by Local government; MO (I&S) are focal persons for environmental sector and MO(P) are focal persons for social sectors.
[10] It is meant as PC-I and/or engineering estimates of sub-project

Estuarine		✓	Not observed in sub project area
Special area for protecting biodiversity		✓	Not observed in sub project area
Buffer zone of protected area		✓	Not observed in sub project area
Mangroves Forest		✓	Not observed in sub project area
Man-made forest /game reserve, orchid /crops or any other area of environmental importance		✓	Not observed in sub project area
Socially sensitive /important areas/communities/ people?			
Physical Cultural Resources (PCRs) and or any site of cultural/religious importance (Graveyard, Shrine, Mosque, Church, Gordwarah, Temple, Fort, archeological/historical site) within 100 m of the proposed subproject		✓	
Sensitive receptors (Schools, colleges, Shrine, Mosque, Church, hospitals and clinics) within 100 meters of the proposed sub project		✓	Not observed in sub project area
Any graveyard of local community (Muslims or Christians)		✓	Not observed in sub project area
Any demographic or socio-economic aspects of the subproject area that are already vulnerable (e.g., high incidence of marginalized populations, rural-urban migrants, illegal settlements, squatters, ethnic minorities, people with disabilities, people in old age, socially isolated segments11 of the society and women or children)?		✓	Not observed in sub project area
Already existing infrastructure (including public amenities) which may be required to dismantle or may be affected temporarily by any means?		✓	No infrastructure will be dismantling due to construction activities.
B. Potential Environmental Impacts Will the Sub-Project cause…			
1. Disturbance to habitats/biodiversity of environmentally sensitive or protected areas?		✓	The proposed project site doesn't have any environmentally sensitive or protected areas.
2. Cutting of trees?		✓	No Cutting of trees involved during construction phase
3. Disruption to habitats/biodiversity of surrounding ecosystem/environment?		✓	No significant adverse impacts on environment.
4. Generation of wastewater during construction or operation?		✓	No such impacts are envisaged.
5. Pollution of surface water/ground water due to wastewater discharge from construction site		✓	No such impacts are envisaged

[11] Due to caste, creed, religion or gender e.g. transgender

or due to direct/indirect disposal of wastewater?			
6. Alteration of surface water hydrology of waterways resulting in increased sediment in streams/rivers or due to increased soil erosion at construction site?		✓	No such impacts are envisaged
7. Deterioration of surface water quality due to silt runoff and sanitary wastes from worker-based camps and chemicals used in construction.		✓	No such impacts are envisaged
8. Over pumping of ground water, leading to salinization and ground subsidence?		✓	No such impacts are envisaged
9. Serious contamination of soil due to construction works?		✓	No such impacts are envisaged
10. Aggravation of solid waste problems in the area?		✓	No such impacts are envisaged
11. Generation of hazardous waste?		✓	No such impacts are envisaged
12. Increased air pollution due to sub-project construction and operation?		✓	No such impacts are envisaged
13. Noise and vibration due to sub-project construction or operation?		✓	No such impacts are envisaged
14. Creation of temporary breeding habitats for diseases such as those transmitted by mosquitoes and rodents due to solid/liquid?		✓	No such impacts are envisaged
15. Use of chemicals during construction?		✓	No chemicals will be used during construction activities
C: Potential Social Impacts Will the Sub-Project cause…			
2. Impairment of historical/cultural areas; disfiguration of landscape or potential loss/damage to Physical Cultural Resources (PCRs)?		✓	No impairment/damage to any PCR envisioned as per scope of construction activities
2. Displacement or involuntary resettlement of people? (physical displacement and/or economic displacement) (If "Yes", please also fill Involuntary Resettlement Screening Checklist)		✓	Not observed in sub project area
3. Disproportionate impacts on the poor, women and children and or other vulnerable groups 12(mentioned above)?		✓	No such impacts are envisaged

[12] Women, Children, Women headed households, People in old age, people having disabilities, socially isolated community groups and or people living below the poverty line

4. Temporary impediments in movements of people/transport and animals?		✓	No such impacts are envisaged
5. Large population influx during sub-project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		✓	No such impacts are envisaged
6. Social conflicts if workers from other areas are hired.		✓	No such impacts are envisaged
7. Risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation?		✓	Contractor will follow EHS SOPs to avoid physical hazards which are part of PC-I.
8. Risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel, and other chemicals during construction and operation?		✓	.
9. Community safety risks due to both accidental and natural causes, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation, and decommissioning.		✓	There would be some safety issues during fixing manhole cover. The SOPs for health and safety will follow by the worker
10. Any impact on sensitive receptors (mentioned above)		✓	Not observed in sub project area
11. Any impact of negative nature on already existing infrastructure including public amenities		✓	Not observed in sub project area

Prepared By:	**Endorsed By:**	**Reviewed By:**
Name: Muhammad Imran	**Name:** Umar Nawaz	**Name:** Hassan Ali
Designation: Environmentalist	**Designation:** MOI&S	**Designation:** Deputy Program Officer ESM
Organization: MM Pakistan	**Organization:** MC Kamalia	**Organization:** PMDFC
Signature:	**Signature**	**Signature:**
Date: 10-08-2023	**Date:** 10-08-2023	**Date:** 10-08-2023

INVOLUNTARY RESETTLEMENT SCREENING CHECKLIST

Name of City/MC/LG: Kamalia

Sub-Project Sector: Sewerage

Sub-Project Title: Providing & Fixing of Manhole cover

Sub- Project Categorization: E-3 & S-3

Date of Screening: 11-08-2023

SECTION 1	Yes	No	Expected	Remarks
Does the project require land acquisition? Yes/No		✓		land owned by Govt so no land acquired for this sub project
If yes, then describe the type of land being acquired from the categories below:		✓		No Land acquired for this sub project
Has any AED been conducted at the proposed location by the government1? Yes/No		✓		Not observed in sub project area and confirm by MC Staff also
Land (Quantify and describe types of land being acquired in "remarks column".		✓		No Land acquired for this sub project
Government and LG owned land free of occupation (agriculture or settlement)		✓		Already land owned by govt so no land acquired for this sub project
Government or state-owned land (other than LG) free of occupation (agriculture or settlement)		✓		No Land acquired for this sub project. No government or state-owned land will be affected due to the implementation of the project
Private land		✓		Construction activities will be limited on streets, no additional private land will be required/ affect
Residential		✓		No residential structure or land will be affected due to the rehabilitation of sewerage lines
Commercial		✓		No Land acquired for this sub project

Agricultural		✓		No Land acquired for this sub project
Communal		✓		No Land acquired for this sub project
Others (specify in “remarks”).		✓		Already land owned by govt so no land acquired for this sub project
Name of owner/owners and type of ownership document if available.		✓		Already land owned by govt so no land acquired for this sub project
If land is being acquired, describe any structures constructed on it		✓		No Land acquired for this sub project
Land-based assets:		✓		No Land acquired for this sub project
Residential structures		✓		No Land acquired for this sub project
Commercial structures (specify in “remarks”)		✓		No Land acquired for this sub project
Community structures (specify in “remarks”)		✓		No Land acquired for this sub project
Agriculture structures (specify in “remarks”)		✓		
Public utilities (specify in “remarks”)	✓			Already land owned by govt so no land acquired for this sub project. Ramps are away from ROW.
Others (specify in “remarks”)		✓		No Land acquired for this sub project
If agricultural land is being acquired, specify the following:		✓		No Land acquired for this sub project
Agriculture related impacts		✓		No Land acquired for this sub project
Crops and vegetables (specify types and cropping area in “remarks).		✓		No Land acquired for this sub project
Trees (specify number and types in “remarks”).		✓		No Land acquired for this sub project
Others (specify in “remarks”).		✓		No Land acquired for this sub project
Affected Persons (APs)		✓		No Persons Affected during this Project
Will any people be displaced from the land when acquired? Yes/No		✓		No Land acquired for this sub project
Number of APs		✓		No Persons Affected during this Project
Males		✓		No Persons Affected during this Project

Females		✓		No Persons Affected during this Project
Titled landowners		✓		No Land acquired for this sub project
Tenants and sharecroppers		✓		No Land acquired for this sub project
Leaseholders		✓		No Land acquired for this sub project
Agriculture wage laborers		✓		Not involved in this project
Encroachers and squatters (specify in remarks column)		✓		No Land acquired for this sub project
Vulnerable APs (e.g. women headed households, minors and aged, orphans, disabled persons, and those below the poverty line). Specify the number and vulnerability in "remarks".		✓		No Land acquired for this sub project no one effected during this this intervention
Others (specify in "remarks")		✓		Not involved in this project

Prepared By: **Name**: Ihasan-ul Farooqi **Designation:** Senior Sociologist **Organization:** MM Pakistan **Signature:** **Date:** 10-8-23	**Endorsed By:** **Name:** Umar Nawaz **Designation:** Municipal Officer Planning (MOP) **Organization:** MC Gojra **Signature** **Date:** 10-8-23	**Reviewed By:** **Name:** Hassan Ali **Designation:** Deputy Program Officer ESM **Organization:** PMDFC **Signature:** **Date:** 10-8-23

Package -3 Providing and Fixing of RPC Manhole Cover Estimated Budget			
Item	**Quantity**	**Tentative Cost/Item- PKR./-**	**Total Cost**
A-PPEs for Health and Safety of Labor/Workers			
Face Masks (3 PLY) - box	5	300	1500
Safety Hard Helmets	5	3,000	15000
Safety Shoes	5	3,000	15000
Hand Gloves	5	1,000	5000
Ear Plugs	5	500	2500
Reflective Safety Vest	5	1,000	5000
Safety Goggles	5	500	2500
Total (PKR)			**46,500**

Environmental & Social Screening Checklist

Instructions: Environmental and Social Focal Persons (ESFPs) nominated by the MCs for PCP environmental and social management, will use this checklist in field for environmental and social screening and categorization of each and every sub-project proposed to be executed under the Program. Deputy Program Officers-Environmental and Social Management deputed by PMDFC in regional offices will technically assist and support the ESFPs/MCs in filling in of this Checklist It is to be attached with the main document[13] of sub-projects at planning stage and will be duly signed by the relevant ESFP and endorsed by the respective DPO-ESM This checklist focuses on environmental issues and social concerns. To ensure that social dimensions are adequately considered, Involuntary Resettlement Screening Checklist will also be used (iii) The purpose of this E&S Screening Checklists is to identify potential "Negative" impacts of environmental and social attributes or to enhance the existing environmental & social benefits. Use the "remarks" section to discuss any anticipated mitigation measures.	
Name of ESFP:	Muhammad Umar Nawaz Khan (MOI)
Name of MC:	**Kamalia**
Sub-Project Sector:	Sewerage
Sub-Project Title:	Waste Water Treatment Plant Kamalia City. (33 Acre approx.)
Sub- Project Categorization:	**E-1** ✓ **S-1** **E-2** **S-2**✓ **E-3** **S-3**
Date of Screening:	**10**-08-2023
Anticipated Project Activities	➢ Excavation and backfilling involved, the excavation would be carried out either by manual labor or by machines like power shovels, track excavators. Transport excavated material to fix disposal sites. ➢ Sewage Collecting pit / Chamber ➢ Anaerobic ponds ➢ Pipe Laying Activities. ➢ Construction of Inlet and outlet Drains structure. ➢ Construction of Boundary wall. ➢ Construction of Retaining ponds Beds. ➢ Electric Installations. ➢ Back Filling: Lastly, the trenches will be filled up with the excavated earth in layers about 15 cm thick. Each layer will be properly watered and rammed. ➢ Staff Quarters+ Security Guard Room.
Estimated E&S Cost of Subprojects	**4,100,000**-Rs as environment management and mitigation cost
Completion Time/Duration	2 years
Estimated Labor for Subproject	20-30

[13] It is meant as PC-I and/or engineering estimates of sub-project

CHECKLIST

Screening Questions	Yes	No	Remarks
A. Project Siting Is the Sub-Project area adjacent to or within any of the following? **Environmentally sensitive areas?**			
Cultural heritage site		✓	No cultural heritage site observed within 250 meters of periphery of Sub-Project.
Legally protected Area (core zone or buffer zone)		✓	No legally protected area exists within 250 meters of radius of sub-Project.
Any surface water body (river, canal, stream, lake, wetland) within 250 meters of proposed project?		✓	No surface water body (river, canal, stream, lake, wetland) exist within 250 meters of proposed project.
Mangrove Forest		✓	No mangrove forest observed.
Estuarine		✓	No estuarine exists in Sub-Project proposed scope of work.
Special area for protecting biodiversity Buffer zone of protected area	✓		Kamalia forest present at 500 m from WWTP Land that is a protected area or buffer zone for Biodiversity within peripheral zone of sub-Project.
Man-made forest /game reserve, orchid/crops or any other area of environmental importance	✓		Kamalia forest present at 500 m from WWTP Land that is a protected area or buffer zone for Biodiversity within peripheral zone of sub-Project. WWTP Land is surrounded by dense cropping fields of Rice and fodder crops.
Socially sensitive/Important areas/communities/people?			
PCRs and or any site of cultural/religious importance (Graveyard, Shrine, Mosque, Church, Gordwarah, Temple, Fort, archeological/historical site) within 100 m of the proposed subproject		✓	No PCRs and or any site of cultural/religious importance is existed within 500 m buffer zone of project area.
Sensitive receptors (Schools, colleges, hospitals and clinics) within 100 meters of the proposed sub project	✓		School and civil veterinary Dispensary located approximately 1000 meters away from the selected place.
Any graveyard of local community (Muslims or Christians)		✓	Muslim Graveyard is located approximately 1000 meters away for the selected place.
Any demographic or socio-economic aspects of the sub-project area that are already vulnerable (e.g., high incidence of marginalized populations, rural-urban migrants, illegal settlements, squatters, ethnic minorities, people with disabilities, people in old age, socially isolated segments of the society and women or children)?	✓		Socio-economic status of local community based of agriculture practices. They use to grow wheat, sugarcane, vegetables and fruit farms in surrounding area of Sub-Project. Sub-Project area is Rich agricultural land and allotted to three members. Their income source of Agricultural production disturbed by this project so ARAP IS Prepared for these affected persons of that land patch.
Already existing infrastructure (including public amenities) which may be required to dismantle or may be affected temporarily by any means?	✓		Sub-Project area is Rich agricultural land. public amenities situated within premises of proposed WWTP site are 2 Tube wells and 2 Dera Jat which may be dismantled and will be compensated through ARAP.
B. Potential Environmental Impacts Will the Sub-Project cause…			

Screening Questions	Yes	No	Remarks
Disturbance to habitats/biodiversity of environmentally sensitive or protected areas?	✓		Kamalia forest present at 500 m from WWTP Land that is a protected area or buffer zone for Biodiversity within peripheral zone of sub-Project.
Cutting of trees?	✓		Cutting of 96 trees are involved during this project Which are mature and medium both. Massive plantation in the buffer zone of 100m is proposed and made part of EIA/ESIA.
Disruption to habitats/biodiversity of surrounding ecosystem/environment?		✓	No disruption to any habitat/ecosystem due to any Sub-Project activities.
Generation of wastewater during construction or operation?	✓		During construction, wastewater will be generated from contractor's camp etc., The generated wastewater will require proper disposal and mitigation measures will be provided in the ESMMP of EIA/ESIA During operational phase, significant adverse impacts on environment and surrounding settlements of the sub-project area will occur i.e. odor and breeding site for the mosquitos. Accordingly, mitigation measures will be proposed in the ESMMP of the EIA/ESIA. The municipal wastewater will be drained into the Wastewater Treatment Plant (WWTP) through a sewerage conveyance system. The treated wastewater will essentially comply the the PEQSs. WWTP will be exclusively designed for the municipal wastewater and wastewater from all the localities will be discharged into the WWTP. There will be no chance of mixing industrial wastewater and storm water with the municipal wastewater before treatment. Sewage wastewater of Kamalia city will be treated through Waste Stabilization Ponds and aerated lagoons during operational phase of Sub-Project and treated water will be discharged into forest with the permission of custodian Department.

Screening Questions	Yes	No	Remarks
Pollution of surface water/ground water due to wastewater discharge from construction site or due to direct/indirect disposal of waste water?	✓		Wastewater will be generated during construction phase by contractor camp and construction activities. Wastewater from contactor camp will require proper treatment and management before disposal to the sewerage system or natural drain. At operational phase, due to leakage and clogging of the sewerage system, and overflow at WWTP may result in seepage and pondage. This might result contamination of groundwater. Mitigation measures will be provided in the ESMMP of EIA/ESIA and these will be made part of the sewerage system and WTP designs. Emergency Plan will also be developed. 1.5mm thick geomembrane beneath the ponds will be placed to mitigate seepage of wastewater to the groundwater. Wastewater after treatment and PEQS compliance will be released into the nearby water body and will be used for irrigation after compliance of US EPA Guidelines.
Alteration of surface water hydrology of waterways resulting in increased sediment in streams/rivers or due to increased soil erosion at construction site?	✓		No such impact foreseen, as the sub-project is located away from the surface water bodies. No other significant adverse impacts on alteration of surface water hydrology of waterways and increase in sediment of streams/rivers during construction phase.
Deterioration of surface water quality due to silt runoff and sanitary wastes from worker-based camps and chemicals used in construction?	✓		Campsite establishment envisaged. Contactor will be instructed to rent a house with already established sewerage system OR submit plan for sewerage treatment for camp to Engineer In-charge. Chemical storage facilities will be regularly monitor
Over pumping of ground water, leading to salinization and ground subsidence?		✓	No over pumping involved during construction works.
Serious contamination of soil due to construction works?	✓		In operation phase Desiltation material will be generated during clearance of pond area and need urgent disposal at designated place. Construction materials will be stored properly. Mitigation will be provided in the ESMMP of EIA/ESIA
Aggravation of solid waste problems in the area?	✓		Stockpiling of dismantled material may temporarily disturb local communities. No aggravation of solid waste problems in the area is anticipated. The waste construction material will be collected and disposed at designated place on daily basis. For solid waste of labor camp, mitigation measures shall be provided in the ESMMP od EIA Report

Screening Questions	Yes	No	Remarks
Generation of solid waste/hazardous waste?	✓		Hazardous waste generated during construction activities in terms of oils, rubber lining, sealants will be managed with precautions and mitigation measures will be provided in the ESMMP of EIA/ESIA An Environmental Quality Testing laboratory will be managed by the MC Kamalia at site to ensure effective monitoring of treated wastewater to ensure that treated wastewater is in compliance with the PEQSs and WHO Guidelines to be reused for the agricultural activities
Increased air pollution due to sub-project construction and operation?	✓		Impact will be assessed before the execution of Sub-Project. Due to heavy traffic movement; there will be generation of $PM_{2.}$ and ambient air will also be assessed during construction & post-construction. The sub-project construction and operational phases will result in air pollution. Air pollution control measures during construction and operational phases will be included in the design of the sub-project and these will be described in detail in EIA/ESIA and ESMMP
Noise and vibration due to sub-project construction or operation?	✓		Due to flow of heavy-duty vehicles and private vehicles plus rikshaws; noise and vibration impact is substantial. Noise and vibration will be generated during construction and operational phases. Mitigations will be included in the design of the sub-project. EIA /ESIA and ESMMP will cover noise and vibration aspects, impacts and mitigations in detail.
Creation of temporary breeding habitats for diseases such as those transmitted by mosquitoes and rodents due to solid/liquid?	✓		In the proposed wastewater treatment technology, waste stabilization ponds will be used and further bio-remediation (floating wetlands) will be introduced in which minimal chances of mosquito breeding are anticipated. During operation phase; such factors may cause significant impact which needs immediate remedial measures.
Use of chemicals during construction?	✓		Multiple chemicals will be used during construction and operational phases. Chemical management system for the safe use of chemicals will be made part of the EIA/ESIA and ESMMP.
C: Potential Social Impacts Will the Sub-Project cause…			
1.Impairment of historical/cultural areas; disfiguration of landscape or potential loss/damage to Physical Cultural Resources (PCRs)?		✓	No any PCRs situated nearby the selected place of WWTP
2. Displacement or involuntary resettlement of people? (Physical displacement and/or economic displacement)		✓	Displacement or involuntary resettlement of people? (Physical displacement and/or economic displacement) not required during this project.

Screening Questions	Yes	No	Remarks
3. Disproportionate impacts on the poor, women and children and or other vulnerable groups [14](mentioned above)?	✓		Disproportionate impacts on These three Lease Holder will be estimated and a compensation plan will be prepared for these peoples.
4. Temporary impediments in movements of people/transport and animals?		✓	No significant movement of people/transport and animals observed because Sub-Project is proposed on agriculture fields in Peri-Urban area of Kamalia City near project area.
5. Large population influx during sub-project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		✓	No such impact envisaged.
6. Social conflicts if workers from other areas are hired?	✓		Local level labor engagement in the construction work may reduce and mitigated the issue
7. Risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation?	✓		To planning/ designing the Occupational Safety Health measures to mitigated the risks during the WWTP construction period
8. Risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?	✓		To planning/ designing the Occupational Safety Health measures to mitigated the risks during the WWTP construction period
9. Community safety risks due to both accidental and natural causes, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning?	✓		
10. Any impact of negative nature on already existing infrastructure including public amenities	✓		Sub-Project area is Rich agricultural land. public amenities situated within premises of proposed WWTP site are 2 Tube wells and 2 Dera Jat which may be dismantled and will be compensated through ARAP

Prepared By:	Endorsed By:	Reviewed By:
Name: Muhammad Imran	**Name:** Muhammad Umar Khan	**Name: Tahmina Kiren**
Designation: Environment Specialist	**Designation:** Municipal Officer Infrastructure (MOI)	**Designation:** Program Officer ESM
Organization: MM Pakistan	**Organization:** MC	**Organization:** PMDFC
Signature:	**Signature**	**Signature:**
Date: 20-08-2023	**Date: 20**-08-2023	**Date: 20**-08-2023

[14] Women, Children, Women headed households, People in old age, people having disabilities, socially isolated community groups and or people living below the poverty line

INVOLUNTARY RESETTLEMENT SCREENING CHECKLIST

Name of Enumerator/ESFP: MO Planning

Name of City/MC/LG: MC Kamalia

Sub-Project Sector: Urban Development

Sub-Project Title: Waste Water Treatment Plant Kamalia City (33 Acre approx.)

Sub- Project Categorization:

S-1 ☐ **S-2** ■ **S-3** ☐

Date of Screening: **10**-08-2023

SECTION 1	Yes	No	Expected	Remarks
Does the project require land acquisition? Yes/No		✓		A state land is selected for the construction of Sub-Project. There will be inter-departmental transfer of state land required.
If yes, then describe the type of land being acquired from the categories below:		✓		No Land acquired for this sub project
Has any AED been conducted at the proposed location by the government1? Yes/No		✓		No AED conducted on proposed area.
Land (Quantify and describe types of land being acquired in "remarks column".	✓			Approximately 33 Acre of state land available and land requirement will be decided after WWTP design and sewerage network assessment.
Government and LG owned land free of occupation (agriculture or settlement)		✓		Government department (Revenue) owns the land.
Government or state-owned land (other than LG) free of occupation (agriculture or settlement)		✓		Government department (Revenue) owns the land and occupied by three persons for agricultures purposes. there are crops, farms, Dera Jat, trees, tube wells present within premises of Sub-Project.
Private land		✓		No private land acquired for this project
Residential		✓		No Residential land acquired for this project
Commercial		✓		No Commercial land acquired for this project
Agricultural		✓		Sub-Project area is Rich agricultural land. public amenities situated within premises of proposed WWTP site are 2 Tube wells and 2 Dera Jat,96 Trees which may be dismantled/cut and will be compensated through ARAP.
Communal		✓		No Land acquired for this sub project
Others (specify in "remarks").		✓		No Land acquired for this sub project

Name of owner/owners and type of ownership document if available.		✓		Land is used for Agri purposes by three persons. Land transfer letter attach below this check list.
If land is being acquired, describe any structures constructed on it				
Land-based assets:		✓		Sub-Project area is Rich agricultural land. public amenities situated within premises of proposed WWTP site are 2 Tube wells and 2 Dera Jat which may be dismantled and will be compensated through ARAP.
Residential structures		✓		Sub-Project area is Rich agricultural land.
Commercial structures (specify in "remarks")				
Community structures (specify in "remarks")				
Agriculture structures (specify in "remarks")				
Public utilities (specify in "remarks")				
Others (specify in "remarks")				
If agricultural land is being acquired, specify the following:				
Agriculture related impacts		✓		Sub-Project area is Rich agricultural land and owned by Government department (Revenue). deduction in agricultural production of that area and disturbance in economical circle of that effected families are the Agri related impacts.
Crops and vegetables (specify types and cropping area in "remarks).		✓		Wheat, Sugar Cane, Tunnel Farming, Fodder observed.
Trees (specify number and types in "remarks").		✓		Not Observed in this sub project area
Others (specify in "remarks").		✓		
Affected Persons (APs)		✓		Affected Persons (APs) are present so RAP are not Required
Will any people be displaced from the land when acquired? Yes/No		✓		Lease agreement ended in 2020 so no Leaseholder exist but land is occupied for Agri purposes. These affected families compensate through ARAP.
Number of APs		✓		
Males				
Females		✓		
Titled land owners		✓		
Tenants and sharecroppers		✓		
Leaseholders		✓		
Agriculture wage laborers		✓		Sub-Project area is Rich agricultural land. Affected families compensate through ARAP.
Encroachers and squatters (specify in remarks column)	✓			Lease agreement ended in 2020 so no Leaseholder exist but land is occupied for Agri purposes. These affected

				families compensate through ARAP
Vulnerable APs (e.g. women headed households, minors and aged, orphans, disabled persons and those below the poverty line). Specify the number and vulnerability in "remarks".	✓			Negative impact observed on vulnerable groups like women labor and people in old age
Others (specify in "remarks")		✓		
How will people be affected?				

Prepared By:	**Endorsed By:**	**Reviewed By:**
Name: Ihsan ul Haq Farooqi	**Name:** Muhammad Umar Khan	**Name:** Muhammad Tahmina Kiren
Designation: Senior Sociologist	**Designation:** Municipal Officer Planning (MOI)	**Designation:** Deputy Program Officer ESM
Organization: MM Pakistan	**Organization:** MC Kamalia	**Organization:** PMDFC
Signature:	**Signature**	**Signature:**
Date: 10-08-2023	**Date: 10**-08-2023	**Date: 10**-08-2023

Pictures of Field Visit

Pictoral view of WWTP Site at 724/GB , Kamalia

MMP and PMDFC E&S Team Departmental Consultation with SDO Irrigation Kamalia

MMP and PMDFC E&S Team Public Consultation with APs 724 Kamalia

MMP and PMDFC E&S Team Departmental Consultation with DFO District T.T Singh

MMP E&S Team Departmental Consultation with CO Municipal Committie Kamalia

MMP and PMDFC E&S Team Departmental Consultation with EPA Officer District T.T Singh

Package 4- Construction of Wastewater Treatment Plant (WWTP) Estimated Bydget			
Item	**Quantity**	**Tentative Cost/Item-PKR./-**	**Total Cost**
A-PPEs for Health and Safety of Labor/Workers			
Face Masks (3 PLY) - box	50	300	15000
Safety Hard Helmets	30	3,000	90000
Safety Shoes	30	3,000	90000
Hand Gloves	30	1,000	30000
Ear Plugs	30	500	15000
Reflective Safety Vest	30	1,000	30000
Safety Goggles	30	500	15000
B-Community Health and Safety			0
First Aid Box Complete	4	10,000	40000
Infrared Thermometer (Benetech GM-2200 or equivalent)	1	40,000	40000
Safety Signs	20	15,000	300000
Safety Cones	19	1,000	19000
Safety Tapes	20	1,500	30000
Portable Delineator with chain	20	2,200	44000
Emergency Portable Lights	20	3,000	60000
Solid Waste Collection Drums with Cover	20	12,000	240000
Fire Fighting Equipment Purchase and refilling	3	10,000	30000
Hiring of Environmental Manager (for 02 years)	24	50,000	1200000
Pole Hanging Waste Bins	8	12,000	96000
Labor Campsite Management	1	770,000	770000
Water Sprinkling	1	300,000	300000

Social and Behavior Change Campaign and Labor Awareness/Training	1	250,000		250000
C- Environment Quality Testing during Construction Phase				0
Ambient Air Quality-Before, during, and after construction	12	85000		1020000
Noise Quality-Before, during, and after construction	12	1000		12000
Water Quality-Before, during, and after construction	12	22000		264000
D -Monitoring cost				0
Water Quality Analysis Lab Establishment at site to ensure treated water quality as per WHO/PEQSs	Estimated Cost has been incorporated in the BOQ of Civil works of WWTP	0	0	0
Total (PKR)-A+B+C+D				**5,000,000**

Environmental & Social Screening Checklist
5

Instructions:
Environmental and Social Focal Persons (ESFPs)15 nominated by the MCs for PCP environmental and social management, will use this checklist in field for environmental and social screening and categorization of each and every sub-project proposed to be executed under the Program.
Deputy Program Officers-Environmental and Social Management deputed by PMDFC in regional offices will technically assist and support the ESFPs/MCs in filling in of this Checklist
It is to be attached with the main document16 of sub-projects at planning stage and will be duly signed by the relevant ESFP and endorsed by the respective DPO-ESM
This checklist focuses on environmental issues and social concerns. To ensure that social dimensions are adequately considered, Involuntary Resettlement Screening Checklist will also be used
(iii) The purpose of this E&S Screening Checklists is to identify potential "Negative" impacts of environmental and social attributes or to enhance the existing environmental & social benefits. Use the "remarks" section to discuss any anticipated mitigation measures.

Name of ESFP:	**Umar Nawaz**
Name of MC:	**Kamalia**
Sub-Project Sector:	**Sewerage**
Sub-Project Title:	Improvement of Sewerage System and Construction of Waste Water Treatment Plant (WWTP)
Sub- Project Categorization:	**E-1** **S-1** **E-2** **S-2** **E-3** ✓ **S-3**✓
Date of Screening:	10-8-23
Anticipated Project Activities	Supply of Liquid Waste Machinery
Estimated Cost of Subprojects	1952.60 million PKR
Completion Time/Duration	3 months

Screening Questions	Yes	No	Remarks
A. Project Siting **Is the Sub-Project area adjacent to or within any of the following?**			
Environmentally sensitive areas?			
Legally protected Area		✓	No legally protected area lies within 200 meters jurisdiction of Sub-Project.
Any surface water body (river, canal, stream, lake, wetland) within 200 meters of the proposed sub project		✓	No water body observed within 200 meters in the Sub-Project area

[15] In all MCs, ESFPs are notified by Local government; MO (I&S) are focal persons for environmental sector and MO(P) are focal persons for social sectors.
[16] It is meant as PC-I and/or engineering estimates of sub-project

Estuarine		✓	Not observed in sub project area
Special area for protecting biodiversity		✓	Not observed in sub project area
Buffer zone of protected area		✓	Not observed in sub project area
Mangroves Forest		✓	Not observed in sub project area
Man-made forest /game reserve, orchid /crops or any other area of environmental importance		✓	Not observed in sub project area
Socially sensitive /important areas/communities/ people?			
Physical Cultural Resources (PCRs) and or any site of cultural/religious importance (Graveyard, Shrine, Mosque, Church, Gordwarah, Temple, Fort, archeological/historical site) within 100 m of the proposed subproject	✓		
Sensitive receptors (Schools, colleges, Shrine, Mosque, Church, hospitals and clinics) within 100 meters of the proposed sub project		✓	Not observed in sub project area
Any graveyard of local community (Muslims or Christians)		✓	Not observed in sub project area
Any demographic or socio-economic aspects of the subproject area that are already vulnerable (e.g., high incidence of marginalized populations, rural-urban migrants, illegal settlements, squatters, ethnic minorities, people with disabilities, people in old age, socially isolated segments17 of the society and women or children)?		✓	Not observed in sub project area
Already existing infrastructure (including public amenities) which may be required to dismantle or may be affected temporarily by any means?		✓	No infrastructure will be dismantling due to construction activities.
B. Potential Environmental Impacts Will the Sub-Project cause…			
1. Disturbance to habitats/biodiversity of environmentally sensitive or protected areas?		✓	The proposed project site doesn't have any environmentally sensitive or protected areas.
2. Cutting of trees?		✓	No Cutting of trees involved during construction phase
3. Disruption to habitats/biodiversity of surrounding ecosystem/environment?		✓	No significant adverse impacts on environment.
4. Generation of wastewater during construction or operation?		✓	No such impacts are envisaged.

[17] Due to caste, creed, religion or gender e.g. transgender

5. Pollution of surface water/ground water due to wastewater discharge from construction site or due to direct/indirect disposal of wastewater?		✓	No such impacts are envisaged
6. Alteration of surface water hydrology of waterways resulting in increased sediment in streams/rivers or due to increased soil erosion at construction site?		✓	No such impacts are envisaged
7. Deterioration of surface water quality due to silt runoff and sanitary wastes from worker-based camps and chemicals used in construction.		✓	No such impacts are envisaged
8. Over pumping of ground water, leading to salinization and ground subsidence?		✓	No such impacts are envisaged
9. Serious contamination of soil due to construction works?		✓	No such impacts are envisaged
10. Aggravation of solid waste problems in the area?		✓	No such impacts are envisaged
11. Generation of hazardous waste?		✓	No such impacts are envisaged
12. Increased air pollution due to sub-project construction and operation?	✓		Good quality fuel will be used. Regular tunning of vehicles will be done
13. Noise and vibration due to sub-project construction or operation?		✓	Regular tunning of vehicles will be done
14. Creation of temporary breeding habitats for diseases such as those transmitted by mosquitoes and rodents due to solid/liquid?	✓		Improperly managed liquid waste machinery can create breeding grounds for disease-carrying vectors, such as mosquitoes and rats, leading to the spread of vector-borne diseases in the community.
15. Use of chemicals during construction?		✓	No chemicals will be used during construction activities
C: Potential Social Impacts Will the Sub-Project cause…			
3. Impairment of historical/cultural areas; disfiguration of landscape or potential loss/damage to Physical Cultural Resources (PCRs)?		✓	No impairment/damage to any PCR envisioned as per scope of construction activities
2. Displacement or involuntary resettlement of people? (physical displacement and/or economic displacement) (If "Yes", please also fill Involuntary Resettlement Screening Checklist)		✓	Not observed in sub project area

3. Disproportionate impacts on the poor, women and children and or other vulnerable groups 18(mentioned above)?		✓	No such impacts are envisaged
4. Temporary impediments in movements of people/transport and animals?	✓		During use of machinery implement traffic control measures such as signage, road diversions, and flaggers to guide vehicles safely around the work area
5. Large population influx during sub-project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		✓	No such impacts are envisaged
6. Social conflicts if workers from other areas are hired.		✓	No such impacts are envisaged
7. Risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation?	✓		By using liquid waste machinery biological Ergonomic and respiratory hazards may face by labor. • Providing appropriate personal protective equipment (PPE) for workers, such as gloves, eye protection, respirators, and chemical-resistant clothing. • Conducting regular training for workers on the safe operation of liquid waste machinery and proper handling of hazardous materials. • Implementing engineering controls, such as splash guards, ventilation systems, and noise reduction measures, to minimize exposure to hazards. • Implementing standard operating procedures (SOPs) for potential incidents involving liquid waste machinery. • Regularly inspecting and maintaining machinery to ensure it is in safe working condition

[18] Women, Children, Women headed households, People in old age, people having disabilities, socially isolated community groups and or people living below the poverty line

8. Risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel, and other chemicals during construction and operation?	✓		Improperly managed liquid waste machinery can create breeding grounds for disease-carrying vectors, such as mosquitoes and rats, leading to the spread of vector-borne diseases in the community.
9. Community safety risks due to both accidental and natural causes, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation, and decommissioning.		✓	
10. Any impact on sensitive receptors (mentioned above)		✓	Not observed in sub project area
11. Any impact of negative nature on already existing infrastructure including public amenities		✓	Not observed in sub project area

Prepared By:	**Endorsed By:**	**Reviewed By:**
Name: Muhammad Imran	**Name:** Umar Nawaz	**Name:** Hassan Ali
Designation: Environmental Specialist	**Designation:** Municipal Officer Infrastructure (MOI)	**Designation:** Deputy Program Officer ESM
Organization: MMP	**Organization:** MC Kamalia	**Organization:** PMDFC
Signature	**Signature**	**Signature:**
Date: 10-8-23	**Date:** 10-8-23	**Date:** 10-8-23

INVOLUNTARY RESETTLEMENT SCREENING CHECKLIST

Name of City/MC/LG: Kamalia

Sub-Project Sector: Sewerage System

Sub-Project Title: Supply of Liquid Waste Machinery

Sub- Project Categorization: S-2

Date of Screening: 10-08-2023

Involuntary Resettlement Checklist				
SECTION 1	**Yes**	**No**	**Expected**	**Remarks**
Does the project require land acquisition? Yes/No		✓		Land owned by MC so no land acquired for this sub project
If yes, then describe the type of land being acquired from the categories below:		✓		No Land acquired for this sub project
Has any AED been conducted at the proposed location by the government[19]?		✓		Ramps are not involved. No AED been conducted at the proposed location by the Government[1]
Land (Quantify and describe types of land being acquired in "remarks column".		✓		No Land acquired for this sub project
Government and LG owned land free of occupation (agriculture or settlement)		✓		Land is owned by Govt.
Government or state-owned land (other than LG) free of occupation (agriculture or settlement)		✓		No Land acquired for this sub project
Private land		✓		No Land acquired for this sub project
Residential		✓		No Land acquired for this sub project
Commercial		✓		No Land acquired for this sub project
Agricultural		✓		No Land acquired for this sub project
Communal		✓		No Land acquired for this sub project
Others (specify in "remarks").		✓		land owned by govt so no land acquired for this sub project

[19] The sub-projects have to avoid all such lands where any government led AED has been conducted since 2018 and such land will be considered as ineligible expenditure.

Involuntary Resettlement Checklist				
SECTION 1	**Yes**	**No**	**Expected**	**Remarks**
Name of owner/owners and type of ownership document if available.		✓		Already existing sewerage drainage and land is owned by govt.
If land is being acquired, describe any structures constructed on it		✓		No Land acquired for this sub project
Land-based assets:		✓		No Land acquired for this sub project
Residential structures		✓		No Land acquired for this sub project
Commercial structures (specify in "remarks")		✓		No Land acquired for this sub project
Community structures (specify in "remarks")		✓		No Land acquired for this sub project
Agriculture structures (specify in "remarks")		✓		No
Public utilities (specify in "remarks")		✓		land owned by govt so no land acquired for this sub project. No Ramps are ROW.
Others (specify in "remarks")		✓		No Land acquired for this sub project
If agricultural land is being acquired, specify the following:		✓		No Land acquired for this sub project
Agriculture related impacts		✓		No Agriculture related impacts foreseen for this sub project
Crops and vegetables (specify types and cropping area in "remarks).		✓		Not anticipated during this sub project
Trees (specify number and types in "remarks").		✓		No tree cutting involved during this sub project
Others (specify in "remarks").		✓		No Land acquired for this sub project
Affected Persons (APs)		✓		No Persons Affected during this Project
Will any people be displaced from the land when acquired? Yes/No		✓		No Land acquired for this sub project
Number of APs		✓		No Persons Affected during this Project
Males		✓		No Persons Affected during this Project
Females		✓		No Persons Affected during this Project
Titled land owners		✓		No Land acquired for this sub project

Involuntary Resettlement Checklist				
SECTION 1	**Yes**	**No**	**Expected**	**Remarks**
Tenants and sharecroppers		✓		No Land acquired for this sub project
Leaseholders		✓		No Land acquired for this sub project
Agriculture wage laborers		✓		Not involved in this project
Encroachers and squatters (specify in remarks column)		✓		No Land acquired for this sub project
Vulnerable APs (e.g. women headed households, minors and aged, orphans, disabled persons and those below the poverty line). Specify the number and vulnerability in "remarks".		✓		No Land acquired for this sub project no one effected during this this intervention
Others (specify in "remarks")		✓		Not involved in this project
How will people be affected?		✓		There would be Temporary hindrances in movements of people/transport during the desilting phase. However, GRM will be established at site to ensure the best management and silt material will be disposed off in 24 hours to the disposal site

Prepared By: **Name**: Ihsan ul Haq Farooqi **Designation:** Senior Sociologist **Organization:** MM Pakistan **Signature:** **Date:** 10-8-23	**Endorsed By:** **Name:** Umar Nawaz **Designation:** MOI **Organization:** MC Kamalia **Signature** **Date:** 10-8-23	**Reviewed By:** **Name:** Hassan Ali **Designation:** Deputy Program Officer ESM **Organization:** PMDFC **Signature:** **Date** 10-8-23

Estimated cost for Supply Liquid Waste Machinery

Item	Quantity	Tentative Cost/Item- PKR. /-	Total Cost
A-PPEs for Health and Safety of Labor/Workers			
Face Masks (3 PLY) - box	5	300	1500
Safety Hard Helmets	5	3,000	15000
Safety Shoes	5	3,000	15000
Hand Gloves	5	1,000	5000
Ear Plugs	5	500	2500
Reflective Safety Vest	5	1,000	5000
Safety Goggles	5	500	2500
Total (PKR)			**46,500**

Estimated Total Budget for Implementation of ESMMP of ESIA		
Package	**Subproject Component**	**Estimated Cost**
1.	Sewerage System	783000
2.	Disposal Station & Force main	1624000
3.	Providing & fixing of RPC Manhole Cover	46500
4.	Construction of Waste Water Treatment Plant	5,000,000
5.	Supply of Liquid waste machinery	46500
	Total Estimated Cost for Implementation of ESMMP	7500000

Estimated Cost of ARAP Compensation	**14,417,360/-PKR**

Sr. No.	Description	Affected Asset (Acre)	Units (Mund/ acre)	Rate (PKR)/ Mund	Total Compensation (PKR)	Total Compensation Rs. (Million)
1	**Land Acquisition**					
1.1	State Land	33	Acre	Govt Land		
2	**Crops**					
2.1	Wheat	33	40	3,900	5,148,000	5.148
2.2	Rice	33	40	4200	5,544,000	5.544
				Sub Total	**10,692,000**	**10.69**
3	**Trees and Tubewell**					
3.1	Tree (Fire Wood)	95	No.	15,000	1,425,000	1.43
3.2	Trees (Fruits)	1	No.	25,000	25,000	0.03
3.3	Tube wells	2	no	400,000	800,000	0.80
				Sub-total	**2,250,000**	**2.25**
				Total A	**12,942,000**	**12.94**
B				**M&E @ 5% of the total cost**	**647,100**	**0.6471**
C				**Administrative charges@ 1% of the total cost**	**129,420**	**0.12942**
D				**Contingencies @ 02% of the total cost**	**258,840**	**0.25884**
				Grand Total (A+B+C+D)	**13,977,360**	**13.98**

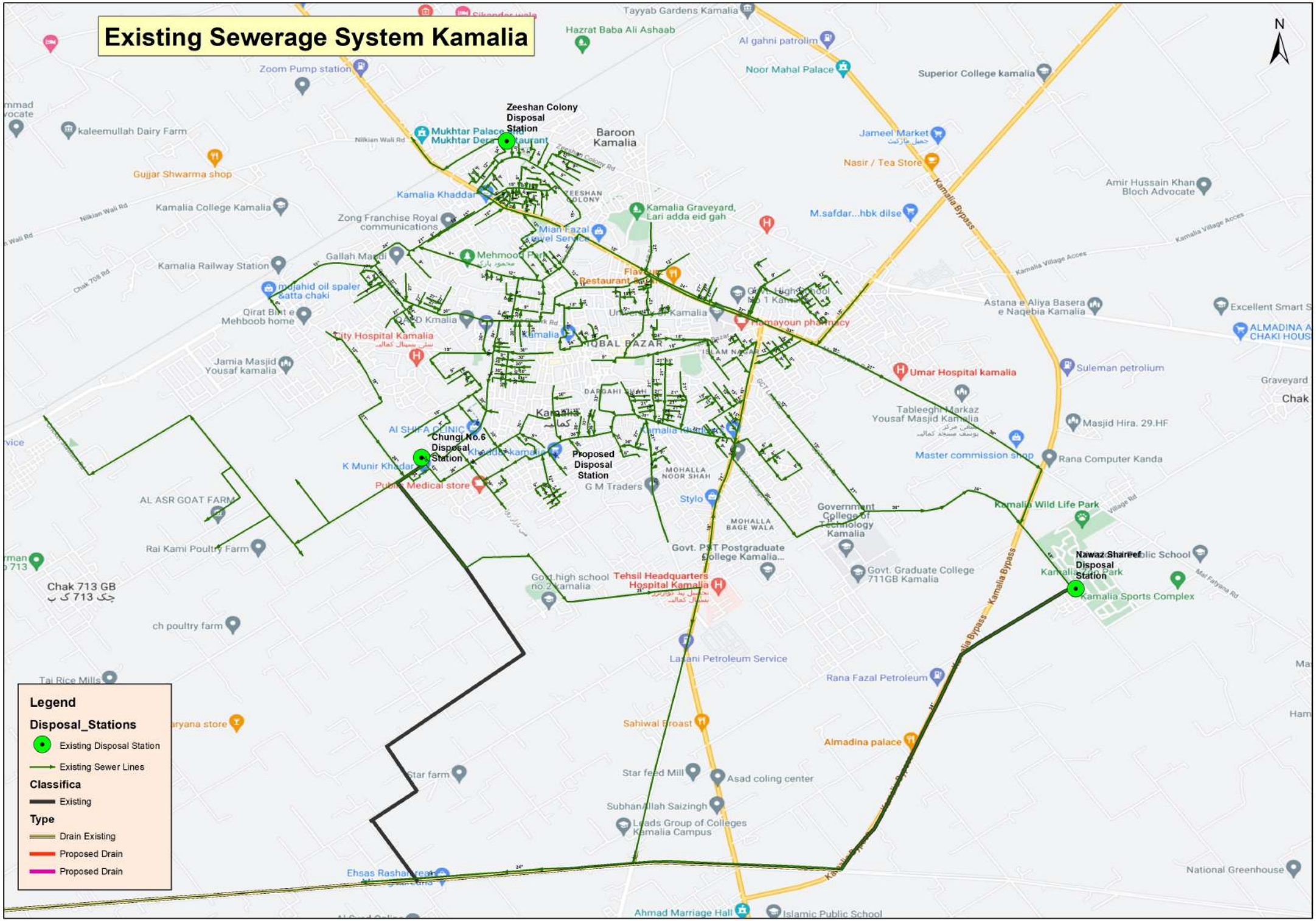
ANNEXURE-G
WORK PLAN

WORK PLAN

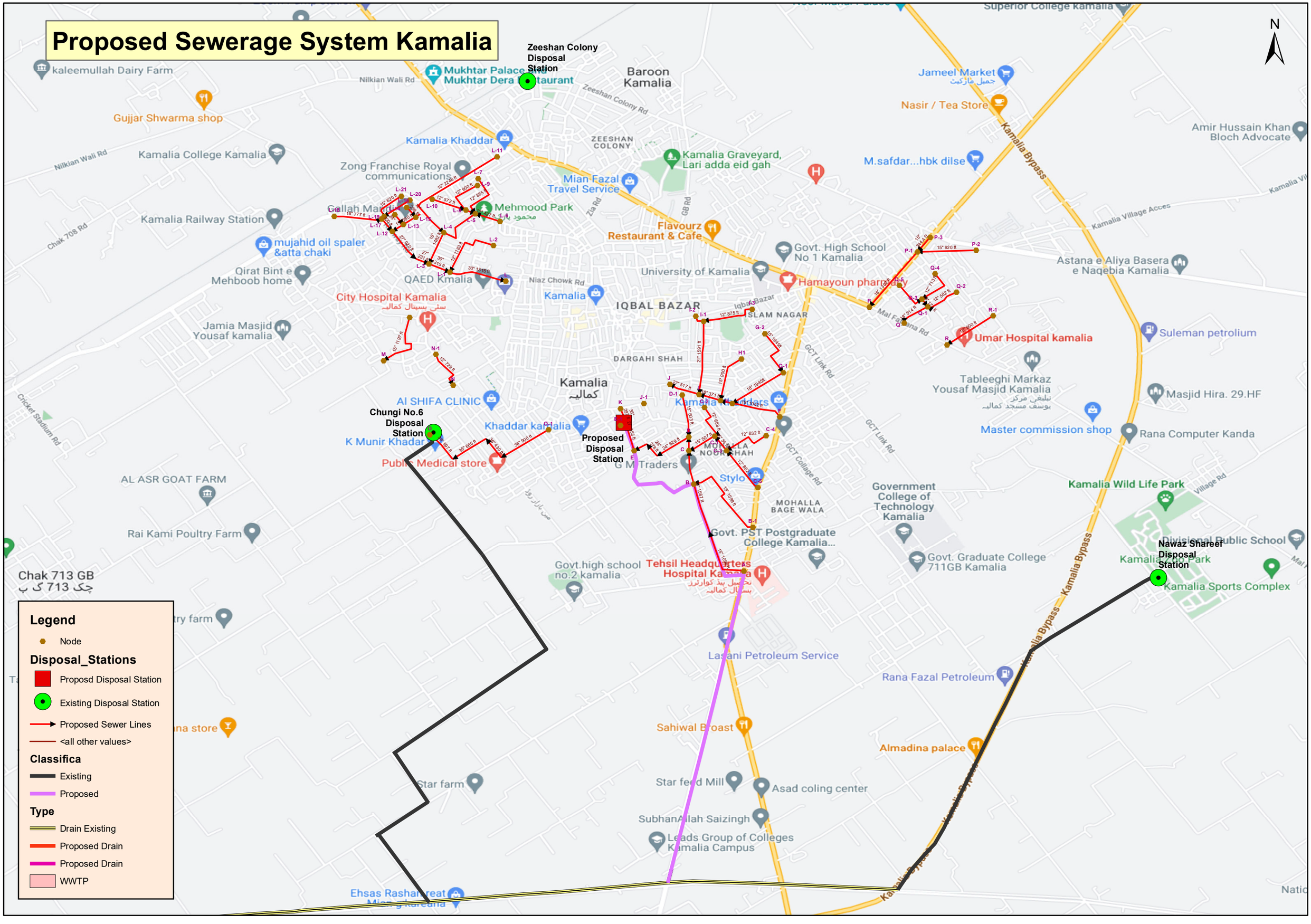
IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA CITY

S #	Description	2023	2024											
		Dec	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
1	Sewerage system													
2	Disposal station & Forcemain													
3	Providing and Fixing of RPC manhole Cover													
4	Construction of Wastewater Treatment Plant (WWTP)													
5	Supply of Liquid Waste Machinery													
6	E & S													

ANNEXURE-H
DESIGN AND DRAWINGS


Existing Sewerage System Kamalia
N
Zeeshan Colony Disposal Station
Chungi No.6 Disposal Station
Proposed Disposal Station
Nawaz Shareef Disposal Station
Kamalia Bypass
Legend
Disposal_Stations
Existing Disposal Station
Existing Sewer Lines
Classifica
Existing
Type
Drain Existing
Proposed Drain
Proposed Drain

