B I H A R U R B A N I N F R A S T R C T U R E D E V E L O P M E N T C O R P O R A T I O N L I M I T E D (B U I D C o)

Volume-I

Technical & Financial Capability Evaluation (Pre-Qualification) BID

FOR

CONSTRUCTING OF INTERCEPTION & DIVERSION WORKS INCLUDING 6 PUMPING STATIONS, RISING MAIN, NEW TAPPINGS FOR 9 DRAINS (NAYA TOLA BASTI NALA,MILAN CHOWK & TARA BHAWAN NALA, WARD NO 8 NALA,WARD NO 9 NALA, STATION ROAD NALA(1st), STATION ROAD NALA(2ND) AND DURGA STHAN NALA AND WARD NO 3 NALA) CONTROLLED WITH SCADA & CONSTRUCTION OF SEWAGE TREATMENT PLANT OF CAPACITY 9 MLD INCLUDING DISPOSAL & REUSE FACILITY WITH 2 MONTHS TRIAL, RUN, TESTING, COMMISSIONING & MAINTENANCE OF COMPLETE SYSTEM ON DESIGN BUILD OPERATE TRANSFER (DBOT) BASIS & THERE AFTER OPERATION & MAINTENANCE FOR 15 YEARS FOR NAUGACHIYA TOWN

UNDER

"NAMAMI GANGE" SCHEME

Date of downloading of bid document	**:**	**05-01-2018 to 14-01-2018 up to 3:00 PM**
Date of Pre-Bid Meeting	**:**	**08-01-2018 at 3:00 PM at BUIDCo office**
Last date and time for receipt(upload) of bids	**:**	**15-01-2018 up to 3:00 P.M.**
Last date and time for submission of hard copy of bids	**:**	**16-01-2018up to 3:30 P.M.**
Date and time of opening of technical bids	**:**	**16-01-2018up to 4:00 P.M.**
Completion period	**:**	**18 months (including 2 months trial, run, testing & commissioning & stabilization period).**
Operation & Maintenance	**:**	**15 years since completion of successful stabilization period**

Managing Director,
BUIDCo,

B I H A R U R B A N I N F R A S T R U C T U R E
D E V E L O P M E N T C O R P O R A T I O N L I M I T E D .

Volume-I

TECHNICAL & FINANCIAL CAPABILITY EVALUATION (PRE-QUALIFICATION) BID

Table of Index

Bihar Urban Infrastructure Development Corporation Ltd.

A Government of Bihar Undertaking

NOTICE INVITING TENDER

for

NAUGACHHIYAI&D AND STP PROJECT

NIT. No- BUIDCo/BUIDCo/Yo-864/17-01 | ***Date:01.01.2018***

(Through e-procurement mode only – www.eproc.bihar.gov.in)

1. Bihar Urban Infrastructure Development Corporation Limited (BUIDCo) invites bids from eligible experienced Firms/Contractors/Agencies/Bidders registered in appropriate category in any government organisation/PSUs for execution of works as given below :-

Sl. No	Name of work	Bid Processing fees (Beltron) (In Rs.)	Bid Document Cost (In Rs.)	Bid Security (EMD) (Rs. In Lakh)	Contract Duration
1.	**CONSTRUCTING OF INTERCEPTION & DIVERSION WORKS INCLUDING 6 PUMPING STATIONS, RISING MAIN, NEW TAPPINGS FOR 9 DRAINS (NAYA TOLA BASTI NALA,MILAN CHOWK & TARA BHAWAN NALA, WARD NO 8 NALA,WARD NO 9 NALA, STATION ROAD NALA(1st), STATION ROAD NALA(2ND) AND DURGA STHAN NALA AND WARD NO 3 NALA) CONTROLLED WITH SCADA & CONSTRUCTION OF SEWAGE TREATMENT PLANT OF CAPACITY 9 MLD INCLUDING DISPOSAL & REUSE FACILITY WITH 2 MONTHS TRIAL, RUN, TESTING, COMMISSIONING & MAINTENANCE OF COMPLETE SYSTEM ON DESIGN BUILD OPERATE TRANSFER (DBOT) BASIS & THERE AFTER OPERATION & MAINTENANCE FOR 15 YEARS FOR NAUGACHIYA TOWN**	17,700/-	50,000/-	69.00 Lakh	18 Month

2.	Place & Date of Pre-bid meeting	:	Date **08.01.2018** Time **03:00**PM. BUIDCo 2nd floor, Bihar Rajya Khadya Bhawan, DarogaRai Path, R. Block Road No.-2, Patna-800 001
3.	Date of downloading of bid document	:	From **05.01.2018** to **14.01.2018** up to **03:00** PM Through website www.eproc.bihar.gov.in
4.	Last date and time for receipt (upload) of bids	:	Date **15.01.2018.** up to **04:00** PM Through website www.eproc.bihar.gov.in
5.	Last Date and time for Submission ofhard copy of bid	:	Date 1**6.01.2018** up to**03:30** PM
6.	Time and date of opening technical bids	:	Date **16.01.2018** Time **04:00** PM
7.	Time and date of opening of financial bids	:	To be communicated later on
8.	Place of opening of bid	:	Through website www.eproc.bihar.gov.in
9.	Period of bids validity	:	120 days
10.	Officer inviting bids	:	Chief General Manager, BUIDCo

11. For participating in E – tendering process, the contractor shall have to get themselves registered to get user ID, Password and Digital signature. This will enable them to access the website www.eproc.bihar.gov.in and download/participate in E – tender. All tender queries related to this tender shall be communicated at cgmbuidco@gmail.com

12. (i) Bid processing fees to be paid through online mode i.e. Internet payment getaway (Credit/Debit Card), Net Banking, NEFT/RTGS.
(ii) Bids along with necessary online payments must be submitted through e-procurement portal www.eproc.bihar.gov.in before the date & time specified in the NIT. The department does not take any responsibility for the delay/Non availability of internet connection, Network Traffic/Holidays or any other reasons".

13. The tender documents can be obtained through website www.eproc.bihar.gov.in and www.buidco.in

14. Bid document cost should be paid by draft of any scheduled banks payable in favour of Managing Director, Bihar Urban Infrastructure Development Corporation Ltd, Original Bank Draft will have to be submitted in the office of Managing Director, Bihar Urban Infrastructure Development Corporation Ltd, KhadyaBhawan, 2nd floor, DarogaRai Path, R. Block Road No.-2, Patna-800 001on or before 03:30 PM on 15.11.2017 failing which the tender will be rejected.

15. Earnest Money should be in the form of Bank Guarantee of any scheduled banks payable in favour of Managing Director, Bihar Urban Infrastructure Development Corporation Ltd, on or before 03:30 PM on 13.12.2017 failing which the tender will be rejected.

The Estimated Cost may increase or decrease. EMD shall be valid upto 45 days after the bid validity period.

16. All the information/corrigendum/addendum related to the project shall be published on the website www.eproc.bihar.gov.in and www.buidco.in . The authority shall have the right to reject the bid partially or fully without assigning any reason what so ever.

17. For any information department help line No. 18003456109 may be used

18. Estimate amount may vary. So EMD will be deposited as per Technical Sheet uploaded on the website www.eproc.bihar.gov.in

19. Further details of works can be obtained from the office of General Manager (Tech.) For clarification, regarding the E –tendering process, please contact e-procurement, Helpdesk, first Floor, M/22, Bank of India Building, Road No-25, Sri Krishna Nagar, Patna – 800 001, Telephone no. 0612-2523006, Mobile No –07542028164.

Chief General Manager
BUIDCo, Patna

Terms & Conditions:-

1. Intending applicants may obtain the bid documents by calling in person or writing at the following offices by submitting non-refundable cost of tender as mentioned above plus GST by demand draft issued by any Nationalized/Scheduled Bank drawn in favour of Managing Director Bihar urban infrastructure development corporation limited , Patna-800001.
2. Earnest Money shall be pledged in the name of Managing Director Bihar urban infrastructure development corporation limited, Patna-800001. In the shape of F.D.R./C.D.R. of any Nationalized Bank or saving bank pass book/N.S.C. of Post Office or a bank guarantee of any schedule bank. Conditional or tenders without earnest money or invalid earnest money will be summarily rejected.
3. In case the tender document are desired by post, same can be obtained by writing to of Managing Director Bihar urban infrastructure development corporation limited, Patna-800001. Who will dispatch the documents by speed post/registered mail on receipt of remittance of Rs. 300.00 + GST (if applicable) as postal charges but under no circumstances the department be held responsible for late delivery or loss of the document so mailed. NIT can also be seen on BUIDCo www.buidco.in

1. 4. "Technical & Financial Capability Evaluation Bid" and "Financial bid" document shall be sold to contractors/ construction firms registered with BUIDCo in class and category as mentioned above. The contractor who is not registered in BUIDCo but has expertise in particular work may also obtain "Tender Document" provided that he gets himself registered in BUIDCo in respective class & category before the date of opening of financial bid. **Joint Ventures/Consortium are permitted, as per RCD letter no 8131(S) dt: 24-7-12.**

Joint Venture Documents and Requirements

Each Joint Venture Bidder shall submit, as Part IV of the Technical Section of its Bid, a written commitment, in the form of a letter duly executed by an authorized officer of each joint venture participant which, Confirms each joint venture participant's commitment to the joint venture and acceptance of the joint venture arrangements described in the Bid. Confirms each joint venture participant's willingness to provide a joint and several guarantee to the Owner to underwrite the performance of the joint venture in respect of the Contract; and Identifies which joint venture participant,

will assume the leading role on behalf of the other joint venture participants; and

will have the authority to commit all joint venture participants.

will have the authority to incur liabilities and receive instructions for and on behalf of any and all participants of the joint venture.

A copy of the Joint Venture Agreement entered into by the Partners (JV Participants) shall be submitted with the bid. Alternatively, a Letter of Intent as per format provided under Format 11 – to execute a Joint Venture Agreement in the event of a successful bid shall be signed by all partners and submitted with the bid together with a copy of the proposed Agreement, clearly indicating the objectives of the joint venture, the proposed management structure, the contribution of each participant to the joint venture operations, the commitment of the participants to joint and several liability for performance of the contract, recourse or sanctions within the joint venture in the event of default or withdrawal of any participant, and arrangements for providing the required indemnities.

If the Successful Bidder is a Joint Venture to whom the contract is awarded, each partner of the Joint Venture shall sign and execute the contract with the Owner and shall be jointly and severally responsible to Owner for the performance of the contract.

5. Tender with requisite earnest money must be uploaded in e-proc website www.eproc.bihar.gov.in as per corrigendum – 1. The last date for upload (receipt) of bid is on 15.01.2018 up to 3:00 PM. The last date for submission of Hard copy of bid is on 16.01.2018 up to 3:30 PM. Technical bid shall be opened on 16.01.2018 at 4:00 PM. The "financial bids" of only those bidders will be opened at a date to be notified later on, who's bid is found technically responsive and declared eligible.

6. The notarized/attested copies of following documents by Gazetted officer will also be submitted with tenders:-

(i) No-Objection Certificate from Income Tax Department or receipt of deposition of Income Tax Return/Attested copies of Income Tax Assessment order of last three years.

(ii) No-Objection Certificate from Goods & Service Tax Department and Clearance certificate of last financial year in favor of contractor from Sale Tax Department.

(iv) Solvency Certificate issued by Nationalized Bank.

7. Earnest money & registration document in BUIDCo/Any other Govt. Department for required Class & Category will be submitted in Envelope no.-1 by the bidders. Attested/notarized copies of all certificates mentioned in Sr. No. 6(i), 6(ii), 6(iii) & 6 (iv), all affidavits and attested copies of all certificates related to tender along with documents related to Technical & Financial Capability Evaluation Bid with all affidavits will be submitted in Envelope No.-1 by the bidders. Financial Bid will be submitted in Envelope no.-2.

Bidders should upload the required document as per Technical bid sheet and bid document. During hard copy submission bidder should submit the following documents:

a) EMD as in required shape, b) Bid document cost in required shape, c) Attested/notarized copies of all certificates mentioned in Sr. No. 6(i), 6(ii), 6(iii) & 6 (iv), all affidavits and attested copies of all certificates related to tender along with documents related to Technical & Financial Capability Evaluation Bid.

However bidders should also upload the same documents during submission of bid in eproc website.

8. The original certificates mentioned in Sr. No. 6(i), 6(ii), 6(iii) & 6(iv) will be produced in concerned office for verification in any time, at the time of opening of tender or before or after bid approval, as informed by BUIDCo.

9. The BUIDCo reserves the right to accept or reject any or all the tenders without assigning any reasons thereof and the decision of the undersigned shall be final & binding.

10. The quantum of work can vary on either side as per site condition.

11. The bidders are advised to inspect the site of work before quoting the rates.

12. If a holiday is declared on any of the above dates, the stipulated action will be taken on the next working day at the same time and venue.

13. A Pre-submission meeting will be held by the undersigned at 12:00 Noon on dated 02.11.2017 in the office of the undersigned to clarify queries of the prospective bidders.

14. Documents required for Technical and Financial capability evaluation/prequalification criterion are as below:

14.1 **Technical Experience** –

A) The Bidder must have Experience of design, build & commissioning, one STP of minimum 7 MLD capacity in the last 7 years; or Two STP of minimum 5 MLD capacity in the last 7 years or Three STP of minimum 4 MLD capacity in the last 7 years.

B) The Bidder must have Experience of design, build & commissioning, at least 1 SPS of 4 MLD Capacity and

C) also having operating and maintaining of i) STP of the same capacity as per 14.1.A and ii) SPS of same capacity as per 14.1.B, for minimum 1 year in the last 7 Years (i.e.2010-2011to 2016-2017).

For the purpose of demonstrating the design experience requirement for above mentioned work, the Bidder, whether a single entity or a joint venture may claim the experience of its nominated sub-consultants. However bidder has to submit the experience of nominated sub-consultant along with the bid in prescribed format. Bidder shall submit the information regarding the nomintated consultant with his relevant design experiences.

14.2. **Financial Experience** – Experience of I&D, pumping station and STP will be based on criteria regarding their design, build, operate and maintenance experience in sewerage works such experience of having successfully completed and maintained similar works as given below during last 7 years ending last day of the month previous to the one in which applications are invited.

Three Similar Works (40% of the estimated cost) in Rs Lacs	Two Similar Works (60% of the estimated cost) in Rs Lacs	One Single Work (80% of the estimated cost) in Rs Lacs

2432.00	3648.00	4863.00

14.2. **Minimum turnover** should be at least as under:

Average of last three Years (Rs. in Lacs) (30% of the estimated cost)	Minimum of one financial Year (Rs. in Lacs) (50%of the estimated cost)
1824.00	3040.

14.3 **Solvency** should not be less than 40% of estimated cost i.e not less than Rs 2432.00 Lakh

14.4 The tenderers shall provide evidence that it has been actively engaged in building, operation and maintaining of such types stipulated works. Including survey, investigation, build, operation and maintaining experience information shall be submitted by the tenderers to attach with their bids.

14.5 The firm should not have incurred any loss in more than two years during last 5 years. The firm should have a positive net worth.

14.6 Remaining terms and conditions shall be those as contained in tender document.

14.7 For O & M Period Revolving BG must be submitted by the Contractor as per relevant clause of the bid document..

14.8 All bidders shall also furnish evidence of access to or availability of credit facilities Rs. 608.00 Lakhs certified by the bankers

14.9 14.9 All bidders shall also furnish undertaking…….Rs. 1470 Lakh of the contract value of work, during implementation of contract

Managing Director.

SECTION – I

PROJECT BACKGROUND

The principal objective of project is to improve the water quality of river Ganga by avoiding the discharge of waste water, untreated sewage into river Ganga. The objective and targets are proposed to be achieved through the following major envisaged activities under the projects:

SALIENT FEATURES OF PROJECT

Sl. No.	Particulars	Details
1.	Project Area	Naugachia Nagar Panchayat
2.	Geographical location	25.4°N Latitude
		87.1°E Longitude
3.	Census Population (year 2011)	49,069 souls
4.	Projected Population:	
	Design Base Year 2020	59144 souls
	Design Intermediate Year 2035	79622 souls
	Design Ultimate Year 2050	106005 souls
5.	Command Area	11.24 sq. Km.
6.	No. of Wards	23
7.	Existing Sewerage System	No
8.	Existing practices	Open defecation, mixing of sewage into drains
9.	Existing Wastewater Management	• Dry Latrines • Disposal of night soil into drains • Open defection • No wastewater management system
10.	Number of Household	8,547
11.	Source of Water Supply	Ground Water
12.	Ground Level variation	40.74 to 35.34 m
13.	Proposed System:	
	Rate of Water Supply	135 lpcd
	Design Capacity of Sewers	80% full
	Minimum Size of Sewers	150mm
	Minimum Depth of Cover	0.9m
	Maximum Allowable Depth	8.0m
	Effluent disposal standards	BOD (mg/l) 3 days 20^C = 10,
		TSS (mg/l) = 30
	Sewage Treatment Plants	1 (STP-1)
	Pumping Stations	6
	Design Capacity and technology:	

	STP-1	8.85 ≈ 9MLD MLD, Technology For year 2035
	Land Availability and its locations:	
	STP-1	2.65 acres , In ward no. 15, near Makhtakiya area

DRAINAGE CATCHMENT DESCRIPTION

Entire Naugachiya town is divided into nine Catchments based on the drainage system in the town. The Catchments division and flow of drain are based on the contour of Naugachiya town as showed in drawings submitted in Volume IV of this submission. The Naugachiya town i divided in to nine Catchments and each Catchment planned based on the topographic of the town. We have kept minimum pumping station to avoid maximum operation cost of the town.

Catchment 1

The Catchment 1 is covered ward no 11, to 18 and partly 10,19 and 20 with total population of 25877 for year 2020 and 34837, 46381 for year 2035 and 2050 with approx. 247.13 Ha. The total contribution of flow is about 3.80 MLD for the year 2035 and 5.06 MLD for year 2050.

Catchment 2

The Catchment 2 is covered ward no, partly 19,20 and 21 with total population of 2984 with approx. 40.17 Ha. The total contribution of is about 0.44 MLD for the year 2035 and 0.58 MLD for year 2050.

Catchment 3

The Catchment 3 is covered ward no 1 to 4, partly 19 to 21 with total population of 8892 for 2020 with approx. 196.25 Ha. The total contribution of is about 1.31 MLD for the year 2035 and 1.74 MLD for year 2050.

Catchment 4

The Catchment 4 is covered ward partly 22 with total population of 1246 for 2020 with approx. 35.17 Ha. The total contribution of is about 0.18 MLD for the year 2035 and 0.24 MLD for year 2050.

Catchment 5

The Catchment 5 is covered ward partly 22 with total population of 748 for 2020 with approx. 35.17 Ha. The total contribution of is about 0.18 MLD for the year 2035 and 0.24 MLD for year 2050.

Catchment 6

The Catchment 6 is covered ward no 23, partly 22 with total population of 3819 for 2020 with approx. 263.19 Ha. The total contribution of is about 0.56 MLD for the year 2035 and 0.75 MLD for year 2050.

Catchment 7

The Catchment 7 is covered ward no 7 and 8, partly 6 with total population of 7934 for 2020 with approx. 157.9 Ha. The total contribution of is about 1.17 MLD for the year 2035 and 1.55 MLD for year 2050

Catchment 8

The Catchment 8 is covered ward no 5, partly 6 with total population of 4917 for 2020 with approx. 88.24 Ha. The total contribution of is about 0.72 MLD for the year 2035 and 0.96 MLD for year 2050.

Catchment 9

The Catchment 9 is covered ward no 9, partly 10 with total population of 2725 for 2020 with approx. 94.32 Ha. The total contribution of is about 0.40 MLD for the year 2035 and 0.53 MLD for year 2050.

Table 2 : details of catchments

SI. No.	Name of Drains	I&D	Remark
1	Naya Tola basti Nala	Pumping	TO STP
2	Milan Chowk nala	Gravity/Diversion	Maa Tara Bhawan Nala Tola
3	Maa Tara Bhawan Nala Tola	Pumping	TO STP
6	Ward no 8 Nala	Pumping	TO STP
7	Ward no 9 Nala	Pumping	TO STP
4	Station Road Nala (1st)	Gravity/Diversion	Durga Sthan Chowk Nala
5	Station Road Nala (2nd)	Gravity/Diversion	Durga Sthan Chowk Nala
8	Durga Sthan Chowk Nala	Pumping	TO STP
9	Ward no 3 Nala	Pumping	TO STP

Table 3 : SPS Details for Different Catchments

Discharge Point	Head Requirement (m)	Flow (Total Out) (MLD)	Discharge to	Rising Main Length	Dia (mm)	Pump HP
Outfall 1	10.00	0.67	STP	3639.56	150	3
Outfall 2	10.00	0.44	STP	1997.34	300	20
Outfall 3	10.00	0.18	STP	3034.69	100	1
Outfall 4	10.00	0.40	STP	2523.08	100	2
Outfall 5	10.00	0.40	STP	2523.08	100	2
Outfall 6	10.00	0.44	STP	4163.91	100	4

Land Acquisition: It is always beneficial to propose the sites for such structures on Govt. Land. So as to avoid the complications involved in acquisition of land and also to prevent bearing of excessive expenses of resettlement and rehabilitation. The proposed locations for Intermediate Pumping Stations and Sewage Treatment plants along with their capacity (2048) and land requirement details are mentioned below:

Table 4: Details of proposed locations and land required

Sl. No.	Component	Capacity(2050)	Land Required	Location(s) Proposed
1.	STP	11.75 MLD	2.65 acre	In ward no. 15, near Makhtakiya Area

Sewage Generation: After allowing for losses in treated water transmission, distribution, etc. an agreed percentage of the gross water supplied will be considered as reaching the consumer. The wastewater generated is considered to be 80 percent of the water consumed (compensating for infiltration, flow form institutions etc.)

Water supply considered (after losses)	=	135 Lpcd
Per capita Waste water flows	=	80 %
Per capita waste water generation	=	0.80 x 135
	=	108 Lpcd

Additionally, 80% of the water consumed by floating population has also been considered

Water supply to floating population	=	45 Lpcd
Per capita waste water flows	=	80 %
Per capita waste water generation	=	0.8 x 45
	=	36 Lpcd

The design parameters have been opted in line with the CPHEEO manual and NGRBA guidelines. Based on technical comparisons and considering the limited land availability within the cities, it is proposed to adopt submersible sewage pumps.

1. Sewage Treatment is the process of removing contaminants from wastewater. It includes physical, chemical and biological processes to remove physical, chemical and biological contaminants. Typically, Sewage Treatment involves three stages, called primary, secondary and Tertiary Treatment. The final effluent can be discharged into a stream, river, bay, lagoon or wetland, or it can be used for the irrigation of a golf course, green way or park. If it is sufficiently clean, it can also be used for groundwater recharge. For selecting the Sewage Treatment Technology best suitable for Naugachia town, Life Cycle Cost Analysis (LCA) of all abovementioned technologies has been calculated considering Net Present Value (NPV). Keeping in view the parameters and comparisons, various alternatives are feasible for construction of STP at Naugachia. However, because of following reasons, Technology System is proposed for construction of STP at Naugachia:
2. Minimum land area around 1/10th of conventional system is required for which is best for town of Naugachia where Govt. land is not sufficiently available.
3. technology shows low sensitivity to small power downs which is suitable for Naugachia Council.
4. gives higher degree of BOD removal of 98% with effluent concentration under 10mg/L and removal HSS with effluent concentration under 20mg/L which is good for disposing the treated effluent to River Ganga or re-use by further chlorination or can be easily used for irrigation.
5. Even faecal coliforms removal is to the order of 2-3 on log scale.
6. Thus, Sewage Treatment Plant of capacity 11.75 MLD in Ward No. 15 near Makhtakiya area respectively is proposed to be constructed based on Sequential Batch Reactor technology accordingly

Influent Quality – The design of STP will be based on measured values of sewage strength with an assessment made of the sewage dilution due to natural flows in the drains. The pH of fresh domestic sewage is slightly more than that of the water supply to community. However, the onset of septic conditions may lower the pH while the presence of industrial wastes may produce extreme fluctuations. Fresh domestic sewage has a slightly soapy and earthy odor and cloudy appearance. With passage of time, sewage becomes stale, darkening in color with a pronounced smell due to microbial activity. Nitrogen content is necessary for biological treatment and land irrigation and if inadequate it is necessary to supplement it.

Effluent Quality Standards – The sewage after treatment may be disposed either into a water body such as lake, stream, river, estuary and ocean or onto land. It may also be utilized for industrial reuse or reclaimed sewage effluent in cooling systems, boiler feed, process water, reuse in agriculture and

horticulture, watering of lawns, golf courses, ground water recharge or for preventing saline water intrusion in coastal areas. The effluent should fulfill statutory requirements laid down by pollution control boards for disposal in water bodies and for irrigation. The following Table shows the disposal standards for treated effluent according to the General Standards for Discharge of Environment Pollutants notified by NGRBA.

Table 33: Effluent Disposal Standards

S.No	Industry	Parameters	Standards	
1	2	3	4	
		Effluent discharge standards (applicable to all mode of disposal)		
"105	Sewage Treatment Plants (STPs)		**Location**	**Concentration not to exceed**
			(a)	**(b)**
		Ph	Anywhere in the country	6.5-9.0
		Bio-Chemical Oxygen Demand (BOD)	Metro Cities*, all State Capitals except in the State of Arunachal Pradesh, Assam, Manipur, Meghalaya Mizoram, Nagaland, Tripura Sikkim, Himachal Pradesh, Uttarakhand, Jammu and Kashmir and Union territory of Andaman and Nicobar Islands, Dadar and Nagar Haveli Daman and Diu and Lakshadweep	20
			Areas/regions other than mentioned above	30
		Total Suspended Solids (TSS)	Metro Cities*, all State Capitals except in the State of Arunachal Pradesh, Assam, Manipur, Meghalaya Mizoram, Nagaland, Tripura Sikkim, Himachal Pradesh, Uttarakhand, Jammu and Kashmir and Union territory of Andaman and Nicobar Islands, Dadar and Nagar Haveli Daman and Diu and Lakshadweep	<50
			Area/regions other than mentioned above	<100
		Fecal Coliform (FC) (Most probable Number per 100 mililiter, MPN/100ml	Anywhere in the country	<1000

* Metro Cities are Mumbai, Delhi, Kolkata, Chennai, Bengaluru, Hyderabad, Ahmedabad and Pune.
Note:

i. All values in mg/l except for pH and Fecal coliform.
ii. These standards shall be applicable for discharge into water bodies as well as for land disposal/applications.
iii. The standards for Fecal Coliform shall not apply in respect of use of treated effluent for industrial purposes.
iv. These Standards shall apply to all STPs to be commissioned on or after the 1 June, 2019 and the old existing STPs shall achieve these standards within a period of five years from date or publication of this notification in the Official Gazette.
v. In case of discharge of treated effluent into sea, it shall be through proper marine outfall and the existing shore discharge shall be converted to marine outfalls, and in cases where the marine outfall provides a minimum initial dilution of 150 times at the point of discharge and a minimum

dilution of 1500 times at a point 100 meters away from discharge point, then, the existing norms shall apply as specified in the general discharge standards.

vi. Reuse/Recycling of treated effluent shall be encouraged and in case where part of the treated effluent is reused and recycled involving possibility of human contact, standards as specified above shall apply.

vii. Central Pollution Control Board/State Pollution Control Boards/Pollution Control Committees may issue more stringent norms taking account to local condition under section 5 of the Environment (Protection) Act, 1986.".

REUSE AND RECYCLE OF TREATED EFFLUENT AND SLUDGE

Different options for recycle and reuse of treated effluent for various beneficial non-potable uses and use of manure, sewage gas etc., to generate revenue is mentioned below:- 20% of Treated effluent from STP being rich in N-P-K content can be very useful for farming. This is generally sold for agriculture and forest department at a considerable rate of Rs. 1.50 – 2.50 per KL. For this a separate pipeline may be planned along with installation of hydrants at various locations for which cost has been considered in the cost estimate for reuse application. Treated effluent can also be reused with minimum chlorination for street washing. However, the ULB shall arrange its own measures for transportation of this water from STP sites to designated locations.

Sludge may be sold in the form of Sludge cakes and manure at a mutually agreed rate. Generally, these are sold in a range of Rs. 2.00 – 3.00 per Kg and this has been observed to be prominently used in the Sultanganj.

Apart from afore-mentioned direct benefits, there are indirect benefits attached to successful execution of I&D . These benefits include savings in Household medical expenditures due to wastewater related diseases and reduction in earning lost due to illness per capita per year. Treated effluent will be used for agriculture purposes to the surrounding areas.

Based on the trend of increasing population and public willingness for better sanitation and hygiene, it is assumed that ULB will be able to collect the connection charges, monthly user charge, sale of sludge cakes, sale of water for sewage farming etc. and collect the revenue sufficient enough to compensate the expenses of Operation and Maintenance for 30 years. Based on this assumption, the project seems to be economically viable.

ANNUAL OPERATION AND MAINTENANCE COST

The objective of a good maintenance program is to keep the system in a good operating condition so that it can function efficiently throughout its design life. Lack of maintenance can have health implications as well as cause damage to properties when things go wrong. It is important that the operation and maintenance personnel continuously monitor the condition of the sanitation system to ensure proper functioning thereof. Inspection and testing provide the means for the monitoring activity. Below Table shows cost for operation and maintenance for I&D System.

Table 40: O & M cost calculation for Sewerage Treatment Plant

I. Manpower Cost						
S.No	Unit	Manpower per Shift			Per Month Salary (Rs.)	Per Year Salary (Rs.)
		Personnel	Man-Power	Salary per Person		
A	STP & IPS (Operational)	Process/Plant Engineer	1			
		Junior Engineer	1			
		Helper/Semi skill labour for 3 shifts	6			
B	STP & IPS (Maintenance)	Fitter for 3 shifts	3			
		Plumber	1			
		Electrician for 3 shifts	3			
C	STP & IPS (Other Services)	Sweeper	1			
		Gardener	1			
		Lab Chemist	1			
Sub- Total (A)			18			
Total Manpower Cost (A + B)						
Total Man-Power Cost for 15 Years						

Sl.No	Chemical Name	Flow rate per Hour	Dosage Rate in PPM	Chemical Required per hr	Operational Hours per day	Chemical required per Day	Commercially available Chemical conc.	Chemical required per at available conc.	Chemical cost	Handling & transportation	Total cost of chemical per day	Total cost of chemical per year
		M3/Hr				ay		ay	g			
1	Poly Electrolyte - De Watering	14	125	1.688	24	41	100	40.50				
2	Chlorine-Disinfection	375	0.4	0.150	24	4	10	36.00				
Chemical Cost												

lo	Unit	Flow rate per Hour	Power Requirement/Hr (0.22 KW/hr)	Operational Hours per Day	Total Operational Hours per day	Total Power Consumption Day	Power Cost	Total cost of Power per day	Handling & Other Exp.	Power Cost/Day	Total cost of Power per year
	Power Consumption /Treatment	5	83	22	24	1815.00					
	Plant and Street Lighting	6	12	8	10	99.0					
	Automation and Acs	6	4	22	24	80.30					
Power Consumption Cost											

SECTION – II

INSTRUCTION TO BIDDERS.

1. GENERAL

1.1 BUIDCo intends to use the grant from the Govt. of India (100%) to finance the contract for which invitation for Pre-Qualification is issued. The grant will not be used for payment to person or entities or for any import of goods, if such payment or import is prohibited by a decision of the Govt. of India.

1.2 The BUIDCo intends to pre-qualify the firms who bid for the contract outlined in the pre-qualification data.

1.3 The schedule for bidding shall be outlined in the pre-qualification data.

2. PREPARATION & SUBMISSION OF APPLICATION FOR PRE-QUALIFICATION :

2.1 The applicants/bidders may request in writing to the Managing Director BUIDCo Patna. for the clarification, if any, of the project requirements and the criteria for qualification at any time up to 7 days prior to the last date set for the submission of applications. A pre-bid meeting is schedule on at 12:00 Noon.

2.2 All information requested for pre-qualification shall be provided in the English language.

2.3 The application for pre-qualification shall consist of the forms and documentation specified in the pre-qualification data along with all certificates and attachments to fulfill the eligibility conditions.

2.4 Failure to provide information which is essential to evaluate the applicants/bidders qualifications, or failure to provide timely clarification or substantiation of the information supplied may result in disqualification & rejection of the applicant/bidder.

2.5 Submission of applications for pre-qualification must be received in sealed envelopes which shall be delivered either by hand or by registered mail, to the address specified in the pre-qualification document not later than the date specified in the pre-qualification document, and shall bear the identification

specified in the pre-qualification document. Application received later, than the date & time specified shall be liable for rejection.

2.6 If any information in this schedule is found to be incorrect or concealed, the tender will be summarily rejected.

2.7 The names and mailing address of the applicant/bidder shall be clearly marked on the envelope.

3. PRE-QUALIFICATION AND TENDERING :

3.1 The BUIDCo reserves the right to :

(a) Amend the scope of work and value of any contract(s) to be tendered, in that event only those prequalified applicants/bidders who meet the amended requirements will be invited for tendering.

(b) Reject or accept any application.

(b) Cancel the pre-qualification process and reject all applicants. The BUIDCo shall neither be liable nor be under any obligation to inform the applicant/bidder of the grounds for such action like rejection, cancellation or amendments.

3.2 Applicants/bidders who have qualified in the pre-qualification criteria will be informed about the BUIDCo's decision in writing. However, the bidders/applicants are advised to be in touch with the department regarding final decision of the department.

3.3 The financial bid of only those contractors/bidders shall be opened who will qualify the eligibility criteria of pre-qualification as mentioned in pre-qualification document for evaluation of Technical & Financial Capability. The date of sale and opening of financial bid is given in the notice inviting tender.

3.4 The pre-qualification bidders who qualify in the P. Q. bid shall be required to participate in the tendering process. In case the bidders who qualify in this P.Q. bid, do not participate in tendering process then their earnest money deposited with this P.Q. bid shall be forfeited.

3.5 At the time of submitting their tenders/bid pre-qualified tenders/bidders shall update the relevant information used for pre-qualification to confirm that they continue to comply with the qualification criteria and verify that the information

previously provided is still valid and correct. A tenderer/bidder shall be disqualified if it no longer meets the qualification requirements before, on or after the time of contract of award.

3.6 Tenders/bidders will be required to provide an earnest money outlined in the notice inviting tender in a separate sealed Envelope No.1, without which his Bid shall not be entertained.

3.7 The Earnest Money Deposit (EMD) amounting Rs.69.00 lakh (Sixty Nine Lakhs only) must be enclosed with the tender in the shape of FDR/CDR/NSC/ Bank Guarantee of a Scheduled Bank/Post Office duly pledged in the name of Managing Director Bihar urban infrastructure development corporation limited Patna. Bid not accompanied with full EMD shall be rejected..

4. **CLASSIFICATION OF TENDERS :**

4.1 If the tender is made by an individual it shall be signed by the individual with his full name and current address underneath. If the tender is made by a proprietary firm, it shall be signed by the proprietor with his full name and name of his firm with its current address underneath.

4.2 If the tender is made by a firm in partnership, it shall be signed by all partners of the firm with their full names and current addresses, or by a partner holding the power of attorney. A certified copy of the power of attorney, partnership deed, address of the firm and the full names and address of all the partners of the firm shall also accompany the tender.

4.3 If the tender is submitted by a limited company or a limited corporation, it shall be signed by a duly authorized person holding the power of attorney. Such limited company or corporation may be required to furnish satisfactory evidence of its existence. A copy of said company's articles of Association should be enclosed to substantiate its claim.

4.4 All witnesses and sureties shall be of persons of status and probity and their full names, occupations and addresses shall be stated below their signatures. All signatures in the tender document shall be dated.

4.5 **CANVASSING:**

Any political/administrative pressure by the contractor or canvassing directly or indirectly in favor of his offer will render his tender liable to rejection.

4.6 (a) Experience in construction, Commissioning and Opertion&Maintenance O&M} (construction and O&M may be under same or different contracts) for a period of minimum two year of STP of minimum one STP of 80% capacity or two STPs of 60% capacity or three STPs of 40% capacity.

(b) If in the present bid, the bidder has offered STP of a different technology from the one it has built for the requirement in (a) above , then bidder must submit a tie-up with a technology provider for technology or his nominated sub-contractor should have designed, developed, built, tested and sucessfully comissioned at least one sewage treatment plant having same process technology as proposed for this contract which has been operating sucessfully (meeting the required performance standards) for a period of minimum 1 year over a period of last 07 years. In case of technology tie-up, the bidder shall submit tie-up arrangement in form of an MOU on Rs 1000 non-judicial stamp paper as a part of their bid.

The Technology Provider is required to submit the experience certificate obtained from Government client not below the Rank of Executive Engineer in support of his claim and ated confirming treeffluents parameters as specified in this tender.

Technology provider must be enlisted with any state government or central government organization.

SUBMISSION OF BIDS

(only on website: www.eproc.bihar.gov.in)

5. **Sealing and Marking of Bids**

5.1 The bidder shall download the bid document from the site website: www.eproc.bihar.gov.in and upload the scanned copy of required documents together with filled up documents on the website.: www.eproc.bihar.gov.in .The contents of Technical and Financial Bids will be as per bid document.

6. **Deadline for Submission of the Bids**

6.1 Complete Bids (including Technical and Financial) must be uploaded at www.eproc.bihar.gov.in not later than the date indicated in NIT.

6.2 The Employer may extend the deadline for submission of bids by issuing an amendment, in which case all rights and obligations of the Employer and the bidders previously subject to the original deadline will then be subject to the new deadline.

E. BID OPENING AND EVALUATION

(Only on website: www.eproc.bihar.gov.in)

All Process shall be done through e-tendering Process)

7. **Bid Opening**

7.1 BUIDCo or their authorized representative will open all the Bids submitted on **www.eproc.bihar.gov.in** at the time and date specified in NIT in the manner specified in Clause Given Below.

7.2 Deleted.

7.3 The "Technical Bid" shall be opened on the website **www.eproc.bihar.gov.in**. The amount, form and validity of the Earnest money furnished with each bid will be verified. If the bid security furnished does not conform to the amount and validity period as specified in the Bid then his technical bid will not be opened.

7.4 (i) Subject to confirmation of the bid security by the issuing Bank, the bids accompanied with valid security will be taken up for evaluation with respect to the Qualification Information and other information furnished in the bid document.

(ii) After receipt of confirmation of the bid security, the bidder will be asked in writing (usually within 10 days of opening of the Technical Bid) to clarify or modify his technical bid, if necessary, with respect to any rectifiable defects.

(iii) The bidders will respond in not more than 7 days of issue of the clarification letter.

(iv) Immediately (usually within 3 to 4 days), on receipt of these clarifications the Evaluation Committee will finalize the list of responsive bidders whose financial bids are eligible for consideration.

7.5 The Financial bids of only those bidders will be opened on the website **www.eproc.bihar.gov.in**, who qualifies in the technical evaluation. The remaining bids will not be opened. The responsive Bidders' names, the Bid prices, the total amount of each bid, Bid Modifications and withdrawals, and such other details as BUIDCo may consider appropriate, will be announced by BUIDCo at the opening. Any Bid price, which is not read out and recorded will not be taken into account in Bid Evaluation.

7.6 In case bids are invited in more than one package, the order for opening of the "Financial Bid" shall be that in which they appear in the "Invitation For Bid".

7.7 BUIDCo shall prepare minutes of the Bid opening, including the information disclosed to those present in the meeting.

8. Process to be Confidential

8.1 Information relating to the examination, clarification, evaluation and comparison of Bids and recommendations for the award of a contract shall not be disclosed to Bidders or any other persons not officially concerned with such process until the award to the successful Bidder has been announced. Any effort

by a Bidder to influence BUIDCo's processing of Bids or award decisions may result in the rejection of his Bid.

9. Clarification of Financial Bids

9.1 To assist in the examination, evaluation and comparison of Bids, BUIDCo may, at his discretion, ask any Bidder for clarification of his Bid, including breakdowns of unit rates. The request for clarification and the response shall be sought, offered or permitted except as required to confirm the correction of arithmetic errors discovered by BUIDCo in the evaluation of the Bids in accordance with clause11 here and Section III, Clause 22.

9.2 No Bidder shall contact BUIDCo on any matter relating to his bid from the time of the bid opening to the time the contract is awarded. If the Bidder wishes to bring additional information to the notice of BUIDCo, it should do so in writing.

9.3 Any effort by the Bidder to influence BUIDCo in BUIDCo's bid evaluation, bid comparison or contract award decisions may result in the rejection of the Bidders' bid.

10. Examination of Bids and Determination of Responsiveness

10.1 During detailed evaluation of "Technical Bids", BUIDCo will determine whether each Bid (a) meets the eligibility criteria defined in Terms & Condition Clause 14, (b) has been properly signed on each page; (c) is accompanied by the required securities and; (d) is substantially responsive to the requirements of the Bidding documents. During the detailed evaluation of the "Financial Bid", the responsiveness of the bids will be further determined with respect to the remaining bid conditions, i.e., priced bill of quantities, technical specifications, and drawings.

10.2 A substantially responsive "Financial Bid" is one which conforms to all the terms, conditions, and specifications of the Bidding documents, without material deviation or reservation. A material deviation or reservation is one (a) which affects in any substantial way the scope, quality or performance of the Works; (b) which limits in any substantial way, inconsistent with the Bidding documents, BUIDCo's rights or the Bidder's obligations under the Contract; or (c) whose rectification would affect unfairly the competitive position of other Bidders presenting substantially responsive Bids.

10.3 If a "Financial Bid" is not substantially responsive, it will be rejected by BUIDCo, and may not subsequently be made responsive by correction or withdrawal of the non-conforming deviation or reservation.

11. Correction of Errors

11.1 "Financial Bids" determined to be substantially responsive will be checked by BUIDCo for any arithmetic errors. Errors will be corrected by BUIDCo as follows:

(a) Where there is a discrepancy between the rates in figures and in words, the rate in words will govern; and

(b) Where there is a discrepancy between the unit rate and the line item total resulting from multiplying the unit rate by the quality, the unit rate as quoted will govern.

11.2 The amount stated in the "Financial Bid" will be corrected by BUIDCo in accordance with the above procedure and the bid amount adjusted with the concurrence of the Bidder in the following manner:

(a) If the Bid price increases as a result of these corrections, the amount as stated in the bid will be the 'bid price' and the increase will be treated as rebate;

(b) If the bid price decreases as a result of the corrections, the decreased amount will be treated as the 'bid price'

Such adjusted bid price shall be considered as binding upon the Bidder. If the Bidder does not accept the corrected amount the Bid will be rejected, and the Earnest money may be forfeited.

12. Evaluation and Comparison of Financial Bids

12.1 BUIDCo will evaluate and compare only the Bids determined to be substantially responsive in accordance with Sub-Clause 10.2.

12.2 In evaluating the Bids, BUIDCo will determine for each Bid the evaluated Bid Price by adjusting the Bid Price as follows:

(a) making any correction for errors pursuant to Clause 11; or

(b) making an appropriate adjustments for any other acceptable variations, deviations.

12.3 BUIDCo reserves the right to accept or reject any variation or deviation. Variations and deviations and other factors, which are in excess of the requirements of the Bidding documents or otherwise result in unsolicited benefits for BUIDCo, shall not be taken into account in Bid evaluation.

12.4 If the Bid of the successful Bidder is seriously unbalanced in relation to the Engineer's estimate of the cost of work to be performed under the contract, BUIDCo may require the Bidder to produce detailed price analysis for any or all items of the Bill of Quantities, to demonstrate the internal consistency of those prices with the construction methods and schedule proposed. After evaluation of the price analysis, BUIDCo may require that the amount of the performance security set forth be increased at the expense of the successful Bidder to a level sufficient to protect BUIDCo against financial loss in the event of default of the successful Bidder under the Contract.

12.5 A bid, in the opinion of employee which contains several items in the Bill of Quantities which are unrealistically priced low and which cannot be substantiated satisfactorily by the bidder, may be rejected as non-responsive.

SECTION – III
PRE – QUALIFICATION/ELIGIBILITY CRITERIA

1. "Technical & Financial Capability Evaluation Bid" and "Financial bid" is to be opened to Bidders/construction firms registered with BUIDCo in class and category as mentioned in NIT. The contractor who is not registered in BUIDCo but has expertise in particular work may also obtain "Tender Document" provided that he gets himself registered in BUIDCo in respective class & category before the date of opening of financial bid.
2. The applicant is an Indian commercial entity registered as a firm or a company.
3. The firm is registered with Provident Fund Authorities.
4. The applicant should have a valid GST Registration Certificate.
5. Applicant has a valid PAN & TAN of Income Tax.
6. The bidder should be enlisted as registered contractor in BUIDCo in appropriate category", The contractor who is not registered in BUIDCo but has expertise in particular work may also obtain "Tender Document" provided that he gets himself registered in BUIDCo in respective class & category before the date of opening of financial bid.
7. **Joint Ventures/Consortium is permitted, as per RCD letter no 8131(S) dt: 24-7-12.**

   Joint Venture Documents and Requirement

   Each Joint Venture Bidder shall submit, as format-16 of the Technical Section of its Bid, a written commitment, in the form of a letter duly executed by an authorized officer of each joint venture participant which,

   Confirms each joint venture participant's commitment to the joint venture and acceptance of the joint venture arrangements described in the Bid.