Proposed Sewerage System Kamalia



HYDRAULIC STATEMENT TRUNK SEWER KAMALIA

Zone	NODE	Length of Line (in ft)	Area (acre)			Population (No's) @ 85 person/acre	Consumption in gallong @ 40 GPCD	Avg. Sew. Flow (in cusec)	Peak Factor	Peak Flow (in cusec)	Infilteration @ 5% of average flow (in cusec)	Storm Allow 50% of peak flow (in cusec)	Design Flow (in cusec)	Proposed Dia (inches)	Velocity ft/sec	Capacity of proposed dia (inch)	Grade of Sewer	Road Levels		Invert Elevation		Elev difference	
			online	Previous	TOTAL													u/s MH	d/s MH	u/s MH	d/s MH	u/s MH	d/s MH
																	ft/ft	ft	ft	s	ft	ft	ft
Kamalia City	A-B	1,992	49.21		49.21	4,183	167,314	0.26	4.50	1.19	0.01319	0.59	1.79	15	2.50	3.07	0.0022	509.97	507.17	*501.97*	497.59	8.00	9.58
	B1-B	1,598	41.56		41.56	3,533	141,304	0.22	4.50	1.00	0.01114	0.50	1.51	15	2.50	3.07	0.0022	511.97	507.17	*503.97*	500.45	8.00	6.72
	B-C	629	5.16	91	95.93	8,154	326,162	0.51	4.00	2.06	0.02571	1.03	3.11	18	2.50	4.42	0.0018	507.17	508.87	*497.34*	496.21	9.83	12.66
	C5-C3	862	10.54	-	10.54	896	35,836	0.06	4.50	0.25	0.00282	0.13	0.38	12	2.50	1.96	0.003	511.86	509.95	505.86	503.27	6.00	6.68
	C4-C3	832	11.15		11.15	948	37,910	0.06	4.50	0.27	0.00299	0.13	0.41	12	2.50	1.96	0.003	509.67	509.95	503.67	501.17	6.00	8.78
	C3-C1	*341*	*4.36*	*21.69*	26.05	2,214	88,570	0.14	4.50	0.63	0.00698	0.31	0.95	*15*	2.50	3.07	*0.0022*	*509.95*	*509.82*	*500.92*	500.17	9.03	9.65
	C2-C1	*688*	*7.87*		7.87	669	26,758	0.04	4.50	0.19	0.00211	0.09	0.29	*12*	2.50	1.96	*0.003*	*509.95*	*509.82*	*503.95*	501.89	6.00	7.93
	C1-C	*507*	*3.87*	*33.92*	37.79	3,212	128,486	0.20	4.50	0.91	0.01013	0.46	1.38	*15*	2.50	3.07	*0.0022*	*509.82*	*509.17*	*500.17*	499.06	9.65	10.11
	C-D	*262*	*2.03*	*133.72*	135.75	11,539	461,550	0.73	3.50	2.55	0.03638	1.27	3.86	*21*	2.50	6.01	*0.0014*	*509.17*	*509.89*	*495.96*	495.59	13.21	14.30
	D1-D	*803*	*41.97*		41.97	3,567	142,698	0.22	4.50	1.01	0.01125	0.51	1.53	*15*	2.50	3.07	*0.0022*	*510.24*	*509.89*	*501.24*	499.47	9.00	10.42
	D-E	*1,148*	*37.98*	*215.70*	253.68	21,563	862,512	1.36	3.50	4.76	0.06799	2.38	7.21	*24*	2.50	7.85	*0.00121*	*509.89*	*506.78*	*495.34*	493.95	14.55	12.83
	E-E1	*555*	*83.15*	*253.68*	336.83	28,631	1,145,222	1.81	3.50	6.32	0.09028	3.16	9.57	*27*	2.50	9.94	*0.00103*	*506.78*	*507.14*	*493.45*	492.88	13.33	14.26
	LINE F TO DW																						
	F-G	842	30.15		30.15	2,563	102,510	0.16	4.50	0.73	0.00808	0.36	1.10	15	2.50	3.07	0.0022	511.48	510.13	504.48	502.63	7.00	7.50
	G2-G1	934	31.17		31.17	2,649	105,978	0.17	4.50	0.75	0.00835	0.38	1.14	15	2.25	2.76	0.0018	511.12	512.95	502.13	500.45	5.00	12.50
	G1-G	1,009	33.11	31.17	64.28	5,464	218,552	0.34	4.50	1.55	0.01723	0.78	2.34	18	2.25	3.97	0.0014	512.95	510.13	500.20	498.78	12.75	11.35
	G-H	198	1.83	94.43	96.26	8,182	327,284	0.52	4.00	2.06	0.02580	1.03	3.12	18	2.25	3.97	0.0014	510.13	510.93	498.78	498.51	11.35	12.42
	H1-H	913	29.88		29.88	2,540	101,592	0.16	4.50	0.72	0.00801	0.36	1.09	15	2.25	2.76	0.0018	510.51	510.93	504.51	502.87	6.00	8.06
	H-I	371	3.07	126	129.21	10,983	439,314	0.69	3.50	2.42	0.03463	1.21	3.67	18	2.25	3.97	0.0014	510.93	510.93	498.51	497.99	12.42	12.94
	I3-I1	867	18.05		18.05	1,534	61,370	0.10	4.50	0.44	0.00484	0.22	0.66	12	2.25	1.77	0.0025	509.45	508.85	504.45	502.28	5.00	6.57
	I2-I1	202	4.55	85.45	90.00	7,650	306,000	0.48	4.00	1.93	0.02412	0.96	2.92	18	2.25	3.97	0.0014	511.21	508.85	503.20	502.92	8.01	5.93
	I1-I	1,388	61.35	108.05	169.40	14,399	575,960	0.91	3.50	3.18	0.04540	1.59	4.81	21	2.25	5.41	0.0012	508.85	510.93	502.67	501.00	6.18	9.93
	I-J	517	53.45	298.61	352.06	29,925	1,197,004	1.89	3.00	5.66	0.09436	2.83	8.59	27	2.25	8.94	0.00084	510.93	509.17	497.24	496.80	13.69	12.37
	J-J1	703	65.98	352.06	418.04	35,533	1,421,336	2.24	3.00	6.72	0.11204	3.36	10.20	33	2.25	13.36	0.00064	509.17	508.40	496.30	495.85	12.87	12.55
	J1-K	393	61.45	418.04	479.49	40,757	1,630,266	2.57	3.00	7.71	0.12851	3.86	11.69	36	2.25	15.90	0.00057	508.40	507.69	495.60	495.38	12.80	12.31
	K-E1	271	10.18	479.49	489.67	41,622	1,664,878	2.62	3.00	7.87	0.13124	3.94	11.94	36	2.50	17.66	0.0007	507.69	507.14	493.38	493.19	14.31	13.95
	E1-DW	35	11.18	826.50	837.68	71,203	2,848,112	4.49	2.50	11.23	0.22452	5.61	17.06	42	2.50	24.04	0.00057	507.69	507.14	491.63	491.61	16.06	15.53
	LINE L21 TO L																						
	L21-L19	567	37.47		37.47	3,185	127,398	0.20	4.50	0.90	0.01004	0.45	1.37	15	2.25	2.76	0.0018	509.18	508.20	501.23	500.21	7.95	7.99
	L20-L19	528	16.15		16.15	1,373	54,910	0.09	4.50	0.39	0.00433	0.19	0.59	12	2.25	1.77	0.0025	507.29	508.20	502.80	501.48	4.49	6.72
	L19-L17	53		53.62	53.62	4,558	182,308	0.29	4.50	1.29	0.01437	0.65	1.95	15	2.25	2.76	0.0018	508.20	508.03	500.21	500.11	7.99	7.92

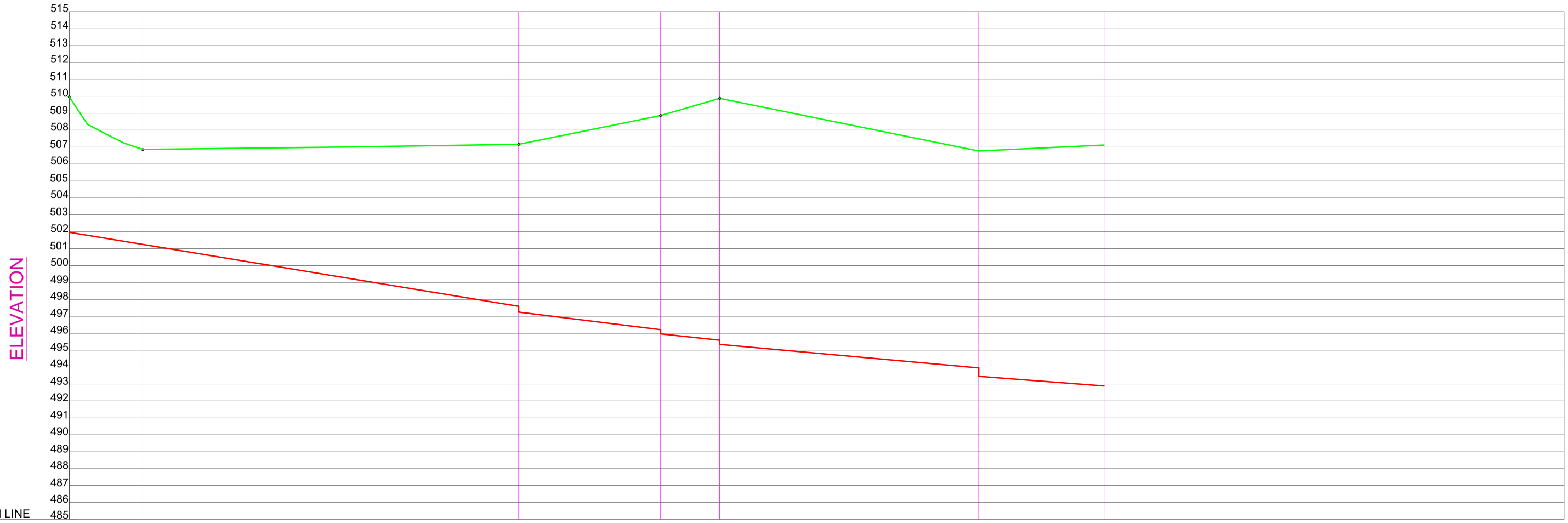
EXISTING

Kamalia City																						
	L18-L17	776	92.15		92.15	7,833	313,310	0.49	4.00	1.98	0.02470	0.99	2.99	18	2.25	3.97	0.0014	506.81	508.03	500.94	499.85	5.87	8.18
	L17-L12	299	3.15	145.77	148.92	12,658	506,328	0.80	3.50	2.79	0.03991	1.40	4.23	24	2.25	7.07	0.00098	508.03	507.25	499.35	499.06	8.68	8.19
	L16-L15	239	13.17		13.17	1,119	44,778	0.07	4.50	0.32	0.00353	0.16	0.48	12	2.25	1.77	0.00250	506.40	505.84	501.90	501.30	4.50	4.54
	L15-L13	247	6.37	13.17	19.54	1,661	66,436	0.10	4.50	0.47	0.00524	0.24	0.71	15	2.25	2.76	0.00180	505.84	505.66	501.05	500.61	4.79	5.05
	L14-L13	233	13.17		13.17	1,119	44,778	0.07	4.50	0.32	0.00353	0.16	0.48	12	2.25	1.77	0.00250	506.45	505.66	501.95	501.37	4.50	4.29
	L13-L12	223	2.68	32.71	35.39	3,008	120,326	0.19	4.50	0.85	0.00949	0.43	1.29	15	2.25	2.76	0.0018	505.66	507.25	500.61	500.21	5.05	7.04
	L12-L3	878	117.18	184.31	301.49	25,627	1,025,066	1.62	3.00	4.85	0.08081	2.42	7.35	27	2.25	8.94	0.00084	507.25	508.12	498.81	498.07	8.44	10.05
	L11-L11a	987	41.37		41.37	3,516	140,658	0.22	4.50	1.00	0.01109	0.50	1.51	15	2.25	2.76	0.00180	512.36	508.06	503.48	501.70	8.88	6.36
	L11a-L4	1,259	28.31	41.37	69.68	5,923	236,912	0.37	4.00	1.49	0.01868	0.75	2.26	18	2.25	3.97	0.00140	512.36	508.06	501.45	499.69	10.91	8.37
	L10-L8	572	11.93		11.93	1,014	40,562	0.06	4.50	0.29	0.00320	0.14	0.43	12	2.25	1.77	0.0025	508.54	508.56	503.60	502.17	4.94	6.39
	L9-L8	704	10.87		10.87	924	36,958	0.06	4.50	0.26	0.00291	0.13	0.40	12	2.25	1.77	0.0025	511.87	508.56	506.37	504.61	5.50	3.95
	L8-L5	184	1.15	22.80	23.95	2,036	81,430	0.13	4.50	0.58	0.00642	0.29	0.87	12	2.25	1.77	0.0025	508.56	508.66	502.17	501.71	6.39	6.95
	L7-L5	884	14.78		14.78	1,256	50,252	0.08	4.50	0.36	0.00396	0.18	0.54	12	2.25	1.77	0.0025	511.90	508.66	506.40	504.19	5.50	4.47
	L6-L5	427	12.12		12.12	1,030	41,208	0.06	4.50	0.29	0.00325	0.15	0.44	12	2.25	1.77	0.0025	508.21	508.33	503.21	502.14	5.00	6.19
	L5-L4	847	9.46	50.85	60.31	5,126	205,054	0.32	4.00	1.29	0.01616	0.65	1.96	15	2.25	2.76	0.0018	508.33	508.06	501.46	499.94	6.87	8.12
	L4-L3	635	5.07	129.99	135.06	11,480	459,204	0.72	3.50	2.53	0.03620	1.27	3.84	18	2.25	3.97	0.0014	508.06	508.12	499.69	498.80	8.37	9.32
	L3-L1	374	21.31	436.55	457.86	38,918	1,556,724	2.45	3.00	7.36	0.12272	3.68	11.17	30	2.25	11.04	0.00070	508.12	508.39	497.82	497.56	10.30	10.83
	L2-L1	1,183	18.17		18.17	1,544	61,778	0.10	4.50	0.44	0.00487	0.22	0.66	12	2.25	1.77	0.0025	505.97	508.39	500.97	498.01	5.00	10.38
	L1-L	938	67.37	476.03	543.40	46,189	1,847,560	2.91	3.00	8.74	0.14564	4.37	13.25	30	2.25	11.04	0.0007	508.39	510.29	497.56	496.90	10.83	13.39
	LINE M1-M																						
	M1-M	1,197	65.15		65.15	5,538	221,510	0.35	4.00	1.40	0.01746	0.70	2.11	15	2.50	3.07	0.0022	504.01	504.58	498.01	495.38	6.00	9.20
	LINE N1 TO N																						
	N1-N	729	22.22		22.22	1,889	75,548	0.12	4.50	0.54	0.00596	0.27	0.81	12	2.50	1.96	0.003	501.99	501.61	494.99	492.80	7.00	8.81
	LINE O1 TO O																						
	O1-O	2,635	97.32	495.87	593.19	50,421	2,016,846	3.18	2.50	7.95	0.15899	3.97	12.08	36	2.50	17.66	0.00070	507.63	505.69	495.84	494.00	11.79	11.69
	LINE P3 TO P																						
	P3-P1	344	37.33		37.33	3,173	126,922	0.20	4.50	0.90	0.01001	0.45	1.36	15	2.50	3.07	0.00220	516.40	515.87	507.40	506.64	9.00	9.23
	P2-P1	958	41.17		41.17	3,499	139,978	0.22	4.50	0.99	0.01103	0.50	1.50	15	2.50	3.07	0.00220	514.33	515.87	507.83	505.72	6.50	10.15
	P1-P	1,302	57.15	78.50	135.65	11,530	461,210	0.73	3.50	2.54	0.03636	1.27	3.85	18	2.50	4.42	0.00180	515.87	514.56	505.47	503.13	10.40	11.43
	LINE Q5 TO Q1																						
	Q5-Q3	569	18.17		18.17	1,544	61,778	0.10	4.50	0.44	0.00487	0.22	0.66	12	2.50	1.96	0.003	514.46	514.66	508.46	506.75	6.00	7.91
	Q4-Q3	713	19.15		19.15	1,628	65,110	0.10	4.50	0.46	0.00513	0.23	0.70	12	2.50	1.96	0.003	515.34	514.66	509.34	507.20	6.00	7.46
	Q3-Q1	171	9.87	37.32	47.19	4,011	160,446	0.25	4.50	1.14	0.01265	0.57	1.72	15	2.50	3.07	0.00220	514.66	515.50	506.95	506.57	7.71	8.93
	Q2-Q1	582	21.21		21.21	1,803	72,114	0.11	4.50	0.51	0.00568	0.26	0.77	12	2.50	1.96	0.003	512.86	515.50	506.86	505.11	6.00	10.39
	Q1-Q	512	24.15	68.40	92.55	7,867	314,670	0.50	4.00	1.98	0.02481	0.99	3.00	18	2.50	4.42	0.00180	515.50	514.00	504.61	503.69	10.89	10.31
	LINE R1 TO R																						
	R1-R	923	65.15		65.15	5,538	221,510	0.35	4.00	1.40	0.01746	0.70	2.11	15	2.50	3.07	0.00220	514.00	513.20	505.50	503.47	8.50	9.73

PROFILE OF MAIN SEWER Kamalia CITY.

SUB SOIL WATER LEVEL =43.75 ft

Line A To Line E1

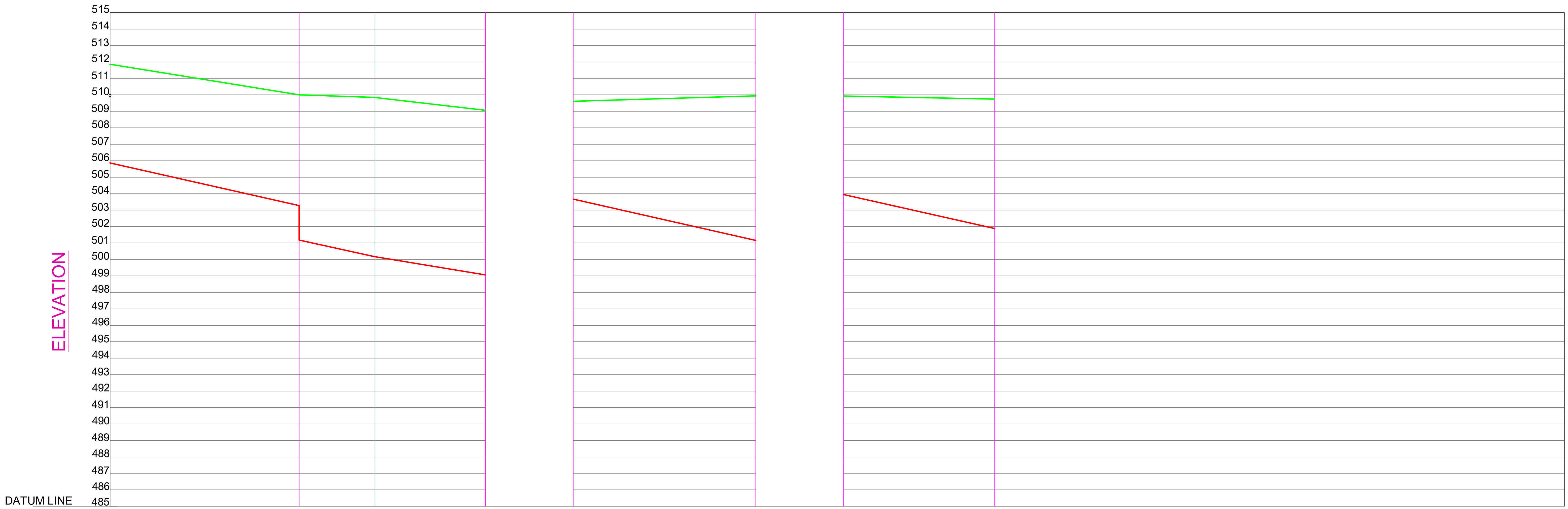


REDUCED DISTANCE	0+00'	326	1992	2621	2883	4031	4586
N.S.L	509.97	506.94	507.17	508.87	509.89	506.78	507.14
INVERT LEVEL	501.97	501.25	497.59 / 497.34	496.21 / 495.96	495.59 / 495.34	493.95 / 493.45	492.88
Velocity			2.50 ft/sec				
Slope		0.0022		0.0018	0.0014	0.00121	0.00103
DIA OF PIPE		15" Ø		18" Ø	21" Ø	24" Ø	27" Ø
REF. POINT	A		B	C	D	E	E1

PROFILE OF MAIN SEWER Kamalia CITY.

SUB SOIL WATER LEVEL =43.75 ft

Line C5 To Line C



REDUCED DISTANCE	0+00'	862	1203	1710	0+00	832	0+00	688
N.S.L	511.86	509.99	509.82	509.17	509.67	509.95	509.95	509.82
INVERT LEVEL	505.86	503.27 501.17	500.17	499.06 496.21	503.67	501.17	503.95	501.89
Velocity	2.50 ft/sec							
Slope	0.0030		0.0022		0.0030		0.0030	
DIA OF PIPE	12" Ø		15" Ø		12" Ø		12" Ø	
REF. POINT	C5	C3	C1	C	C4	C3	C2	C1

PROFILE OF MAIN SEWER Kamalia CITY.

SUB SOIL WATER LEVEL =43.75 ft

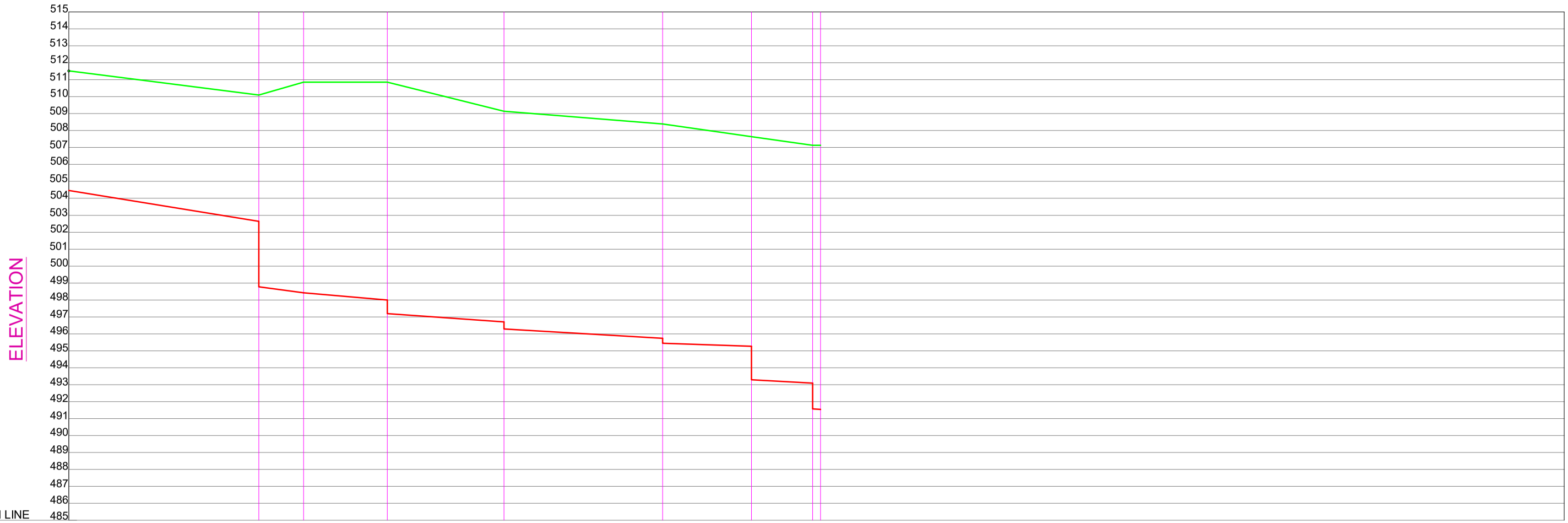
Line D1 To Line D

REDUCED DISTANCE	0+00' — 803	
N.S.L	510.24 — 509.89	
INVERT LEVEL	501.24 — 499.47	
Velocity	2.50 ft/sec	
Slope	0.0022	
DIA OF PIPE	15" Ø	
REF. POINT	D1 — D	

PROFILE OF MAIN SEWER Kamalia CITY.

SUB SOIL WATER LEVEL =43.75 ft

Line F To Line DW



REDUCED DISTANCE	0+00'	842	1040	1411	1928	2631	3024	3295	3295				
N.S.L	511.48	510.13	510.93	510.93	509.17	508.40	507.69	507.14	507.14				
INVERT LEVEL	504.48	502.63	498.78	498.51	497.99	497.24	496.80	496.30	495.85	495.60	495.38	493.38	493.19	491.63	491.61
Velocity	2.50 ft/sec				2.25 ft/sec						2.50 ft/sec				
Slope	0.0022		0.0014		0.00084		0.00064		0.00057		0.0007		0.00057		
DIA OF PIPE	15" Ø		18" Ø		27" Ø		33" Ø		36" Ø				42" Ø		
REF. POINT	F	G	H	I	J	J1	K	E1	DW						

PROFILE OF MAIN SEWER Kamalia CITY.

SUB SOIL WATER LEVEL =43.75 ft

Line G2 To Line G

REDUCED DISTANCE	0+00'	934	1943
N.S.L	511.12	512.95	510.13
INVERT LEVEL	502.13	500.45 / 500.20	498.78
Velocity			2.25 ft/sec
Slope		0.0018	0.0014
DIA OF PIPE		15" Ø	18" Ø
REF. POINT	G2	G1	G

PROFILE OF MAIN SEWER Kamalia CITY.

SUB SOIL WATER LEVEL =43.75 ft

Line I3 To Line I1

REDUCED DISTANCE	0+00'		867		2255	0+00		202	
N.S.L	509.45		508.85		510.93	511.21		508.85	
INVERT LEVEL	504.45		502.28	502.67	501.00	503.20		502.92	
Velocity				2.25 ft/sec					
Slope		0.0025		0.0012			0.0014		
DIA OF PIPE		12" Ø		21" Ø			18" Ø		
REF. POINT	I3		I1		I	I2		I1	

PROFILE OF MAIN SEWER Kamalia CITY.

SUB SOIL WATER LEVEL =43.75 ft

Line L9 To Line L5

REDUCED DISTANCE	0+00'	704	0+00	884	0+00	427
N.S.L	511.87	508.56	511.90	508.66	508.21	508.66
INVERT LEVEL	506.37	504.61	506.40	504.19	503.21	502.14
Velocity				2.25 ft/sec		
Slope				0.0025		
DIA OF PIPE				12" Ø		
REF. POINT	L9	L8	L7	L5	L6	L5

PROFILE OF MAIN SEWER Kamalia CITY.

SUB SOIL WATER LEVEL =43.75 ft

Line L10 To Line L4

REDUCED DISTANCE	0+00'	572	756	1603
N.S.L	508.54	508.56	508.66	508.06
INVERT LEVEL	503.60	502.17	501.71 / 501.46	499.94
Velocity			2.25 ft/sec	
Slope		0.0025		0.0018
DIA OF PIPE		12" Ø		15" Ø
REF. POINT	L10	L8	L5	L4

PROFILE OF MAIN SEWER Kamalia CITY.

SUB SOIL WATER LEVEL =43.75 ft

Line L11 To Line L3

REDUCED DISTANCE	0+00'	1797	2171	3109
N.S.L	512.36	510.18	508.06	508.12
INVERT LEVEL	503.48	501.70 / 501.45	499.69	498.80
Velocity			2.25 ft/sec	
Slope		0.0018	0.0014	
DIA OF PIPE		15" Ø	18" Ø	
REF. POINT	L11	L11a	L4	L3

PROFILE OF MAIN SEWER Kamalia CITY.

SUB SOIL WATER LEVEL =43.75 ft

Line L16 To Line L12

REDUCED DISTANCE	0+00'	239		486	709
N.S.L	506.40	505.84		505.66	507.25
INVERT LEVEL	501.90	501.30	501.05	500.61	500.21
Velocity	2.25 ft/sec				
Slope	0.0025		0.0018		
DIA OF PIPE	12" Ø		15" Ø		
REF. POINT	L16	L15	L13		L12

PROFILE OF MAIN SEWER Kamalia CITY.

SUB SOIL WATER LEVEL =43.75 ft

Line L20 To Line L13

REDUCED DISTANCE	0+00'	776	0+00	528	0+00	233
N.S.L	506.81	508.03	507.29	508.19	506.45	505.66
INVERT LEVEL	500.94	499.85	502.80	501.48	501.95	501.37
Velocity			2.25 ft/sec			
Slope	0.0014			0.0025		0.0025
DIA OF PIPE	18" Ø			12" Ø		12" Ø
REF. POINT	L18	L17	L20	L19	L14	L13

PROFILE OF MAIN SEWER Kamalia CITY.

SUB SOIL WATER LEVEL =43.75 ft

Line M1 To Line M

REDUCED DISTANCE	0+00'	1797
N.S.L	504.01	504.58
INVERT LEVEL	498.01	495.08
Velocity	**2.50 ft/sec**	
Slope	**0.0022**	
DIA OF PIPE	**15" Ø**	
REF. POINT	M1	M

PROFILE OF MAIN SEWER Kamalia CITY.

SUB SOIL WATER LEVEL =43.75 ft

Line N1 To Line N

REDUCED DISTANCE	0+00'	729
N.S.L	501.99	501.61
INVERT LEVEL	494.99	492.80
Velocity	2.50 ft/sec	
Slope	0.0030	
DIA OF PIPE	12" Ø	
REF. POINT	N1	N

PROFILE OF MAIN SEWER Kamalia CITY.

SUB SOIL WATER LEVEL =43.75 ft

Line O1 To Line O

REDUCED DISTANCE	0+00'	2635
N.S.L	507.63	505.69
INVERT LEVEL	495.84	494.00
Velocity	**2.50 ft/sec**	
Slope	**0.0007**	
DIA OF PIPE	**36" Ø**	
REF. POINT	O1	O

PROFILE OF MAIN SEWER Kamalia CITY.

SUB SOIL WATER LEVEL =43.75 ft

Line P3 To Line P

REDUCED DISTANCE	0+00'	344		1646	0+00		958		
N.S.L	516.10	515.87		514.56	514.33		515.87		
INVERT LEVEL	507.40	506.64	505.47	503.13	507.83		505.72		
Velocity			2.50 ft/sec						
Slope		0.0022		0.0018			0.0022		
DIA OF PIPE		15" Ø		18" Ø			15" Ø		
REF. POINT	P3	P1		P	P2		P1		

PROFILE OF MAIN SEWER Kamalia CITY.

SUB SOIL WATER LEVEL =43.75 ft

Line Q5 To Line Q

REF. POINT	Q5	Q3	Q1	Q	Q4	Q3	Q2	Q1
REDUCED DISTANCE	0+00'	569	740	1252	0+00	713	0+00	582
N.S.L	514.46	514.66	515.50	514.00	515.34	514.66	512.86	515.50
INVERT LEVEL	508.46	506.75 / 506.50	506.13 / 504.61	503.69	509.34	507.20	506.86	505.11
Velocity						2.50 ft/sec		
Slope		0.0030	0.0022	0.0018		0.0030		0.0030
DIA OF PIPE		12" Ø	15" Ø	18" Ø		12" Ø		12" Ø

PROFILE OF MAIN SEWER Kamalia CITY.

SUB SOIL WATER LEVEL =43.75 ft

Line R1 To Line R

REDUCED DISTANCE	0+00'	923
N.S.L	514.00	513.20
INVERT LEVEL	505.50	503.47
Velocity	**2.50 ft/sec**	
Slope	**0.0022**	
DIA OF PIPE	**15" Ø**	
REF. POINT	R1	R

PROFILE OF MAIN SEWER Kamalia CITY.

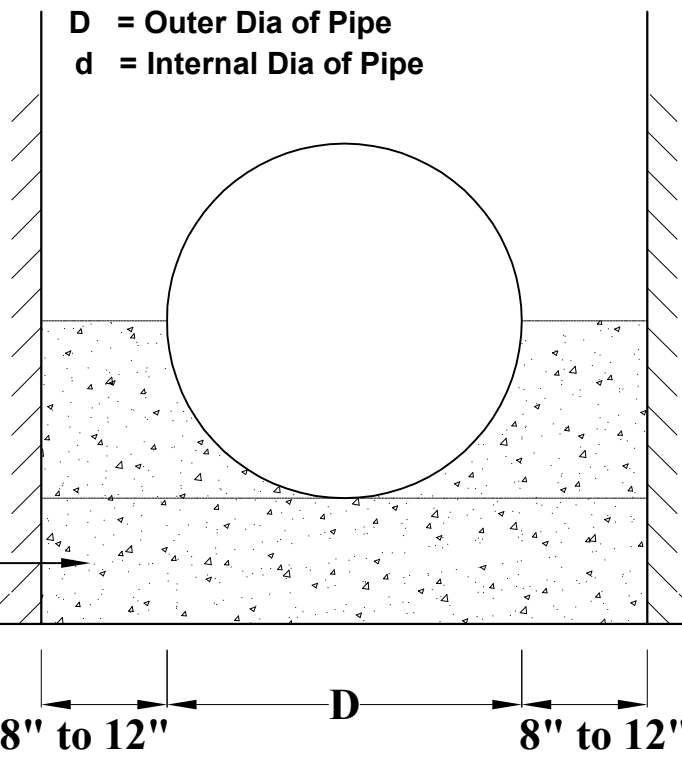
SUB SOIL WATER LEVEL =43.75 ft

Line L21 To Line L

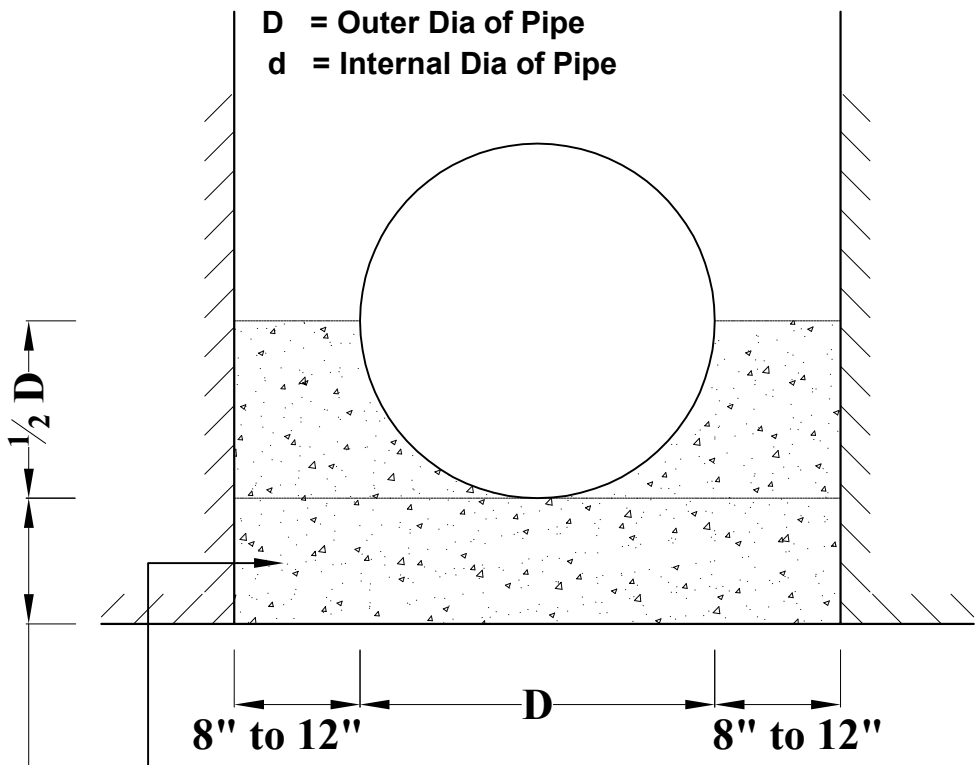
REDUCED DISTANCE	0+00'		567	620	919		1797	2171		3109		
N.S.L	509.18		508.20	508.03	507.25		508.12	508.39		510.29		
INVERT LEVEL	501.23		500.21	500.11	499.35	499.06	498.81	498.07	497.82	497.56	496.90	
Velocity	2.25 ft/sec											
Slope	0.0018			0.00098		0.00084				0.0007		
DIA OF PIPE	15" Ø			24" Ø		27" Ø				30" Ø		
REF. POINT	L21		L19	L17	L12		L03	L01		L		

Detail of Bedding of Pipe

Dia Of Pipe		Trench Width		Depth of Bedding			
Internal	External	Min.	Max	Under Pipe	Around Pipe	Total	
9"	11"	2'-3"	2.92'	4"	5.5"	9.5"	(0.79')
12"	16"	2.67'	3.33'	4"	8"	12"	(1')
15"	19.5"	2.96'	3.63'	4"	9.75"	13.75"	(1.15')
18"	23"	3.25'	3.92'	4.5"	11.50"	16.00"	(1.33')
21"	26.5"	3.54'	4.21'	5.25"	13.25"	18.50"	(1.54')
24"	30"	3.83'	4.50'	6"	15"	21"	(1.75')
27"	33.5"	4.13'	4.79'	6.75"	16.75"	23.50"	(1.96')
30"	37"	4.42'	5.08'	7.50"	18.50"	26"	(2.17')
33"	40.5"	4.71'	5.37'	8.25"	20.25"	28.50"	(2.21')
36"	44"	5.00'	5.67'	9"	22"	31"	(2.58')
42"	51"	5.58'	6.25'	10.50"	25.50"	36"	(3.00')
48"	58"	6.17'	6.83'	12"	29.00"	41"	(3.42')
54"	65"	6.75'	7.42'	13.50"	32.50"	46"	(3.83')
60"	72"	7.33'	8.00'	15"	36.00"	51"	(4.25')
66"	79"	7.92'	8.58'	16.5"	39.50"	56"	(4.67')
72"	86"	8.50'	9.17'	18"	43.00"	61"	(5.08')

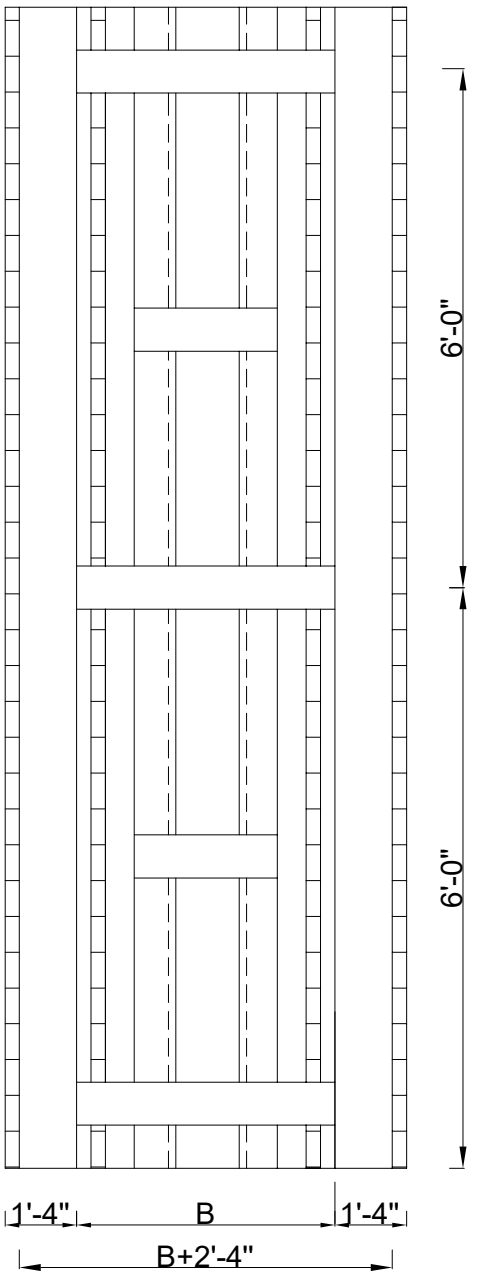


X-Section Bedding of Sewer Pipe



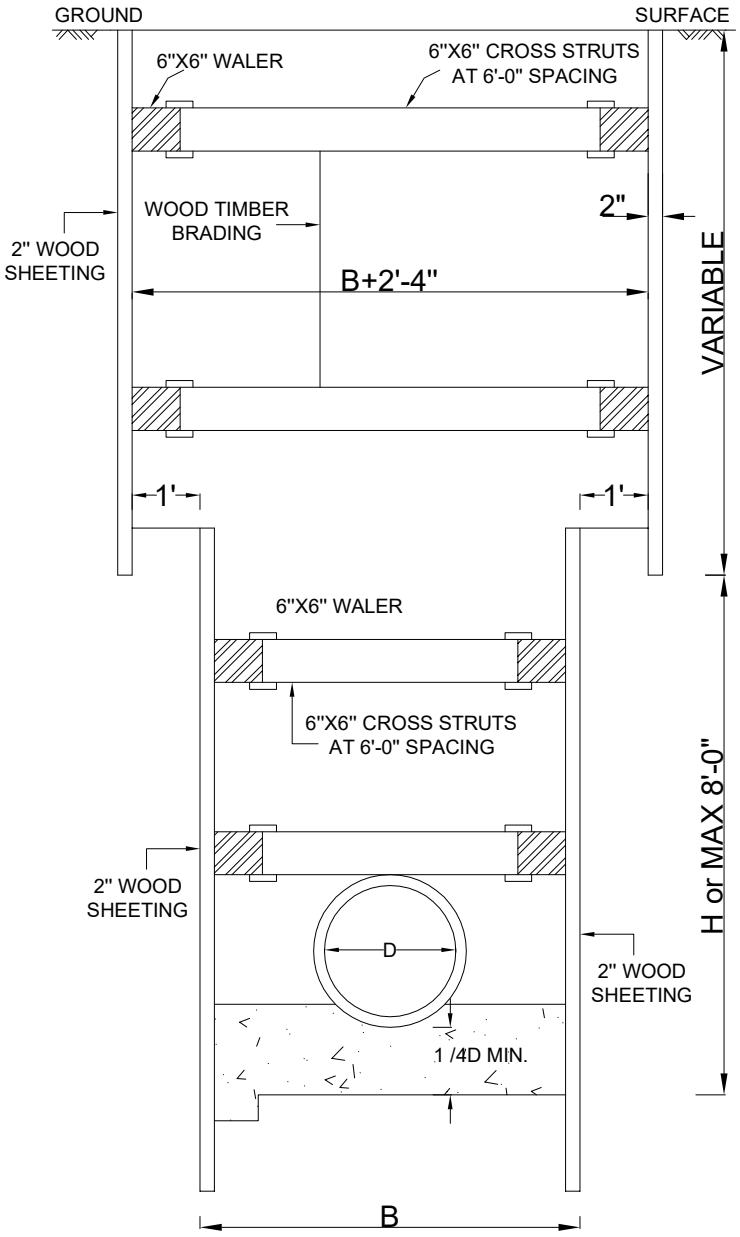
X-Section Bedding of Sewer Pipe

PLAN & X-SECTION OF TRENCH OF SEWER EXCAVATION WITH TIMBERING & BRACING

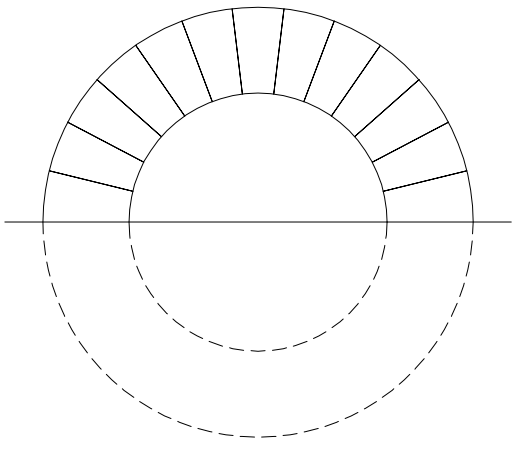


PLAN

TRENCH EXCAVATION WITH TIMBERINGAND BRACING



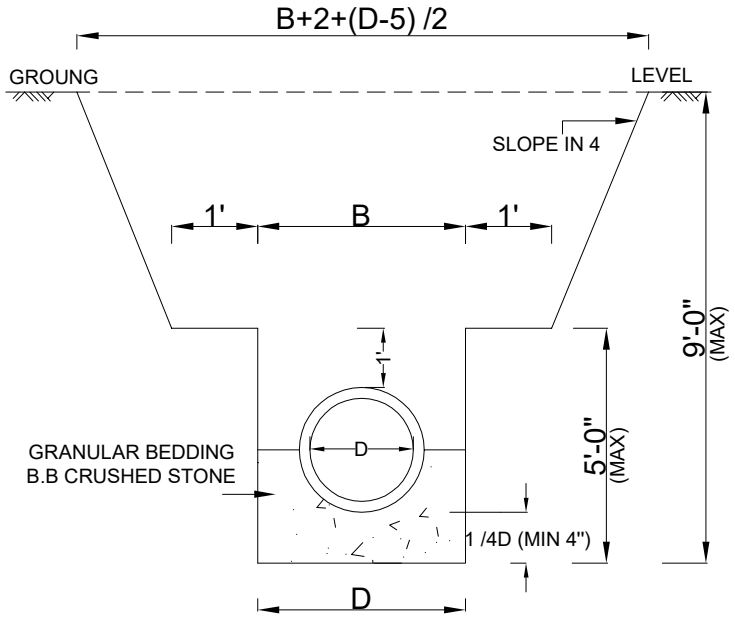
SECTION



ARCHING IN MANHOLE FOR PIPE

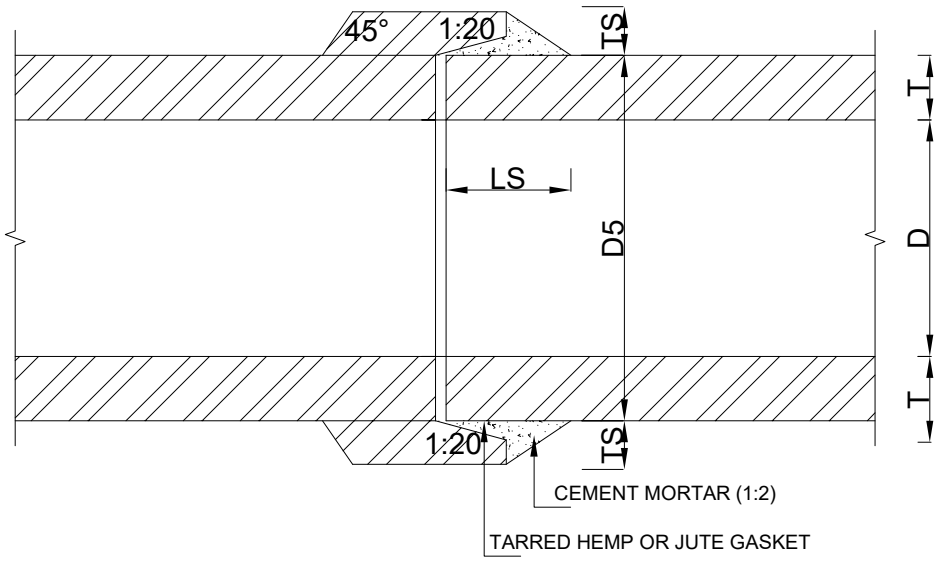
VARIABLE DIMENSIONS FOR SEWER MANHOLE

PIPE DIAMETER	B	H
36"	5' - 8"	6' - 0"
42"	6' - 4"	6' - 0"
48"	6' - 10"	7' - 0"
60"	8' - 0"	7' - 0"

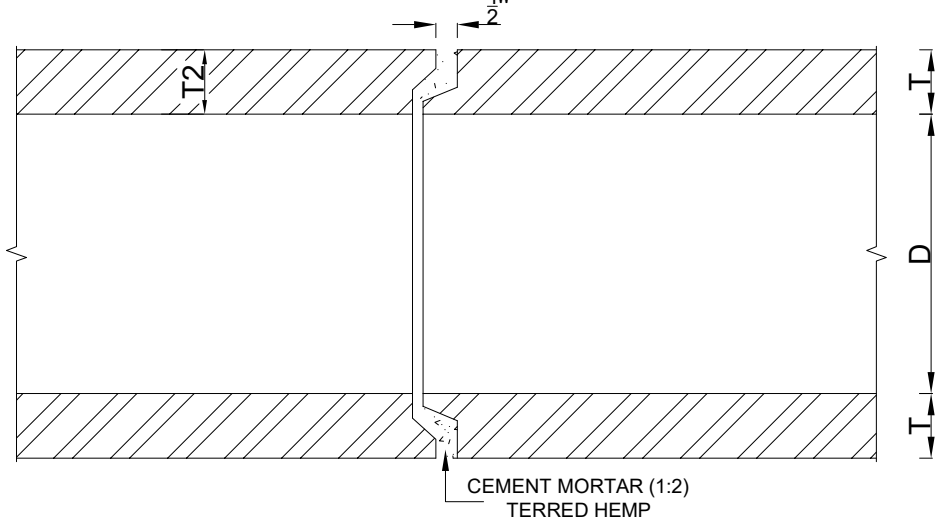


TRENCH EXCAVATION WITHOUT TIMBERING & BRACING

RIGID (CEMENT MORTAR) JOINT
(FOR USE IN DRY EXCAVATION ONLY)

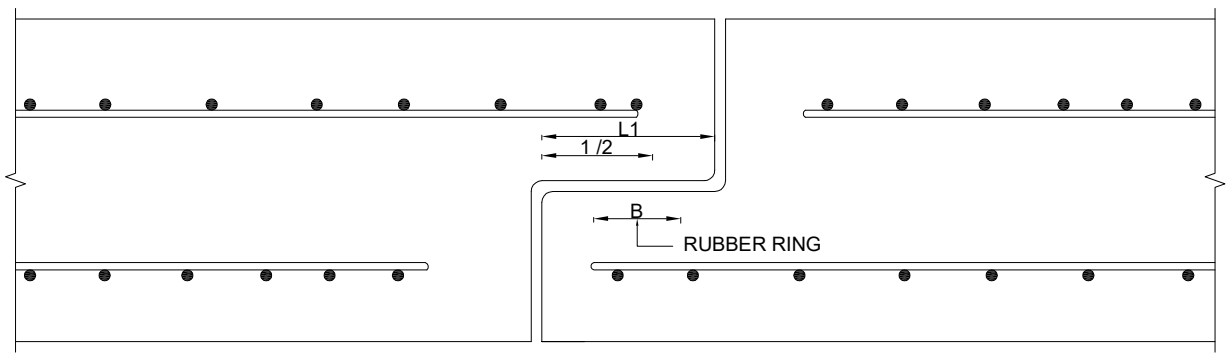


BELL AND SPIGOT JOINT



TONGUE AND GROOVE JOINT

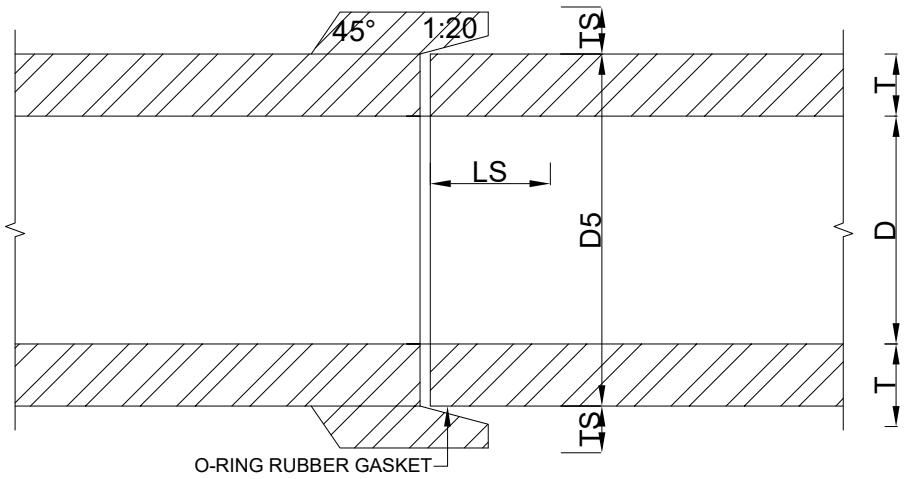
SKETH TONGUE & GROOVE JOINT



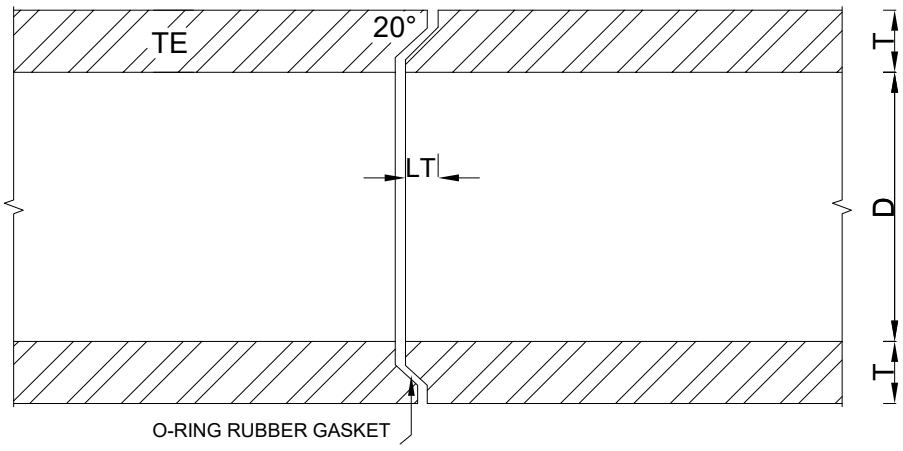
VARIABLE TRENCH DIMENSIONS

PIPE	TRENCH	WIDTH(B)
INSIDE DIA	WITHOUT TIMBERING	WITH TIMBERING
6"	2' - 0"	3' - 0"
9"	2' - 3"	3' - 0"
12"	2' - 8"	3' - 6"
15"	3' - 0"	3' - 10"
18"	3' - 3"	4' - 2"
21"	3' - 7"	4' - 6"
24"	3' -10"	4' - 10"
27"	4' - 2"	5' - 2"
30"	4' - 5"	5' - 7"
36"	5' - 8"	6' - 3"
42"	6' - 3"	7' - 3"
48"	6' - 10"	7' - 10"
54"	7' - 5"	8' - 5"
60"	8' - 0"	9' - 0"
66"	8' - 7"	9' - 7"
72"	9' - 2"	10' - 2"
78"		10' - 9"
84"		11' - 4"
90"		11' - 11"
96"		12' - 6"

FLEXIBLE (RUBBER RING)
(FOR USE IN DRY EXCAVATION ONLY)



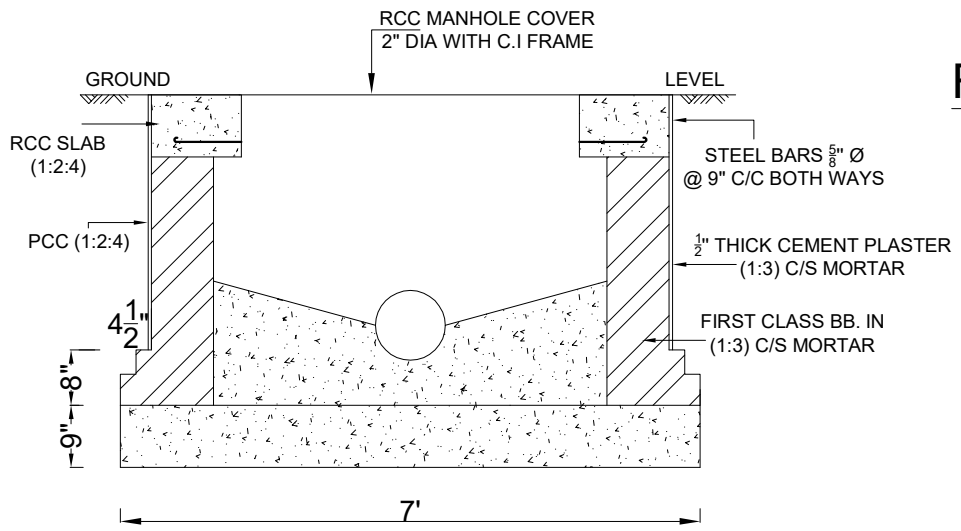
BELL AND SPIGOT JOINT



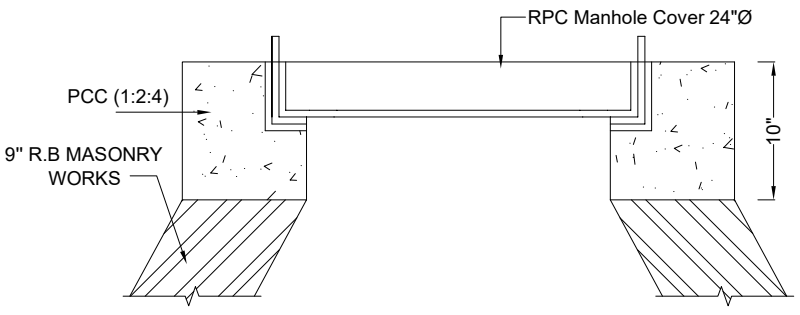
TONGUE AND GROOVE JOINT

DIMENSIONAL REQUIRMENT FOR CONC: SEWER PIPE CONFORMING TO A.S.T.M. SPECIFCATIONS 76 - 70 (IN INCHES)

PIPE DIA (D)	WALL THICHN-ESS(T)	BELL & SPIGOT JOINT			TONGUE GROOVE JOINT
		DS	TS	LS	LT
9	7 / 8 / 1	12 1/4	7 / 8 / 1	2 / 2	-
12	2	17 1/4	2	3	-
15	2 1/4	20 1/4	2 1/4	3	-
18	2 1/2	24 1/4	2 1/2	3	-
21	2 3/4	27 3/4	2 1/2	3	-
24	3	31 1/4	2 1/2	3	
27	3 1/4	-	-	-	4 1/8
30	3 1/2	-	-	-	4 1/8
33	3 3/4	-	-	-	4 1/8
36	4	-	-	-	4 1/8
42	4 1/2	-	-	-	4 3/8
48	5	-	-	-	4 3/8
54	5 1/2	-	-	-	4 5/8
60	6	-	-	-	4 5/8
66	6 1/2	-	-	-	4 7/8
72	7	-	-	-	4 7/8
78	7 1/2	-	-	-	5
84	8	-	-	-	5
90	8 1/8	-	-	-	5
96	9	-	-	-	5



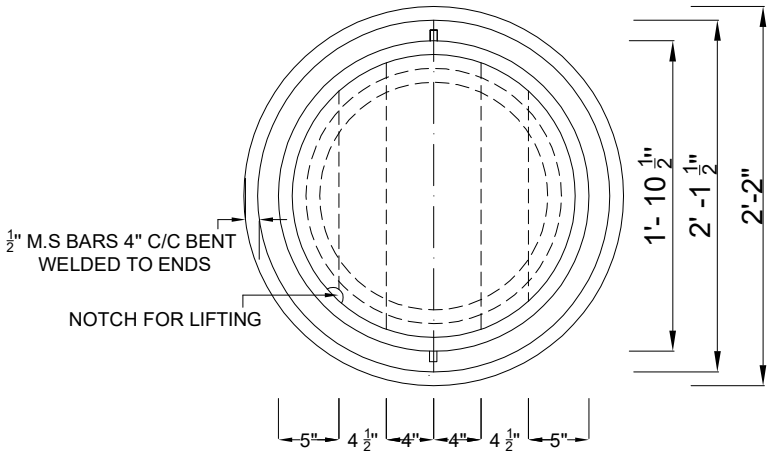
SECTION B-B



SECTION E-E

RUBBER GASKET GROOVE DETAILS FOR
TONGUE AND GROOVE (T & G) TYPE JOINT

DIA OF PIPE	WIDTH OF GROOVR B	DEPTH OF GROOVR B	DIA OF RUBBER RING	L1	L2	THICK-NESS
18"	1/2"	1/4"	1/2"	3 5/8"	1 1/8"	2 1/2"
21"	1/2"	1/4"	9/16"	3 5/8"	1 5/8"	2 3/4"
24"	1/2"	1/4"	9/16"	3 5/8"	1 5/8"	3"
27"	1/2"	1/4"	9/16"	4 1/8"	1 5/8"	3 1/4"
30"	1/2"	1/4"	9/16"	4 1/8"	1 5/8"	3 1/2"
33"	1/2"	1/4"	9/16"	4 1/8"	1 5/8"	3 3/4"
36"	1/2"	1/4"	9/16"	4 1/8"	1 5/8"	4"
42"	6/8"	3/8"	3/4"	4 3/8"	1 6/8"	4 1/2"
48"	6/8"	3/8"	3/4"	4 3/8"	1 6/8"	5"
54"	7/8"	3/8"	7/8"	4 5/8"	1 7/8"	5 1/2"
60"	7/8"	3/8"	7/8"	5"	2"	6"
66"	7/8"	1/2"	1"	5"	2"	6 1/2"



M.N COVER (PLAN)

REINFORCEMENT DETAIL

	Dia of Bars		Spacing		No. of Rings	Dia of Rings (Tolerance ± 6 mm)		Longitudinal Dia of Bars		No. of Bars
	Inches	mm	Inches	mm		Inches	mm	Inches	mm	
BARREL	3/16	4.76	4.5	114	20	10.25	260	3/16	4.76	6
BELL	3/16	4.76	2.75	70	2	13.5	343	3/16	4.76	6

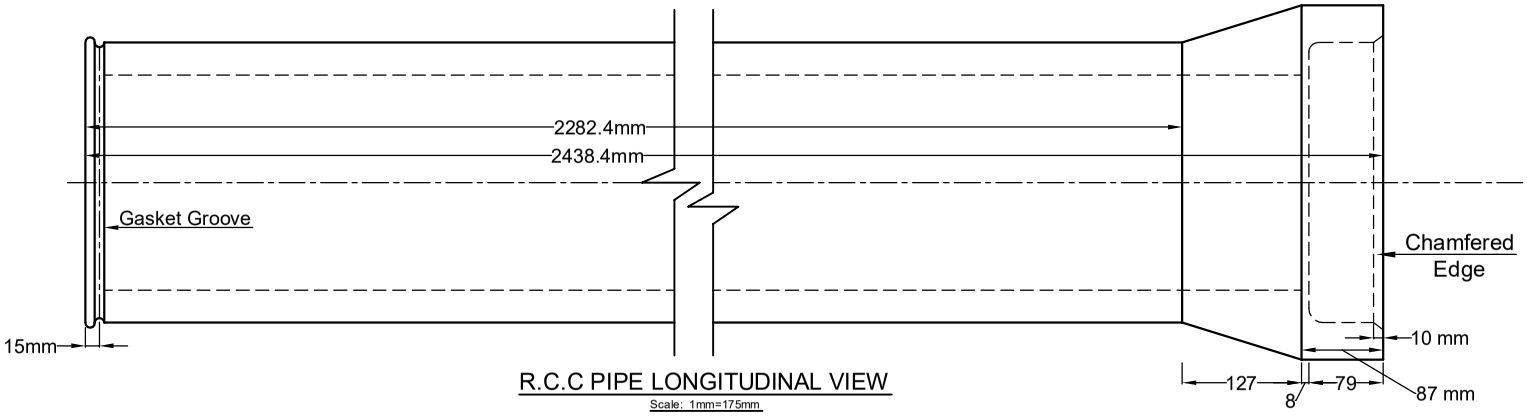
CONCRETE STRENGTH 4000 psi = 281 Kg / cm²

Concrete Strength / Ft. Length					
CLASS	WALL	Proof Load		Ultimate Load	
		Lbs	Tonne	Lbs	Tonne
L	-	1375	0.63	1700	0.78

RUBBER RING

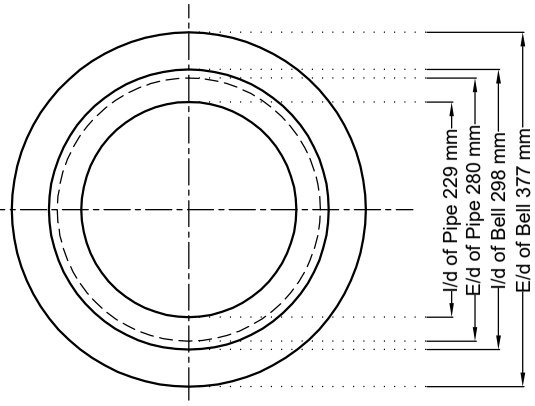
Size (Thickness)		Internal Dia	
Inches	mm	Inches	mm
1/2	12.7	10.5	267

WALL THICKNESS OF PIPE	
Inches	mm
1	25.4



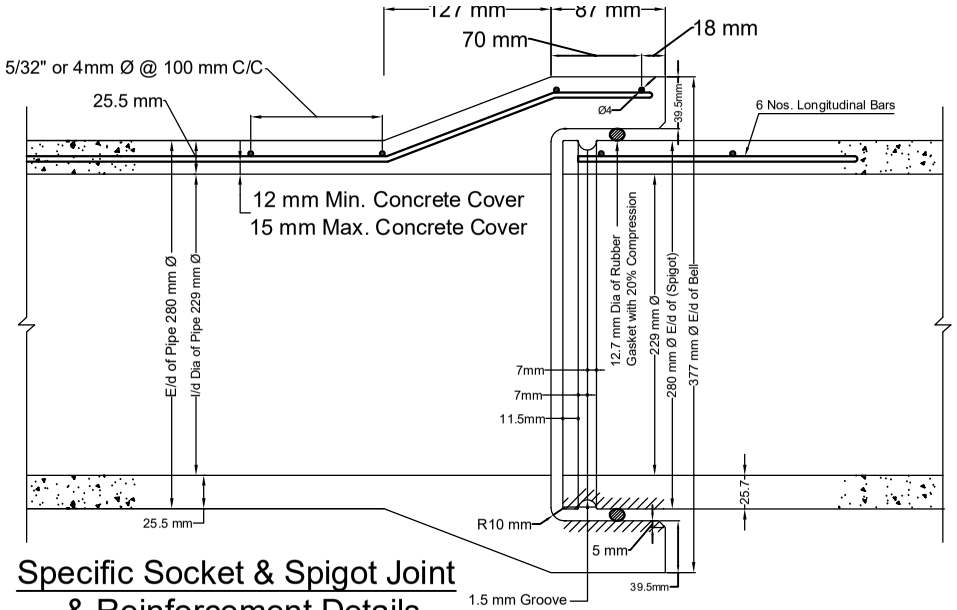
R.C.C PIPE LONGITUDINAL VIEW

Scale: 1mm=175mm



CIRCULAR VIEW OF PIPE

Scale: 1mm = 175mm



Specific Socket & Spigot Joint & Reinforcement Details

Scale: 1mm = 125mm

TOLERANCE

1.
(a) Other than faces marked //// all tolerances conformed to B.S.S. Class L
(b) Faces marked //// ± 1mm on Diameter

2. 229 mm Dia (9") pipe will not be allowed to be laid beyond the depth as per WASA design criteria hand book.

3. 229mm (9") Internal Dia RCC Pipe, B.S.S. Class L

Standard Drawing of RCC Sewer Pipe, Joint & Reinforcement Detail (9"Ø)

Class	Dia of Bars		No.of Rings	Dia of Rings		Spacing of Ba	
	Inches	mm		Inches	mm	Inches	mm
II	**3/16**	**4.76**	**19**	**13.87**	**351**	**4.64**	**118**
III	**3/16**	**4.76**	**22**	**13.87**	**351**	**4.00**	**102**
IV	**3/16**	**4.76**	**19**	**13.87**	**351**	**4.64**	**118**
	1/4	6.35	10	13.87	351	8.81	224

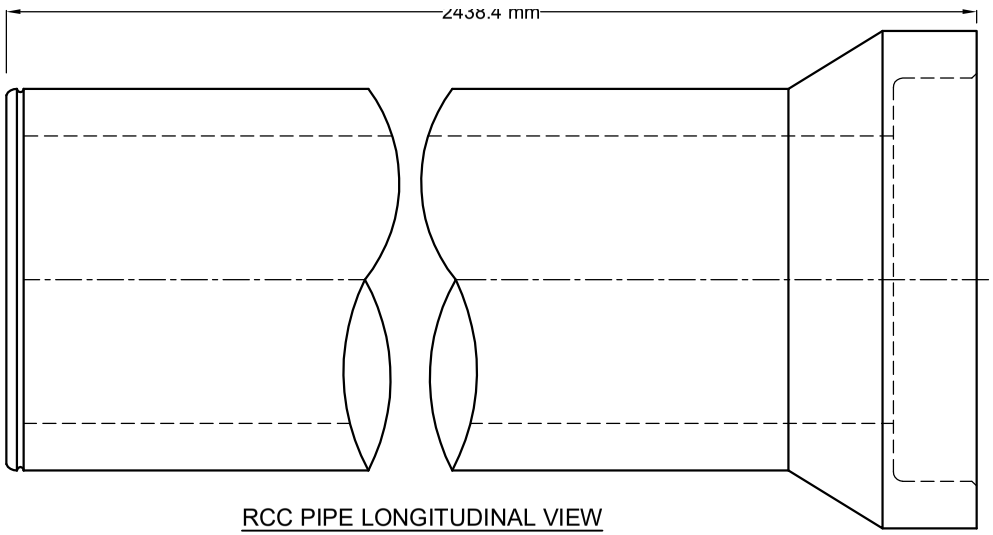
Class	Dia of Bars		No.of Rings	Dia of Rings		Spacing of B.	
	Inches	mm		Inches	mm	Inches	mm
II	**3/16**	**4.76**	**2**	**18.74**	**476**	**2.75**	**70**
III	**3/16**	**4.76**	**2**	**18.74**	**476**	**2.75**	**70**
IV	**3/16**	**4.76**	**2**	**18.74**	**476**	**2.75**	**70**
	1/4	6.35	2	18.74	476	2.75	70

Strength Requirement / Ft Length					
Type of Pipe	Wall	Proof Load		Ultimate Load	
		Lbs	Tonne	Lbs	Tonne
Class II	B	1000	0.45	1500	0.68
Class III	B	1350	0.62	2000	0.92

Longitudinal Reinforcement Class II-IV		
Dia of Bars		No. of Bars
Inches	mm	
3/16	4.76	4
Bars to be Equally Spaced Around 360°		

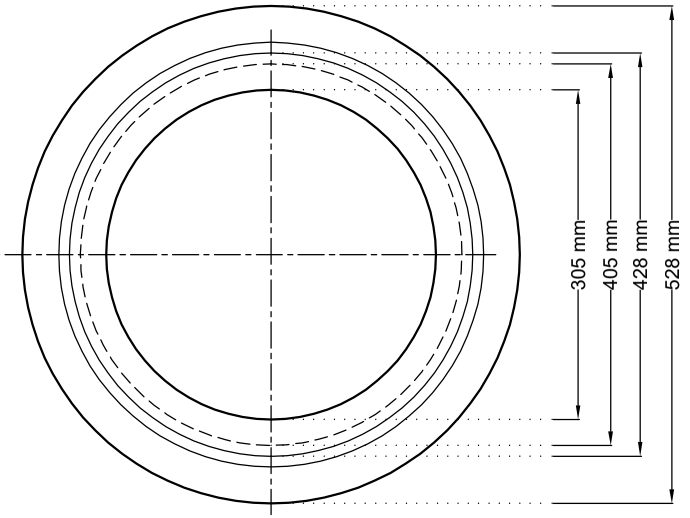
Size (Thickness)		Internal Dia	
Inches	mm	Inches	mm
9/16	14.3	15.03	382

WALL THICKNESS OF PIPE	
Inches	mm
2.0	51



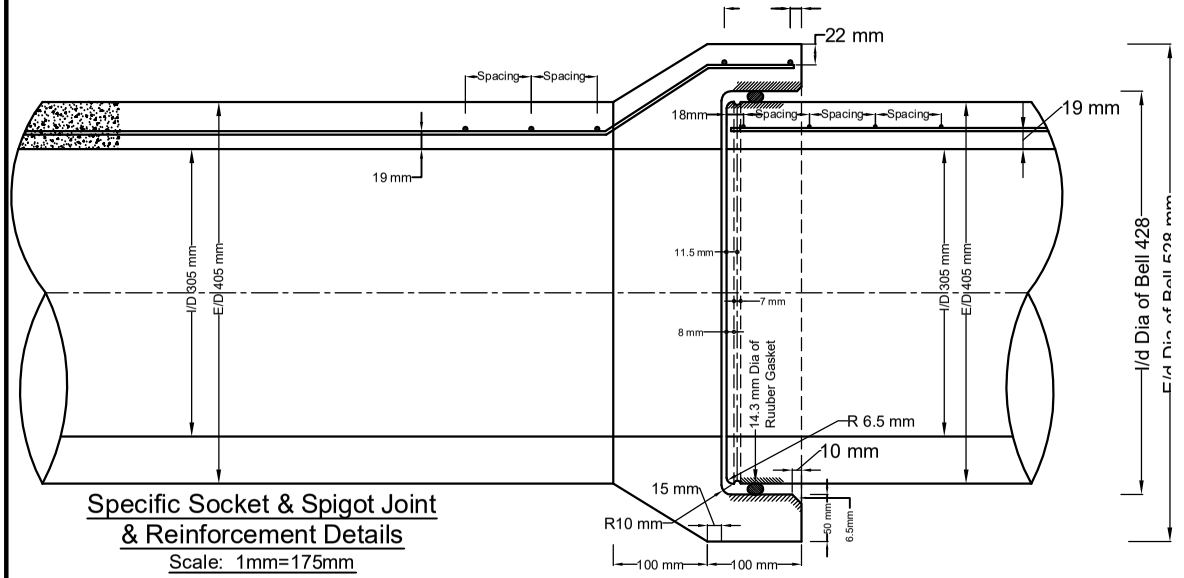
RCC PIPE LONGITUDINAL VIEW

Scale: 1mm=175mm



CIRCULAR VIEW OF PIPE

Scale: 1mm=175mm



Specific Socket & Spigot Joint & Reinforcement Details

Scale: 1mm=175mm

NOTE:

1. **TOLERANCE**

   (a) Other than these faces marked //// all tollerences are ASTM C 76

   (b) Faces marked //// ±1mm on diameter.

2. 305mm (12") I/d Pipe will not be allowed to be laid beyond the depth as per WASA design criteria hand book.

3. 305mm (12") Internal Dia RCC Pipe, Class II, III & IV, ASTM C 76-88

TITLE:

Standard Drawing of RCC Sewer Pipe, Joint & Reinforcement Detail (12"Ø)

REINFORCEMENT FOR BARREL

Class	Dia of Bars		No.of Rings	Dia of Rings		Spacing of Rings	
	Inches	mm		Inches	mm	Inches	mm
II	**3/16**	**4.76**	**20**	**16.88**	**429**	**4.64**	**118**
III	**3/16**	**4.76**	**22**	**16.88**	**429**	**4.00**	**102**
IV	**3/16**	**4.76**	**27**	**16.88**	**429**	**3.26**	**83**

REINFORCEMENT FOR BELL

Class	Dia of Bars		No.of Rings	Dia of Rings		Spacing of Bars	
	Inches	mm		Inches	mm	Inches	mm
II	**3/16**	**4.76**	**2**	**22.24**	**565**	**2.75**	**70**
III	**3/16**	**4.76**	**2**	**22.24**	**565**	**2.75**	**70**
IV	**3/16**	**4.76**	**2**	**22.24**	**565**	**2.75**	**70**
	5/32	3.97	2	22.24	565	2.75	70

CONCRETE STRENGTH 4000 psi = 281 Kg / cm ²

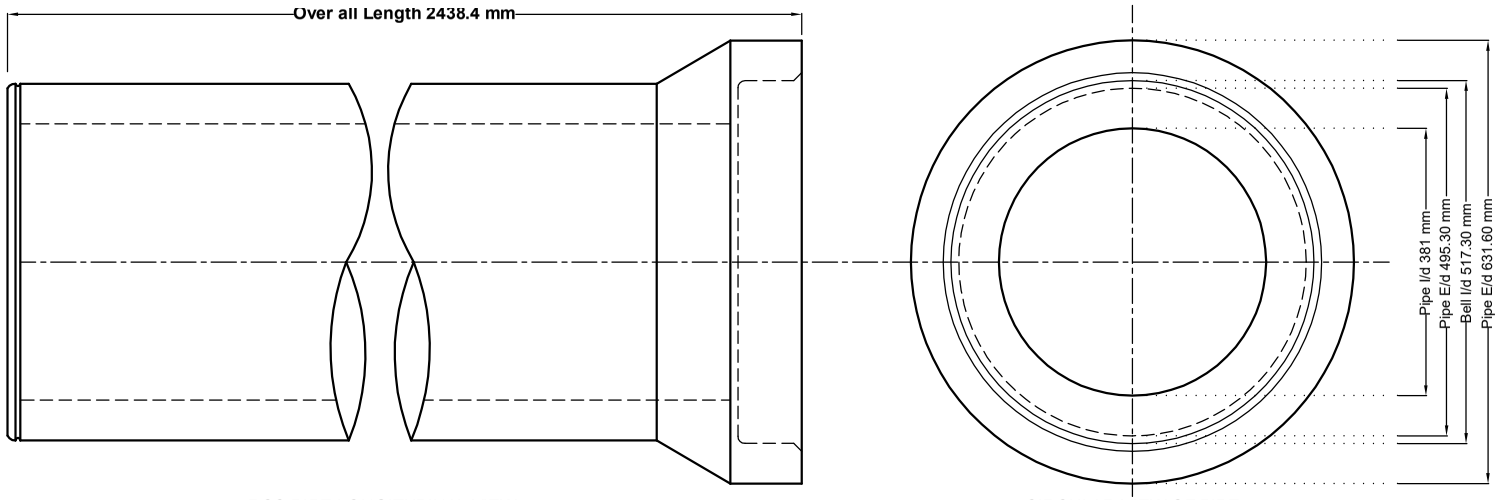
Strength Requirement / Ft Length					
Type of Pipe	Wall	Proof Load		Ultimate Load	
		Lbs	Tonne	Lbs	Tonne
Class II	B	1250	0.57	1825	0.83
Class III	B	1688	0.77	2000	1.13
Class IV	B	2500	1.13	3750	1.70

Longitudinal Reinforcement Class II-IV		
Dia of Bars		No. of Bars
Inches	mm	
3/16	4.76	4
Bars to be Equally Spaced Around 360°		

RUBBER RING

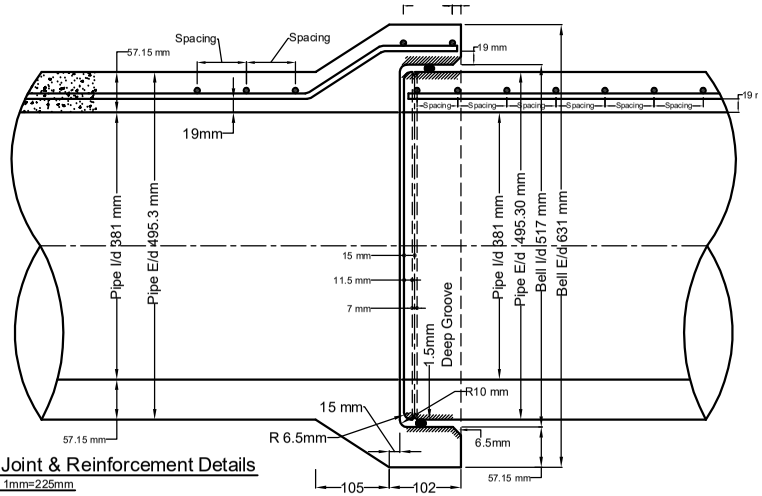
Size (Thickness)		Internal Dia	
Inches	mm	Inches	mm
9/16	14.3	18.42	468

WALL THICKNESS OF PIPE	
Inches	mm
2.25	57



RCC PIPE LONGITUDINAL VIEW
Scale: 1mm=225mm

CIRCULAR VIEW OF PIPE
Scale: 1mm=225



Specific Socket & Spigot Joint & Reinforcement Details
Scale: 1mm=225mm

NOTE:

1. TOLERANCE
   (a) Other than these faces marked //// all tolerances are ASTM C 76
   (b) Faces marked //// ± 1 mm on diameter
2. 381 mm (15") I/d Pipe will not be allowed to be laid beyond depth as identified in WASA design criteria hand book.
3. 381 mm (15") Internal Dia RCC Pipe, Class II III I' ASTM C 76-88

TITLE:

Standard Drawing of RCC Sewer Pipe, Joint & Reinforcement Detail (15"Ø)

Class	Dia of Bars		No.of Rings	SINGLE CAGE			
				Dia of Rings		Spacing of Rings	
	Inches	mm		Inches	mm	Inches	mm
II	**3/16**	**4.76**	**19**	**20.35**	**517**	**4.62**	**118**
III	**3/16**	**4.76**	**22**	**20.35**	**517**	**4.25**	**108**
IV	**3/16**	**4.76**	**39**	**20.35**	**517**	**2.24**	**57**
	1/4	6.35	21	20.35	517	4.17	106

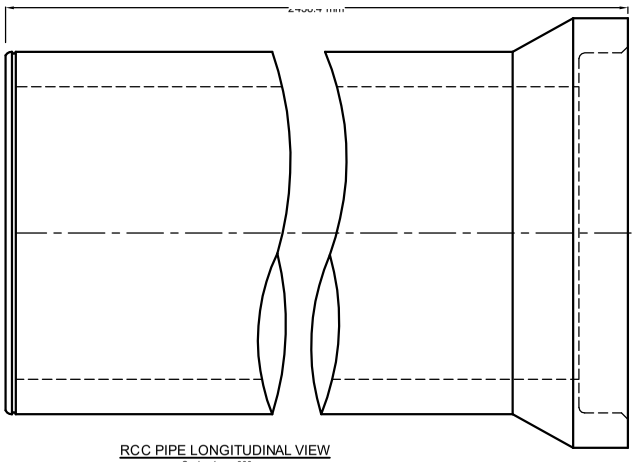
Class	Dia of Bars		No.of Rings	SINGLE CAGE			
				Dia of Rings		Spacing of Rings	
	Inches	mm		Inches	mm	Inches	mm
II	**3/16**	**4.76**	**2**	**26.25**	**667**	**2.75**	**70**
III	**3/16**	**4.76**	**2**	**26.25**	**667**	**2.75**	**70**
IV	**3/16**	**4.76**	**2**	**26.25**	**667**	**2.75**	**70**
	1/4	6.35	2	26.25	667	2.75	70

Strength Requirement / Ft Length					
Type of Pipe	Wall	Proof Load		Ultimate Load	
		Lbs	Tonne	Lbs	Tonne
Class II	B	1499	0.68	2250	1.02
Class III	B	2025	0.92	3000	1.36
Class IV	B	3000	1.36	4500	2.04

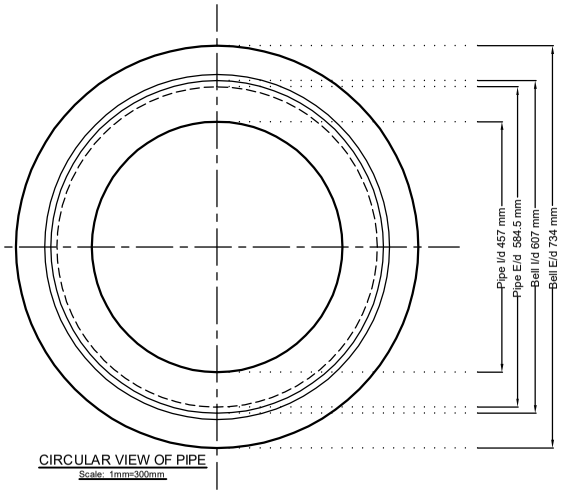
Longitudinal Reinforcement Class II-IV		
Dia of Bars		No. of Bars
Inches	mm	
3/16	4.76	4
Bars to be Equally Spaced Around 360°		

Size (Thickness)		Internal Dia	
Inches	mm	Inches	mm
9/16	14.3	21.73	552

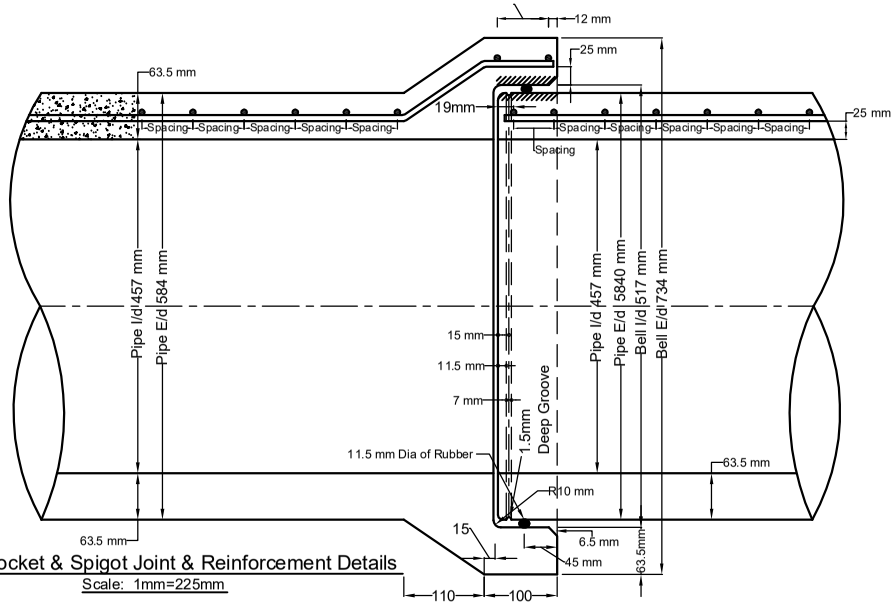
WALL THICKNESS OF PIPE	
Inches	mm
2.5	64



RCC PIPE LONGITUDINAL VIEW
Scale: 1mm=300mm



CIRCULAR VIEW OF PIPE
Scale: 1mm=300mm



Specific Socket & Spigot Joint & Reinforcement Details
Scale: 1mm=225mm

NOTE:

1. TOLERANCE
   (a) Other than these faces marked //// all tolerances are ASTM C 76
   (b) Faces marked //// ± 1 mm on diameter
2. 457 mm (18") I/d Pipe will not be allowed to be laid beyond depth as identified in WASA design criteria hand book.
3. 457 mm (18") Internal Dia RCC Pipe, Class II, III & IV, ASTM C 76-88

TITLE:

Standard Drawing of RCC Sewer Pipe, Joint & Reinforcement Detail (18"Ø)

REINFORCEMENT FOR BARREL

Class	Dia of Bars		No.of Rings	Dia of Rings		Spacing of Rings	
	Inches	mm		Inches	mm	Inches	mm
II	**3/16**	**4.76**	**19**	**23.74**	**603**	**4.56**	**116**
III	**3/16**	**4.76**	**22**	**23.74**	**603**	**4.25**	**108**
IV	3/8	9.52	13	23.74	603	6.69	170
	1/4	**6.35**	**31**	**23.74**	**603**	**2.80**	**71.23**

REINFORCEMENT FOR BELL

Class	Dia of Bars		No.of Rings	Dia of Rings		Spacing of Rings	
	Inches	mm		Inches	mm	Inches	mm
II	**3/16**	**4.76**	**2**	**30.15**	**766**	**2.75**	**70**
III	**3/16**	**4.76**	**2**	**30.15**	**766**	**2.75**	**70**
IV	3/8	9.52	2	30.15	766	2.75	70
	1/4	**6.35**	**2**	**30.15**	**766**	**2.75**	**70**

CONCRETE STRENGTH 4000 psi – 281 Kg / cm²

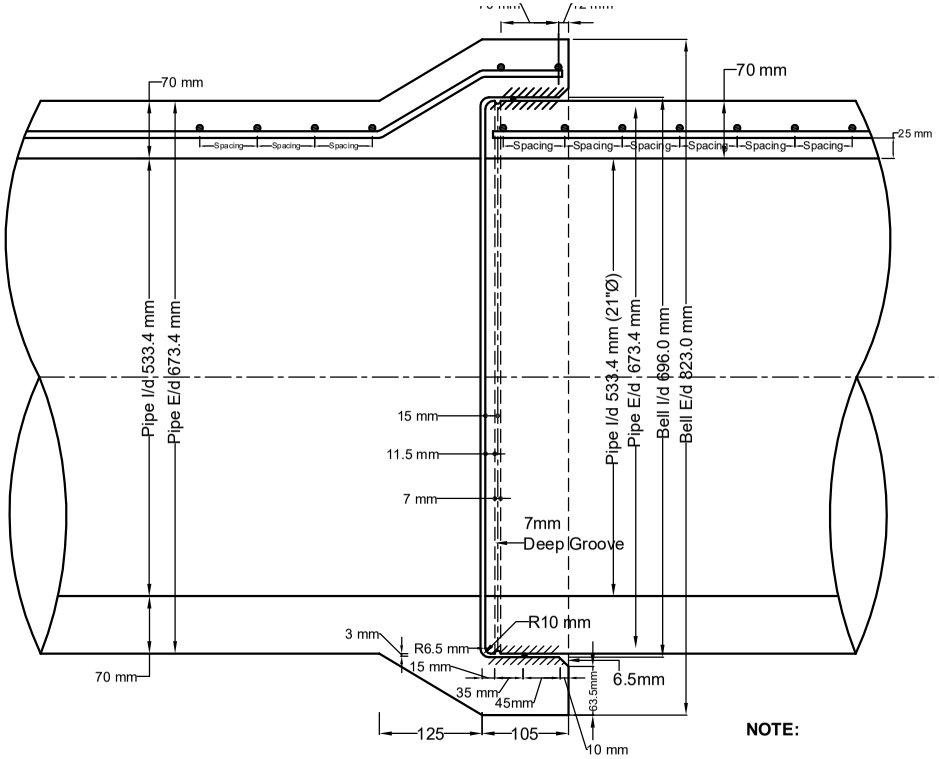
Strength Requirement / Ft Length					
Type of Pipe	Wall	Proof Load		Ultimate Load	
		Lbs	Tonne	Lbs	Tonne
Class II	B	1750	0.79	2625	1.19
Class III	B	2363	1.07	3500	1.51
Class IV	B	3500	1.58	5250	2.36

Longitudinal Reinforcement Class II-IV		
Dia of Bars		No. of Bars
Inches	mm	
3/16	4.76	4
Bars to be Equally Spaced Around 360°		

RUBBER RING

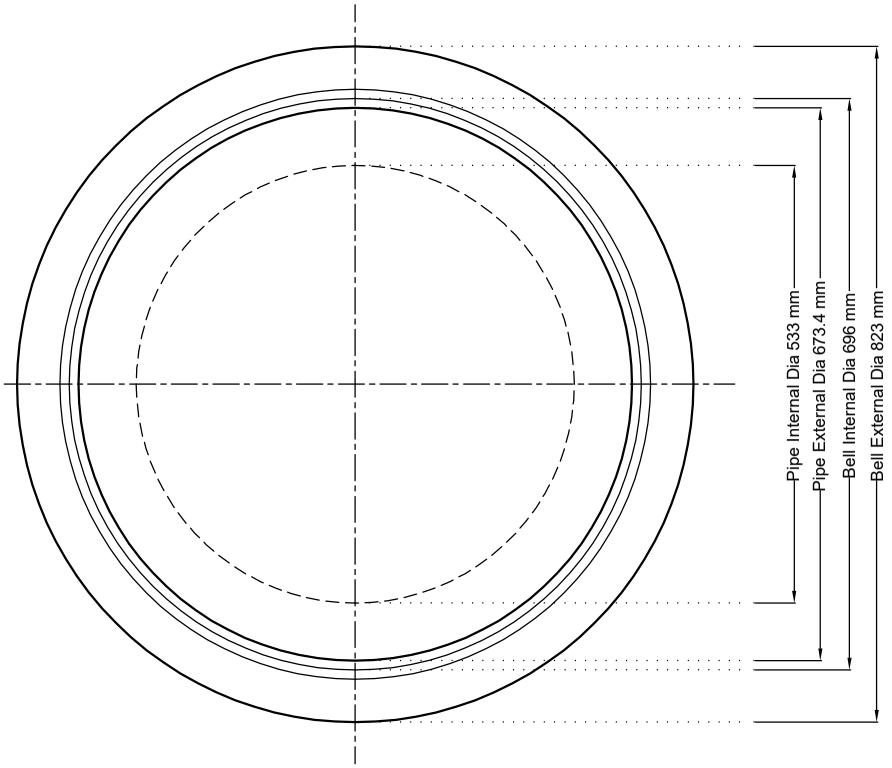
Size (Thickness)		Internal Dia	
Inches	mm	Inches	mm
9/16	14.3	25.07	637

WALL THICKNESS OF PIPE	
Inches	mm
2.75	70



Specific Socket & Spigot Joint & Reinforcement Details

Scale: 1mm=200mm



CIRCULAR VIEW OF PIPE

Scale: 1mm=200mm

NOTE:

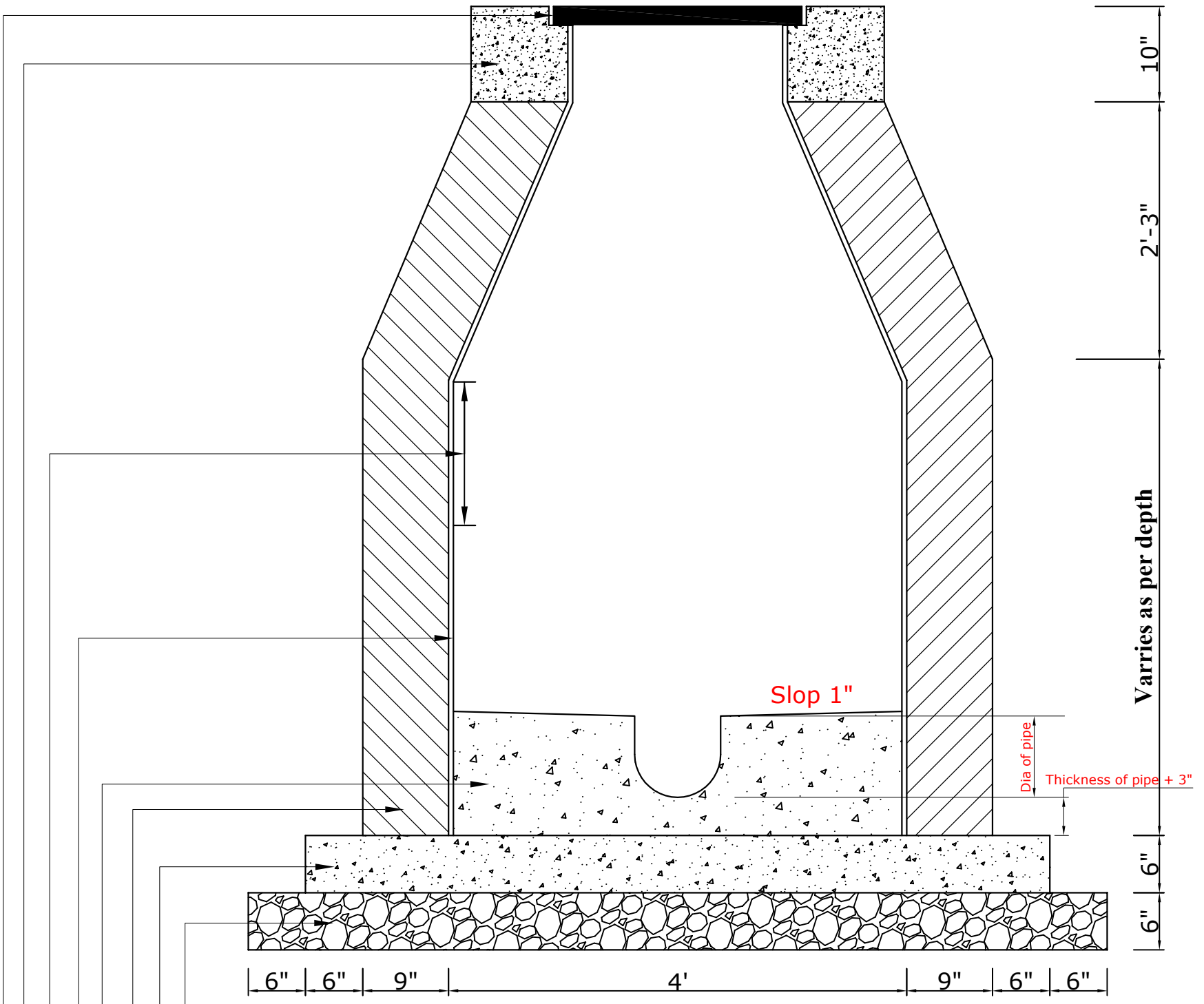
1. TOLERANCE
   (a) Other than these faces marked //// all tolerances are ASTM C 76
   (b) Faces marked //// ± 1 mm on diameter
2. 534mm (21") I/d Pipe will not be allowed to be laid beyond depth as identified in WASA design criteria hand book.
3. 534mm (21") Internal Dia RCC Pipe, Class II, III & IV, ASTM C 76-88

TITLE:

Standard Drawing of RCC Sewer Pipe, Joint & Reinforcement Detail (21"Ø)

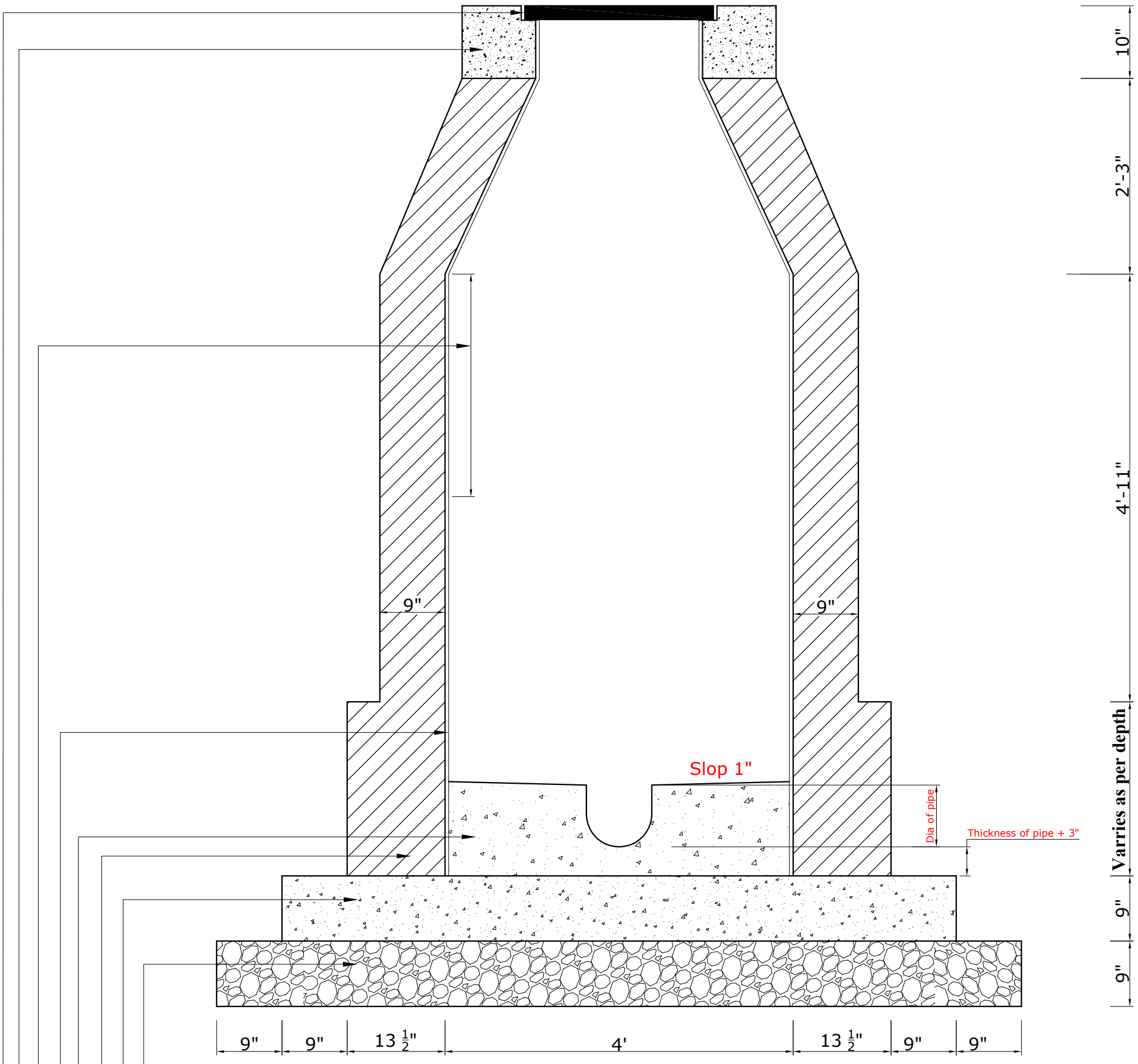
Typical X-Section of Manhole for up to Depth 8Ft.

(FOR 9" TO 15" DIA)



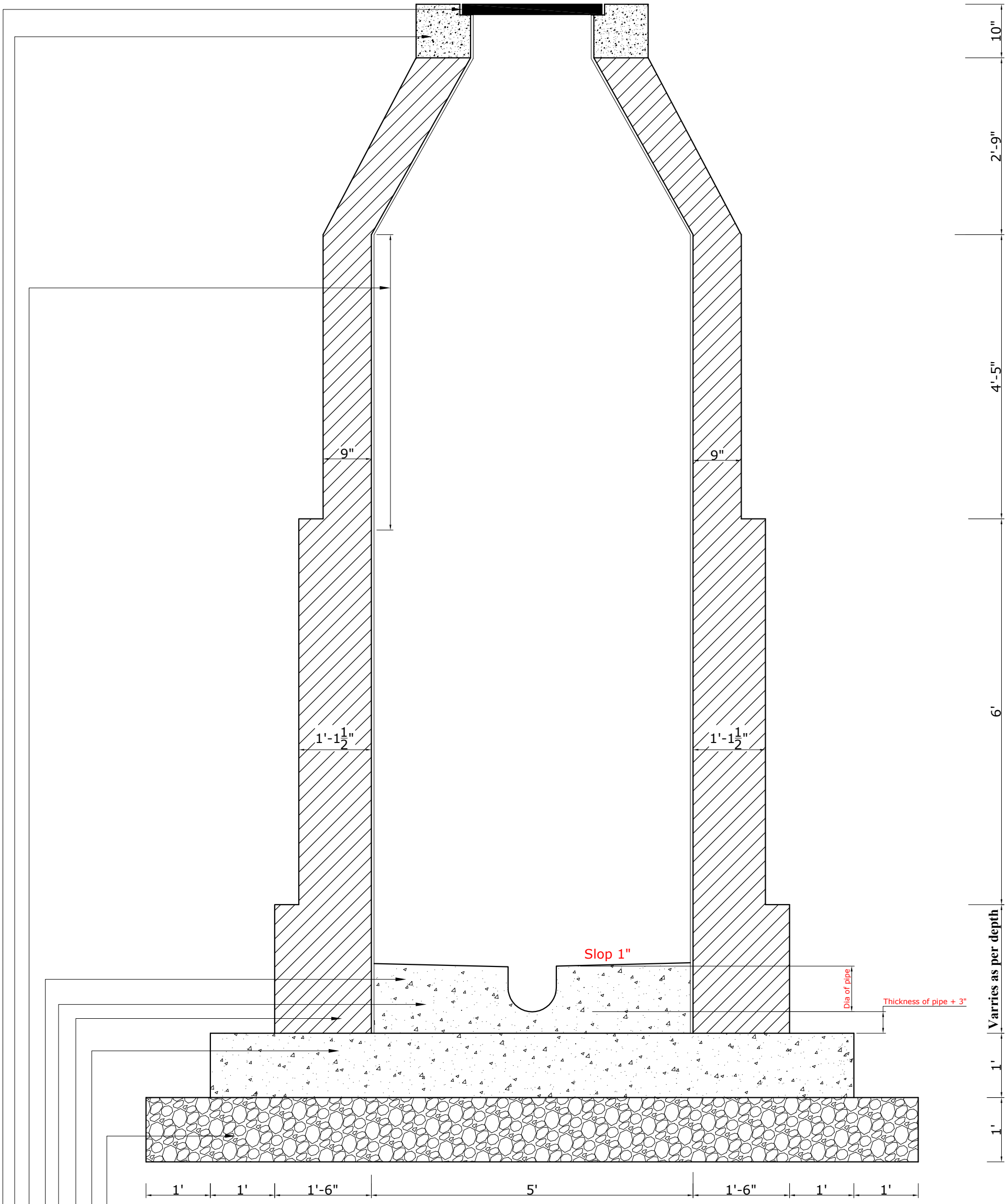
Typical X-Section of Manhole for Up to 14Ft Depth.