   Confirms each joint venture participant's willingness to provide a joint and several guarantee to the Owner to underwrite the performance of the joint venture in respect of the Contract; and

   Identifies which joint venture participant,

   will assume the leading role on behalf of the other joint venture participants; and

   will have the authority to commit all joint venture participants.

will have the authority to incur liabilities and receive instructions for and on behalf of any and all participants of the joint venture.

A copy of the Joint Venture Agreement entered into by the Partners (JV Participants) shall be submitted with the bid. Alternatively, a Letter of Intent as per format provided under Annexure A – Part K to execute a Joint Venture Agreement in the event of a successful bid shall be signed by all partners and submitted with the bid together with a copy of the proposed Agreement, clearly indicating the objectives of the joint venture, the proposed management structure, the contribution of each participant to the joint venture operations, the commitment of the participants to joint and several liability for performance of the contract, recourse or sanctions within the joint venture in the event of default or withdrawal of any participant, and arrangements for providing the required indemnities.

If the Successful Bidder is a Joint Venture to whom the contract is awarded, each partner of the Joint Venture shall sign and execute the contract with the Owner and shall be jointly and severally responsible to Owner for the performance of the contract.

Bidder shall not have a conflict of interest. Any Bidder found to have a conflict of interest shall be disqualified. A Bidder may be considered to have a conflict of interest for the purpose of this bidding process, if the Bidder:

(a) Directly or indirectly controls, is controlled by or is under common control with another Bidder; or

(b) Receives or has received any direct or indirect subsidy from another Bidder; or

(c) Has the same legal representative as another Bidder; or

(d) Has a relationship with another Bidder, directly or through common third parties, that puts it in a position to influence the bid of another Bidder, or influence the decisions of the Employer regarding this bidding process; or

(e) Participates in more than one bid in this bidding process. Participation by a Bidder (Main or any partner of the Firm) in more than one Bid will result in the disqualification of all Bids in which such Bidder is involved. However, this does not limit the inclusion of the same subcontractor in more than one bid; or

(f) Any of its affiliates has been hired (or is proposed to be hired) by the Employer or Borrower as Engineer for the Contract implementation; or

(g) Has a close business or family relationship with a professional staff of the Borrower (or of the project implementing agency, or of a recipient of a part of the loan) who: (i) are directly or indirectly involved in the preparation of the bidding documents or specifications of the contract, and/or the bid evaluation process of such contract; or (ii) would be involved in the implementation or

supervision of such contract unless the conflict stemming from such relationship has been resolved in a manner acceptable to the Bank throughout the procurement process and execution of the contract.

Bidder shall not have a conflict of interest. Any Bidder found to have a conflict of interest shall be disqualified. A Bidder may be considered to have a conflict of interest for the purpose of this bidding process, if the Bidder:

(h) Directly or indirectly controls, is controlled by or is under common control with another Bidder; or

(i) Receives or has received any direct or indirect subsidy from another Bidder; or

(j) Has the same legal representative as another Bidder; or

(k) Has a relationship with another Bidder, directly or through common third parties, that puts it in a position to influence the bid of another Bidder, or influence the decisions of the Employer regarding this bidding process; or

(l) Participates in more than one bid in this bidding process. Participation by a Bidder (Main or any partner of the Firm) in more than one Bid will result in the disqualification of all Bids in which such Bidder is involved. However, this does not limit the inclusion of the same subcontractor in more than one bid; or

(m) Any of its affiliates has been hired (or is proposed to be hired) by the Employer or Borrower as Engineer for the Contract implementation; or

(n) Has a close business or family relationship with a professional staff of the Borrower (or of the project implementing agency, or of a recipient of a part of the loan) who: (i) are directly or indirectly involved in the preparation of the bidding documents or specifications of the contract, and/or the bid evaluation process of such contract; or (ii) would be involved in the implementation or supervision of such contract unless the conflict stemming from such relationship has been resolved in a manner acceptable to the Bank throughout the procurement process and execution of the contract.

8. Bidders that are Government-owned enterprises or institutions in the Employer's Country may participate only if they can establish that they (i) are legally and financially autonomous (ii) operate under commercial law, and (iii) are not dependent agencies of the Employer. To be eligible, a government-owned enterprise or institution shall establish to the Owners satisfaction, through all relevant documents, including its Charter and other information the Bank may request, that it: (i) is a legal entity separate from the government (ii) does not currently receive substantial subsidies or budget support; (iii) operates like any commercial enterprise, and, inter alia, is not obliged to pass on its surplus to the government, can acquire rights and liabilities, borrow funds and be liable for repayment of its debts, and can be declared bankrupt; and (iv) is not bidding for a contract to be awarded by the department or agency of the government which under their applicable laws or regulations is the reporting or supervisory authority of the enterprise or has the ability to exercise influence or control over the enterprise or institution.

9. Bidders should not be black listed or under a declaration of ineligibility for corrupt and fraudulent practices by the Central Government, any State Government or any public undertaking, autonomous body, authority by whatever name called under the Central or the State Government.

10. Any bidders having criminal record is not allowed to particípate in the bidding process. Any person who is having criminal cases against him or involved in the organised crime or gangster activities or Mafia or Goonda or Anti social activity are strictly prohibited to participate in the bidding process. If it is established that any bidder has criminal record, his bid shall be automatically cancelled. The bidder has to produce character certificate issued by the competent authority in original with bid document. Self declaration affidavit (on the prescribed format no. 11 which is attached with the bid document) should be submitted with the bid.

11. A Bidder shall not be under suspension/debarred from bidding by the Employer or from any Department of Central/State Government.

12. Even though the applicant meets the above criteria, he/she is subject to be disqualified if he/she has :

(a) Made misleading or false representation in the forms, statements and attachments submitted ; and/or

(b) Record of poor performance such as abandoning the work, not properly completing the contract, inordinate delays in completion, or financial failures. Etc.

13. **The criteria for pre-qualification :**

Technical Experience –

A) The Bidder must have Experience of design, build & commissioning, one STP of minimum 8 MLD capacity in the last 7 years; or Two STP of minimum 6 MLD capacity in the last 7 years or Three STP of minimum 4 MLD capacity in the last 7 years.

B) The Bidder must have Experience of design, build & commissioning, at least 1 SPS of 5 MLD Capacity and

C) also having operating and maintaining of i) STP of the same capacity as per 14.1.A and ii) SPS of same capacity as per 14.1.B, for minimum 2 year in the last 7 Years (i.e.2010-2011to 2016-2017).

a) **<u>Financial Experience</u>**:

Experience for award of the Contract, each bidder should have successfully completed works during the last 7 years ending last day of the month previous to the one in which applications are invited within India only. :

(i) Three similar completed works costing (Evaluated Cost) not less than the amount equal to 40% of estimated cost i.e .Rs. 2432.00 Lacs.

(ii) Two similar completed works costing (Evaluated Cost) not less than the amount equal to 60% of estimated cost i.e .Rs. 3648.00 Lacs.

(iii) One similar completed works costing (Evaluated Cost) not less than the amount equal to 80% of estimated cost i.e .Rs. 4863.00 Lacs.

Note : Cost will be evaluated taking escalation @ 8% per year.

(b) Turn Over:

Average annual turnover of last three years, whichever is more, should be Rs. 1824.00 Lacs during the last three years ending 31st March 2017, and

Minimum turn over in any one financial year in last seven financial year should be Rs. 3040.00 Lacs

Note: The turnover will be indexed at the rate of 8 percent for a year.

(c) Profit/Loss :

The firm should have a positive Net worth during last 3 years.

(d) Solvency Certificate :

The Contractor should have the solvency of Rs.3040.00 Lacs.

(e) Bid Capacity:

Bidders who meet the minimum qualification criteria will be qualified only if their available bid capacity for construction work is equal to or more than the total bid value. The available bid capacity will be calculated as under:
Assessed Available Bid capacity = (A*N*3 - B)

where

A = Maximum value of works executed in any one year during the last five years (updated to the price level of the last year at the rate of 8 percent a year) taking into account the completed as well as works in progress.

N = Number of years prescribed for completion of the works for which bids are invited

B = Value, at the current price level, of existing commitments and on-going works to be completed during the period of completion of the works for which bids are invited.

(f) Personnel Capability :

The Applicant must have suitable qualified personnel to fill the specified key positions shown below and needs to supply information on prime candidates and alternates for each position.

Sr. No.	Position	Recommended Number	Total Experience (Years)	Experience in Similar Position (Years)	Minimum Qualification
Site Posting in accordance with mutually agreed work plan					
1	Graduate Engineer	2	5	1	B.E. (Civil) / E&M
2	Diploma Engineer	5	5	1	Diploma(Civil)/

					E&M

It is also necessary for each applicant to clearly identify the role of every key person for each of the major component of the Project.

Experience of the key persons mentioned for each role will be evaluated in line with its indicated responsibilities. For this purpose, each nominated key person will give details of duties in previous projects, clearly indicating his/her role in each project. Experience on projects of similar nature and comparable complexity/magnitude will be given due weightage in evaluation. BUIDCO will assess the personnel capability of the Applicant through the information provided by the applicant in attached formats no.5A & 5B of this Per-Qualification Document and other information, if any enclosed with the application.

(g) <u>Equipment Capability</u> :

a) The Applicant should own or have assured through hire, lease, purchase agreement, availability of manufacturing capacity or other means to the key equipment in working order and must demonstrate, that based on the known commitments, the equipment will be available for use in the proposed contract.
b) The equipment shall include equipment for heavy engineering works including equipment for mass concreting, large excavations with dewatering and earth moving, power generators, cranes & sufficient vehicles for transportation of material, considering completion of the Project within stipulated time period.
BUIDCO will assess the equipment capability of the Applicant through the information provided by the applicant in Form 6 of this pre-qualification document and other information, if any enclosed with the application.

Sr. No.	EQUIPMENTS	MINIMUM REQUIREMENT
(a)	**Machineries for Earth work**	
i.	Excavators /loaders (Min. 0.3 cum Bucket Capacity)	1 No.
ii.	Trolley/Tractor (1.5 cum capacity)	1 No.
(b)	**Machinery for structural concrete and Concrete lining**.	
1.	Transit Mixers/Agitator cars of 4 cum capacity.	1 No.
2.	Vibrators	1 No.
3.	Power generating units of adequate capacity	1 No.
4.	Diesel Pump Set of 5 H.P. for dewatering	1 No.
(c)	**Equipment for field testing**	
1.	Compression testing machine	1 No.
2.	Concrete cube molds 150 x 150 x 150mm	3 No.
3.	Slump cones	1 No.
4.	Graduated glass cylinder	1 No.
5.	Set of sieves for fine aggregate (4.75, 2.36, 1.18 mm & 600, 300, 150 micron)	1 Set
6.	Weighing scale (Pan Type) with weights	1 Set
7.	Auto level or Dumping Level	1 No.

8.	Measuring Tape 30m/3m	2 each

15 Litigation History :

The applicants must provide accurate information on any litigation or arbitration resulting from contracts completed or under execution by the firm covered in the application over the last 7 year. A consistent history of arbitration awards against the applicant may result in rejection of the application.

BUIDCO will assess the litigation history of the applicant through the information provided by the applicant in Format no. 10 of this pre-qualification document and other information, if any enclosed with the application.

16 Each bidder must produce:

(i) The current income-tax clearance certificate or copy of income tax return of last 3 years.

(ii) The applicant has a valid GST certificate.

(iii)The proof that the firm is registered with Provident Fund Authorities.

(iv) Last 5 years audited balance sheet report.

(v) Registration of the Firm for Labour welfare cess and the Firm shall have to produce at the time of singing the contract registration of its labours also for labour welfare cess without which firm may be denied any payment of work as per labour laws of the state.

(vi) All men and machinery of the contractor should have adequate insurance cover proof of which shall become a part of contract.

(vii) An affidavit that the information furnished with the bid documents is correct in all respects; and the firm should submit

17 Each bidder must demonstrate:

1. Availability for construction work, of the owned, key equipment stated in the document, including equipment required for establishing field laboratory as above to perform mandatory tests.
2. Availability of technical personnel for construction work as stated in the document.
3. Liquid assets and /or credit facilities, net of other contractual commitments and exclusive of any advance payments which may be made under the Contract.

18 The bidder must not have in his employment, the near relations (defined as first blood relations, and their spouses, of the bidder or the bidder's spouse) of any employee of BUIDCO and/or without permission of BUIDCO or State/Central Government, any person who retired within the last two years from the departments.

19 To qualify for a package of contracts made up of this and other contracts for which bids are invited in the Notice Inviting Tender, the bidder must demonstrate having experience and resources sufficient to meet the aggregate of the qualifying criteria for the individual contracts. Sub-contractors experience and resources shall not be taken into account in determining the bidders compliance with the qualifying criteria. and also the consultancy firm which were involved in this project preparation like DPR/Bid document etc. will not Participate in this Bid. If they participate their Bid will Be Cancelled.

Note: ***The statements showing the value of existing commitments and on-going works as well as the stipulated period of completion remaining for each of the works listed should be countersigned by the Engineer in charge, not below the rank of an Managing Director-I or equivalent.***

20 Even though the bidders meet the above qualifying criteria, they are subject to be disqualified if they have:

(i) Made misleading or false representations in the forms, statements, affidavits and attachments submitted in proof of the qualification requirements; and/or

(ii) Record of poor performance such as abandoning the works, not properly completing the contract, inordinate delays in completion, litigation history, or financial failures etc.

(iii) Participated in the previous bidding for the same work and had quoted unreasonably high or low bid prices and could not furnish rational justification for it to the Employer.

(iv) Sub-contractors experience and resources shall not be taken into account in determining the bidders compliance with the qualifying criteria

21 List of works for which tender have already been submitted to the client but not awarded.

Bidder is instructed to give the details of their tenders, yet to be decided, in BUIDCo or any other department, on enclosed format no. 9. BUIDCo may take consideration of this information for evaluation of eligibility.

22. BID EVALUATION :

22.1 Opening of Bids by Owner

(a) The Owner shall conduct the bid opening in public at the address, date and time **specified in the BDS.**

(b) First, envelopes marked "WITHDRAWAL" shall be opened and read out and the envelope with the corresponding bid shall not be opened, but returned to the Bidder. If the withdrawal envelope does not contain a copy of the "power of attorney" confirming the signature as a person duly authorized to sign on behalf of the Bidder, the corresponding bid will be opened. No bid withdrawal shall be permitted unless the corresponding withdrawal notice contains a valid authorization to request the withdrawal and is read out at bid opening. Next, envelopes marked "SUBSTITUTION" shall be opened and read out and exchanged with the corresponding Bid being substituted, and the substituted Bid shall not be opened, but returned to the Bidder. No Bid substitution shall be permitted unless the corresponding substitution notice contains a valid authorization to request the substitution and is read out at bid opening.

Envelopes marked "MODIFICATION" shall be opened and read out with the corresponding Bid. No Bid modification shall be permitted unless the corresponding modification notice contains a valid authorization to request the modification and is read out at Bid opening. Only envelopes that are opened and read out at Bid opening shall be considered further.

(c) All other envelopes shall be opened one at a time, reading out: the name of the Bidder and whether there is a modification; the Bid Prices, including any discounts and alternative offers; the presence of a Bid Security or Bid-Securing Declaration, if required; and any other details as the Owner may consider appropriate. Only discounts and alternative offers read out at Bid opening shall be considered for evaluation. No Bid shall be rejected at Bid opening except for late bids.

(d) The Owner shall prepare a record of the Bid opening that shall include, as a minimum: the name of the Bidder and whether there is a withdrawal, substitution, or modification; the Bid Price, per lot if applicable, including any discounts, and alternative offers if they were permitted; and the presence or absence of a Bid Security. The Bidders' representatives who are present shall be requested to sign the attendance sheet. A copy of the record shall be distributed to all Bidders who submitted bids in time.

22.2 Clarification of Bids

During Bid evaluation, the Owner may, at its discretion, ask the Bidder for a clarification of its Bid. The request for clarification and the response shall be in writing, and no change in the price or substance of the Bid shall be sought, offered or permitted.

22.3 Preliminary Examination of Bids

a. The Owner will examine each Bid to determine whether it is complete, whether any computational errors have been made, whether required securities have been furnished, whether the documents have been properly signed, and whether the Bid is generally in order.

b. Arithmetical errors in the Bids will be rectified on the following basis:

1. If there is a discrepancy between the unit price and the total price that is obtained by multiplying the unit price and quantity, the unit price shall prevail, and the total price shall be corrected unless in the opinion of the Owner there is an obvious misplacement of the decimal point in the unit price, in which case the total price as quoted shall govern and the unit price shall be corrected;

2. If there is an error in a total corresponding to the addition or subtraction of subtotals, the subtotals shall prevail and the total shall be corrected; and

3. If there is a discrepancy between words and figures, the amount in words shall prevail, unless the amount expressed in words is related

to an arithmetic error, in which case the amount in figures shall prevail subject to (1) and (2) above.

Bidders shall be requested to accept correction of arithmetical errors. If a Bidder does not accept the correction in accordance, its Bid shall be rejected.

c. The Owner may waive any minor informality, nonconformity or irregularity in a Bid that does not constitute a material deviation, and that does not prejudice or affect the relative ranking of any Bidder as a result of the technical and price evaluation pursuant to it.

d. Prior to the detailed evaluation, the Owner will determine whether each Bid is of acceptable quality, is complete and is substantially responsive to the Bidding Documents. For purposes of this determination, a substantially responsive Bid is one that conforms to all the terms, conditions and specifications of the Bidding Documents without material deviations, objections, conditionality's or reservations. A material deviation, objection, conditionality or reservation is one,

   1. that affects in any substantial way the scope, quality or performance of the contract;

   2. that limits in any substantial way, inconsistent with the Bidding documents, the Owner's rights or the Successful Bidder's obligations under the contract; or

   3. whose rectification would unfairly affect the competitive position of other Bidders who are presenting substantially responsive Bids.

e. If a Bid is not substantially responsive, it will be rejected by the Owner, and may not subsequently be made responsive by the Bidder by correction of the nonconformity. The Owner's determination of a Bid's responsiveness is to be based on the contents of the Bid itself without recourse to extrinsic evidence.

22.4 Conversion to Single Currency

Not Applicable

22.5 Technical Evaluation

a. The Owner will carry out a detailed evaluation of the Technical Sections previously determined to be substantially responsive in order to determine on a pass/fail basis whether the technical aspects are in accordance with the requirements set forth in the Bidding Documents. Bidders acknowledge that, in order to reach such a determination, the Owner will examine and analyze the technical aspects of each Bid on the basis of the information supplied by Bidders, taking into account the completeness, consistency and level of detail of the following factors:

   1. with respect to the Design-Build construction plan,

i. the Bidder's ability to demonstrate how it will meet the Owner's project objective and requirements, the technical standards and the Environmental Management Plan;

ii. the soundness of the proposed methodology and approach, and the extent to which the Design-Build Work plan demonstrates an understanding of the local conditions and specific Project requirements;

2. with respect to the Operation and Maintenance Work plan,

i. the extent to which the Operations Work plan addresses all of the Operations Services that are to be provided in accordance with the Contract;

ii. the soundness of the proposed methodology and approach, and the extent to which the Operations Work plan demonstrates an understanding of the local conditions and specific Project requirements; and the Bidder's ability to demonstrate how it will meet the technical standards; and

3. with respect to the Staffing Plan,

i. the qualifications and competence of the Key Staff; and

ii. the overall quality of the Staffing Plan, including the depth and organizational strength demonstrated by the Plan and the extent to which it meets the expertise requirements set out in the BDS.

b. For the purpose of the evaluation of the overall quality of the Staffing Plan shall be based on,

1. the clarity, comprehensiveness and level of detail of the Staffing Plan;

2. the extent to which the expertise required by the Operator's Key Staff as specified in the BDS is included in the Staffing Plan; and

3. the extent to which the Staffing Plan addresses the specific Services that are required by the Design-Build and Operations Services Schedules to the General Conditions.

22.6 Price Evaluation and Comparison of Bids

a. a. The Owner shall examine each Bidder's Financial Section to determine whether such Financial Section is complete and substantially responsive to the Bidding Documents.

b. b. The Financial Sections, which are substantially responsive to the Bidding Documents, shall be evaluated to determine the lowest evaluated bid.

c. c. The Owner shall evaluate the bid by determining and adding various components of cost and prices as under:

d. i. Price adjustment for correction of arithmetic errors in accordance with plus

e. ii. Cost of design, development, construction, testing and successful commissioning of STP; plus

f. iii. Cost of land requirement for STP indicated by the bidder and as determined in accordance with ITB Section 3.3(c); plus

g. iv. Cost for I&D works with pumping stations and rising mains works

h. v. NPV of the yearly payments due on account of O & M of STP, I&D works with pumping stations and rising mains works over 15 years of O & M assuming "Indicative Sewage Flow for STP" reaching the STP during respective years of the Operation Period as indicated in Appendix to Bid (Indicative Flow). For the purpose of determining the NPV discount factor of 10 % per annum shall be applicable.

i. d. The Owner shall compare the evaluated prices of all substantially responsive bids to determine the lowest evaluated bid.

j. e. Electricity Tariff is INR. 6.50 per KWh

k. f. Price of Land per square meter is. Rs. 3953/Sqm

22.7 Qualification of the Bidder

a. The Owner shall determine to its satisfaction whether the Bidder that is selected as having submitted the lowest evaluated and substantially responsive bid meets the Qualification Criteria specified in Annexure A Part h of bidding documents.

b. The determination shall be based upon an examination of the documentary evidence of the Bidder's qualifications submitted by the Bidder, pursuant to Section 3.5 (b).

c. An affirmative determination shall be a prerequisite for award of the Contract to the Bidder. A negative determination shall result in disqualification of the bid, in which event the Owner shall proceed to the next lowest evaluated bid to make a similar determination of that Bidder's qualifications to perform satisfactorily.

22.8 Contacting the Owner

a. From the time of bid opening to the time of Contract award, if any Bidder wishes to contact the Owner, it must do so in writing.

b. Any effort by a Bidder to influence the Owner, its advisors, employees, consultants or agents, in the Owner's Bid evaluation, Bid comparison, or Contract award decision may, in the discretion of the Owner, result in rejection of the Bidder's Bid.

The evaluation and comparison of tenders which have according to the scope of construction of sewerage infrastructure as per tender document including 2

months successful trial, run, testing, commissioning and thereafter 15 years operation and maintenance with two years defect liability period beginning since completion of successful trial run and stabilization period mentioned in Schedule G will be evaluated **after working out final cost of various tenderers**. 15 Years operation and maintenance of build sewerage infrastructure including 24 month defect liability period will compulsory for successful bidder, bid will be awarded to most suitable bidder.

The NMCG / SPMG / BUIDCo reserves the right to accept or reject any or all bids to waive any informally or minor deviation or omission without assigning any reason thereof.

Any political / administrative pressure by t he contractor upon the owner or canvassing directly or indirectly in favour of his offer, his tender will liable to reject. Such tender will be debarred from participating any tender of sewerage / water supply is State Govt.

SIGNATURE OF **SIGNATURE OF**

APPLICANT/ BIDDER **MANAGING DIRECTOR**

Indicative Flow

Indicative Flow for the purpose of evaluation of bids during the Operations Period shall be as follows:

Year of Operations	**Indicative Sewage flow rate for STP (MLD)***
1- Year One	6.0
2- Year Two	6.2
3- Year Three	6.4
4- Year Four	6.6
5- Year Five	6.9
6- Year Six	7.1
7- Year Seven	7.3
8- Year Eight	7.5
9- Year Nine	7.8
10- Year Ten	8.0
11- Year Eleven	8.2
12- Year Twelve	8.4
13- Year Thirteen	8.6
14- Year Fourteen	8.8
15- Year Fifteen	9.0

***"Indicative flow rate** for STP" means the rate of sewage flow which is projected by the Owner to be available for treatment in the STP facility for each of the 15 years of the O & M period.

Indicative Sewage Flow Rate for SPS

Year of Operations	Indicative Sewage flow rate (MLD)					
	SPS A	**SPS B**	**SPS C**	**SPS D**	**SPS E**	**SPS F**
1st year	**0.50**	**3.79**	**0.14**	**0.300**	**0.300**	**0.320**
2 nd Year	**0.511**	**3.878**	**0.143**	**0.307**	**0.307**	**0.328**
3 rd year	**0.523**	**3.966**	**0.146**	**0.314**	**0.314**	**0.336**
4 th year	**0.533**	**4.054**	**0.149**	**0.321**	**0.321**	**0.344**
5 th Year	**0.545**	**4.142**	**0.152**	**0.328**	**0.328**	**0.352**
6 th year	**0.556**	**4.230**	**0.155**	**0.335**	**0.335**	**0.360**
7 th Year	**0.567**	**4.318**	**0.158**	**0.342**	**0.342**	**0.368**
8 th year	**0.579**	**4.406**	**0.161**	**0.350**	**0.350**	**0.376**
9 th year	**0.590**	**4.494**	**0.164**	**0.357**	**0.357**	**0.384**
10 th year	**0.602**	**4.582**	**0.167**	**0.364**	**0.364**	**0.392**
11^{th} year	**0.613**	**4.670**	**0.17**	**0.371**	**0.371**	**0.400**
12^{th} year	**0.624**	**4.758**	**0.173**	**0.378**	**0.378**	**0.408**
13^{th} year	**0.635**	**4.846**	**0.176**	**0.385**	**0.385**	**0.416**
14^{th} year	**0.657**	**4.934**	**0.178**	**0.392**	**0.392**	**0.424**
15^{th} year	**0.670**	**5.11**	**0.18**	**0.400**	**0.400**	**0.440**

Indicative Sewage flow rate for SPS means the rate of sewage flow which is projected by the Owner to be available for handling in the SPS for each of the 15 years of the O&M period.

LETTER OF APPLICATION

[Letterhead paper of the Applicant including full postal address, telephone no., fax no., E-mail address]

Date:.....

To,

Managing Director,
2nd floor, SFC building,
Daroga Prasad rai path,
Patna (Bihar) Pin- 800001.

Being duly authorized to represent and act on behalf of ....., (Hereinafter referred to as "the Applicant"), and having reviewed and fully understood all of the Technical & Financial Evaluation information provided, the undersigned hereby apply to be pre-qualified by yourselves as a bidder for

Attached to this letter are copies of original documents defining:

(a) The Applicant's legal status;

(b) The principal place of business; and

(c) The place of incorporation (for applicants who are corporations), or the place of registration and the nationality of the owners (for applicants who are partnerships or individually-owned firms).

(d) Technical & Financial Evaluation documents as defined.

3. Your Agency and its authorized representatives are hereby authorized to conduct any inquiries or investigations to verify the statements, documents, and information submitted in connection with this application, and to seek clarification from our bankers and clients regarding any financial and technical aspects. This Letter of Application will also serve as authorization to any individual or authorized representative of any institution referred to in the supporting information, to provide such information deemed necessary and as requested by you to verify statements and information provided in this application, such as the resources, experience, and competence of the Applicant.

4. Your Agency and its authorized representatives may contact the following persons for further information:

Contact 1 Name : ……. Designation : …….	Telephone : …… Mobile : …… Fax no. : …… E -Mail ID : ……
Contact 2 Name : ……. Designation : …….	Telephone : …… Mobile : …… Fax no. : …… E -Mail ID : ……

5. This application is made with the full understanding that:

   (a) Bids by pre-qualified applicants will be subject to verification of all information submitted for Technical & Financial Evaluation at the time of bidding;

   (b) Your Agency reserves the right to:

   - Amend the scope and value of any contracts bid under this project; in such event, bids will only be called from pre-qualified bidders who meet the revised requirements; and
   - Reject or accept any application, cancel the Technical & Financial Evaluation process, and reject all applications.

   (c) Your Agency shall not be liable for any such actions and shall be under no obligation to inform the Applicant on the grounds for them.

6. Our firm is enlisted in BUIDCo as class …….. contractor in ……. Category.

   OR

   Our firm is not enlisted in BUIDCo as required but we have applied for enlistment as contractor in BUIDCo in required class and category on …….. (Copy of proof of submission of application form of enlistment attached)

7. The undersigned declare that the statements made and the information provided in the duly completed application are complete, true, and correct in every detail.

Signed
Name
For and on behalf of (Name of Applicant)

FORMAT (1)

GENERAL INFORMATION OF BIDDERS

All individual firms applying for Technical & Financial Evaluation are requested to complete the information in this form. Nationality information should be provided for all owners or applicants who are partnerships or individually owned firms.

Where the Applicant proposes to use named subcontractors for critical components of the works, the following information should also be supplied for the specialist subcontractor(s), together with a brief description of their specialized input.

1.	**Name of Applicant Firm**	
2.	**Head office address**	
3.	**Contact Person**	**Telephone** **Mobile no.**
4.	**Fax**	**E-mail**
5.	**Place of incorporation / registration**	**Year of incorporation / registration**

Signature & Seal of Applicant

FORMAT (2)

1. The Applicant is

(a) An Individual

(b) A Proprietary Firm

(c) A Partnership Firm

(d) A Limited Company or Corporation

(e) Any other (Please specify)

2. Attach the Organisation Chart showing the structure of the Organisation including the names of the Owners/Directors and position of the officers.

3. No. of years of experience as firm shouldering major responsibility.

4. No. of years the organization has been in business of similar work under its present name and style areas of business when the organization was established.

   New areas of business added to the organization and the years when added.

5. Name of the projects where in the organization was required to suspend the construction and/or erection works for more than six months continuously after commencement. Please state the reasons therefore and the present status.

6. Name of the projects where in the organization was required to suspend the operation and maintenance works for more than six months continuously after commencement. Please state the reasons therefore and the present status.

7. Name of the projects where in the organization was required to abandon after award and the reasons therefore.

8. Areas of specialization and interest in civil engineering construction.

9. Details of experience in using heavy earthmoving equipment.

STRUCTURE AND ORGANISATION

FORMAT (3)

GENERAL EXPERIENCE RECORD

Name of Applicant

All individual firms are requested to complete the information in this form. The information supplied should be the annual turnover of the Applicant, in terms of the amounts billed to clients for each year for work in progress or completed.

Applicants should not be required to enclose testimonials, certificates, and publicity material with their applications; they will not be taken into account in the evaluation of qualifications.

Sl. No.	Financial Year	Annual Turnover Data			Remarks
		Actual Annual Turnover (In Rs. Crores)	Multiplying Factor	Evaluated Turnover (In Rs. Crores)	
1	2	3	4	5	6
1.	2015-16		1.00		
2.	2014-15		1.08		
3.	2013-14		1.17		
4.	2012-13		1.26		
5.	2011-12		1.360		
6.	2010-11		1.47		
7.	2009-10		1.59		
~~8.~~	~~2008-09~~		~~1.71~~		
~~9.~~	~~2007-08~~		~~1.85~~		
~~10~~	~~2006-07~~		~~2.00~~		

Signature & Seal of Applicant

FORMAT (4)

PARTICULAR EXPERIENCE RECORD

Name of Applicant

To pre-qualify, the Applicant shall be required to pass the specified requirements applicable to this form, as set out in the "Instructions for Pre – Qualification/Eligibility".

On a separate page, using the format of Format (4A), and (4B) as applicable, the Applicant is requested to list all contracts of a similar nature and complexity to the contract for which the Applicant wishes to qualify and undertaken during the last 10 (ten) years within India. Such details should be submitted using formats 4A and 4B respectively for each contract completed or under execution, by the Applicant. The applicants must submit the performance report (completion certificate) in support of their work experience obtained from the authorized representative of client containing Agreement No., date of start, date of completion and value of work done (Performa is annexed with format (4C).

Where the Applicant proposes to use named subcontractors for critical components of the works, the information in the same forms should also be supplied for each specialist subcontractor.

Applicants are required to enclose evidence documents for work in progress or completed as specified in para 8 of Important Note. Use of copy of certificates is recommended with signature of applicant for authentication.

Any work done as a subcontractor will not be considered for eligibility.

Please attach certified copy of the certificate of experience in support of above details issued by the Govt. Deptt./Public sector under taking by an authority not below the rank of Executive Engineer or authorised rank for the work cost on attached Performa.

FORMAT (4A)

DETAILS OF CONTRACTS OF SIMILAR NATURE AND COMPLEXITY

Name of Applicant :-

Use a separate sheet for each contract.

1.	Status of Work	Completed/Under Execution
2.	Contract Bond No.	
3.	Name of Contract	
4.	Country	
5.	Name of Employer	
6.	Employer Address & Phone no.	
7.	Nature of works and special features relevant to the contract for which the Applicant wishes to prequalify	
8.	Contract role (check one) Sole contractor Subcontractor	
9.	Value in specified currencies at completion, or at date of award for current contracts, • Total Contract Amount : Rs _____(Rs. _____) • Sub-Contract Amount (if the role was sub-contractor): Rs_____(Rs. _____)	
10.	Schedule Contract/duration for execution and commissioning _____Years _____ months	
11.	Schedule Contract/duration for operation & maintenance _____Years_____months	
12.	Schedule Date of award/completion	
13.	Actual date of completion of work (Execution and Commissioning)	
14.	Actual date of completion of work (Operation & Maintenance)	
15	Main component of the work executed	
(a)	Total Excavation/Earth Work	
(b)	Total RCC Work	
(c)	Total Pipe Line Work in Water Supply (Dia & Length)	
(d)	Total Sewer Laying Work (Dia & Length) and Maximum Depth	
(e)	STP/WTP	
(f)	Pumping Plant	
(g)	Others	

NOTE : Verification of above required on Performa annexed with (4a).

Signature & Seal of Applicant

FORMAT (4B)

Summary Sheet: Current Contract Commitments / Works in Progress

Name of Applicant
Applicants and each partner to an application should provide information on their current commitments on all contracts that have been awarded, or for which a letter of intent or acceptance has been received, or for contracts approaching completion, but for which an unqualified, full completion certificate has yet to be issued.

Rs. In Crores

Sl. No	Name of contract	Address of the client	Brief scope	Date of Start	Contract Value	Stipulated completion date	Estimated completion date	Percent completion achieved as on 31.03.2017	Value of outstanding work	Amount to be spent during next 2 years	
										Year 1	Year 2
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11a**	**11b**
1.											
2.											
3.											
4.											
5.											

NOTE : IF REQUIRED PLEASE ADD ADDITIONAL SHEETS

Signature & Seal of Applicant

Annexure of Format no. – 4(C)

Certificate Regarding Performance of Contractor

Name of Client.....: Address of the .....Details of Works executed by Shri / M/s. .....
.....

1	Name of work brief particulars	
2	Agreement No. and Date	
3	Date of commencement of work	
4	Stipulated date of completion.	
5	Actual Date of completion	
6	Details of compensation of levied for delay, if any	
7	Tendered amount	
8	Gross amount of the work completed	
9	Name and address of the authority under whom works executed	
10	Whether the contractor employed qualified Engineer/Overseer during execution of work?	
11	(i) Quality of work (indicate grading) (ii) Amount of work paid on reduced rate basis if any	
12	(i) did the contractor go for arbitration? (ii) If yes, total amount of claim (iii) Total amount awarded.	
13	Comments on the capacities of the contractor (a) Technical Proficiency (b) Financial soundness (c) Mobilisation of adequate T&P (d) Mobilisation of manpower (e) General behaviour	 Outstanding/Very Good/Good/Poor Outstanding/Very Good/Good/Poor Outstanding/Very Good/Good/Poor Outstanding/Very Good/Good/Poor Outstanding/Very Good/Good/Poor

Note : All columns should be filled in properly.

Signature of Bidder

FORMAT (5A)

PERSONNEL CAPABILITY

The Applicant is requested to provide the names of at least two candidates qualifying the specific positions that according to the Applicant are essential to contract implementation and for positions mentioned in the Pre – Qualification Document.

Please supply the candidate data on separate sheets using the format of Form (6B)

Name of Applicant Firm …….

Sl. No.	Title of Position	Name of Prime Candidate & E. Mail/Mobile No.	Name of Alternate Candidate & E. Mail/Mobile No.
1	2	3	4
1			
2			
3			
4			
5.			

Signature & Seal of Applicant

FORMAT (5B)

CANDIDATE SUMMARY

Name of Firm……..

Sl. No.	Name of Employee /Candidate	Professional Qualifications	Designation	Professional Experience	Working with Firm		Staff to be deployed on the work under this tender
					From	To	
1	**2**	**3**	**4**	**5**	**6a**	**6b**	**7**

Signature of Bidder

FORMAT (6)

EQUIPMENT CAPABILITY

Name of Firm : ……..

The Applicant shall provide adequate information to demonstrate that the Firm has the capability to meet the requirements for all items of equipment required for timely completion of the Project.

Sl. No.	Name of T&P /Equipment	Model / Year of Manufacturing	Capacity	T&P to be used on the work under this tender	Remarks
1	2	3	4	5	6

Signature of Firm

FORMAT (7)

FINANCIAL CAPABILITY

Name of Applicant					
Applicants should provide financial information to demonstrate that they meet the requirements stated in the Instructions to Applicants. Each applicant must fill in this form. If necessary, use separate sheets to provide complete banker information. A copy of the audited balance sheets and statement of profit and losses should be attached.					
Banker	Name of banker				
	Address of banker				
	Telephone/Mobile no.		Contact name and title		
	Fax no.		E-Mail		
Summarize actual assets and liabilities in INR equivalent (at the rates of exchange current at the end of each year) for the previous five years. Based upon known commitments summarize projected assets and liabilities in INR equivalent for the next two years.					
Financial information Rs.in Crore	Actual : Previous five years				
	Year 1	Year 2	Year 3	Year 4	Year 5
1. Total assets					
2. Current assets					
3. Total liabilities					
4. Current liabilities					
5. Sales					
6. Ordinary Profits					
7. Profits before taxes					
8. Profits after taxes					
9. Net worth					

Specify proposed sources of financing to meet the cash flow demands of the Project, net of current commitments for other contracts.	
Source of financing	Amount (Rs. in Crore)
1.	
2.	
3.	
4.	

Attach audited financial statements for the last five years (for the individual applicant).

Firms owned by individuals, and partnerships, may submit their balance sheets certified by a registered accountant, and supported by copies of tax returns.

Applicants are be requested to submit a bank reference letter from a reputable commercial bank to the effect that such bank certifies the financial capability of the applicants to meet their financial obligation to perform the said contract and considers to issue a specific line of credit when and if the contract is awarded to the applicants.

Signature & Seal of Applicant

FORMAT (8)

BIDDING CAPACITY

NAME OF THE APPLICANT / FIRM / CORPORATE HOUSES:

SI. No.	Description	Eligibility
A	Bid Capacity	Should not be less than 58.52 crores

Financial Year	Turnover in Rs. Million (Pre-Factoring)	Factor	Turnover in Rs. Million (Post - Factoring)
2015-2016		1.00	
2014-2015		1.08	
2013-2014		1.17	

Assessed available bid capacity (AxNx3)-B

A = Maximum value of all works at current price executed in any one of the three previous financial years (at current price level)

B = Value at current price level of existing commitments and ongoing works to be completed in the next 'N' years.

N = No. of years prescribed for the completion of the subject contract

I/ We fulfill / not fulfill the aforesaid of eligibility criteria.

Signature of authorized signatory with
Name designation, date & company seal

FORMAT (9)

List of works for which tenders have already submitted to any client but not awarded.

Name of Applicant

Sl. No.	Name of Client & Address of Correspondence/ Telephone no.	Name of work	Estimated cost of work, Rs. In lacs	Date of submission of offer	Position in the bidding if opened	Likely date of award	Remarks, if any
1	2	3	**4**	**5**	6	7	8
1.							
2.							
3.							
4.							
5.							
6.							

Signature & Seal of Applicant

FORMAT (10)

LITIGATION HISTORY

Sl.No.	Name of Deptt. With which dispute arose. Address with Tel. No. and e-mail address of Deptt.	Ref. of Tender/ cost of work	Date of start of work	Schedule date of completion of work	Date of start of Dispute
1	2	3	4	5	6

Nature of Dispute	Total Cost of Disputed work	Dispute pending under		Present of Position of Dispute	
		Arbitration	Court	Settled with cost & Date	Under Progress
7	8	9	10	11	12

Please Specify:

1. If the Applicant firm has ever been black listed or debarred or tendering by any Government/Semi Government Organization. If so, provide details and present status.
2. If the Applicant firm has ever been executed or under trial by any court on any tendering matter or any matter related to contract bond.

Signature & Seal of Applicant

FORMAT (12)

Affidavit

I ..... S/o, D/o .....Age .....

R/o ..... do herby solemnly affirm as under

1. I am the registered contractor in A/B/C/D category of ..... department (Certificate attached). I am having movable and immovable assets and is competent to execute/complete the project work in professional manner. I am also having requisite machines machineries etc. and is having requisite experience with respect to this project work.
2. I am submitting tender upon the format provided by the department in consequent to the tender for ..... floated by the concerned executing agency/department.
3. All the certificates namely Character Certificate,Experience Certificate,Income Tax Return,Turnover,Sales Tax Certificate/Cost Bid Security Certificate,Bid Capacity Certificate, Bank Guarantee etc. and Other respective documents have been annexed with the tender document/bid document in its original form.
4. My PAN No. is ..... (Certificate attached).
5. The details of litigation for and against me are as under
   (Criminal/Civil Cases) :-
   Parties ....., Case No. ....., Thana ....., District .....
   Court where litigation is pending .....
   Short Synopsis of case .....
6. I have not been debarred and blacklisted from the concerned department and any other department of state/central Govt. Neither I have been involved in any criminal activities, Common Criminal conspiracy nor I have been involved in any antisocial activities. I am not a criminal my character is good.
7. Neither any case has been instituted in district nor in State against me.
8. Even after award of the contract, if any certified complaint against me regarding my involvement in criminal activities/antisocial activities or common criminal conspiracy have been found then if is the right of competent authority to cancel/terminate my LOA/Contract and punish me as per the terms of RFP/Contract. If i have been found involved in my criminal activity against the department/misappropriating public money than suitable criminal action as per Law against me can be taken by the competent authority and I have no objection to that.
9. I will execute the project work maintaining complete quality and well with in stipulated time as per BOQ. I will provide full support to the department/executing agency.
10. My work and character are good.
11. My temporary and permanent address are as under :
    Temporary Address :-
    .....
    ...

Permanent Address :-

.....

(Complete address with Phone No and Pin Code has to be provided)

12. I declare that I have been residing upon the above mentioned address since ..... years and I will not change either my temporary address or permanent address till execution of the project work however. If due to some unavoidable situation/circumstances, my above mentioned address changes then I will give notice to this effect immediately after change to the competent authority.
13. I am deposing above facts full mentioned under Para No.1 to 13 in my sense with healthy mind in the name of God. and the Same is correct to the best of my knowledge.

Date .....

Deponent
(full signature)

Full Name .....

Full Address .....

FORMAT (13)

FORM OF SOLVENCY CERTIFICATE FROM A SCHEDULED PUBLIC SECTOR BANK

This is to certify that to the best of our knowledge and Information M/s/Sri …… Address……., a customer of our bank are/is respectable and can be treated as good for any engagement upto a limit of Rs. ……. (Rupees ……..). This certificate is issued without any guarantee or responsibility on the Bank or any of the officers.

(Signature)
Of the Bank Authority
Name of Bank & Seal

Note : In case of partnership firm, certificate to include names of all partners as recorded with the Bank.

Signature of Applicant/Bidder

DELETED

FORMAT (15)

Check List

(To be filled by Bidder)

Sl. No.	Title	Action Required	Action Taken or Not	Page No.
1	2	3	4	5
a.	Memorandum of Works	Filled & Signed	Yes/No	
b.	Letter of Undertaking	Filled & Signed	Yes/No	
c.	EMD Details	Filled & Attach	Yes/No	
d.	Application Forms	Signed & Attach Document	Yes/No	
e.	Information Regarding Enlistment in BUIDCoas contractor	Copy Attach	Yes/No	
(i)	Format – 1, General Information	Signed & Attach required documents	Yes/No	
(ii)	Format – 2, Structure and Organisation	Signed & Attach organization chart	Yes/No	
(iii)	Format – 3, General Experience Record	Signed & Attach Certificate of Chartered Account	Yes/No	
(iv)	Format – 4, Particular Experience Record			
(v)	Format – 4a, Details of Contracts of Similar Nature and Complexity	Filled for Qualifying as per clause 14a & signed	Yes/No	
	Performa of Performance Report by Client Department	Copy Attach	Yes/No	
(vi)	Format – 4b, Current Contract Commitments / Works in Progress	Filled & Signed	Yes/No	
(vii)	Format – 5A, Personnel Capability	Filled & Signed	Yes/No	
(viii)	Format – 5B, Candidate Summary	Filled & Signed	Yes/No	
(ix)	Format – 6, Equipment Capability	Filled & Signed	Yes/No	
(x)	Format – 7, Financial Capability	Filled & Signed, Attach copy of Previous 5 Year Audited Balance Sheet & Bank Letter	Yes/No	
(xi)	Format – 8, Bidding Capacity	Filled & Signed	Yes/No	
(xii)	Format – 9, List of works for which tenders have already submitted to any client but not awarded	Filled & Signed	Yes/No	
(xiii)	Format – 10, Litigation History	Filled & Signed and Attach Supporting Document	Yes/No	
(xiv)	Format – 11, 'kiFk i=	Filled & Signed with Photo	Yes/No	
(xv)	Format – 12 Form of Solvency Certificate Form A Scheduled Public Sector Bank	Filled & Signed	Yes/No	
(xvi)	Format – 13 Manufacturer's Authorization Form	Filled & Signed	Yes/No	
(xvii)	Additional Information	Enclosed	Yes/No	

Signature of Applicant/Bidder

FORMAT (16)

FORMATE OF PREBID QUERIES

To,
Managing Director,BUIDCo.
SFC Building, Second Floor,
Daroga Prasad Rai Path,
Road No.- 02, R-Block,
Patna- 800001, Bihar

Subject :- Naugachiya I&D work

Dear Sir,

Following are the clarification and comments from the term and conditions and scope of work against the RFP for selection of Consultant firm for Procurement Management Support Services.

Sl.	Clause Ref.	Page No.	Clarification asked for

Signature of the Authorized Signatory

Name of the Authorized Signatory

Name of Bidder

Date:

Place

FORMAT (17)

FORM OF LETTER OF INTENT BY JV PARTNERS TO ENTER INTO JV AGREEMENT

THIS LETTER OF INTENT signed on this..... day of..... Two Thousand and .....by..... a company incorporated under the laws of ..... and having its Registered Office at .....(hereinafter called the "Party No.1" which expression shall include its successors, executors and permitted assigns) and M/s .... a company incorporated under the laws of ..... and having its Registered Office at .....(hereinafter called the "Party No.2" which expression shall include its successors, executors and permitted assigns)

which expression shall include its successors, executors and permitted assigns) for the purpose of making a bid and entering into a contract [hereinafter called the "Contract" (in case of award) against the work for the design and build Sewage Treatment Plant and all Appurtenant Structures and Allied Works, and O & M of Complete Works associated with …….. ……..(hereinafter called the "Owner").

WHEREAS the Party No.1 and Party No.2 intend to enter into a JointVenture Agreement

AND WHEREAS the Owner invited bids as per the above mentioned Specification to design and build Sewage Treatment Plant and all Appurtenant Structures and Allied Works, and O & M of Complete Works stipulated in the bidding documents.

AND WHEREAS Qualification Criteria forming part of the bidding documents, inter-alia, stipulates that two partners, meeting the requirements of 'Qualification Requirement of the Bidder', as applicable may bid, provided, they submit a Letter of Intent to enter into Joint Venture Agreement and the Joint Venture Partners fulfill all other requirements 'Qualification of the Bidder' and in such a case, the Letter of Bid (Bid Form) shall be signed by the Partner - In Charge so as to legally bind all the Partners of the Joint Venture, who will be jointly and severally liable to perform the Contract by entering into Joint Venture Agreement as per proforma submitted with the Bid which will be legally binding on all partners and all obligations hereunder.

The above clause further states that this Letter of Intent shall be attached to the bid and the Contract performance guarantee will be as per the format enclosed with the bidding document without any restrictions or liability for either party.

AND WHEREAS the bid is being submitted to the Owner vide proposal No.....dated..... by Party No.1 based on this letter of Intent between all the parties; under these presents and the bid

has been signed by all the parties.

NOW THIS UNDERTAKING WITNESSETH AS
UNDER:

In consideration of the above premises and agreements all the parties of this letter of Intent do here by declare and undertake:

1. In requirement of the award of the Contract by the Owner to the Joint Venture Partners, we, the Parties do here by undertake that M/s..... the Party No.1, shall act as lead Partner and further declare and confirm that we the parties to the Joint Venture shall jointly and severally be bound unto the Owner for the successful performance of the Contract and shall be fully responsible for the design and build Sewage Treatment Plant and all Appurtenant Structures and Allied Works, and O & M of Complete Works accordance with the Contract for which we shall enter into Joint Venture Agreement as per proforma submitted with the Bid which will be legally binding on all partners:
2. If the Contract is awarded to Joint Venture then in case of any breach or default of the said Contract by any of the parties to the Joint Venture, the party (s) will be fully responsible for the successful performance of the Contract and to carry out all the obligations and responsibilities under the Contract in accordance with the requirements of the Contract.
3. Further, if the Owner suffers any loss or damage on account of any breach in the Contract or any short fall in the performance of the equipment in meeting the performances guaranteed as per the specification in terms of the Contract, the Party(s) of the represents will promptly make good such loss or damages caused to the Owner, on its demand without any demur. It shall not be necessary or obligatory for the Owner to proceed against lead Partner to these presents before proceeding against or dealing with the other Party(s), the Owner can proceed against any of the parties whos hall be jointly and severally liable for the performance and all other liabilities/obligations under the Contract to the Owner.
4. The financially ability of the Parties of the Deed of Undertaking to the Owner in the even to faward of Contract on the Joint Venture, with respect to any of the claims a rising out of the performance or non-performance of the obligations set for thin the Deed of Undertaking, read in conjunction with there levant conditions of the Contract shall, however not be limited in any way so as to restrict or limit the liabilities or obligations of any of the Parties of the Deed of Undertaking.
5. It is expressly understood and agreed between the Parties to this Letter of Intent that there sponsibilities and obligations of each of the Parties shall be as delineated in Appendix-I (to be suitably appended by the Parties along with this Letter of Intent in its bid). It is further undertaken by the parties that the above sharing of responsibilities and obligations shall not in

any way be a limitation of joint and several responsibilities of the Parties under the Contract in the event of award on Joint Venture.

6. It is also understood that this Letter of Intent is provided for the purposes of undertaking joint and several liabilities of the partners to the Joint Venture for submission of the bid and performance of the Contract if awarded and that this Letter of Intent shall not be deemed to give rise to any additional liabilities or obligations, in any manner or any law, on any of the Parties to this Letter of Intent or on the Joint Venture, other than the express provisions of the Contract.

7. *This Letter of Intent shall be construed and interpreted in accordance with the provisions of the Contract.*

8. *In case of an award of a Contract, we the parties to this Letter of Intent do hereby agree that we shall enter into Joint Venture Agreement as per performa submitted with the Bid which will be legally binding on all partners and we shall be jointly and severally responsible for furnishing a Contract performance security from a bank in favor of the Owner in the currency of the Contract.*

9. It is further agreed that this Letter of Intent shall be irrevocable and shall form an integral part of the bid. It shall be effective from the date first mentioned abovefor all purposes and intents.

IN WITNESS WHEREOF, the Parties to this Letter of Intent have through their authorized representatives executed these presents and affixed Common Seals of their companies,on the day,month and year first mentioned above.

Common Seal of ..... has been affixed in my/ our presence pursuant to Board of Director's Resolution dated	For Lead Partner (PartyNo.-1) For and on be half of M/s
Name…….	
Designation ……	
Signature……	Signature of the authorized representative)

WITNESS:

I…….

II…….

INSTRUCTIONS TO BIDDERS :

(1) To visit the site so as to ascertain the local conditions and availability of materials etc and quote their rates accordingly. However, no claim shall be entertained even if the site of works is changed / modified.

(2) To study the schedule 'I' for materials to be supplied by the department and their issue rate and other conditions.

(3) To quote the rates strictly as per language of price Schedule - 'Volume II' and bidders should not quote or write any conditions which are not required in price schedule. The conditional tender is liable to be rejected.

(4) To read carefully the specifications, terms and conditions, work out their own quantities from the drawing before quoting the rates.

(5) To well acquaint themselves with the nature of work, the existing water mains, incoming drainage and other utility service lines/obstacles etc. through the alignment, they should include in their rates sufficient allowances to meet unforeseen expenses on these grounds.

(6) The quantities are approximate and can vary up to any extent on either side and no extra claim shall be entertained on this account. The contactors will be paid on the basis of actual measurements of finished work, executed by him.

(7) No payment will be made for making the layout, construction of level pillars and removal of debris from the alignment and grass etc. for the proper execution of work.

(8) Final payment shall be made after proper testing as per satisfaction of Engineer.

(9) ISS/ PWD detailed specifications shall be followed during execution of work/ recording measurements and payment etc.

(10) The tender shall be issued in duplicate but is to be submitted in one copy only containing all necessary information therein as asked for.

(11) The tenderers should go through all the details carefully including annexure Form No. 2 L.S.G.E.D./ BUIDCo. & drawings etc. mentioned here-in-under & sign each page before submitting.

(12) The field survey, Hydraulic design and structural design for each and every individual unit of work shall have to be done by the contractor and duly approved by the department.

(13) The working pressure shall be as prescribed in the technical specifications and factory test pressure shall be as per latest amendment of relevant IS code for the pipe to be supplied by the contractor as per approved vendor list by the competent authority.

1. (14) The earnest money as specified in tender notice i.e. Rs. 69.00 lacs must be enclosed with the tender in the shape of FDR/ NCR/ CDR of a Nationalized bank/ Post Office Saving Account duly pledged in the name of Managing Director Bihar urban infrastructure development corporation limited , Patna-800001. and shall be sealed in a separate envelope.

(15) Corrections in the bid should be noted over and initialed at the place of corrections.

(16) Specifications, conditions, schedules, regulations and safety measures and drawings of bidding document constitute an integral part of the bid.

(17) Negligence of the bidder in preparing bid confers no right to withdraw the bid after it has been opened and before expiry of stipulated validity period.

(18) The bid along with enclosures, drawings and technical literature should be in English only.

(19) **Bids should be kept valid for acceptance for a period of 120 days from the day bids are opened**.

(20) The bidding document shall be governed and interpreted according to the laws of the Union of India. .

(21) All bidders are urged to submit promptly, written requests, on matters where clarifications or additional information are desired before per-bid meeting. No extension in due date of submission of bids will be allowed on this ground.

(22) Bids should be responsive to the instructions to bidders and the conditions of contract in the bid document.

(23) Bidder shall not be under a declaration of ineligibility for corrupt and FRAUDULENT practices issued by any authority.

(24) **All bidders shall include the following information and documents with their bids**.

(a) Copies of original documents or notarized copy defining the constitution or legal status, place of registration and principal place of business, written power of attorney of the signatory of the bid to commit the Bidder.

(b) Total monetary value of construction work performed for each of the last five years.

(c) Experience in works of similar nature and size for each of the last five years and details of works under-way or contractually committed, and clients who may be contacted for further information on those contracts.

(d) Major items of construction equipment proposed to carry out the contract.

(e) Qualification and experience of key site management and technical personnel for the contract.

(f) Reports on the financial standing of the bidder, such as profit and loss statement and auditors reports for the last five years.

(g) Evidence of adequacy of working capital for this contract (access to line of credit and availability of other financial resources.

(h) Authority to seek references from the bidder's bankers.

(i) Information regarding any litigation or arbitration resulting from contracts executed by the Bidder in last five years or currently under execution. The information shall include the names of the parties' concerned disputed amount, cause of litigation and matter in dispute

(j) Proposals for subcontracting component of the works amounting to more than 20% of the bid price for each, the qualification and experience of the identified sub-contractors in the relevant field should be annexed.

(k) To qualify for the contract, bidder should stand qualified as per norms/ criteria given in prequalification bid.

NOTE:MANAGING DIRECTOR INVITING TENDERS RESERVES THE RIGHT TO ACCEPT OR REJECT ANY OR ALL BIDS WITHOUT ANY EXPLANATION TO BIDDERS.

Managing Director **Signature of Contractor**

BUIDCo

DEFINITIONS AND INTERPRETATIONS

1. **TERMS:** The important terms, which shall be used in the contract Documents are defined herein. It shall be applicable to both the singular and plural number and masculine/ feminine in gender.

2. **ADDENDA AND CORRIGENDA:** Written or graphic notices issued by the department prior to submission of the tender to modify or interpret the Contract Documents.

3. **TENDER/ BID:** The offer or proposal of the bidder, submitted in the prescribed form to set-forth the prices for the work to be carried out and the details thereof.

4. **TENDERER/ BIDDER/ CONTRACTOR/ SUPPLIER:** Any person, firm, corporation or organization submitting a Tender or execute the work after signing the agreement with the department.

5. **MANAGING DIRECTOR:** Managing Director shall mean the Managing director, BUIDCo, Govt. of Bihar here-in-after called the Managing Director.

6. **CHIEF ENGINEER/CHIEF GENERAL MANAGER:** "The Chief Engineer" shall' mean the Chief general manager BUIDCo, Patna here-in-after called the Chief Engineer.

7. **SUPERINTENDING ENGINEER/GM(WORKS):** The Superintending Engineer or GM shall mean Superintending Engineer / General Manager,BUIDCo ,Patna .

10. **ENGINEER:** shall mean the Engineer officer (or any other competent person appointed by the PD/Engineer-in-Charge, to act in addition or replacement of the Engineer) who shall supervise the execution of the works and administering the contract and be in-charge of the work on behalf of the Engineer- in-charge i.e. Dy. Project Director BUIDCo Patna. Here in after called the Engineer.

11. **PD/ENGINEER-IN-CHARGE:** It shall mean the Officer signing the contract on behalf of BUIDCo.

12. **COMPETENT AUTHORITY:** It shall mean the next higher authority signing the contract.

14. **CONSULTANT:** The firms or persons whose expertise has been sought by. the Managing Director for the proper execution of work stipulated in the contract bond here in after called the consultant

15. **CONTRACTOR'S REPRESENTATIVES:** Any competent person/ persons such as Engineer/Sub-Engineer/ Work Agent/Supervisor /Foreman etc. as may be necessary duly authorized by the contractor in writing & approve by the Engineer for the proper execution of work/works.

16. **DEPARTMENT/BIHAR URBAN INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED (BUIDCO)':** It shall mean the BUIDCo hereinafter called the department.

17. **SUB-CONTRACTOR:** A sub-contractor is a person, firm corporation or organization who has a direct contract with the main Contractor to perform parts of the works at the site, whose entity is duly approved by the General Manager.

18. **CONTRACT TIME:** The number of consecutive calendar months for completion of the work as stipulated in schedule "F" here in annexed

19. **STANDARDS:** It refers to Indian-Standards issued by the Bureau of Indian Standards. All materials and workmanship which form part of tender documents shall conform to the relevant IS code or its latest amendments Items not covered under the IS code shall be executed as per standard code of practice of BUIDCo/P.W.D/ U.P. Irrigation /CPWD.

20. **CONTRACTOR'S EQUIPMENT:** Contractor's equipment means all equipments and appliances such as mixer, vibrator, pumps, chain pulley block, sieves and fabricated device excavators; crane etc. for proper execution, completion and maintenance of works.

21. **NOTICE OF AWARD:** The written notice by the Chief Engineer to the successful Bidder for signing the agreement on the format herein annexed in stipulated time.

22. **NOTICE TO PROCEED:** The written notice by the Engineer to the Contractor authorizing him to proceed with the work. The date mentioned in the letter shall be the date of start of the work.

23. **VARIATION ORDER:** A written order to the Contractor signed by the authorizing an addition, deletion or revision in the quantum of work/drawings provided in the tender documents.

Managing Director **Signature of Contractor**

BUIDCo

GENERAL RULES AND GUIDE LINES

1.0 All work proposed for execution by contract will be notified in a form of invitation to tender pasted in public places and signed by the officer inviting tender or by publication in News papers or posted on website as the case may be. Tender, documents will be sold to only registered contractors as defined in Tender notice.

2.0 **CLASSIFICATION OF TENDERERS:**

2.1 If the tender is made by an individual it shall be signed by the individual with his full name and current address underneath. If the tender is made by a proprietary firm, it shall be signed by the proprietor with his full name and name of his firm with its current address underneath.

2.2 If the tender is made by a firm in partnership, it shall be signed by all partners of the firm with their full names and current addresses, or by a partner holding the power of attorney. A certified copy of the power of attorney, partnership, deed, address of the firm and the full names and address of all the partners of the firm shall also accompany the tender.

2.3 If the tender is submitted by a limited company or a limited corporation, it shall be signed by a duly authorized person holding the power of attorney. Such limited company *or* corporation may be required to furnish satisfactory evidence of its existence before the contract is awarded. A copy of said company's articles of Association should be enclosed to substantiate its claim.

2.4 All witnesses and sureties shall be of persons of status and probity and their full names, occupations and addresses shall be stated below their signatures. All signatures in the tender document shall be dated.

3.0 Receipts for payment made on account of work, when executed by a firm, must also be signed by all the partners, except where contractors are described in their tender as a firm, in which case the receipts must be signed in the name of the firm by one of the partners, or by some other person having due authority to give effectual receipts for the firm.

4.0 Any person who submits a tender shall fill up the usual printed form, stating at what rate he is willing to undertake each item of the work. Tenders, which propose any alteration in the work specified in the said form of invitation to tender, or in the time allowed for carrying out the work, or which contain any other conditions of any sort, including conditional rebates, will be summarily rejected.

5.0 In case the lowest tendered amount (worked out on the basis of quoted rates) of two or more contractors is same, then such lowest contractors may be asked to submit sealed revised offer quoting rate of each item of the schedule of quantity for all sub sections/sub heads as the case may be, but the revised quoted rate of each item of schedule of quantity for all sub sections/sub heads should not be higher than their respective original rate quoted already at the time of submission of tender. The lowest tender shall be decided on the basis of revised offer.

6.0 If the revised tendered amount (worked out on the basis of quoted rate of individual items) of two or more contractors received in revised offer is again found to be equal, then tender shall be rejected and fresh tender shall be invited.

7.0 In case any one or all the lowest contractors refuse to submit revised offers, then tenders are to be recalled after forfeiting 50% of EMD of such lowest contractors and contractor, whose earnest money is forfeited because of non-submission of revised offer, or quoting higher revised rate(s) than their respective original rate quoted already at the time of submission of his bid shall not be allowed to participate in the retendering process of the work.

8.0 The officer inviting tender or his duly authorized assistant will open tenders in the presence of any intending contractors who may be present at the time, and will enter the amounts of the several tenders in a comparative statement in a suitable form. In the event of a tender being accepted, a receipt for the earnest money shall there upon be given to the contractor.

9.0 **The officer inviting tenders shall have the right of rejecting all or any of the tenders and will not be bound to accept the lowest or any other tender.**

10. The memorandum of work tendered for in case of Percentage Rate Tenders, only percentage quoted shall be considered. Any tender containing item rates is liable to be rejected. Percentage quoted by the contractor in percentage rate tender shall be accurately filled in figures and words, so that there is no discrepancy. The procedure in above paragraphs for valuating and deciding shall also apply.

11. In the case of any tender where unit rate of any item/items appear unrealistic, such tender will be considered as unbalanced and in case the tenderer is unable to provide satisfactory explanation, such a tender is liable to be disqualified and rejected.

12. The contractor shall comply with the provisions of the Apprentices Act 1961, and the rules and orders issued thereunder from time to time. If he fails to do so, his failure will be a breach of the contract and the Superintending Engineer/Project Engineer may in his discretion, without prejudice to any other right or remedy available in law, cancel the contract. The contractor shall also be liable for any pecuniary liability arising on account of any violation by him of the provisions of the said Act

13 **ELIGIBILITY AND QUALIFICATION REQUIREMENTS**

13.1. SALE OF TENDER DOCUMENTS IS RESTRICTED TO ELIGIBLE BIDDERS ONLY:
To be eligible for award of contract, bidders shall provide evidence satisfactory to the employer of their eligibility, and of their capability and adequacy of resources to carry out the contract effectively. To this end, all intending bidders shall submit the necessary information in proof of their eligibility before contract document are sold to them. The tender will be applied through e tendering only.

13.2 The bidders only who are registered in a particular category of works as per UP BUIDCo norms, which can be seen in the office on any working day, shall be allowed to participate in bidding. For tenders of works more than RS. One crore the bidder must emerge successful in pre-qualification bid.

13.3 **Tenderes / bidders should produce original or notarized copies of following documents along with their bids:**

A) Copies of documents defining the constitution in or legal status, place of registration and principal place of business of the company or firm or partnership of each party there to constituting the bidder.

B) Details of the experience and past performance of the bidder on works of a similar nature within the past five years, and details of current work in hand and other contractual commitments, on the formats prescribed here with the tender document.

C) Major items of construction plant immediately available with the tenderer for use in carrying and the contract in the format prescribed.

D) The qualifications and experience of key personnel proposed for administration end execution of the contract, on the format prescribed in the document. Experience will be based on criteria regarding their design, build, operate and maintenance, experience in sewerage work such experience of having successfully completed and maintenance similar works as given prescribed format in the document during last 10 years ensuing last day of the month previous the one in which applications are invited.

E) Reports on the financial standing of the bidder (or of each partner) such as profit and loss statements, balance sheets and auditor's report for the past five years, an estimated financial projection for the next two years and an authority from the bidder seek references from the bidder's bankers in addition to the information regarding financial position, solvency and capability of the firm.

14. **(a) SITE VISIT**

The bidder is advised to visit and examine the site or works and its surroundings and obtain for himself on his own responsibility, all information that may be necessary for preparing the bid and entering in a contract. The cost of visiting the site shall be at bidder's own expense.

The bidder and any of his personnel or agents will be granted permission by the employer to upon the land for the purpose of such inspection, but only upon the express condition that the bidder, his personal or agents, will release and identify the employer and his personnel and agents against liability in respect thereof and will be responsible for personal injury (whether fatal or otherwise), loss of or damage to property and any other loss, damage-costs and expenses however caused, which but for the exercise of such permission would not have arisen.

"Further, the contractor shall conduct all such tests and carry out all such investigations, at his own cost, as may be required by him or by the engineer to ascertain bearing capacity of soils at different points for founding structures and various other data on hydrological and subsurface conditions relevant to the works and shall make available to the engineer the results of all such tests and investigations conducted by him. The proposals and designs of the contractor shall be based on results and finding of tests and investigations conducted by him as above subject approval would not absolve the contractor in any way, from any of his responsibilities regarding quality, safety, life and utility of works.

(b) PRE-BID MEETING :

All bidders who have purchased the bid documents are encourage to attend the pre-bid meeting to be held at indicated place and time. Venue office of Managing Director BUIDCo, 2nd floor, SFC building, Daroga Prasad rai path, Patna-800001. on dated at 12:00 noon. If the efficacy of the existing arrangement in such areas is found satisfactory then those relevant works from such areas would require to be deleted from the scope of tender document such details will be discussed in the Pre-bid meeting. This information and also decision on the suggestions that may be received in the pre-bid meeting shall be made available on the BUIDCo website inform of addendum / amendment to be the bid documents. If addendum / amendment required shall be deemed to be part of the bid documents. Therefore the bidders are strongly advised to prepare their bids only after incorporation of the addendum / amendment so issued.

15. BIDDING DOCUMENTS

The set of bidding documents issued for the purpose of bidding includes two copies of the following document as applicable, together with any addenda thereto issue in accordance with clause 13 and any minutes of pre-bid meetings to be invited by the Engineer inviting tenders.

PRE-QUALIFICATION BID (For tenders more than 1.0 crore)

A. NOTICE FOR PRE-QUALIFICATION OF BIDDERS

B. PROJECT DESCRIPTION AND GENERAL SCOPE OF WORK

C. PRE-QUALIFICATION DATA AND INSTRUCTION TO THE APPLICANT

D. ELIGIBILITY AND QUALIFICATION CRITERIA

E. APPLICATION FORMS

F. CHECK LIST

GENERAL AND SPECIAL CONDITIONS:-

(i) Instructions to bidders

(ii) General Conditions of contract

(iii) Conditions of particular application

(iv) Schedule of guarantee

(v) Schedule of supplementary information

TECHNICAL SPECIFICATIONS

A. WORKS

B. DRAWINGS

PRICE BID

A. BILL OF QUANTITIES

16. The bidder is expected to examine carefully all instructions, conditions, forms, terms, specifications and drawings in the bidding documents. Failure to comply with the requirements of bid submission will be at the bidder's own risk. The bids which are not substantially responsive to the requirements of the bidding documents will be rejected.

16.1 Conditions of particular reference/special conditions shall apply over and above "conditions of contract" attached hereto with this document.

17**. CLARIFICATION OF BIDDING DOCUMENTS**

A prospective bidder requiring any clarification of the bidding documents may notify the employer in writing or by cable (which is deemed to include telex or facsimile transmission) at the employer's address indicated in the invitation to bid. The employer will respond in writing or by cable to any request for clarification which he receives earlier than 7 days prior to the deadline for the submission of bids.

Written copies of the employer's response (including a description of the enquiry but without identifying its source) will be sent to all prospective bidders who have purchased the bidding documents.

18. The earnest money shall, at the bidder's option, be in the form of bank draft, a deposit on call, from a scheduled /nationalized bank located in India, bank which has been determined by the bidder to be acceptable to the employer.

19 Any bid not accompanied by an acceptable earnest money/bid security will be rejected and shall not be opened by the employer.

20 The earnest money of unsuccessful bidders will be discharged/returned promptly as possible, but not later than 30 days after the expiration of the period of bid validity prescribed by the employer.

The earnest money of the successful bidder will be discharged when the bidder has signed the agreement and furnished the required performance security or shall be accepted towards performance security after revalidation till required period.

21. The bid security/earnest money may be forfeited,

(a) If a bidder withdraws his bid during the period of bid validity

(b) In the case of a successful bidder, if he fails, within the specified time, either to

i) Sign the agreement

ii) Furnish the required performance security.

iii) or any amendments have been made or Correcting ink has been used by the person or persons signing the bid.

The complete bid shall be without alterations, interlineations or erasers except those to accord with instructions issued by the employer or necessary to correct errors made by the bidder, in which case such corrections shall be initialed by the person or persons signing the bid.

22. Only one bid may be submitted by each bidder. No bidder may participate in the bid of another for the same contract in any relation whatsoever.

23**. Deadline for submission of bids**

Bids must be received by employer at the address and time specified in the tender notice.

The employer may, at his discretion extend the deadline for submission of bids by issuing an amendment, in which case all rights and obligations of the employer and bidders, previously subject to the original deadline shall thereafter be subject to the new deadline as extended.

24 **LATE BIDS:** Any bid received by the employer after the deadline for submission of bids prescribed by the employer in accordance with clause 23 will be returned unopened to the bidder.

25.0 **SEALING AND MARKING OF BIDS**

25.1 The tenders shall be submitted on a date and time as given in tender notice in a sealed cover.

25.2 However for tenders of more than 1.0 crore two envelope system, containing separately sealed envelopes as below shall be followed.

Envelope No-1 shall contain

An envelope containing **Pre-Qualification Bid document** and an envelope containing

A) **Earnest Money**. Both these above envelopes shall be sealed in a single envelope. The envelope shall be marked as' Pre Qualification Bid' for the work addressed to the officer inviting bids along with signature of contractor under his full name and address.

B. Volume-I (Technical Bid/Conditions of Contract). This would comprise of the technical bid as per owner's conceptual plan or contractor design as per term of bids in general and would be submitted sealed in an envelope and superscripted as "Technical Bid".

Bidders alternative offer if any, sealed in a separate envelope and superscripted as "Alternative Technical Offer".

Envelope No-2 shall contain

C. Price Bid (Volume-II) or the "Price Bid" sealed in another envelope and superscripted as "Price Bid". Bidder's quotation for his alternative offer, if any, will be sealed in a separate envelope and superscripted as "Quotation for alternative offer". All three envelopes should be duly superscripted with their subject heading as mentioned elsewhere.

D. Note:- Any separate Discount/ offer letter etc. will not be accepted by BUIDCo.

26. **Opening of Bids**

26.1 The bids shall be opened in presence of intending bidders or their authorized representatives and in presence of the officer inviting tender or his authorized representative and divisional accountant and cashier on the date and time as given in tender notice.

26.2 For bids required under two envelope system, on the date of opening the two envelopes containing earnest money and the pre-qualification bid shall be opened first and if the earnest money deposit is found to be in order and the Bidder successfully pre-qualifies, only then envelope No-2 containing Volumes Technical and Price Bid shall be opened. The envelope containing Volume-IV (Price Bid) shall not be opened on the date of opening but will be kept as such to be opened on a date to be specified later after evaluation of the technical bid.

26.3 Technical Bids of only those bides who emerge as qualified shall be examined and a pre bid meeting, if so desired, shall be called for clarifying any detail or technical issue. If required Officer inviting tender shall call for revised technical and price Bid on a later date.

26.4 If any contractor who does not turn up for revised bid, 50% his earnest money shall be forfeited and he shall not be allowed to participate further.

26.5 Price Bid shall be opened on a date and time intimated to each bidder in presence of intending bidders or their authorized representatives and the officer inviting tender or his authorized representative and divisional accountant and cashier.

27 **NAME AND ADDRESS OF THE BIDDER**

If the cover is not sealed and marked as instructed above, no responsibility will be assumed for any misplacement of the tenders or premature opening of any envelope or parcel.

28. Tenders with charges payable, will not be accepted. No arrangements will be made to collect, vendors from any delivery point. If tenderer wishes to receive an acknowledgement or a receipt of mailed tender, he shall make a request for or such acknowledgement in a separate letter attached to but not included in the sealed envelope or parcel of tender. Upon request, acknowledgement of receipt of tenders will be issued to those making delivery in person or by messenger.

29 Subject to clause 23, no bid may be modified subsequent to the deadline for submission of bids.

30. Withdrawal of a bid during the interval between, the deadline for submission of bids and the expiry of the period of bid validity specified by the bidder in the form of bid may result in the forfeiture of the bid security.

31. **ACCEPTANCE OF BIDS**

The bidder who emerge winner shall be confirmed in writing by registered letter that his bid has been accepted. This letter thereinafter and in the conditions of contract called "Letter of Acceptance" shall name the sum which the employer will pay to the contractor in consideration of the execution, completion and maintenance of the works by the contractor as prescribed by the contract (hereinafter and in the conditions of contract called "The Contract Price").

32. The notification of award will constitute the information of the contract.

33. Upon furnishing of a performance security in accordance with the provisions of “conditions of contract” Clause-27 by the successful bidder, the employer will promptly notify the unsuccessful bidders that their bids have been unsuccessful and their earnest money shall be released on receiving a request.

34. **SIGNING OF AGREEMENT**

34.1 At the same time it will be notified to the successful bidder that his bid has been accepted, the employer will send the bidder the “form of agreement” provided in the bidding documents, incorporating all agreement between the parties.

34.2 Within fourteen days of reception of the “form of agreement”, the successful bidder shall attend the concerned Office of BUIDCo for signing of contract agreement or alternatively shall sign the form and return it to the employer.

34.3 The engineer would, within one month of receipt of performance security and detailed structural and hydraulic designs of the works from the successful bidder, convey his approval of the same to the bidder and issue to him the "Order to Proceed".

35. **TIME OF COMPLETION**

35.1 The contractor shall construct, complete the works including initial clear up, final inspection, correction of all defects, testing and commissioning of the work within the contract time as prescribed in Schedule-F of contract document from date of order to proceed. After works are completed satisfactorily, the owner will issue to the contractor a written "Completion Certificate". The date of issue of completion certificate shall mean the date of start of trial run period as prescribed in Schedule – F.

35.2 After satisfactory completion of trial run period, the owner will issue to the contractor a written "Final Acceptance" certificate. Date of issue of Final Acceptance certificate shall mean the date of start of maintenance period.

36. After satisfactory completion of maintenance period, the owner will issue to the contractor a written certificate of satisfactory performance/taking over.

37. The contractor shall submit with his tender, his own modified programme showing the order of procedure in which he proposes to carry out the works and complete important milestones including testing and commissioning within the time allowed.

38. **EARNEST MONEY:**

The earnest money as specified in tender notice must be enclosed with the tender in the shape of FDR/NSC/CDR of a Nationalized/ scheduled bank /Post Office Saving Account duly pledged in the name of Officer described in tender notice.

38.1 The earnest money of unsuccessful bidder shall be returned as early as possible, but not later than 30 days after the expiry of the validity period.

39 **SECURITY DEPOSIT:**

39.1 39.1 The contractor shall provide a Performance Security of 10 % (Ten percent) of the total contract price, i.e. value of Design, Build, and Commissioning services plus O& M prices for 15 years operation valid initially until 180 days beyond the Time for Completion of the Design-Build Services subject to the condition that the Performance Security shall be renewed from time to time, in the manner specified in the following paragraph, so as to be valid until 180 days after the End Date (i.e. completion of the O&M period of 15 years) or any extension to the End Date. In the O & M period the Performance Security shall be renewed each year at least 120 days prior to expiry of the current Performance Security.

It shall be the responsibility of the Operator to furnish extension of the Performance Security Guarantee from time to time 120 days prior to the expiry of the current Performance Security.

In case the renewed Performance Security is not received by the Owner at least 60 days prior to the expiry date of the current Performance Security, the Owner will be entitled to take measures for enforcement/forfeiture of the Performance Security without any further notice to the Operator.

40 **SCHEDULE OF-PRICES :**

The bidder shall fill Volume II (Schedule A & B) of financial Bid both in figures and words and submit his financial bid in separate envelope, and in case of any discrepancy; the rates in words shall govern.

41 **FILLING IN TENDER FORM AND STAMP DUTY:**

41.1 The tender shall be prepared in indelible ink and legibly written. Overwriting is not allowed. All cuttings should be initialed .No correcting ink shall be used.

41.2 The bidder and witness shall sign at the specified places indicated in the tender documents; the persons signing on behalf of the bidder must have legal authority to do so.

41.3 Stamp duty charges, wherever necessary, shall be borne by the bidder, at the rate as prevalent at the time of award of the contract. The current rates of stamp duty being charged are Rs. 70/- per thousand, of the amount of security deposit in shape of FDR/CDR or NSC. In case of Bank Gurantee charges is Rs 2.00 per thousand for security amount deposited in shape of FDR/CDR or NSC. The stamp duty will be applicable as Indian Stamp Act 1899 schedule 1(B) of Article 57(B) will be Rs 100.00 as applicable. The contract agreement will be executed on non-judicial stamp paper of the value of Rs 100.00 along with Rs 10.00 for affidavit.

42. **VALIDITY OF TENDER:**

The tender shall be valid for a period of not less than 120 (One Hundred Twenty) days from the date of opening of the tender.

43. **CANVASSING:**

Any political/administrative pressure by the contractor or canvassing directly *or* indirectly in favor of his offer will render his tender liable to rejection. Such bidders will be debarred from participating in other' bids of BUIDCo. in the State.

44. **MISCELLANEOUS:**

The contractor shall note carefully that the receipt / acknowledgement of any employee other than authorized in respect of materials issued to him or received back from him by the department will not be considered valid. The contractors are therefore advised that they should obtain

acknowledgement/receipts only from the authorized official of the department who should not be below the rank of an Assistant Project Engineer (Junior Engineer).

45. **ADDENDUM :** If the Engineer decides that the contract documents require changes, corrections, clarifications or interpretations prior to the receipt of tenders, an appropriate 'Addendum' will be issued & shall form part & parcel of the tender documents.

GM/PM **Signature of contractor**

MEMORANDUM OF WORKS

I/We hereby tender for the work specified in the underwritten memorandum within the time specified in such memorandum at the rates given in the Schedule of rates hereto attached and in accordance in all respect with the specifications and drawings which said specifications and drawings have been prepared by the Managing Director BUIDCo Patna and have been inspected and understood by me/ us and such other written instruction and as may be given from time to time for the due carrying out of the said work and with such materials as are provided for by and in all other respects in accordance with the conditions hereto attached.

MEMORANDUM

(a) General description of Works-

(b) Estimate Cost. Rs.

(c) Earnest Money Rs.

(d) Security Money (including earnest money). Rs.

(e) Percentage to be deducted from bills. -------- Percent.

(f) Time allowed for the work from date of written order to commence
Calendar months 18 months.

Should this tender be accepted I/We hereby agree to abide by and fulfill all the terms and provisions of the said conditions of contract annexed hereto and within--------days from the time when called upon to do so execute a contract embodying the conditions hereto attached and also deposit the said security with the Managing Director, ---------- BUIDCo, ---------- for the due performance of the said contract.

The sum thus deposited as security money, full amount of which is to be absolutely forfeited to the said Managing Director, BUIDCo or his successor in office should I/We not when called upon to do so by the Managing Director, BUIDCo---------- on the day to execute the said contract and deposit full amount of security deposit specified in the above memorandum, and in the event of the default the transaction affected this tender shall cease and determine.
dated the ---------- day of ---------- 20--

Witness (1) : **Signature of contractor**

Witness (2) :

Accompanying tender is hereby accepted by me on behalf of Managing Director BUIDCo subject to the current financial year's allotment.
Dated the ---------- day of ---------- 20--

Signature of the officer by whom accepted

Designation

Note- This form is not be filled in by the bidder
BUIDCo
FORM OF AGREEMENT (On Stamp of Rs. 1000/-)
Lump Sum-Cum-Item Rate Contract

THIS INDENTURE made on the --------day of----------20-- between ----------herein after called the contractor which expression shall where the context so admits or implies be deemed to include his heirs, executors and administrations of the one part and Managing Director BUIDCo herein after called the Managing Director which expression shall where the context so admits or implies, be deemed to include Ins successor-in-office and assigns of the other part, WHEREAS the said Managing Director requires the execution of certain works for---------- ---------- herein after called the said works which said works are more particularly described in the drawings and specifications hereto annexed **AND ALSO** requires the provisions of the necessary material therefore and have caused the necessary drawings and specifications and schedules of rates to be prepared and the contractor has delivered to the said Managing Director a Tender for the execution of the said works and the provision of the said materials **AND WHEREAS** the Managing Director has accepted such Tender subject to the provisions and condition here to attached : **NOW THIS INDENTURE WITNESSETH** as follows : In consideration of the covenant, for the Payment by and on behalf of the said Government here in after contained, the contractor hereby covenants with the Managing Director that he will supply all necessary materials, and execute and complete in a thoroughly sound and workmanlike manner and afterwards maintain for the requisite period stated in the said Conditions all the works set out said specifications and schedules of rates here to attached, signed by the contractor, and as explained in the said drawing hereto attached, and in accordance, in every respect, with the requirements, stipulations and conditions hereto attached

In consideration of the covenants by the contractor hereinafter contained the said Managing Director hereby covenants with the contractor to pay to him for the execution, completion and maintenance of the work as a aforesaid according to the rates.

It is **hereby agreed and declared** that all the provision of the said conditions, drawings, specifications and schedules of rates of marked.

And hereto attached shall be as binding upon the contractor and upon the said Managing Director as if the same has been repeated herein and shall be read as part of these presents.

In witness where of the parties hereto have affixed their signature on the --------day of ---------- 20--

Signature of Contractor.

Witness:

Witness:

Signed on behalf of the Managing Director by

Witness:

Designation of the Officer

Witness:

(Declaration to be filled in, signed and witnessed & to be submitted with the Tender)

From: ----------
.....
.....

To,

The ----------,
(----------),
BUIDCo,
---------- (BIHAR).

1. I/We ..... (Name of Contractor/ Firm) have read, the various conditions governing the contract attached hereto, studied the specifications, possess the knowledge of site conditions, availability of materials and labour. I/We offer to do the work ---------- ---------- ---------- as per specifications/ drawings and abide by the conditions. I/We also agree to keep this offer valid up to 120 days from date of receipt of the tenders.
2. I/We agree to complete the works within --------- months from the date of issue of letter of intent.
3. A sum of Rs. -------Lacs towards earnest money in the form of Bank .....dated..... pledged in the name of Managing Director, ---------- Unit, BUIDCo, ----------, is enclosed.
4. The full value of earnest money shall stand forfeited without prejudice to any other rights or remedies if,

(a) I/We do not execute the contract documents within thirty days from the date of issue of letter of intent.
(b) I/We do not commence the work within 10 days after the dale of issue of orders to that effect.

5. Until a formal agreement is prepared and executed, acceptance of this tender shall constitute a binding contract between me/us and the department subject. to modifications if any as indicated in the letter of acceptance of me/our offer for this work.
6. All tender documents/drawings duly signed are returned herewith, along with a declaration as specified.

Enclosures: One tender along with all enclosures

Witness:

1. .....
(Sig. of witness)
Address.....
.....
.....
.....

Signature
Name of Contractor.....

2. .....
(Sig. of witness)
Address.....
.....
.....

AFFIDAVIT

(On stamp of Rs. 100)

I/We hereby tender for the work specified in the tender written memorandum within the time specified in such memorandum in accordance with noted all said specifications, regulations, safety measures and drawings contained in this tender have been inspected and understood by me/us and also undertake to make compliance of such other written instructions as may be given from time to time for carrying out the said works.

1. That I/We do hereby solemnly state that I/We do not intend to migrate to any foreign country during the period of the contract and that I/We will produce a clearance certificate from the Income Tax Officer at the time of final payment or taking refund of the security deposit, if demanded.

2. I/We undertake to abide by the following provision of G.O. No. G-2 1893/X-916-48 dated 7th June 1960.

   "No person who has retired from Government/BUIDCo services as an Engineer or Gazetted Officer is employed or Engineering has employed any such retired Engineer or Gazetted Officer, is entitled to tender for the notified work up to two years from the date of such retirement unless special permission of the Government/BUIDCohas been obtained and is furnished by the contractor along with his tender". I/We also agree that if it any time before acceptance of tender or thereafter I/We are found to have violated the aforesaid provision, my/our tender and the contract, if entered into with me/us at option of the Chief Engineer (------)/ G.M/S.E (----------),Ex. En. (----------UNIT) BUIDCo, ----------, be liable to immediate cancellation in which case my/our entire earnest money or the security deposits (as the case may be) shall stand forfeited to BUIDCoand I/We shall have no right to claim any compensation whatsoever, on account of the cancellation of our tender or contract.

Witness	:	Contractor	:
Dated	:	Dated	:
Address	:	Address	:

Letter of Undertaking

1. I/We.....have read the general and special conditions of the contract which are appended to the tender and I/We agree to the conditions laid therein if the contract is awarded to me/us.
2. I/We have also read the specifications, studied drawings, understood the scope of works included in the tender and to be executed by me/us.
3. I/We have visited the site of works and, am/are well acquainted with the local practices, availability of the materials and labour and their prevailing market rate.
4. I/We agree to abide by the departmental rules regarding deductions made in the bills like income tax, security deposits and Trade Tax etc.
5. I/We do not ask for revision of rates due to any escalations in rates of materials or labour in the rates quoted by me in this offer throughout the period of construction and completion of the works.
6. I/We keep the validity of our offer for 120 days from the date of opening of the tender.
7. I/We undertake to complete the works and hand over ..... within the stipulated/allotted time for the, completion of the works in good workman like manner.
8. I/We stand guarantee for the repair of the works to the full satisfaction of the department during the maintenance period.
9. I/We have no doubts or un-cleared ambiguities regarding the specifications, details in the drawings, scope of the works, and have fully understood our responsibilities in executing and completing the works to the full satisfaction of the Engineer I/C.
10. I/We have based our tender rates having the full knowledge of the statements and facts. Should my/our offer is accepted, I/we hereby agree to abide and fulfill the terms and conditions annexed hereto and within 14 days of the date of receipt of an information of acceptance of my/our offer from the General Manage/S.E. (----------), BUIDCo, --------. I/We shall communicate in writing my/our acceptance of said offer and shall also execute an agreement embodying the conditions hereto attached.
11. I/We also agree that the drawing, specifications, terms and conditions set-forth in the offer from the General Manager/S.E., (-------l), BUIDCo, ---------- together with its acceptance thereof in writing by me/ us shall form part of the agreement.
12. I/We further agree that in the event of my/our failure to convey my acceptance of the offer to the said Managing Director BUIDCo Patna within 14 days (Fourteen days) of its receipt, ... the Managing Director BUIDCo Patna may withdraw offer and forfeit the earnest money deposited by me/us.
13. Form No. 2 LSGED which contains form of agreement, shall be filled at the time of agreement on a non-judicial stamp paper of Rs. 1000.00 of BIHAR. Govt. along with a revenue stamp of Rs. 2.00 affixed on it. The validity period will be 120 days from the date of opening of tender.
14. AND that it is hereby agreed and declared that all the provisions of the said conditions drawings specifications and schedules of rates hereto attached or mentioned, shall be as binding upon me/us and upon the said BUIDCo as if the same had been repeated herein and shall be read as part of these presents.

WITNESS : **SIGN. OF CONTRACTOR**

WITNESS :

(EARNEST MONEY)

I/We deposit herewith an Earnest Money for Rs. ------ Lacs (---------- Lacs) in the following form as per terms and conditions laid down in the tender notice.

I/We also agree to deposit requisite security money as per terms and conditions of the tender document.