(FOR 9" TO 15" DIA)



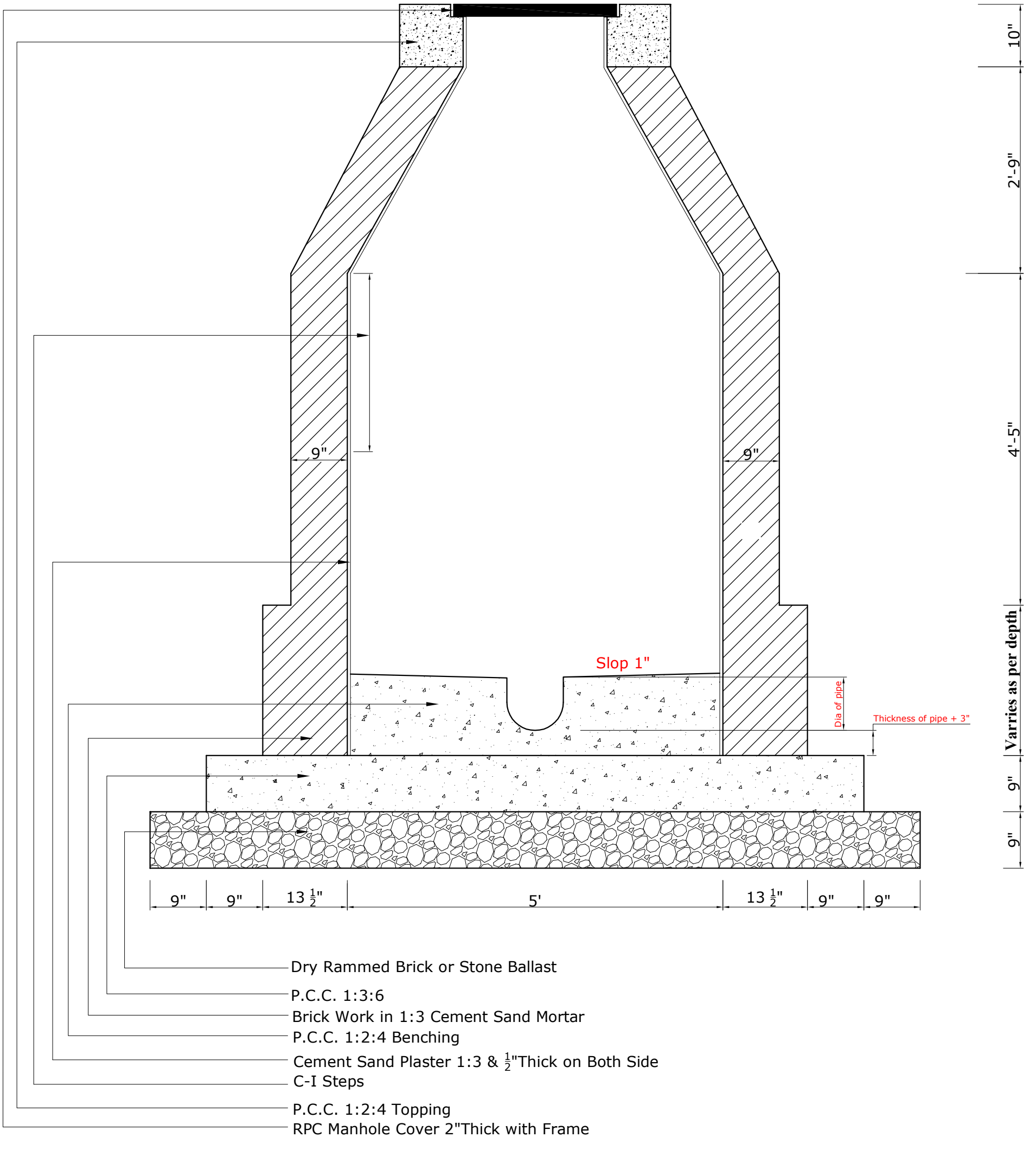
Typical X-Section of Manhole for Up to 20Ft Depth.

(FOR 18" TO 27" DIA)



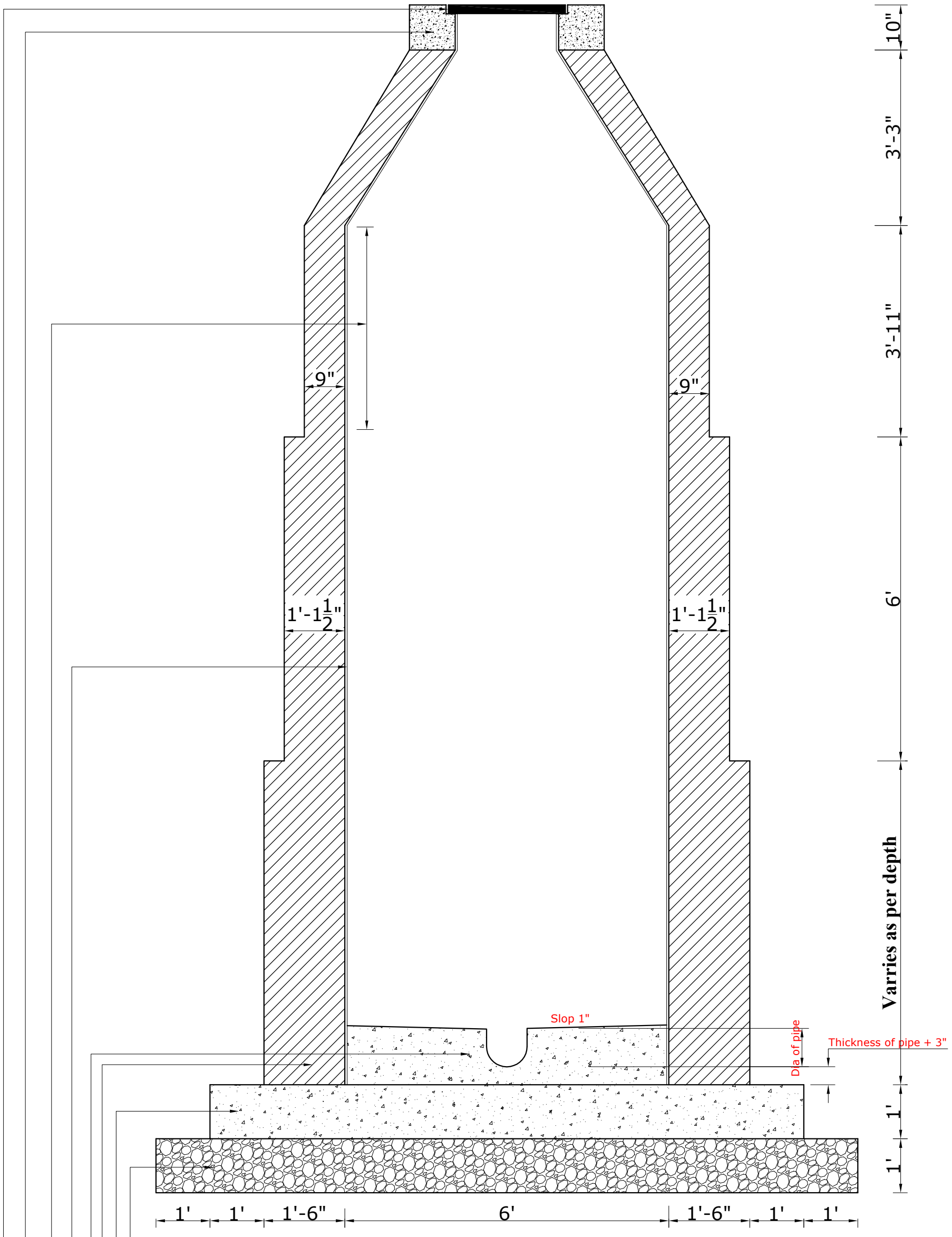
Typical X-Section of Manhole for Up to 14Ft Depth.

(FOR 18" TO 27" DIA)



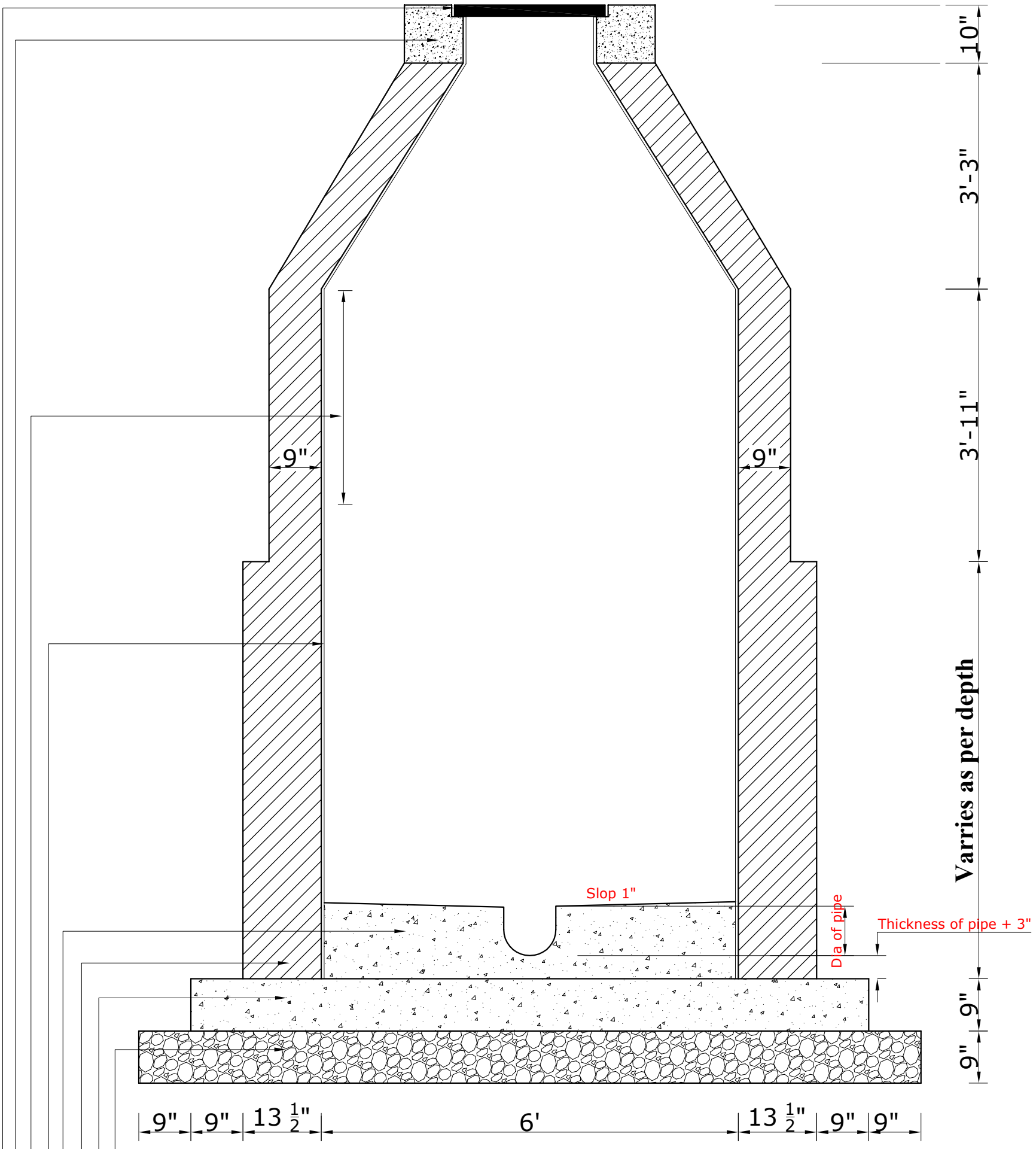
Typical X-Section of Manhole for Up to 20Ft Depth.

(FOR 30" TO 42" DIA)



Typical X-Section of Manhole for Up to 14Ft Depth.

(FOR 30" TO 42" DIA)



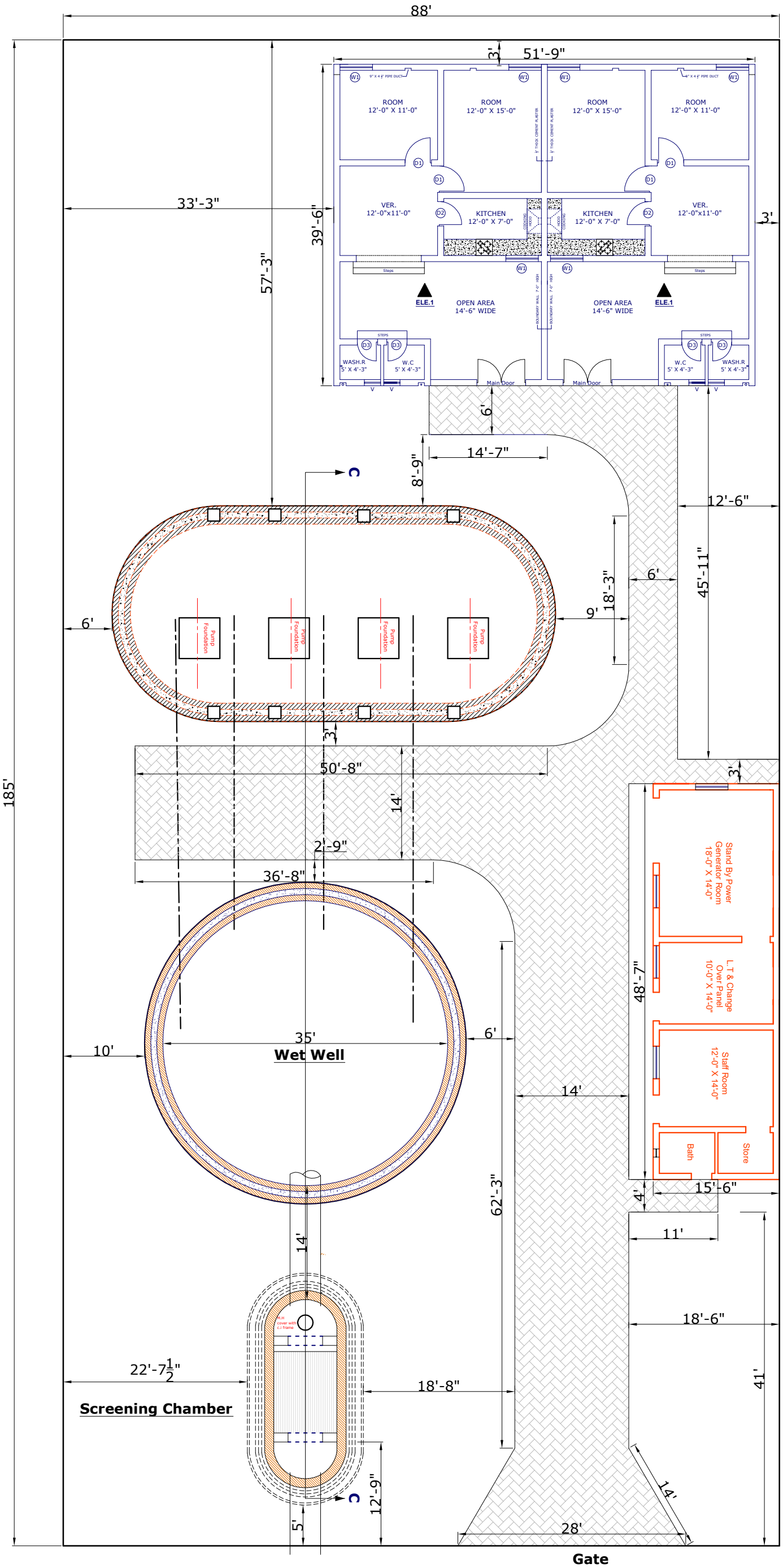
DESIGN OF SEWAGE PUMPING STATION KAMALIA

A	**FLOW**				
i	Population		85 P/Acre	75225	Person
ii	Av. Dry weather flow @ 40 GPCD	40		4.46	Cusec
iii	Peak factor			2.5	
iv	Peak flow			11.16	Cusec
v	Storm water allowance @50% of peak flow			5.58	Cusec
vi	Total			16.74	Cusec
vii	Say			17	Cusec
B	**SCREENING CHAMBER**				
i	Two time of flow area	$2*3.14*(d)^2/4$		19.23	ft^2
ii	Depth of water contact to screen			3.00	ft
iii	Clear width of screen			6.41	ft
iv	spacing of screen			2.00	Inch C/C
v	No. of opening			38.47	
	Say			38.00	
vi	Thickness of stirupps			0.38	inch
				14.25	inches
vii	Area covered by stirupps			1.19	ft
viii	Total			7.60	ft
ix	Say			8.00	ft
x	Depth of screen NSL to Bed level			16.85	ft
xi	Up to Top level				ft
C	**WET WELL**				
i	Peak flow			17.00	Cusec
ii	Proposed retention period			7	Minutes
iii	Miximum flow ft^3 per minuts			1020	
iv	Proposed capacity of Tank required for retention			7140	ft^3
v	Working depth			8.5	ft
vi	Surface area of Tank			840.00	ft^2
vii	No. of tank proposed			2	
viii	Dia of Tank	$d=\sqrt{A*4/3.14}$		27.61	ft
ix	Say			28	ft
x	Depth of Tank				
	NSL			507.14	ft
	Bed Level	491.61	8.5	483.11	
	Depth from NSL			24.03	ft
	Depth up to top level	509	511	27.89	ft
D	**FORCE MAIN**				
i	Discharge			17.00	Cusec
i	Proposed dia of line			630	mm
ii	Type of Material			HDPE	
	Classification of Pipe			PN-8	
iii	proposed veloscity			2.75	ft/sec
iv	Classification of Pipe				
v	Head Losses per ft run	$V=1.318*n*r^{0.63}*s^{0.54}$			
	V	6.41			

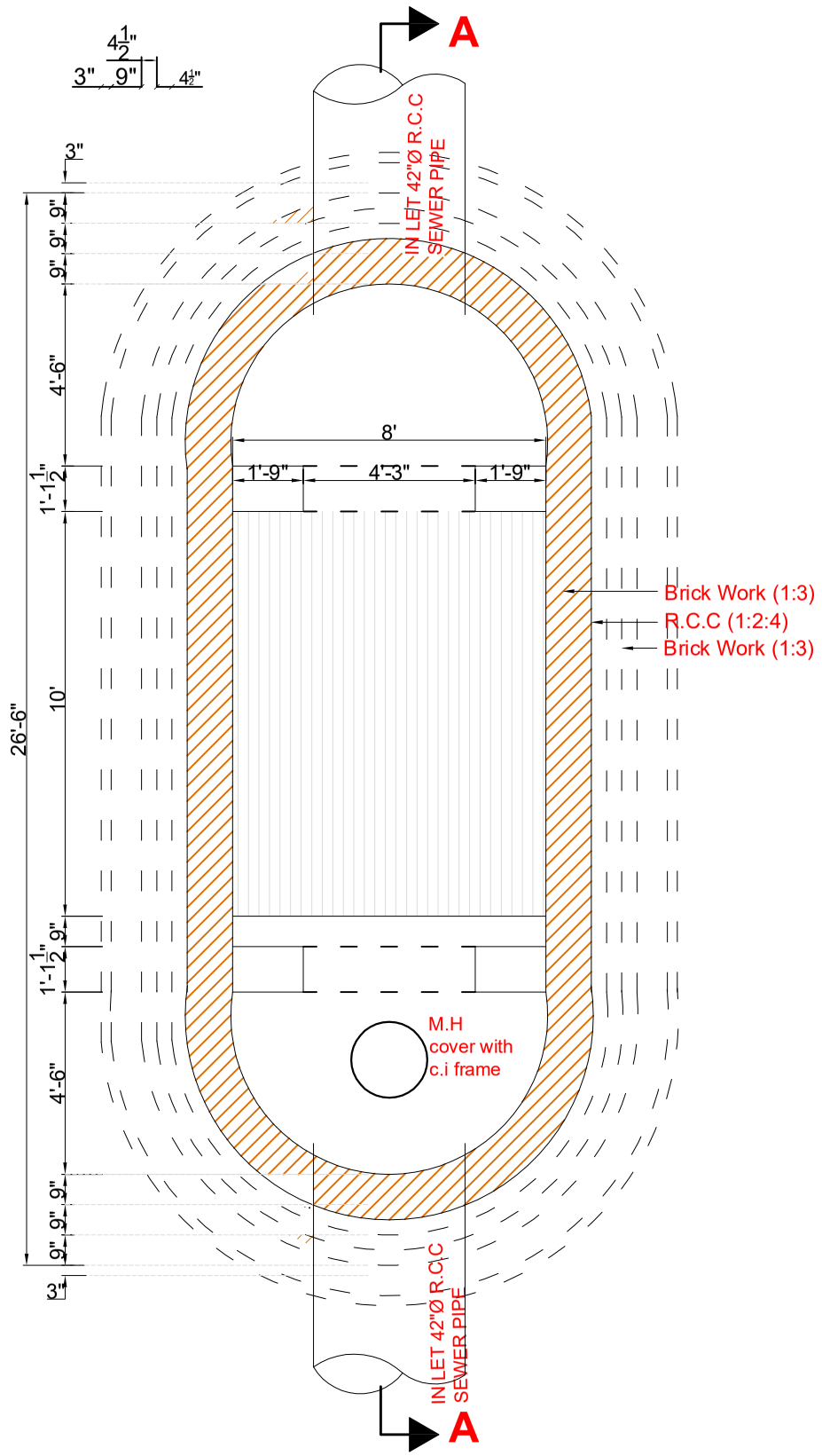
	n=	150	
	$r.^{63}$	0.646	
	$s^{0.54}$	0.505191841	
	s	0.0039	
vi	Length of force main	10485	Rft
vii	Head Losses	40.8915	ft
viii	Head losses specials, fixtures & others	2	
ix	Level difference	-2	ft
x	Total	40.89	ft
	Say	41.00	ft
E	**PUMPING MACHINERY**		
i	Proposed size of pump	8	Cusec
ii	Ultimate discharge	17	Cusec
iii	No. of Pump	3	
F	**HEAD OF MACHIERY**		
I	Suction lift	16	ft
ii	Depth from NSL to suction of pump	16	ft
iii	Fixtures and special losses	2	ft
iv	Losses of force main	41	ft
v	Total Losses	59	ft
vi	Proposed Head pump	60	ft

Layout Plan of Disposal Works Kamalia City

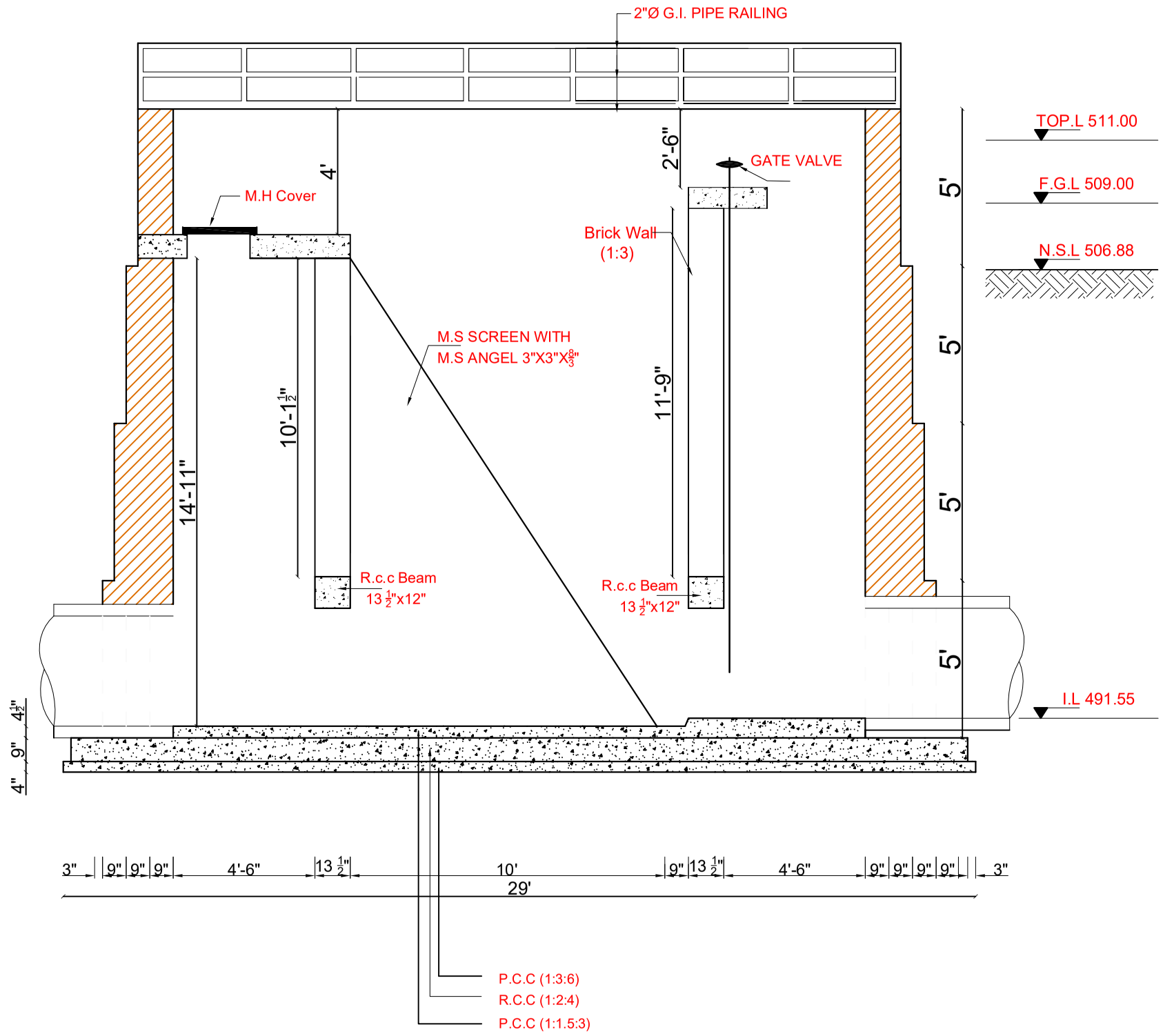
Sub Soil Water Level =43.75ft



CONSTRUCTION OF SCREENING CHAMBER FOR Kamalia CITY

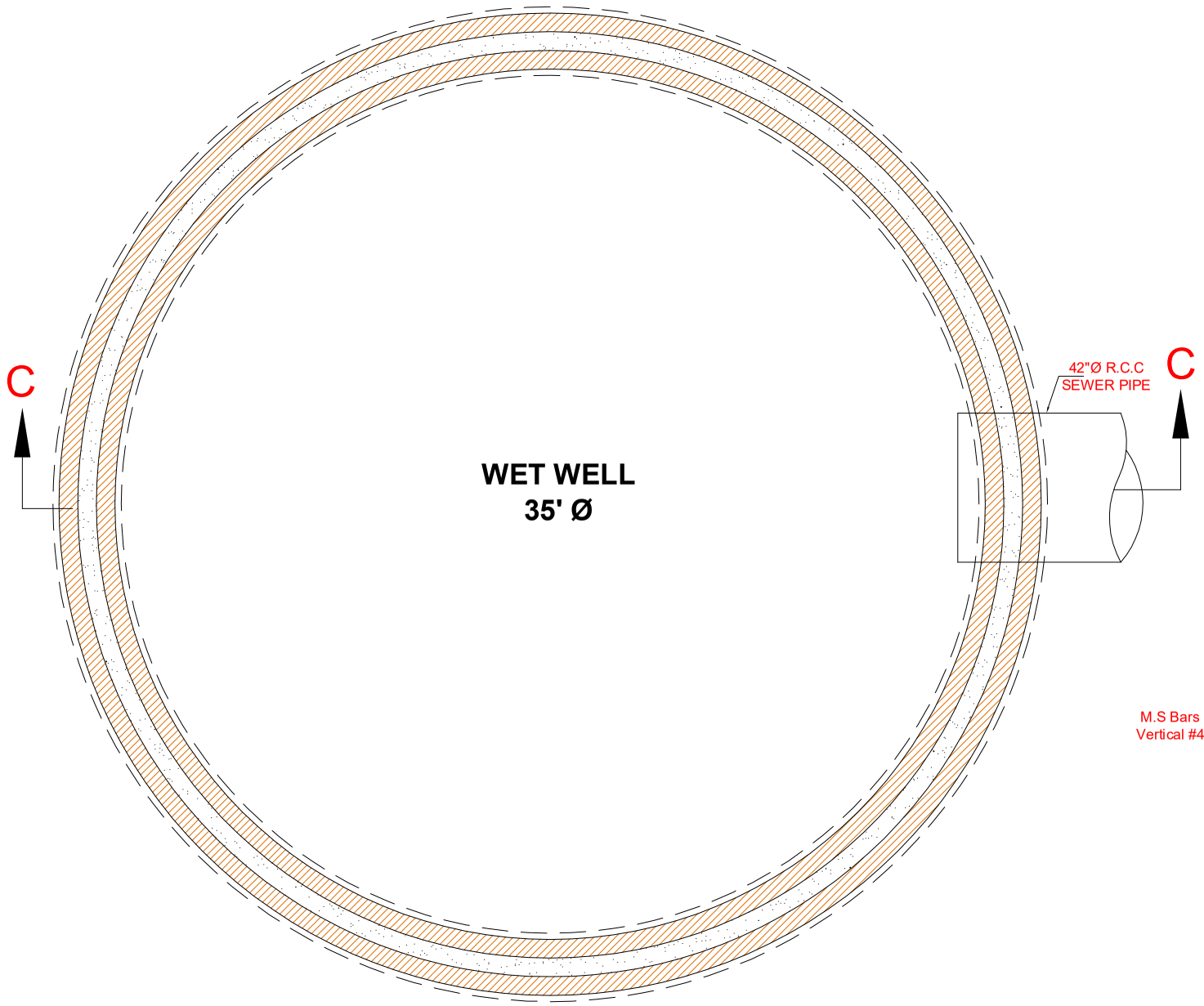


PLAN SCREENING CHAMBER

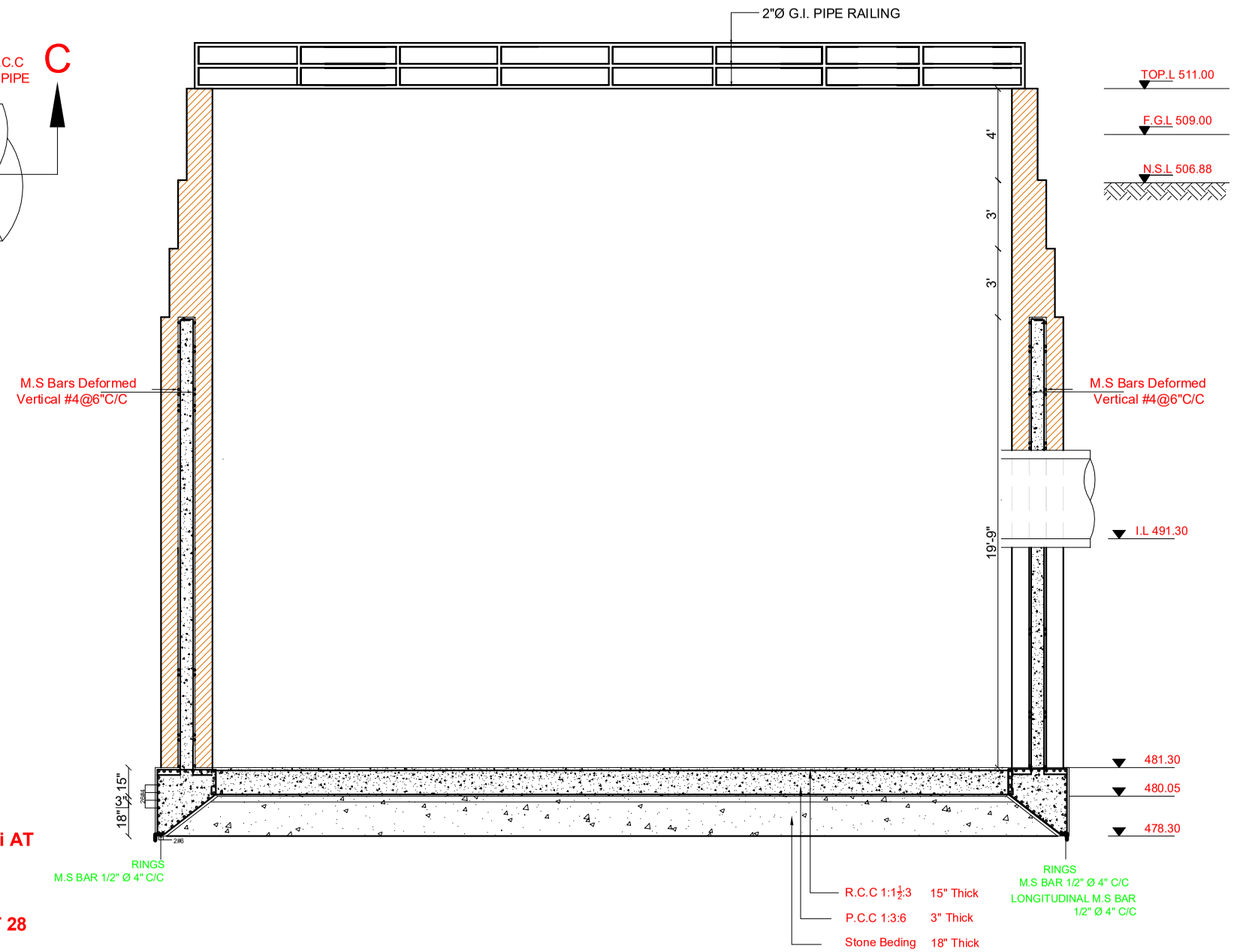


SECTION OF SCREENING CHAMBER A-A

PLAN AND SECTION OF WET WELL FOR Kamalia CITY



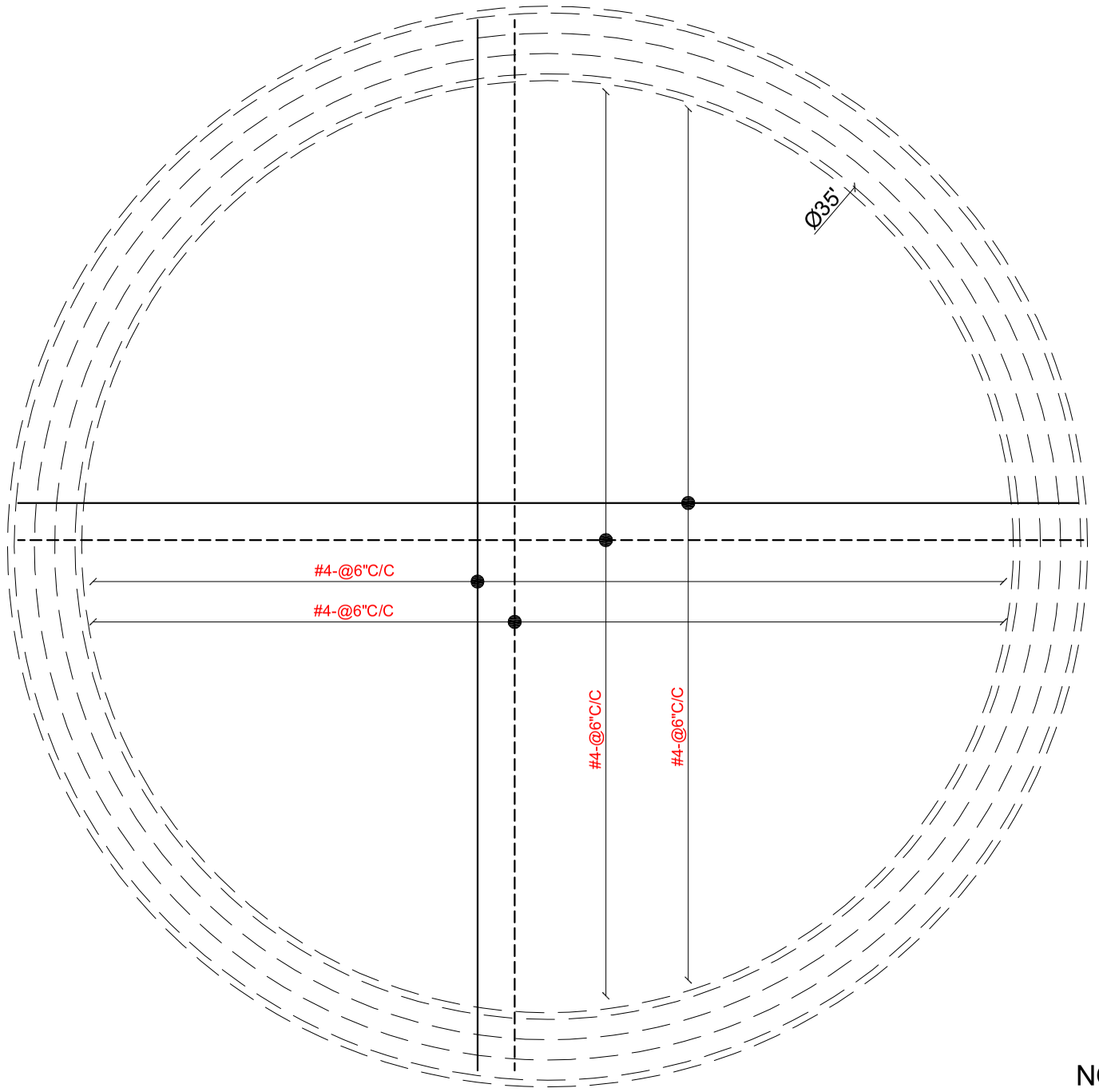
PLAN OF WET WELL



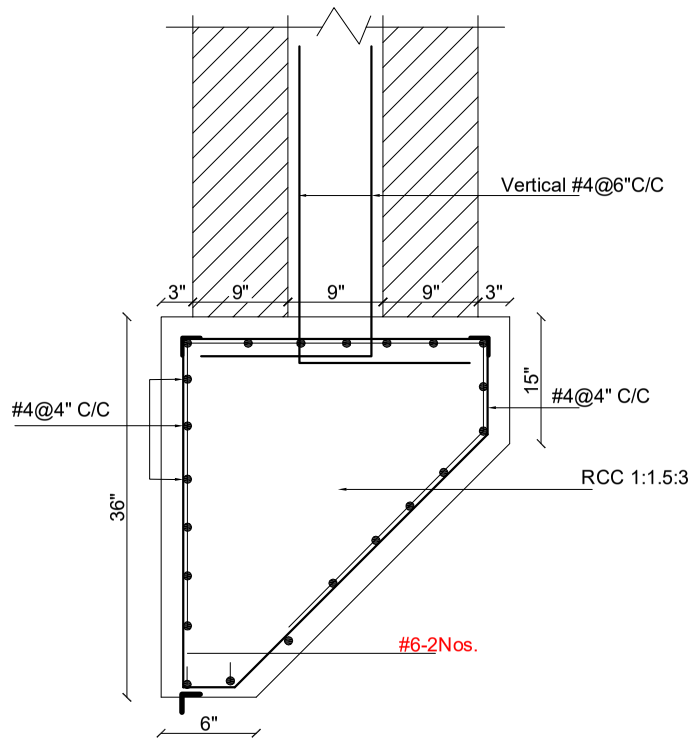
SECTION C-C

NOTE:-

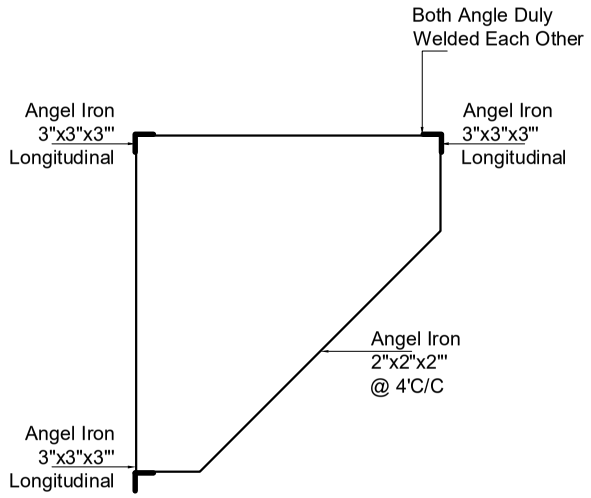
1. **ALL DIMENSION IN FEET AND INCHES.**
2. **THE MINIMUM COMPRESSIVE CYLINDER STRENGTH OF REINFORCED CONCRETE SHALL BE 3000 Psi AT 28 DAYS.**
3. **THE REINFORCINGSTEEL SHALL BE DEFORMED BARS CONFORMING TO ASTM DESIGNATION A615-GRADE 40**
4. **THE MINIMUM COMPRESSIVE CYLINDER STRENGTH OF BLINDING CONCRETE SHALL BE 2000 Psi AT 28 DAYS.**
5. **CLEAR COVER TO REINFORCEMENT SHALL BE**
   a, **EXTERNAL FACED 1 $\frac{1}{2}$" to 2"**
   INTERNAL FACED 1 $\frac{1}{2}$" to 2"
   b, **FOR SLABS AND STAIR ETC 1" to $\frac{3}{4}$"**
6. **THE CONTRACTOR MUST MAKE SURE THAT ALL ITEMS TO BE EMBEDDED IN CONCRETE ARE SECURE AT PROPER LOCATION BEFORE CONCRETING.**



Reinf : PLAN OF WET WELL



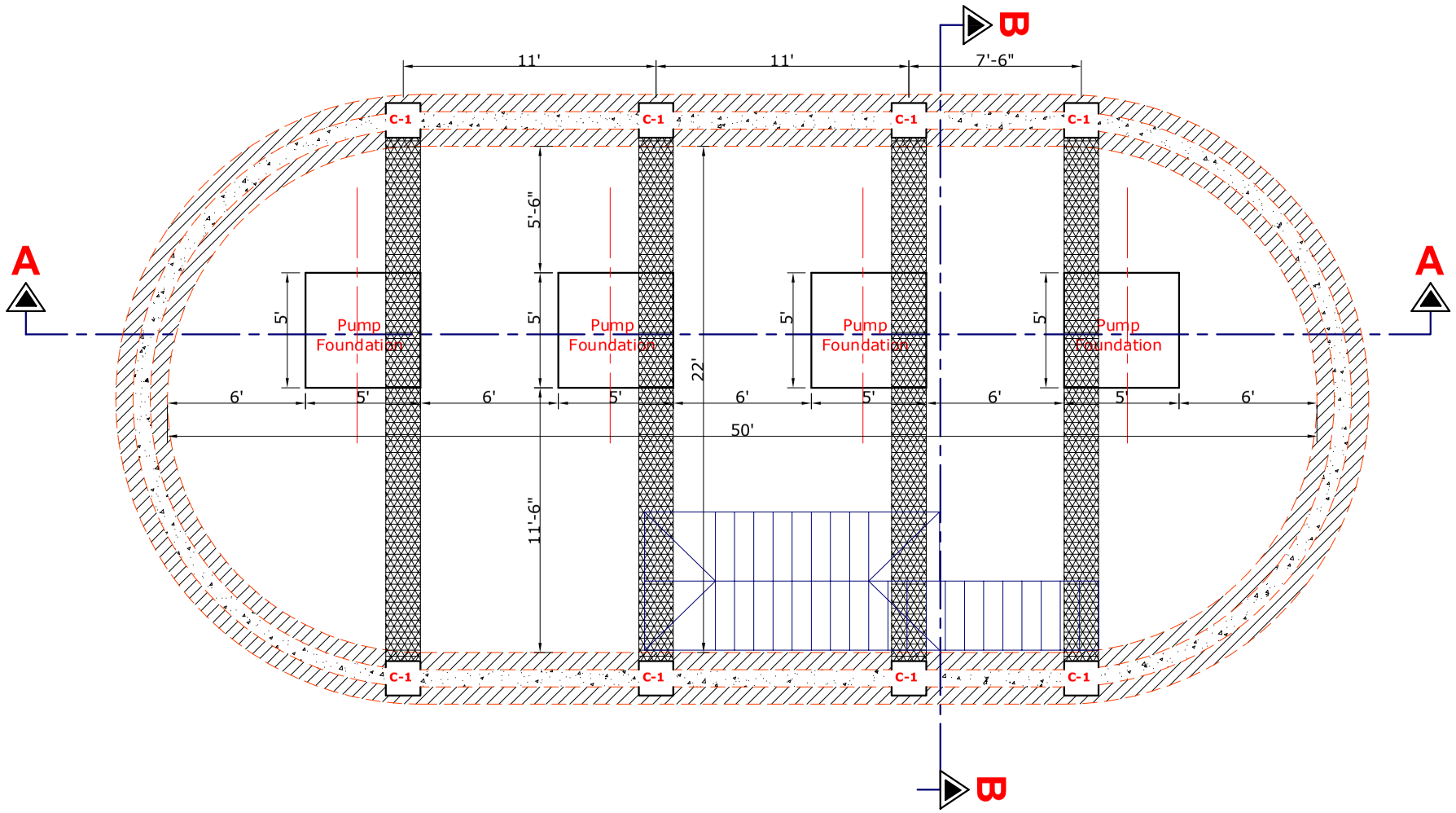
TYP: REINFORCMENT DETAIL OF CURVE BEAM

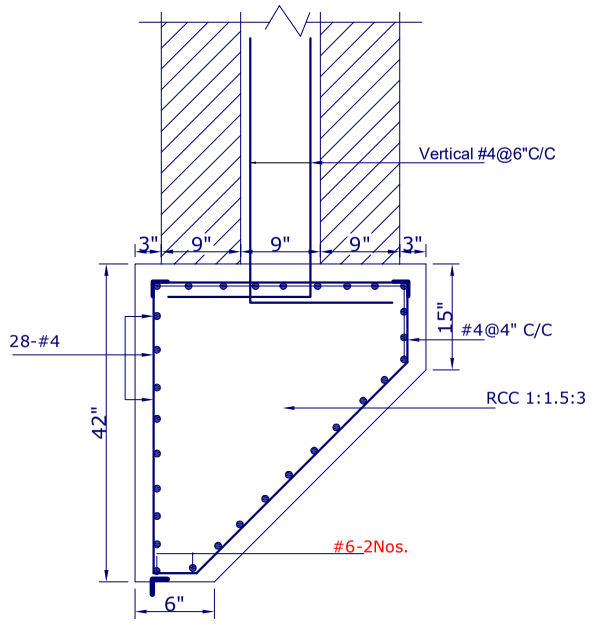


TYP: FABRICATION DETAIL OF ANGLE IRON OF CURVE BEAM

NOTE:-

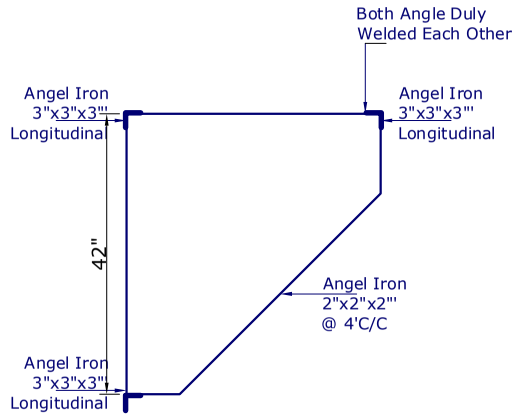
1. ALL DIMENSION IN FEET AND INCHES.
2. THE MINIMUM COMPRESSIVE CYLINDER STRENGTH OF REINFORCED CONCRETE SHALL BE 3000 Psi AT 28 DAYS.
3. THE REINFORCINGSTEEL SHALL BE DEFORMED BARS CONFORMING TO ASTM DESIGNATION A615-GRADE 40
4. THE MINIMUM COMPRESSIVE CYLINDER STRENGTH OF BLINDING CONCRETE SHALL BE 2000 Psi AT 28 DAYS.
5. CLEAR COVER TO REINFORCEMENT SHALL BE
   a, EXTERNAL FACED 1 $\frac{1}{2}$" to 2"
      INTERNAL FACED 1 $\frac{1}{2}$" to 2"
   b, FOR SLABS AND STAIR ETC 1" to $\frac{3}{4}$"
6. THE CONTRACTOR MUST MAKE SURE THAT ALL ITEMS TO BE EMBEDDED IN CONCRETE ARE SECURE AT PROPER LOCATION BEFORE CONCRETING.