The details of deposit of earnest money are given below :

S.No.	Description	Amount Rs.	Name of Issuing Bank/ P.O.

Date :

Signature of Contractor
Name
Address

BUIDCO

LUMP SUM CUM ITEM RATE / PERCENTAGE RATE CONTRACT
GENERAL CONDITIONS OF CONTRACT FOR WORKS MORE THAN Rs. 100 LAKH

1. INTERPRETATION

In these conditions and in the specifications which are herein attached the term "THE CHIEF ENGINEER" shall mean the concerning "Chief Engineer (--) BUIDCo. ---------- .

The "SUPERINTENDING ENGINEER" shall mean the S.E. / General Manager, (----------), BUIDCo, ----------.

"ENGINEER" shall mean the Engineer officer (or any other competent person appointed by the Engineer – in-charge, to act in addition or replacement of the Engineer) who shall supervise the execution of the works and administering the contract and be in-charge of the work on behalf of the Engineer- in-charge i.e. Ex. En./P.D.,(----------), BUIDCo---------- hereinafter called the Engineer.

"ENGINEER – IN - CHARGE" shall mean Officer signing the contract

"COMPETANT AUTHORITY" shall mean next higher authority than Engineer – in –charge.

"WORK or WORKS" where used in these conditions and specifications shall unless there be something either in the subject or context repugnant to such construction, be construed and taken to mean "WORKS" by or by virtue of the contract contracted to be executed whether temporary or permanent and whether original, altered, substituted or additional.

2. TIME OF COMPLETION OF WORKS

The time allowed as set forth in Schedule-'F', for carrying out the works shall be 18 (Eighteen) calendar months, and Schedule of important Milestones as set forth in Schedule- 'F' shall be strictly observed by the contractor and shall be reckoned from the date on which the order to commence work is given to the contractor.

3. CONTRACTOR'S LIABILITY TO PAY COMPENSATION

The works shall throughout the stipulated period of the contract be proceeded with all due diligence (time being deemed to be essence of the contract) and the contractor shall pay as compensation an amount equal to 3 (three)% per month of delay of work to be computed on per day basis or such smaller amount as the Chief Engineer (whose decision in writing shall be final), may decide on the amount of the construction cost of the whole work, that is to say, Rs. --------- for every day that the works remain un-commenced or unfinished after the proper dates and further to ensure good progress during the execution of the works the contractor shall be bound to complete one forth of the whole of the works before one forth of the whole time allowed under this contract has elapsed, one half of the work before one half of such time has elapsed and the three fourths of the work before three fourths of such time has elapsed. In the event of the contractor failing to comply with these conditions, he shall be liable to pay as compensation an amount equal to 3 (three) % per month of delay of work to be computed on per day basis or such smaller amount as the Chief Engineer (whose decision in writing shall be final) may decide on the said cost of the whole works for every day that the due quantity of works remain incomplete PROVIDED ALWAYS that the entire amount of compensation to be paid under the provisions of this clause shall not exceed 10% of the Tendered Value of work or of the Tendered Value of the item or group of items of work for which a separate period of completion is originally given.

The amount of compensation may be adjusted or set-off against any sum payable to the Contractor under this or any other contract with the BUIDCo. In case, the contractor does not achieve a particular milestone mentioned in schedule F(schedule of time of completion), or the re-scheduled milestone(s) submitted by him and accepted by the Engineer, the amount shown against that milestone shall be withheld, to be adjusted against the compensation levied at the final grant of Extension of Time. With-holding of this amount on failure to achieve a milestone, shall be automatic, without any notice to the contractor. However, if the contractor catches up with the progress of work on the subsequent milestone(s), the withheld amount shall be released. In case the contractor fails to make up for the delay in subsequent milestone(s), amount mentioned against each milestone missed subsequently also shall be withheld. However, no interest, whatsoever, shall be payable on such withheld amount.

4. RIGHTS OF BREACH OF CONTRACT

In any case in which BUIDCo under any clause or clauses of these conditions the contractor shall have rendered himself liable to pay compensation amounting to the whole of the security deposit whether deducted in one sum or deducted by installment, the Engineer on behalf of the Managing Director, BUIDCo, shall have power to adopt any of the following course as he may deem best suited to the interest of BUIDCO.

(a) To rescind the contract of which rescission notice in writing to contractor under the hand of the Engineer/PD shall be conclusive evidence and in which case the security deposit of the contractor together with such sum or sums due to him under this contract shall stand forfeited and be absolute at the disposal of the said Managing Director BUIDCo.

(b) Or determine the contract and call in another contractor or employ daily labour to dismantle bad work, if necessary (the bad work to be certified by the Engineer/PD whose decision shall be final), and to renew and complete the said work and pay the cost of such contractor for the daily labour and price of material required for such dismantling, renewing and completion out of the said security deposit for such sum or sums as may be due to the contractor under this contract and if such cost be more than the amount made up of the security money and the sum or sums due to the contractor under this contract, the difference between it and sum made by the security money and the balanced due to the contractor as aforesaid shall be a debt due from the said contractor to the said Managing Director. In the event of either of the above course being adopted by the Engineer, the contractor shall have no claim to compensation for any loss sustained by him by reasons of his having purchased or procured any materials or entered into any agreements, or made any advances on account of or with view to the execution of the work or the performance of the contract. And in case the contract shall be rescinded under the provision aforesaid, the contractor shall not be entitled to recover or be paid any sum for any work therefore actually performed under this contract, unless and until the Engineer shall have certified in writing the performance of such work and the value payable in respect thereof, and he shall only be entitled to be paid the value so certified.

(c) Contract can be Determined also on following issues

Subject to other provisions contained in this clause, the PD/Engineer-in-Charge may, without prejudice to his any other rights or remedy against the contractor in respect of any delay, inferior workmanship, any claims for damages and/or any other provisions of this contract or otherwise, and whether the date of completion has or has not elapsed, by notice in writing absolutely determine the contract in any of the following cases:

(i) If the contractor having been given by the PD/Engineer-in-Charge a notice in writing to rectify, reconstruct or replace any defective work or that the work is being performed in an inefficient or otherwise improper or un workman like manner shall omit to comply with the requirement of such notice for a period of seven days thereafter.

(ii) If the contractor has, without reasonable cause, suspended the progress of the work or has failed to proceed with the work with due diligence so that in the opinion of the PD/Engineer-in-Charge (which shall be final and binding) he will be unable to secure completion of the work by the date for completion and continues to do so after a notice in writing of seven days from the PD/Engineer-in-Charge.

(iii) If the contractor fails to complete the work within the stipulated date or items of work with individual date of completion, if any stipulated, on or before such date(s) of completion and does not complete them within the period specified in a notice given in writing in that behalf by the PD/Engineer-in-Charge.

(iv) If the contractor persistently neglects to carry out his obligations under the contract and/ or commits default in complying with any of the terms and conditions of the contract and does not remedy it or take effective steps to remedy it within 7 days after a notice in writing is given to him in that behalf by the PD/Engineer-in-Charge.

(v) If the contractor had secured the contract with Government as a result of wrong tendering or other non-bonafide methods of competitive tendering or commits breach of Integrity Agreement.

(vi) If the contractor being a company shall pass a resolution or the court shall make an order that the company shall be wound up or if a receiver or a manager on behalf of a creditor shall be appointed or if circumstances shall arise which entitle the court or the creditor to appoint a receiver or a manager or which entitle the court to make a winding up order.

(vii) If the contractor assigns, transfers, sublets (engagement of labour on a piece-work basis or of labour with materials not to be incorporated in the work, shall not be deemed to be subletting) or otherwise parts with or attempts to assign, transfer, sublet or otherwise parts with the entire works or any portion thereof without the prior written approval of the Engineer -in-Charge/Superintending Engineer.

5. NON-EXERCISE OF CONTRACTOR'S LIABILITY TO PAY COMPENSATION

In any case in which any of the power conferred upon the Engineer by Clause 4 hereof, shall have become exercisable and the same shall not be exercised, the non-exercise thereof shall not constitute a waiver of any the conditions hereof, any such powers shall not with standing be exercisable in the event of any future case of default by the contractor for which, by any clause or clauses hereto he is declared liable to pay compensation amounting to whole of his security deposit and the liability of the contractor for past and future compensation shall remain unaffected. In the event of the Engineer putting in force either of the powers (a) or (b) vested in him under the preceding clause, he may, if he so desires, take possession of all or any tools, plant, materials, and stores in or upon the works the site thereof or belonging to the contractor or procured by him intended to be used for the execution of the work or any part thereof, paying or allowing for the same into account at prevailing market rates to be certified by the Engineer, whose certificate thereof shall be final, otherwise the Engineer may give notice in writing to the contractor or his other authorized agent require him to remove such tools, plants, materials or stores from the premises (within a time to be specified in such notice), the Engineer may remove them at the contractor's expenses or sell them by auction or private sale on account of the contractor and at his risk in all respects, and the certificate of the Engineer as to the expense of any such removal, and the amount of the proceeds and the expense of any such sale be final and the conclusive against the contractor.

6. EXTENSION OF TIME:

If the contractor shall desire an extension of time or rescheduling of Mile stones for construction of the work on the ground of his having been unavoidably hindered in its execution or any other ground, he shall apply in writing to the Engineer within seven days after the date of hindrance on account of which he desires such extension as aforesaid, and the Engineer shall grant, if in his opinion (which shall be final), reasonable time, if any, as may in his opinion be necessary or proper.

6.1 Extension of time where no compensation is levied under clause-3:

If the work(s) be delayed by:-

(i) Force majeure, or
(ii) Abnormally bad weather, or
(iii) Serious loss or damage by fire, or
(iv) Civil commotion, local commotion of workmen, strike or lockout, affecting any of the trades employed on the work, or
(v) Delay on the part of other contractors or tradesmen engaged by Engineer in executing work not forming part of the Contract, or
(vi) Non-availability of stores, which are the responsibility of BUIDCo to supply or
(vii) Non-availability or break down of tools and Plant to be supplied or supplied by BUIDCo or
(viii) Pending road cutting permission by concerned authorities i.e. Nagar BUIDCo ,PWD, NH, NHAI, Forest, Defense and local administration etc
(ix) Delay in land acquisition or title dispute or pendency at Court at Law
(x) Stoppage of work by local administration due to any law and order condition or due to any code of conduct during any municipal or assembly or parliament election.
(xi) Due to change in technology, alteration and deviation in specifications of materials and works and change in scope of work or increase in quantum of work.
(xi) Any other cause which, in the absolute discretion of the Engineer is beyond the Contractor's control.

Then upon the happening of any such event causing delay, the Contractor shall immediately give notice thereof in writing to the authority as indicated in Schedule 'F' but shall nevertheless use constantly his best endeavors to prevent or make good the delay and shall do all that may be reasonably required to the satisfaction of the PD/Engineer-in-Charge to proceed with the works. The contractor may be allowed a reasonable extension of time for delay on these grounds by the Engineer but any compensation or price escalation shall not be allowed. However lawful deviation in rates may be allowed by the Chief Engineer due to change in technology and due to alteration and deviation in specifications of materials and works beyond the scope of this tender as per terms set forth in clause-13 (Alternation in specification and drawings) below.

6.2 As soon as possible after the Contract is concluded, the Contractor shall submit a Time and Progress Chart for each mile stone and get it approved by the Department. The Chart shall be prepared in direct relation to the time stated in the Contract documents for completion of items of the works. It shall indicate the forecast of the dates of commencement and completion of various trades of sections of the work and may be amended as necessary by agreement between the PD/Engineer-in-Charge and the Contractor within the limitations of time imposed in the Contract documents, and further to ensure good progress during the execution of the work, the contractor shall in all cases in which the time allowed for any work, exceeds one month (save for special jobs for which a separate programme has been agreed upon) complete the work as per mile stones given in Schedule 'F'.

The Contractor shall prepare an integrated programme chart in MS Project/Primavera software for the execution of work, showing clearly all activities from the start of work to completion, with details of manpower, equipment and machinery required for the fulfilment of the programme within the stipulated period or earlier and submit the same for approval to the Engineer-in- Charge within ten days of award of the contract. The programme chart should include the following:

a. Descriptive note explaining sequence of the various activities.
b. Network (PERT / CPM / BAR CHART).
c. Programme for procurement of materials by the contractor.

Programme of procurement of machinery / equipment having adequate capacity, commensurate with the quantum of work to be done within the stipulated period, by the contractor. In addition to above, to achieve the progress of Work as per programme, the contractor must bring at site adequate shuttering material required for cement concrete and R.C.C. works etc. for three months within one month from the date of start of work till the completion of RCC work as per requirement of work. The contractor shall submit shuttering schedule adequate to complete structure work within laid down physical milestone.

If at any time, it appears to the PD/Engineer-in-Charge that the actual progress of work does not conform to the approved programme referred above or after rescheduling of milestones, the contractor shall produce a revised programme within 7 (seven) days, showing the modifications to the approved programme to ensure timely completion of the work. The modified schedule of programme shall be approved by the Engineer in Charge/PD.

The submission for approval by the PD/Engineer-in-Charge of such programme or such particulars shall not relieve the contractor of any of the duties or responsibilities under the contract. This is without prejudice to the right of PD/Engineer-in-Charge to take action against the contractor as per terms and conditions of the agreement.

Non application by the contractor for extension of time/ rescheduling of the milestones shall not be a bar for giving a fair and reasonable extension/ rescheduling of the milestones by the authority as indicated in Schedule 'F' and this shall be binding on the contractor.

6.3 In case, the work cannot be started due to reasons not within the control of the contractor, as in 6.1 above, within 25% of the stipulated time for completion of work or three months whichever is higher, either party may close the contract. In case contractor wants to close the contract, he shall give notice to the BUIDCo stating the failure on the part of BUIDCo. In such eventuality, the Performance Guarantee of the contractor shall be refunded within 30 days, however no interest shall be payable to contractor on this account and fresh tenders will be called.

6.4 All risks of loss of or damage to physical property and of personal injury and death which arise during and in consequence of the performance of the Contract other than the excepted risks, referred to in clause 6.1, are the responsibility of the Contractor.

7. ENGINEER'S CERTIFICATE OF COMPLETION:

On completion of the work the contractor shall be furnished with a certificate by the Engineer of such completion, but not such certificates shall be given nor shall the work be considered to be completed until the works shall have been measured by the Engineer, whose measurement shall be binding and conclusive against the contractor and the contractor shall have removed from the premises on which the work has been executed all scaffolding, surplus materials and rubbish and cleaned off all dirt and debris in upon or about the premises of which he may had possession for the purpose of executing the said works. If the contractor shall fail to comply with the requirements of this clause as to removal of scaffolding, surplus materials and rubbish and cleaning of all dirt and debris on or before the date fixed for the completion of work/s the Engineer may at the expenses of contractor remove such Scaffolding, surplus materials and rubbish and dispose of the same as he thinks fit and clean off such dirt and debris of all expenses so incurred and shall have no claim in respect of any such scaffolding or surplus materials as aforesaid except for any sum actually realized by the sale thereof after deducting the aforesaid expenses.

8. PAYMENTS:

On measurements of the work done for the convenience of the contractor, interim payments shall ordinarily be made monthly but final payments shall not be made until the whole of the work shall have been completed and certificate of the completion of the work given and it shall be lawful for the said Engineer to **deduct a sum equal to 5% of the said payment and such sum or sums to be held in deposit as further security for the due performance** of the conditions of this contract, provided always that the Engineer may refuse to advance such payments if in his opinion the progress of the work or the conduct of the contractor is not satisfactory or the contractor has in any other way done or neglected to do anything so as to make it doubtful whether the works will be completed by him in accordance with the contract. But all such interim payments shall be recorded as payments by way of advance against the final payments only and as payment of work actually done and completed and not regular the requiring of bad unsound and imperfect or unskillful works to be removed and taking a way or reconstructed or re-erected or be recognized as on admission of the due performance of the contract or any part thereof in any respect of the accruing of any claim, nor shall it conclude, determine or effect in any way the powers of the Engineer under these conditions or any of them as to the final settlement and adjustment of the account or otherwise or in any other way vary or affect this contract. The final bill shall be submitted by the contractor within one month of the date fixed for the completion of the work otherwise the Engineer's certificate of the measurements (due notice having given before hand to the contractor of the date of such measurements) and of total amount payable for the works accordingly shall be final and binding on all parties. No interest shall be paid for delayed payment due to paucity of funds.

8.1 39.1 The contractor shall provide a Performance Security of 10 % (Ten percent) of the total contract price, i.e. value of Design, Build, and Commissioning services plus O& M prices for 15 years operation valid initially until 180 days beyond the Time for Completion of the Design-Build Services subject to the condition that the Performance Security shall be renewed from time to time, in the manner specified in the following paragraph, so as to be valid until 180 days after the End Date (i.e. completion of the O&M period of 15 years) or any extension to the End Date. In the O & M period the Performance Security shall be renewed each year at least 120 days prior to expiry of the current Performance Security.

It shall be the responsibility of the Operator to furnish extension of the Performance Security Guarantee from time to time 120 days prior to the expiry of the current Performance Security.

In case the renewed Performance Security is not received by the Owner at least 60 days prior to the expiry date of the current Performance Security, the Owner will be entitled to take measures for enforcement/forfeiture of the Performance Security without any further notice to the Operator.

8.2 If rates quoted by contractor in Schedule–G are more than 15% below SOR, one percent additional security for every 2% below rates or part thereof on prorate basis, for performance shall be deducted from bills of contractor for satisfactory completion of work which shall be returned only after completion of work in all respect; however no interest or compensation shall be given on this account to contractor.

8.3

1. Payment of Design-Build Price(STP)

Subject to the provisions of this Contract Agreement and in consideration of the contractor undertaking the implementation of the Project, the contractor shall be paid as per the terms of payment contained hereunder:
Design-Build Price shall be paid in monthly amounts equal to the percentage of the Design-Build Services that the Design-Build-Operations Engineer indicates in the Design-Build Engineer's Statement were completed or supplied, as applicable, in the preceding month. The amount of payments for completion of each stage of works shall not exceed the amounts indicated below.

1A	Civil works	
	(a) Completion of Design and detailed engineering	5% of Contract Price as per SN 1A of Price Schedule Part A
	(b) After Completion of various stages of civil structures	
	Stage 1	20% of cost of itemised Contract Price as per SN 1A of Price Schedule Part A
	Stage 2	30% of cost of itemised Contract Price as per SN 1A of Price Schedule Part A
	Stage 3	20% of cost of itemised Contract Price as per SN 1A of Price Schedule Part A
	Stage 4	10% of cost of itemised Contract Price as per SN 1A of Price Schedule Part A
	(c) Finishing testing & commissioning,	15% of Contract Price as per SN 1A of Price Schedule Part A
1B	Installation, testing and commissioning of Electro – mechanical and Instrumentation equipment and accessories. Power connection of 1100 kwincluding construction of electrical substation. Supply & Installation of as per required capacity Diesel Generating set	
	Completion of Design and detailed engineering	5% of Contract Price as per SN 1B of Price Schedule Part A
	Supply & Installation of equipment including Completion of allied works for mechanical/electrical /instrumentation works	80% of cost of itemised Contract Price as per SN 1B of Price Schedule
	Testing at site	5% of cost of itemised Contract Price as per SN 1B of Price Schedule
	Commissioning & Trial run	10% of cost of itemised Contract Price as per SN 1B of Price Schedule
1C	Ancillary works like approach roads, bridges, compound wall with gates, internal roads, area grading etc.	
	After Completion of each activity	90%
	After commissioning & trial run	10%

2a. Description of various stages of construction of civil structures

Sl. No.	Stages of works	Completion stage	Type of Civil Structures
1	Stage- 1	Completion of Excavation & construction of Foundation including bottom raft/ pile foundation with pile cap, columns etc.	All type of water storage tanks including all type of settling tanks/ basins, chlorination & de-chlorination tanks, sumps of sludge/ filtrate/ pumping stations, open channels etc.
		Completion up to Foundation & Columns/ beams/walls up to plinth level	Pumping stations, sludge pumping stations, filtrate pumping stations disinfection/ chlorination building, control rooms, Panel rooms etc.
2	Stage 2	Completion of side walls up to 60% height	All type of water storage tanks including chlorination & de-chlorination tanks, sumps of sludge/ filtrate/ pumping stations, open channels etc.
		Completion of super structures including columns, beams, walls, lintels, roof slab etc.	Pumping stations, sludge pumping stations, filtrate pumping stations disinfection/ chlorination building, control rooms, Panel rooms etc.

3	Stage 3	Completion of side walls up to 100% height	All type of water storage tanks including chlorination & de-chlorination tanks, sumps of sludge/ filtrate/ pumping stations, open channels etc.
		After completion of all required fittings, e.g. internal electrification, shutters, doors & windows & plastering etc.	Pumping stations, sludge pumping stations, filtrate pumping stations disinfection/ chlorination building, control rooms, Panel rooms etc.
4	Stage 4	Completion of all type of ancillary structures including required interconnection with other units & any other required for completion of the structures.	All type of water storage tanks including chlorination & de-chlorination tanks, sumps of sludge/ filtrate/ pumping stations, open channels etc.
		Completion of ancillary structures roof treatment, plastering, flooring, cable trench, painting, varnishing, apron, drainage etc and any other work required for proper completion of the structure.	Pumping stations, sludge pumping stations, filtrate pumping stations disinfection/ chlorination building, control rooms, Panel rooms etc.

3. Interception and Diversion

a. The Contractor shall submit to the Design Build Operations Engineer monthly statements of the value of the work completed less the cumulative amount certified previously along with details of measurement of the quantity of works executed in a tabulated form as approved by the Design Build Operations Engineer. The Design Build Engineer will follow respective State's Public Works Department procedures such as measurement, check measurements, approving deviations etc and certify such invoices for payment. Further, a third party QA Consultants will also review invoices, photographic evidence for all the works, more importantly for shuttering, bedding, manholes, depth of cutting etc. that are not visible for future verification; conduct tests where required and certify the invoices.

The Contractor shall include in the Monthly Statements only such items of works which are described in the 'Payment Break-up Schedule' provided such items have been completed during the month.

b. The DesignBuild Operations Engineer shall check the details given in the Contractor's monthly statement and within 14 days certify the amounts to be paid to the Contractor aftertaking into account any credit or debit for the month in question in respect of materials for the works in the relevant amount and under conditions set forth in para 1.2 above, deductions for advance payments, secured advance, other recoveries, adjustment on account of Liquidated Damages - Operations, and other adjustments in terms of the contract and deduction of taxes at source, asapplicable under the law.

c. The value of work executed shall be determined by the Design Build Operations Engineer after due check measurement of the quantities claimed as executed by the Contractor, and only such items of works included in the Monthly Statement will qualify for verification/payment if these have been identified as such in the 'Payment Break-up Schedule'. For items of works not covered in the said 'Break-up Schedule', payment as per rate quoted and quantity executed shall be verified for payment.

d. The value of work executed shall comprise the value of the quantities of the items in the Bill of Quantities completed.

e. The value of work executed shall include the valuation of Variations.

f. The Design Build Operations Engineer may exclude any item certified in a previous certificate or reduce the proportion of any item previously certified in any certificate in the light of later information.

4. Payment of Annual Operations and Maintenance Price for treatment of sewage up to the Threshold Sewage Flow (For STP):

a. Subject to deduction of Liquidated damages for Operation determined in accordance with SCC 5.4, and other provisions of this Contract Agreement and in consideration of the Contractor undertaking the implementation of the Project, Owner shall pay, from the Operations Starting Date to the Contractor, Annual O&M Price in equal monthly instalments, as determined in accordance with the provisions of this Clause and other relevant provisions of this Contract Agreement. The O&M Prices in respect of Operation and Maintenance services shall be paid for a period of 15 years as monthly amounts. The monthly payments shall be taken as one twelfth of the Annual Operations and Maintenance Price payable by the Owner to the Contractor.

b. In the event that the occurrence of the Operations Starting Date is delayed due to Owner or Force Majeure events, the Annual O&M Price shall be paid from the date of delayed Operations Start Date till the end of the Term (which shall be extended by the numbers of days of delay) so as to achieve total O&M period of 15 years.

5. Payment of Additional Operations and Maintenance Price per MLD (for STP):

a. Additional Operation and Maintenance Prices shall be paid only in the event the amount of sewage treated by the STP exceeds the specified Threshold Sewage Flow as per the provisions of this Contract.

b. Subject to the provisions of this Contract Agreement and in the event of the Contractortreating sewage in excess of the Threshold Sewage Flow, Owner shall pay on a quarterly basis, additional O&M Prices for each MLD of sewage above the Threshold Sewage Flow level treated and disposed in an environmentally compliant manner, as determined in accordance with the provisions of this Clause and other relevant provisions of this Contract Agreement. The Additional Operation and Maintenance Price stipulated in the contract for the relevant year shall be multiplied with the additional quantity of the Sewage treated and measured at the outfall point for that particular quarter.

6. Payment of O&M Prices for Operations and Maintenance of I&D works and Pumping Stations

a. Owner shall pay O&M prices on a Monthly basis, from the Operations Starting Date to the Contractor, as determined in accordance with the provisions of this Clause and other relevant provisions of this Contract Agreement. The Monthly prices in respect of Operations and Maintenance services shall be paid for a period of 15 years as one twelfth of the quoted annual O&M prices for the relevant year of operation.

b. In the event that the occurrence of the Operations Starting Date is delayed for any reasons, O&M prices shall be paid from the date of commencement of the Operations till the end of the O&M period of 15 years.

9. BILL TO BE SUBMITTED ON PRESCRIBED FORM:

The contractor shall submit all bills on the prescribed forms to be had on application at the office of the Engineer and the charges in the bills shall always be entered at the rates given in the schedule of rates hereto attached, or in the case of an extra work ordered in pursuance of these conditions and not mentioned or provided for the Tender, at the rates hereinafter to be agreed upon.

10. STORES SUPPLIED BY BUIDCO:

10.1 No material shall be supplied by the department. All the construction material shall be arranged by the contractor at his cost but all such material should be ISI marked or as specified in the contract and shall be factory tested. If required such testing will be done at factory by the Engineer or his representative or by third party agency at the cost of contractor. All manufactured items shall be supplied by the contractor from the list of approved vendors ,if such list is available, or contractor will get his vendor's list duly approved by the Engineer.

10.2 Deleted.

11. MATERIAL AND PLANT OF CONTRACTOR :

All materials brought by the contractor upon the site of the works shall be deemed to be the property of the Managing Director, BUIDCo and shall not on any account be removed from the site of the works during the execution of the works and shall at all times be open to inspection by the PD/Engineer. The Engineer on the completion of the works or upon the stoppage of the works as provided for in clause 14 of this contract shall have an option of taking over any such unused materials at prevailing market rates, with the provision that the price allowed to the contractor shall not exceed the amount originally paid by him for the same as he (the Engineer) shall desire upon giving a notice in writing under his within seven days of the completion of the works to that effect, and all materials not so taken over by the Engineer shall cease to be the property of the Managing Director and the contractor shall have no claim for compensation on account of any such materials as aforesaid which are not so taken over by the said Engineer, unused by him (the Contractor) or for any wastage in or damage to any such materials.

12. WORKS TO BE EXECUTED IN ACCORDANCE WITH THE SPECIFICATION

The contractor shall execute the whole and every part of the work in a most substantial and workman like manner both as regards to materials and otherwise in every respect in strict accordance with the specifications. The contractor shall also confirm exactly and faithfully to the drawings and instructions in writing relating to the work signed by the Engineer.

The contractor shall comply with the provisions of the contract and with the care and diligence execute and maintain the works and provide all labours and materials, tools and plants including for measurements and supervision of all works, structural plans and other things of temporary or permanent nature required for such execution and maintenance in so far as the necessity for providing these, is specified or is reasonably inferred from the contract. The Contractor shall take full responsibility for adequacy, suitability and safety of all the works and methods of construction.

13. ALTERATION IN SPECIFICATION AND DRAWINGS:

The Engineer shall have powers to make any alteration or additions to the original specifications, drawings and instructions that may appear to him, to be necessary or advisable during the progress of the work, and the contractor shall be bound to carry out the work in accordance with any instruction which may be given to him in writing signed by the Engineer and such alterations shall not invalidate this contract and any additional work which the contractor may be directed to do in the manner above specified as part of the work shall be carried out by the contractor on the same conditions in all respect

on which he agreed to do the main work, and at the same rates as are specified in the Schedule of Rates marked, 'G' for the main work. And should any alteration necessitate a curtailment of the work described in the specifications and shown on the drawings, it shall be lawful for the Engineer to deduct from the sum of Rs. ------- value of this contract as a sum equal to the amount that the curtailed portion of the work if carried out would have cost based upon the rates set forth in the schedule of rates marked 'G'. The time for the completion of the work shall be extended if applied for by contractor in writing in the proportion that the additional work bear to the original contract work and the certificate of the Engineer shall be conclusive as to such extension.

And if the additional work includes any class of work which no rates provided in this contract, then such class of work shall be carried out at rates to be agreed upon between the Engineer and contractor in writing prior to the work being taken in hand. The basis for fixing such rates shall ordinarily be the BUIDCo erstwhile L.S.G.E.D. schedule of rates for the district and if not covered by it, SOR of PWD/ BIHAR Irrigation Department / CPWD will apply. Provided always that if the contractor shall commence work or incur any expenditure in regard thereto before the rate shall have been determined as lastly therein before, mentioned, then and in such case he shall only be entitled to be paid in respect of the work carried out or expenditure incurred by him prior to the date of the determination of the work carried out or expenditure incurred by him prior to the date of the determination of the rates as aforesaid according to such rate or rates shall be fixed by the Engineer. In the event of a dispute, the decision of the Chief engineer shall be final.

14. NO COMPENSATION FOR ALTERATION IN OR REDUCTION OF WORK TO BE CARRIED OUT :

If at any time after the commencement of the work the Chief Engineer /Superintending Engineer shall for any reason whatsoever not require the whole thereof as specified in this contract to be carried out, the Engineer shall give notice in writing of the fact to the contractor and upon the receipt of such notice in writing the works under this contract shall cease and the contractor shall have no claim to any payment or compensation whatsoever on account of any profit or advantage which he might have derived from the execution of the works in full, but which he did not derive in consequence of the full amount of the works not having been carried out, neither shall he have any claim for compensation by reason of any alterations having been made in the original specifications, drawings and instructions which shall involve any curtailment of the work as originally contemplated.

15. ACTION AND COMPENSATION PAYABLE IN CASE OF BAD WORK:

If it shall appear to the Engineer or his subordinate in charge of the works that any works has been executed with imperfect or unskilled workmanship or with materials of any inferior description or that any materials or articles provided by the contractor, for the execution of the works are unsound or of a quality inferior to that contracted for or otherwise not in accordance with the contract, the contractor shall on demand in writing from the Engineer specifying the work materials or articles complained of forthwith rectify remove demolish and reconstruct the work so specified in whole or in part as the case may require or as the case may be, remove the materials or articles so specified and provide other proper and suitable materials or articles at his own proper charge and cost, and in the event of his failing to do so within a period to be specified by the Engineer in his demand aforesaid, then the contractor shall be liable to pay compensation at the rate of one percent or such smaller amount as the Chief Engineer (whose decision in writing shall be final) may decide, on the amount of the cost of the whole work for every day not exceeding ten days, while his failure to do shall continue, and in case of any such failure the engineer may rectify remove, demolish and reconstruct the work, or remove and replace with others the materials or articles complained of, as the case may be at the risk and expense in all respect of the contractor and such expenses may be deducted from such sum as may be due to the contractor or may become due to him and from his security deposit. An instruction by the Engineer as to the amount of the expenses incurred shall be final and binding upon the contractor.

16. WORKS TO BE OPEN TO INSPECTION:

All works under or in course of execution or executed in pursuance of the contract shall at all times be open to the inspection of Engineer and his subordinate or a third party as deemed necessary in the opinion of the Engineer and the contractor shall all times during the usual working hours and at the all other times of which reasonable notice of the intention of the Engineer or his subordinate to visit the works shall have been given to the contractor, either himself be present to revive orders and instructions or have a reasonable agent duly accredited in writing present for the purpose. Orders given to the contractor's agent shall be considered to have the same force as if they had been given to the contractor himself. Verbal orders shall not be considered as binding on either party until they are confirmed in writing signed by the Engineer. The contractor shall ,without any extra charge or compensation, make all good for such inspection including arrangement of all labours, appliance ,access, safety etc at his own cost.

17. NOTICE TO BE GIVEN BEFORE WORK IS COVERED UP :

The contractor shall give not less than five days notice in writing to the PD/Engineer in Charge or his duly authorized assistant in charge of the work before covering up, for otherwise placing by beyond the reach of measurement any work in order that the same may be measured and correct dimensions thereof be taken before the same is so covered up or placed beyond the reach of measurement and shall not cover up or place beyond the reach of measurement any work without the consent in writing of the Engineer or his duly authorised assistant in charge of the work, and if any work shall be covered, up or replaced beyond the reach of measurement without such notice having been given or consent obtained the same shall be uncovered at the contractor's expense, or in default thereof no payment or allowance shall be made for such work or the materials with the same was executed.

18. CONTRACTOR LIABLE FOR DAMAGE DONE AND IMPERFECTION:

If the contractor or his work people or servants shall break, defense, injury or destroy and part of a building, in which they be working or any building, road, fence, enclosure, land or cultivated ground continuous to the premises on which the work any part of it is being or executed, if any damage shall happen to the work, which in progress, from any cause whatever or any imperfections become apparent in it within months after the final certificate of its completion shall have been given by the Engineer as aforesaid, the contractor shall make the same good at his own expense, or in default the Engineer may cause the same to be made good by other workman, and deduct the expenses (of which the certificate of the Engineer shall be final) from any sum that may be then or at any time thereafter may become, due to the contractor or from his security deposit. All compensation, loss or damage to physical property and of personal injury or death of any or more persons, which arise during and in consequences of the performance of the contract due to his negligence or overlooking of safety measures.

19. CONTRACTOR TO SUPPLY LABOUR, PLANT, LADDERS, SCAFFOLDINGS, etc.:

The contractor shall supply at his own cost all labour skilled and unskilled and all things necessary (except such special things, if any, as may, in accordance with the specification, be supplied from the Engineer stores), such as plants, tools, appliances, implements, ladders, cordage, tackle, scaffolding, shoring, shuttering, pumps, boilers, fuel, oils, packing, derrick, boring tools, winches and power as well as all other apparatus and temporary work requisite or proper for the proper execution of the works, whether original, altered or substituted and whether included in the specifications or other documents part of the contract or to in these considerations or not which may be necessary for the purpose of satisfying or complying with the requirements of the Engineer as to any matter as to which under these conditions he is entitled to be satisfied or which he is entitled to require, together with carriage therefore to and from the work. The contractor shall also supply without charge the requisite number of persons, with the means and things necessary for the purpose of setting out the works, and counting, weighting and assisting the measurement and examination at any time and from time to time of the work done or materials supplied by him. Failing his so doing the same may be provided by the Engineer at the expense and risk of the contractor and the expenses (of which the certificate of the Engineer shall be final) may be deducted from any money due to the contractor under this contract or from his security deposit. The contractor shall also provide at his own expense all necessary fencing and light required to

protect the public from accident, and shall assume all liability for and indemnity the Managing Director against all actions or suits arising out of or in connection with the carrying out of the works whether such actions are brought by members of the public, neighboring owner or workmen employed on works, save only actions for permanent interference with casements to which the site may be subject at law or in equity or otherwise arising out title of the site. The contractor shall in carrying out works confirm to the statutory and other legal enactment applicable to them and give all notices and pay all fees payable to local authorised and others in respect of them. The contractor shall be responsible for the adequacy, strength and safety of all shoring, structuring, bounding, curbing, brick work, masonry concrete permanent or temporary, appliances, matter and things furnished by him for the purpose of this contract.

20. FEMALE LABOUR:

No female labour shall be employed within the limits of a cantonment.

21. WORKS NOT TO BE SUBLET WITHOUT SANCTION:

This contract or any part thereof shall not be assigned or sublet without the written approval of the Chief Engineer. And if the contractor shall assign or sublet his contract or attempt to do so or become insolvent commence any insolvency proceedings or make any composition with his creditor or attempt to do so or if any bribe, gratuity, gift, loan perquisite, reward or a advantage, pecuniary or otherwise shall either directly or indirectly be given, promised or offered by the contractor or any of his servants or agent to any public in the employ of BUIDCo in any way relating to his office of employment of BUIDCo, in any way relating to his office or employment or officer or person shall become in any way Engineer may thereupon by notice in writing rescind the contract and the security deposit. BUIDCo and the same consequences shall ensure as if the contract has been rescinded under clause 4 thereof, and in addition the contractor shall not be entitled to recover or be paid for any work that has already been performed under this contract.

22. SUM PAYABLE BY WAY OF COMPENSATION:

All sums payable by way of compensation under any of these conditions shall be considered as reasonable compensation to be applied to the use of the said Managing Director, without reference to the actual loss or damage sustained, and whether or not any damage shall have been sustained.

23. WORKS TO BE UNDER DIRECTION OF ENGINEER:

All works to be executed under the contract shall be executed under the direction and subject to the approval in all respect of the Engineer for the time being who shall be entitled to direct at what point or points and in what manner they are to be commenced and from time to time carried on.

24. ~~DECISION OF CHIEF ENGINEER TO BE FINAL~~: DELETED

~~Except where otherwise specified in this contract, the decision of the Chief Engineer for the time being shall be final, conclusive and binding on all parties to the contract upon all question relating to the measuring of the specification, drawings and instructions herein before mentioned and as to the quality of workmanship or materials used on the work, or as to any other question, claim, right matter or things whatsoever, in any way arising out of relating to, the contract, drawings, specifications, estimates, instructions under the works, or the execution, or failure to execute the same whether arising during the progress of the work or after the completion or the sooner determination thereof the contract.~~

25. ACTIONS WHERE NO SPECIFICATION:

In the case of any class of work of which there is no mention in the specification such work shall be carried out in all respect in accordance with the Bureau of Indian standards Specifications. In case there are no such specifications in Bureau of Indian Standards, the work shall be carried out as per

manufacturers' specifications or as per BUIDCo/ LSGED / CPWD/BIHARPWD/BIHAR Irrigation specifications. In case there are no such specifications, the work shall be carried out as per instructions and requirements of the Engineer.

26. CONTRACTOR TO EMPLOY COMPETENT AGENT AND FOREMAN:

During the execution of the works and until the work is taken over by the order of the Engineer, the contractor shall employ a competent agent and such foreman as may be necessary for the proper execution of the "WORKS" (and then work is carried on day and night there shall be a foreman in charge of each shift) who shall be engaged constantly on the works to ensure proper management and efficient control.

27. EARNEST MONEY AND RECEIPT OF AND POWER AS TO SECURITY MONEY:

27.1 The earnest money as specified in tender notice i.e. Rs 69.00 lacs must be enclosed with the tender in the shape of FDR/NSC/CDR of a nationalized bank /Post Office Saving Account duly pledged in the name of Engineer.

27.2 The Managing Director, BUIDCo has received from the Contractor the sum of 5% of tender cost i.e. Rs. ----------(including earnest money deposit validated up to time as given in schedule-F),.the receipt of which is hereby acknowledged . **This said sum together with the sum made up the 5% described in clause 8 of this contract (i.e. 10% total) shall be held as security for the performance of all the conditions and stipulation of the contract**, and the Engineer is empowered to deduct from time to time from such security money all or any sum or any sums which may become due from the contractor as liquidated damages for the breach of any or all the covenants or provisions of this contract. If not confirmed under the provisions of this contract, the security money or such balance thereof as may be left after making the deductions aforementioned will be returned to the contractor after ------- months after the final certificate of the completions of the works shall have been given by the Engineer and after the Engineer shall have satisfied himself that all the terms of the contract have been duly and faithfully carried out by the contractor.

27.3 Fixed deposits receipts OR Bank Guarantee **(on the Performa as per Annexure-3)** of the State Bank of India, Allahabad Bank and Central Bank or any other scheduled/nationalized bank shall also be accepted as security provided that all such fixed deposits receipts must be issued in the name of the BUIDCo, and that they will be accepted as security on the conditions that BUIDCo will hold the deposit at the risk of depositor and will not be liable in the event of the loss of the security due to failure of the Bank or to any other clause, and that if the security is lost the loss will fall on the depositor who will have to deposit fresh security.

27.4 All compensations or the other sums of money payable by the contractor under the terms of this contract may be deducted from, or paid by the sale of a sufficient part of his security deposit or from the interest arising there from, or from any sums which may be due to or may become due to the contractor by Government on any account whatsoever and in the event of his Security Deposit being reduced by reason of any such deductions or sale as aforesaid, the contractor shall within 10 days make good in cash or fixed deposit receipt tendered by the State Bank of India or by Scheduled / nationalized Banks (if deposited for more than 12 months) endorsed in favour of the Engineer, any sum or sums which may have been deducted from, or raised by sale of his security deposit or any part thereof.

27.5 The contractor shall provide a Performance Security of 10 % (Ten percent) of the total contract price, i.e. value of Design, Build, and Commissioning services plus O& M prices for 15 years operation valid initially until 180 days beyond the Time for Completion of the Design-Build Services subject to the condition that the Performance Security shall be renewed from time to time, in the manner specified

in the following paragraph, so as to be valid until 180 days after the End Date (i.e. completion of the O&M period of 15 years) or any extension to the End Date. In the O & M period the Performance Security shall be renewed each year at least 120 days prior to expiry of the current Performance Security.

It shall be the responsibility of the Operator to furnish extension of the Performance Security Guarantee from time to time 120 days prior to the expiry of the current Performance Security.

In case the renewed Performance Security is not received by the Owner at least 60 days prior to the expiry date of the current Performance Security, the Owner will be entitled to take measures for enforcement/forfeiture of the Performance Security without any further notice to the Operator..

28. WORKMEN'S COMPENSATION ACT:

In every case in which by virtue of the provision of section 12, sub-section (i) of the Workmen's Compensation Act, 1923, BUIDCo is obliged to pay compensation to a workman employed by the contractor or by any sub-contractor from him in the execution of the said work, BUIDCo will recover from the contractor the amount of the compensation so paid; and, without prejudice to the rights of Government under section 12, sub-section (2) of the said Act. BUIDCo shall be of liberty to recover such amount or any part thereof by deducting it either from the earnest money or security deposited by the contractor or to his credit under Clause-19 of these conditions or from any other sum due by BUIDCo to the contractor under this contract or otherwise.

29. BUIDCo shall not be bound to contest any claim made against it under section-12, sub-section (1) of the said Act, except on the written request of the contractor and upon his giving to BUIDCo full security for all costs for which BUIDCo might become liable in consequence of contesting the claim.

30. **Dismantled Material Govt. Property:**

The contractor shall treat all materials obtained during dismantling of a structure, excavation of the site for a work, etc. as Government's/BUIDCo/ULB property and such materials shall be disposed off to the best advantage of Government/BUIDCo/ULB according to the instructions in writing issued by the PD/Engineer-in-Charge.

31. Lien in respect of claims in other Contracts:

Any sum of money due and payable to the contractor (including the security deposit returnable to him) under the contract may be withheld or retained by way of lien by the Engineer or any other contracting person or persons through Engineer against any claim of the Engineer or such other person or persons in respect of payment of a sum of money arising out of or under any other contract made by the contractor with the Engineer or with such other person or persons.

It is an agreed term of the contract that the sum of money so withheld or retained under this clause by the Engineer will be kept withheld or retained as such by the Engineer or the Government or till his claim arising out of the same contract or any other contract is either mutually settled or determined by the arbitration clause or by the competent court, as the case may be and that the contractor shall have no claim for interest or damages whatsoever on this account or on any other ground in respect of any sum of money withheld or retained under this clause and duly notified as such to the contractor.

32. Unfiltered water supply:

The contractor(s) shall make his/their own arrangements for water required for the work and nothing extra will be paid for the same. This will be subject to the following conditions.

(i) That the water used by the contractor(s) shall be fit for construction purposes to the satisfaction of the Engineer.

(ii) The Engineer shall make alternative arrangements for supply of water at the risk and cost of contractor(s) if the arrangements made by the contractor(s) for procurement of water are in the opinion of the Engineer, unsatisfactory.

32.1 Departmental water supply, if available

Water if available may be supplied to the contractor by the BUIDCo subject to the following conditions:-

(ii) The water charges @ 1% shall be recovered on gross amount of the work done.

(iii) The contractor(s) shall make his/their own arrangement of water connection and laying of pipelines from existing main of source of supply.

(iv) The BUIDCo do not guarantee to maintain uninterrupted supply of water and it will be incumbent on the contractor(s) to make alternative arrangements for water at his/ their own cost in the event of any temporary break down in the BUIDCo/Municipal water main so that the progress of his/their work is not held up for want of water. No claim of damage or refund of water charges will be entertained on account of such break down.

33. Alternate water arrangements

(ii) Where there is no piped water supply arrangement and the water is taken by the contractor from the wells or hand pump constructed by the Government, no charge shall be recovered from the contractor on that account. The contractor shall, however, draw water at such hours of the day that it does not interfere with the normal use for which the hand pumps and wells are intended. He will also be responsible for all damage and abnormal repairs arising out of his use, the cost of which shall be recoverable from him. The PD/Engineer-in-Charge shall be the final authority to determine the cost recoverable from the contractor on this account and his decision shall be binding on the contractor.

(iii) The contractor shall be allowed to construct temporary wells in Government land for taking water for construction purposes only after he has got permission of the Engineer-in- Charge in writing. No charges shall be recovered from the contractor on this account, but the contractor shall be required to provide necessary safety arrangements to avoid any accidents or damage to adjacent buildings, roads and service lines. He shall be responsible for any accidents or damage caused due to construction and subsequent maintenance of the wells and shall restore the ground to its original condition after the wells are dismantled on completion of the work.

34. Levy/Taxes/Royalty payable by Contractor

(i) GST/Sales tax/VAT(except GST), trade tax or any other Tax or Cess in respect of this contract shall be payable by the contractor and GST/trade tax shall be deducted from the bills of the contractor at prevalent rates. Certificate showing the details of such deductions shall be issued by the BUIDCo. to the Contractor as and when required. **However excise exemption certificate shall Not be provided as applicable.**

TRADE TAX CLEARANCE CERTIFICATE:

If the contractor is a GST/Trade Tax assess, he should produce a valid Trade GST/Tax clearance certificate, before the payment of the final bill, failing which the payment will be with-held. In case he is not liable to Trade Tax Assessment, a certificate to this effect from the competent Trade Tax authority shall be produced before payment of the final bill.

(i) Building and other Construction Workers Welfare Cess@1% or as applicable shall be deducted from all the bills (advance ,running or final bills) of contractor.

(iv) However, in respect of GST, **excluding works under programme exempted from GST by a government order**, same shall be paid by the contractor to the concerned department on demand and it will be reimbursed to him by the Engineer after satisfying that it has been actually and genuinely paid by the contractor or suitable deduction shall be made from the bills of contrfactor as per prevalent laws as in force from time to time by the Government and TDS certificate shall be issued.

(v) The contractor shall deposit royalty and obtain necessary permit for supply of the red bajri, stone/grit, Kankar, sand, murrum etc. from local authorities and shall produce form MM-11 to the engineer in its support or same shall be deducted from the bills of the contractor.

(vi) Income tax @ 2% or as applicable shall be deducted from all the bills (advance, running or final bills) of contractor and TDS certificate shall be issued.

NOTE:- ABOVE MENTIONED TAX MAY CHANGE AS PER GOVT. FINANCIAL RULE.

35. Conditions for reimbursement of levy/taxes if levied after receipt of tenders:

(i) All tendered rates shall be inclusive of all taxes and levies /GST payable under respective statutes. However, if any further tax or levy or cess is imposed by Statute, after the last stipulated date for the receipt of tender including extensions if any and the contractor thereupon necessarily and properly pays such taxes/levies/cess, the contractor shall be reimbursed the amount so paid, provided such payments, if any, is not, in the opinion of the Superintending engineer (whose decision shall be final and binding on the contractor) attributable to delay in execution of work within the control of the contractor.

(ii) The contractor shall keep necessary books of accounts and other documents for the purpose of this condition as may be necessary and shall allow inspection of the same by a duly authorized representative of Engineer and shall also furnish such other information/document as the Engineer may require from time to time.

(iii) The contractor shall, within a period of 30 days of the imposition of any such further tax or levy or cess, give a written notice thereof to the Engineer that the same is given pursuant to this condition, together with all necessary information relating thereto.

36. Termination of Contract on contractors death, becoming insolvent, insane or imprisoned:

In the event of the death of the contractor & his firm (where the contractor being in partnership), becomes dissolved or a corporation goes into liquidation, the contact may be terminated by notice in writing posted at the site of the works and advertised in one of the issue of a newspaper and all acceptable works shall be paid, after recovering all the dues at appropriate rates without compensation to the contractor, to the person or persons entitled to receive such payment.

37. ADVANCE:

37.1 Secured Advance on Non-perishable Materials

The contractor, on signing an indenture in the form to be specified by the Engineer shall be entitled to be paid during the progress of the execution of the work up to 75% of the assessed value of any materials which are in the opinion of the Engineer non-perishable, non-fragile and non-combustible and are in accordance with the contract and which have been brought on the site in connection therewith and are adequately stored and/or protected against damage by weather or other causes but which have not at the time of advance been incorporated in the works. When materials on account of which an advance has been made under this clause are incorporated in the work, the amount of such advance shall be recovered /deducted from the next payment made under any of the clause or clauses of this contract. No secured advance, shall however, be paid on high-risk materials such as ordinary glass, sand, petrol, diesel, wood etc.

37.2 Mobilization advance

Mobilization advance not exceeding 10% of the cost of contract work at SBI BPLR simple interest may be given, if requested by the contractor in writing within one month of the order to commence the work. Such advance shall be in two installments each of 5% of contract value or to be determined by the Engineer-in- Charge at his sole discretion. The first installment of such advance shall be released by the PD/Engineer-in-Charge to the contractor on a request made by the contractor to the Engineer in- Charge in this behalf after signing the contract bond and receiving the date of start of work. The second and subsequent installments shall be released by the Engineer- in- Charge only after the contractor furnishes a proof of the 70% of satisfactory utilization of the earlier installment to the entire satisfaction of the PD/Engineer-in-Charge and after start of work at site physically. Before any installment of advance is released, the contractor shall execute a Bank Guarantee Bond from Scheduled commercial Banks (Public Sector Bank) or such other Bank authorize by Reserve Bank of India for the amount equal to

110% of the amount of advance and valid for the contract period. This Bank Guarantee (B.G) from Scheduled commercial public sector Bank for the amount equal to 110% of the balance amount of advance) shall be kept renewed from time to time to cover the balance amount and likely period of complete recovery. Bank Guarantee may be given in more than One (Maximum 5) parts but equal to 110% of mobilization advance in total and in this case, B.G. will be released for the amount for which recovery has been made.

Recovery of Mobilization advance:

The mobilization advance as above shall bear a simple interest at the rate of SBI BPLR per annum and shall be calculated from the date of payment to the date of recovery, both days inclusive, on the outstanding amount of advance. Recovery of such sums advanced shall be made by the deduction from the contractors bills commencing after first twenty per cent of the gross value of the work is executed and paid, on pro-rata percentage basis to the gross value of the work billed beyond 20% in such a way that the entire advance is recovered by the time eighty percent (80%) of the gross value of the contract is executed and paid, together with interest due on the entire outstanding amount up to the date of recovery of the installment.

38. Insurance:

38.1 The Contractor at his cost shall provide, in the joint names of the Employer and the Contractor, insurance cover from the Start Date to the date of completion, in the amounts and deductibles stated in the bid document for the following events which are due to the Contractor's risks:

a) Loss of or damage to the Works, Plant and Materials;
b) Loss of or damage to Equipment;
c) Loss of or damage to property (except the Works, Plant, Materials, and Equipment) in connection with the Contract; and
d) Personal injury or death.

38.2 Insurance policies and certificates for insurance shall be delivered by the Contractor to the Engineer for the Engineer's approval before the completion date which will be inclusive of defect liability period / Start Date. All such insurance shall provide for compensation to be payable in Indian Rupees to rectify the loss or damage incurred.

38.3 Alterations to the terms of insurance shall not be made without the approval of the Engineer.

38.4 Both parties shall comply with any conditions of the insurance policies.

39. COMPLIANCE WITH LABOUR REGULATIONS:

During continuance of the Contract, the Contractor and his sub Contractors shall abide at all times by all existing labour enactments and rules made there under, regulations, notifications and bye laws of the State or Central Government or local authority and any other labour law (including rules), regulations, bye laws that may be passed or notification that may be issued under any labour law in future either by the State or the Central Government or the local authority. The list of such regulations and bye laws is given in **Annexure-1.** The Contractor shall keep the Employer indemnified in case any action is taken against the Employer by the competent authority on account of contravention of any of the provisions of any Act or rules made there under, regulations or notifications including amendments. If the Employer is caused to pay or reimburse, such amounts as may be necessary to cause or observe, or for non-observance of the provisions stipulated in the notifications/bye Laws/Acts/Rules/regulations including amendments, if any, on the part of the Contractor, the Engineer/Employer shall have the right to deduct any money due to the Contractor including his amount of performance security. The Employer/Engineer shall also have right to recover from the Contractor any sum required or estimated to be required for making good the loss or damage suffered by the Employer. The employees of the

Contractor and the Sub-Contractor in no case shall be treated as the employees of the Employer at any point of time.

40. Drawings and Photographs of the Works:

40.1 The contractor shall do photography/video photography of the site firstly before the start of the work, secondly mid-way in the execution of different stages of work and lastly after the completion of the work. No separate payment will be made to the contractor for this.

40.2 The Contractor shall not disclose details of Drawings furnished to him and works on which he is engaged without the prior approval of the Engineer in writing. No photograph of the works or any part thereof or plant employed thereon, expect those permitted under clause 40.1, shall be taken or permitted by the Contractor to be taken by any of his employees or any employees of his sub-Contractors without the prior approval of the Engineer in writing. No photographs/ Video photography shall be published or otherwise circulated.

41.0 APPROVAL OF DESIGNS AND DRAWINGS

The contractor shall submit, if applicable as per scope of work, detailed hydraulic and structural designs and detailed drawings conforming to conceptual drawing including calculations and specification in triplicate (3 sets), separately for main and all appurtenant works to be supplied and erected by him. The design, detailed calculations and drawings shall be got prepared by the contractor from qualified experienced and reputed designer from any Indian Institute of Technology / National Institute of Technology / Central & State owned technical institutions which are recognized by A.I.C.T.E. & from any University in consultation and with the approval of the Engineer, however, the contractor will be entirely and fully responsible for the structural stability, soundness and water tightness and safety against earth quakes and wind pressure, of the structure or works to be carried out.

41.1 On submission, these designs and drawing will be reviewed by the Engineer or his representative and he may suggest modification, alteration, if any, which shall be promptly complied with by the contractor.

41.2 After satisfying himself, the Engineer will accord approval to the designs, detailed drawings and detailed specifications. The contractor shall then submit five (5) sets of final designs, calculations, detailed drawings and specification for all the works along with required quantity of Cement & Steel duly bound for incorporation in the contract which will be incorporated and form a part of the contract Such approval shall however not relieve the contractor of his responsibilities of the correctness of the designs, drawings and specifications and he shall be fully responsible for that.

41.3 On completion of the contract he shall provide the Engineer with fully dimensioned built in drawing of the whole installation and construction in five (5) sets embodying and alterations and amendments that may have been agreed upon and executed. The contractor shall withdraw any worker or supervisor etc. only after the consent of the Engineer.

42.0 DISCREPANCIES:

If there is a discrepancy between the Drawings and the Specifications, such discrepancies shall be promptly reported to PD/Engineer-in-Charge and the Contractor shall obtain the PD/Engineer-in-Charge interpretation which shall be binding on the Contractor.

43. Dispute Redressal System/Arbitration clause

43.1 If any dispute or difference of any kind what-so-ever shall arises in connection with or arising out of this Contract or the execution of Works or maintenance of the Works there under, whether before its commencement or during the progress of Works or after the termination, abandonment or breach of the Contract, it shall, in the first instance, be referred for settlement to the competent authority(Chief Engineer), described along with their powers in the Bid document, above the rank of the Engineer, The competent authority shall, within a period of forty-five days after being requested in writing by the Contractor to do so, convey his decision to the Contractor. Such decision in respect of every matter so

referred shall, subject to review as hereinafter provided, be final and binding upon the Contractor. In case the Works is already in progress, the Contractor shall proceed with the execution of the Works, including maintenance thereof, pending receipt of the decision of the competent authority as aforesaid, with all due diligence.

43.2 DECISION OF MD BUIDCo TO BE FINAL:

Except where otherwise specified in this contract, the decision of the MD shall be final, conclusive and binding on all parties to the contract upon all question relating to the measuring of the specification, drawings and instructions ~~Except where otherwise specified in this contract, the decision of the Managing Director for the time being shall be final, conclusive and binding on all parties to the contract upon all question relating to the measuring of the specification, drawings and instructions herein before mentioned as mentioned in clause 24 above.~~

43.3 Either party will have the right of appeal, against the decision of the competent authority, to the arbitration if the amount appealed exceeds rupees one lac.

43.4 PROCEDURE FOR ARBITRATION:-

In case where the contractor is not satisfied with the decision of the Chief Engineer/CGM, the matter shall be referred to the Managing Director. Every dispute, difference or question which may at any time arise between the parties to the contract or arising out of or in respect of the contract shall be referred to the arbitration of 'MANAGING DIRECTOR' of BUIDCo, who will have the power to decide the same as an arbitrator if he so likes or may nominate any working or retired Chief Engineer/CGM of BUIDCo or any one as an arbitrator to decide it and his AWARD shall be final and binding on the parties. In the event of the arbitrator to whom the matter is originally referred being transferred or vacating his office or being unable to act for any reason, he shall either enter upon the reference himself or appoint another person to act as arbitrator. Such person shall be entitled to proceed with the reference from the state it was left by his predecessor. The Managing Director while nominating any one as Arbitrator will have the power to fix the FEE of the nominee. The arbitrator will have the power to decide the COUNTER-CLAIM if lodged by the other party. The arbitrator will also have the power to award pendent elite and further interest on the principal sum so awarded but not in excess of **6% P.A.** (**Simple Interest**) or as he thinks reasonable. Initially the FEE of the Arbitrator will be paid by the claimant i.e. the party who invoked the arbitration clause which will be one of the elements of costs of the arbitration and will finally be borne by the parties as per award of the arbitrator. The VENUE of arbitration will be decided by the Managing Director.

In all cases where the amount of the claim in dispute is Rs. 100000/- (Rupees one Lac) and above, the arbitrator shall give reasons for the award. The party invoking the arbitration shall specify the dispute to be referred to arbitration together with this amount or amounts claimed in respect of each such dispute, subject to the provision of the arbitration & concillation Act 1996 as amended from time to time or any rule made there under and for the time being in force shall apply to the arbitration proceedings.

The arbitrator may from time to time with the consent of the parties enlarge the time for marking and publishing the award. The decision taken by the arbitrator will be final and binding on both the parties in question and matters relating to this contract.

44. Procedure for Resolution of Disputes

44.1 The Competent Authority mentioned in clause 42.2 shall give a decision in writing within 45 days of receipt of a notification of a dispute.

44.2 Where the Initial Contract Price as mentioned in the Acceptance Letter is Rs. 25.00 Crore and below, disputes and differences in which an Adjudicator has given a decision shall be referred to a sole

Arbitrator. The sole Arbitrator would be appointed by the agreement between the parties; failing such an agreement within 15 days of the reference to arbitration, the appointing authority, namely the Managing Director on behalf of Managing Director BUIDCo shall appoint. Arbitrator will give decision within 45 days. If any fee is to be paid to Arbitrator (not more than Rs. 1.00 Lacs), it shall be borne equally by both the parties.

44.3 Arbitration proceedings shall be held at Patna or any other place as decided by the both parties mutually in BIHAR. (India) but on the approval of Managing Director. The language of the arbitration proceedings and that of all documents and communications between the parties shall be English.

44.4 Performance under the contract shall continue even after reference to the arbitration and payments due to the contractor by the Employer shall not be withheld, unless they are the subject matter of the arbitration proceedings.

44.5 Either party may refer a decision of the Competent Authority to Arbitration within 28 days of the Competent Authority's written decision. Arbitration shall be under the Arbitration and Conciliation Act 1996. If neither party refers the dispute to Arbitration within the above 28 days, the Competent Authority's decision will be final and binding.

44.6 The Arbitration shall be conducted in accordance with the following procedure, in case Initial Contract Price is more than Rs. 25.00 Crore or the Contractor is a Foreign Contractor, who has bid under ICB:-

(a) In case of a decision of the Competent Authority in a dispute or difference arising between the Employer and a Contractor relating to any matter arising out of or connected with this Agreement, the matter will be referred to an Arbitral Tribunal. The Arbitral Tribunal shall consist of three Arbitrators, one each to be appointed by the Employer and the contractor. The third Arbitrator shall be chosen by the two Arbitrators so appointed by the parties and shall act as presiding Arbitrator. In case of failure of the two Arbitrators appointed by the parties to reach upon a consensus within a period of 30 days from the appointment of the Arbitrator appointed subsequently, the presiding Arbitrator shall be appointed by the Managing Director of BIHAR URBAN INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED (BUIDCO) .

(b) If one of the parties fails to appoint its arbitrator in pursuance of sub-clause (a) above within 30 days after receipt of the notice of the appointment of its arbitrator by the other party, then the Managing Director on behalf of BIHAR URBAN INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED (BUIDCO) shall appoint the arbitrator. A certified copy of the order of the Managing Director, making such an appointment shall be furnished to each of the parties.

(c) The decision of the majority of arbitrators shall be final and binding upon both parties. The cost and expenses of Arbitration proceedings will be paid as determined by the Arbitral Tribunal. However, the expenses incurred by each party in connection with the preparation, presentation etc. of its proceedings as also the fees (In accordance of BIHAR Government or as per Bihar financial rules or as per latest amendment but which shall not be more than Rs 100000/- for any arbitrator) and expenses paid to the arbitrator appointed by such party or on its behalf shall be borne by each party itself.

44.7 If amount of award/proceedings exceeds Rs. 1,00,000/- , (Rs. One Lac) the Arbitrator shall have to give reasons.

44.8 Neither party is entitled to bring a claim to arbitration if its arbitrator has not been appointed within thirty days after the expiration of the Defects Liability Period. All claims shall be within the jurisdiction of court at the place where work is carried out.

44.9 Area **of Jurisdiction:**

The Contract documents shall be governed by the Laws and bye-laws of India, the State of BIHAR, and of the local bodies in the Project area. Concerned District Court of the project area, alone shall have the jurisdiction over all matters, arising out of the contract agreement.

45. Shelter/Drinking water/Toilets and drainage for labour

The contractor(s) shall at his/their own cost provide

(a) His/their labour with a sufficient number of huts (hereinafter referred to as the camp) on a suitable plot of land to be approved by the Engineer.

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(b) The contractor(s) shall also construct temporary latrines and urinals for the use of the labours each on the scale of not less than four per each one hundred of the total strength, separate latrines and urinals being provided for women.

(c) The contractor(s) shall construct sufficient number of bathing and washing places, one unit for every 25 persons residing in the camp.

(d) The contractor(s) shall provide adequate potable drinking water supply of water for the use of labours including water for bathing and washing. Where piped water supply is available, supply shall be at stand posts and where the supply is from wells or river, tanks which may be of metal or masonry, shall be provided. The contractor(s) shall also at his/ their own cost make arrangements for laying pipe lines for water supply to his/ their labour camp from the existing mains wherever available, and shall pay all fees and charges there off.

(e) The contractor(s) shall make necessary arrangements for the disposal of excreta from the latrines in a hygienic manner.

(f) The contractor(s) shall provide efficient arrangements for draining away sullage water so as to keep the camp neat and tidy.

(g) The contractor(s) shall make necessary arrangements for keeping the camp area sufficiently lighted to avoid accidents to the workers.

(h) The contractor(s) shall make arrangements for conservancy and sanitation in the labour camps according to the rules of the Local Public Health department.

46. SITE ENGINEER & FIRST-AID:

46.1 The contractor shall employ a site Engineer who is well experienced in the type of the works he has to handle and shall have worked in similar projects earlier. He should be well acquainted with all latest Indian Standards, codes of practice, and local practices of construction and has good managerial qualities. He should also be capable of handling labour force tactfully and extract good quality of workmanship and have to plan execution of works efficiently. He shall be well acquainted with specifications, construction equipment & its use, testing and supervising the works. He shall have good ability to guide his subordinates, and conscious about the time limit of the contract.

46.2 The contractor shall make all arrangements for first aid and medical facilities to the laborers at his own expenses.

46.3 Proper protective accessories and all safety equipments like gum boots, gloves, goggles and helmets etc. as found necessary, shall be provided to the laborers free of cost, by the contractor.

47.0 TESTING:

The material to be supplied by the contractor as per schedule-"G" shall be tested as per relevant IS code / relevant Manual issued by MoUD, G.O.I. The contractor shall give timely notice to the Engineer

indicating place and date where & when the testing is to be carried out. All tests are subject to the approval of the Engineer or any agency appointed by the Engineer. The stores supplied willfully, without testing shall be rejected. Contractor will provide all testing facilities at his works and at his cost.

48.0 ORAL AGREEMENT:

No oral order, objection, claim or notice by any party to the other shall effect or modify any of the terms or obligations contained in the Contract Documents, and none of the provision of the Contract Documents shall be held to be waived or modified by reason of any act whatsoever, other than by a definitely agreed waiver or modification there-of in writing, and no other evidence shall be introduced in any proceeding of any other waiver or modification

49.0 CLEANING UP :

49. 1 Contractor shall at all times during the work keep the site and premises, adjoining property and public property free from accumulations of waste materials, rubbish and- other debris, resulting from the works, and at the completion of the work, he shall remove all waste-materials, rubbish and debris from the site and premises as well as all tools, construction equipment's, machinery and surplus materials and shall leave the site and premises clean, tidy and ready for occupation by the PD/Engineer-in-Charge. The Contractor shall restore to its original condition those portions of the site not designated for alteration in the tender documents such as paved walkways, parking areas and road etc.

49.2 Cleaning up operations shall include the removal and disposal of earth that renders surplus after filling as directed and approved by the Engineer. No waste material shall be buried or disposed off unless approved in writing by the PD/Engineer-in-Charge.

50.0 FOSSILS:

Any find made on the site such as antique relics, coins and fossils or any other valuable articles shall be immediately made over to the care of PD/Engineer-in-Charge on behalf of the Government.

51 TESTS ON COMPLETION:

51.1 After the completion of work the Contractor shall give minimum of twenty one (21) days notice in writing to the Engineer to carry out the required test to ascertain the soundness of the work executed by him.

51.2 If in the opinion of Engineer the tests are being unduly delayed, he may by notice in writing, call upon the Contractor to make such tests within 21 days, from the date of issue of letter. In the event of the Contractors failure to carry out such tests within the stipulated time, the Engineer may himself proceed to get the work done at the risk and cost of the Contractor.

53 COMMUNICATIONS:

Communications between parties which are referred to in the conditions are effective only when it is received. However, in case a registered letter sent to the contractor on the address given by him, is not received by him or his representative the notice will be considered as delivered and will be effective from the date of dispatch of letter.

54 PERSONNEL:

The contractor is to employ either the key personnel named in the Schedule of key personnel to carry out the functions stated in the Schedule or other personnel approved by the Engineer. The Engineer will approve proposed replacement of key personnel only if their qualifications, abilities, and relevant experience are equal or better than those of the personal listed in the Schedule.

55 MANAGEMENT MEETINGS

55.1 Either the G.M./S.E. or the Contractor may require the other to attend a management meeting. The business of a management meeting is to review the plans for remaining work and to deal with matters raised in accordance with the terms and conditions of the contract bond.

55.2 The Engineer is to record the business of management meetings and is to provide copies of his record to those attending the meeting. The responsibility of the parties for actions to be taken is to be decided by the Engineer either at the management meeting or after the management meeting and stated in writing to all who attended to meeting.

56. **CURRENCIES:**

All payments shall be made in Indian Rupees.

57. **RETENTION:**

On the completion of the whole of the works, the total amount retained is repaid to the contractor when the Defects liability Period has passed and the Engineer has certified that all defects notified by him to the contractor have been removed.

58. **SAFETY MEASURES**

The contractor shall be responsible for fencing in a good sufficient manner, all open excavations, works and materials at site so as to prevent accidents by day and by night. He shall also be responsible for lighting up in proper and sufficient manner at night the portion of the work which is open or under construction & he shall always maintain a sufficient number of watchmen on duty when his staff is not actually working. He shall also be responsible for the safety of his materials as well as any other materials, issued to him for use on the work from the beginning of the works' up to the time of its completion and handing over. He shall make his rates sufficiently comprehensive to cover all such charges. In the event of any accidents, mishaps due to his failure to observe these and other precautions, he shall be responsible for the payment of all damages, compensations, and losses that may arise. The rates in schedule "G" shall be deemed included all charges on this account. A List of safety measures which is mandatory is attached as **Annexure-2**

59. **DISPOSAL FOR SURPLUS EARTH AND CARRIAGE CHARGES**

The contractor shall provide disposal for surplus earth within 8 km. as per direction of Engineer and shall remove from the works, spoils and rubbish and shall include in his rates quoted for the excavation in Schedule 'G' a sufficient amount to cover the cost of this and all carriage charges in this connection. He shall also include in his rates all other carriage and transport charges that may be necessary for the proper carrying out and completion of the entire contract work. The surplus earth spoils and rubbish so disposed shall be neatly dressed by the contractor. Engineer may specify the location for the disposal of earth which shall be binding on contractor. All excavated surplus earth is the property of owner or local body so disposal of such earth shall be on specified location as directed by Engineer or local body otherwise contractor shall be liable to pay the cost of earth and royalty as applicable.

60. PUMPING DURING CONSTRUCTION

The contractor shall provide all appliances such as pumps engines, machinery suction and delivery pipes, foundation fastenings, fuel lubrication, cotton, waste and labour necessary for dealing with sub-soil water, flood water, drainage problem and discharge from pipelines/sewers broken during construction or any other causes which are encountered during the construction of the works and the contractor shall make his rates sufficiently comprehensive to cover the cost of such work until and unless specified in Schedule-G under a separate item of work of specific nature.

61. **WORKMANSHIP**

All works, in general, shall be carried out in a most workmanship like manner, true to level and plumb. The entire work shall be given a neat appearance and appealing look. No patch or mark of form and shuttering shall be visible in any other parts of the work and the same shall be made even and smooth. The R.C.C. work shall be rendered even and smooth by means of cement and coarse sand mortar 1:3 or so and by rubbing it with carborandum stone.

62. EMPLOYMENT AND REMOVING OF CONTRACTOR PERSONS

During the execution of work and until the work is taken over by the Engineer, the contractor shall employ for the execution of the work persons who are careful, skilled and experienced in their trades and calls. The engineer shall have full power to ask the contractor to remove immediately from the site of works, who in the opinion of the Engineer, misconducts or misbehaves or are incompetent in the proper performance of their duties or are otherwise undesirable.

63. EMPLOYMENT OF MAINTENANCE GANG

The contractor's attention is also drawn to the necessity for employing proper maintenance gang during the period of maintenance for immediate repairs of any defects that may be noticed or brought to the notice during the period of maintenance. The Engineer shall get any such defects rectified if the contractor fails to do so and the cost in this connection shall be recoverable from contractor.

64. RECORDS TO BE MAINTAINED BY CONTRACTOR

The contractor shall maintain following records at site of work in the desired form. These records shall be open for inspection by the Engineer/his representative during execution of work. These shall be submitted to the BUIDCo on the completion of the work.

(i) Cement & steel consumption register.
(ii) Log books of Mixer, Vibrator and other such equipment.
(iii) Date wise record showing results of different tests got conducted by the Contractor as described in schedule "E".
(iv) Daily progress report.
(v) Concrete register.

65. SITE OFFICE ,COMPUTOR ,OPERATOR AND VEHICLE

If the tendered cost is more than Rs. Five crores, contractor will have to provide Air conditioned (A/C) site office with one attendant on is site with furniture and toilet along with a computer with operator and also a four wheeled light motor vehicles (Not more than Three year old) with driver & fuel for the use of Engineer (Average 3000 km/month of capacity not less than 1800cc) till the completion of work including testing and trial run and performance period for which contractor shall make sufficient provision in his rates as below.

Contract Value	**Site office(A/C)**	**r wheel LMV (A/C)&capacity not less than 1800 cc.**	**Computer**
than 5.00 crore to Rs. 25.00 crore	One (20 sq/m)	One	ne Desktop with operator
than 25.00 crore to Rs. 100.00 crore	30 sq/m) + One additional (20 sq/m)	Two	Desktop computer with Operator +one laptop
than 100.00 crore	30 sq/m) + One additional (20 sq/m) with attendant	Three	Desktop computer with Operator + two Laptop

66. Force Majeure

(1) "Force Majeure" shall mean any event,
(a) beyond the reasonable control of the Owner or of the Operator, as the case may be; and
(b) which is unavoidable notwithstanding the reasonable care of the Party affected.
(2) Force Majeure shall include the events listed below in this Section 9.8(2) if the conditions set out in GC Section 66.1(a) and (b) are satisfied:

(a) war, hostilities or warlike operations, whether a state of war be declared or not, invasion, act of foreign enemy and civil war;

(b) rebellion, revolution, insurrection, mutiny, usurpation of civil or military government, conspiracy, riot, civil commotion and terrorist acts;

(c) confiscation, nationalization, mobilization, commandeering or requisition by or under the order of any government or de jure or de facto authority or ruler or any other act or failure to act of any local state or national government authority;

(d) strike, sabotage, lockout, embargo, import restriction, port congestion, lack of usual means of public transportation and communication, industrial dispute, shipwreck, shortage or restriction of power supply, epidemics, quarantine and plague;

(e) earthquake, landslide, volcanic activity, fire, flood or inundation, tidal wave, typhoon or cyclone, hurricane, storm, lightning, or other inclement weather condition, nuclear and pressure waves or other natural or physical disaster; and

(f) shortage of labour, materials or utilities where caused by circumstances that are themselves Force Majeure.

(3) If the Parties are prevented, hindered or delayed from or in performing any of their obligations under the Contract by an event of Force Majeure, then it shall notify the other in writing of the occurrence of such event and the circumstances thereof within 14 days after the occurrence of such event.

(4) The Party who has given such notice shall be excused from the performance or punctual performance of its obligations under the Contract for so long as the relevant event of Force Majeure continues and to the extent that such Party's performance is prevented, hindered or delayed. The Time for Completion shall be extended in accordance with GC Section 66.4(1) for events of Force Majeure during the Design-Build Period. If the Time for Completion is extended in accordance with Section 66.4(1), the End Date shall be extended for a period of time equal to the period of time during which the relevant event of Force Majeure continued.

(5) The Party or Parties affected by the event of Force Majeure shall use reasonable efforts to mitigate the effect thereof upon its or their performance of the Contract and to fulfil its or their obligations under the Contract, but without prejudice to either Party's right to terminate the Contract under this Sections 66.8(7) and 66.9(6).

(6) No delay or non-performance by either Party hereto caused by the occurrence of any event of Force Majeure shall,

(a) constitute a default or breach of the Contract; or

(b) subject to GC Sections 66.4(2), 66.9(3) and66.9(5), give rise to any claim for damages or additional Cost occasioned thereby,

if and to the extent that such delay or non-performance is caused by the occurrence of an event of Force Majeure.

(7) If the performance of the Contract is substantially prevented, hindered or delayed for a single period of more than 60 days or an aggregate period of more than 120 days on account of one or more events of Force Majeure during the term of the Contract, the Parties will attempt to develop a mutually satisfactory solution, failing which either Party may terminate the Contract by giving a notice to the other, but without prejudice to either Party's right to terminate the Contract under Section 66.9(6).

(8) In the event of termination pursuant to this Section 66.8(7), the rights and obligations of the Owner and the Operator shall be as specified in Bid.

(9) Notwithstanding GC Section 66.8(6), Force Majeure shall not apply to any obligation of the Owner to make payments to the Operator herein.

Signed by Contractor **Signed on behalf of the Managing Director, BUIDCo,**

(10) Conditions of Particular reference/Special Conditions

(11) Government land is available for STP and pumping station. Environmental clearances, the specific requirements and the status in this regard shall be made available by the . BUIDCo will facilitate in getting such clearances/ approval.

(12) Survey of specified drain, investigation preparation of drawing design shall be done by in specified time and no additional payment shall be made on this account.

(13) shall submit drawing design of each proposed component approval to be gotten from competent authority of BUIDCo.

(14) shall get the approved working drawing & design from the Engineer in charge before commencement.

(15) Drains to be intercepted and diverted to proposed STP in ward no-15 near makhtakiya area, to prevent the pollution load of river Ganga..

(16) The objective star gets of this project is communication and publication awareness creation activities aimed at facilitating project implementation and to create awareness on need, benefits and approach for Ganga rejuvenation.

(17) It will be mandatory for to operate and maintain the build infrastructure for 15 years post commissioning.

(18) The specified and mentioned specifications of quality of material and work to be ensured by .

(19) Quality test of materials should be submitted by on his own expenditure.

(20)

(21) Process Instrumentation, Control. and SCADA System. The instrumentation shall include online measurement of influent and effluent parameters for sewage, sludge and sludge gas. Process Instrumentation, Control. and SCADA System shall include continuous monitoring the process parameters, process flow, tank level and other equipment protection devices. These measurements shall be connected to a network of Programmable Logic Control (PLC) based unit process controllers that shall generate pre-programmed monitoring and control actions for process, equipment and other control devices. A Supervisory Control and Data Acquisition (SCADA) system, networked to the PLC unit process controllers shall acquire and display process parameters, process flow, tank level, etc., monitor and issue remote control actions for maintaining process control. The SCADA system shall also achieve pre-determined process parameters and originate custom performance reports for management reporting.

(22)

(23)

(24) Operate the STP, I&D works with Pumping Stations, for a period of 15 years as specified below:

(25) General Scope

(26) The Contractor shall operate and maintain the STP under the Contract complete including the road works, landscaping, civil/structural, mechanical components, instrumentation system, Electrical System, all utility and ancillary buildings for the period of fifteen (15) years from the date of successful completion of "Tests after Completion of the Works".

(27) The Contractor shall make his own arrangements at his own cost for Works operation personnel, lubricants, diesel, spares, tools and tackles, routine maintenance, screenings collection, desilted material collection, transportation and disposal, co-ordination with respective pollution control board, agency supplying power to the STP, and any other activity required for the operation and maintenance of the constructed Works in full compliance with all applicable rules, regulations, laws, codes, effluent quality requirements and any other limitations.

(28) Carrying out continuous flow measurements and recording of treated & untreated sewage at outlet and inlet of STP, regular calibration, cleaning, maintenance and replacement when required of measuring devices;

(29) Collecting samples of influent and effluent and analyzing & testing them on a daily basis (inhouse) and getting tests done at weekly basis from laboratory of Bihar PCB to determine the quality of sewage and performance of the treatment plant. Minimum 3 grab samples representative of different flow conditions (quantum and quality wise) in the day of the treated effluent shall be drawn every week jointly by the Owner and the Contractor and the results of the test report shall be binding on both the parties.;

(30) Take all necessary measures to minimize the power consumption in carrying out its operations.

(31) operate electrical equipment during power failures by making appropriate alternative arrangements,

(32) Store or dispose: (i) the Residual Matter obtained after the processing and treatment of the Sewage such as sludge, grit, waste screens etc.; and (ii) the Residual Treated Water obtained from treatment of Sewage in a manner which is compliant to all applicable environmental laws and rules;

(33) The Contractor shall submit a weekly report to the Owner detailing the Operation and Maintenance indicating the labour hours expended, Electrical Power Consumed and other Consumables consumed and also problems faced and rectified.

(34) The Contractor shall submit detailed schedule/manual of all O& M activities with references of equipment manufacturers' maintenance schedules/manuals to the Owner for review and approval.

(35) The Contractor shall submit Guidelines and Instructions manual for the maintenance staff of all levels for all the tools, plants and equipment and Operating STP to maintain the service levels within the standards prescribed within the contract;

(36) The Contractor shall carry out all O&M activities as per the approved Operation and Maintenance Manuals.

(37) During the Operation and Maintenance period, the Contractor shall ensure that the sewage detention time in wet well not exceeds 30 min. and there is no backflow of sewage.

(38) The Contractor's responsibility shall also include the safety and security of the Works during the course of Operation and Maintenance.

(39) Acquire and maintain sufficient stock of consumables such as chemicals, algal nutrients, safety gear, grit screens etc. and procure necessary electrical and mechanical equipment required for operations and maintenance of STP to ensure continuous operations.

(40) Establish a Project office to manage the Project. The Project office can be located at the sewage treatment plant campus or at any other appropriate location where land is made available by the Owner.

(41) All Project sites shall be well secured and kept in a clean and hygienic condition with sufficient measures for safety and security of man-power, built structures, equipment and other system components.

(42) During Operation and Maintenance period, the Contractor shall appoint anContractor and Electrical/Mechanical Technician. In addition, the Contractor shall appoint suitable number of Contractors, drivers, cleaners,fitters, electricians, helpers, gardeners, office peons, security guards, labourers as required for the operation and maintenance of complete proposed STP for three shifts and adequate other staff / supporting personnel during general Shift. Security of man-power, built structures, equipment and other system components

(43) General Scope

(44) To Operate and maintain the sewage treatment plant, all instruments and mechanical, electrical equipment in accordance with the aim and purpose of treatment. The plant &equipment covered under the above contract will be totally attended to, by the Contractor including any "Troubleshooting" to ensure smooth and trouble free operation.

(45) The Contractorwill monitor the performance of the sewage treatment plant; conduct the analysis of the inlet sewage and water quality after treatment. Contractor shall initiate and take adequate actions to ensure smooth and satisfactory performance / running of the plants on a 24 hours / round the clock basis.

(46) The Contractorshall prepare and implement an effective plant maintenance programme in consultation with the Owner. It is an absolutelyContractor's responsibility to look after all sorts of maintenance whether preventive, Minor, Major, or break-down

(47) The Contractorwill determine operating parameters, select settling (Chemical doses etc.) and generally optimize the process, and working of the treatment plant. Excessive chemical dozing i.e. dose more than normal should be avoided otherwise penalty shall be levied and recovered from the Contractor.

(48) The Contractorshould plan & procure all spares, Polyelectrolyte and all consumables including chemicals, grease, lubricating oil, cleaning agents, laboratory reagents etc. Further the Contractorwill plan about the requirement well in advance (At least 4 months) and procure the material from the market.

(49) The Contractorwill be responsible for keeping up-to-date record of documents including History Card for equipment and maintaining every day log book relating to various analyses performed.

(50) The Contractorshall maintain and update logbook, in which details of operational parameters are recorded in every shift and at regular interval say hourly or as decided mutually.

(51) The Contractorwill prepare and submit a daily report of plant performance and will assist the Owner in preparing the necessary documents for their purpose and records.

(52) The Contractorwill be responsible to carry out day to day periodic maintenance, necessary to ensure to smooth and efficient performance / running of all equipment / instruments comprising the sewage treatment plant and maintaining the record of the same.

(53) The Contractorshall have to issue identity cards with photographs to all the staff employed for Operation and Maintenance. The list of the same shall be submitted to the Owner mentioning qualification & experience.

(54) The Contractorwill also be responsible to carry out day to day Maintenance of the rising main inside the STP premises.

(55) The Contractorwill employ minimum staff for operation and maintenance of the Plant as per the list mentioned in the bid document.

(56) The staff of Contractor will always remain in contact with the Junior Engineer, Assistance Engineer/Electrical Supervisor, in charge of the Plant deployed by the Owner and follow their instruction.

(57) Unsatisfactory and inefficient running of the plant and unnecessary and excessive usage of spare, consumable, etc. supported by the reasons which are under control of Contractor will be highly objected. In such cases Design Build Operations Engineer .'s decision will be final and binding to theContractor.

(58) It is required that at least once in every one month a technical expert other than the Monthly Staff of the Contractor will visit the plant and will suggest if required, to improve the efficiency and working of the plant etc. No separate payment will be made for such visits. The visit must be recorded and outcome of the visit/minutes of the meeting should be got signed by Owner authorities without which the visit shall not be considered.

(59) Contractor will comply with all safety rules and regulations as followed by the Owner.

(60) The Owner will not be responsible for any accident /injury to the staff of theContractor. Further the Owner will not provide any insurance or medical facility to the staff ofContractor. The responsibility lies with the Contractor.

(61) All Central/State Government / Semi-Government / Local Body's Rules and Regulations pertaining to this contract shall be followed and observed by the Contractor without any extra cost to the Owner.

(62) No accommodation / guesthouse / transportation facility will be provided by the to theContractor. Operation & maintenance staff will not be allowed any accommodation facility inside the plant premises.

(63) The duration of the O&M shall be 180 months from the date of successful commissioning of the STP. The same can be extended for the further period if the Owner so desires. The Contractorshould employ all the staff within two days of successful commissioning. The Contractor will provide the necessary tools and tackles required for day-to-day maintenance.

(64) The scope of work also includes cleaning of complete plant area including floor, toilet block railing, door, windows, light fixtures and ceiling etc. The entire premises of the plant area shall also be cleaned and maintain by the Contractorregularly.

(65) This work is inclusive of but not limited to operation, maintenance, housekeeping, cleaning, removing sludge by its own carrier arrangement & disposes it off as per Owner's instructions. Preparing data recording, correspondence work to Owner and Government Departments, etc. All this work should be done as per standard practices and by following labour, factory, electrical, STATE PCB, and all other latest updated regulations, Indian standards etc. as applied of Local, State and Central Government of India.

(66) The Contractorwill not employ persons who are, pronounced guilty or charged with indiscipline.

(67) Right is reserved by Owner of suspension, dismiss ion, termination of any officer / staff employed byContractor. He shall have taken prior permission to employ or to terminate his personals.

(68) No watch and ward, safety insurance, security, storage, housing accommodation etc. will be provided by Owner. This will be responsibility ofContractor.

(69) Consumable items like rubber bush, graphite packing, rubber sheet, nut-bolts, material required for cleaning and housekeeping etc. are to be brought by the Contractor.

(70) Monitoring should be done as per guideline given by Design Build Operations Engineer .. Contractor has to maintain all the parameter of effluent within stipulated limit or he will be penalized for not maintaining the parameters given by STATE PCB and Owner. All expenditure incurred for the same like, suite fee, court fee, case fee, or the penalty as decided by Engineer of Owner and penalty charged by STATE PCB will be charged to Contractorand deducted from his bills, S.D etc.

(71) Contractor shall have to test the effluent / influent at his own cost at the plant lab on daily basis. The same be verified by and checked by Owner whenever required. The Contractor shall also have to test the effluent / influent at STATE PCB lab for different parameter on weekly basis at his own cost.

(72) No equipment shall remain ideal or un-attended or damaged for the period of 3 days.

(73) The payment of O & M charges will be made as per the tender conditions. The other terms and condition described in these complete tender documents, wherever applicable shall remain unchanged. In case of any discrepancy the decision of Design Build Operations Engineer .will remain final & binding on theContractor.

(74) During Operation & Maintenance period, Contractor has to supply all the spares, at his cost during preventive, major-minor breakdown, replacement and maintenance work. No extra payment will be made for such maintenance on any ground. The payment for the same will be made strictly as per tender document irrespective of the number of break down / minor, major repairs replacements. During the O & M Contractorwill have to enter annual maintenance agreement with Manufacturers of all major Mechanical Equipments like Centrifuge, Air Blowers, Screens, Decanters etc.

(75) Contractor will have to maintain required Power Factor as per STATE EB rules and regulations. Incase penalty is levied by STATE EB for not maintaining the Power Factor the same will be recovered from the.Contractor

(76) Maintenance of Garden, Lawns, Plants, Bushes, Plantation of new Plants, Lawns etc. and feeding, gardening, cleaning etc. is in the scope of theContractor. No separate payment will be made for the same.

(77) The Contractor during his O&M period will have to follow all the guidelines set by STATE PCB for Operation & Maintenance of STP.

(78) Operation and maintenance of all General facilities and utility services including all other components of work done under this contract.

(79) Operation and maintenance of PLC based automation system and all instruments installed in the STP including all repairs, replacements towards the entire instrumentation works during the O & M period shall be in the scope ofContractor.

(80) Any other services required for smooth running of the scheme.

(81) The Contractorshall also dispose off the sludge, screenings, grit and any other material, as per specifications and to the satisfaction of the Design Build Operations Engineer .. It is to be noted that all costs during the O&M period, excluding the cost of power and chlorine are to be borne by theContractor. The Contractor is to ensure that the following guarantees are maintained during the operation & maintenance period:

(82) for quality of effluent

(83) for consumption of chemicals

(84) for automation

(85) The Contractorshall provide on job training to the Local body staff as per specifications.

(86) At the end of every 2(1/2) year of operation & maintenance period, an assessment of the condition of the plant has to be done by the Owner through third party inspection at Owner's cost and based on that assessment the Contractorshall, at no extra cost to the Owner, repair and re-condition all the mechanical equipment in the concluding year of the O&M contract to a condition so that they are in running condition with regular preventive and recommended maintenance as per manufacturer's recommendations or as per CPHEEO manual.

(87) Variability of through output: If the quantity of treated sewage from the Facility can be increased in the existing system without impacting the annual fixed costs to the Contractor, the Contractor shall comply with such requirements. For a sustained requirement of higher throughout from the Facility, the Contractor may be required to frame and submit a proposal that shall be implemented if mutually acceptable.