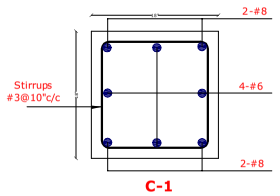
N.T.S

TYP: REINFORCMENT DETAIL OF CURVE BEAM



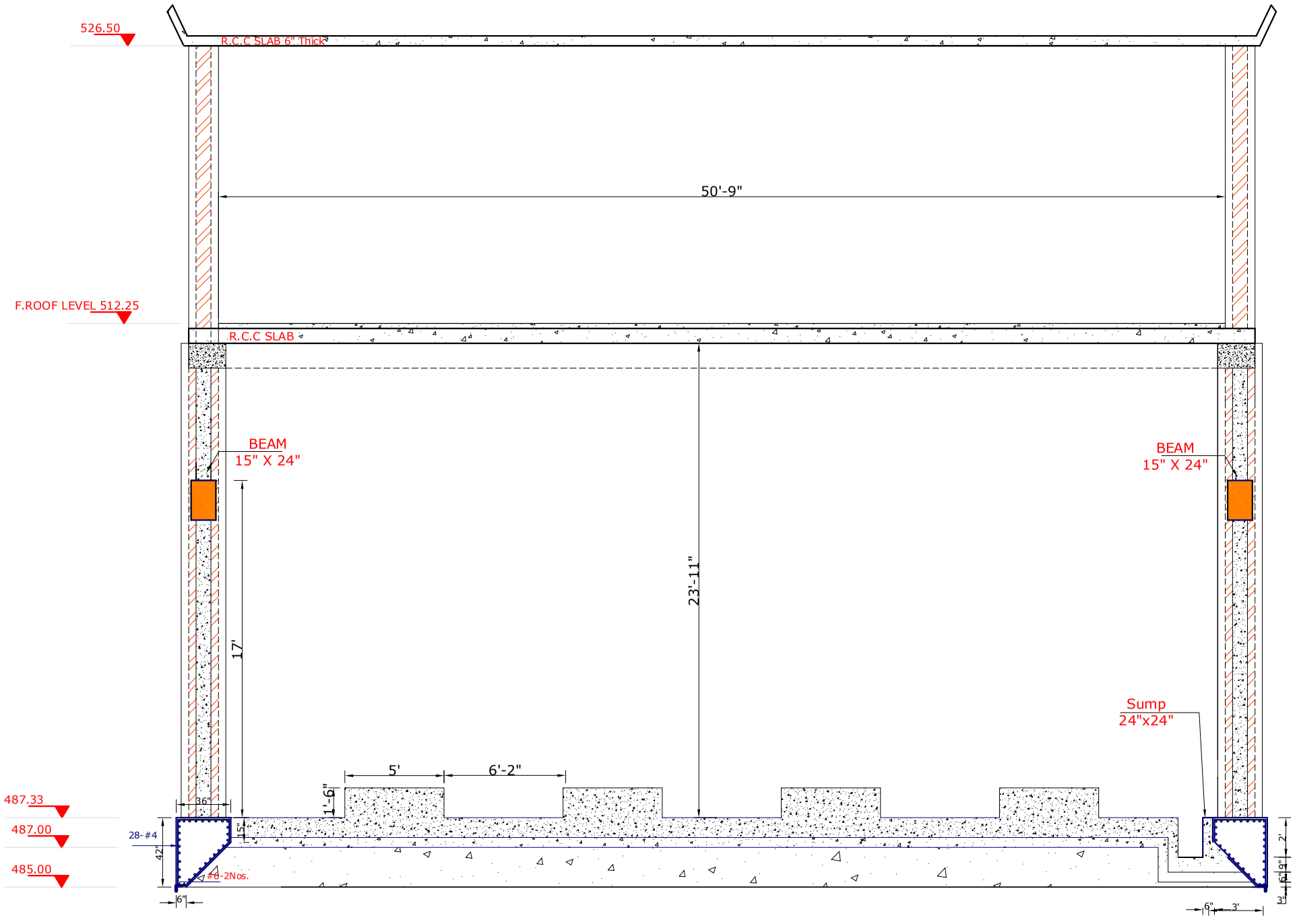
N.T.S

TYP: FABRICATION DETAIL OF ANGLE IRON OF CURVE BEAM

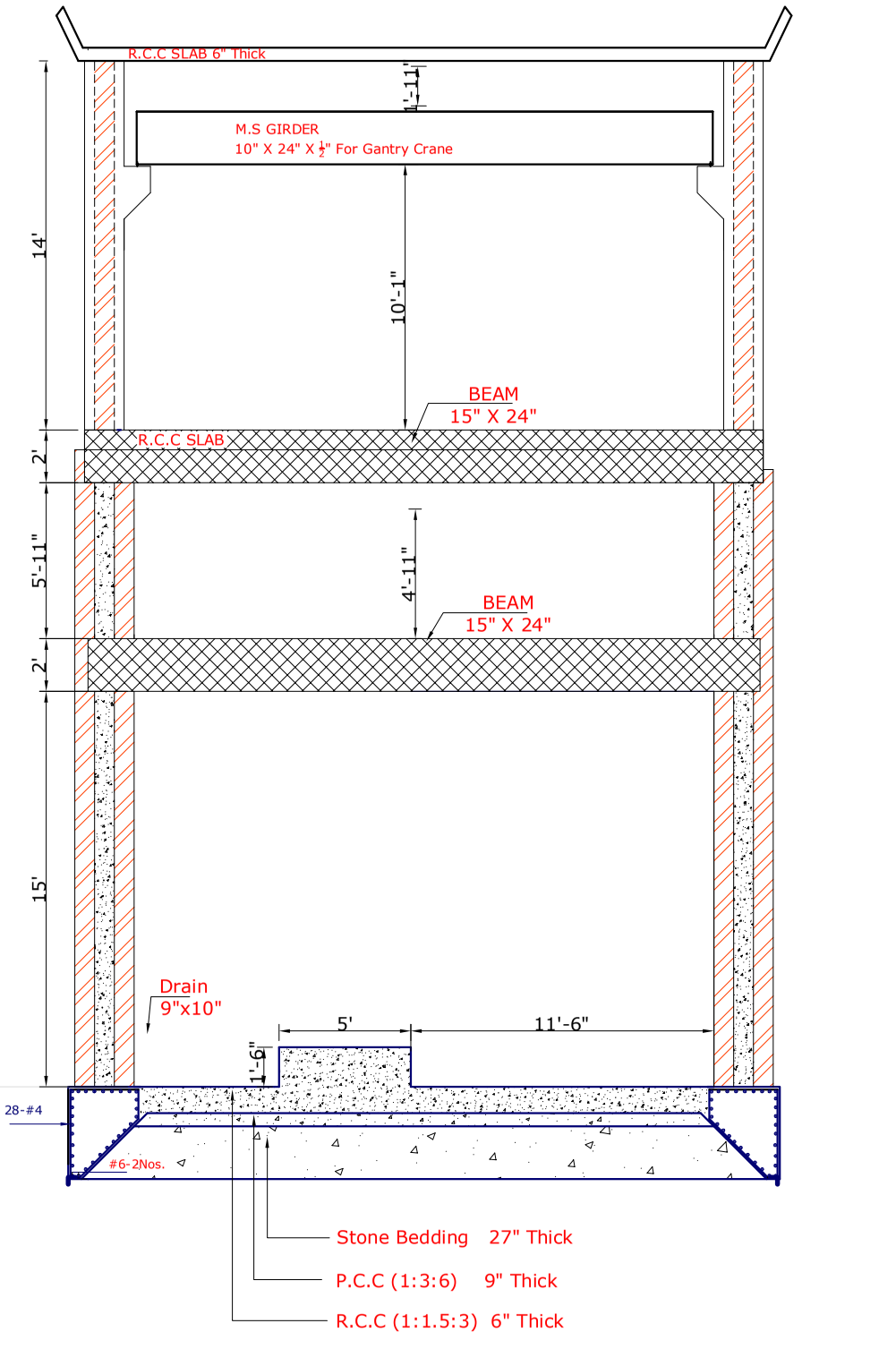


Column Reinf: Detail

PLAN OF PUMP HOUSE AT DISPOSAL WORKS KAMALIA CITY

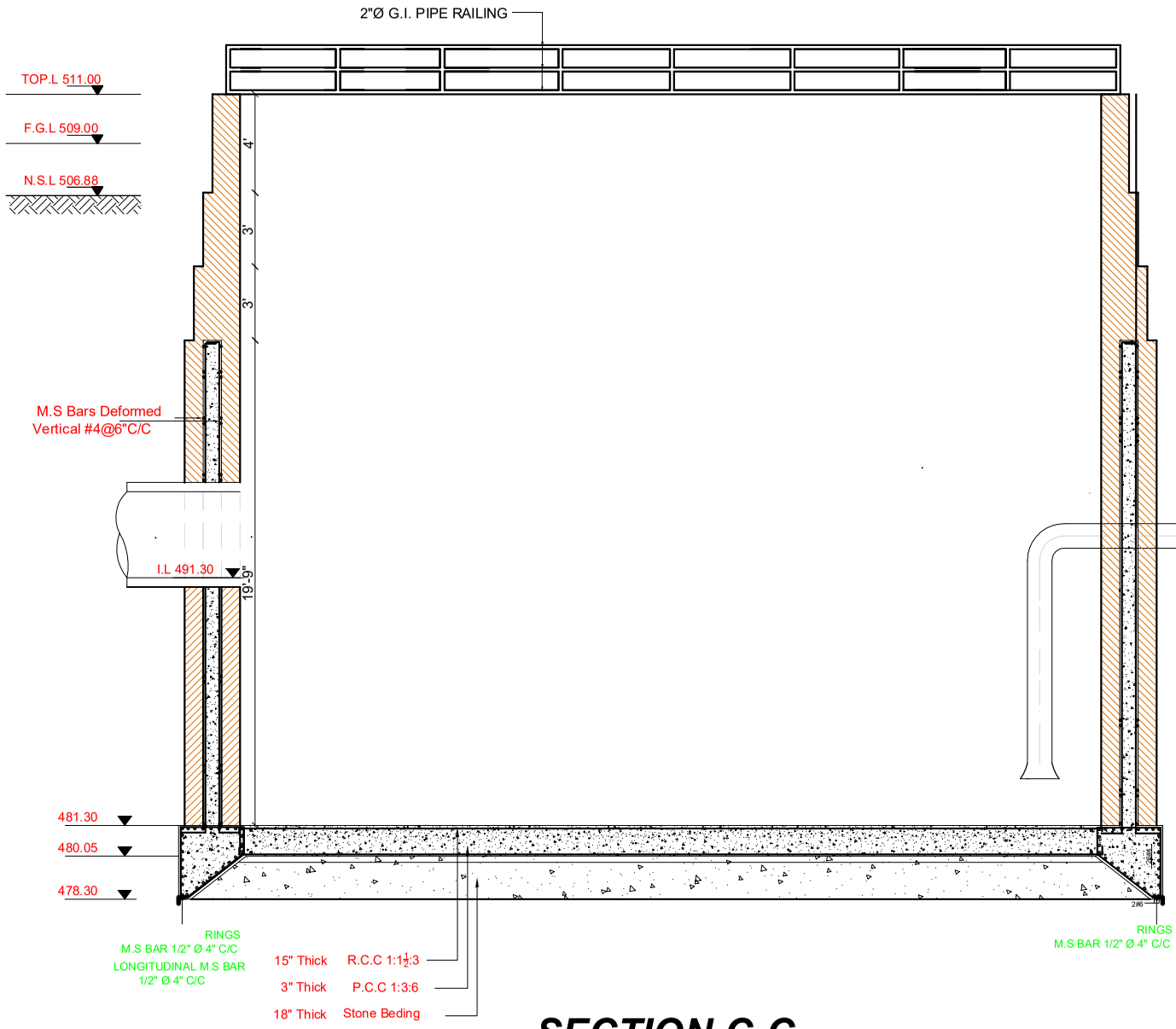


SECTION A-A PUMP HOUSE

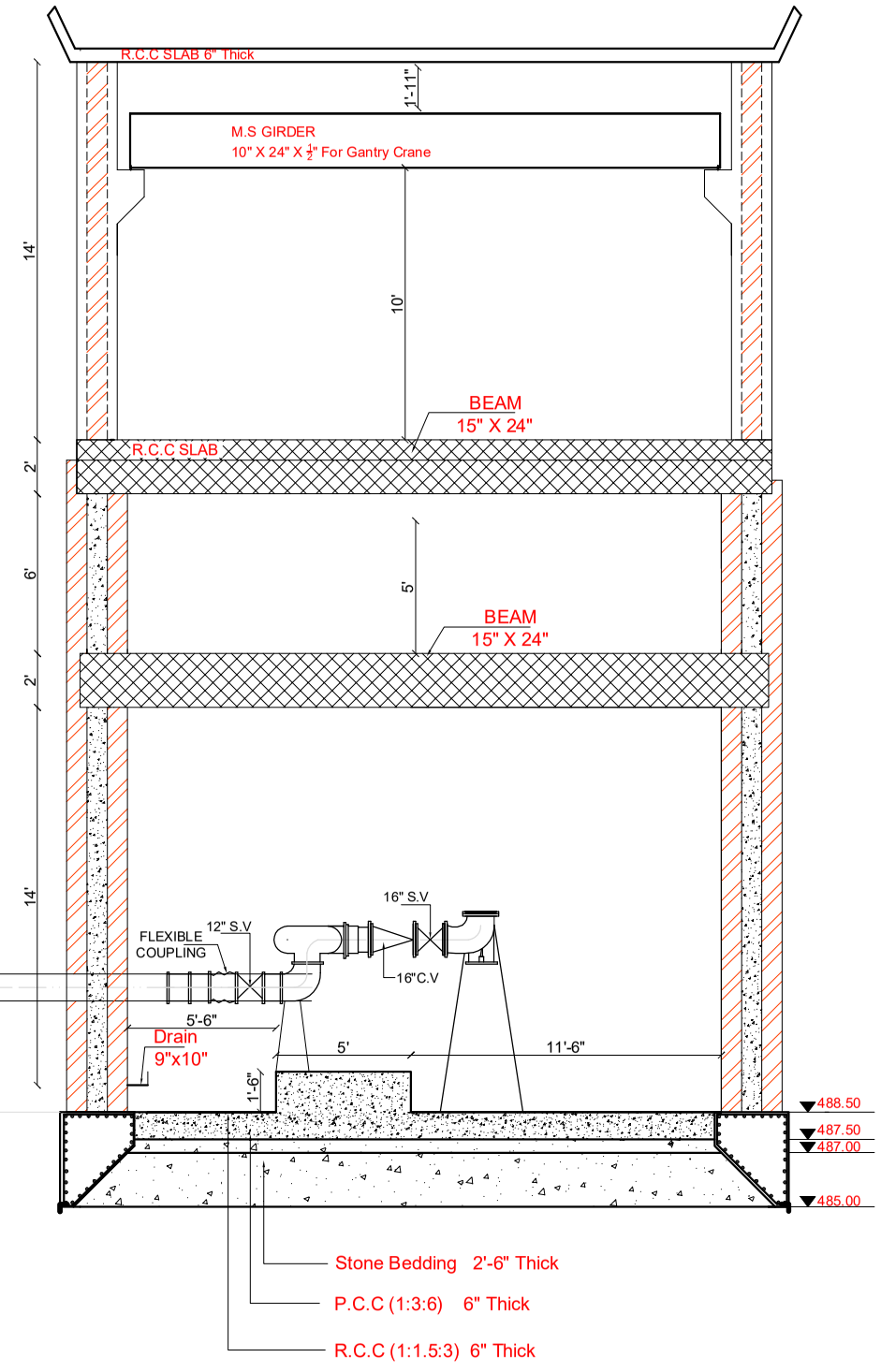


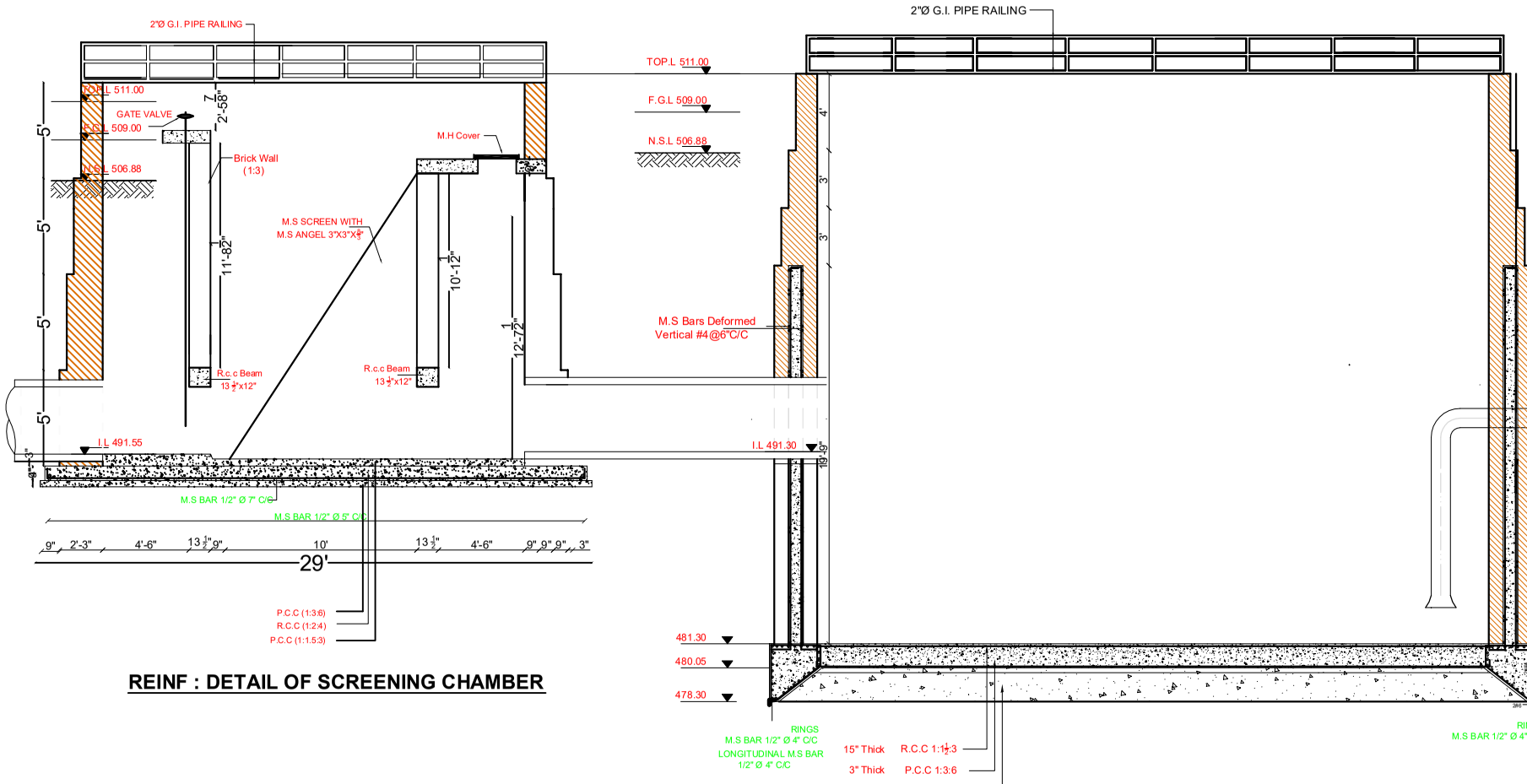
SECTION B-B PUMP HOUSE

ARRANGEMENT OF PUMPING MACHINERY DISPOSAL
FOR Kamalia CITY

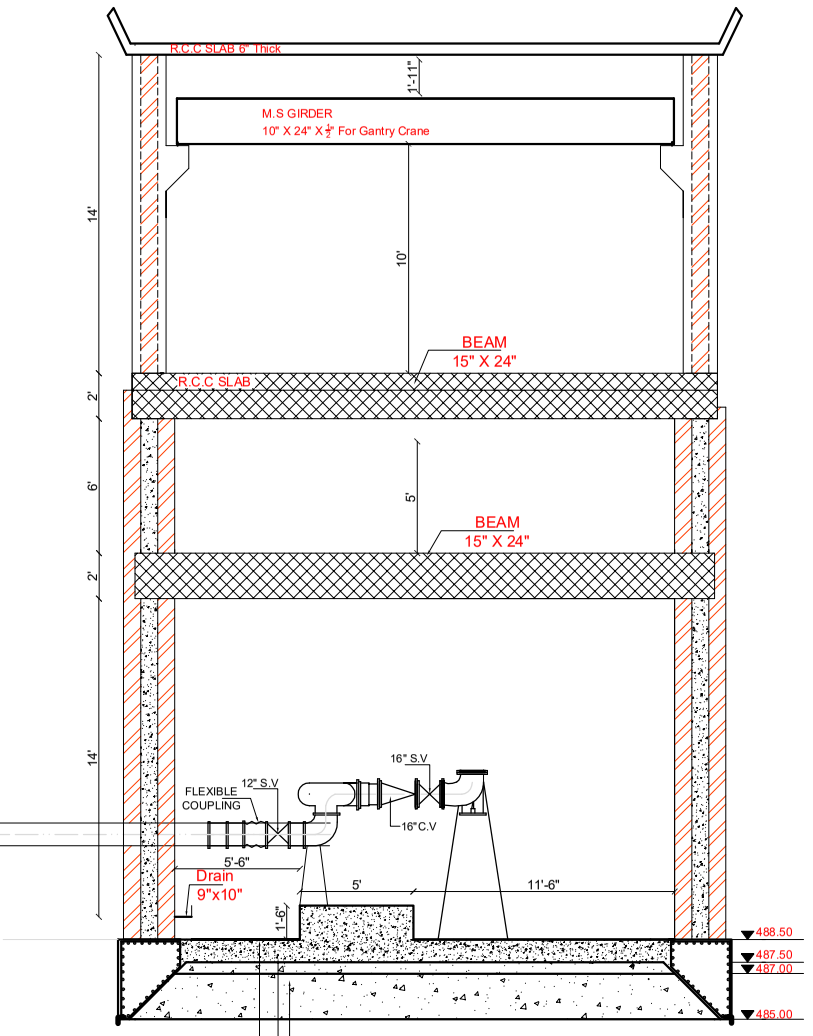


SECTION C-C

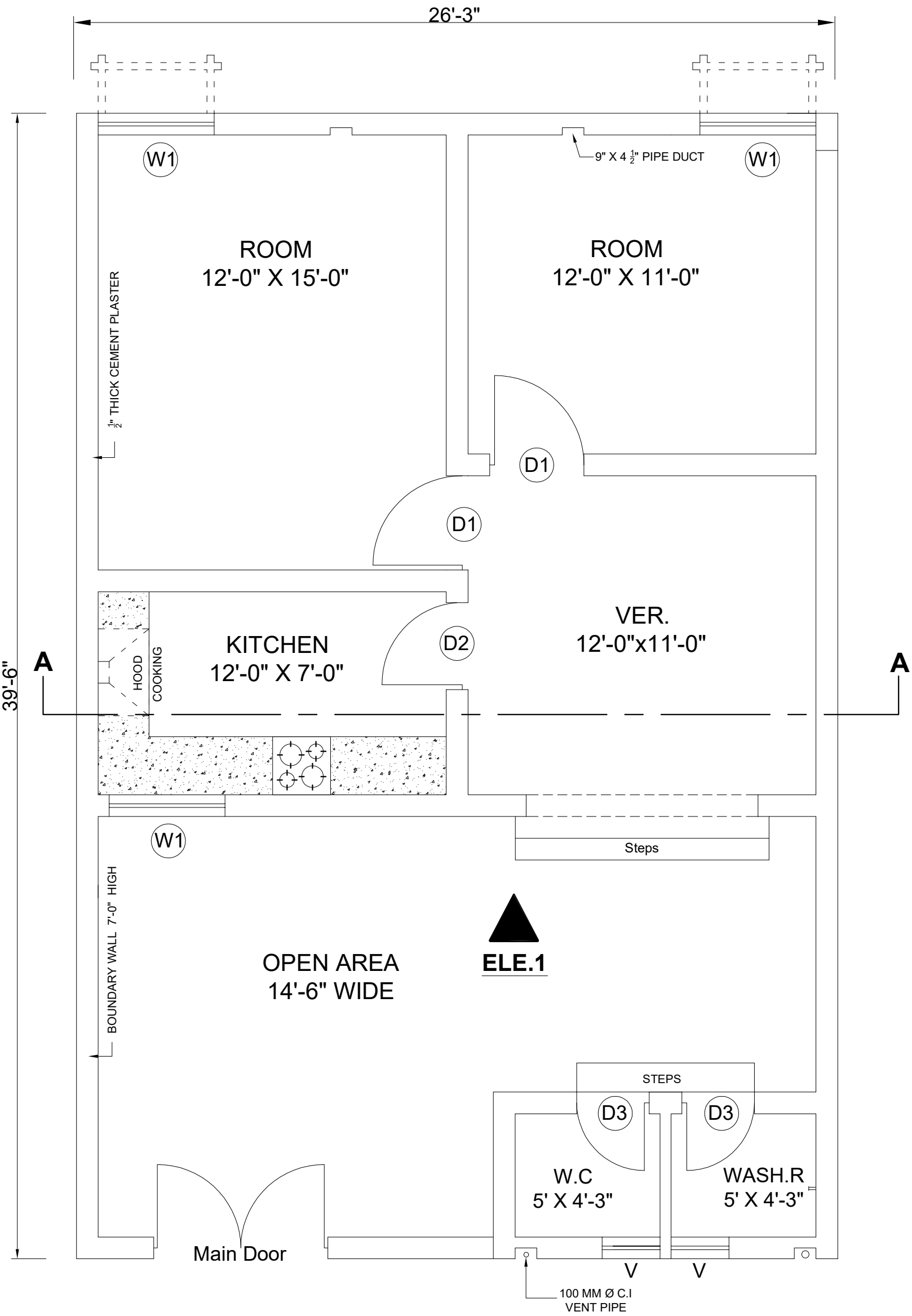




REINF : DETAIL OF SCREENING CHAMBER

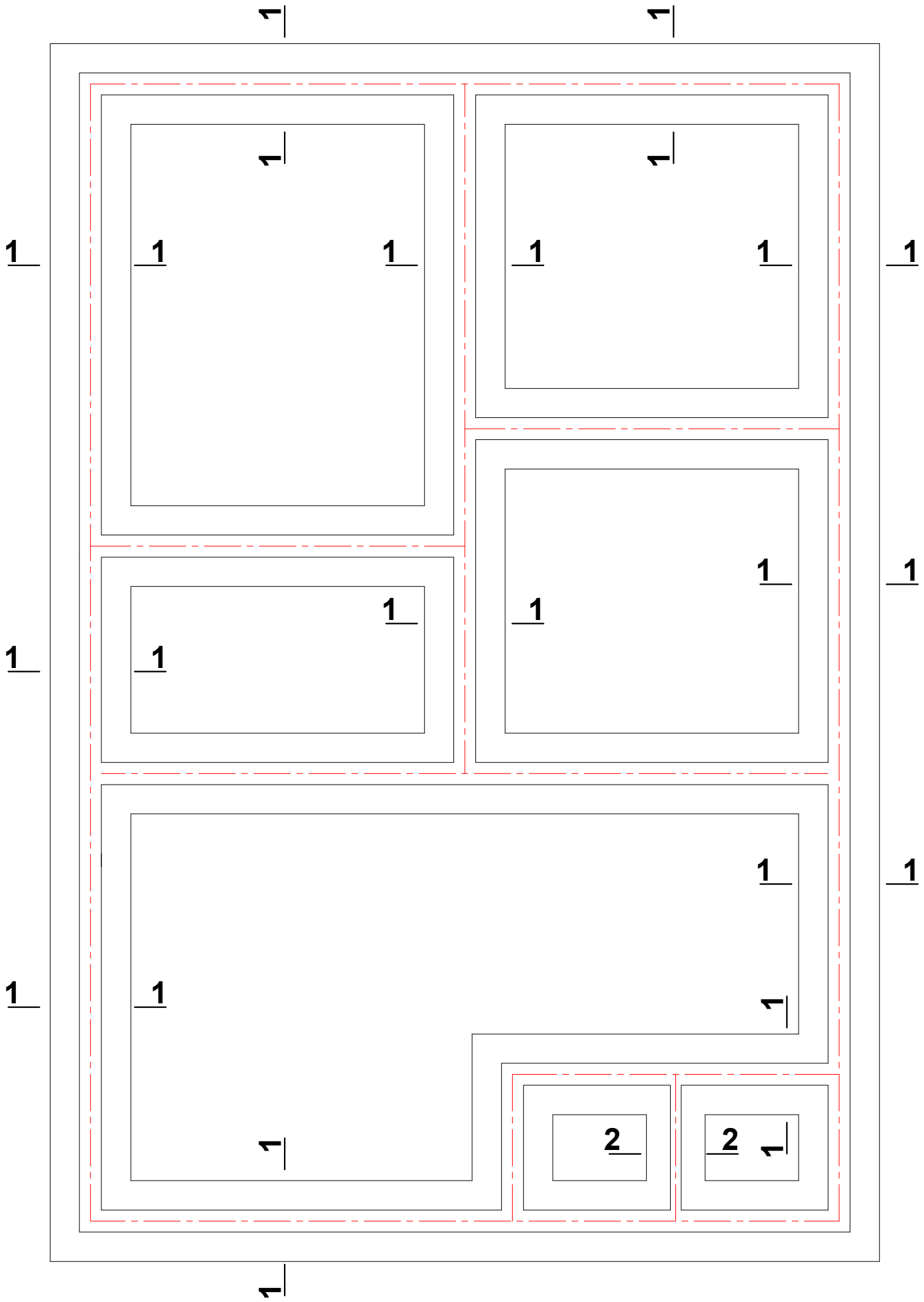


SECTION C-C

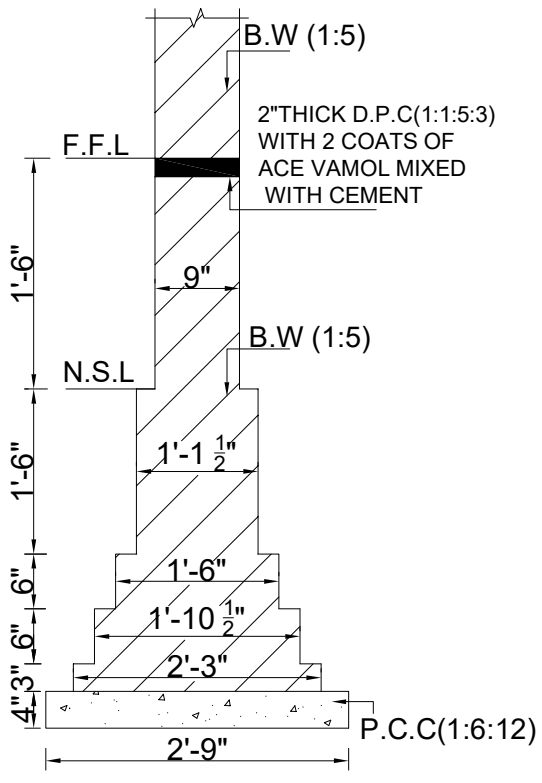


STAFF QUARTER

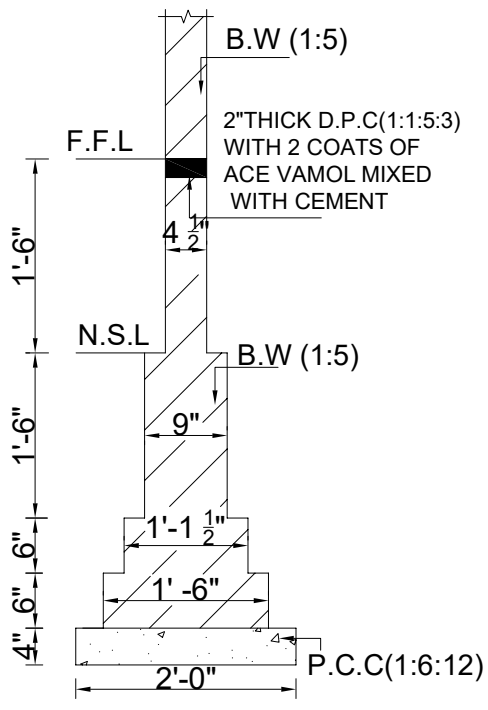
PLAN OF STAFF QUARTER KAMALIA CITY DISPOSAL STATION



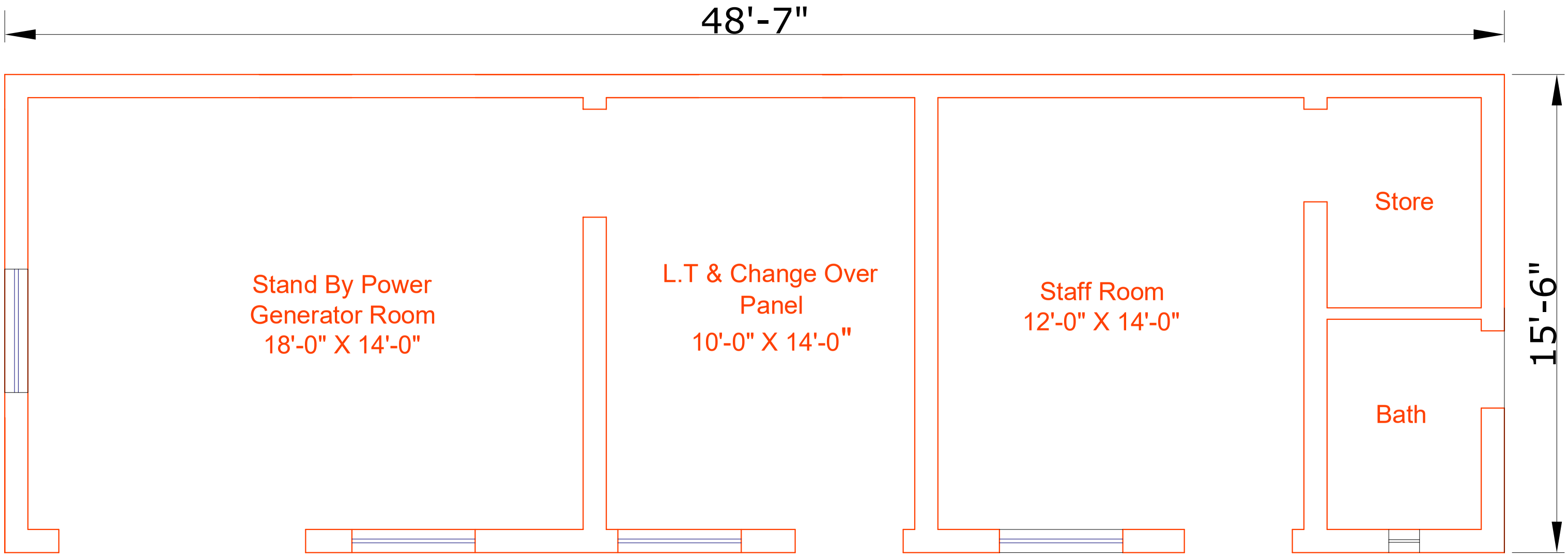
FOUNDATION PLAN OF STAFF QUARTER KAMALIA CITY DISPOSAL STATION ZONE - 1



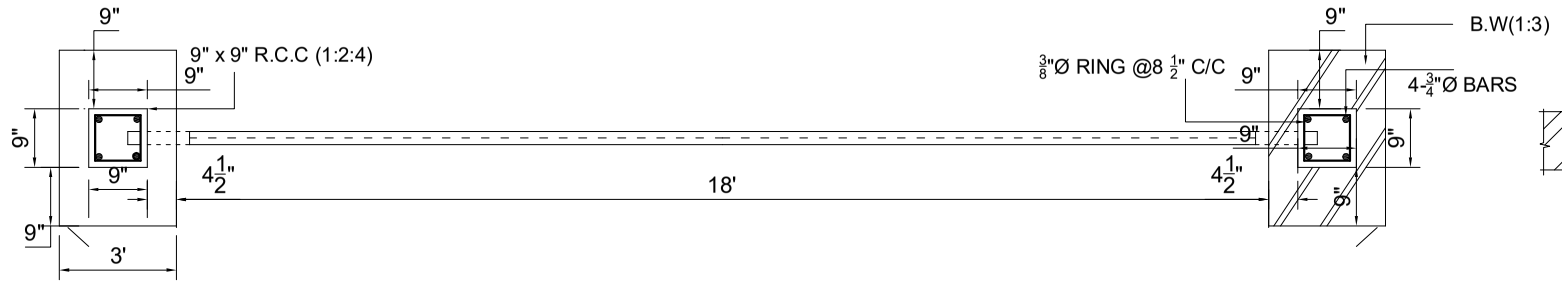
SEC 1-1

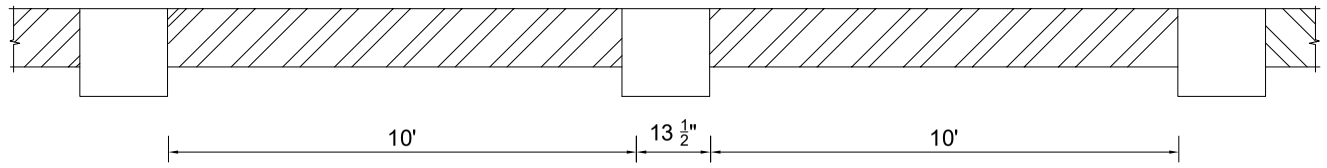


SEC 2-2


48'-7"
Stand By Power
Generator Room
18'-0" X 14'-0"
L.T & Change Over
Panel
10'-0" X 14'-0"
Staff Room
12'-0" X 14'-0"
Store
Bath
15'-6"

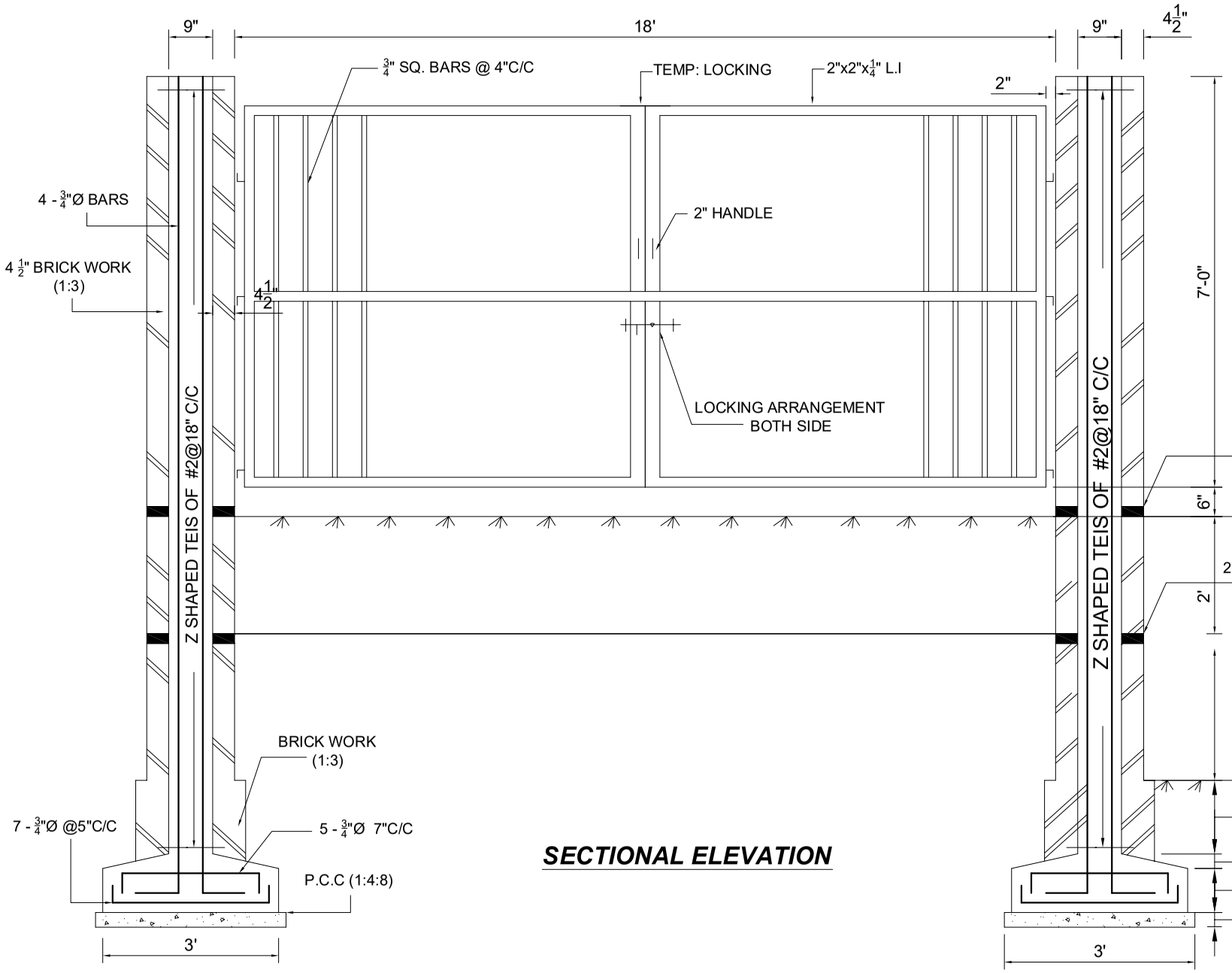
PLAN OF MAIN GATE KAMALIA DISPOSAL STATION



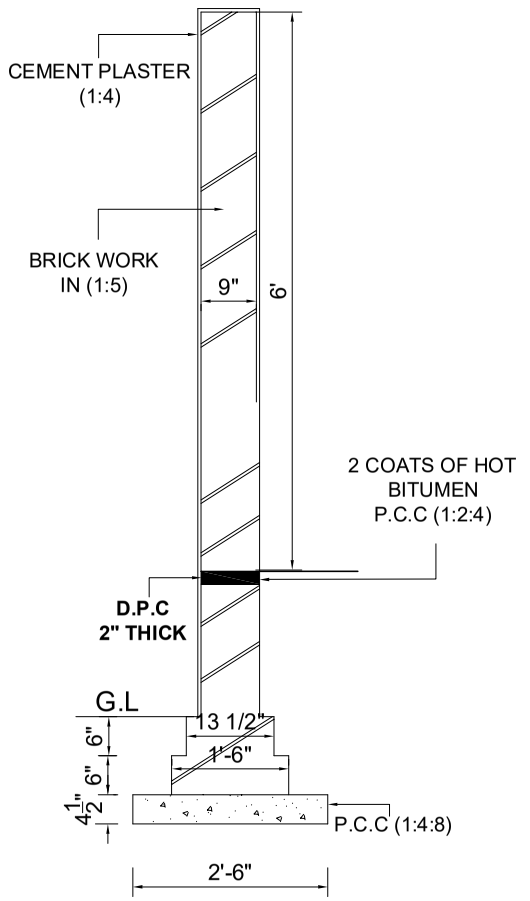


PLAN OF BOUNDARY WALL (9" THICK)

PLAN OF MAIN GATE



SECTIONAL ELEVATION



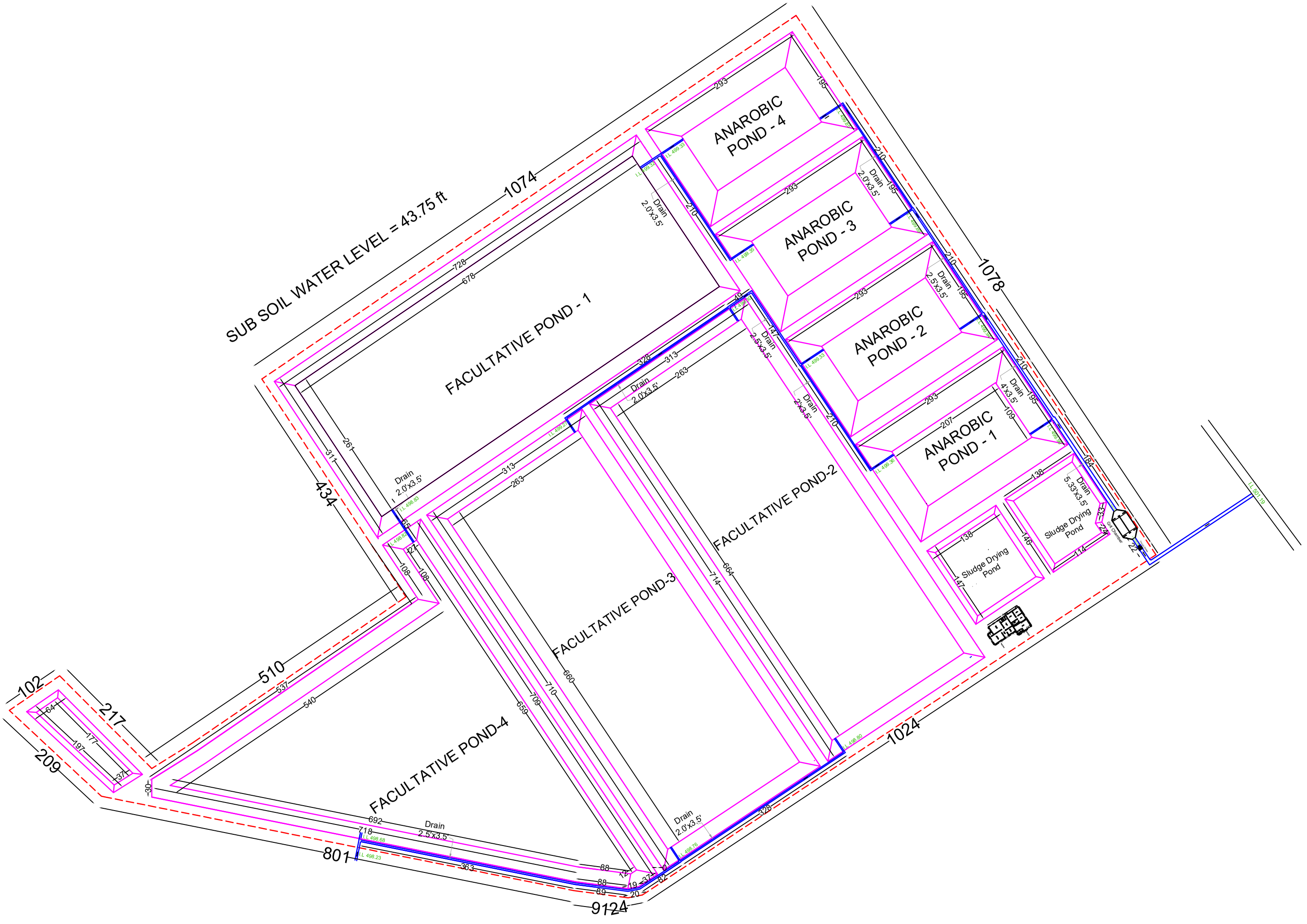
TYPICAL SECTION OF BOUNDARY WALL 9" THICK

DESIGN OF WASTEWATER TREATMENT PLANT KAMALIA				
A	**FLOW**			
	Peak Flow		13.03	Cusec
	Peak Flow		26.05	Cusec
	Peak Flow		7.02	Mgd
	Peak Flow		16.15	Mgd
	INLET DRAIN			
	Width of drain		5.33	ft
	Water depth taken		3.25	ft
	velocity		1.50	ft/sec
B	**COURSE SCREEN**			
i	Capacity / Av. Flow		13.03	Cusec
ii	Peak Flow		26.05	Cusec
iv	Width of Screen		5.33	ft
v	Depth of water		3.25	ft
vi	Velocity		1.50	ft/sec
vii	Area contact to screen		23.985	ft^2
viii	X-sectional		17.3225	ft^2
ix	Clear width of channel		5.33	ft
x	Spacing of opening		63.96	inches
xi	Spacing of opening		2	inch c/c
xii	No. opening required		31.98	No.
xiii	Thickness of strip to be used		0.38	inch
xiv	Area required		11.99	inches
xv	Overall width		75.95	inches
			6.33	ft
	GRIT CHAMBER			
i	Peak discharge		26.0637	Cusec
	Q		0.738	m^3/s
ii	Depth of water		3	ft
	D		0.91	m
iii	In grit chamber taking constant velocity using proportionate weir for varrient discharge. Let us assume V_h Horizantal velocity Ranging from 0.15 to 0.3 m/s	0.2	0.2	m/s
iv	Detntion time		?	
v	Perticular size	0.15		mm
vi	Specific gravity	2.65		
vii	On basis of this assume V_s setting velocity	0.02		m/s
viii	Area Q=Area*veloscity (Hori)		3.69	m^2
ix	Free Board		0.3	m
x	Grit accumlation Ranging (0.15to 0.45)	0.45		m
xi	Area A= Width * Depth			
	W		4.04	m
	Total depth		1.66	m

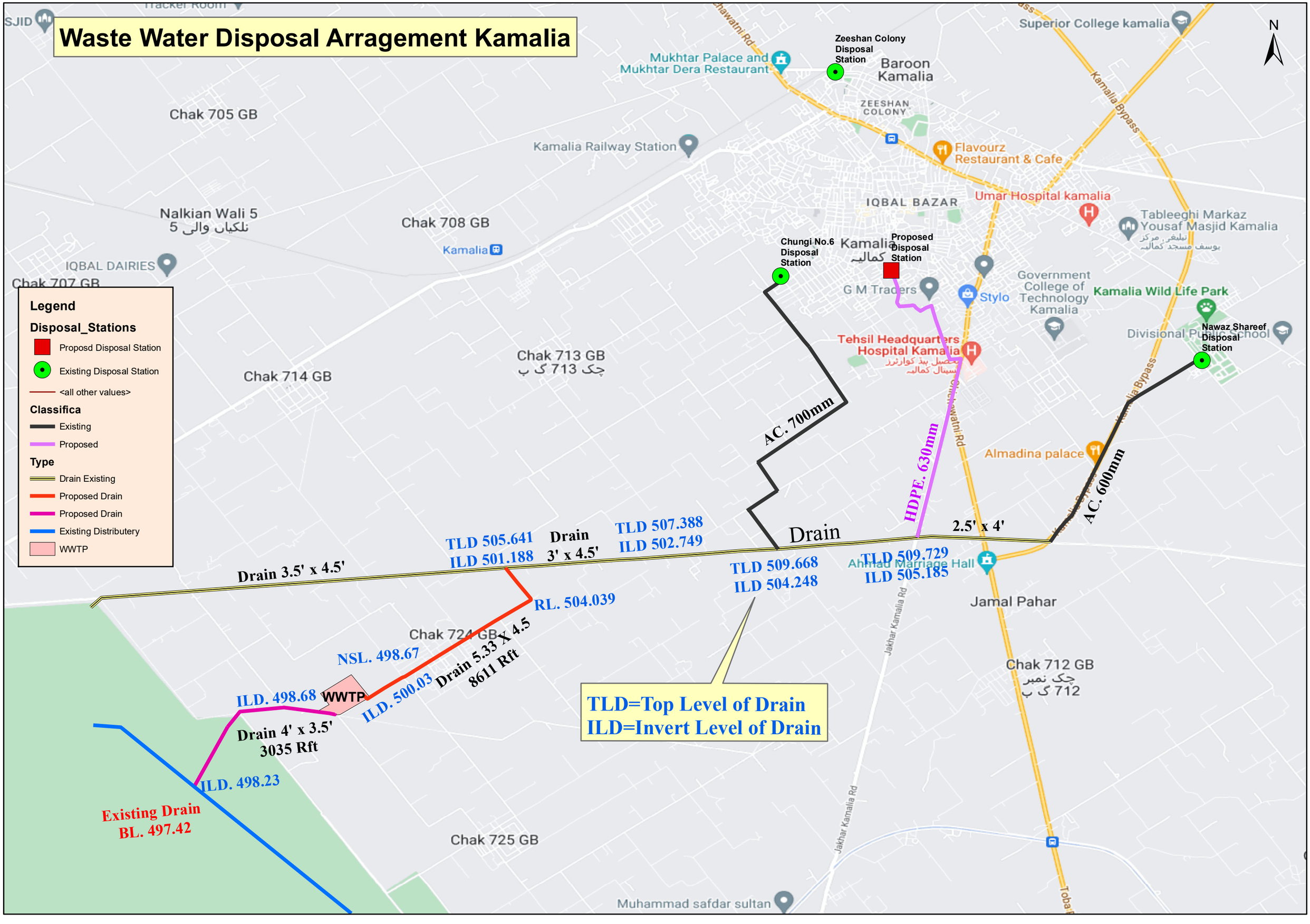
xii	For setting particular, depth in the distance, in setting veloscity V_s=depth of water/detention time			
	Detention time		45.72	sec
	Detention time should be ranging from 45 to 90 sec hence we taken		53	sec
xiii	Now Vh = Length/dentention time			
	Length		10.6	m
	Ref: Duncan Mara lenth ranging 10d to 20d i.e ok		ok	
D	**ANAROBIC PONDS**			
i	Discharge		13.02647198	cusec
ii	Total volume of sewage		1125487.179	ft^3/day
			31866	m^3/day
iii	Area of Anarobic Pond			
	$A_a = L_lQ/ð_s*D_a$			
	A_a			
	L_l = BOD i.e =128 mg/lit	140.8	141	
	Q = Volume of effluent 10.1			
	T= 20^o C Average in Pakistan during cold weather			
	ð = (20*20)- 100 = 300	300		
	Ref: Duncun Mara Book Table 10.1			
	$D_ϑ$ = Depth of effluent taken = 4.5 m	4.5		
	A_a		3323.54	m^2
			35774.60	ft^2
iv	To check the retention period			
	$ϑ_a = A_aD_a/Q$		0.47	day
	Minimum Retention period (Duncun Mara)	2		day
	Revised Area		13454.68	m^2
			144583.95	ft^2
	Removal of BOD (2T+20)	60%		
	Ref: Table 10.2 Duncan Mara Book			
v	No of Ponds	4		
	Area of each Anarobic pond		36145.99	ft^2
vi	Assume it Mid span area			
vii	Proposed Slop	2.5:1		
vii	Free board	2		ft
viii	proposed length in mid span		246	ft
ix	Width in mid span		147	ft
x	Water depth taken	4		m
		15		ft
xi	Free board	2		ft
xii	Depth above mid span	9		ft
xiii	one slop	23.45563		
xiv	Total slop	46.91125		
xv	Say	47		ft
xvi	Total length at top of pond		293	ft
xvii	Total width at top of pond		194	ft

	Total Length at bottom of pond		199	ft
	Total width at bottom of pond		100	ft
	Length on top of silt (taking depth of silt)	3	214	
	width on top of silt		115	
	Average area (bottom area of pond and top area of silt)		22185	
	Area at top		56797	ft^2
	Area at bottom		19887	
	area in acre		5.22	acre
	Li per annum		0.01	m^3/person year
	Population		219470	persons
	Accumulation of Silt per annum		2195	m3
			77515	ft3
	depth of silt		0.87	ft
	taking 4 years	4	3	ft
xviii	Depth of pond		17	ft
xvv	Total depth of Tank		20	ft
E	**FACULTATIVE PONDS**			
i	No of ponds		4	
ii	Discharge		13.02647198	cusec
vi	Total volume of sewage		1125487.179	ft^3/day
			31866.34	m^3/day
vi	$A_f = 10\ L_i\ Q\ /ð_s$			
	A_f = Area of faculative Ponds			
	L_i = BOD entering in Facultative Ponds	56.4		mg/l
	Q = Volume of effluent			
	T= 20^o Average in Pakistan during cold weather			
	$ð_s$= 350(1.107-0.002T)^(T-25)	253.0731		
vi	A_f		73175.00	m^2
	= Retention period			
	$ϑ_f = 2A_fD_f/2Q-(0.001eA_f)$			
	D = depth of Liquid	2		m
	e = 5	5		
vii	$ϑ_f$		5	days
ix	Area at mid span		73175.00	m^2
x	Area at mid span		786338.55	ft^2
	Area of each pond		196584.64	ft^2
xi	Proposed Length at mid span		686	ft
	Width at mid span		286.57	ft
	Slop	2.5:1		
	Depth of water from mid span	3.28		ft
	Free board	2		ft
xii	Total hiegt from mid depth	5.28		ft
xiii	one side slope	13.2		
xiv	Both side slope	26.4		
xv	Length at top of pond		712.4	ft
	Width at top of pond		312.97	ft

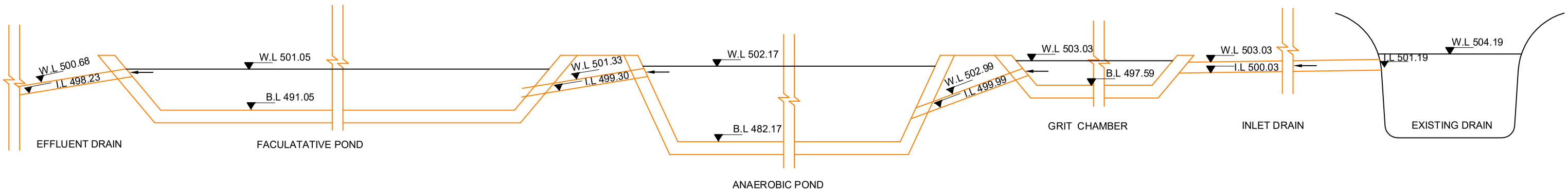
	Silt Allowance	1.44		ft
	Total Depth of pond		10.00	ft
	Removal of BOD			
	Le(unfiltered) = Li/(1+k_1 ϑf)			
	k_1 = 0.1 design value for secondary facultative pond	0.1		
	Le(unfiltered)		38.6	mg/l
	Le(filtered) = F_{na}*(Le(unfiltered))			
	F_{na} is non algal fraction of the BOD and it ranges between (0.1-0.3) , usual design value is 0.3	0.3		
	Le(filtered)		11.6	mg/l
			O.K.	
	Egg Removal : 75% removal in 1 day anaerobic pond and 93% in 4 days facultative pond			
	Design Parameter Value (Duncan Mara) of Human Intestinal Nematode Eggs/l, Ei=	500		egg/l
	R = 100(1-0.41exp(-0.49ϑ+0.0085ϑ^2)), Ref. Duncan Mara Eq 11.12			
	For Anaerobic Ponds, Egg removal %	83.3	0.83	
	For Facultative Ponds, Egg removal %	94.9	0.95	
	Ee = Ei(1-Egg Removal_a)(1-Egg Removal_f) ,(Ref Duncan Mara)		4.3	per litre


SUB SOIL WATER LEVEL = 43.75 ft
ANAROBIC POND - 4
ANAROBIC POND - 3
ANAROBIC POND - 2
ANAROBIC POND - 1
FACULTATIVE POND - 1
FACULTATIVE POND-2
FACULTATIVE POND-3
FACULTATIVE POND-4
Sludge Drying Pond
Sludge Drying Pond
Drain 2.0'x3.5'
Drain 2.5'x3.5'
Drain 4'x3.5'
Drain 5.33'x3.5'
Drain 2x3.5'
1074
1078
1024
801
9124
510
434
217
209
102

Waste Water Disposal Arragement Kamalia

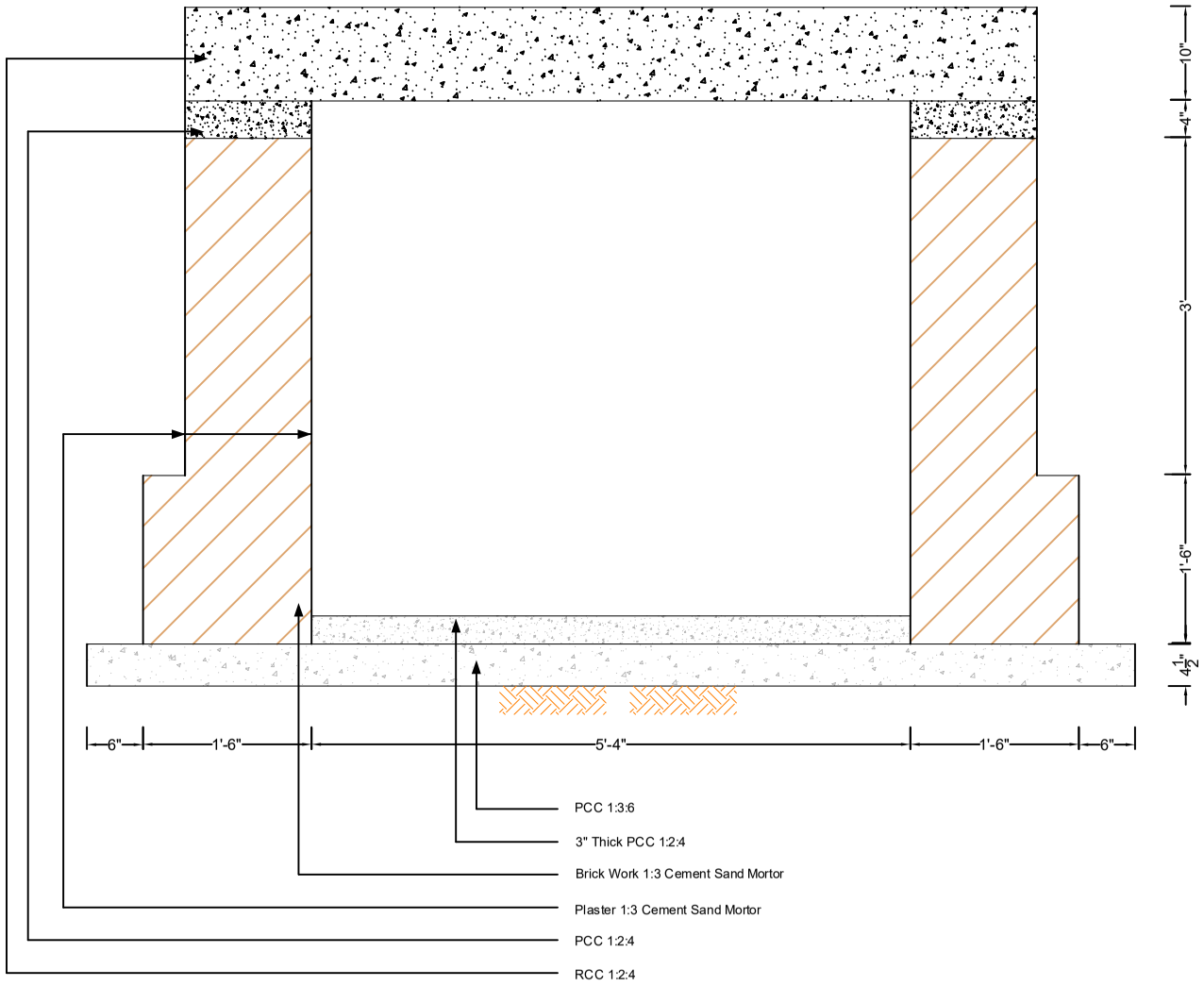


Line Diagram Hydraulic Statement From Existing Drain To Effluent Drain of WWTP

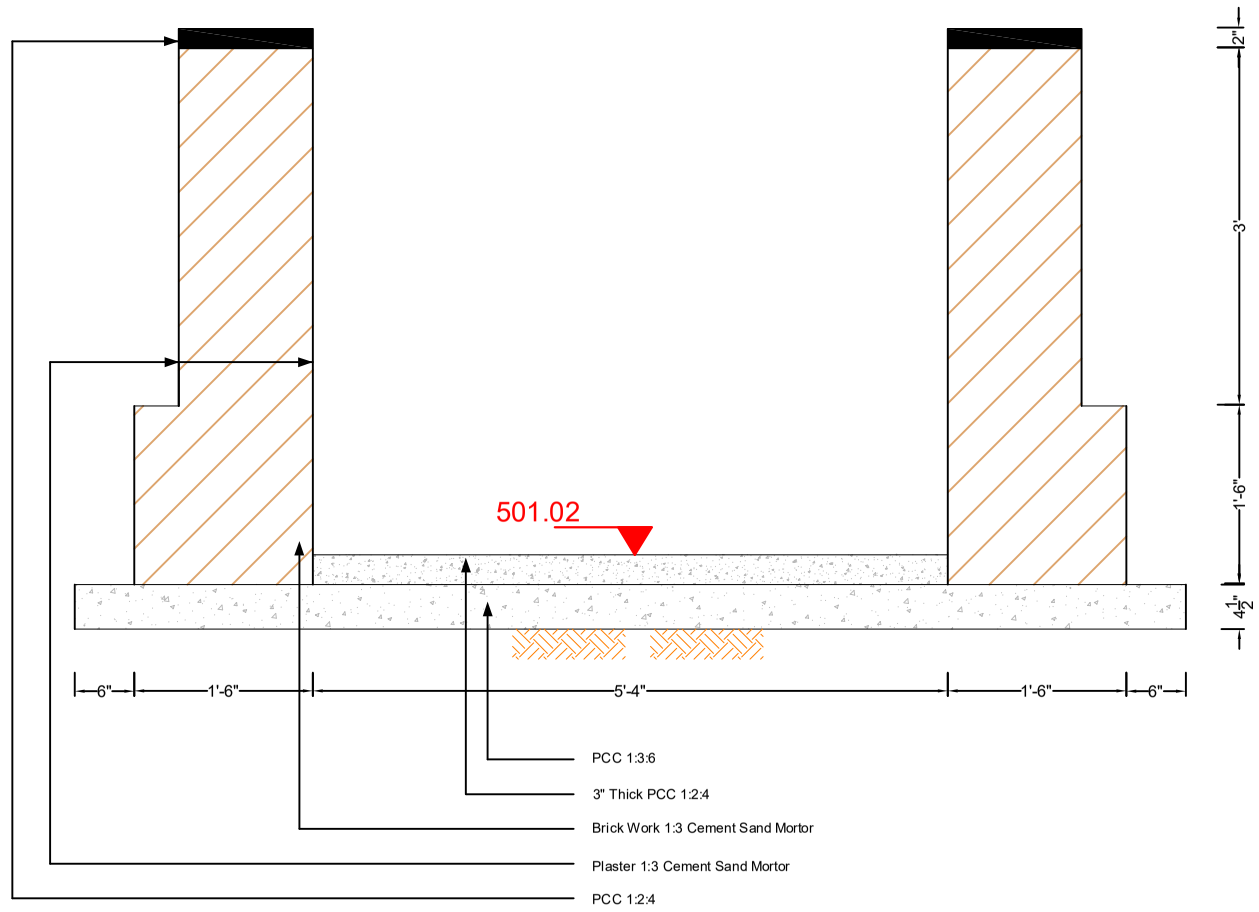


N.T.S

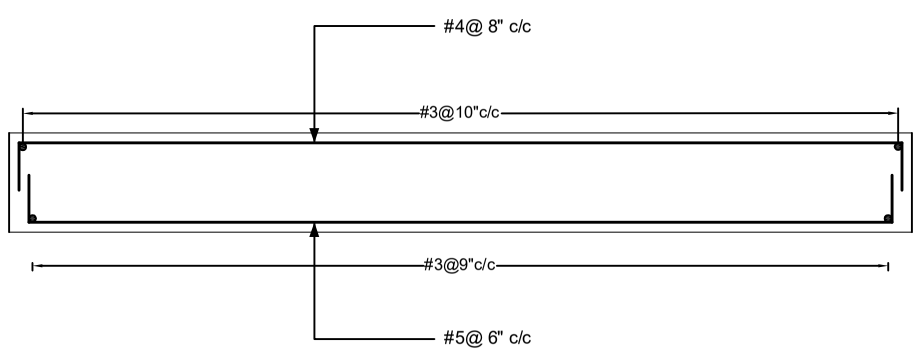
R.D 850



X-SECTION INTAKE DRAIN(Covered) 5.33' x 4.50'



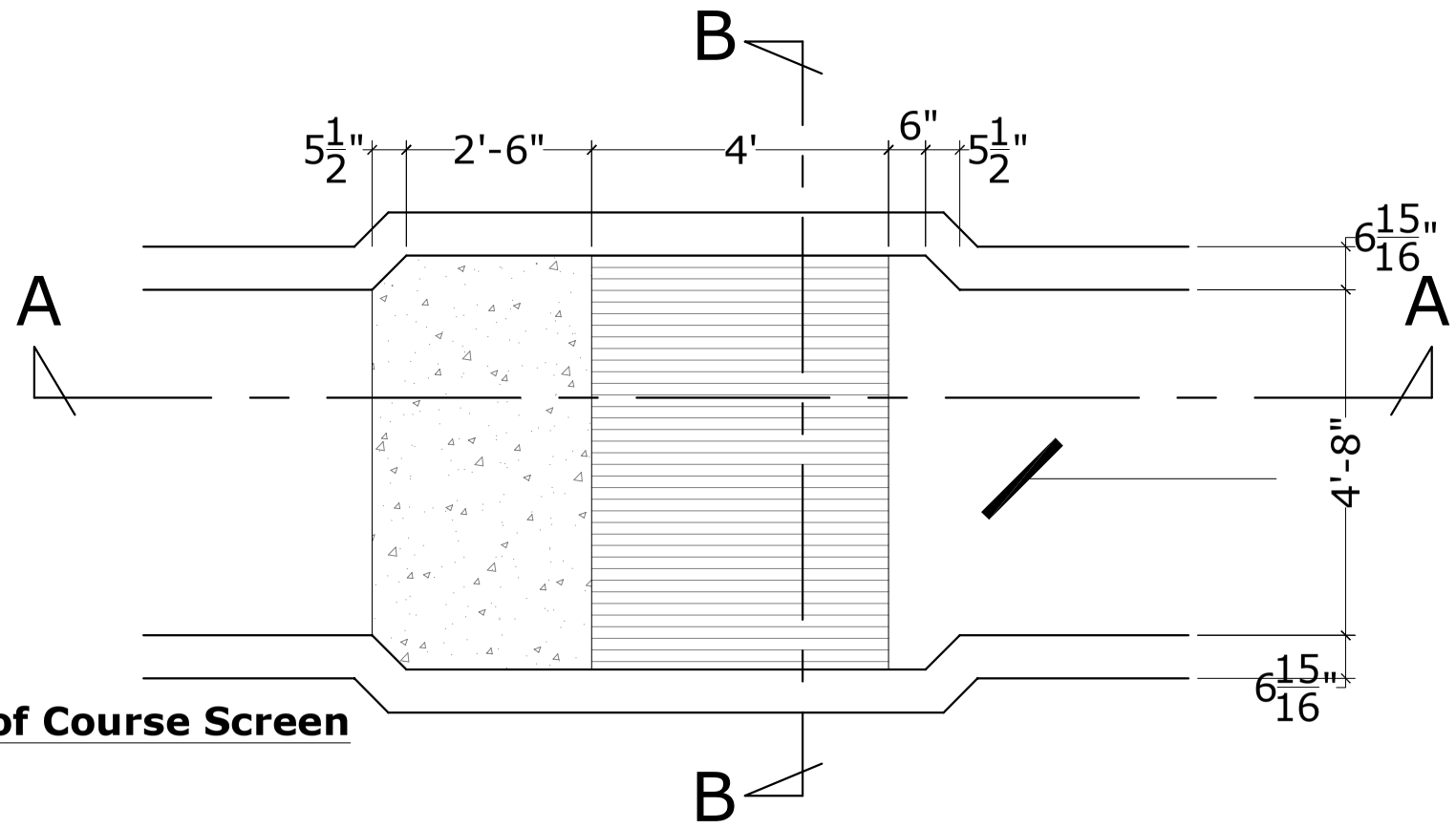
X-SECTION INTAKE DRAIN 5.33' x 4.50'



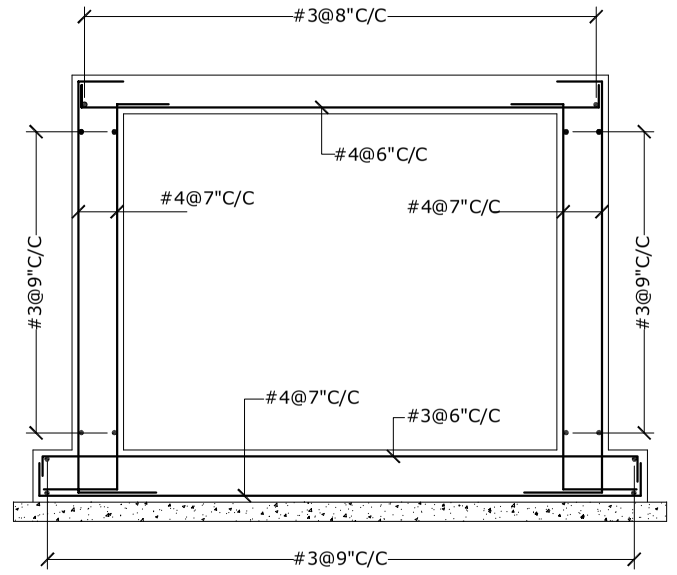
Reinf : Typical X-SECTION OF SLAB

INTAKE DRAIN 5.33' x 4.50'