(88) Treated Sludge Disposal

(89) The Contractorshall operate the Sewage Treatment Plant such that the sludge produced is of a spreadable consistency and the volume of sludge produced after necessary process is minimum. The sludge generated from the STP shall be disposed of through proper approved means of transport to the Compost yard site as designated by the Owner

(90) Chemical Requirements

(91) All chemicals consumed to operate the Sewage Treatment Plant and other facilities under this contract will be borne by theContractor.

(92)

(A) SCOPE OF WORKS

BUIDCo wishes to receive tender for the interception and diversion of nine main drains to prevent the pollution load of river Ganga at Naugachiya town on itemwise rate basis and construction of sewage treatment plant (STP) of capacity 9 MLD on lumpsum basis. The scope of work under this contract includes:-

i) Laying of rising main of different dia and sewer line. in the mentioned in the proposed works Schedule "B"of price proposal.

ii) Construction of sewage treatment plant of capacity 9 MLD as mentioned in schedule "A" of price proposal.

iii) Construction of all building such as IPS and tapping works mentioned in schedule "B" of price proposal.

iv) Hydraulic testing & commissioning of all the system.

v) Diversion of traffic with necessary sign / caution board, required as per site conditions and as approved by Engineer in charge shall be made by the contractor, for which no extra payment shall be admissible.

vi) The roads (Bituminous/ CC /BOE/Interlocking tiles) cut during executions of works shall have to be Restored after proper back filling and compaction as specified by. This work shall be executed as per direction of Engineer in charge after proper refilling and proper compaction of earth, so that no hindrance/ inconvenience occurs for traffic / public. It will also include obtaining permission from the concerned authority for cutting of the roads.

vii) Providing necessary barricading with necessary ballies and GI sheet as per site requirement and as per direction of Engineer in charge.

viii) Diversion and restoration of utility services such as telephone lines/ electric cables/data cables, water supply lines, sewers, drains, minors, irrigation channels, roads metalled or Kutcha etc. as per site requirement and as per direction of PD/Engineer-in-Charge for which no extra claim shall be admissible.

ix) Operation & Maintenance of works and trial run for a period of ~~6~~ 2 (months).During this period all expenses shall be borne by the contractor and no extra payment shall be admissible for this activity.

x) Defects liability for a period of twenty (12) months after the completion of works i.e. after commissioning and stabilization of works & after 2 months trial run period, any defect occurred in this period shall be rectified by contractor at his own cost. Post commissioning operation & maintenance of sewerage infrastructures should be 15 years including 12 months defect liability period.

xi) Handing over of all the works to local body or as directed. The full responsibility for handing over of all the works will be of the contractor.

xii) Supply of completion drawings after completion and commissioning of work as per requirement of PD/Engineer-in-Charge. No extra payment for this shall be admissible.

xiii) Performance guarantee of all the works executed.

xiv) Permission from the department whom property is to be used, dismantled, disturbed or mandatory permission from various such as for felling of trees from Forest Department.

xv) Any other activity of work as contractor or Engineer in charge may feel necessary to complete the work as per drawings, specification & contract agreement, which are not included in above mentioned elsewhere in the tender document but are necessary for proper completion of work shall be deemed to be incorporated in the scope of work.

xvi) Excavation, cutting of roads, dewatering sub soil water if any, Timbering of trenches, Construction of bedding, Laying and jointing of pipes along with construction of chamber and other appurtenant works including supply of all labor, materials, T&P etc as per terms and conditions of tender documents and permanent reinstatement of roads to the satisfaction of the Engineer.

xvii) Supply of all materials, labor, T&P etc. complete.

xviii) Testing commissioning and maintenance of work as provided in the contract documents.

The contractors are advised to go through the specifications carefully and acquaint themselves with the nature of work, the difficulties likely to be encountered during the execution of work before tendering their rates. They should make sufficient provision in their rates to overcome such difficulties. The rates offered in schedule G should be inclusive of cost of all materials labour, T&P and all taxes whether levied by Central Govt. or State Govt. or local Authorities during currency of the contract etc as no claim or compensation on these accounts shall be entertained.

The contractor should clearly understand that he will have to make his own arrangements for the T&P, equipment's, water for construction & testing and all other accessories that may be required for proper completion of the work.

Contractor has to make arrangement of main power supply connection from the nearest BSEB source to STP premises i/cPoles,cables,HT jointing Kit and all associated works as per Technical specifications and direction of EIC.up to Punping Station including providing of poles, wires, cables etc. at his own cost.

The scope of work also includes diversion of drains, diversion of traffic, display of caution boards, arrangement of caution lights in the night, marking of level pillars etc. reinstatement of water pipe line, cleaning of side drain filled by excavated earth etc, as mentioned elsewhere, for which no extra payment shall be made to the Contractor. The Contractor should make sufficient provision for these works in his rates. The contractor should make all arrangement for the safety of Public and Private Property for convenience of public at the time of execution of work.

The contractors are advised to recheck bearing capacity of soil for their own satisfaction for which no extra payment shall be made

Technical Specifications FOR ELECTRO-MECHANICAL WORKS OF SEWAGE TREATMENT PLANT

All works shall be carried out in accordance with the requirements of:

i. IE Rules

ii. State Electricity Board

iii. Rules and regulations of Local authorities, and

iv. The standards in this specification

The Operator is responsible for applying and obtaining necessary statutory approvals and shall ensure workmanship of good quality and shall assign qualified supervisor / engineers and competent labour who are skilled, careful and experienced in carrying out similar works.

1. General engineering specifications and practice for Electro-mechanical Works.

The following General engineering specifications and practice shall be adopted/adhered to for the Sewage Pumping Station and Sewage treatment plant:

a) Supply, Installation, Testing of the mechanical and electrical equipments, pipes, fittings & other accessories.

b) Adequate measure shall be taken to prevent dry running of the pump. Low level to trip the pump shall be above the top of pump casing. The sump floor shall have slope towards suction pit / channel. Care shall be taken especially for underground sludge sumps to provide suction pit of adequate size for emptying the sump for ease of maintenance.

c) Effective liquid depth of units shall be considered between levels corresponding to lowest level switch and highest level switch. Flooded suction requires that lowest level switch shall not be lower than the elevation of discharge flange of pump.

d) Monorail and chain pulley block (manually operated) shall be provided for all pump houses (both underground and above ground), Blower room, etc. as required of adequate capacity (minimum 1.5 times the weight of the heaviest equipment). Monorail shall be extended outside pumphouse / building to facilitate loading / unloading of equipment directly on vehicle, for which ramp approach shall be given.

e) All pump areas / pedestals shall be provided with kerb walls and suitable arrangement for collection of leakage and connection to the nearest piping/unit, keeping in mind the process requirement, shall be provided. In dry wells necessary drain collection pit and dewatering pump of sufficient capacity and head requirement having auto operation with low and high level switches shall be provided in all pump houses, especially underground pump house for this purpose.

f) All motors shall have running indication.

g) Motors of all pumps and blowers shall be covered with canopy.

h) Mixers in chemical solution tanks (without baffle) shall be located off-centre to avoid vortex.

i) All chemical dosing pumps shall be provided with pulsation dampeners. Metering pumps shall have bypass with valves and external pressure safety valves.

j) Common delivery header and suction header of pumps (and blowers) shall be provided with a blind flange on one end.

k) Aeration blowers shall be located inside the blower room with necessary acoustic hoods complying with statutory and safety norms.

l) Flow measurement shall be provided at all chemical dosing lines as well as Air Blower discharge lines.

m) Knife Gate valves shall be provided for sludge application.

n) Flushing connections shall be provided for all sludge handling units and sludge lines.

o) The clear distance between adjacent pump / blower pedestal shall be minimum 1000mm. The clear distance from pedestal to internal face of walls shall not be less than 1500mm. The clear distance from pedestal to internal face of walls on motor side of the pumps shall not be less than 2000mm.

p) Minimum clearance of 500mm shall be provided around pumps, blowers, equipment pedestal for paving etc.

q) Safety shower and eye wash facility, service water connection shall be provided near chemical handling areas, especially chlorination and polyelectrolyte area.

r) All instrument indication facility shall be readable from grade.

s) All below grade valves (including sludge outlets of clarifiers and thickeners) shall be operable from grade by providing extended spindle and handwheel arrangement.

t) Epoxy lining in polyelectrolyte tanks and other units as required shall be provided. Complete wetted surface including free board and top of walls shall be lined.

u) Large tanks shall be able to be segregated for manual desludging, whenever required along with drain piping.

v) Operating platforms shall be provided for operation of any equipment or valve causing inconvenience to operate from ground/floor level. For operating height above 1.5m operating platform shall be provided. Platform shall have minimum width of 900mm with galvanized grating / chequered plate.

w) Main control room housing PLC/SCADA shall be located in the first floor such that entire STP is preferably visible to the operator through glazed windows. The control room layout shall be planned after taking into consideration the space requirement of various PLC/SCADA panels, HMI, etc. It shall be housed in administration/office building. It shall be properly air conditioned and shall be provided with false ceiling. Control room shall be aesthetically appealing.

x) All the sludge withdrawal valves of Primary Clarifier, Thickener and Digester shall be electrical actuator operated with auxiliary open/close limit switches and position transmitter for open/close position feedback.

y) H.T. & L.T. Room for electric Sub-station to serve the proposed Sewage pumping station and Sewage treatment plant.

z) Laboratory, Main Control Room housing PLC/SCDA system alongwith necessary office furniture.

aa) Water distribution network for drinking purpose/service water within the plant premises and sewage disposal

bb) All interconnecting pipes, channels, valves, fixtures, appurtenances.

cc) Setting up of the testing arrangement as per requirement.Getting of successful test results & obtaining approval from authorized Lab / Agency of the Pollution Control Board and relevant Authorities.

dd) Operation Maintenance of the entire system including consumables for the specified period. Supply, erection, testing, commissioning of various mechanical, electrical & instrumentation equipment required for the smooth working of the Sewage treatment plant, including the 10 years O & M during guarantee period.

1.1 General Mechanical Equipments

Design, supply, erection, commissioning and testing of all mechanical equipments based on chosen technology of Sewage treatment process, shall generally comprise of:

a) Bar Screen with frame and scrapper

b) CI Sluice Gate

c) Air blowers with motor and related accessories.

d) Air distribution assembly.

e) Mech. arrangements for clarifier. if required

f) Sludge return pumps with motor and related accessories.

g) Sludge Loading pumps with motor and related accessories.

h) Agitator for equalization tank, if required.

i) Sludge dewatering System-Filter press/Centrifuge

j) Drainage sump pumps

k) Loading/Unloading System for Pump House

l) Flow measuring System

m) Level measuring System for well and Tank.

n) All Pipe-works and valves

o) Chlorine dosing pump/UV Disinfaction System.

p) DG Set for Power back-up.

q) Fire fighting system.

r) Ventilation inside the Pump & Control room, as per requirement.

s) Any other equipment required.

1.2 General Electrical Equipments

Design, supply, erection, commissioning and testing of all Electrical equipments based on chosen technology of Sewage treatment process, shall generally comprise of:

a) HT/LT Transformer

b) Electric motors for all equipments as required.

c) Motor control center completes with all internal wiring and accessories.

d) Electrical cables from M.C.C panel to all electric motors and units.

e) Electric earthing stations as per I.E.E. rules.

f) Cable Trench, Cable Tray as per I.E.E. rules.

g) Gland and Lugs as per I.E.E. rules.

h) All internal lighting & exhaust system etc. for the Pump & Control Room.

1.3 Technical specifications of Mechanical Works for the proposed Sewage treatment plant:

1.3.1 **Screening System.**

— All Sewage Pumping Stations shall be provided with Mechanical screens as working and Manual Screen as Standby with conveyor system.

— The screens shall be made with welded stainless steel (AISI410) frame.

— Bye bass arrangement shall be provided on the upstream side, to avoid overflow of the screen channel in case of sudden power failure.

— Drainage facility shall also be provided in the individual screen channels to empty these channels for maintenance purposes.

— Individual screen channel should be designed to provide a velocity of min. 0.6 m/sec at average

design flow.

- The effective area of opening of the screen should be such as to produce a velocity through the screen opening not exceeding 0.9 m/sec. at maximum expected flow.
- The top of the screen shall be at least 500 mm above the expected highest flow level.

1.3.2 Sluice Gate

- The gates shall be as per IS:13349/AWWA C 501 or relevant BS/DIN/ISO at their Latest revision.
- The gates shall be CI with rising type spindles.
- The unbalanced head shall never be more than 15 m.
- The gates shall be manually/Electrically operated.
- The gates shall be installed primarily in the screen chambers for isolation of flow for maintenance purposes.

1.3.3 Submersible Motor Sewage Pump

1. General

The pump shall be vertical, submersible, non-clog, single stage, bottom suction, monoblock type driven by single speed submersible motor suitable for pumping all kinds of sewage / sludge / storm water containing plastics and fibrous materials. The pumps must have fitted with in-built cutting and tearing system for foreign matters. The speed of the pump should not be more than 1450 r.p.m. The motor output power must have at least 15% margin over pump input power at duty point and the motor will never be overloaded throughout the entire pump operating range as shown in the performance curve. The pump performance must be stable from zero discharge to run out condition. The design, manufacture and performance of the submersible pump-motor sets shall comply with the latest applicable Indian / International Standards. In particular, the equipment must conform to the latest revision of applicable specification. The pump shall be capable of developing the required total dynamic head at rated capacity and will be suitable for parallel and continuous operation. The head-capacity curve of the pump shall be continuously rising towards the shut-off with highest head at shut-off. The impeller of the pump shall preferably be of non-overloading type. The pump shall be designed to be protected against reverse direction of rotation due to the sewerage returning through the pump. The set rotor assembly weight and unbalanced hydraulic thrust of the impeller shall be carried out by the thrust bearings provided in pump assembly. The pump shall operate trouble free, smooth and without any undue noise and vibrations. The magnitude of peak-to-peak vibration at shop and at site installation will be limited to 75 microns and 50 microns respectively at the bearing housing.
The pump installation design should be such as to facilitate automatic installation and removal of pumps without having entry into the sewage pit. Profile gasket should be provided in automatic coupling system so as to avoid metal-to-metal contact between pump and delivery pipe bend to ensure leak proof joint.

2. Constructional Features

Casing

The pump casing, made of cast iron shall be hydrostatically tested at 1.5 times the shut-off head with maximum impeller size. The pump casing shall be of robust construction and the liquid passage in the casing shall be finished smooth.

Impeller

The non-clog, semi open / vortex type impeller will be both statically and dynamically balanced and will be keyed and positively held on the motor shaft. The impeller will also be secured against damages, if the direction of rotation should reverse due to liquid flowing backward through the pump. The impeller shall be capable of handling soft solids of minimum diameter 100 mm. The leading edge of the vanes shall be rounded and cut back to prevent rags, stringy materials etc. from impinging on the impeller vanes.

Shaft

The shaft, made of stainless steel shall be finished to close tolerance at the impeller and bearing diameters. The impeller shall firmly be secured to the shaft by key and / or nuts. The size of the

shaft shall be calculated on the basis of maximum combined stresses. While designing the shaft the critical speed of the shaft must be taken into account which shall be at least 20% above / below the operating speed. The rotor shall be dynamically balanced to avoid any vibration during operation.

Seal

The pump shall have two mechanical seals in tandem arrangement. The lower mechanical seal shall have SiC / SiC face combination. Upper mechanical seal shall have with Carbon / TC face combination.

Bearing

Maintenance free antifriction deep grooved, permanently grease filled ball / roller bearings should be provided and this should take care of axial and radial thrust at any point of operation.

Motor

The motor should be dry, squirrel cage type, suitable for 3 ph, 415 ± 10% volt, 50 Hz supply, designed, manufactured and tested conforming to IS: 325. The motor should be rated for continuous duty with IP68 protection and class 'F' insulation or better. However, the motor frame size shall be liberally designed to restrict the temperature rise as per class 'B' insulation.

All squirrel cage induction motors shall be provided with electrolytic grade copper winding for stator and the rotor of the motor shall be of copper bars only.

3. Internal Protection Features for Pump sets (above 15 KW motor)

The pump sets shall at the minimum be provided with the following internal protections. The leads of all the protecting sensors shall be brought out from the motor with separate control cables.

Winding Temperature

The motors shall be provided with 3 sets of PT 100 type thermostats embedded in the winding to protect it from getting overheated.

Bearing Temperature

For detection of mechanical faults, both bearings, at drive end and non-drive end shall be provided with PT 100 type temperature sensors for monitoring the bearing temperature, protection and annunciation.

Moisture Sensors

The motors shall be provided with a resistance type sensor to sense entry of any moisture in the motor chamber. It shall operate on 230 V AC supply.

Monitoring Seal Leakage Chamber

The pump set shall be provided with a float switch type sensor assembled in the seal leakage collection chamber. In the event of any leakage this sensor will give the tripping signal. The contacts of the float switch shall be rated for operation on 230 V 6A AC.

4. Material of Construction

Casing
Impeller
Shaft
Motor housing
Stator/Rotor core
Stator/Rotor winding
Fastners
Auto coupling system
Lifting chain, Guide pipe :

5. Scope of Supply

The scope of supply will include Submersible Pump set along with Automatic coupling, Delivery bend and Cable, Guide pipe & chain of required length.

6. Painting

The pump set shall be painted with zinc rich epoxy primer plus two coats of epoxy paint. The paint shall be spray applied and dried in a painting booth to avoid ingress of foreign particles especially when the painted surface is not completely dry.

7. Inspection & Testing at Manufacturer's Works

The manufacturer will submit their QAP for Engineer's approval including the following inspections and testings which will be carried out at the manufacturer's works.

8. Hydrostatic Test

The pump casing will be hydrostatically tested for any leakage, with water at a pressure 1.5 times of closed valve pressure with maximum impeller size or 2.0 times of pump duty point pressure whichever is higher. Unless otherwise stated the minimum duration of testing will be 30 minutes.

9. Statical Balancing

All major rotating components must be statically balanced individually.

10. Dynamic Balancing

In addition to static balancing of individual component the whole rotor assembly of pump must be dynamically balanced at rated operational speed.

11. Performance Test

Each assembled pump shall be shop tested by the manufacturer to determine the following characteristics as furnished in the characteristics curve.

i) Capacity Vs. Total Dynamic Head Curve

ii) Capacity Vs. Brake Horse Power (KW) curve

iii) Capacity Vs. Efficiency (%) curve

iv) Capacity Vs. NPSHR curve

And also recording of

v) Vibration level

vi) Bearing Temperature

The above tests for each pump for its full operating range at rated speed shall be conducted in accordance with the latest revision of IS/BS/DIN/ISO specifications and/or Hydraulic Institute Standards USA.

During pump testing, reading to the extent possible, shall be taken correspond to its full working range from its closed valve condition to 30% increase of the rated output or corresponding to the output at its minimum head specified, whichever is higher.

Each pump performance shall be documented by obtaining concurrent readings showing motor voltage and amperage, pump suction head, pump discharge head, pump discharge etc. Such readings shall be documented for at least seven pumping conditions including one at the shut-off head and each power load shall be checked for proper current balance.

The curves produced from the above readings shall be used to determine the capability of pump sets to meet the guaranteed performance at site.

Bearing temperatures shall be determined by PT 100 or equivalent type temperature detector. A running time of at least 30 minutes shall be maintained for this test at shut off head if sufficient water is not available for a complete test.

After the test runs have been performed to the satisfaction of the Client or his representative that the pumping equipment complies with the stipulated specifications the Client shall be provided with the Manufacturer's Test Certificates.

All instruments and equipment required for such test shall be provided by the manufacturer and the instruments shall be calibrated and certified by an approved independent testing authority not more than 15 days prior to the test in which they will be used.

In the event of any pump failing to meet the specified test requirements, it shall be modified and retested until the requirements are attained.

12. Non-Destructive Tests

Physical and Chemical tests of the major components of each pump must be done. These tests shall be conducted in accordance with relevant IS/BS/DIN/ISO standard. Prior to testing the tests and major components' identifications along with the actual standard to be followed, shall be submitted for Client's approval and only those, which will pass the tests successfully, shall be used for the manufacture of end product. All material test certificates to be submitted before machining operation to the Client for his approval and finally these 'Approved' test certificates will be

produced during pump performance testing.

13. Visual Inspection

Pumps shall be offered for visual inspection to the Client before despatch. The pump assembly/ any component shall not be painted before inspection.
Testing At Site
All pump sets shall be tested at site in the presence of manufacturer's expert. The QH parameters can be measured, if space permits.

1.3.4 Monorail Crane With Chain Pulley Block

- Monorail Crane shall be used for lifting of Submersible motor pumps as and when required for maintenance.
- Monorail mounted hand operated chain pulley block shall be as per the requirement of BS:3243/ Equivalent.
- It shall be of required capacity having adequate chain length.
- The load chain shall conform to BS:2902/Equivalent.
- Guide shall be provided for effective guidance to the load chain and a stripper for effective disengagement of chain from wheel.

1.3.5 Pipe Works.

- Pipes carrying sewage shall be of ductile iron with flange or spigot and socket joints according to individual circumstances.
- Pump delivery line flow velocity shall be set at < 2.1 m/sec and individual delivery pipe & common header diameters shall be selected accordingly.
- All pipe work and fittings etc. shall conform to the appropriate Indian Standards and shall be to a class in excess of the maximum pressure they shall attain in service including any surge pressure and shall be supplied by an approved manufacturer. All pipelines shall be tested at 1.5 times the design working pressure.
- The pipe works shall include all pipes and fittings for connection to the rising main upto the stipulated length outside the pump house building. The pipes and fittings shall be as per latest revision of IS:1536/IS:1537/IS:1538/BS:4622/ IS 8329/ IS 9523 / Equivalent and must be suitable to withstand the pressure tested to at least double the close valve pressure.
- The diameter and length of the pipes shall be determined from the specified velocity of the sewage water and size of the pump house. The delivery pipe of the pump shall be connected with the pump through enlarger immediately after the pump so as to restrict the velocity of sewage water in the pipe line at delivery side.
- Each delivery pipe line shall include one puddle collar at the exit of the wet well.
- All the pipe lines shall be protected with anticorrosive paints of required quality to suit the site climatic condition.
- Necessary rubber insertion of suitable thickness shall be provided at all the flanged joints complete with supply and erection of necessary number of bolts, nuts, washers of suitable sizes.

1.3.6 Valves

- Each Sewage pump shall be fitted with a reflux valve and a sluice valve on the delivery side of the pump.
- All the sluice valves shall be as per IS:14846/BS 5150/DIN 3352 at their latest revision and rising spindle type, flat face, bolted bonnet with solid wedge disc.
- The valves above and including 400 DN shall be provided with spur/bevel gear arrangement for operation and be fitted with by-pass arrangement.
- The pressure rating of the valve shall be as per the Design working pressure. Wherever specifically

mentioned the valve shall be fitted with extended spindle, head stock along with hand wheel for easy operation from the operating platform.

- The reflux valve ensures that backflow, from the rising main through the pump, does not occur when the pump is not operating. The Reflux valves shall be of Double flanged with hinged single/multi swinging disc complete with bypass arrangements. The reflux valve shall be of flat face bolted cover and shall be fitted with renewable body and disc seat. The reflux valve shall be as per IS:5312/BS:5153/ISO 2531 at their latest revision. The pressure rating of the valve shall be as per Design working pressure.
- The valves on the discharge pipe work are to be mounted in a separate Valve Chamber. This allows the operator in operation and maintenance of valves easier to carry out. The separate valve pit also allows a suitable accessible point for the attachment of pressure gauges to check the performance of the pumps.
- The Air Release Valve shall be Single air valve (Large Orifice) confirming to IS-14845/2000 for automatically releasing/admitting air that may accumulate under pressure in a section of pipe line at the time of initial charging or draining of main.
- The pressure rating of the valve shall be as per Design working pressure and end connections shall be flanged as per IS specifications.The Air release valve shall be fitted with isolating sluice valve of same size.

1.3.7 *Air Blower*

Air blowers shall be either of positive displacement or centrifugal with pressure vessel type complete with motor, baseplate, inlet filter, intake silencer and off-load starting system outlet silencer, anti-vibration damper, flexible coupling, filter restriction indicator, non-return valve, pressure relief valve, V-belt system or direct drive coupling. The casing rotor shall be of cast iron construction. Bearings and gears shall be grease lubricated. Motor speed shall be 1500 rpm.
The capacity of the air blower shall be of required airflow rate and pressureto maintain required level of dissolved oxygen in the aeration tanks in operation.

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1.3.8 *Chemical Dosing*

*C*hemical dosing pumps shall be complete with plastic suction and delivery piping, solution tank, mixing tank and feed arrangement. Pumps shall be complete with motor control center, cabling and connection.

1.3.9 Diesel generating set

The Diesel Generating set shall be of A.C type with totally enclosed air cooled multi cylinder, AMF Panel,alternator, 3 Phase, 415V, 50 Hz 0.8 p. f. for developing suitable BHP at 1500 rpm.The DG shall be designed with 10% overload with standard accessories, self excited self regulated, screen protected alternator with static excitation system running at 1500 RPM as per IS 4722-1968 with voltage regulation +/- 5 % .
Both the engine and alternator shall be directly coupled on a common fabricated steel base plate with anti vibrating pad with control panel comprising of standard meters, switchgears, indicators connected with suitable wires/cables. The complete set shall be enclosed in acoustic enclosure made of 18 SWG CRCA Sheet, sound absorbing material, Rockwool covered from inside with ¾ mm holes perforated sheet to restrict sound level upto 75 dB at 1.0 m
The engine shall be supplied with first filling of oil, diesel etc. obtaining necessary approval from Electrical Inspector as per specification.

1.3.10 Wheel Barrow

Wheel barrows of Polyethylene moulded construction shall be supplied for carting up screenings. The wheel barrows shall have rubber tyred wheels. The moulded units shall be bought out items from ISO : 9000 certified manufactures.

1.3.11 Screenings Container

Portable galvanized steel container shall be provided to store the screenings until the time of pick up. The container shall have a capacity of approximate 2.5 m3 and shall be of a convenient height to permit the discharge of screenings manually. The container shall have hinged covers and its design shall permit their being lifted by an overhead hoist or packer truck. The container shall have four wheels of about 200 mm diameter and two of which shall be swivel castors. The maximum height of a container including wheels shall not be more than 660 mm. The sides shall be fabricated of 12 gauge H.T. steel and the bottom of the container shall be of 5 mm plate steel. The container shall be reinforced with 50 x 50 x 6 angle.

1.3.12 Exhaust Fan

Exhaust fans shall be provided at the places specifically mentioned for ventilation purpose. The cast aluminum alloy blades shall have high efficiency aerofoil section. Blades shall be directly mounted on motor shaft, dynamically balanced and shall conform to IS:2312. The means provided for securing the fan mounting or fan casing to the wall shall be such as to provide a secure fixing without damage to the fan or wall.
The drive motors shall be TEFC, squirrel cage, induction type suitable for 240 Volts + 10%, 1 phase OR 415 Volts + 10%, 3 phase, 50 Hz AC supply with IP54 enclosure and class B insulation.
Suitable designed guards shall be provided at the inlet and outlet side to prevent accidental contact. No inflammable material shall be used in the construction of fan. Moulded parts, if used, shall be of such materials as to withstand the maximum temperature attained in the adjacent component parts.
The fan shall have protective insulation may be of all insulated construction or have either double insulation or reinforced insulation. Each fan should be provided with a 10 sq.mm mesh bird screen. The sheet used for the cowl shall be 14 gauge.
The finish will be stove enameled glossy paint/epoxy paint with specially pre-treated components to enhance corrosion resistance.
The number and size of exhaust fan will be determined taking into account 12 complete changes of air per hour to the service area.

1.4 Technical specifications of Electrical Works for the proposed Sewage treatment plant:

1.4.1 Scope
This specification is intended to cover complete installation, testing and commissioning of electrical equipments i.e. motor control centres, power control centres, control panels, switch gears, motors, push button starters, transformers, etc.

1.4.2 Code and standards
The installation, testing and commissioning of all electrical equipments shall comply with all currently applicable states, regulations, fire insurance and safety codes in the locality where the work will be carried out. Nothing in this specification shall be constructed to relieve operator of his responsibility.

Unless otherwise specified, the work, material and accessories shall conform to the latest applicable Indian British of IEC standard. All items of switch starter panel shall confirm to their relevant specifications as under or its latest revision.

IS: 4237: 1982 General requirements of switch gear and control gear voltage not exceeding 1000 volts.
IS: 2959 : 1982 contactors
IS: 4064 (Part I): Isolators
IS: 3842 (Part- IV) Overload Relay
IS: 8544 Motor Starters
IS: 10118 Code of practice for installation and maintenance of motor starter.
IS: 1248 Indicating installments
IS: 2705 Current transformers
IS: 2147 Degree of protection for starters.
Good workmanship shall be in accordance with best engineering practices to ensure satisfactory performance and service life.

1.4.3 Detailed requirement of installation

1.4.3.1 Switch gear, Control panel, etc.

a) All alignment, leveling, grouting, anchoring, adjustments shall be carried out in accordance with manufacturer's instructions and or as directed by the Owner.

b) All modules shall be taken out and shall be cleaned preferably with vacuum cleaner.

c) All connections of fixing of equipments in switch gear control panels etc. shall be completed, checked and adjusted to ensure safety and satisfactory operation of the equipment.

d) In some cases, minor modifications may have to be carried out at site in the wiring and mounting of the equipment to meet the requirements of the desired control scheme and the Contractor shall have to do the same.

1.4.3.2 Motors

a) The installation of motors shall be carried out in accordance with manufacturer's instructions and / or as directed by the Owner.

b) Checking and cleaning of bearings and charging / filling of lubricants whatever necessary.

c) Cleaning of core and winding, varnishing and drying but the windings and measurements of air gap for motor assembly at site if demanded.

d) Motors shall be run on un-coupled condition for few hours before coupling them with the drive equipment.

e) Motors shall be coupled with drive, adjusted and shall be tested on load.

1.4.3.3 Miscellaneous Items

a) The Bidder shall install miscellaneous items such as motors starters, local start / stop push button starters etc.

b) These equipments will be generally wall, column or stand mounting. The exact location will be as shown in the final drawing.

c) All supports or brackets needed for installation shall be fabricated and painted by the Bidder.

d) All welding, cutting, chipping and grinding as and when necessary shall be carried out by the Bidder.

1.4.3.4 Cable termination

Cable Termination shall include the following

a) Making necessary holes in bottom / top plates for fixing cable gland / box.

b) Fixing cable gland / box, connecting armour clamp to cable armour.

c) Dressing cable, pouring, compound etc. wherever necessary to make termination complete.

d) Putting cable lugs, crimping them on to cores of cable, taping bare conductors upto lugs, wherever necessary.

e) Termination to equipment terminals.

f) Supply and fixing of cable and core identification ferrules.

Wherever Owner has not provided MS plates for fixing cable tray supports, Bidder shall install approved concrete fasteners for fixing cable tray supports.

1.4.3.5 Inspection

a) After completion of the erection / installation, each equipment shall be thoroughly inspected in presence of Owner for correctness and completeness of installation.

b) A check list may be furnished by the Owner wherein all details to be checked and necessary instructions shall be listed. The inspection and checking shall strictly follow the check list.

c) On completion of the inspection two (2) copies of the check list duly filled in shall be jointly signed by Contractor and the Owner, such endorsement, however, shall not relieve the Contractor of his obligation under the contract.

1.4.3.6 Testing and commissioning

a) After completion of erection work tests shall be conducted by the Contractor on each piece of the equipment as per list be supplied by the Owner or his authorized representative.

b) The Bidder shall provide all tools, instruments; materials labour supervisory personnel for carrying out tests on the equipment and materials under his scope of work.

c) The Bidder shall record the test results on approved Proforma and furnish four (4) copies of the results to the Owner for his approval within a week form the date of test completed.

d) Before commissioning of the equipment, the Contractor shall set the relays to their recommended values.

e) On successful inspection and testing, the equipment shall be commissioned and put on trial run along with other equipment in a manner mutually agreed upon.

1.4.3.7 Rectification

The Bidder shall carry out all rectifications, repairs or adjustment work found necessary during testing, commissioning and trial run.

Unless otherwise specified the work, material and accessories shall conform to the latest applicable Indian, British of IEC Standards, some of which are listed below:

IS 3043 Code of Practice for earthing.

1.4.3.8 Installation of cables

1. The Bidder's scope of work includes, unloading, laying, fixing, jointing, bending and terminating of cables.Contractor shall also supply all the necessary hard-wares for jointing and terminating of cables. Cables shall be laid directly buried in earth, on cable trays and support in conduits and ducts or bare on walls, ceiling etc as shown in the approved Drawings.

2. All cable work and the allied apparatus shall be designed and arranged to reduce the risk of fire and any damage that may cause in the event of fire. Wherever cables pass through any floor or wall opening suitable bushes shall be supplied. If required by the Design Build Operations Engineer, the bushes shall be sealed using fire resisting materials to prevent fire spreading.

3. Standard cable installation tools shall be utilized for cable pulling. Maximum pull tension shall not exceed manufacturers recommended value. Cable grips, reels or pulleys used shall be properly lubricated. The lubricant shall not injure the overall covering and shall not set up undesirable conditions of electrostatic stress. Cables pulling shall permit performance of collateral work without obstruction.

4. Sharp bending and kinking of cables shall be avoided. The bending radius for various types of cables shall be more than those specified by manufacturer.

5. Power and control cables shall be laid in separate cable trays. The order of laying of various cable in trenches and overload trays shall be as specified below:

6. Cables of highest system voltage at the top most tier with second highest voltage on the second tier from top, third highest on the third tier from top etc. with control instrumentation and other service cables in bottom most cable tier.

7. Where groups of HV and LV and control cables are to be laid along the same route, suitable barriers to segregate them physically shall be employed.

8. Where cables cross roads and water, oil gas or sewage pipes the cables shall be laid in reinforced spun concrete pipes of 15 mm minimum diameter, also 50% space shall be kept as space for future, if more than one cable is to be laid through pipe. For road crossing the pipe for the cable shall be buried at not less than one metre depth. Cable less than 15 mm unless otherwise approved by the Engineer. Cable shall be protected at all times from mechanical injury and from absorbing moisture.

9. Some extra length shall be kept in each cable run at a suitable point to enable one or two straight through joints to be made at a later date, if any fault occurs.

10. To facilitate visual tracing, cables in trays shall be laid only in single layers where design, permits. Cables shall be laid in proper sequence so as to avoid unnecessary crossing of other cables upon entering or leaving a run of tray. Cable splices shall not be permitted.

11. Cable jointing shall be in accordance with relevant Indian Standards Codes of Practice and Manufacturer's special instructions. Materials and tools required for cable jointing work shall be supplied by Concessionaire. Cable shall be firmly clamped on either sides of a straight joint at not more than 300 mm away from the joints. Identification tags shall be provided at each joint and at all cable terminations. Single core cable joints shall be marked so that phase identify at each joint can be determined easily. The joints shall be located at most suitable places. When two or more cables are laid together, joints shall be arranged to be staggered by about three meters. Before jointing insulation resistance of both sections of cables to be jointed shall be checked.

12. Bidder shall install and connect the power, control and heater supply cables, for motors.Contractor shall be responsible for correct phasing of the motor power connections and shall interchange connections at the motor terminal box if necessary after each motor is test run.

13. Metal sheath and armour of the cable shall be bonded to the earthing system of the station.

14. Cable clamps shall be minimum 3 mm thick and 25 mm wide galvanized MS flat spaced at every 1.0 m interval.

1.4.3.9 Cable trays, accessories and tray supports

Cable trays shall either be run in concrete trenches or overload supported from building steel, floor slab etc.

Cables shall be clamped to the cable trays in both horizontal runs and vertical runs by suitable site fabricated clamps.

Cable trays supporting system shall be adequately designed so as to keep maximum deflection within permissible limit.

1.4.3.10 Conduits and pipes

Bidder shall supply and install conduits, pipes as specified and as shown in drawings all accessories / fittings required for making installation complete shall be supplied by Contractor.

Conduits and pipes shall be of GI and of heavy duty type.

Flexible metallic conduits shall be used for termination of connections to equipments to be disconnected at periodic intervals.

Conduits or pipes shall run along walls, floors and ceilings, on steel supports, embedded in soil, floor, wall or foundation, in accordance with relevant layout drawings. Under ground portions of conduit installation to be embedded in the foundation or structural concrete shall be installed in close co-ordination with collateral work. Exposed conduit shall be neatly run and evenly spaced.

Exposed conduit shall be adequately supported by racks, clamps, straps or by other approved means. These fittings shall be of same material as conduits.

Each conduit run shall be marked with its designation as indicated on the drawings. Identification shall be made where possible by means of brass ribbon. So located that each run of conduit is readily identified at each end.

When one or more cables are drawn through a conduit, cables shall fill not more than 50% of the internal cross sectional area of the conduit.

Entire system of conduit after installation shall be tested for mechanical and electrical continuity throughout

and permanently connected to earth by means of special approved type earthing clamp efficient fastened to the conduit.

For jointing purpose,Contractor shall have available at site, dies for threading pipe or conduit. All such threaded ends shall be reamed after treading and anti-corrosive paint applied.

1.4.3.11 Switch gear control panel / desks

Base of outdoor type units shall be sealed in an approved manner to MS channel concrete to prevent ingress of moisture.

Bidder shall take utmost care in handling delicate equipments and mechanism like instruments, relays, dragging shall be avoided as far as possible. Proper pies shall be provided underneath when dragging for short distance. Wherever the instruments and relays are supplied separately, they shall be mounted only after the associated control panels / desks have been erected and aligned. Any damage to relays and instruments shall be immediately reported to the Owner.

Contractor shall also make all necessary adjustments as specified by the manufacturer for proper functioning of the equipment. The setting of relays shall be carried out.

Outgoing feeders and incoming feeders of cable or bus duct shall be connected at the switch gear panel and as explained in the installation procedures of cables and bus ducts.

After installation of all power and control wiring, Contractor shall carry out operating tests, manufacturer's installation tests. Meager tests for insulation, polarity checks on the instrument transformers.

The Contractor shall also carry out the drying of equipment in case of low insulation resistance.

1.4.3.12 Transformer

Sleepers shall be provided when unloading on bare ground. After placing on foundation alignment, leveling, etc. shall be carried out in neat workmanlike manner. Dehydration of silica gel rather shall be carried out.

For the power / control cables projecting above the ground the termination of cable box / marshalling box / shall be run in GI conduits of suitable cross section. Ends shall be sealed with bitumen compound.

The cable end box of the transformer of detachable type shall be supported properly enabling the transformer to be taken out for repair without disturbing the cables.

1.5 Process Instrumentation, Control. and SCADA System

Process Instrumentation, Control. and SCADA System. The instrumentation shall include online measurement of influent and effluent parameters for sewage, sludge and sludge gas. Process Instrumentation, Control. and SCADA System shall include continuous monitoring the process parameters, process flow, tank level and other equipment protection devices. These measurements shall be connected to a network of Programmable Logic Control (PLC) based unit process controllers that shall generate pre-programmed monitoring and control actions for process, equipment and other control devices. A Supervisory Control and Data Acquisition (SCADA) system, networked to the PLC unit process controllers shall acquire and display process parameters, process flow, tank level, etc., monitor and issue remote control actions for maintaining process control. The SCADA system shall also achieve pre-determined process parameters and originate custom performance reports for management reporting.

(B) GENERAL SPECIFICATIONS

1.0 MATERIALS:

1.1 IST CLASS BRICKS: (M-100)

Bricks shall have a uniform deep cherry red or copper colour, shall be thoroughly burnt but not over burnt, and regular in shape. Their edges must be Straight Square and the two bricks must emit a clear ringing sound on being struck with each other. They must be free from cracks, chips, flows and stones or lumps of any kind. The bricks shall comply with the I.S. – 1077.

1.2 STONE BALLAST:

Stone ballast shall consist of crushed stone and shall be hard, strong, dense, durable, clean, of proper gradation and free from weather effect. It shall be generally cubical in shape. As far as possible, soft, thin, flaky or elongated or laminated pieces shall be avoided. For RCC work it should not contain any materials which might affect the reinforcement. The grading and test requirements should comply with the I.S. – 383.

1.3 TIMBER:

Timber to be used in shuttering works shall be from the heart of a sound tree of natural growth, the sapwood being entirely removed. It shall be uniform in substance, straight in fiber, free from large, loose and dead knots, flaws, shakes, decay, rot, fungi and insect attacks and from any other damages of harmful nature which will affect the strength, durability, appearance or its usefulness for the purpose for which it is required. The color should be uniform as far as possible. The other requirements of timber shall comply with the PWD specification No. 1.5 (material) part-I.

1.4 STEEL:

The steel for RCC shall be high yield strength deformed bars of Grade Fe 500 conforming to IS -1786 - 1985 the placement of reinforcement shall be as per IS 456-2000.

1.5 PORTLAND CEMENT:

The cement shall be Ordinary Portland shall be 43 grade cement conforming to I.S:8112 with its latest amendments.

1.6 SAND:

The sand shall consist of natural sand, crushed stone or crushed gravel or a combination of any of these. it should be hard, durable, clean and free from adherent coating and organic matter and shall not

contain any clay. The fine sand which shall be used for plaster and brick work shall have F.M. as 1.25 and the coarse sand for cement plaster/ brick work shall have F.M. as 2.0 and for cement concrete 2.9 to 3.2. All materials which shall be brought and used at site shall confirm to I.S. - 383.

1.7 SUNDRY MATERIALS:

Certain other materials not particularly mentioned or described herein may be required for the works and these if not specifically mentioned shall comply with the description set out in standard specifications of PWD, LSGED (now BUIDCo) or IS for the respective materials and these specifications in so far as they are applicable shall be deemed to be incorporated in this contact.

1.8 Bricks

Bricks used for the construction of brick masonry shall be hard, rectangular in shape and size and well burnt of uniform deep red, cherry or copper colour and shall confirm to IS: 1077-1986.

The bricks shall be brought from approved brick kilns. The bricks shall be free from cracks, chippings, flaws, stones or lumps of any kind. The bricks shall not show any signs of efflorescence and shall be homogeneous in texture.

They shall emit a clear metallic ringing sound on being struck and shall have a minimum compressive strength of 10.5 N/mm2 equivalent to 105 kg/cm².

They shall not absorb more than 20% of its dry weight when soaked in cold water for 24 hours or otherwise specified in the Indian Standard Specification.

1.9 Mortar

The proportion of the cement mortar used for the masonry work shall be as specified on the various drawings for different places/types of construction, specifications for each part of the work.

For cement mortar fresh Portland cement of standard specifications shall be used. Sand shall be sharp, clean and free from organic and foreign matters. For rich mortar coarse or medium sand shall be used and for weak mortar local fine sand may be used. Materials of mortar shall be measured to have the required proportion with measuring box and first mixed dry to have a uniform colour in a clean masonry platform and then mixed by adding clean water slowly and gradually to have workable consistency and mixed thoroughly by turning at least three times. Fresh mixed mortar shall be used, old and stale mortar shall not be used and mortar for an hour work only shall be mixed with water so that the mortar may be used before setting starts.

Coarse sand is mixed with the required quantity of cement for the preparation of the mortar. Mortar shall be prepared in accordance with **IS: 2250-1981.** The sand used for the masonry mortar shall meet the requirements as specified in **IS: 2116-1980.** For masonry mortars, sand and cement of required proportions are mixed in small quantities in a dry state first and then water is added to make the mortar of required consistency suitable for the type of work for which it is required as directed by the PD/Engineer-in-Charge. No left over mortar shall be used and therefore only that much quantity of mortar that can be consumed within 30 minutes shall be mixed in batches.

1.9.1 Sand for Brick Masonry

Table 1.9.1 : Grading of sand for use in Masonry Mortar

IS Sieve Designation	Percentage passing by mass
4.75 mm	100
2.36 mm	90 to 100
1.18 mm	70 to 100
600 micron	40 to 100
300 micron	5 to 70
150 micron	0 to 15

2.0 WATER SUPPLY FOR WORK AND DRINKING PURPOSE AND FACILITIES TO LABOUR:

The contractor shall make his own arrangement in regard to water required for the execution and tests of the works and shall also arrange for a supply of drinking water to his employees and labour.

He shall bear all charges in this connection and include in his rates a sufficient amount to cover such charges. All such facilities as are required to be provided for the labourers under the labour welfare rules in force shall also be made available by the contractor at his own cost.

Minimum reasonable sanitary conditions are to be maintained in and around the labour camps and at the site or work. As soon as one or more labour in trenches or at site get wounded or hurt due to accident or carelessness immediate proper medical-aid shall be provided by the contractor to them. However, if it is felt by the engineer that proper medical aid has not been provided to them, it shall be incumbent upon the contractor to follow the instruction of the engineer for proper medical-aid. A first-aid box should be maintained by the contractor during execution period of the work. If proper medical facility is not provided by the contractor, same shall be done by the department & cost shall be debited to the contractor's account.