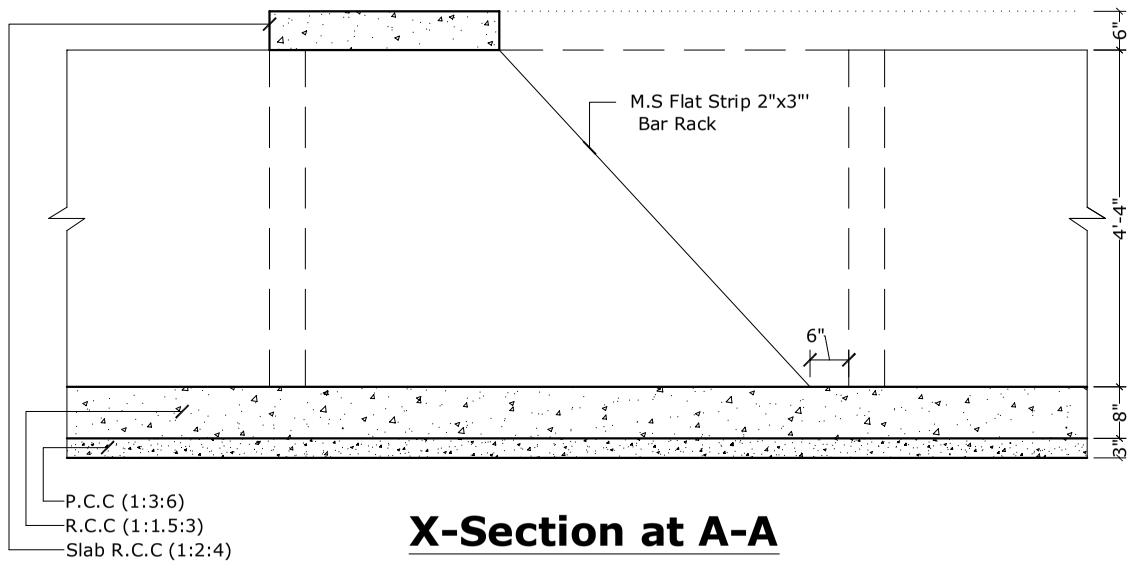
Plan and Section of Coarse Screen



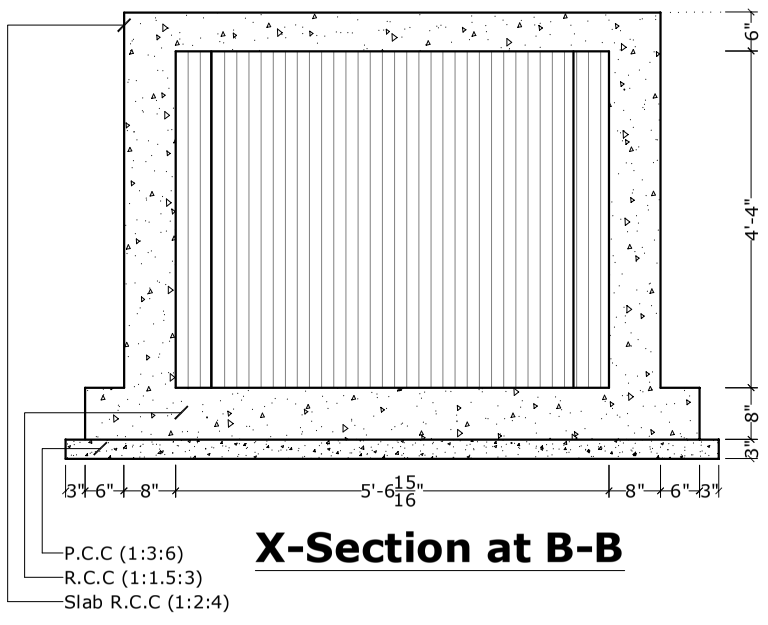
Plan of Course Screen



Typ: Reinf: Detail of Course Screen



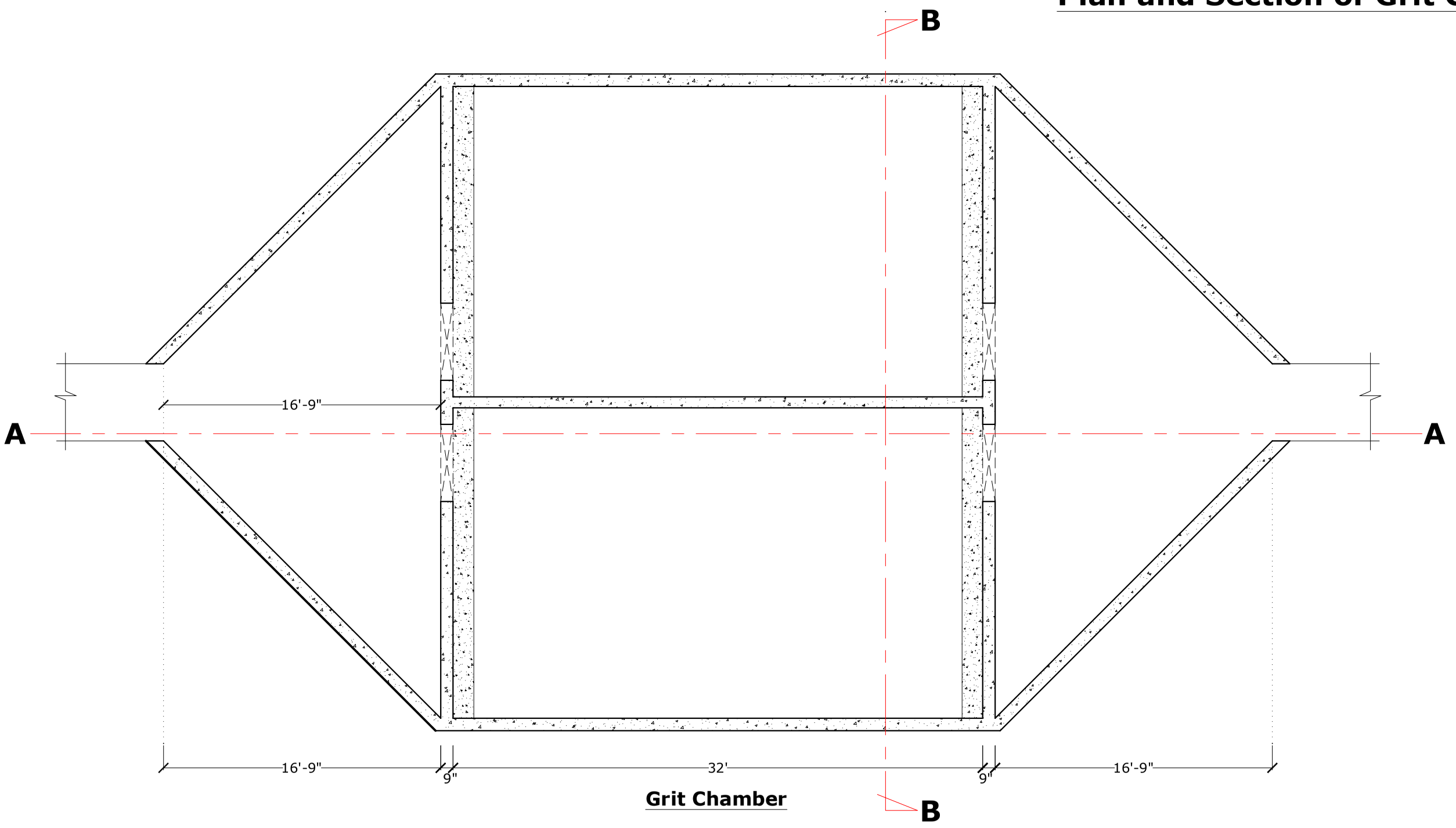
X-Section at A-A



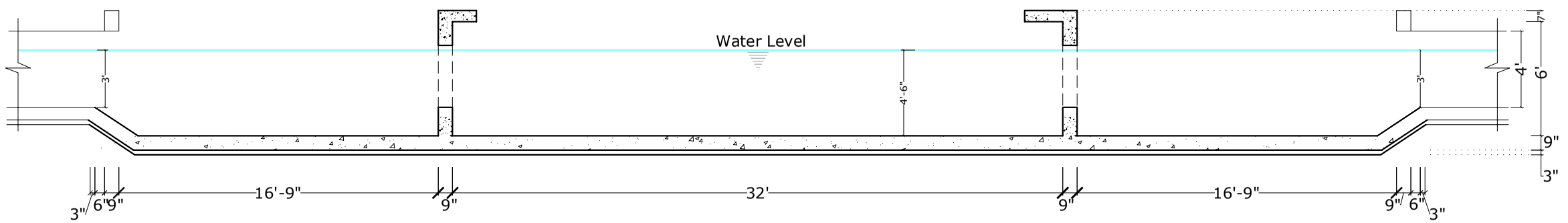
X-Section at B-B

NOTE:
Steel Grade 60

Plan and Section of Grit Chamber

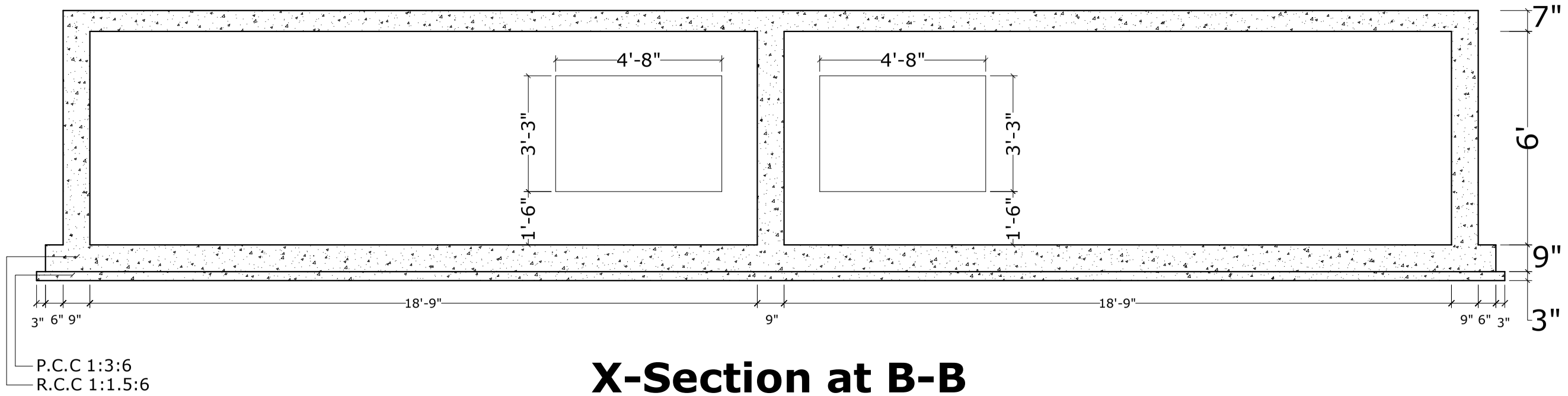


Grit Chamber

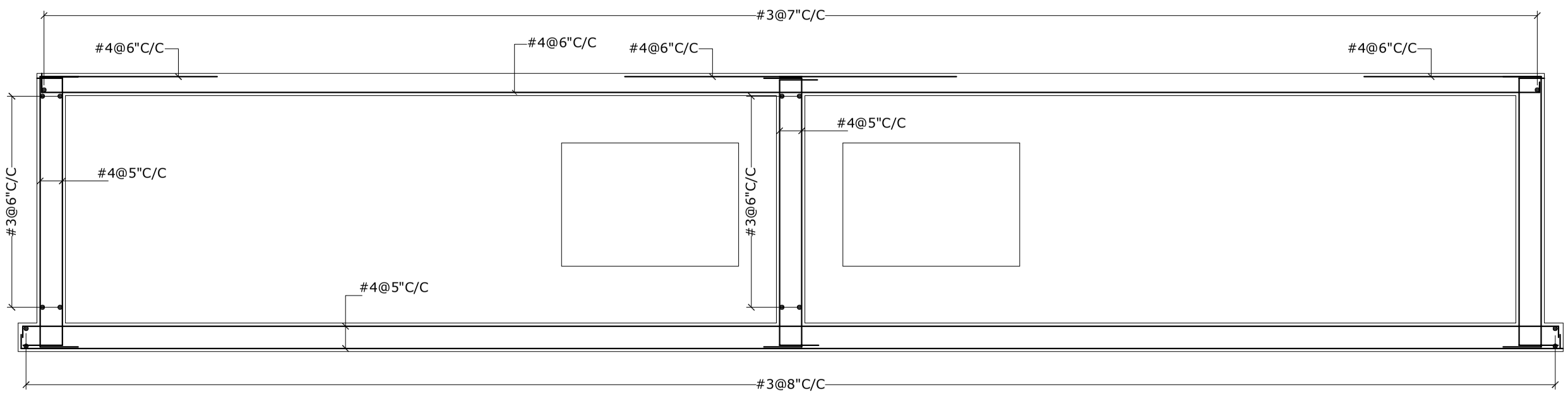


X-Section at A-A

NOTE:
Steel Grade 60



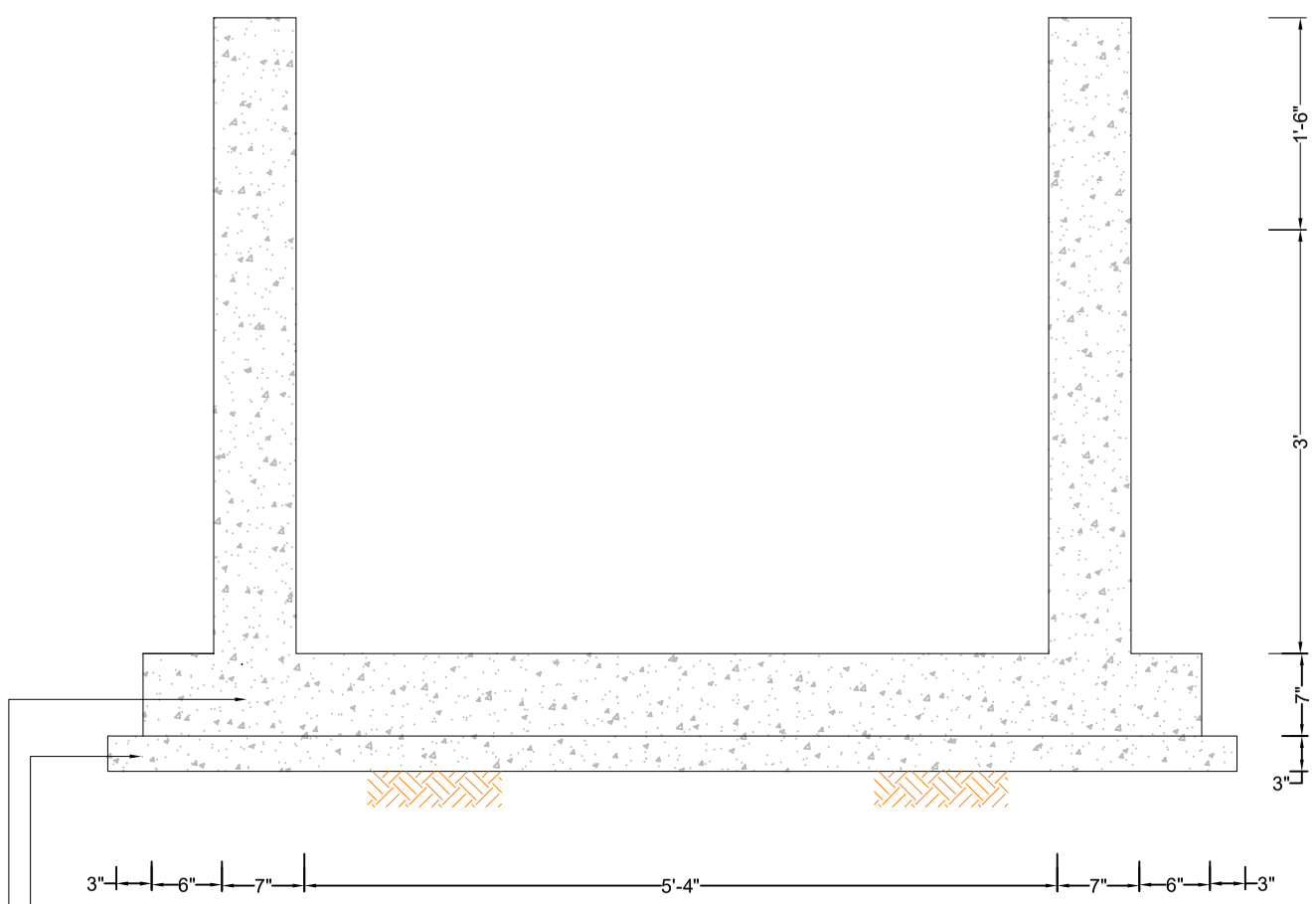
X-Section at B-B



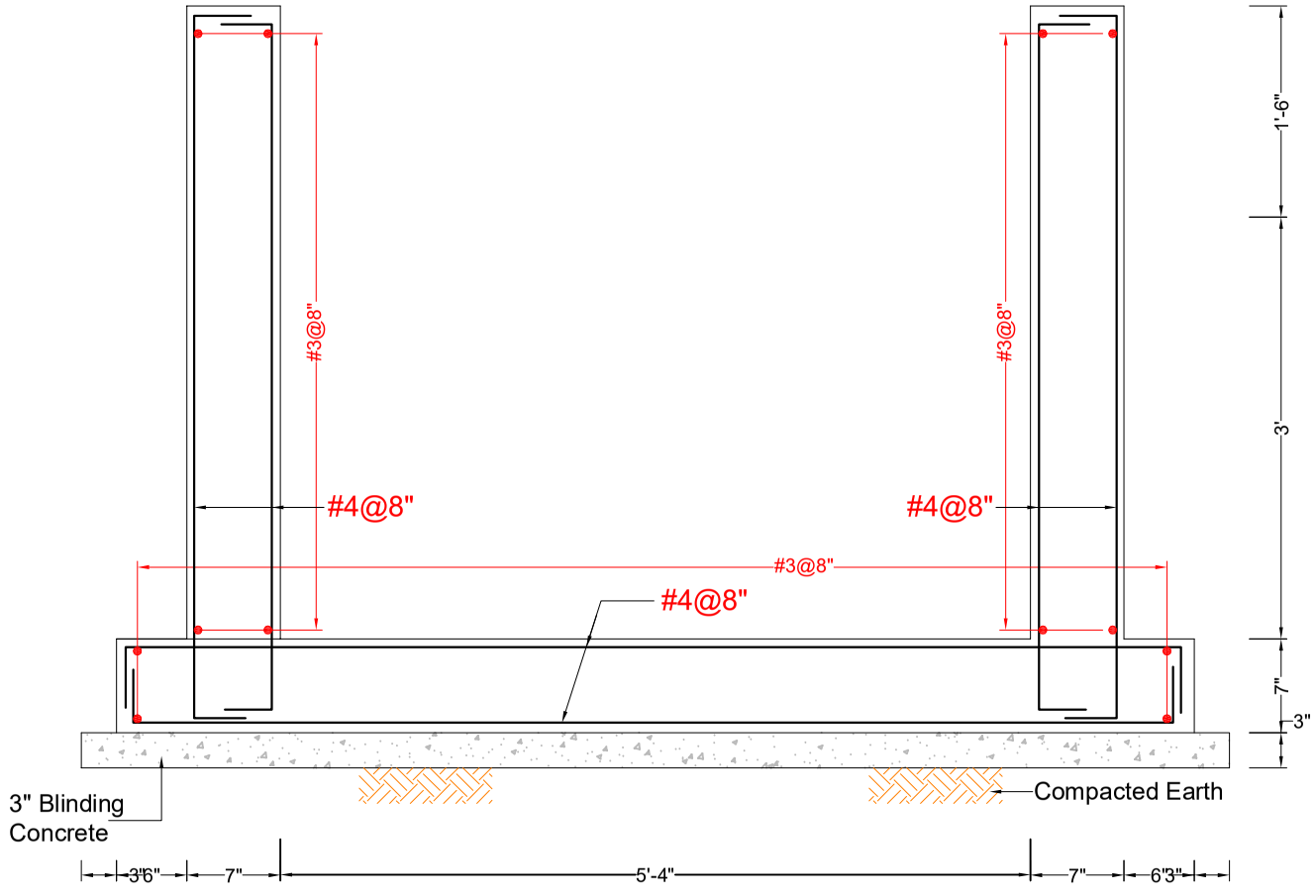
Typ. Reinf: Detaile of Secton B-B

NOTE:
Steel Grade 60

INTAKE Drain

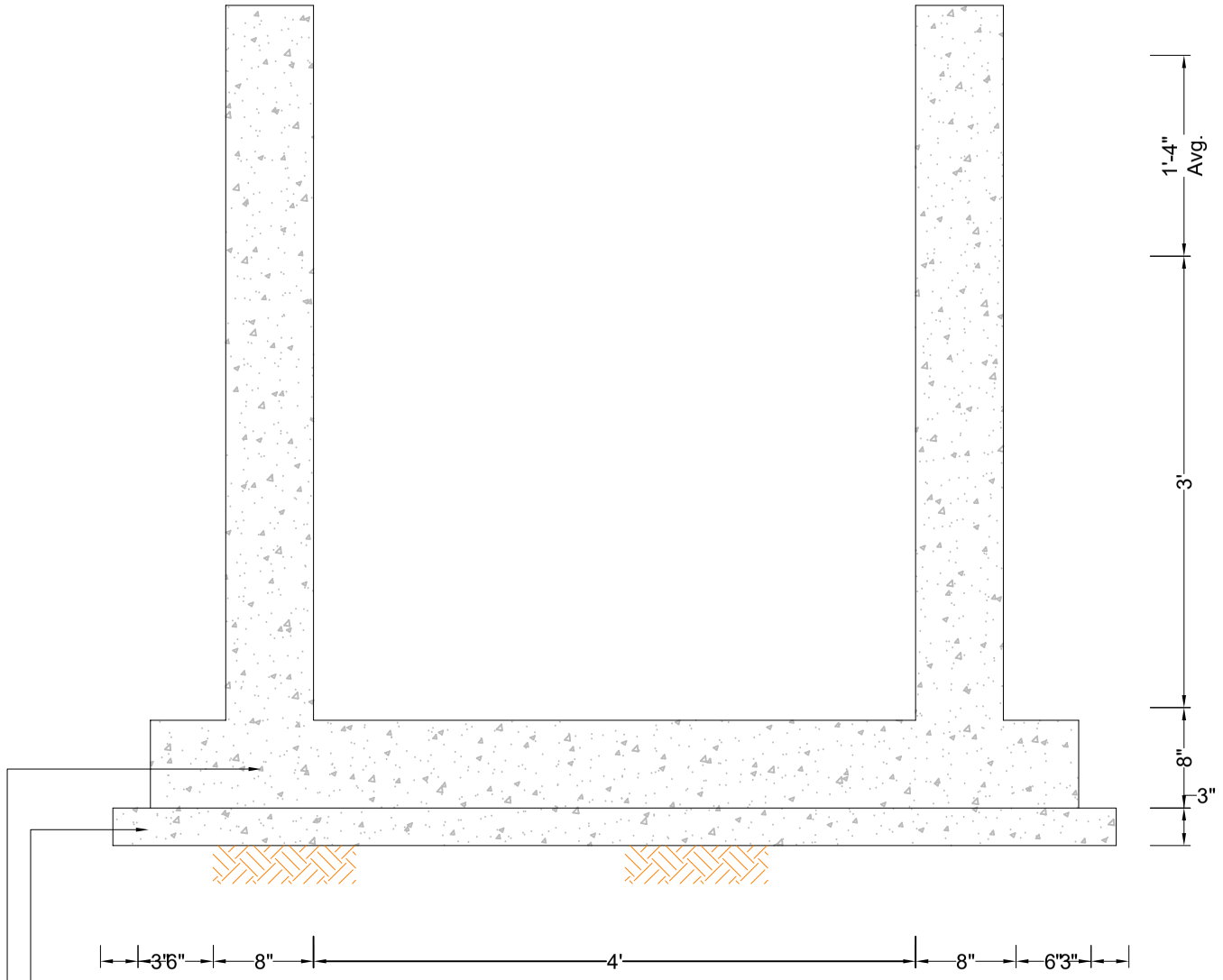


X-SECTION DRAIN

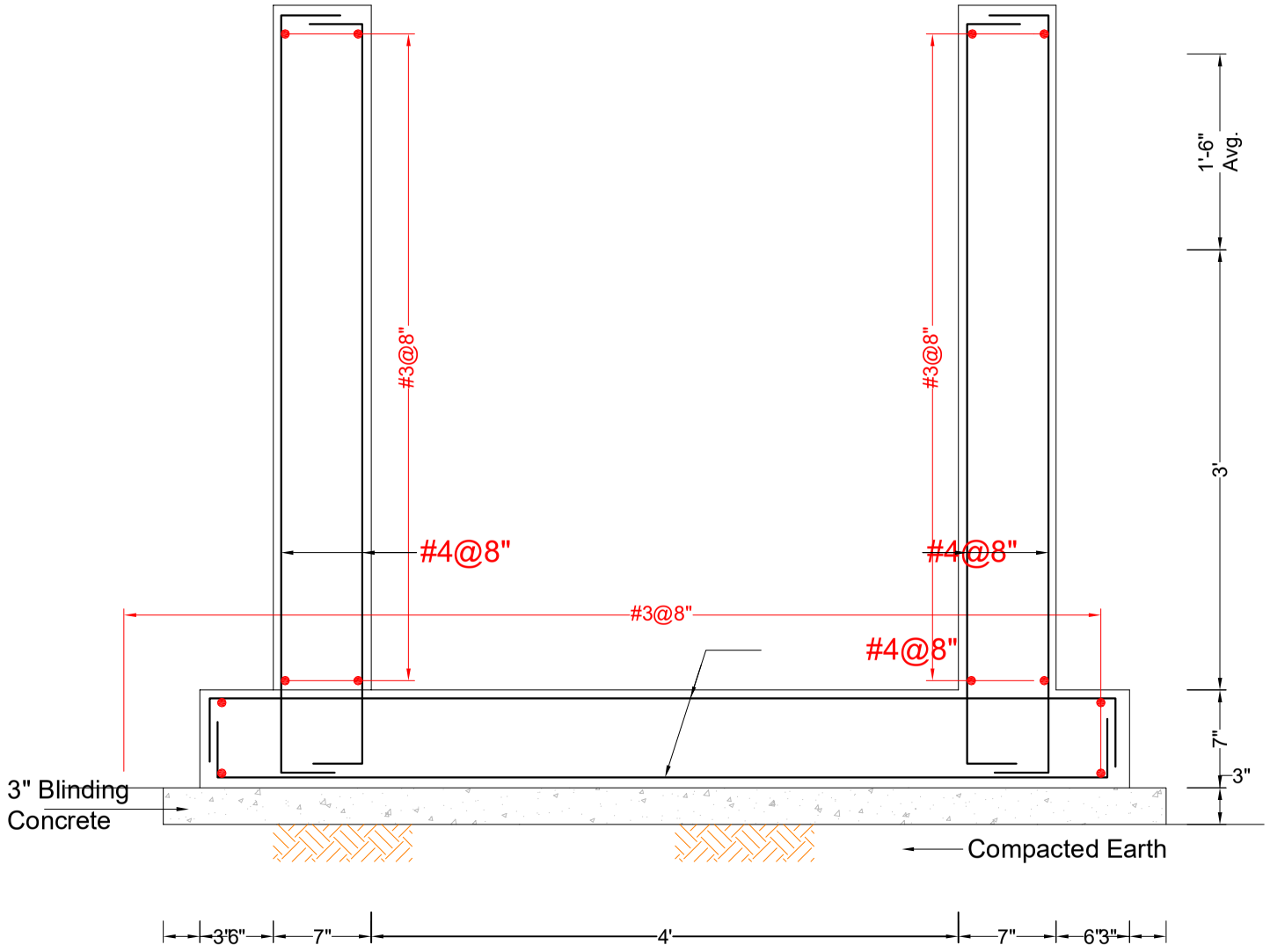


Reinf : Typical X-SECTION DRAIN

NOTE:
Steel Grade 60

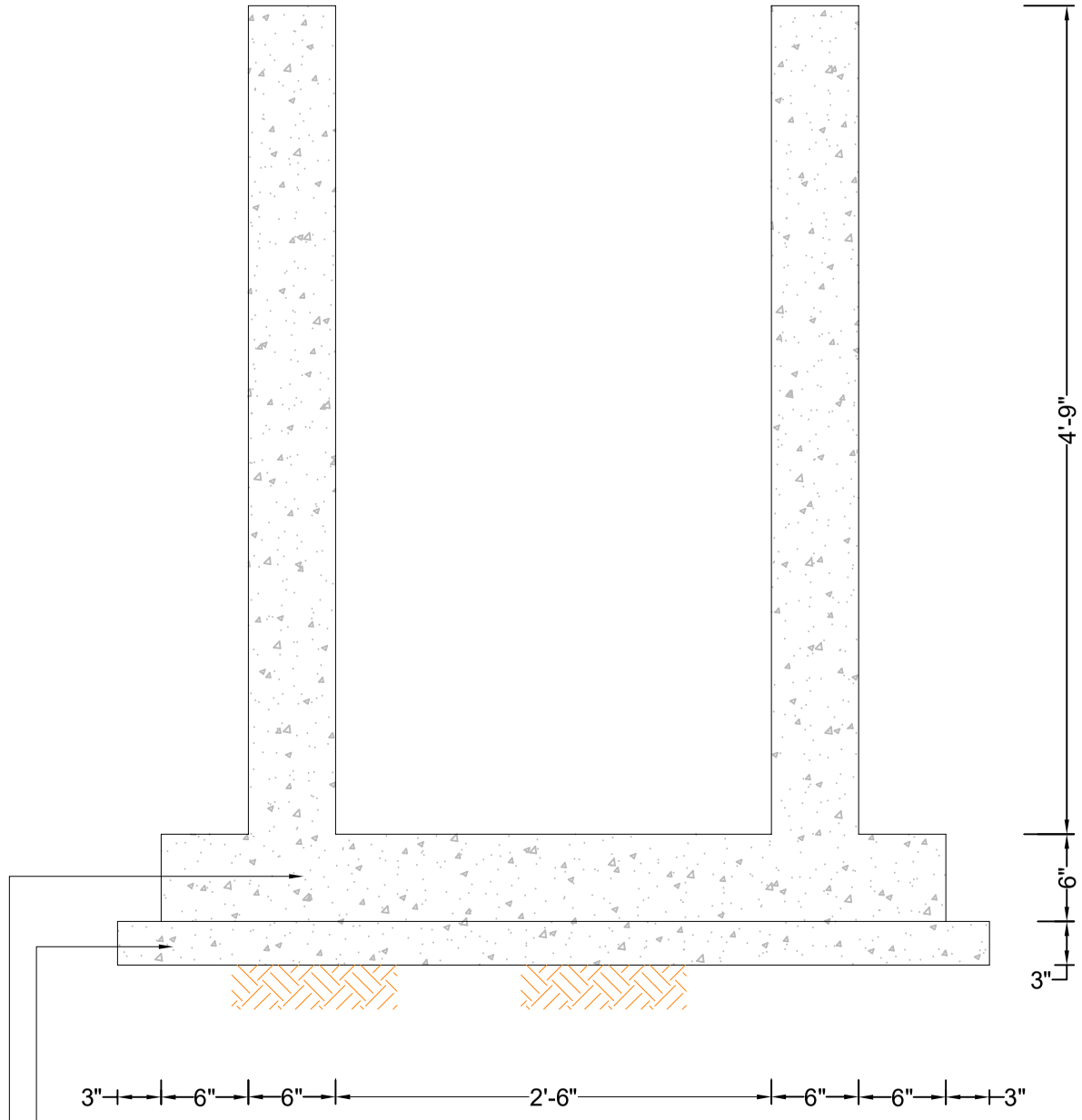


X-SECTION DRAIN

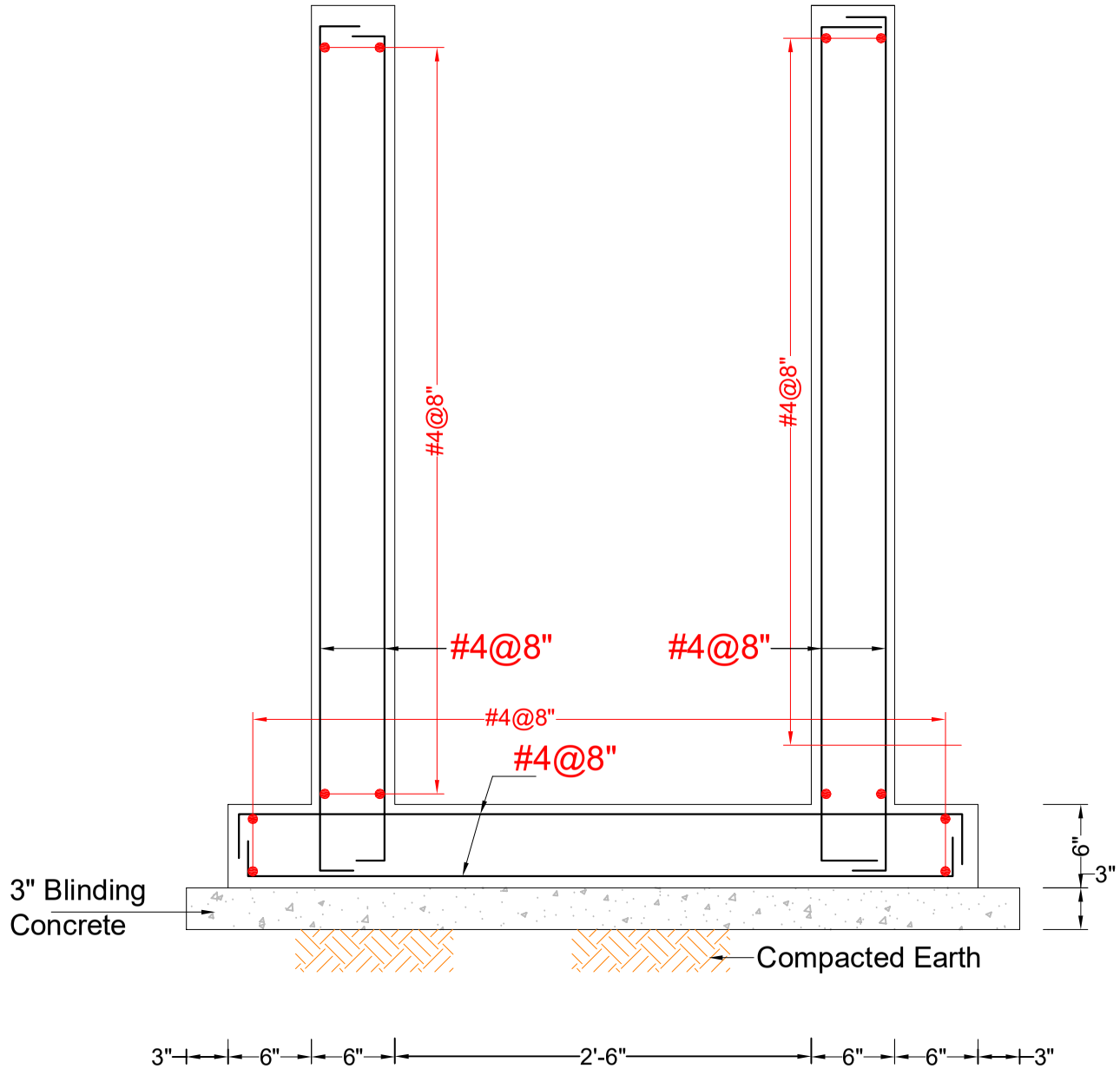


Reinf : Typical X-SECTION DRAIN

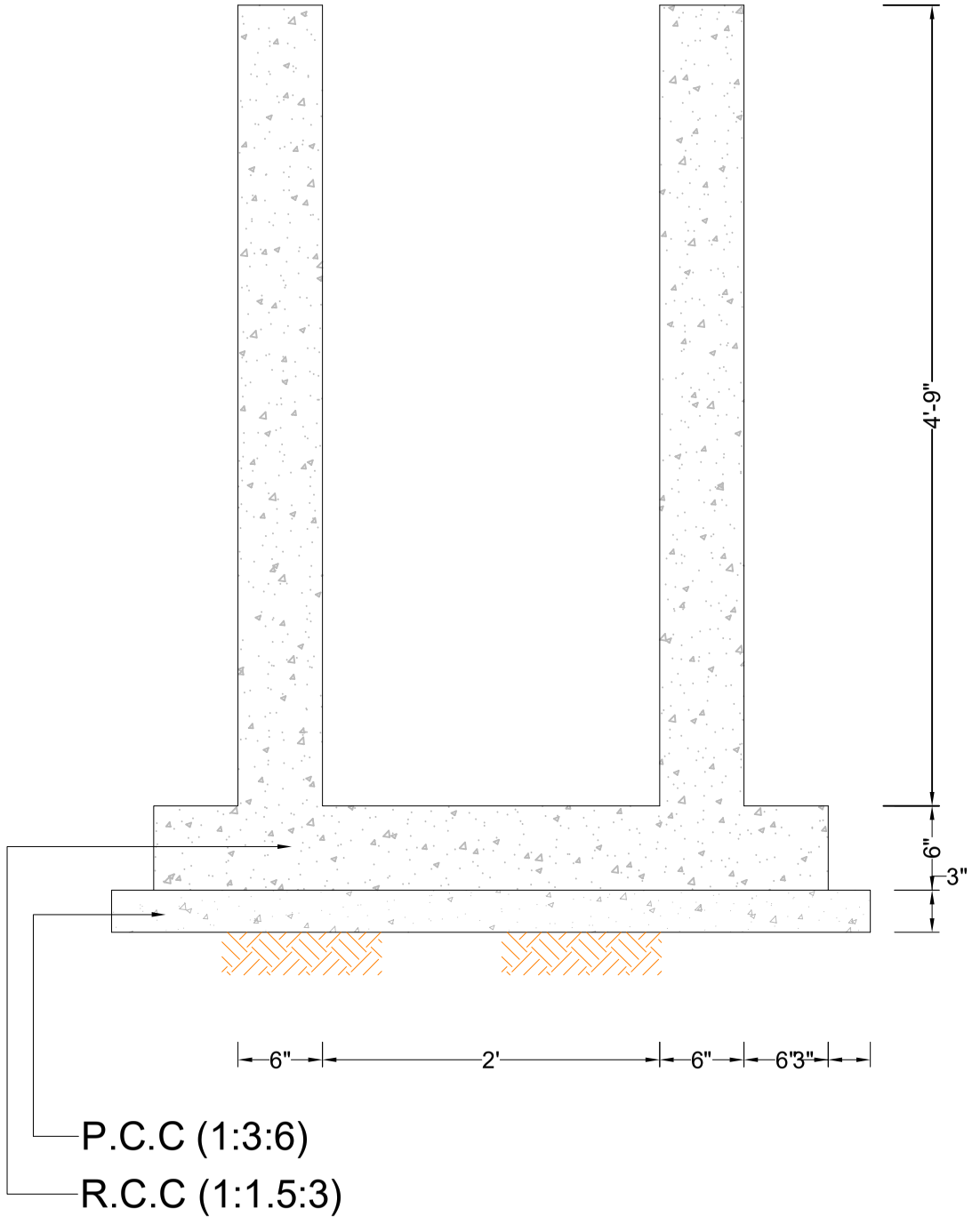
NOTE:
Steel Grade 60



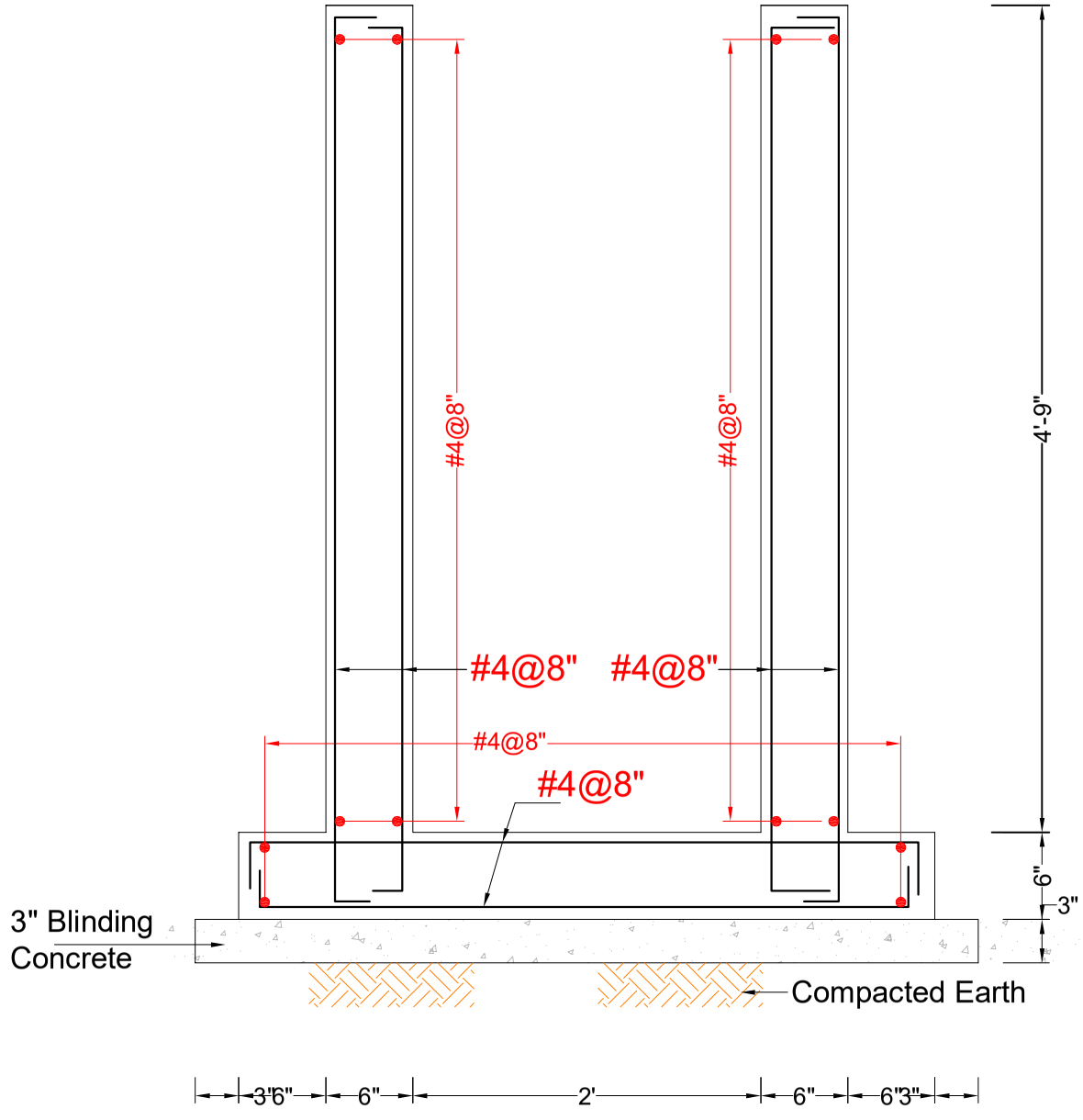
X-SECTION DRAIN



Reinf : Typical X-SECTION DRAIN

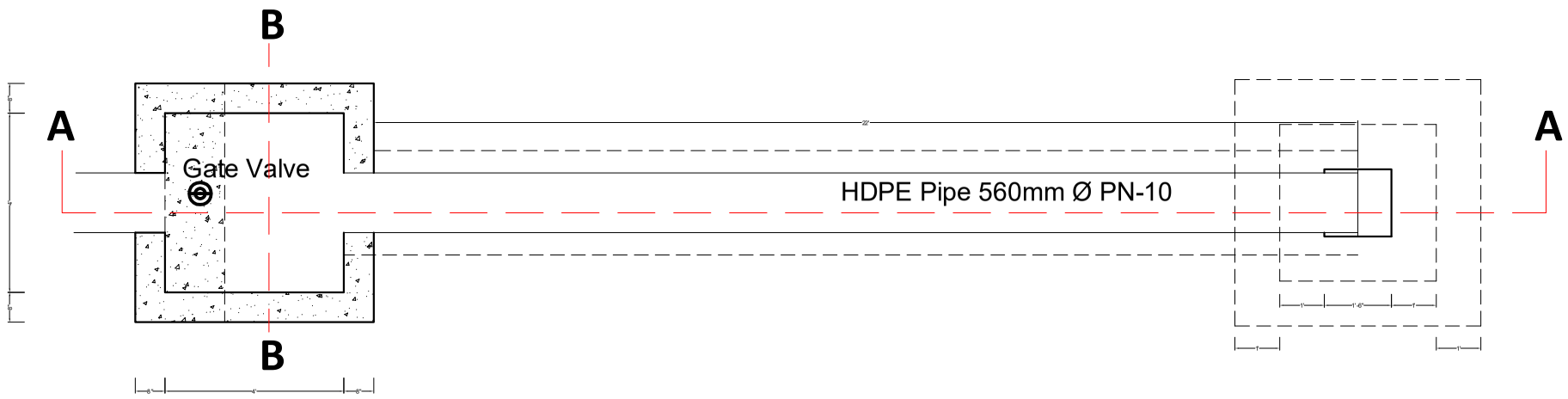


X-SECTION DRAIN

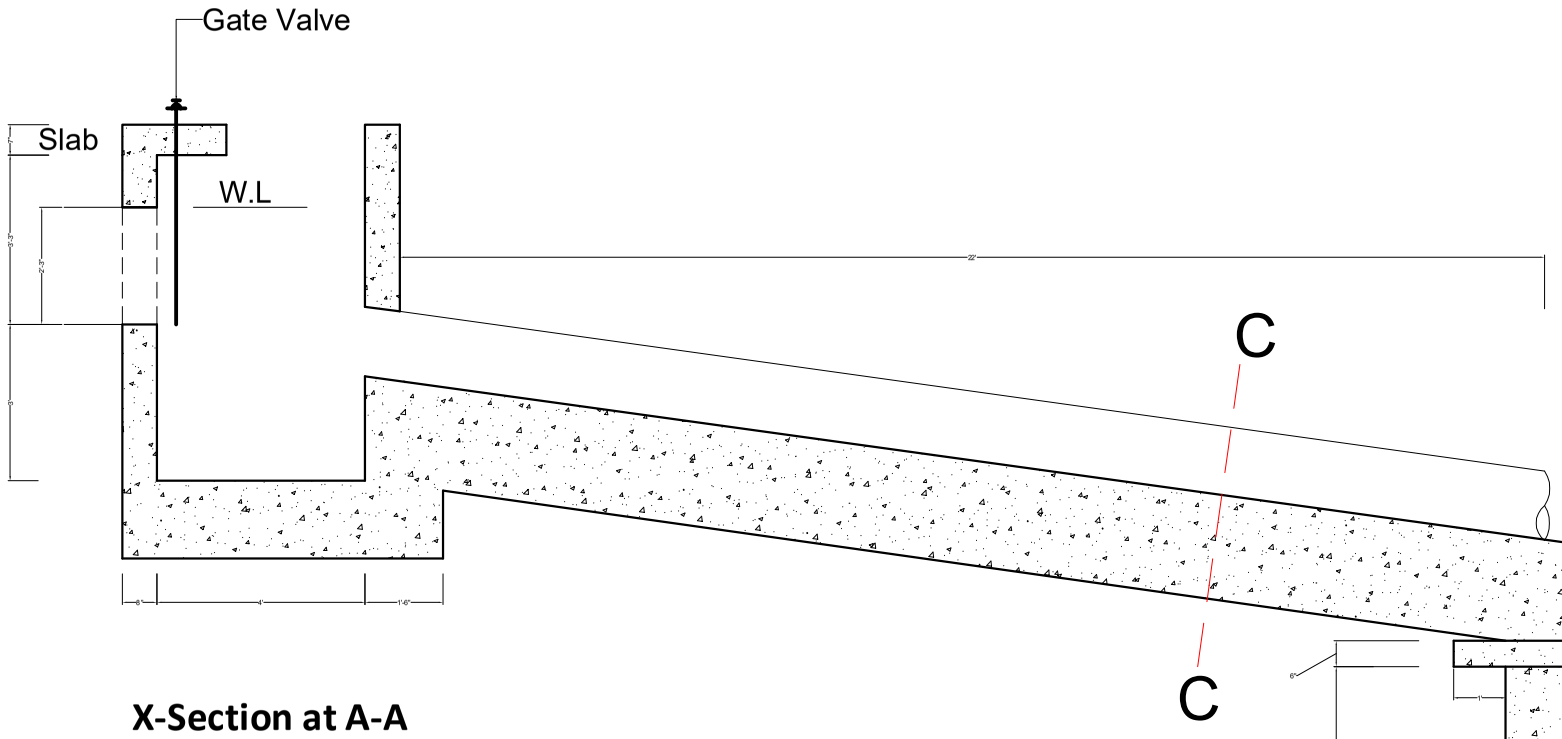


Reinf : Typical X-SECTION DRAIN

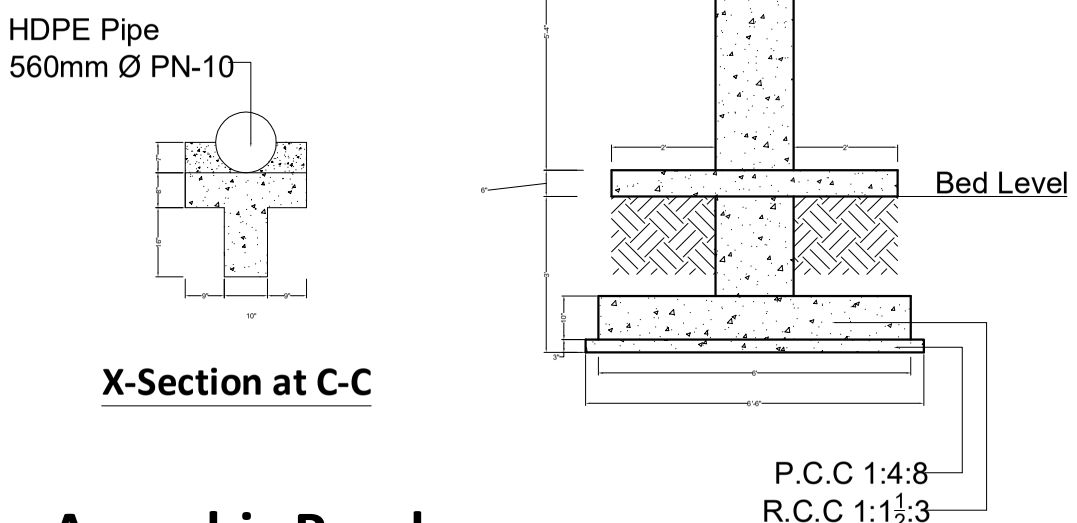
NOTE:
Steel Grade 60



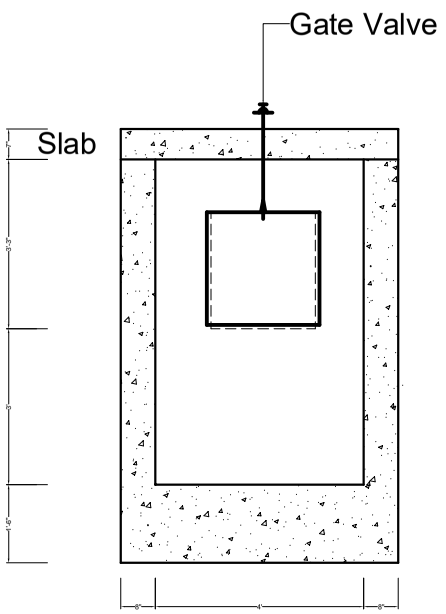
Plan of inlet Chamber



X-Section at A-A

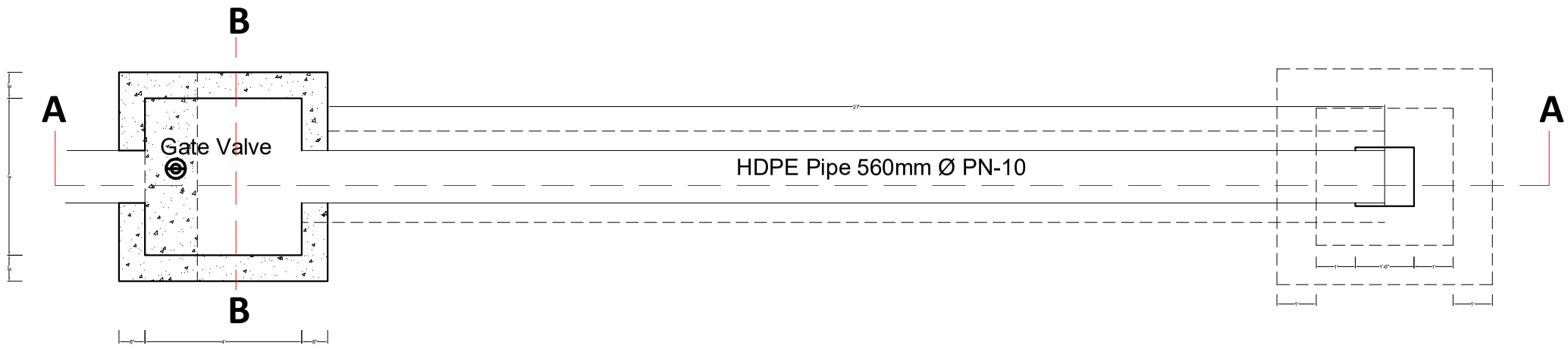


X-Section at C-C

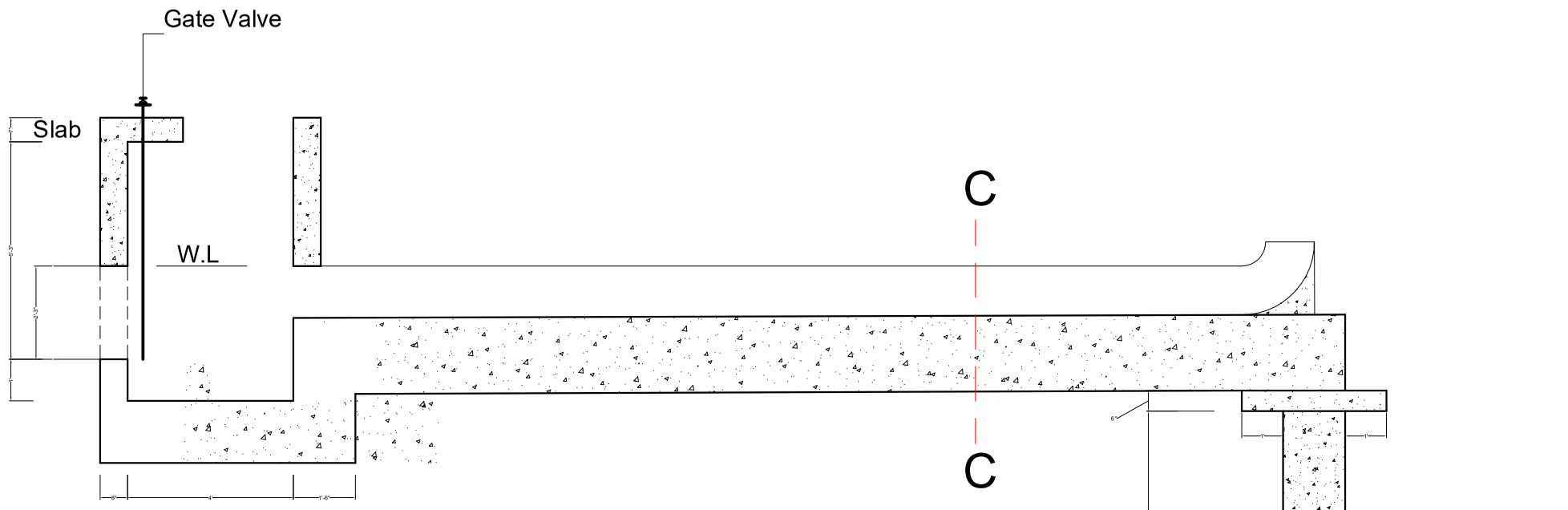


X-Section at B-B

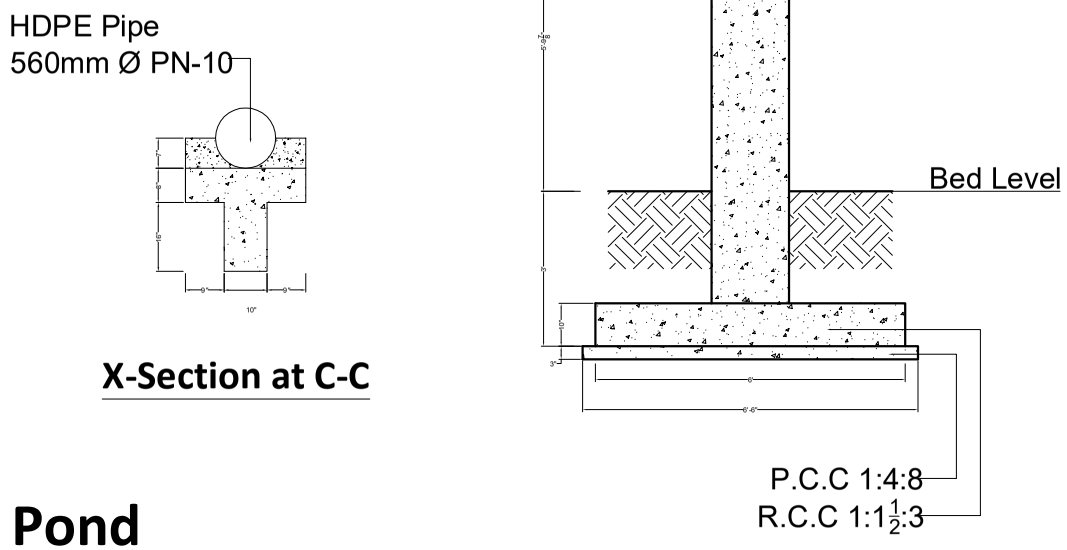
Plan & X-Section of Inlet Chamber Anarobic Pond



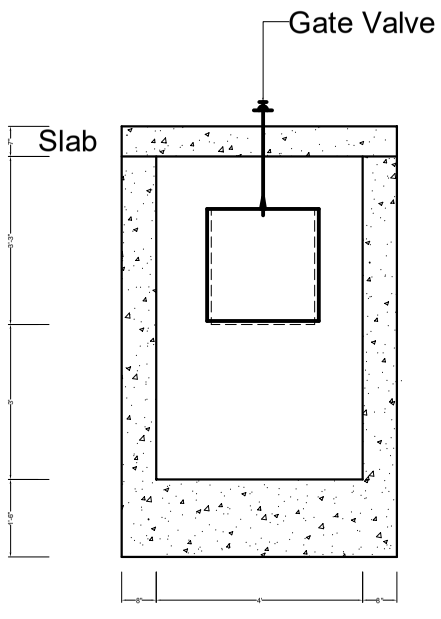
Plan of inlet Chamber



X-Section at A-A



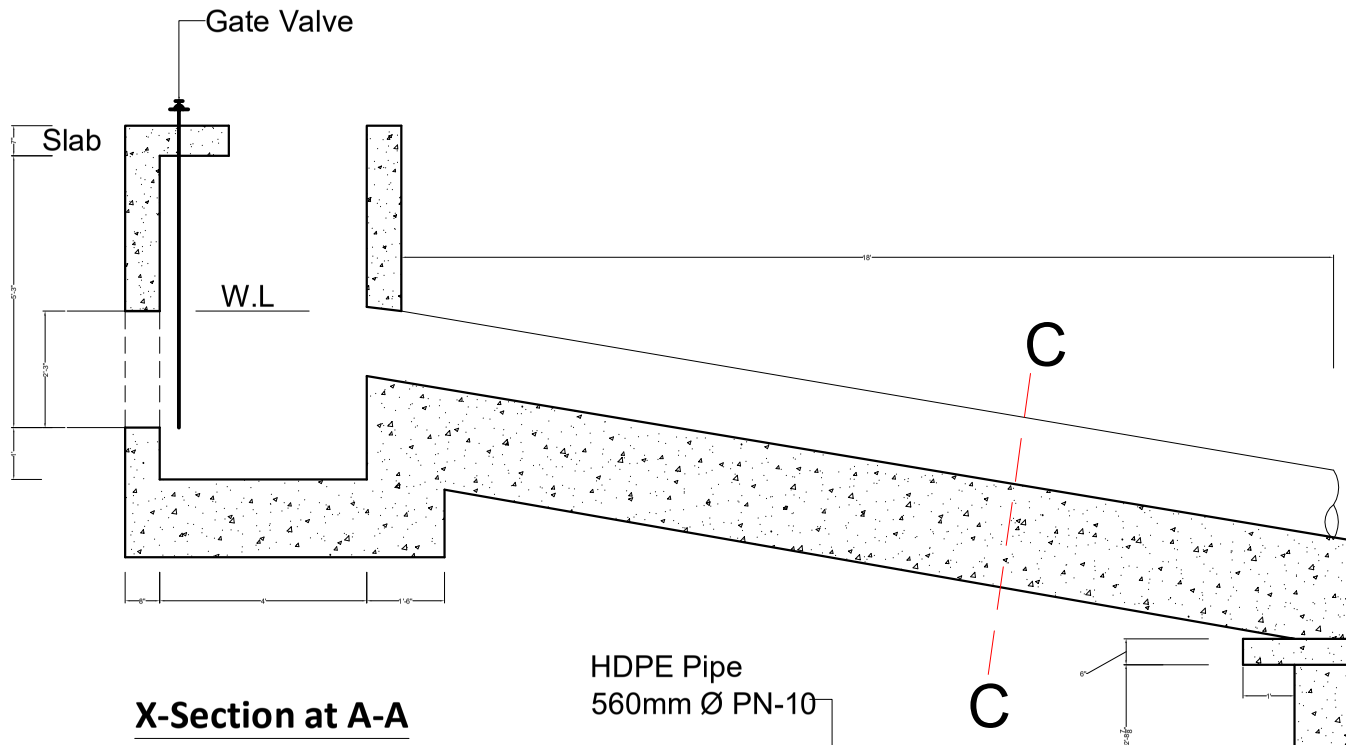
X-Section at C-C



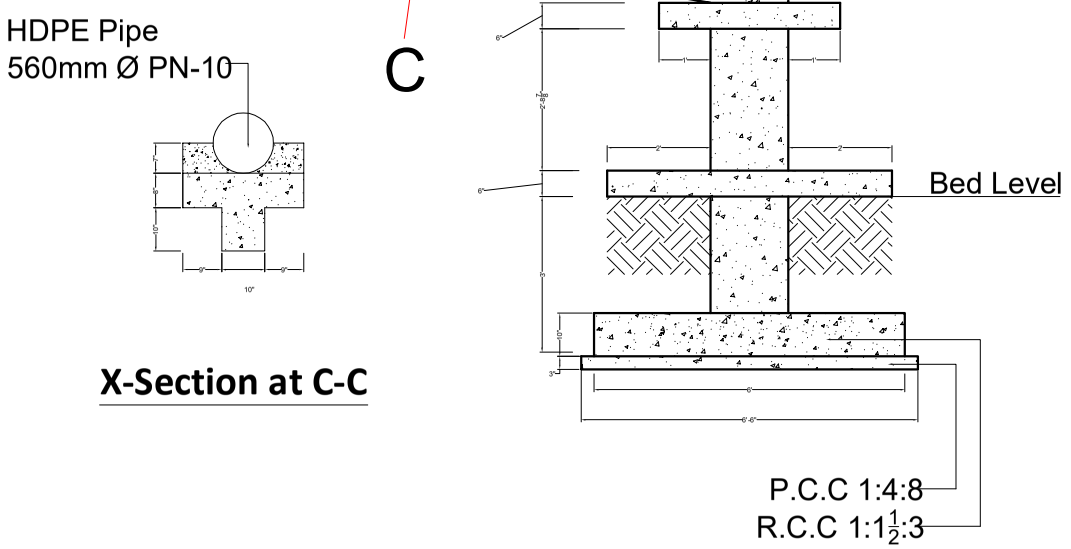
X-Section at B-B

Plan & X-Section of Outlet Chamber Anarobic Pond

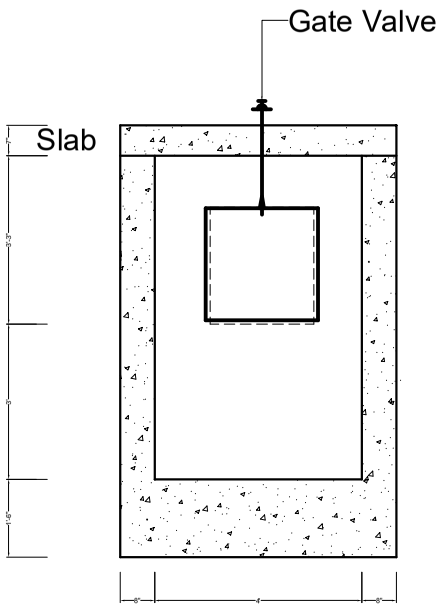
Plan of inlet Chamber



X-Section at A-A

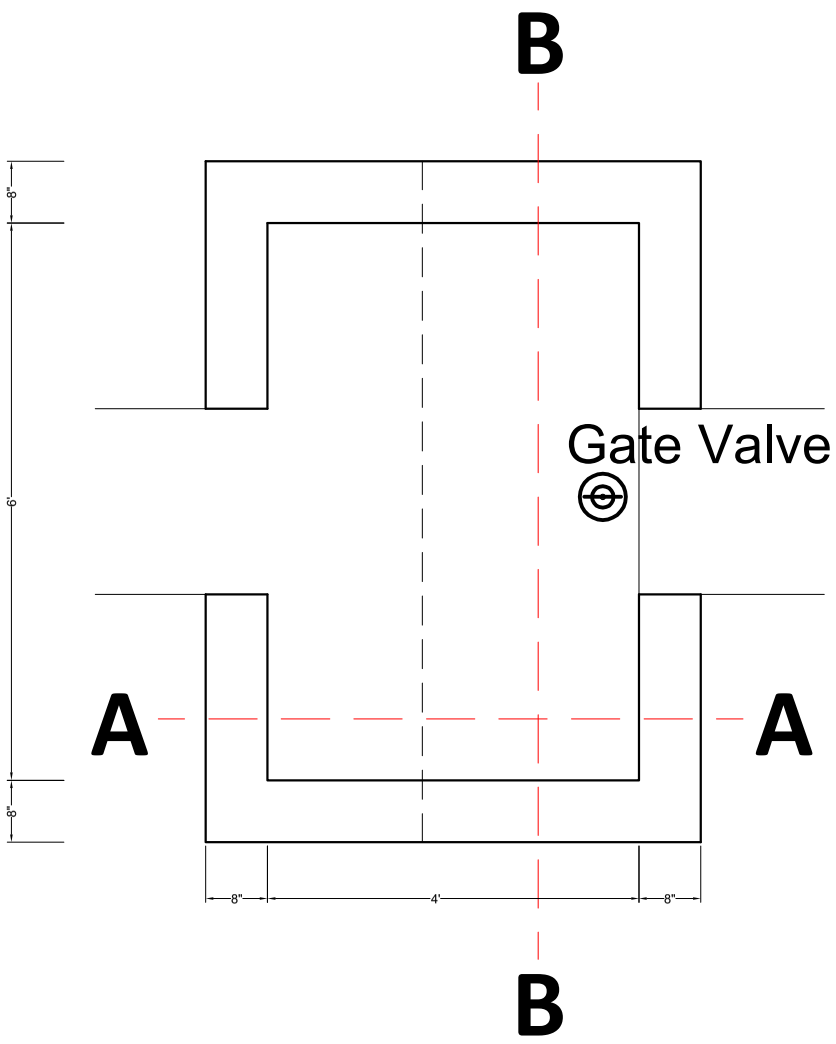


X-Section at C-C

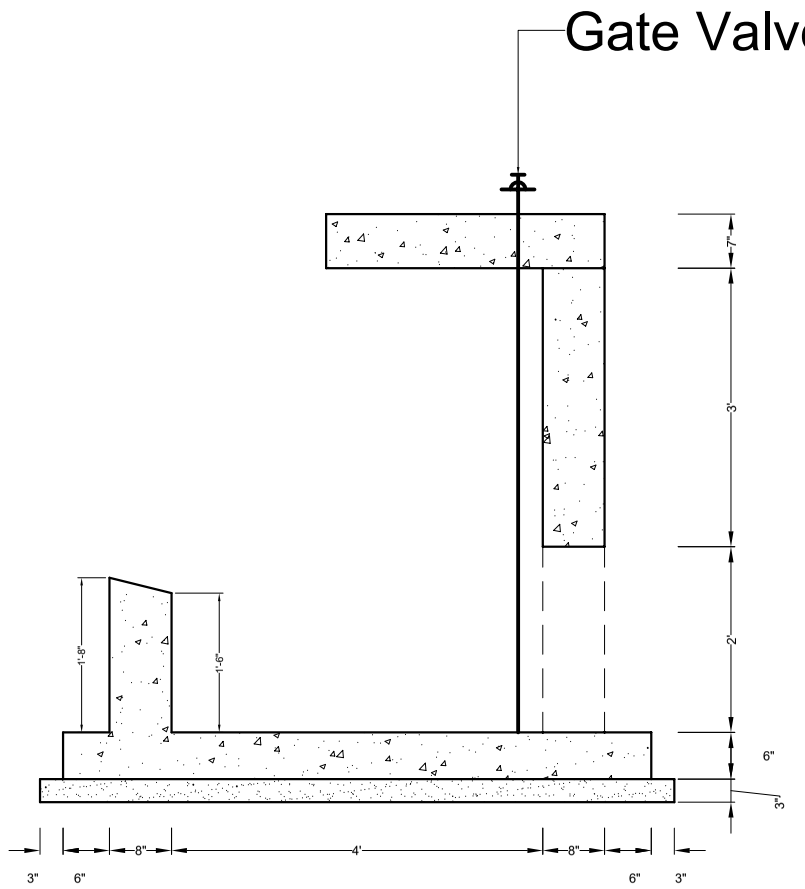


X-Section at B-B

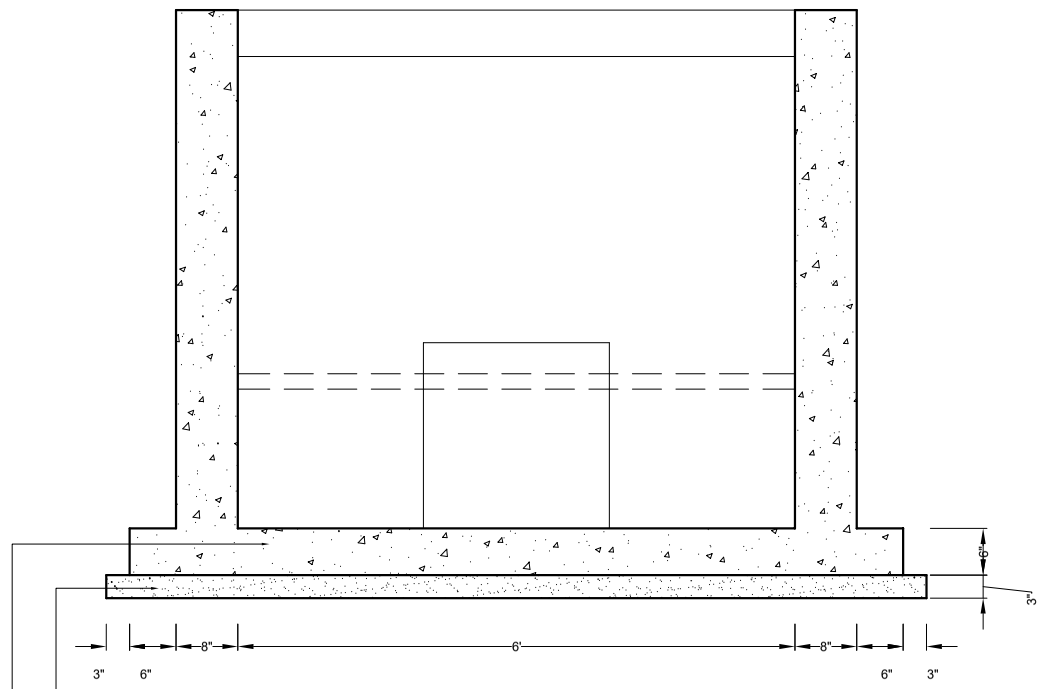
Plan & X-Section of Inlet Chamber Facultative Pond



Plan of Facultative Outlet Chamber



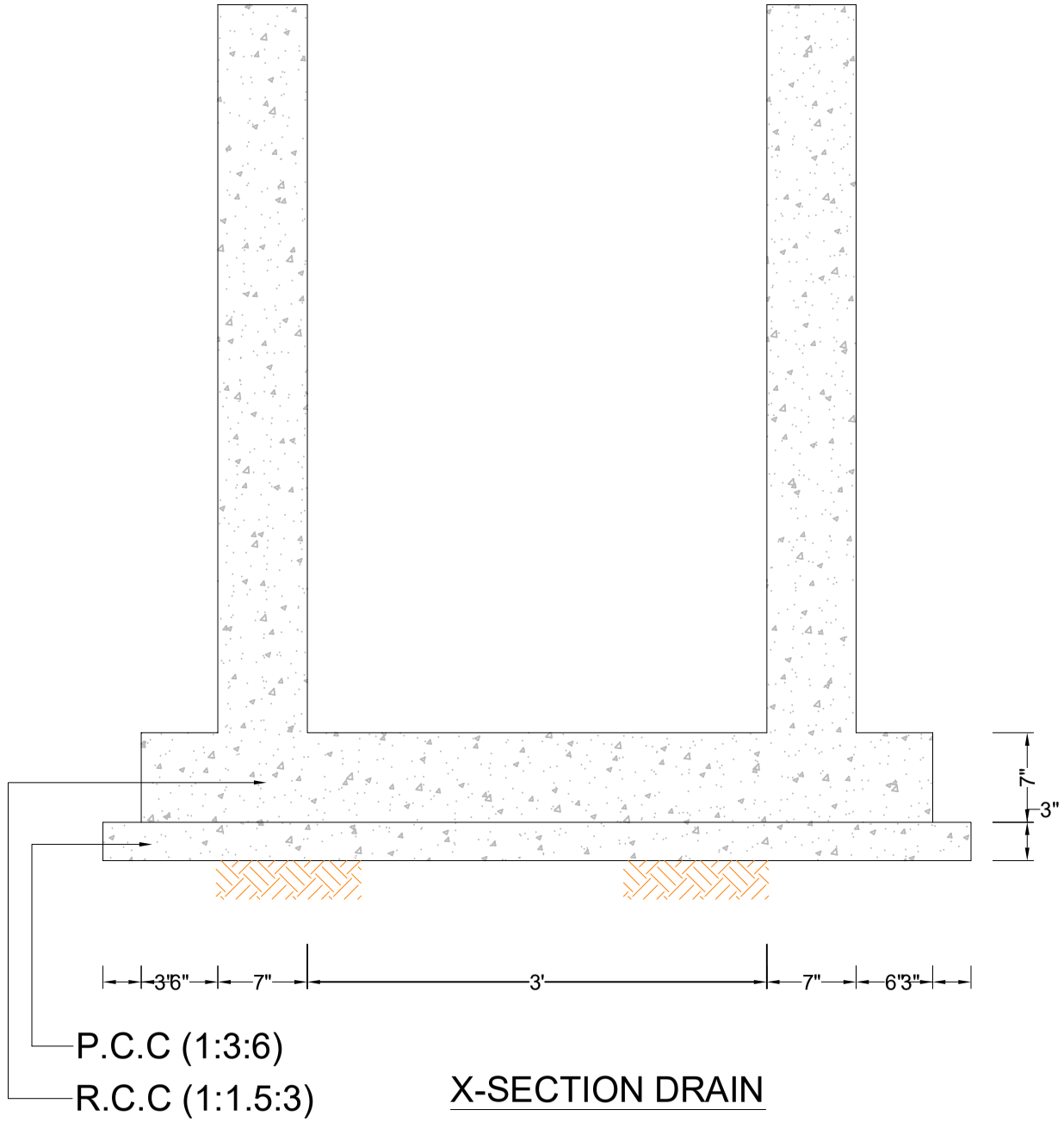
X-Section at A-A



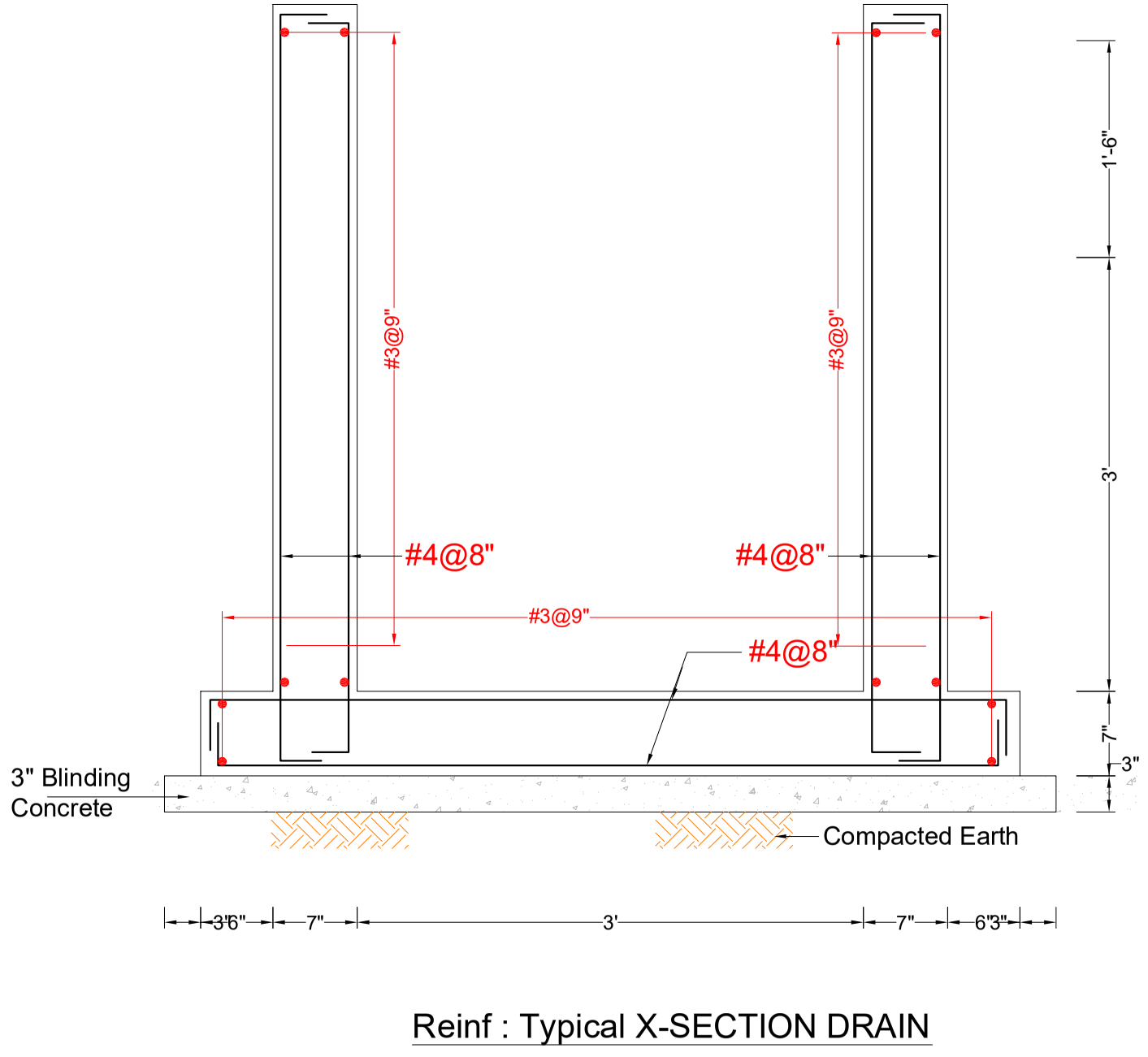
X-Section at B-B

P.C.C 1:4:8

R.C.C 1:$1\frac{1}{2}$:3

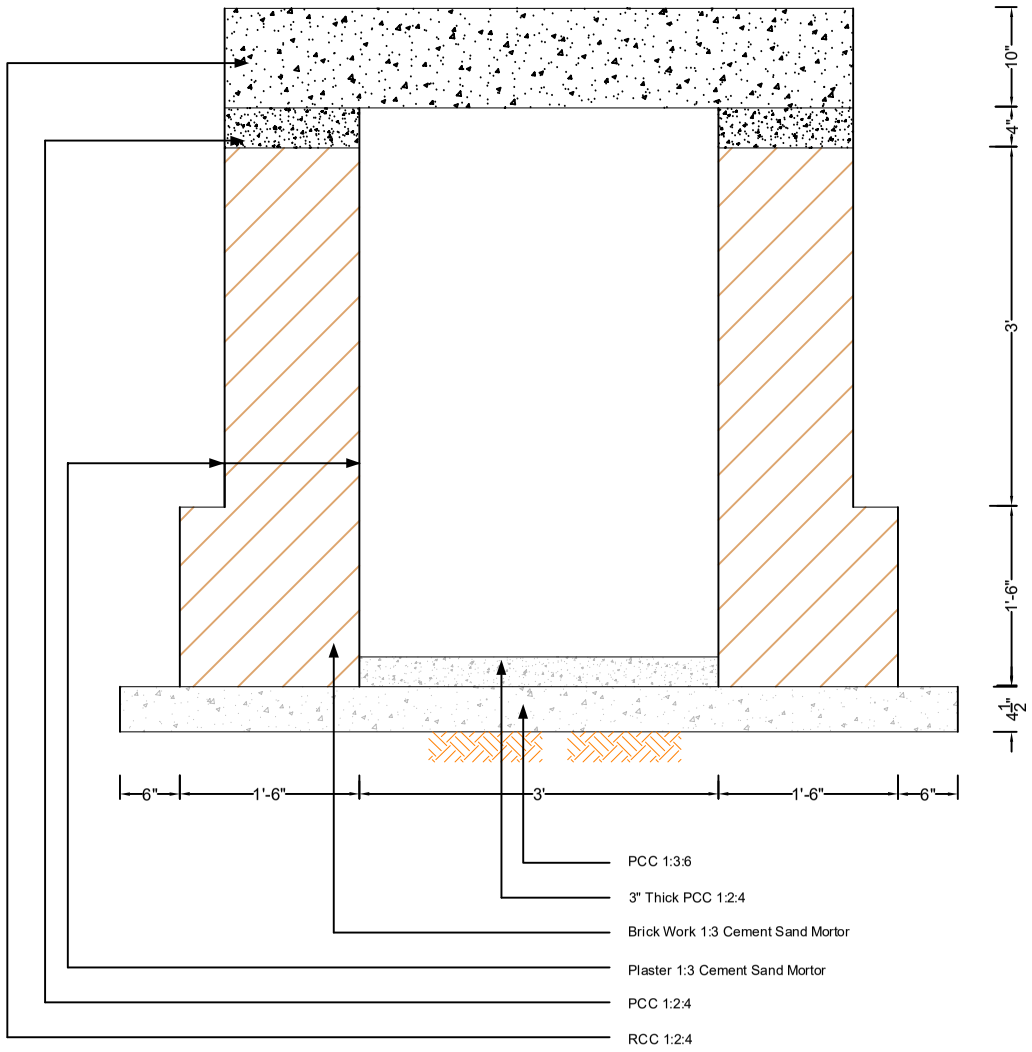


X-SECTION DRAIN

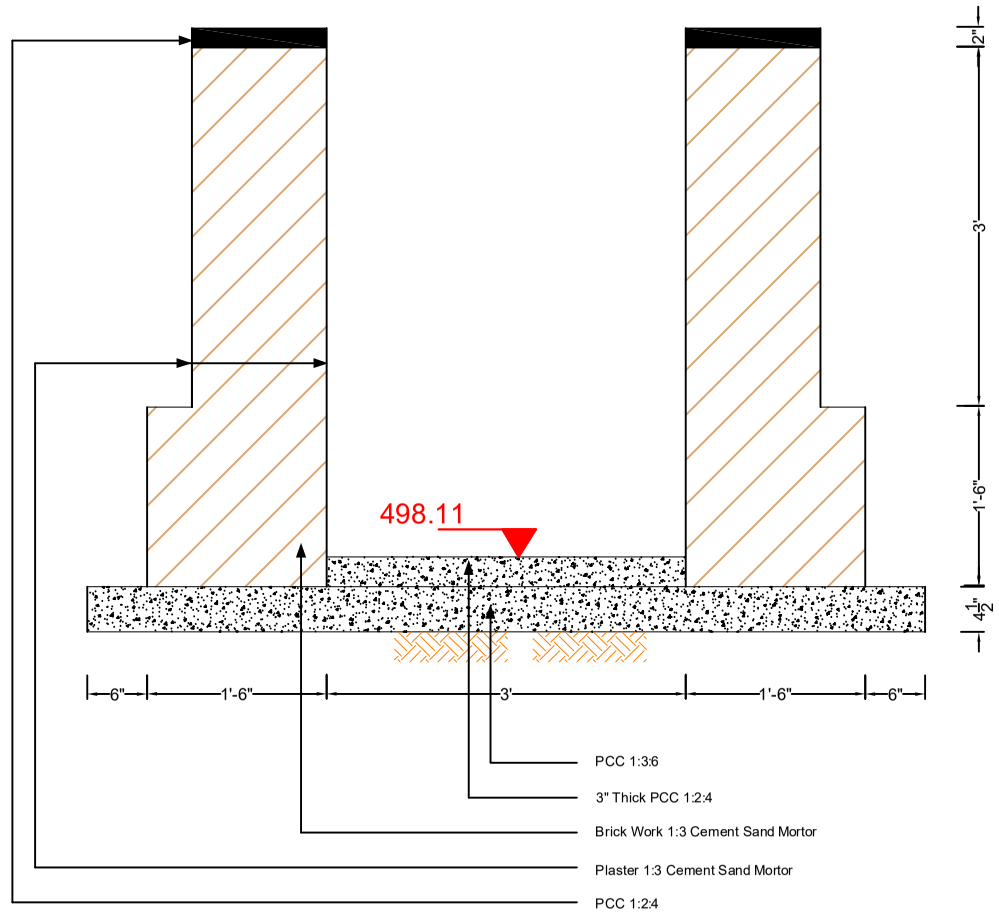


Reinf : Typical X-SECTION DRAIN

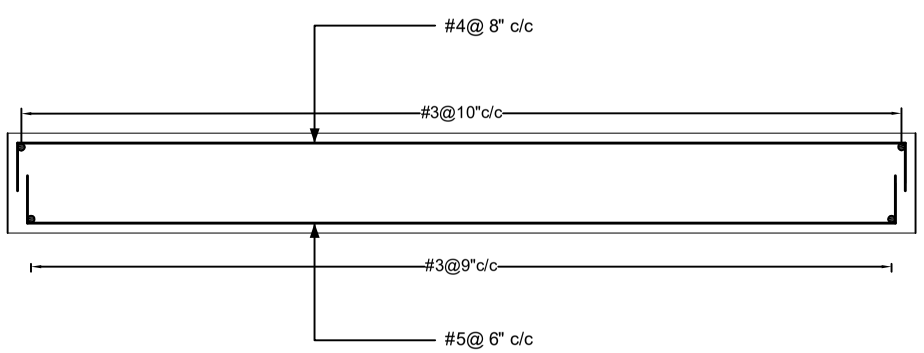
NOTE:
Steel Grade 60



X-SECTION INTAKE DRAIN(Covered) 5.33' x 4.50'

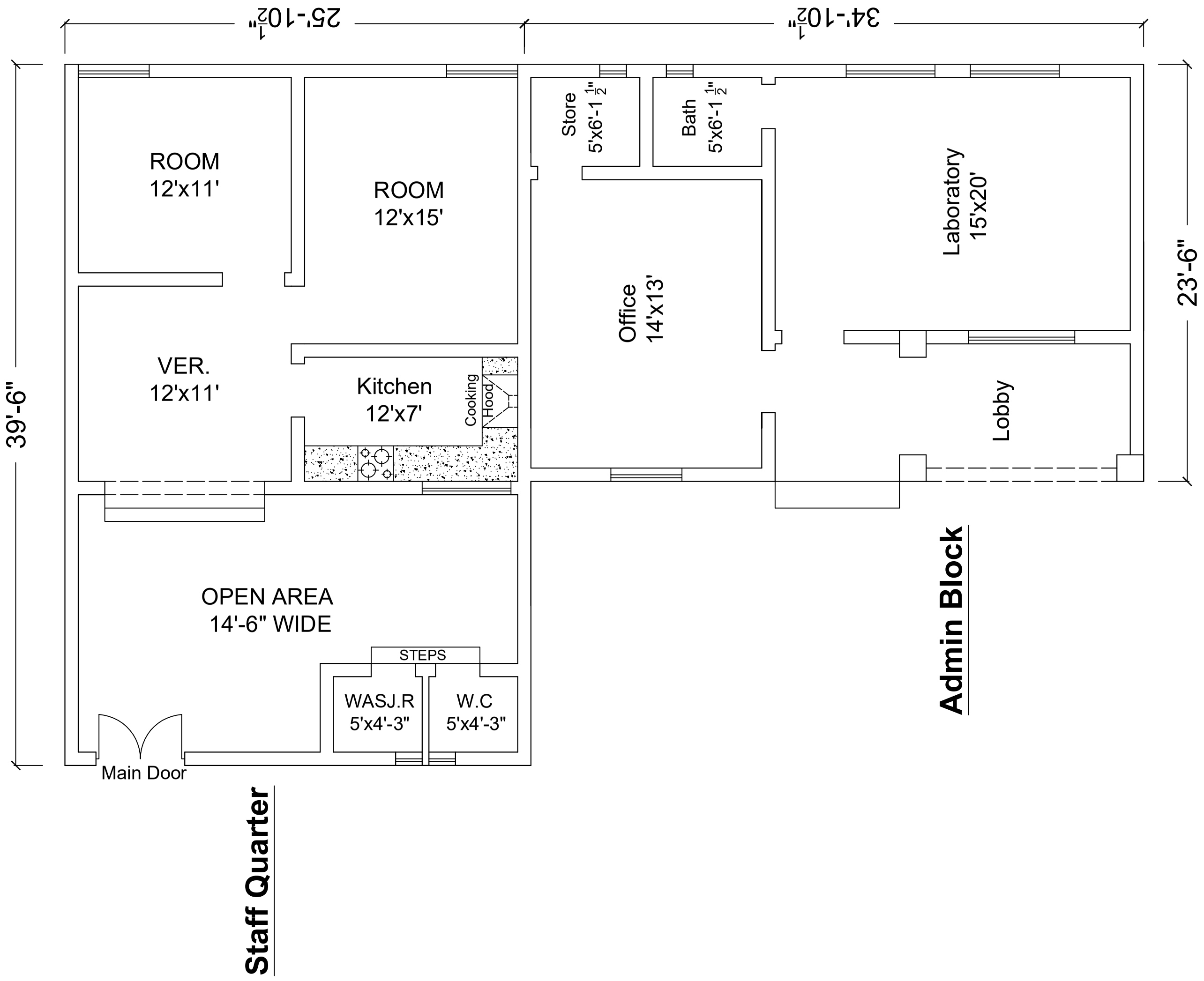


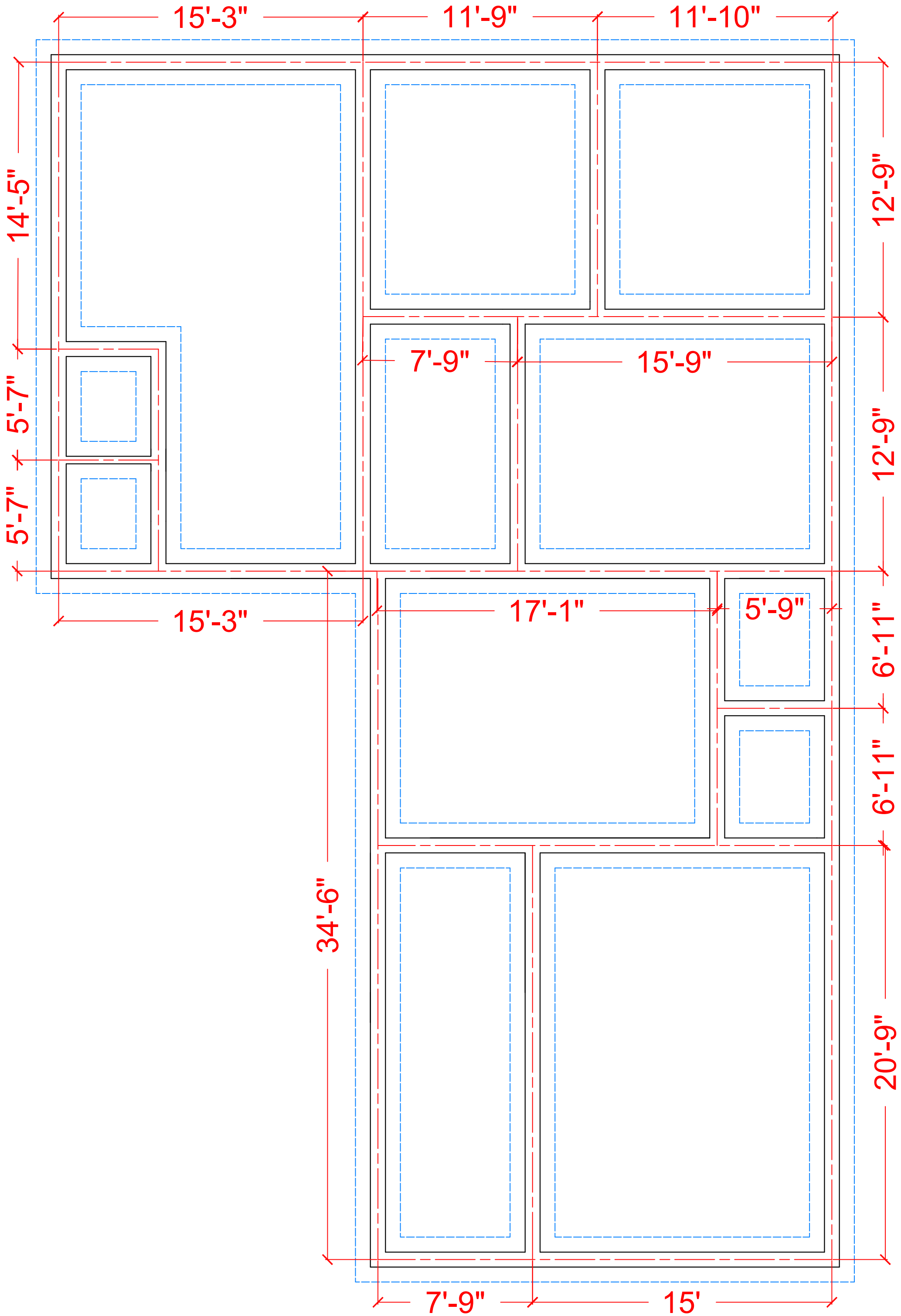
X-SECTION INTAKE DRAIN 5.33' x 4.50'



Reinf : Typical X-SECTION OF SLAB

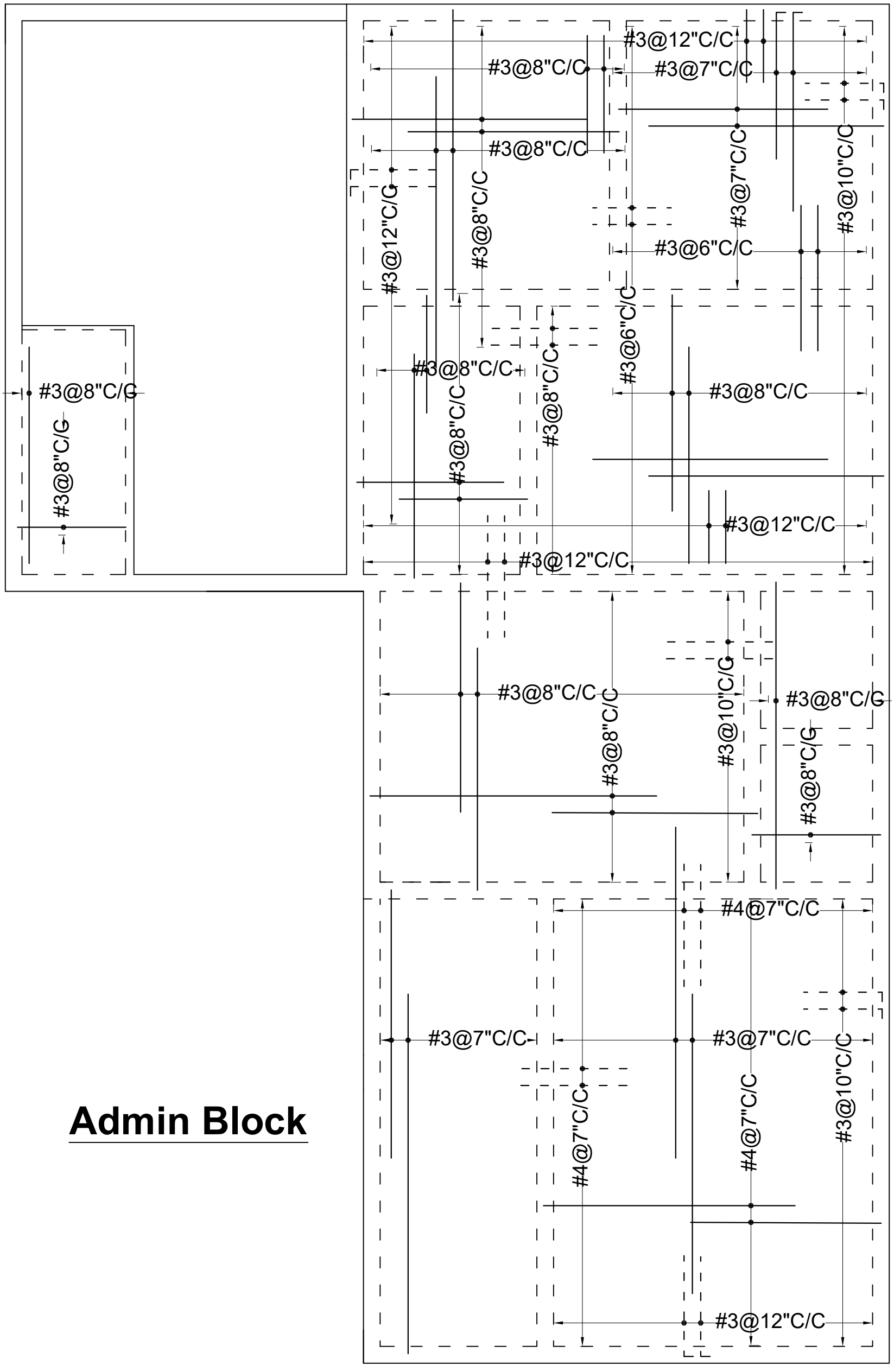
EFFLUENT DRAIN 3' x 4'-6"


25'-10½"
34'-10½"
39'-6"
23'-6"
ROOM
12'x11'
ROOM
12'x15'
Store
5'x6'-1 ½"
Bath
5'x6'-1 ½"
Laboratory
15'x20'
Office
14'x13'
VER.
12'x11'
Kitchen
12'x7'
Cooking
Hood
Lobby
OPEN AREA
14'-6" WIDE
STEPS
WASJ.R
5'x4'-3"
W.C
5'x4'-3"
Main Door
Staff Quarter
Admin Block


15'-3"
11'-9"
11'-10"
14'-5"
12'-9"
5'-7"
7'-9"
15'-9"
5'-7"
12'-9"
15'-3"
17'-1"
5'-9"
6'-11"
6'-11"
34'-6"
20'-9"
7'-9"
15'

Staff Quarter

Admin Block



ANNEXURE-I
ECONOMIC ANALYSIS, SENSITIVITY ANALYSIS AND COST BENEFITED RATIO

Punjab Cities Program

IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA

1. ECONOMIC AND FINANCIAL ANALYSIS

1.1. GENERAL

Currently, Municipal Wastewater in Kamalia City has been connected through open drains and

- This wastewater is going to the agriculture farm without any treatment.
- Wastewater is also stagnating the streets, open plots and creating environmental pollution.
- Occur deterioration in air quality due to bad smell
- Overflow on the roads are occurring resultantly, road network are damaging and MC Kamalia spending huge funds for maintenance as well as reconstruction of road network.

The project is designed to improve the service delivery by replacement and laying of trunk sewer according to need base and topographic conditions. It will provide Improvement of service delivery level of the municipal services in the served areas of the city for provision of better basic urban services for improved live-ability of the citizen.

The objective of the study is to assess future flow of incremental benefits/revenues against the investment on proposed project works, mainly comprising:

- Improvement of Existing System &
- Construction of Waste Water Treatment Plant

1.2. ECONOMIC AND FINANCIAL STUDIES

The main objective of the economic and financial studies for the above-mentioned works is to assess the benefits both in economic and financial terms against estimated costs for the proposed facilities. The project has been appraised to estimate the economic and financial viability by working out Economic Internal Rate of Return (EIRR) and Financial Internal Rate of Return (FIRR), B/C Ratio, Net Present Value and test its sensitivity under different constraints.

1.3. ECONOMIC EVALUATION

Economic evaluation of the project analysis has been decided by application of efficiency criterion of public investment involved using “Discounted Cash Flow” technique. The analysis details:

- Determination of economic parameters to express costs and benefits in real economic terms

- Quantification of Economic benefits
- Derivation of project financial costs in economic terms
- Computation of indicators viz. EIRR, NPV, B/C Ratio and
- A full range of sensitivity studies by various parameters used in analysis

1.3.1. Economic Parameters

Parameters for measurement of Economic Benefits

i) Annual sewerage flow figure is estimated as 4105 MG.

ii) Project implementation period taken as year 2023-24 and 2024-25

iii) 1st Year after project implementation taken as 2026

iv) Project analysis undertaken for period of 20 year, after implementation

v) UC population of Kamalia City in 2022 was 161,668 persons.

vi) Population Growth Rate taken as 1.76 % per annum.

vii) Served Population is estimated to be 44 % of the total population.

viii) Average household size taken as 6.74 %

ix) Population suffering from water borne diseases are broadly taken as 30%. However, about half (15%) is assumed to be suffering due to sewerage problems.

x) Pakistan Average Monthly Income: Household data was reported at 41,545.000 PKR in 2019. This records an increase of 5.22% from the previous number of 35,662.000 PKR for 2016. Average monthly household Income thus taken as Rs.41, 545 in 2019 has been projected as over the period of analysis using annual growth rate of 5.22%.

xi) Average monthly expenditure per household on health care has been reported as Rs. 1245.15 in 2019 for urban area of Pakistan. To be conservative, it is taken as Rs 1500 per month (in base year) and onwards projected at 10% annual increase.

xii) Sewerage Tariff revenue collection efficiency has been taken as 75% in first year after implementation and onwards increased gradually up to 95%.

xiii) Productivity increase is of averagely 4 days per month

xiv) The Opportunity Cost of Capital (OCC) has been taken as 12% for economic appraisal. This rate of discount has been adopted as a cut-off rate for declaring the project economically and financially viable

xv) Standard Conversion Factor (SCF) represents the ratio of prices of all goods within the economy with respective international prices. The value of SCF used in analysis is 0.88. (refer to Table-1)

Table-1
Derivation of Standard Conversion Factor

(Million Rs)

Sr No	Description/Years	2016/17	2017/18	2018/19	2019/20	2020/21	Average
1	Total Imports (CIF)	5,539,721	6,694,897	7,443,253	7,029,819	8,982,441	7,138,026

2	Total Exports (FOB)	2,138,186	2,555,043	3,128,229	3,369,782	4,041,927	3,046,633
3	Taxes on Imports	454,814	538,019	605,677	538,076	654,673	558,252
4	Sales tax on Imports	702,565	824,219	810,357	876,345	1,118,193	866,336
5	Subsidies on Imports	7,000	5,000	5,000	5,000	0	4,400
6	Taxes on Exports	5,980	6,988	8,508	9,547	10,691	8,343
7	Exports Rebates	11,095	14,751	16,570	12,295	22,931	15,528.4
	SCF	**0.869**	**0.871**	**0.882**	**0.880**	**0.879**	**0.877**

Standard Conversion Factor = $\frac{M + X}{(M+Tm) + (X-Tx)}$

SCF = 0.88

i) Data Source: i) Pakistan Economic Survey 2021-22 ii) CBR Year Book 2021-22

1.3.2. Project Economic Benefits

Quantified project economic benefits comprise of:

i. Savings in Health Costs (due to reduction in medical expenditures by public)

ii. Productivity Improvement Benefits

Some more quantifiable economic benefits may include:

i. Reduction in annual O&M cost of the infrastructure due to reduced repairs in forthcoming years
ii. Will
iii. Use of treated water for irrigation.

Some indirect benefits (not quantifiable) of development works would also occur such as:

i) Improve service delivery level of the municipal services

ii) Increased employment during construction period

iii) Improved sources of earning resulting in poverty reduction

iv) Increased economic activities leading to increase in GDP

v) Improved environmental conditions due to improved sewerage facility

vi) Improved hygienic conditions in the city

vii) Elimination of obnoxious smell

viii) Will improve live-ability of the citizen.

ix) Improved overall socio-economic development

Based on above parameters, annual economic benefits for the 20 years after project implementation have been calculated and compared with costs as given in below section.

Project Benefits are detailed in Table-2

Table-2

ECONOMIC BENEFITS

IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA

Description	Unit	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36	2036-37	2037-38	2038-39	2039-40	2040-41	2041-42	2042-43	2043-44	2044-45
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Total UC Population - Kamalia		170,355	173,353	176,404	179,509	182,669	185,884	189,155	192,484	195,872	199,319	202,827	206,397	210,030	213,726	217,488	221,316	225,211	229,174	233,208	237,312
Total Served Population	No	74,956	76,276	77,618	78,984	80,374	81,789	83,228	84,693	86,184	87,701	89,244	90,815	92,413	94,040	95,695	97,379	99,093	100,837	102,612	104,418
Household Size	No	6.74	6.74	6.74	6.74	6.74	6.74	6.74	6.74	6.74	6.74	6.74	6.74	6.74	6.74	6.74	6.74	6.74	6.74	6.74	6.74
Households of Served Population	No	11,121	11,317	11,516	11,719	11,925	12,135	12,348	12,566	12,787	13,012	13,241	13,474	13,711	13,952	14,198	14,448	14,702	14,961	15,224	15,492
Economic Benefits of Savings of Health Cost																					
HH With Waterborne Diseases (Sewerge)	%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%
	Number	1668	1698	1727	1758	1789	1820	1852	1885	1918	1952	1986	2021	2057	2093	2130	2167	2205	2244	2284	2324
Average Monthly Health Expenditure (Urban)	Rs/month/HH	1650	1815	1997	2196	2416	2657	2923	3215	3537	3891	4280	4708	5178	5696	6266	6892	7582	8340	9174	10091
	Rs/Annum/HH	19800	21780	23958	26354	28989	31888	35077	38585	42443	46687	51356	56492	62141	68355	75190	82710	90980	100079	110086	121095
Annual Health Cost Savings	Rs. Million	33.03	36.97	41.39	46.32	51.85	58.04	64.97	72.73	81.41	91.12	102.00	114.18	127.80	143.06	160.13	179.25	200.64	224.59	251.40	281.40
Economic Benefits of Productivity Increases																					
Average Monthly Household Income	Rs	59,321	62,417	65,676	69,104	72,711	76,506	80,500	84,702	89,124	93,776	98,671	103,822	109,241	114,944	120,944	127,257	133,900	140,889	148,244	155,982
Economic Value of daily per capita Income	Rs	293.38	308.69	324.80	341.76	359.60	378.37	398.12	418.90	440.77	463.78	487.99	513.46	540.26	568.46	598.14	629.36	662.21	696.78	733.15	771.42
Average Expected Productivity Increase Days	Days	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Annual Economic Benefits of Productivity Increases	Rs. Million	87.96	94.18	100.84	107.97	115.61	123.79	132.54	141.91	151.95	162.69	174.20	186.52	199.71	213.83	228.95	245.15	262.48	281.05	300.92	322.20
Total Economic Benefits (million Rs)		120.99	131.15	142.23	154.30	167.46	181.83	197.51	214.64	233.36	253.82	276.20	300.69	327.51	356.89	389.09	424.39	463.12	505.64	552.32	603.61

1.3.3. Project Economic Costs

Project costs comprise of Investment/capital costs and annual operation and maintenance costs. These are detailed below:

1.3.4. Capital Costs

Project's total investment costs works out as Rs. 1592.52 million. These have been phase over the project implementation period in years 2023-24 and 2024-25. Project Investment Costs by major works are detailed as under::

Table- 3
Project Investment Costs – By Major Works

Ser #	Description	Total Cost	Year 23-24	Year 24-25
		Rs in Million		
1	Package-1 Sewerage system	463.87	324.71	139.16
2	Package-2 Disposal station & Forcemain	349.46	244.62	104.84
3	Package-3 Providing and Fixing of RPC manhole Cover	11.05	11.05	
4	Package-4 Construction of Wastewater Treatment Plant (WWTP)	539.07	377.35	161.72
5	Package-5 Supply of Liquid Waste Machinery	50.8	50.8	
6	E & S cost	7.5	5.25	2.25
	Total Cost (Rs.)	**1421.74**	**1013.78**	**407.97**
	ARAP Cost	6	6	-
	Add 2% contingencies	28.43	19.9	8.53
	Add 5% PST	68.17	47.72	20.45
	Add 5% escalation	68.17	47.72	20.45
	Grand Total Cost (Rs. In millions)	**1592.52**	**1135.12**	**457.4**

These Costs have been summarized in below Table:

Table- 4
Project Investment Costs – Summary

Implementation Years	Start/End Month	Annual Phasing	Financial Cost	**Economic Costs**
		%	Million Rs	
2023-24	2023-24	71.28	1135.12	998.9056
2024-25	2024-25	28.72	457.4	402.512
Total	**16 Months**	**100.00**	**1592.52**	**1401.418**

- By applying SCF of 0.88

Total Investment costs of Rs. 1592.52 have been converted in to economic costs of Rs 1401.418 million by applying SCF (Standard Conversion Factor) of 0.88.

1.3.5. Operation and Maintenance Costs

Annual operation and maintenance costs are taken as Rs 6.70 million. These also have been converted in to economic terms as Rs 5.896 million by applying SCF of 0.88.

1.3.6. Calculation of Economic Indicators

In order to assess economic viability, economic indicators like EIRR, B/C Ratio, NPV have been worked out by using the streams of economic benefits and costs and detailed in Table-5.

TABLE -5
Derivation of Economic Internal Rate of Return
IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA

Rs.Million

n	Implementation Years	Project Costs			Total Water Supply Benefits	Net Benefits (Base case)
		Investment Costs	O&M Costs	Total Costs		
1	2023-24	998.91	0.00	998.91	0.00	-998.91
2	2024-25	402.51	0.00	402.51	0.00	-402.51
3			5.90	5.90	120.99	115.10
4			5.90	5.90	131.15	125.26
5			5.90	5.90	142.23	136.33
6			5.90	5.90	154.30	148.40
7			5.90	5.90	167.46	161.57
8			5.90	5.90	181.83	175.93
9			5.90	5.90	197.51	191.62
10			5.90	5.90	214.64	208.74
11			5.90	5.90	233.36	227.46
12			5.90	5.90	253.82	247.92
13			5.90	5.90	276.20	270.30
14			5.90	5.90	300.69	294.80
15			5.90	5.90	327.51	321.62
16			5.90	5.90	356.89	351.00
17			5.90	5.90	389.09	383.19
18			5.90	5.90	424.39	418.50
19			5.90	5.90	463.12	457.23
20			5.90	5.90	505.64	499.74
21			5.90	5.90	552.32	546.42
22			5.90	5.90	603.61	597.71
		1,401.42	117.92	1,519.34	5,996.76	4,477.42
	Discount Rates (%)	**Present Worth of Costs**			**Present Worth of Benefits**	**Net Present Worth**
	10%	1240.75	41.48	1282.23	1624.08	341.84
	12%	1212.76	35.11	1247.87	1312.03	64.17
	15%	1172.97	27.91	1200.88	978.05	-222.82

20%	1111.94	19.94	1131.88	637.84	-494.04
25%	1056.73	14.92	1071.65	443.83	-627.82
Economic Internal Rate of Return (FIRR) %				**12.56**	
Benefit/ Cost Ratio (at 12% Discount Rate)				**1.05 :1**	

Results are summarised as under:

Table- 6

Economic Analysis Results

Economic Parameters / Indicators	**At 12 % Discount Rate**
Present Worth of Benefit (Rs. in Million)	1312.03
Present Worth of Costs (Rs. in Million)	1247.87
Net Present Value (Rs. in Million)	64.17
B/C Ratio	1.05:1
EIRR (Percent)	12.56

The results given above indicate that the project as planned is economically viable as calculated EIRR is well above 12 %, the economic opportunity cost of capital in Pakistan.

1.3.7. Sensitivity / Risk Analysis

The sensitivity analysis has been done to test the resilience of assumptions used. Alternate analyses would be done to indicate the sensitivity of the results with regard to the key assumptions relating to project benefits and project cost for both options. The sensitivity test would comprise of the following:

- Over runs in Project Construction Cost.
- Reduction in Project Benefits
- Cost over runs and reduction in benefits, both occurring simultaneously.

The results of the sensitivity analysis are given below:

Table-7

Results of Sensitivity Analysis - Economic

Sr #	**Assumptions**	**EIRR (%)**
i)	Base Case	12.56
Sensitivity Tests		
i)	Reduction in total benefits by 10%	11.39
ii)	Cost over-run by 10%	11.50
iii)	Reduction in benefits and cost over-run both occurring simultaneously	10.37

The results showed that the project is slightly sensitive to the assumed changes in parameters.

1.4. FINANCIAL ANALYSIS

The analysis has been carried out to identify and quantify benefits expressed in financial terms (using market prices), resulting from proposed investment & operational expenditure. Justification of the project has been established by showing its profitability in term of excess of benefits (revenues) over costs by using the discounted cash flow technique. The projected stream of total project revenues over the life of the project has been compared to the estimated stream of total project costs by bringing two to a uniform basis through the process of discounting.

The analysis carried out for the project included:

- Estimation of Project's revenues through tariff
- Estimation project financial costs (investment & operation)
- Calculation of financial indicators

1.4.1. Financial Parameters

1.4.1.1. Discount Rate for Financial Analysis

Discount Rate for Financial analysis might have been based on the Rate of mark-up chargeable on development Loans and advances by the Federal Government. These rates for the Fiscal years 2013-14 through 2021-22 are given as given under:-

Table- 8

Rates of mark-up Chargeable on Development Loans & Advances**

Year	2013-14	2014-15	2015-16	**2016**-17	2017-18	2018-19	2019-20	2020-21	2021-22	Average*
Rates (%)	11.79	10.53	7.37	6.54	6.62	11.53	12.20	10.30	11.20	9.73 Say 10%

Source: Annual Notifications by Government of Pakistan, Finance wing. * Geometric Mean

On average, 9.73 % rate is worked out which may be taken as 10%. The latest available rate for the year 2021-22 is 11.20%. Financial Indicators (NPV & B/C Ratio) have thus been worked out using discount rate of 11.20 % percent.

1.4.1.2. Sewerage Tariffs

Currently, no tariff levies are imposed in the city. However proposed tariff would be taken as 80 % of the waters supply tariff. The proposed tariff, onwards, is projected using 5% per annum over the period of analysis (i.e. 20 Years after project implementation).

1.4.1.3. Sewerage - Commercial Tariffs

Financial cost per 000 gallon (against annual Sewerage flow of 4015 MGD) is calculated as Rs 21.50 per 000 gallons and the same have been applied.

1.1.1.1. New Connections

The new sewerage connections for domestic consumers have been taken as 11,121 in first year after operation and Commercial user's connections have been estimated as 556 (5% of domestic Connections).

1.1.1.2. New Connections Charges / Fee

Proposed new connection charges are taken as Rs 2500 per new domestic connection and Rs 5000 per new commercial connection.

New connection revenues thus calculated for the first year after project implementation (Year 2025-26) are given under:

Table-9

Revenues – New Connections

New Connection Type	New Connections (no)	Proposed Connection Charges (Rs)	Connection Revenues (M.Rs)
Domestic Connections	11,121	2500	27.80
Commercial Connections*	556	5000	2.78
Total		-	30.58

- 5% of Domestic Connections

1.4.2. Annual Financial Revenues

Based on parameters / assumptions discussed above, financial revenues have been calculated, detailed in Table-10.

Table-10

FINANCIAL REVENUES

IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (W

Item	Unit	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36	2036-37	2037-38	2038-39	2039-40	2040-41	2041-42	2042-43	2043-44	2044-45
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Domestic Revenues																					
Total Domestic Served Population	Number	74,956	76,275	77,617	78,983	80,373	81,788	83,227	84,692	86,183	87,700	89,244	90,815	92,413	94,039	95,694	97,378	99,092	100,836	102,611	104,417
Household Size	Number	6.74	6.74	6.74	6.74	6.74	6.74	6.74	6.74	6.74	6.74	6.74	6.74	6.74	6.74	6.74	6.74	6.74	6.74	6.74	6.74
Served Household	Number	11,121	11,317	11,516	11,719	11,925	12,135	12,348	12,566	12,787	13,012	13,241	13,474	13,711	13,952	14,198	14,448	14,702	14,961	15,224	15,492
Tariff for Sewerage discharge (Domestic)	Rs/Month/HH	550	605	666	732	805	886	974	1,072	1,179	1,297	1,427	1,569	1,726	1,899	2,089	2,297	2,527	2,780	3,058	3,364
	Rs/Annum/HH	6,600	7,260	7,986	8,785	9,663	10,629	11,692	12,862	14,148	15,562	17,119	18,831	20,714	22,785	25,063	27,570	30,327	33,360	36,695	40,365
Annual Revenues (Domestic)	Rs. Million	73.40	82.16	91.97	102.94	115.23	128.98	144.38	161.61	180.90	202.50	226.67	253.72	284.01	317.90	355.85	398.32	445.87	499.09	558.66	625.34
Commercial Revenues																					
Sewerage Flow (10% of 4015 MG per annum)	MG / Annum	803	803	803	803	803	803	803	803	803	803	803	803	803	803	803	803	803	803	803	803
Cost of Sewerage based on O&M Costs	Rs/000 Gallons	23.65	26.02	28.62	31.48	34.63	38.09	41.90	46.09	50.70	55.77	61.34	67.48	74.23	81.65	89.81	98.80	108.68	119.54	131.50	144.65
Total Commercial Revenues	Rs. Million	18.992	20.891	22.980	25.278	27.806	30.586	33.645	37.009	40.710	44.781	49.260	54.186	59.604	65.565	72.121	79.333	87.266	95.993	105.592	116.152
Total Revenues (Domestic +Commercial)	Rs. Million	92	103	115	128	143	160	178	199	222	247	276	308	344	383	428	478	533	595	664	741
Recovery	Recovery Rate	75%	80%	85%	90%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%
Total Tariff Revenues	80%	69.293	82.440	97.704	115.399	135.884	151.592	169.123	188.691	210.533	234.914	262.131	292.514	326.431	364.296	406.572	453.773	506.477	565.325	631.038	704.417
New Connection Revenues	Rs. Million	15.291	15.291																		
Total Revenues (tariff+New Connection)		**84.585**	97.732	97.704	115.399	135.884	151.592	169.123	188.691	210.533	234.914	262.131	292.514	326.431	364.296	406.572	453.773	506.477	565.325	631.038	704.417

These revenues are compared with following costs.

1.4.3. Project Financial Costs

1.4.3.1. Capital Cost

Total engineering estimates of project capital investment works out as Rs, **1592.52** million and is phased as given below:

Table-11
Investment Costs - Financial

Implementation Years	Start/End Month	Annual Phasing	Financial Cost
		%	Million Rs
2023-24	2023-24	71.28	1135.12
2024-25	2024-25	28.72	457.4
Total		**100.00**	**1592.52**

1.4.3.2. O&M (Operational and Maintenance) Costs

The annual operation and maintenance cost (repair & maintenance, staff, utilities etc.) has been estimated as Rs. 6.7 million.

1.4.4. Financial Indicators

As mentioned above, the streams of project financial revenues and costs over 20 years period of analysis have calculated in Table-12.

TABLE -12

Derivation of Financial Internal Rate of Return

IMPROVEMENT OF SEWERAGE SYSTEM AND CONSTRUCTION OF WASTE WATER TREATMENT PLANT (WWTP) KAMALIA

Rs.Million

n	Implementation Years	Project Costs			Total Water Supply Receipts	Net Benefits (Base case)
		Investment Costs	O & M Costs	Total		
1	2023	1,135.120	0.00	1,135.12	0.00	-1,135.12
2	2024	457.400	0.00	457.40	0.00	-457.40
3			6.70	6.70	84.58	77.88
4			7.04	7.04	97.73	90.70
5			7.04	7.04	97.70	90.67
6			7.39	7.39	115.40	108.01
7			7.76	7.76	135.88	128.13
8			8.14	8.14	151.59	143.45

9			8.55	8.55	169.12	160.57
10			8.98	8.98	188.69	179.71
11			9.43	9.43	210.53	201.11
12			9.90	9.90	234.91	225.02
13			10.39	10.39	262.13	251.74
14			10.91	10.91	292.51	281.60
15			11.46	11.46	326.43	314.97
16			12.03	12.03	364.30	352.26
17			12.63	12.63	406.57	393.94
18			13.27	13.27	453.77	440.51
19			13.93	13.93	506.48	492.55
20			14.63	14.63	565.33	550.70
21			15.36	15.36	631.04	615.68
22			16.12	16.12	704.42	688.29
Total		1,592.52	211.65	1,804.17	5,999.13	4,194.96

	Discount Rates (%)	**Present Worth of Costs**			**Present Worth of Benefits**	**Net Present Worth**
	10%	1409.94	64.34	1474.29	1500.76	26.48
	11.20%	1390.69	57.26	1447.95	1305.20	-142.76
	12%	1378.14	53.12	1431.26	1192.72	-238.54
	15%	1332.92	40.83	1373.75	868.12	-505.63
	20%	1263.57	27.84	1291.42	545.72	-745.69
	25%	1200.83	20.09	1220.93	367.90	-853.03
	Financial Internal Rate of Return (FIRR) %					**10.17**
	Benefit/ Cost Ratio (at 10% Discount Rate)				**0.90 :1**	

These are compared with financial costs as given in Table-11 above (in Section 1.4.3)

To judge the financial viability of the project, financial indicators like net present value (NPV), Benefit Cost Ratio (B/C Ratio) and Financial Internal Rate of Return (FIRR) have been calculated. The results are summarized blow.

Table- 13
Financial Analysis Results

Financial Parameters / Indicators	**At 11.20 % Discount Rate***
Present Worth of Benefit (Rs. in Million)	1305.20
Present Worth of Costs (Rs. in Million)	1447.95
Net Present Value (Rs. in Million)	-142.76
B/C Ratio	0.90:1
FIRR (Percent)	10.17

- Refer to Section 1.3

Above results indicate that calculated FIRR is not above 11.20% (The latest available rate of mark-up Chargeable on Development Loans & Advances 2021-21). At 11.20% discount rate, NPV is not positive, calculated B/C ratio does not exceeds unity.

However, as mentioned above, provision of water supply systems in the responsibility of the Government and such projects are never based on financial viability.

1.5. CONCLUSION

Provision of water supply systems in basic necessity of the community and is responsibility of the Government to provide; financially though project is viable, however, such projects are not based on financial viability (and such projects are rarely intended to recover the invested financial resources) and therefore, in the public interest, the project is recommended to implement as planned.

ANNEXURE-J
NO OBJECTION CERTIFICATE

To

OFFICE OF THE
SUPERINTENDING ENGINEER
LOWER CHENAB CANAL EAST CIRCLE

Executive Engineer.
Burala Division.
Faisalabad.

No. _____ /229-W Dated: ___/02/2017.

Subject: NO OBJECTION CERTIFICATE REGARDING CONSTRUCTION OF SULAGE CARRIER DRAIN FOR WASTE WATER OF KAMALIA DISTY ALONG WAGHI DISTY RD:22+100 TO 48+800 AT THE END OF RIGHT OF WAY.

Ref: your office letter No.161/24-WP dated 22-02-2017.

As recommended by you vide your letter under reference approval is hereby accorded for the construction of sulage water carrier for disposal of waste water of Kamalia City along Waghi Disty from RD.22+100 to 48+800 at the end of right of way of the channel subjected to the following conditions:-

1- While execution construction of drain Public Health Engineering Department will be fully responsible for repair of any damage to the channel , on their own expenditure

2- Public Health Engineering Department will be duty bound to vacate the right of way of channel with their own expenditure, whenever land is required by the Irrigation Department.

Superintending Engineer
Lower Chenab Canal East Circle
25/02/17 Faisalabad.

CE

Copy to Executive Engineer Public Health Engineering T.T Singh for Information and necessary action under the rules /policy.

DIO CE (SOUTH) P.H.E.D. LHR
7
HPLA

OFFICE OF THE
DIVISIONAL FOREST OFFICER, FAISALABAD FOREST DIVISION, FAISALABAD.
Phone # 041/9220338: Email: faisalabaddfo@gmail.com

To

The Executive Engineer,
Public Health Engg. Division,
Toba Tek Singh.

No. 1-2/7 /Ac dated Faisalabad, the 10-09- 2015.

Subject: - **EXTENSION/REHABILITATION OF URBAN SEWERAGE SCHEME KAMALIA CITY (PHASE –II).**

Reference:- Your office letter No.1011 dated 10-09-2015.

It is to inform you that this office has no objection for the supply of waste water to Kamalia Forest Plantation as proposed in Annual Development Programme for the year 2015-2016 as per the discussion with Ch. Asad-Ur-Rehman Member National Assembly NA-94 in your presence to supplement the shortage of water in Kamalia Forest Plantation.

10/9/2015

(MUHAMMAD JAVED GILL)
DIVISIONAL FOREST OFFICER,
FAISALABAD FOREST DIVISION,
FAISALABAD.

ANNEXURE-K
REPLY OF OBSERVATION PRE-PDWP

Subject: <u>Annotated Reply of Observations on PC-I of Sewerage System</u>

<u>in Kamalia District T.T. Singh</u>

S.#	Observation	Reply
325	Sewer's layout plan and hydraulic statement	
1	The layout plan of the sewers, disposal stations and force mains has not been included in the PC-I. One map obtained from PMDFC is also not complete. Complete map showing all existing and proposed features of the system in different color coding should be provided with legend.	Layout plan of sewerage system, Disposal Station, and force main was part of PC-1. However map discussed with Consultant and amended. Existing system and proposed system mark in Green and Red colors as desired. All other features already shown.
2	The maximum peak factor is 4.5 but, in some sewers, peak factor of 5.97 has been assumed which should be explained.	Peak Factor was applied Formula base which is amended.
3	The velocity of water at the actual capacity of sewers should also be worked out.	It was explained and agreed that flow in sewer cannot be remained constant hence velocity will according to gradient. Compliance made
4	The sewer nodes provided in the hydraulic statement do not appear in the map provided. The map with nodes given in the hydraulic statement should be provided.	
5	Existing stabilizations pond has been mentioned in the map which actually does not exist at site which should be reconsidered during preparation of the final layout plan.	A stabilization pond was shown in existing map but nothing exists at site. It was agreed to remove and compliance made.
6	The maximum flow in the outfall sewer E- to DW in hydraulic statement is 20.13 cusecs whereas in the design of disposal station at page-348 it has been taken as 17 cusecs. The anomaly should be explained and disposal station should be designed on the correct flow in the outfall sewer.	By amendment in peak factor made, design flow remained same and design of disposal station i.e 17 cusecs.
327	Sewer Profiles	
1	Have any geo-investigations been carried out? If so that should be enclosed in the PC-I.	Boreholes and site data already collected and report being under preparation and will make part of PC-1. The depth of water table 43.75ft.
2	The level of water table should be mentioned in the hydraulic statement as well as in the sewer profiles.	Water level in City area above 43.75 ft.
334	RCC slab	

1	Where the RCC slab shown over here, will be used?	No observation.
348	Design of Disposal Station	
1	The design of collecting tank should match with the flow in the outfall sewer given in the hydraulic statement which does not. Necessary corrections should be done.	As explained and agreed above discharge of wet well matched with peak discharge i.e 17 Cusec. No need of any correction.
349	Disposal station layout plan	
1	A combined section through the entire disposal station showing all levels should be provided to assess the flow of waste water and level of the pumping units.	Required X-section is attached.
2	The head of the pump seems to be on lower side. It should be increased keeping into mind the wear and tear in the impeller and volute chambers which takes place with passage of time.	Compliance made head of pump as agreed enhanced upto 65ft.
350	Screening Chamber	
1	The invert level of the screening chamber is 15.33 feet below NSL. No water table has been shown in the drawings meaning thereby that the water table is much below the floor. Excavation can be done in dry soil up to 20 feet depth. Then, why the dry sinking has been proposed? It should be corrected accordingly.	Agreed with observation. Amended drawing, design and estimate is part of PC-I.
2	All PCC plugs proposed herein should be removed and only RCC flooring with bottom blinding layers should be proposed.	All plugs already provided in RCC with blind concrete.
3	Another drawing of the same screening chamber has been provided at page 351 by sinking method. It is not required and should be deleted.	As explained above, Amended drawing, design and estimate is part of PC-I.
352	Disposal station layout plan	
1	RCC 18” thick in the bed has no connection with the core wall. The well base slab will be stable only when core wall is monolithic with the RCC floor. Drawing should be revised to make them monolithic.	Agreed. Amendment in drawing will made.
2	As there is no uplift pressure, water table being deeper, the thickness should be reduced to 12” or proper design to calculate this this thickness should be established.	Design calculation showed depth of concrete 15 inches, keeping in view waste water structure, cover of concrete increased up to 2 inches. This allowance was incorporate in thickness.
3	The vertical and horizontal reinforcing bars in the walls, should be staggered.	Compliance made
4	No cutting edge has been provided beneath the well curb. How the sinking will take place.	Compliance made. Cutting edge provided

5	The bed level of the collecting tank as given in the drawing is 481.30 whereas that worked out at page-348 is 483.11. The disparity should be looked into and drawings of the disposal station revised accordingly.	Bed level of Collecting tank 481.30 is correctly made in drawing. Level of suction pipe is 481.11. it briefed and agreed.
354	Collecting Tank	
	Page-352 and 354 are the same. One should be removed.	Removed
355	Pump House	
	8 squares have been shown in the walls of the pump house but their nomenclature is not given.	It is clarified that heavy steel work covered the iron work which is part of the estimate
356	Pump House Reinforcements	
1	Thickness of the pump house slab at ground level along with reinforcement should be mentioned.	Thickness of slab at ground level is mentioned as 6" thick. The thickness of pump floor slab is 9".
2	The vertical reinforcement in the pump house walls is excessive and should be rationalized. The bars should be staggered in inner and outer face.	As discussed, vertical reinforcement was agreed keeping in view of pressure loading during sinking.
3	No cutting edge has been provided without which the sinking will not be possible.	Angle iron has been provided in curb beam. However, cutting edge was not shown, needful has been done.
4	The RCC base slab monolithic with the core wall, should be shown in this section and its reinforcement exhibited.	Agreed, necessary correction has been made in drawing.
5	Total number of round bars in the curb should be mentioned.	Agreed, necessary correction has been made in drawing.
358	Pump house configuration	
1	The configuration of the beam of size 15" x 24" in section A-A and Section B-B for supporting the cordon shaft bearing, do not match. It should be corrected and the beams should be shown in the plan at page - 355.	Beam in plan has been shown as desired.
2	In section-B-B the outer masonry wall is missing. The bed slab of the pump house should be kept monolithic with core wall.	Outer masonry wall provided but not hatched which has been done. Agreed, necessary correction has been made in drawing.
B	**Design of WWTP**	
362	Design of WWTP	
1	The disposal stations are designed for peak flows whereas the WWTP is designed on the average flow as peak flow is a timely phenomenon. The average flow given in the hydraulic statement in the outfall sewer is 4.49 cusecs. Then why the design has been based on flow of 13 cusecs which is peak flow of sewage as storm water is to be bypassed and not treated?	The population of city in 2023 is 164,668 and growth rate is 1.76%. The population in 2050 will be 274,595. Assuming that 75% waste water will be dispose of through present sludge drain. The population to be benefitted is 205,947. Average

		discharge calculated as 12.22 i.e 13 cusecs. Clarification was made during meeting and agreed.
2	Four figures for the peak flow have been given in the design which do not match. Correct peak flow from the hydraulic statement should be incorporated but the design should be based on average flow.	As explained above peak factor changed in hydraulic statement.
3	The inlet drain has been designed for 26 cusecs whereas this peak flow is not reflected anywhere in the hydraulic statement. The design of the WWTP should be reviewed in the light of above facts.	Average dry weather flow is 13 cusecs by adding peak factor of 2, the discharges of drain come 26 cusecs.
4	Number of parameters have been shown incorrect in the design. It seems as if the design has not been	Explanation made above during meeting and agreed to no need to change design of WWTP.
5	carried out by some waste water treatment expert which should be done now and entire design should be revised on average discharge.	The parameter of whole design has been considered by Book Duncan Mara which is used as standard design manual in Asia.
365	Plan of WWTP	
1	The plan should be revised after revision of detailed design.	Any revision if need during detailed design will be made.
2	Sections through all the water retaining structures, anaerobic ponds, facultative ponds and sludge drying beds should be given.	Sections of distribution chamber, inlet drain, coarse screen, grit chamber, incoming & outgoing drains, inlet & outlet chamber and effluent drain has already been given.
3	A longitudinal section through all the ponds should be plotted to verify the water flow profile from intake to outlet channel.	Longitudinal X-section of WWTP is provided.
365	Treated water disposal	
1	The ultimate disposal of treated water has not been mentioned in the sections and plans of WWTP which should clearly exhibited.	Ultimate disposal of treated water will go to forest through effluent drain. As desired during meeting level sheet is attached.
2	The use of treated water should be described and if some of it is to be pumped in the nearby canal then the pumping machinery along with all necessary structures and force main should be included in the detailed design, drawings and cost estimates.	Treated water will be provided to forest by gravity hence no pumping required.
3	In case the treated water is also to be used for broad irrigation then the water courses required therein should also be made part of the cost estimate and plans.	Drain up to forest has already been provided in estimate.
366	Distribution chamber	
1	Both plans shown in these drawings do not depict anything as no description has been given.	As desired in the meeting flow direction has been marked in

2	Section A-A has not been marked in the plan.		drawings. Section A-A has been marked.
367	Intake drain		
1	The exact bed level should be shown.		Bed level is provided in drawing.
2	The cover slab of 10" is of excessive thickness. Is it subjected to traffic? If not so, its thickness should be reduced.		Thickness of 10" is calculated keeping in view of crossing of heavy sugarcane loaded trollers.
3	All outer faces of masonry in all structures should be struck pointed and not plastered.		Compliance made.
4	The thickness of PCC topping on the walls of uncovered drain should be mentioned.		Thickness of PCC topping is already mentioned in the drawing.
368	Coarse screen		
1	Correct the spelling of "Course".		Compliance has been made.
2	Section B-B is incorrect. It should not contain any top slab.		Section B-B is discussed in the meeting and agreed to no change.
369	Grit chamber		
1	Water level should be shown in the incoming and outgoing chamber.		Compliance has been made.
2	Direction of flow should be shown.		Direction of Flow has been marked.
3	The chamber has been shown to be covered in section B-B. Wherefrom the grit will be removed.		Only 2.5ft slab for passage provided for operation of gate valves and remaining chamber open
4	For effective deposit and removal of grit, the floor of the chamber should be longitudinally sloping.		Compliance made.
375	Inlet & outlet chambers		
1	Polyethylene pipes when exposed to sun are degradable with UV exposure. Hence DI pipe should be used.		HDPE pipes are not exposed to direct sunlight. Hence, no need to use DI pipe.
2	For DI pipe no horizontal support will be needed. It will rest on the vertical support only.		It has been clarified above.
382	Admin block		
1	Due to shortage of staff with MC, only one person will operate this plant. Hence two bath rooms, staff room and committee room should be excluded from this building and estimate corrected accordingly.		Agreed and proposed amendments made in plan.
C	**Cost Estimate**		
44	Item-6	Huge sum provided for bailing out of water should be justified when the sewers will be laid in dry formation.	Due to narrow streets sewer line will replace after dismantling of outlived sewer line. It is essential to provide relief to the inhabitants of area by disposing off waste water through pump. Hence, bailing of water provided to relief to citizens
46	Left in shuttering	A huge sum of over Rs 25.6 million has been provided for left in shuttering. Its justification with ROW of the roads	As explained above shuttering left in place will be provided to safe guard public buildings and lives.

		where this shuttering will be left in, should be provided.	
51	Dismantled materials	The dismantled materials will be used as sub base and hence its deduction should be incorporated.	Rate of analysis of road reflecting uses of dismantling material as subbase material.
71	Dry sinking	Dry excavation can be done up to 20 feet depth and hence sinking of the well is not required which may be deleted. All plug concrete and RCC well curb should be deleted.	Compliance made and estimate amended. Compliance made.
87	Suction & delivery pipes	Ductile iron pipes have been proposed for these installations.MS should be deleted.	Word MS deleted. Compliance made.
105	Pump head	The pump head is just at margin. Let it be increased by another 5-10 feet if the pump performance curve allows for that.	Compliance made. Head of pump increased 59 to 65ft.
112	Force main	The pressure rating has been mentioned as PN-8 & PN-10 both. Required one pressure rating should be mentioned.	There are clerical mistake as written PN-10. It is clarified that PN-8 pipe will be used. PN-10 is deleted from estimate.
114	Force main	It is a long force main and hence air valves on the high points should be used.	It is mentioned that necessary valves like Non-return & Air releasing valves have already been provided in estimate.
136, 137	Item-2 Item-2	Geo-membrane will only be provided if the water table is within the depth of 10 feet below, he bed of the anaerobic ponds otherwise it should be deleted.	Water Level in the location of WWTP is 43.75ft. Polythene sheet provided in bed and HDPE Geo-membrane deleted from estimate.
180 182	Item-8 Item-7	DI pipe should be used instead of HDPE as this pipe is vulnerable to UV radiation in sunlight.	No HDPE pipe used in direct sunlight. So, requirement of DI is not necessary.
264	O&M cost	The break-up given on this page belongs to Wazirabad. Copy paste should be done with care. This should be provided for Kamalia.	Compliance has been made.
299	Safety equipment	The title given to this safety equipment is “RPC manhole covers” which may be corrected.	Compliance has been made.
323	ARAP cost	A lump sum provision has been given. Its break up should be provided.	Detailed break up of ARAP is provided.
D	**PC-I**		
3	Location plan	Attach location plan. The plan on this page is the plan of Kamalia city	Agreed.
4	Kamalia Municipality	Kamalia is Municipal Committee and not Municipal Corporation. Pl corrects.	Correction made.
4	O&M	Operation & Maintenance agency is	Correction made.

	Agency	Municipal Committee Kamalia. Please correct.	
8	Description of project	Annexure-B and C mentioned over here are missing and should be attached in the PC-I.	Annexure B & C provided.
11	Capital cost	The table shows that all the capital cost will be spent in the year 2023-24 whereas the gestation period of the project is longer. Correction may be made accordingly.	Gestation period is proposed up to December 2025. There is clerical mistake which will be rectified.
15	Annual Operating cost	Annual Operating cost has been mentioned for 2025-26 only and not in future years. It should be mentioned in the forthcoming years as well.	Agreed and Compliance made.
21	Equity	The loan to MC as grant will be 80% of the project cost and equal to Rs 1274.02 million which should be corrected.	Correction has been made.
24	Unit cost analysis	Different population has been mentioned in respect of capital cost and O&M cost which should be corrected.	Correction has been made.
28	RBMs and other parameters	Result Based Monitoring Indicators, M&E Plan, Risk Mitigation Plan and Procurement Plan of the project is missing which should be included.	Compliance made.
385 to 393	Economic & Financial Analysis	The calculation of FIRR, EIRR, NPV and cost benefit ratio should be included in this chapter.	Compliance made.