3.0 NOTICE BOARD TO BE DISPLAYED:

Notice boards shall be supplied and fixed in suitable positions by the contractor where the roads have been opened out for the construction of the culverts or sewers and the traffic has to be diverted. Such boards shall display in big letter in BLACK AND WHITE or in RED AND WHITE colours such warnings as ROAD CLOSED DRIVE SLOW, - WORK AHEAD MEN ON WORK etc. Such caution boards be fixed at suitable points in the neighbor-hood of the work or well before diversion where other roads join or cross the road opened out, so that traffic may have sufficient warning to avoid the blocked road by taking any alternative routes or by using the diversion provided by the contractor. No extra payment shall be made to the contractor on this account. The caution boards shall be painted such that the warning or notices glow in the night also to avoid accident or jamming of traffic.

4.0 BARRICADING:

The contractor shall provide necessary barricading in portion the excavation is done for laying of sewer lines. The barricading shall consist of ballies and G.I. sheet duly painted red and white in colour as per direction and approval of E/I. The contractor shall also make arrangement in proper warnings like providing fencing, danger flags, night warning light and watch and ward etc.. Safety code for excavation work I.S. 3764-1966 shall be rigidly followed.

5.0 SPECIFICATION FOR HDPE PIPES

1. The HDPE Pipe must be as per specifications confirming to IS 14333 : 1996 suitable for following maximum permissible working pressure.

Nominal Diameter (DN)	Pressure Rating of Pipe	Maximum Permissible Working Pressure, MPa
110	PN 10	1.00
160	PN 10	1.00

2. ***Colour***

The Colour of the pipe shall be black.

3. ***Material***

High Density Polyethylene (HDPE) used for the manufacture of pipe shall confirm to designation PEEWA-45-T-006 OF IS 7328:1992.

3.1 The M.R.S. (Minimum Required Strength) of material used shall not be lower than 6.3 MPa at 20°C at 50 years.

3.2 The specified base density between 940.00 kg/m^3 and 958.40 kg/m^3 (both inclusive) shall be determined at 27°C according to procedure prescribed in Annexure A of IS 7328: 1992. The value of density shall also not differ from the nominal value by more than 3 kg/m^3 as per 5.2.1.1 of IS 7328: 1992.

3.3 The MFR of the material shall be between 0.20g/10min and 1.10g/10min (both inclusive) when tested at 190°C with nominal load of 5 kgf as determined by method prescribed in 7 of IS 2530:1963. The MFR of the material shall also be within ±20 percent of the value declared by the manufacturer.

3.4 The resin shall be compounded with carbon black. The carbon black content in the material shall be within 2.5 ± 0.5 percent and the dispersion of carbon black shall be satisfactory when tested according to the procedure described in IS 2500 : 1963.

4. The percentage of anti-oxidant used shall not be more than 0.3 percent by mass of finished resin.

5. ***DIMENSIONS OF PIPES***

The outside diameter of pipes, tolerance on the same and ovality of pipe shall be a given in table below-

Nominal Diameter (DN)	Tolerance (mm)	Ovality (mm)
110	1.0	2.2
160	1.5	3.2

5.1 ***WALL THICKNESS***

The minimum and maximum wall thickness of pipes shall be as given in table below.

Nominal Diameter (DN)	Pressure Rating of Pipe	Minimum Permissible Working Pressure, MPa	Maximum Permissible Working Pressure, MPa
110	PN 10	10.0	11.2
160	PN 10	14.6	16.3

6. ***VISUAL APPEARANCE***

The internal and external surface of the pipes shall be smooth clean and free from grooving and other defects. The ends shall be cleanly out and shall be square with axis of the pipes. Slight shallow longitudinal grooves or irregularities in the wall thickness shall be permissible provided that the wall thickness remains within the permissible limits.

7. ***PEFORMANCE REQUIREMENTS***

7.1 **Hydraulic Characteristics**

When subjected to internal pressure creep rupture test in accordance with procedure given in Annex-B, the pipes under test shall show no and shall not burst during the prescribed test duration. The temperatures, duration of test and induced stresses or the test shall conform to those specified in Table 3.

7.2 **Reversion Test**

When tested according to the procedure given at Annex C, the value of the longitudinal reversion shall not be greater than 3 percent.

7.3 **Density**

When tested from a composite sample of minimum three pipes as per Annex A of IS 7328: 1992, it shall meet the requirement as given in 5.1.2.

8. ***SAMPLING, FREQUENCY OF TESTS AND CRITERIA FOR CONFROMITY***

8.1 Three samples of the same size and same pressure rating selected at random shall be tested for compliance with the requirements of the type test, given in Table 3.

8.2 If all the samples pass the requirements of the type test, the type of the pipe under consideration shall be considered eligible for type approval.

8.3 In case any of the samples fails in the type test, the testing authority, at its discretion, may call for fresh samples not exceeding the original number and subject them to the type test again. If in repeat test, no single failure occurs, the type of pipe under consideration shall be considered eligible for type approval. If any of the samples fails in the repeat tests, the type of pipe shall not be approved. The manufacturer or the supplier may be asked to improve the design and resubmit the product for type approval.

(C). DETAILED SPECIFICATIONS FOR CIVIL WORKS

1. EARTH WORK

1.1 GENERAL

The conditions/specifications laid down hereunder will hold good whether the excavation is to be carried out over areas for leveling foundations of structures, trenches for pipes or cables or any other type of work which involves earth work like the leveling of forming/embankments etc. as per PWD specifications.

a. Earthwork in excavation includes site-cleaning activities like removal of shrubs, loose stones, rubbish of all kinds, interfering with the works and with complete removal of roots.

b. The products of the above clearing operations shall be removed from the site, dumped, stacked at a place or places, burnt or otherwise disposed of as directed by the PD/Engineer-in-Charge within the compound.

c. A permanent base line and cross lines shall be established to serve as reference grid using MS plates, pegs, pins set in concrete or brick masonry pillars where they will be free from disturbances.

d. A permanent bench marks or marks as required necessary for the works connected to the nearest GTS benchmark shall be established for reference.

e. Excavation shall be carried out in all types of soil like top soil, silt, sand, gravel, soft moorrum, clay, kankar, hard materials like disintegrated rock shale which can be removed by picks, crowbars and shovels. Soil/earth may contain boulders. Loosening of rocks include the other methods of excavation other than blasting such as chiseling, wedging line drilling to avoid shattering of rocks. The PD/Engineer-in-Charge shall decide what method shall be adopted for removal of the hard rock.

f. Excavation, whose sides are required to be maintained at a steeper slope than the stable slopes, will be required to be properly shored and strutted failing which the contractor will be required to execute the work by open cutting by the approval of PD/Engineer-in-Charge.

g. Negligence on account of this leading to any mishap will be entirely the responsibility of the contractor.

1.2 DRAINAGE IN THE VICINITY OF EXCAVATION

i. The contractor shall control the drainage in the vicinity of the Excavation so that the surface of the ground will be properly sloped to prevent surface water running into excavated areas during construction. Arrangements shall be made for preventing rain and other extraneous liquids entering the excavated parts. Seepage water shall be directed to flow away from the trenches by gravity. If any pumping is required to keep the trench and the exposed areas dry for further work the same shall be done by the contractor at his own expenses.

ii. The rates quoted by the contractor shall be deemed to be inclusive of all the above costs or charges for stipulations stated above.

iii. Excavated material shall not be deposited within 1.5 meters from the top edge of the excavation.

iv. The contractor shall remove the excavated material to spoil heaps on the site or transport the same to a place as directed by the PD/Engineer-in-Charge.

v. If the bottom of the excavation is left exposed by the contractor and in the opinion of the PD/Engineer-in-Charge it has become deleteriously affected by atmospheric changes or affected

by water then the contractor shall remove at his own cost such portions of the affected foundations and shall make good by filling with lean concrete or with compacted sand as directed by the PD/Engineer-in-Charge.

vi. Where Excavation is made in excess of the depths required as shown in the drawings or as directed by the PD/Engineer-in-Charge the contractor shall at his own expense fill up to the required level with lean concrete or well compacted sand as decided by the PD/Engineer-in-Charge.

vii. Loose, soft or bad soil encountered in Excavation at the -required depth on PD/Engineer-in-Charge's directions shall be excavated to the firm bed and the difference of levels between the required level and the firm bed shall be filled up or dealt with as directed by the PD/Engineer-in-Charge.

viii. Any obstacle encountered during excavation shall be reported immediately to the PD/Engineer-in-Charge and shall be dealt with as instructed by him. Same shall be applicable for any antiques/ treasure found during excavation.

ix. Any public utility services/facilities like water supply lines, gas supply line, sewers, telephone/electric cables poles etc. met with during Excavation shall not be damaged and no disruption is caused to the utility service on account of damages caused by the contractor. Such facilities shall be properly supported in their original positions by giving signs, suspension beams etc. as contractors own expenses.

x. The contractor shall not undertake any concreting or constructing work of any nature on the excavated surfaces until approved for the same is given by the PD/Engineer-in-Charge.

xi. The contractor shall be solely responsible for the protection of adjoining properties from damages that may be on account of excavation close to the properties whether the property belongs to government or to a private party.

xii. The contractor shall make all arrangements for proper warnings like providing. fences, danger flags, barricading, night warning lights, watch and ward etc, to caution the public as well as the labourers engaged by him about the dangers that may be involved by excavation of trenches, pits, foundations etc. Safety code for excavation work IS: 3764-1966 shall be rigidly followed unless instructed otherwise by the PD/Engineer-in-Charge.

xiii. Any useful material obtained during Excavation shall be stacked as directed by the PD/Engineer-in-Charge and will be the property of the department. The decision of the PD/Engineer-in-Charge in this regard shall be final and binding on the contractor.

xiv. Any material used by the contractor out of the Excavated stuff in lieu of his own materials shall be charged to the contractor at the market rates.

xv. The rates quoted shall include back filling of excavated material and disposal of surplus earth as directed by the PD/Engineer-in-Charge.

1.3 EXCAVATION IN TRENCHES AND CABLE DUCTS

i. Excavation as required in trenches, cable ducts, for manholes, other overflow structures, cross drainage works, extra depths for joints of pipes shall be carried out as shown in the drawings/directed by the PD/Engineer-in-Charge.

ii. For deep foundations necessary shoring and strutting shall be executed as directed by the PD/Engineer-in-Charge. If additional slopes are to be provided where vertical cuts 'are not possible the same shall be executed without any additional cost. The rates quoted shall be deemed to be inclusive of all such extra work.

iii. The trench shall be kept perfectly dry by preventing the extraneous water entering the pits and also wherever necessary by pumping at the cost of the contractor. No additional cost of dewatering shall be payable.

iv. The trenches after laying, jointing and testing of pipes/cables are to be back filled. The trenches shall be filled with the excavated material if found suitable as directed by the PD/Engineer-in-Charge.

v. All surplus soil/earth shall be transported and disposed of as directed by the PD/Engineer-in-Charge Boulders, sharp objects, brickbats, roots of trees, rubbish, rubble etc. shall not be used for back filling. The back filling shall be done very carefully so as not to damage the pipes/cables or disturb the alignment levels of the pipes/cables. The back filling shall be done in layers on both sides of the pipes watered, consolidated by ramming to a dense layer. The thickness of each layer shall not be more than 15 cms. Special care shall be taken to avoid unequal pressures and not to disturb the pipe.

vi. In case the excavated material falls short of requirement the back fill soil/earth shall be taken from borrow pits approved by the PD/Engineer-in-Charge. The rates quoted by the contractor shall be deemed to be inclusive of all such works.

vii. Sight rails and boning rods are to be used at regular intervals as directed by the PD/Engineer-in-Charge to excavate the trenches true to line and grade.

1.4 BACK FILLING /EARTH FILLING

i. Back filling of earth around liquid retaining structures and pipes shall be done only after the water-tightness test is done to the satisfaction of the PD/Engineer-in-Charge. Selected earth from the excavated earth shall be used for back filling / embankment.

ii. Care shall be taken to see that unsuitable soil/earth does not get mixed up with the material proposed to be used for filling.

iii. Regarding the soil/earth to be used for back filling the contractor shall have the prior approval of the PD/Engineer-in-Charge.

iv. Backfill shall be placed in successive horizontal layers of loose material not more than 15 cm thick. The material shall be brought to within + or - 2% of the optimum moisture content as described in **IS:2720** (Part VIII) after adjusting the moisture content, the layers shall be thoroughly compacted with such equipment . as may be required to obtain a density equal to or greater than 95% of maximum laboratory dry density of the soil.

v. Successive layers of filling shall not be placed until the layer under construction has been thoroughly compacted to satisfy the requirements laid down in the requirements.

1.5 FILLING AND EMBANKMENT

i. The area where filling or embankment is to be carried out shall be cleared from loose material and the virgin soil shall be exposed. All shrubs and vegetation with roots are cleared. All soft patches shall be removed and filled with selected soil/earth and consolidated. Exposed soil/earth shall be consolidated properly to obtain 95% of maximum laboratory dry density of the soil.

ii. Approved filling material shall be uniformly spread in layers not exceeding 20 cms in loose depth. All clods, lumps, etc shall be broken before consolidation.

iii. Successive layers of filling shall not be placed until the layer under construction has been thoroughly compacted to satisfy the requirements laid down in these specifications.

iv. The contractor shall give the samples of the earth he proposes to use for back filling for testing, if required or directed by the PD/Engineer-in-Charge along with the following characteristics of the soil/earth.

v. Only earth having plasticity index less than 20 shall be used.

vi. Soil/earth having laboratory maximum dry density of less than 1500 kg per cubic meter shall not be used.

vii. If the layer fails to meet the required density it shall be reworked or the materials shall be replaced and method of compaction altered as directed by the PD/Engineer-in-Charge to obtain the required density.

viii. If any test indicates less than the specified degree of compaction the PD/Engineer-in-Charge may require all the fill placed; subsequent to the latest successfully tests to be removed and compacted and compaction procedure to be done once again to obtain satisfactory density.

ix. The contractor shall perform all necessary tests to determine optimum moisture content and the degree of compaction. He shall furnish the results to the PD/Engineer-in-Charge.

x. Prior to rolling, the moisture content of the material shall be brought to within $\pm$2% of the optimum moisture content as described in **IS-2720** (part VIII). The moisture content shall preferably be on the wet side for potentially expansive soil/earth. After adjusting the moisture content as described in this clause, the layers shall be thoroughly compacted by means of rollers till 95% of maximum laboratory dry density is obtained.

xiii. If the layer fails to meet the required density it shall be reworked or the materials shall be replaced and method of compaction altered as directed by the PD/Engineer-in-Charge to obtain the required density.

xiv. The embankment shall be finished to the alignment levels and grades, cross sections, dimensions shown in the drawings or as directed.

xv. If sand filling is specified in the tender for filling the trenches, plinth or foundations the sand used shall be hard, free from inorganic materials and deleterious materials and approved by the PD/Engineer-in-Charge. Filling shall be carried out in layers not exceeding 15 cms in loose depth and flooded and tamped till it meets the approval of the PD/Engineer-in-Charge.

x. The contractor shall perform all necessary tests to determine optimum moisture content and the degree of compaction. He shall furnish the results to the PD/Engineer-in-Charge.

1.6 SHORING/STRUTTING/TIMBERING

i. When the depth of foundation or pipe trench is great and the soil/earth is soft and generally for depths more than 1.5 m. Stepping, sloping and or paneling and strutting of sides shall be done as directed by the PD/Engineer-in-Charge. The decisions regarding the positions and depths at which and what type of precautions are to be provided shall be decided by the PD/Engineer-in-Charge.

ii. It shall be the responsibility of the contractor to take all necessary precautions or steps to prevent the sides of trenches from collapse. The contractor shall be responsible to make good any losses or damages caused to execute works, life and property due to his negligence.

iii. Deep excavation shall be inspected after every rain, storm, or other hazards and if necessary the precautions required shall be augmented.

iv. Planking and strutting shall be either "Close" or "Open" type depending upon the nature of the soil/earth and depth of excavation etc.

v. The timbering shall be of sufficient strength to resist earth pressure and ensure safety to the adjoining property and to persons. Where the excavation is subjected to vibrations due to machinery, vehicles, rail traffic, blasting and other sources, additional bracings shall be provided.

vi. Generally the specifications and sizes and spacing of sheeting, wallers and struts used for timbering of different depths shall be as given in the IS: 3764-1965 Safety code for excavation work unless otherwise specified in the tender elsewhere. Shoring shall extend 30 cms, above the vertical sides.

vii. Withdrawal of timbering shall be done very carefully to prevent collapse of the sides of excavation and any damage to the work executed.

viii Open timbering shall be provided wherever the PD/Engineer-in-Charge directs, where the trenches are not close to any buildings/property/structures. In open timbering the trench shall be protected by covering 1/3 the surface area by planks.

Important Note

1. The bottom of Excavation shall be trimmed to the required levels and when carried below such levels, by error, shall be brought to level by filling with lean concrete of grade 1:4:8 or as specified at the contractor's cost and nothing extra shall be paid to the contractor on this account.
2. The contractor shall be responsible for assumptions and conclusions that he may make regarding the nature of materials to be excavated and the difficulty in making and maintaining the required Excavation and performing the work required as shown on the drawing and in accordance with these specifications. Cofferdams, sheeting, shoring, braking, draining, dewatering, etc. shall be furnished and installed as required and the cost thereof shall be included in the rate quoted for the item of excavation. The contractor shall be held responsible for any damage to any part of the work and property caused by collapse of sides of Excavation. Materials may be salvaged if it can be done with safety for the work and structures, as approved by the PD/Engineer-in-Charge. However, no extra claim shall be entertained for material not salvaged or any other damage to contractor's property as a result of the collapse. He shall not be entitled to any claim for re-doing the excavation as a result of the same.
3. The excavation for foundations shall be carried out carefully, creating least disturbance to the founding stratum. The founding stratum should be blended by the concrete layer immediately after exposure so that it does not loose its strength on exposure to air and water.
4. Where excavation requires bracing, sheeting, or shoring etc, the contractor shall submit to the PD/Engineer-in-Charge, drawings showing arrangement and details of proposed installation, and shall not proceed until he has received approval from the PD/Engineer-in-Charge.
5. The contractor shall have to constantly pump out the water collected in pits due to rainwater, springs etc. and maintain dry working conditions.
6. For the purpose of excavation in earthwork, all types of soil including kankar, moorrum, single and boulders without binding matrix are included.
7. All excavated material obtained as a result of over excavation for which payment shall not be made, and that shall also be transported and disposed off as directed and at places shown by the PD/Engineer-in-Charge, at no extra cost to the department within plot boundary.

8. All excavated materials obtained from excavation shall remain in the department's property. The useful portion as decided by the PD/Engineer-in-Charge, shall be separated from the useless ones and deposited in regular stacks at places indicated and as directed by the PD/Engineer-in-Charge.
9. In no case the excavated soil shall be stacked upto a distance of 1.5 m from the edge of excavation or one-half the depth of excavation whichever is more.
10. IS Codes
Some of the important relevant applicable codes for this section are
IS: 1200 (Part-I)-Method of measurement of building and civil engineering works and earthwork
IS: 3764 - Safety -code for excavation work
IS: 4701 - Code of practice for earthwork on canals
11. Cradle and Manholes for collection sewer line shall be as per CPHEEO Manual.

2. PLAIN CEMENT CONCRETE

General

Aggregate shall be of inert materials and shall be clean, dense, hard, sound durable, non-absorbent and capable of developing good bond with mortar. Coarse aggregate shall be of hard broken stone or granite or similar stone free from dust dirt and other foreign matters. The stone ballast shall conform to PWD specifications.
Fine aggregate shall be of coarse sand consisting of hard, sharp and angular grains and shall' pass through screen of 4.75 mm IS Sieve. Sand shall be of standard specifications, clean and free from dust, dirt and organic matters. Fine aggregate may also be crushed stone.
Ordinary Portland cement of 43 grade as per **IS: 8112** shall be used. It shall have the required tensile and compressive stresses and fineness. Water shall be clean and free from alkaline and acid matters and suitable for drinking purposes.
The proportion of concrete shall be 1:3:6 (Cement: Fine Aggregate: Coarse Aggregate) by unless otherwise specified. Minimum compressive strength of concrete of 1:3:6 proportion shall be as per IS: 456 2000 or its latest revision.
Stone aggregate sand and cement shall be mixed as per PWD specifications. All materials shall be dry. If damp sand is used, compensation shall be made by adding additional sand to the extent required for the bulking of damp sand.
Appropriate quantity of water required for cement may be taken as specified in IS 456-2000 or its latest amendment. For concrete compacted by mechanical vibrations the quantity of water shall be reduced by 20%.
Mixing shall be of machine mixing type. Hand mixing shall not be permitted.

Machinery Mixing: Stone ballast, sand and cement shall be put into the cement concrete mixer to have the required proportion. For concrete of 1:2:4 proportion, first four boxes of stone ballast, then two boxes of sand and then one bag of cement shall be put into the C.C. Mixer, the machine shall then be revolved to mix materials dry and then water shall be added gradually to the required quantity, 25 to 30 litres per bag of cement to have the required water cement ratio. The mixing shall be thorough to have a plastic mix of uniform colour. It requires 1.5 to 2 minutes rotation for thorough mixing. Mixed concrete shall be unloaded on a masonry platform or on a sheet iron. Output of concrete mixer is 15 to 20 mix per hour.
Regular slump test shall be carried out to control the addition of water and to maintain the required consistency.
Formwork centering and shuttering shall be provided as required, as per standard specifications before laying concrete to continue to support or to keep the concrete in position.
Concrete shall be laid gently (not thrown) in layers not exceeding 15 cm and with mechanical vibrating machine until a dense concrete is obtained. (For important work mechanical vibrating shall be used for thick or mass concrete immersion type vibrators and for thin concrete surface vibrators shall be used for compacting concrete). Over vibration will separate coarse aggregate from concrete and shall be avoided. After removal of the formwork in due time the concrete surface shall be free from honey combing, air holes or any other defect.

Concrete shall be laid continuously, if laying is suspended for rest or for the following day the end shall be shuttered and vibrated to achieve dense concrete and made rough after de-shuttering for further jointing. When the work is resumed, the previous portion shall be roughened, cleaned and watered and a grout of neat cement shall be applied and the fresh concrete shall be laid. For successive layer the upper layer shall be laid before the lower has set.

After about 2 hours laying when concrete has begun to harden, it shall be kept damp by covering with wet gunny bags or wet sand for 24 hours, and then cured by flooding with water, making mud walls 7.5 cm high or by covering with wet sand or earth and kept damp continuously for 15 days. If specified, curing may be done by covering concrete with special type of waterproof paper as to prevent water escaping or evaporating.
Plain cement concrete shall be provided for leveling courses, foundations, pipe bedding or at other places wherever indicated in the drawings/directed by the PD/Engineer-in-Charge. Grade and thickness of all PCC works shall be as mentioned in the drawings.
The proportion of the concrete, size of the aggregate shall be as specified in the drawings and technical specifications approved by PD/Engineer-in-Charge.
While placing concrete directly on the soil for foundations etc. all the loose material shall be removed. The surfaces shall be trimmed and well consolidated.
The material specifications, mixing, placing of concrete compaction, curing, removal of the form work shall all be done as specified for reinforced cement concrete in the section of this tender document. The clauses provided therein shall also equally apply for this item of work to the extent relevant.
The rates quoted shall include supply of material, labour, tools and plant, water, mixing platforms, curing, supplying, erecting and dismantling of all form works as required.

Testing and Acceptance Criteria of Concrete
The sampling of concrete making the test specimens, curing and testing procedures etc. shall be in accordance with **IS: 1199, IS: 3085** and **IS: 516,** the size of specimen being 15 cm cubes. Normally only compression tests shall be performed in accordance with **IS: 516.**
For each grade of concrete and for each 8 hours of work or portion thereof the following samples shall be taken.
At least six specimens shall be taken from the first 15.0 m3 or part thereof and three of these shall be tested at 7 days and the remaining at 28 days. Four additional specimens shall be taken from each additional 15.0 m of concrete or portion thereof of which 2 specimens shall be tested at 7 days and the remaining at 28 days.
To control the consistency of concrete from every mixing plant slump tests, and/or compacting factor tests in accordance with **IS: 1199** shall be carried out by the contractor every two hours or as directed by the PD/Engineer-in-Charge. Slumps corresponding to the test specimens shall be recorded for reference.
The acceptance criteria of concrete shall be in accordance with **IS: 456-2000.**
Concrete work found unsuitable for acceptance shall have to be dismantled and replacement is to be done as per specifications by the contractor. No payment for the dismantled concrete, the relevant formwork and reinforcement embedded fixtures etc. shall be paid.
In the course of dismantling if any damage is done to, the embedded items or adjacent structures the same shall be made good free of charge by the contractor to the satisfaction of the PD/Engineer-in-Charge.

3. BRICK MASONRY AND PLASTERING

3.1 Brick Masonry

General

All bricks shall be of class designation 10 or best locally available approved by PD/Engineer-in-Charge made of good brick earth thoroughly burnt, and shall be of deep cherry red or copper colour. Bricks shall be regular in shape and their edges shall be sharp and shall emit clear ringing sound on being struck and shall be free from cracks, chips, flaws and lumps of any kind. Bricks shall not absorb water more than one sixth .of their weight after one hour of soaking by immersing the water. Bricks shall have a minimum crushing strength of 105 kg/cm² (10.5 N/mm2).

Bricks shall be fully soaked in clean water by submerging in a tank for a period of 12 hours immediately before use. Soaking shall be continued till air bubbling is ceased.

Bricks shall be well bonded and laid in English bond unless otherwise specified. Every course shall be truly horizontal and wall shall be truly in plumb. Vertical joints of consecutive course shall not come directly over one another, vertical joints in alternate course shall come directly over one another. No

damaged or broken bricks shall be used. Closers shall be of clean-cut bricks and shall be placed near the ends of walls but not at the other edge. Selected best-shaped bricks shall be used for face work. Mortar joints shall not exceed 6 mm in thickness and joints shall be fully filled with mortar. Bricks shall be laid with frogs upwards except in the top course where frogs shall be placed downward. Brickwork shall be carried out not more than 1.2m height at a time. When one part of the wall has to be delayed, stepping shall be left at an angle of 45º. Corbelling or projections where made shall not be more, than X brick projections in one course. All joints shall be raked and faces of wall cleaned at the end of each day's work.

These specifications deal with all types of brickwork required for buildings, manholes, drains, retaining walls or any construction made out of bricks.

3.1.1.2 Construction

The brick masonry shall be constructed as per the Indian Standard Code of Practice for Brick Work **IS: 2212-1962.** The thickness of the joints shall not be thicker than those specified in para 5.4 of the above Code of Practice.

The bricks shall be thoroughly soaked in water before using them on the work for at least twelve hours and all the air bubbles shall come out during soaking process. The soaked bricks shall be stacked on wooden planks/platforms so as to avoid sticking of the earth and other materials on to the surfaces of bricks. Bricks required for construction in mud mortar or lime mortar shall not be soaked. Brickwork shall be laid in English Bond unless otherwise specified. Half bricks shall not be used except when needed to complete the bond. Each course shall be perfectly straight and horizontal. The masonry shall be true to plumb in case of vertical walls and in case of battered construction the batter or slope shall be truly maintained. The level of the courses completed shall be checked at every one meter interval or less as required.

The bricks shall be laid frogs upwards. While laying the bricks they shall be thoroughly bedded and flushed in mortar and well tapped into position with wooden mallets and superfluous mortar shall be removed.

No part of the structure shall be raised more than one meter above than the rest of the work. In case it is unavoidable the brickwork shall be raked back at an angle of not more than 45 degrees so as to maintain a uniform and effectual bond, but raking shall not start within 60 cms from a corner.

In case of construction of buttresses, counter-forts, returns they are built course by course carefully bound into the main walls.

At all junctions of walls the bricks at alternate courses, shall be carried into each of the respective walls so as to thoroughly unite both the walls together. The brickwork shall not be raised more than 14 courses per day.

All the beds and joints shall be normal to the pressures applied upon them Le horizontal in vertical walls, radial In arches and at right angles to the face in battered retaining walls.

Vertical joints in alternate courses shall come directly one over the other and shall be truly vertical. Care shall be taken to ensure that all the joints are fully fitted up with mortar, well flushed up where no pointing is proposed, nearly struck as the work proceeds. The joints in faces which are plastered or painted shall be squarely raked out to a depth not less than 12 mm while the mortar is still green. The raked joints shall be well brushed to remove the loose particles and the surfaces shall be cleaned with a wire brush so as to remove any splashes of mortar sticking to the surfaces during the construction.

All iron fixtures, pipes, bolts, conduits, sleeves, holdfasts etc. which are required to built into the walls shall be embedded in cement mortar or cement concrete as shown in the drawings/indicated in the specifications/directed during the execution by the Engineer in-Charge as the work proceeds and no holes be left for fixing them at a later date unless authorized by the PD/Engineer-in-Charge.

3.1.2.1 Curing

Green work shall be protected from rain by covering the work suitably. Masonry work as it progresses shall be thoroughly kept wet by watering on all the faces for at least 10 (Ten) days after completion of the parts of the work. Proper watering cans, flexible pipes, nozzles shall be used for the purpose in case of fat lime mortar curing shall start two days after construction of masonry and shall continue for seven days. No additional payment is admissible for curing and the rates quoted are deemed to be inclusive of the cost of curing.

3.1.2.2 Scaffolding

Double scaffolding sufficiently strong so as to withstand all loads that are likely to come upon it and having two sets of vertical supports shall be provided. Where two sets of vertical supports are not possible the inner end of the horizontal supporting pole shall rest in a hole provided in a header course only. Only one header for each pole shall be left out. Such holes however shall not be permitted in pillars less one meter in width or immediately near the skew backs of arches. Such holes shall be filled up immediately after removal of the scaffoldings. Safety Code for Scaffolds and Ladders, **IS: 3696-1987** (Parts I and II) shall be followed.

3.2 Plastering

Cement mortar used for plastering shall be of the mix proportions and thickness as specified on the drawings or bill of quantities or particular specifications for the various different parts of the works. The materials used i.e. cement, sand and water shall be of the same quality and of the same specifications as indicated for plain and reinforced cement concrete works according to the specifications and approved by the PD/Engineer-in-Charge. Sand further shall meet the specifications as laid down in **IS: 1542-1977** Specification for sand for plaster.

The sand for preparation of mortar for plastering shall confirm to the following gradation, shown in **Table 3.2**

TABLE 3.2: GRADING OF FINE AGGREGATES

Percentage by weight passing IS Sieve		
IS Sieve Designation	Class –A	Class-B
4.75 mm	100	100
2.36 mm	90 to 100	90 to 100
1.18 mm	70 to 100	70 to 100
600 Microns	40 to 85	40 to 95
300 Microns	50 to 50	10 to 65
150 Microns	0 to 10	0 to 15

For the purpose of indicating the suitability for use, the sand is classified as Class A and Class B in accordance with the limits of grading. Class A sand shall be used generally for plastering and when they are not available, Class B sand may be used with the approval of PD/Engineer-in-Charge.

The procurement of sand for Mortar for plastering and pointing shall confirm to be specifications given in Table 3.2.

Surface that are to be applied with plaster shall be thoroughly cleaned to remove dust, dirt, loose particle, oil, soil, salts etc, that may be sticking to the surfaces. The surfaces shall be washed, clean and watered properly for 4 hours before applying plaster. Plaster shall not, in any case, be thinner than specified. It shall have uniform specified thickness. When smooth finishing is required the cement plastering shall be floated over with neat cement within 15 minutes after application of the last coat of plastering. The plaster shall be protected from the sun and rain by such means as the PD/Engineer-in-Charge may approve.

The plastered surface shall be cured for 10 (ten) days. Construction joints in plastering shall be kept at places approved by the PD/Engineer-in-Charge. When the thickness of the plaster specified is to be made up in more than one layer the second layer shall be applied only when the lower coat is still green.

Wherever specified approved brands of additives like water proofing compounds shall be added in specified quantities as recommended by the manufacturer of the compound or as directed by the PD/Engineer-in-Charge.
Wherever scaffolds are necessary for plastering they shall be provided as specified for scaffolds under clause **3.2.2.** Stage scaffolding shall be provided for ceiling plaster.
To ensure even thickness and true surface, patches of plaster about 15 cm x 15 cm shall be first applied both horizontally and vertically 2.0 m apart. Plastering shall be done. from top of bottom and care shall be taken to avoid joints on continuous surface.
In case any other finish like rough cast finish or dry dash finish is specified in the drawings the small shall be provided as directed by the PD/Engineer-in-Charge.
Surface which is to be plastered shall be roughened while they are still green or raked so as to give proper bond between the surface and plaster.

All corners junctions shall be truly vertical or horizontal as the case may be and carefully finished. Rounding or chamfering of corners shall be carried out with proper templates to the required size and shapes.

The work shall be tested frequently with a straight edge and plumb bob. At the end of the day the plaster shall be left cut clean to line. When the next days plastering is started the. day the plaster shall be left cut clean to line. When the next days plastering is started the edge of the old work shall be scrapped, cleaned and wetted with cement slurry. At the end of the day the plastering shall be closed on the body of the wall and not nearer than 15 cm to any corner.

Curing shall be started as soon as the plaster has hardened sufficiently not to be damaged when watered. The plaster shall be kept wet for at least 10 days. Any defective plaster shall be cut in rectangular shape and replaced.

4. REINFORCED CEMENT CONCRETE AND ALLIED WORKS

GENERAL

In general RCC work is to be executed as per IS : 456-2000 or its latest revision. The water storage tanks/reservoirs shall be followed by IS : 3370 Part I to IV & latest revision. Steel reinforcement bars shall be of High Yield Strength Deformed (HYSD) steel bars as per **IS: 1786** and shall be free from corrosion, loose rust scales, oil, grease, paint, etc. Wire mesh or fabric shall be in accordance with **IS: 1566.** The steel bar shall be capable' of being bent without fracture. Bars shall be bent accurately and placed in position as per design and drawing and bound together tight with 20 SWG annealed steel wire @ 10 kg/ton of reinforcement at their point of intersection.

Formwork and shuttering shall be made with steel plate close and tight to prevent leakage of mortar, with necessary props, bracings and wedges, sufficiently strong and stable and should not yield on laying concrete and made in such a way that they can be slackened and removed gradually without disturbing the concrete. For slab and beam small chamber should be given in centering, 1 cm per 2.5 m with a maximum of 4 cm. Centering should not be removed before 14 days in general (4 days for RCC columns, 10 days for roof slab, and 14 days for beams).

The grade of concrete to be used shall be as mentioned in specifications/shown on drawings.

Table - 4.1 Minimum compressive strength of 15 cm cubes at 7 and 28 days after mixing, conducted in accordance with IS: 516

Class	Preliminary Test N/mm^2		Work Test N/mm^2		Maximum size of Aggregate mm	Locations for Use
	At 7 days	At 28 days	At 7 days	At 28 days		
M40	33.50	50.00	27.00	40.00	20	As indicated in the specifications or as

						required
M35	30.00	44.00	23.50	35.00	20	-do-
M30	25.00	38.00	20.00	30.00	20	--do-
M25	22.00	32.00	17.00	25.00	20	--do-
M20	17.50	26.00	13.50	20.00	20	--do-
M15	13.50	20.00	10.00	15.00	20	--do-

The coarse aggregate shall usually be 20 mm to 6mm gauge unless otherwise specified. For heavily reinforced concrete members as in the case of ribs of main beams the maximum size of aggregate should usually be restricted to 5 mm less than the minimum clear distance between the main bars or 5 mm less than the minimum cover to the reinforcement whichever is smaller.

Mixing is done in the same manner as in PCC.

Before laying the concrete, the shuttering shall be clean, free from dust, dirt and other foreign matters. The concrete shall be deposited (not dropped) in its final position. In case of columns and wall, it is desirable to place concrete in full height if practical so as to avoid construction joints but the progress of concreting in the vertical direction shall be restricted to 1.2 metre. Care should be taken that the time between mixing and placing of concrete shall not exceed 20 minutes so that the initial setting process is not interfered with. During the winters concreting shall not be done if the temperature falls below 4ºC.

Concrete shall be compacted by mechanical vibrating machine until a dense concrete is obtained. The vibration shall continue during the entire period of placing concrete. Compaction shall be completed before the initial setting starts i.e. within 30 minutes of addition of water to the dry mixture. Over-vibration which will separate coarse aggregate from concrete shall be avoided. After removal of the form work in due time, the concrete surface shall be free from honey combing, air holes or any other defect.

Concrete shall be laid continuously, if laying is suspended for rest or for the following day the end shall be shuttered and vibrated to achieve dense concrete and made rough after de-shuttering for further jointing. When the work is resumed, the pervious portion shall be roughened, cleaned and watered and a grout of neat cement shall be applied and the fresh concrete shall be laid. For successive layer the upper layer shall be laid before the lower has set.

Pre-cast concrete shall be provided with lifting device.

4.1.1 Standards

Following Indian Standards as revised most recently along with amendments will be followed for the works included in the contract.

IS:8112	Ordinary, Portland cement
IS:383	Coarse and fine aggregates from natural sources for concrete
IS:445	Portland slag cement
IS:456-1978	Code of practice for plaint and reinforced concrete
IS:516	Method of test for strength of concrete
	Methods of sampling and analysis of concrete
IS:2386	Methods of test for aggregates for concrete (Part I to VI)
IS:3414	Code of practice design and installation of expansion and contraction joints in building.
IS:3713 Part-I to IV	Code of practice for water storage Tanks

Standards on special subjects have been mentioned elsewhere in this para and also shall be followed.

4.2 Forms, false work or centering

4.2.1 Definitions

"Forms, formwork or shuttering" shall include all temporary moulds for forming the concrete to the required shape, together with any special lining that may be required to produce the concrete finish specified.
"False work or centering" shall consist of furnishing, placing and removal of all temporary construction such as forming, props and struts required for the support of forms.

4.2.2 Materials

Steel shuttering shall be provided as directed by the PD/Engineer-in-Charge.

4.2.3 Forms

All forms shall be of mild steel approved by the PD/Engineer-in-Charge and shall be fabricated and prepared water tight and of sufficient rigidly to prevent distortion due to the pressure of the concrete and other incidental loads incident to the construction operations.

All form shall be set and maintained true to the line designated until the concrete is sufficiently hardened. Forms shall remain in place for periods which shall be specified hereinafter. When forms appear to be unsatisfactory in any way, either before or during the placing of concrete, the PD/Engineer-in-Charge shall order to stop the work until the defects have been corrected.

All formwork shall be approved by the PD/Engineer-in-Charge before concrete is placed within it. The contractor shall be required to submit copies of his calculations of the strength and stability of the formwork or false work but not withstanding the PD/Engineer-in-Charge's approval of these calculations, nothing shall relieve the contractor of his responsibility for the safely or adequacy of the formwork.

Formwork shall be true to line and braced and strutted 10 prevent deformation under the weight and pressure of the unset concrete, constructional load, wind and other forces. The deflection shall not exceed 3 mm. Beam bottom shall be erected with an upward chamber of 2 mm per meter of the span. The form work for a column may be erected.

One side shall. be left open and shall be built up in sections as placing of the concrete proceeds. Before placing the concrete, bolts and fixtures shall be in .position, and cores and other devices, used for forming openings, holes, chases, recesses and other cavities shall be filled to the formwork. No holes shall be cut in any concrete unless approved. Approved mould oil or other material shall be applied to faces of formwork in contact with unset concrete to prevent adherence of the non-staying concrete. Such coating shall be insoluble in water, non-staying and non-detrimental to the concrete and shall not be flaky or removed by wash water.

4.2.4 Tolerance in finished concrete

(As per IS code 456-2000, 0.1)
The form work shall be so made as to produce a finished concrete true to shape, lines, level, plumb and dimensions as shown in the drawing subject to the following tolerances, unless otherwise specified in drawings or directed by the PD/Engineer-in-Charge.

For Deviation from specified Dimensions of cross-section of columns And beams	=	-6mm +12mm
b. Deviations of dimension of footings (See Note) Dimensions in plane	=	-12mm +50mm
Eccentricity of deviation but not more than 50 mm	=	0.02 times the width of footing in the direction
Thickness	=	+/- 0.05 times the specified thickness

Note: Tolerances applied to concrete dimensions only, not to positioning of vertical reinforcing steel or dowels.

4.2.5 False work and Centering

Detailed plans for false work or centering shall be supplied by the contractor if specifically asked for by the PD/Engineer-in-Charge at least 14 days in advance of the time the contractor begins construction of the false work. Notwithstanding the approval by the PD/Engineer-in-Charge of any designs for false work submitted by the contractor, the contractor shall be solely responsible for the strength, safety and adequacy of the false work or centering.

All false work shall be designed and constructed to provide the necessary rigidity and to support the loads from the weight of green concrete and shuttering and incidental construction loads.

False work or catering shall be founded upon a solid footing safe against undermining and protected from softening.

False work which cannot be founded on satisfactory footing shall be supported on piling which shall be spaced, driven and removed in a manner approved by the PD/Engineer-in-Charge. The PD/Engineer-in-Charge may require the contractor to employ screw jacks or hardwood wedges to make up any settlement in the formwork either before or during the placing of concrete. Props of the upper storey shall be placed directly over those in the storey immediately below.

False work shall be set to give the finished structure the required grade and camber specified on the plans.

4.2.6 Formwork and Construction Joints

Where permanent or temporary joints are to be made in horizontal or inclined members, stout stopping off boards shall be securely fixed across the mould to form a watertight joint. The form of the permanent construction joint shall be as shown on the drawings. Temporary construction joints shall have blocks of timber at least 75 mm thick, slightly tapered to facilitate withdrawal and securely fixed to the face of the stopping off board. The area of the key or keys so formed shall be at least 30% the area of the member. The blocks shall be kept back at least 50 mm from the exposed face of the concrete.

Where reinforcement passes through the face of a construction joint the stopping off board shall be drilled so that the bars can pass through, or the board shall be made in sections which a half round indentation in the joint faces for each bar so that when laced, the board is a neat and accurate fit and no grout leaks from the concrete through the bar holes or joints.

4.2.7 Removal of Forms and False work

In the determination of the time for the removal of forms, falsework and housing, consideration shall be given to the location and character of the structure, the weather and other conditions influencing the settings of the concrete and the materials used in the mix.

MS shuttering/formwork and scaffolding should be of standard reputed make to ensure better quality of concrete finish.

Forms shall be removed in such a manner as not to injure the concrete and no formwork shall be removed before the concrete has sufficiently set and hardened. The minimum periods which shall elapse between the placing and compacting of normal Portland cement concrete for the various parts of the structures are given in the following table, but compliance with these requirements shall not relieve the contractor of the obligation to delay the removal of the forms if the concrete has not set sufficiently hard.
Forms shall not be struck until the concrete has reached strength at least twice the stress to which the concrete may be subject at the time of removal of formwork. In normal circumstance, generally where the temperatures are above 20ºC and where ordinary Portland cement is used, form may generally be removed after the expiry of the following periods, according to the Clause 10.3, **IS: 456-2000.**

Table 4.2 : Removal of the Forms

a.	Walls columns and vertical faces of all structural members	24 to 48 hours as may be decided by the PD/Engineer-in-Charge
b.	Slabs (Props left under)	3 days
c.	Beam soffit (props left under)	7 days
d.	Removal of props under slabs 1. Spanning upto 4.5m 2. Spanning above 4.5 m	 7 days 14 days
e.	Removal of props under beams and arches 1. Spanning upto 4.5m 2. Spanning above 4.5 m	 14 days 21 days

Where sulphate resistant cement is used, manufacturer's instructions are to be followed.

The PD/Engineer-in-Charge may modify these requirements taking into account the type of cement and method of compaction used, and contractor shall obtain the PD/Engineer-in-Charge's written approval for any decrease in time of stripping of the formwork given above. The contractor shall notify the PD/Engineer-in-Charge when he proposes to stripe of any formwork and no formwork shall be struck except in the presence of the PD/Engineer-in-Charge or his representative.

4.2.8 Reuse of Forms

Only mild steel formwork of best quality as per approved vendor list given by PD/Engineer-in-Charge shall be used for concreting purpose. These shuttering shall not be reused unless it is properly scraped cleaned and repaired, so that it gives a plane, even, fair and dense concrete surface.

4.2.9 Cleaning and treatment of Forms

All forms shall be thoroughly cleaned of old concrete, wood shavings, sawdust, dirt and dust sticking to them before these is fixed in position. All rubbish, loose concrete, chippings, shavings, saw dust etc. should be scrupulously removed from the interior of the forms before concrete is poured. Wire brushes, brooms, compressed air jet and/or water jet etc. shall be kept handy for cleaning, if directed by the PD/Engineer-in-Charge.

Before formwork is placed in position, the form surface that will be in contact with concrete shall be treated with approved non-staining oil or composition, which is insoluble in water and not injurious to concrete. Care shall be taken that the oil or composition does not come in contact with reinforcing steel or stain the concrete surface. Burnt oil shall not be allowed to be used especially where the concrete surface will require finishing and/or plaster.

4.3 Materials for Concrete

4.3.1 Water

Water used for cement concrete mortar, plaster, grout, curing or washing of sand shall be clear and free from injurious amount of Oil, Acid, Alkali, Organic matter or other harmful substances in such amounts that may impair the strength or durability of the structure.

Potable water shall generally be considered satisfactory for mixing and curing concrete. In case of doubt regarding development of strength, the suitability of water for making concrete shall be ascertained by compressive strength and initial setting time specified in the IS: 456 Code of Practice for Plain and Reinforced concrete. The PD/Engineer-in-Charge may require the contractor to get the water tested from

an approved laboratory at his own expense and in case the water contains any salts for an excess of acid, alkali, any injurious substances etc., the PD/Engineer-in-Charge may refuse its use. And the contractor shall be required to arrange suitable water at his own cost.

4.3.2 Aggregate

General

Coarse and Fine Aggregates for concrete shall confirm in all respect to PWD Specifications / **IS: 383** Specifications for Coarse and Fine Aggregates from Natural Sources for Concrete. Aggregates shall be obtained from a source known to produce satisfactory material for concrete. Aggregates shall consist of naturally occurring sand and gravel or stone, crushed or uncrushed or a combination thereof. They shall be chemically inert, hard strong, dense, durable, clean and free from veins and adherent coatings and of limited porosity. Flaky and elongated pieces shall not be used. Whenever required by the PD/Engineer-in-Charge the aggregates shall be washed by the Contractor before use in the work.

The source of aggregates shall be approved by the PD/Engineer-in-Charge and shall not be changed during the course of the job without his approval. Rejected aggregates shall be promptly removed from the work site by the contractor at his own expense.

4.3.2.1 Deleterious Materials

Aggregates shall not contain any harmful material, such as iron pyrites, coal, mica, shale or similar laminated materials, clay, alkali, soft fragments, sea shells, organic impurities etc, in such quantities as to affect the strength or durability of the concrete and in addition to the above, for reinforced concrete, any material which might cause corrosion of the reinforcement. Aggregates which are chemically reactive with the alkalis of cement shall not be used.

The maximum quantities of deleterious materials in the aggregate, shall be in accordance with **IS: 2386** (Part II). Methods of Test for Aggregates for Concrete, shall not exceed the limit given in Table I of **IS: 383.**

The sum of the percentages of all deleterious materials shall not exceed five. Deleterious materials also include material passing **75** micron IS sieve.

4.3.2.2 Coarse Aggregates

Coarse aggregate is aggregate most of which is retained on 4.75 mm IS: sieve. Coarse aggregate for concrete shall conform to **IS: 383**.

These may be obtained from crushed or uncrushed gravel or stone and shall be clean and free from elongated, Flaky or laminated pieces, adhering coatings, clay lumps, coal residue, clinkers, slag, alkali, mica, organic matter or other deleterious matter. Coarse aggregate shall be either in single size or graded, in both cases the grading shall be within the following limits.

Table 4.3: Grading of Coarse Aggregates

IS Sieve size (mm)	Percentage Passing For Single Sized Aggregate of Normal Size					Percentage Passing for Graded Aggregate of Normal Size			
	40mm	20mm	16mm	12.5mm	10mm	40mm	20mm	16mm	12.5mm
63	100	-	-	-	-	100	-	-	-
40	85-100	100	-	-	-	95-100	100	-	-
20	0-20	85-100	100	-	-	30-70	95-100	100	-
16	-	-	85-100	100	-	-	-	90-100	-
12.5	-	-	-	85-100	100	-	-	-	90-100
10	0-5	0-20	0-30	0-45	85-100	10-35	25-35	30-70	40-85
4.75	-	0-5	0-5	0-10	0-20	0-5	0-10	0-10	0-10
2-36	-	-	-	-	0-5	-	-	-	-

The PD/Engineer-in-Charge may allow graded aggregates to be used provided they satisfy the requirements and Table IV of **IS: 383.**

4.3.2.3 Fine Aggregates

Fine aggregates is aggregate most of which passes 4.75 mm IS sieve but not more than 10% passes through 150 micron IS Sieve. These shall comply with the requirements of grading zones I, II and 1II as given in Table III of 15:383. Fine aggregate conforming to grading zone IV shall not be normally used in reinforced concrete unless tests have been made by the contractor to ascertain the suitability of the proposed mix proportions and approved by the PD/Engineer-in-Charge.

As per IS: 383 Table is given below:

Table 4.4: Grading of Aggregates

IS: Sieve Designation	Grading Zone-I	Grading Zone-II	Grading Zone-III	Grading Zone-IV
10 mm	100	100	100	100
4.75 mm	90-100	90-100	90-100	95-100
2.36 mm	60-95	75-100	85-100	95-100
1.18 mm	30-70	5-90	75-100	90-100
600 microns	15-34	35-59	60-79	80-100
300 microns	5-20	8-30	12-40	15-50
150 microns	0-10	0-10	0-10	0-15

Note: To use the sand falling in Zone -IV, IS: 383 shall be followed.

Fine aggregates shall consist of natural sand resulting from natural disintegration of rock and which has been deposited by streams or glacial agencies, or crushed stone sand or crushed gravel sand.

4.3.2.4 Sampling and Testing

Sampling and testing shall be carried out by the contractor, at the contractor's expense, in accordance with:

IS: 516 METHOD OF TEST FOR STRENGTH OF CONCRETE
IS: 2386 Methods of Test for Aggregates for concrete

4.3.2.5 Storage of Aggregates

The contractor shall at all times maintain at the site of work such quantities of aggregates as are considered by the PD/Engineer-in-Charge to be sufficient to ensure continuity of work.
Each type and grade of aggregate shall be stored separately on hard firm ground having sufficient slope to provide adequate drainage to rain water.

Any aggregate delivered to site in a wet condition or becoming wet at site due to rain shall be kept in storage for at least **24** hours to obtain adequate drainage, before it is used for concreting, or the water content of mix must be suitably adjusted as directed by PD/Engineer-in-Charge.

4.3.3 Cement
4.3.3.1 General

The cement used shall be ordinary Portland cement conforming to IS: 8112 or as specified in the particular specifications/drawings or as directed by the PD/Engineer-in-Charge.

4.3.3.2 Storage on the site

The cement shall be stored in a suitable weatherproof building and in such a manner as to permit easy access for proper inspection and counting. The cement shall be stored in such a manner as to prevent deterioration. Cement of different types and brands shall be kept in separate stacks and marked accordingly. Cement older than two months shall not be used on site.

All cement stored on the site shall be arranged in batches, and used in the same order as received from the manufacturer. A cement register shall be maintained at site in which all entries shall be completed day to day, showing the quantities received date of receipt, source of receipt, type of cement etc, and also the daily cement consumption on site. This register shall be accessible to the PD/Engineer-in-Charge for his certification. The godown / room in which cement shall be kept, shall be locked double; one of BUIDCO and another of contractor.

4.3.3.3 Rejection of Cement

The PD/Engineer-in-Charge may reject any cement as a result of any tests, thereof, not withstanding the manufacturer's certificate. He may also reject cement, which has deteriorated owing to inadequate protection during storage from moisture or due to intrusion of foreign matter or other causes. Any such cement which is considered defective by the PD/Engineer-in-Charge shall not be used, and shall be promptly removed from the site of the work by the contractor at his own expense.

4.3.4 Other Materials

AI materials including admixtures, joint filters and joint sealants not fully specified herein and which may be used in the work shall be of quality approved by the PD/Engineer-in-Charge and he shall have the right to determine whether all or any of the materials offered or delivered for use in the works are suitable for the purpose. Contractor shall give the samples of materials to the PD/Engineer-in-Charge and shall get them approved before procurement and use.

4.3.5 Reinforcement

All reinforcement shall be clean and free from pitting, loose mill scales, dust and coats of paints. oil or other coating which may destroy or reduce the bond.

4.3.5.1 Welded Joints

Welding of joints in reinforcement for bars of 28 mm dia and below shall not be allowed. However, in case of using welded joints for bars 32 mm and above the approval of the PD/Engineer-in-Charge shall be obtained. The PD/Engineer-in-Charge may require the Contractor, prior to the use of welded joints to have tests carried out at he contractor's expense to prove that the joints are of the full strength of the bars connected. The welding of the reinforcement shall be done in accordance with the recommendation of **IS: 2751** code of practice for welding of mild steel bars for reinforced concrete construction. Special precautions are required in the welding of cold worked reinforcing bars. No extra payment for welded joints shall be made to the contractor unless specifically mentioned in the schedule of rates or bill of quantities and approved by the PD/Engineer-in-Charge. Tack welding may be permitted by the PD/Engineer-in-Charge under certain conditions for fixing reinforcements.

4.3.5.2 Reinforcement Splices

Laps & anchorage length of reinforcing bars shall be in accordance with IS: 456, unless otherwise specified. If the bars in a lap are not of the same diameter, the smaller dia will guide the lap lengths. Laps shall be staggered as far as practicable and as directed by PD/Engineer-in-Charge and not more than 50% of the bars shall be lapped at a particular section. Mechanical connections, for splicing reinforcement bars in congested locations may be used by the contractor, only if approved by the PD/Engineer-in-Charge. Reinforcement bars shall not be lapped unless the length required exceeds the maximum available lengths of the bars at site.

Unless otherwise specified the splices shall be wired contact lap splices as per the relevant standards. No splicing of vertical bars shall be allowed except at specified or approved horizontal construction joints. Splices in horizontal bars shall be lapped with atleast one continuous bar between adjacent splices. The minimum spacing of splices in anyone run of bar shall be 6.0 m with splices in adjacent bars offset at least 3.0 m where walls or slab contain two layers of reinforcement, splices in opposite layer shall be offset by atleast 1.50m.

4.3.5.3 Fabrication and placement

Bars shall be pre fabricated accurately to dimensions, forms and shapes, Bending procedure shall be approved by the PD/Engineer-in-Charge. Placing and typing of reinforcement shall conform to IS: 2502-1963 Code of practice for bending and fixing of bars for concrete reinforcement. Bar bending schedules for the reinforced concrete works shown on the drawings shall be prepared by the contractors and furnished to the PD/Engineer-in-Charge at least two weeks before the commencement of bending. Dimensions shown as furnished by the contractor's shall be his responsibility and approval of the schedule shall not constitute the approval of the dimensions thereon.

4.3.5.4 Field Control

The contractor shall appoint a qualified Engineer experienced in reinforcement cutting, bending and placing the same correctly, binding and cleaning before pouring the concrete. The reinforcement shall be continuously kept in correct position during connections.

4.3.5.5 Steel Reinforcement

The reinforcement shall be High Yield Strength Deformed (HYSD) bars. Grade Fe-415 conforming to **IS: 1786-1985** shall be used unless otherwise specified.

Placement of reinforcement should be as per IS: 456 Clause 11.3.

Approved Manufacturers: TISCO, SAIL, Rashtriya Ispat BUIDCo, Tata

4.3.5.6 Structural Steel

Structural steel shall conform to **IS: 226** and **IS: 2062**.
Electrodes for welding shall conform to IS: 814 or IS: 815 or equivalent.

All bolts and nuts shall conform to IS: 1367. Stainless steel nuts and bolts shall be of SS 307 type. All materials shall be of new and unused stocks. Manufacturer's test certificate shall be made available to the PD/Engineer-in-Charge when called for.

4.3.5.7 Storage

The steel reinforcement and structural steel shall be stored in steel yard in such a way as to prevent deterioration and corrosion, preferably at least 150 mm above ground by supporting on wooden or concrete sleepers at contractor's expenses.

4.4 Proportioning of Concrete

The determination of the water-cement ratio and proportions of the aggregates to obtain the required strength shall be made from preliminary tests by designing the concrete mix as per provisions laid down in IS: 456-2000 & IS: 10262 or its latest revision. Design mix shall be admissible only if contractor is able to manage the quality control of design mix e.g. weighbridge, proper water measuring device etc. and designing the concrete mix as and when source of any of the consistent of concrete is changed. If contractor fails to comply with the requirements of design mix concrete, he shall have to follow the nominal mix as tabulated below:

Table- 4.5 Recommended Water-Cement Ratio (As per IS: 456-2000)

Grade of Concrete	Nominal Mix of Concrete	Quantity of Water per 50 Kg. of cement (Max)
M 5	1:5:10	60 litres
M 7.5	1:4:8	45 litres
M 10	1:3:6	34 litres
M 15	1:2:4	32 litres
M 20	1:1.5:3	30 litres
M-25	1:1:2	26 litres

Cube tests shall be carried out by the contractor on the trail mixes before the actual concreting operation starts. Based on the strength of the concrete mix sanction for its use has to be obtained from PD/Engineer-in-Charge.

If during the execution of the works it is found necessary to revise the mix because of the cube tests lower strengths than the required one due to inconsistency of quality of material or otherwise, the PD/Engineer-in-Charge shall ask for fresh trial mixes to be made by the contractor. No extra claim shall be entertained due to such change in mix variations, as it is the contractor's responsibility to produce the concrete of the required grade.

Great care shall be exercised when mixing the actual works concrete using the proportions of the selected trial mix. The final concrete mix shall have the same proportions of cement, fine and coarse aggregates and water as that of the approved selected mix.

Where the weight of cement is determined by accepting the manufacturer's weight per bag, a reasonable number of bags should be weighed separately to check the next weight. Proper control of mixing water is deemed to be of paramount importance. If mixers with automatic addition of water are used water should be either measured by volume in calibrated buckets, tins or weighed. All measuring equipment shall be maintained in a clean serviceable condition and their accuracy periodically checked and certified and the PD/Engineer-in-Charge's approval obtained.

The PD/Engineer-in-Charge may require the contractor to carry out moisture content tests in both fine and coarse aggregates. The amount of the added water shall then be adjusted to compensate for any observed variations in the moisture contents. For the determination of moisture content **IS: 2386** shall be referred to.

No substitution in material, used on the work or alternation in the established proportions shall be made without additional tests to show that the quality and strength of concrete are satisfactory. No alternations shall be permitted .without the prior sanction of the PD/Engineer-in-Charge.

4.5 Mixing of Concrete

The mixing of concrete shall be strictly carried out in an approved type of mechanical concrete mixer. The mixing equipment shall be capable of combining the aggregates, cement and water within the specified time into a thoroughly mixed and uniform mass, and of discharging the mixture without segregation. The entire batch shall be discharged before recharging. Mixing periods shall be measured from the time when all of the solid materials are in the mixing time has elapsed. The mixing time in no case shall be less than two minutes. The mixer speed shall not be less than 14 and not more than 20 revolutions per minute.

Mixing shall be continued until there is a uniform distribution of the materials and the mass is uniform in colour and consistency. Hand mixing of concrete shall not be permitted at all.

4.6 Grades of Concrete

The different grades of concrete shall conform to the strength as required by **IS: 456-2000**. Standard deviation shall be calculated as stated in clause 14.5 of **IS: 456-2000.** The acceptable criteria for concrete shall be as stated in clause 15 of **IS: 456-2000.**

The assumed standard deviations as given in table 6 of 18:456-2000 have to be followed. and are given hereunder :

Table 4.6 : Assumed Standard Deviation

Grade of Concrete	Assumed standard Deviation N/mm^2
M 10	2.3
M 15	3.5
M 20	4.6
M 25	5.3

In order to get a quick idea of quality of concrete, the optional tests are conducted as stipulated in 14.1.1 of **IS: 456-2000** and the results are analysed according to table 5 of **IS: 456-2000.**

4.6.1 Concrete

In general design mix concrete shall be used conforming to **IS: 456-2000.** Nominal Mix concrete batching by volume can only be allowed if the contractor is not able to adhere to the quality control provisions of the design mix with prior approval from Engineer on in writing request of the contractor mentioning reasons, for which no extra payment shall be made.

The mix proportions for all grades of nominal mix concrete shall be provided corresponding to the values specified in Table -4.7 below, for respective grades of concrete.

Table - 4.7 Characteristics Compressive strength of Concrete

Grade Designation	**Proportion of cement : fine aggregate: coarse aggregate**	**Specified characteristic compressive strength at 28 days (N/mm^2)**
M 15	1:2:4	15
M 20	1:1.5:3	20
M 25	1:1:2	25

The maximum water-cement ratio for all concrete works shall be as specified in **IS: 456-2000** and required by the PD/Engineer-in-Charge.
To keep the water cement ratio to the designed value, allowance shall be made for the moisture contents in both fine and coarse aggregates and determination of the same shall be made as frequently as directed by the PD/Engineer-in-Charge. The determination of moisture contents shall be according to **IS: 2386** (Part III).

4.6.1.1 Controlled concrete-

Controlled concrete shall be used on all concreting works except where specified otherwise.

The mix proportions for all grades of concrete shall be designed to obtain strengths corresponding to the values specified in Table 4.7.1 below for respective grades of concrete.

Table –4.7.1

Grade of Concrete	Specified characteristic compressive strength at 28 days [N/mm^2]
M 15	15
M20	20
M25	25
M30	30

The maximum water cement ration for all controlled concrete works shall be as specified in IS: 456-2000 and preliminary tests as specified in the IS codes and required by the Engineer shall be carried out, sufficiently ahead of the actual commencement of the work with different grades of concrete, made from representative sample of aggregates and cement expected to be used on the job to ascertain the ratios by weight of cement, of total quantity of fine and coarse aggregates and the water cement ratio required to produce a concrete of specified strength and desired workability.

The minimum cement content for each grade of concrete shall be as per Table-4.7.2 below. If the requirement of cement is found to be more than that specified below then such excess quantities of cement shall be used and for which no extra payment shall be made.

Table –4.7.2

Minimum Cement Content In Concrete

Grade of Concrete	Minimum cement content as per IS: 456 in kg./ cu. m of finished Concrete
M 15	310
M20	360
M25	410
M30	500

At least 4 (four) trial batches are to be made and 7 (seven) test cubes taken for each batch noting the slump on each mix. These cubes shall then be properly cured and two cubes for each mix shall be tested in a testing laboratory approved by the Engineer at 7 (seven) days and others at 28 (twenty eight) days for obtaining the ultimate compressive strength. The test reports shall be submitted to the Engineer. The cost of mix design and testing shall be borne by the contractor.

On the basis of the preliminary test reports for trial mix, a proportion of mix by weight and water cement ratio will be approved by the Engineer, which shall be expected to give the required strength, consistency and workability and the proportions so decided for different grades of concrete shall be adhered to, during all concreting operations. If however, at any time the Engineer feels that the quality of material being used has been changed from those used for preliminary mix design, the contractor shall have to run similar trial mixes to ascertain the mix proportions and consistency.

The mix once approved must not be varied without prior approval of the Engineer. However, should the contractor anticipate any change in the quality of future supply of materials than that used for preliminary mix design, he shall inform the same to Engineer and bring fresh samples sufficiently ahead to carry out fresh trial mixes. The Engineer shall have access to all places and laboratory where design mix is prepared. Design mix will indicate by means of graphs and curves etc. the extent of variation in the grading of aggregates which can be allowed. In designing the mix proportions of concrete, the quantity of both cement, and aggregate and water shall be determined by weight. All measuring equipment shall be maintained in clean and serviceable condition and their accuracy periodically checked.

To keep the water cement ratio to the designed value, allowance shall be made for the moisture contents in both fine and coarse aggregates and determination of the same shall be made as frequently as directed by the Engineer. The determination of moisture contents shall be according to IS: 2386 (Part III).

4.6.2 Strength Requirements

Where Ordinary Portland cement conforming to **IS: 269** is used the compressive strength requirements for various grades of concrete shall be as shown in Table -2 of IS: 456 -2000 where rapid hardening Portland cement is used the 28 days compressive strength requirements specified in Table-2 shall be met in 7 days. The strength requirements specified in Table-2 as previously given shall apply to both controlled concrete and ordinary concrete.

Other requirements of concrete strength as may be desired by the PD/Engineer-in-Charge shall be in accordance with India Standard **IS: 456-2000.** The acceptance of strength of concrete shall be as per clause 14 “Sampling and Strength Test of Concrete” and clause. 15 “Acceptance Criteria” of **IS: 456-2000** subject to stipulations and/or modifications stated elsewhere in this specification. if any.

Concrete work found unsuitable for acceptance shall have to be dismantled and replaced to the satisfaction of the PD/Engineer-in-Charge by the contractor free of cost to the Department. No payment for the dismantled concrete, the relevant formwork and reinforcement, embedded fixtures, etc. washed in the dismantled portion shall be made. In the course of dismantling if any damage is done to the embedded items or adjacent structures, the same shall also be made good free of charge by the contractor to the satisfaction of the PD/Engineer-in-Charge. If the water quantity has to be increased in special cases, cement also be increased proportionately to keep the ratio of water to cement same as adopted in trial mix design for each grade of concrete. No extra payment for the additional cement shall be made.

4.6.3 Workability

The workability of concrete shall be checked at frequent intervals by slump test. Where facilities exist and if required by the PD/Engineer-in-Charge, alternatively the Compacting Factor test in accordance with IS: 1199 shall be carried out. The degree of workability necessary to allow the concrete to be well consolidated and to be worked into the corners of formwork and round the reinforcement to give the required surface finish shall depend on the type and nature of the structure and shall be based on experience and tests. The limits of consistency for structures are as specified in Table 4.8 below:

Table 4.8: Limits of Consistency (as per IS : 456)

Placing Conditions	Degree of Workability	Values of Workability
Concreting of shallow sections with vibration	Very low	20.1 0 seconds, vee-bee time or 0.75.- 0.60 compacting factor
Concreting of lightly reinforced sections with vibration	Low	10-05 seconds, vee-bee time or 0.80 - 0.85 compacting factor
Concreting of lightly reinforced sections without vibration or heavily reinforced section with vibration	Medium	05-02 seconds, vee-bee time or 0.85 - 0.92 compacting factor or 25-75mm, slump for 20mm aggregate
Concreting of heavily reinforced sections with vibration	High	Above 0.92 compacting factor or 75 - 125 m, slump or 20 mm *aggregate

* For smaller aggregate the values shall be lower.

4.7 Workmanship

All workmanship shall be according to the latest relevant standards. Before starting a pour the contractor shall obtain the approval of the PD/Engineer-in-Charge or his representative in a “Pour Card” maintained for this purpose. He shall obtain complete instructions about the material and proportion to be used, slump, workability, quantity of water per unit of cement, number of test cubes to be taken, finishing to be done, any admixture to be added, etc.

4.8 Transportation and Pouring

The concrete mixer shall be as close to the place of concreting as possible but not as close as to produce vibration and disturbance to the shuttering and reinforcements. It shall be located at such a position that time lapse for transportation of unloaded concrete mix from the mixer to the place of deposition of concrete is minimum.

When there is a difference in level between the unloading platform of concrete from the mixer to the actual place of deposition of concrete, the concrete shall be transported manually as by means of builders’ hoist/crane or concrete pump to the actual level of concreting, depending on requirement as approved by PD/Engineer-in-Charge.

Chutes for transporting the concrete shall not normally be used. The PD/Engineer-in-Charge’s written permission shall be taken for transporting by means of chutes. If use of chutes is permitted then the concrete shall be again thoroughly mixed by using spades manually before placing the concrete in the moulds/shuttering to avoid segregation of concrete. It shall be ensured that initial setting of the concrete shall not take place and the mix of the concrete is as good as that of freshly poured concrete delivered directly into the moulds/shuttering. It shall be ensured that the drop of concrete is not from an excessive height and that the vibration and deposition of concrete are simultaneously carried out.

Before placing concrete, all equipment for mixing and transporting the concrete shall be cleaned and all debris shall be removed from the place to be occupied by the concrete. All form and soil surface shall be finished to desired levels and shall be thoroughly wetted immediately prior to placing of concrete.

No concrete shall be placed until the PD/Engineer-in-Charge has approved the excavation formwork and the reinforcement. The competent formwork maker and steel fixer shall be in attendance during concreting operation.

Concrete shall be handled from the place of mixing to the place of final deposit as rapidly as practicable by methods, which shall prevent the segregation or loss of any of the ingredients. If segregation does occur during transport, the concrete shall be remixed before being placed. The concrete shall be place and compacted before setting commences and shall not be subsequently disturbed.

To ensure bond and water tightness between old concrete surface and the concrete to be place PVC water stops of approved make and size 150 mm wide, 10 mm thick should be used. The bonding of old and new concrete shall be done by applying cement slurry after thoroughly watering the old concrete surface and. removing all loose particles.

In specified cases, with approval of PD/Engineer-in-Charge the surface shall be cleaned and roughened by initial green cut by wire brushes or chipping. The initial green cutting may be done after 6 hours of placing concrete in order to facilitate the work. The old concrete walls/members shall be given a shear of 50 x 65 mm deep. This key shall also be thoroughly cleaned with wire brush in green stage before next lift pouring to avoid percolation of works.

4.7.1 Special methods of Concreting

Should be contractor propose to use the special methods of concreting not included in this specification, such as pumping concrete or using vacuum moulds he shall obtain the Engineer's approval before commencing work and comply with any subsequent specifications made by the Engineer for this special methods of concreting. Contractor is advised to use modern techniques in adapting methods of laying/finishing concrete in raft/wall etc., e.g. in raft, us of any other acceptable and proven method will be welcomed. The contractor may elaborate same on while quoting the offer.

4.8.1 Placing of concrete in slabs and beams

Concrete in slabs shall be placed in one continuous operation for each span unless otherwise directed. Longitudinal construction joints, if required by reason of the width to be placed shall be located as shown on the drawings or as directed by the PD/Engineer-in-Charge.
Concrete in the stem and slab of T -beam shall be placed in one continuous operation and shall be deposited uniformly for the full length of the beam and brought up evenly in horizontal layers.

Where the size of the member is such that it cannot be made in one pour, transverse vertical construction joints shall preferably be located within the area of contra flexure. For continuous spans, where required by design considerations the concrete placing sequence shall be approved by the PD/Engineer-in-Charge.

4.8.2 Concreting floors

Concreting in floor shall be done in a chess board pattern, allowing sufficient time to elapse before the adjacent band in cast. The panel size is restricted to 7.5m in reinforced concrete slab.

Concreting shall not be started unless the electrical conduits or any other piping Puddle Collars wherever required or laid by the concerned agency. The civil contractor shall afford all the facilities and maintain co-ordination of work with other agencies engaged in electrical and such other works as directed by the PD/Engineer-in-Charge.

Where concrete is placed on soil it shall be placed only on firm undisturbed ground. Any concrete that is placed on a well compacted fill shall have the prior approval of the PD/Engineer-in-Charge. Concrete shall not be placed in standing water, on sub-grade or in foundation Excavation.

4.9 Compaction

Concrete during and immediately after depositing shall be thoroughly compacted. The compaction shall be done by mechanical vibration subject to the following provisions:

a. The vibration shall be internal unless special authorization of other methods is given by the PD/Engineer-in-Charge or as provided herein.

b. Vibrators shall be of type and design approved by the PD/Engineer-in-Charge. They shall be capable of transmitting vibration to the concrete at frequencies of not less than 4,500 impulses per minute.

c. The intensity of vibration shall be such as to visibly affect a mass of concrete of 25 mm slump over a radius of at least 0.5m

d. The contractor shall provide a sufficiently number of vibrators to properly compact each batch immediately after it is placed in the forms.

e. Vibrators shall be manipulated so as to the thoroughly work the concrete around the reinforcement and embedded fixtures, and into the corners and angles of the forms.

Vibration shall be applied at the point of deposit and in the area of freshly deposited concrete. The vibrators shall be inserted into and withdrawn out of the concrete slowly. The vibration shall be of sufficient duration and intensity to thoroughly compact the concrete but shall not be continued so as to cause segregation. Vibration shall not be continued at any one point to the extent that localized areas of grout are formed.

Application of vibration shall be at points uniformly spaced and not further apart than twice the radius over which the vibration is visibly effective.

f. Vibration shall not be applied directly or through the reinforcement to sections or layers of concrete which have hardened to the degree that the concrete ceases to be plastic under vibration. It shall not be used to make concrete flow in forms over distances so great as to cause segregation and vibrators shall not be used to transport concrete in the forms.

g. Vibration shall be supplemented by such rodding/ spading as necessary to ensure smooth surface and dense concrete along form surfaces and in corners and locations impossible to reach with the vibrators.

The whole process starting from the mixing of concrete to the placing and compaction shall not take more than 20 minutes and the process shall be completed before the initial setting takes place.

4.10 Curing

Curing shall be accomplished in accordance with **IS: 456-2000** by keeping the concrete covered with a layer of sacking canvas, Hessian or similar absorbent materials and kept constantly wet for at least seven days from the date of placing of concrete unless otherwise specified. The approval of the PD/Engineer-in-Charge shall be obtained for the method of curing the contractor proposes to use on the work. In very hot weather precautions shall be taken to see that temperature of wet concrete does not exceed 38ºC while placing.

Heavy loads shall not be placed on or moved across over the floor slabs until curing is complete. Care shall be taken to prevent floor surface from being marred during curing period. Freshly laid concrete form work shall not be jarred. Concrete placed in trenches or Excavation shall be protected from falling earth during and after placing.

4.11 Consistency

The consistency of concrete shall be frequently checked by means of a slump test performed as per the relevant Indian Standard by the PD/Engineer-in-Charge. The maximum and minimum slump for each class of concrete shall be as directed by the PD/Engineer-in-Charge, and any concrete as represented by the slump test which fails to comply with these directions shall be removed from the site and disposal off at the contractors cost.

4.12 Finishing Concrete

On striking the formwork, all blowholes and honeycombing observed shall be brought to the notice of PD/Engineer-in-Charge. The PD/Engineer-in-Charge may, at his discretion allow such honeycombing or blowholes to be rectified by necessary chippings and packing or grouting with concrete or cement mortar. If mortar is used, it shall be 1:2 mix or as specified by PD/Engineer-in-Charge. However, if honey combing or blowholes are of such extent as being undesirable, the PD/Engineer-in-Charge may reject the work totally and his decision shall be binding. No extra payment shall be made for rectifying these defects. All burrs and uneven faces shall be rubbed smooth with the help of carborundum stone.

The surface of non-shuttered faces shall be smoothened with a wooden float to give a finish equal to that of the rubbed down shuttered faces. Concealed concrete faces shall be Left as from the shuttering except

that honeycombed surface shall be made good as detailed above. The top faces of slabs not intended to be surfaced shall be leveled and floated to a smooth finish at the levels or falls shown on the drawings or elsewhere. The floating shall not be executed to the extent of bringing excess fine material to the surface.

The top faces of slabs intended to be covered with screed, granolithic or similar faces shall be left with a rough finish.

4.13 Work in Extreme Weather

During hot weather (atmospheric temperature above 40 degree centigrade) or cold weather (atmospheric temperature at 5 degree centigrade and below) the concreting shall be done as per the procedure and precautions set out in **IS: 7861** (Part I and II).

Dependence shall not be placed on salt or other chemicals for the prevention of freezing. Calcium chloride shall not be used as an accelerator except with the approval of the PD/Engineer-in-Charge. Recommendation given in relevant clauses of IS: 456 shall be strictly adhered to.

4.14 Loading of the Structures

No concrete structures shall be loaded until the concrete is at least 28 days old and only then with the approval of the PD/Engineer-in-Charge and subject to such conditions as he may lay down.

4.15 Testing and Acceptance Criteria of Concrete

The sampling of concrete making the test specimens, curing and testing procedures etc. shall be in accordance with **IS: 1199, IS: 3085** and **IS: 516,** the size of specimen being 15 cm cubes. Normally only compression tests shall be performed in accordance with **IS: 516.**

For each grade of concrete and for each 8 hours of work or portion thereof the following samples shall be taken.

At least six specimens shall be taken from the first 15.0 m3 or part thereof and three of these shall be tested at 7 days and the remaining at 28 days. Four additional specimens shall be taken from each additional 15.0 m^3 of concrete or portion thereof of which 2 specimens shall be tested at 7 days and the remaining at 28 days.

To control the consistency of concrete from every mixing plant slump tests, and/or compacting factor tests in accordance with **IS: 1199** shall be carried out by the contractor every two hours or as directed by the PD/Engineer-in-Charge. Slumps corresponding to the test specimens shall be recorded for reference. The acceptance criteria of concrete shall be in accordance with **IS: 456-2000.**

Concrete work found unsuitable for acceptance shall have to be dismantled and replacement is to be done as per specifications by the contractor. No payment for the dismantled concrete, the relevant formwork and reinforcement embedded fixtures etc. shall be paid.
In the course of dismantling if any damage is done to, the embedded items or adjacent structures the same shall be made good free of charge by the contractor to the satisfaction of the PD/Engineer-in-Charge.

4.16 Load Test of Structures

The PD/Engineer-in-Charge may instruct for a load test to be carried out on any structure if in his opinion such a test is deemed necessary for any of the following reasons.

The works site made concrete test-cube failing to attain the specified strength, as per the criteria laid down in **IS: 456-2000**.

Suspected overloading during construction of the structure under review
Shuttering being prematurely removed and not as per the specification
The concrete is being improperly cured.
Visible deficiencies of the concrete

If the results of the load test be unsatisfactory, the PD/Engineer-in-Charge may instruct the Contractor to demolish and reconstruct the structure or part thereof at the contractor's cost. The load test of structures shall be carried out as per the clause 16.5 of **IS: 456-2000.**

4.17 Special methods of concreting

The contractor should propose to use special methods of concreting not included in the specifications, such as pumping concrete or using vacuum moulds, he shall obtain the PD/Engineer-in-Charge's approval before commencing work and comply with any subsequent specification made by the PD/Engineer-in-Charge for this special method of concreting. Contractor is advised to use modern techniques in adopting methods of laying/finishing concrete in raft/walls etc. e.g. in raft use of any other acceptable and proven method will be welcomed. The contractor may elaborate same on while quoting the offer.

4.18 CONCRETE FOR WATER RETAINING STRUCTURES

4.18.1 Materials for construction

Materials for concrete viz. Cement, sand aggregate, water etc. shall be as er the specifications of reinforced concrete works described in section 4 and IS : 3320 Part I. However, super-sulphated cement shall be used when ground water contains sulphates more than the permissible limit as indicated in IS: 456-1978.

4.18.2 Design

The design of the structure shall be based as per IS: 3370 (part I to Part IV) code of practice for concrete structures for storage of liquids.

4.18.3 Aggregates

Maximum size of the aggregate shall be 20 mm for thickness of the section upto 40 mm. above this limit 40 mm size aggregate may be used in the quantities as approved by the Engineer.

4.18.4 Controlled concrete

Controlled concrete of grade not weaker than M 20 is to be used in the structures with minimum quantity of cement in the concrete mix to be not less than 330 kg/cum, for the reinforced concrete work, 360 kg/ cum in post-tensioned pre-stressed work and 380 kg/cum in pre-tensioned concrete work. The maximum quantity of cement in the concrete mix shall preferably not exceed 530 kg/cum of concrete. The design should be such that the resultant concrete is dense and impervious. The mix of concrete should be fully compacted. The use of needle type of internal vibrators is recommended.

4.18.5 Cover

Cover to the reinforcement shall be as stated in the drawing and in conformation to IS: 3370 (part-I to IV)

4.18.6 Admixtures

Admixtures such as plastic may be added to improve the workability only with the permission of the Engineer.

4.18.7 Joints

The Maximum spacing between the partial contraction joints shall be not more than 7.5 m and between the full contraction joint 15.0 m. Alternatively, temporary short gaps of width 0.5 m in walls be left out to the filled in after the concrete has hardened on sides. Vertical joint shall be avoided by casting a lift of approximately 1.0m deep in continuous operation for circular structures.

4.18.8 Shuttering

Scope

Form work shall be composed of steel and /or best quality shuttering wood of non-absorbent type. Timber shall be free of knots and shall be of medium grain as far as possible. Hard woods shall be used for caps and wedges under or over posts. Marine plywood shuttering or equivalent shall be used where specified to obtain smooth surfaces for exposed concrete work. Struts shall generally be mild steel tubes, and strong Sal bellies. Bamboos, small diameter bellies etc. shall not be used unless approved by the Engineer in specific cases.

General Requirements

If, it is so desired by the Engineer the contractor shall design and prepare, before commencement of actual work, the drawings for form work and centering and get them approved by the Engineer. The form work shall conform to the shape, lines and dimensions as shown in the drawings.

The centering shall be true, rigid and thoroughly braced both horizontally and diagonally. The forms shall be sufficiently strong to carry, without undue deformation, the dead weight of the concrete at the time of casting as well as working load. Where the concrete is vibrated, the form work shall be strong enough to withstand the effects of vibration without appreciable deflection, bugging distortion of loosening of its components. The joints in the form work shall be sufficiently tight to prevent any leakage of mortar. The form work shall be such as to ensure a smooth uniform surface free from honeycombs, air bubbles, bulges, fins and other blemishes, Any blemish or defect found on the surface of the concrete must be brought to the notice of the Engineer immediately by the contractor and rectified, free of charge, as directed by him. To achieve the desired rigidity, tie bolts, spacer blocks, tie wires and clamps as approved by the Engineer shall be used but they must in no way impair the strength of concrete or leave stains or marks on the finished surface.

Where there are chances of these fixtures being embedded, only mild steel or concrete of adequate strength shall be used. Bolts passing completely through liquid retaining walls/ slabs for the purpose of securing and aligning the form work should not be used.

For exposed interior and exterior concrete surfaces or beams, columns and walls, plywood or other approved forms, thoroughly cleaned and tied shall be used. Rigid care shall be exercised in ensuring that all columns are in plumb and true and thoroughly cross braced to keep them so. All floor and beam centering shall be crowned not less than 8 mm in all directions for every 5 m span. Temporary openings for cleaning, inspection and for pouring concrete shall be provided at the base of vertical forms and at other places where they are necessary and as may be directed by the Engineer. The temporary openings shall be so formed that they can be conveniently closed when required and must not leave any mark on the concrete.

Cleaning and Treatment of forms

All forms shall be thoroughly cleaned of old concrete, wood shavings, saw dust, dirt and dust sticking to them before they are fixed in position. All rubbish, loose concrete, chipping, shavings, sawdust etc. shall b scrupulously removed from the interior of the forms before the concrete is poured, along with wire brushes, brooms etc. compressed air jet and / or water jet shall be kept handy for the cleaning, if so directed by the Engineer.

Before shuttering is placed in position, the form surface in contact with concrete shall be treated with approved form removing non-staining oil or composition. Care shall be taken that the oil or composition does not come in contact with reinforcing steel or existing concrete surfaces. They shall not be allowed to accumulate at the bottom of the shuttering.

The form work shall be so designed and erected that the forms for slabs and the sides of beams, columns and walls may be removed first, leaving the shuttering to the soffits of beams and their supports in position. Re-propping of beams shall not be done except with the approval of the Engineer and props can be reinstated in anticipation of abnormal conditions, if form work for column is erected to the full height of the columns, one side shall be left open and built up in sections, as placing of concrete proceeds: Wedges, spacer, bolts, clamps or other suitable means shall be provided to allow accurate adjustment of the form work and to allow, it to be removed gradually without jarring the concrete.

Pipe inserts to be laid at the time of concreting

For pipes to be laid in the walls during concrete, relevant drawings shall be followed.
Openings shall be provided in the shuttering plates at suitable positions. It is to be noted here that special shuttering plates for this purpose may have to be used, and the number of uses of shuttering material, for working out the rate, shall be calculated accordingly.

Removal of forms

The contractor shall record on the drawings or in other approved manner, the date on which the concrete is placed in each part of the work and the date on which the form work is removed there from and have this record checked and counter signed by the Engineer. The contractor shall be responsible for the safe removal of the form work but the Engineer may delay the time, if considers it necessary. Any work showing sign of damage through premature removal of form work for loading shall be entirely reconstructed by the contractor without any extra cost of the owner.
Forms for various types of structural components shall be removed before the minimum periods specified below (table V) which shall also be subject to the approval of the Engineer. Engineer at his discretion may extend this maximum period for removal of form work and contractor shall retain the form work for a longer period as desired by the Engineer at no extra cost to the owner.

Table 5
Minimum period for Removal of Form work

Part of structure	Temperature in degrees Celsius (^{0}C)			
	Above 40^0 Days	40^0 to 20^0 Days	20^0 5^0 Days	to Below 5^0 Days
1	2	3	4	5
A. Ordinary Portland Cement Concrete				
1. Column and walls	2	1	1	Do not remove forms until site
2. Beams sides	3	2	3	cured test cylinder / cubes
3. Slabs 125 mm thick or less	10	7	8	develop 50% of 28 days strength
4. Slabs over 125 mm thick and soffit of Minor beams.	18	14	16	
5. Soffit of main beams	24	21	22	
B. Rapid Hardening Portland Cement concrete				
1. Columns and walls	1	1.5	1	
2. Beams sides	2	1	1	Do not remove forms until site
3. Slab 125 mm thick or less	7	4	5	cured test cylinder / cubes develop 50%
4. Slab over 125 mm thick and soffit of minor Beams	12	8	9	of 28 days strength
5. Soffit of main Beams	14	10	12	

Note : For Ordinary Portland Cement the removal time should be suitably increased over the time giver for ordinary Portland Cement, as directed by the Engineer.

Reuse of forms

Before reuse, all forms shall be thoroughly scrapped, cleaned, joints examined etc. and when necessary, repaired and inside surface treated as specified herein before. Form work shall not be used/ reused, if declared unfit or unserviceable by the Engineer.

Classification of form work

a. Ordinary

These shall be used in places where ordinary surface finish is required and shall be composed of steel and / or approved good quality seasoned wood.

b. Plywood

These shall be used in exposed surfaces, where specially good finish is required and shall be made mostly of approved brand of heavy quality shuttering/ marine plywood to produce a perfectly level, uniform and smooth surface.
Ordinary form work shall be used for all underground structures and 'plywood' form work shall be used for all structure above ground.

Acceptance of form work and finished concrete shall be true to shape, lines, levels, plumb and dimensions as shown on drawings. All embedded fixtures shall be correct type and in correct position as shown in drawings. Finished concrete surface shall be free from blemishes like honeycombs, air bubbles, fins, etc. Exposed decorative concrete surfaces shall be free from rust, stains, grease and mould oil stains, etc. and shall have uniform pleasing appearance to satisfaction of the Engineer. If desired, the finished concrete shall conform in all respects to the accepted sample.

Where exposed surface of concrete can be effectively sealed to prevent loss of water the periods specified for temperature above 40^0 C can be reduced to those for the temperature range of 20^0 to 40^0 C subject to approval of the Engineer. Before removing any form work, the contractor must notify the Engineer well in advance to enable him to inspect the concrete, if he so desires.

Tolerance in finished concrete

Tolerance in finished concrete shall be exactly same as for reinforced concrete structures in section 2.5.3.3.and 2.5.11.

4.18.9 Curing

Curing etc. of the structures shall be exactly same as for reinforced concrete structures in section 2.5.9

4.18.10 Vertical joints

All vertical joints shall extend full height of the wall in unbroken alignment.

4.18.11 Removal of Shuttering

Removal of the form work shall confirm of IS: 456-1978 and para 2.5.3.9 Bolts and fasteners passing completely through liquid retaining slabs for the purpose of securing and aligning the form work should not be used unless effective precautions are taken to ensure the water tightness after the removal of pipes or other fittings. Puddle flange in concreting shall be placed at correct positions, before concreting and verified by the Engineer.

4.18.12 Water Tightness

The test for water tightness of the structure shall be carried out as per clause 10 f IS 3370 part 3.

4.19 Epoxy coating and bituminous painting

EPOXY COATING

4.19.1 General

Epoxy coating is to be applied to the internal surface of MS pipes. The thickness of epoxy film shall be 400 microns.

4.19.2 **Materials**

A solvent free epoxy coating like "Araldite GY 255 manufactured by Hindustan CIBA Geigy Ltd. Bombay or equivalent is to be used for forming the film. In case of use of an equivalent it should be got approved by the employer before placing supply orders.

Materials used and process of application on the concrete of other surface should be strictly according ot the instructions of the supplier of the epoxy.
Araldite GY 25 one part by weight is to be mixed with 1 part by weight of Hardener HY 45.

4.19.3 Subsurface Preparation

The concrete surfaces should be cleaned thoroughly by sand blasting. The mild steel parts are also to be cleaned to be free of grease and thoroughly sand blasted. The coverage should be move than 6 sq. meters for concrete and 5 sq. meters for mild steel per kg. of epoxy respectively.

4.19.4 **Curing**

The curing should be done for 7 days at room temperature. If the temperature is less than 15^0 C the space should be warmed up by incandescent lamps, heaters, blowers or infrared lamp.
The instructions of both the supplier/ manufacturer of the product, for use of materials and application take priority over the above instructions and they should be followed very rightly.

4.19.5 Bituminous Painting

Two coats of bituminous paint of 80/100 grade, with 1.65 kg/sq. m spread will be provided on internal and / or external surface of the pipes and on piers, in the reach, where MS/ GRP pipes are proposed, and where concrete / structure is exposed to weathering or foul conditions.

4.19.6 Application

All corners and junctions shall be properly rounded off to present a uniform and smooth finish. After complete curing of the paint, it shall be allowed to dry up. After drying, the moisture content shall be brought to a value less than 4% by using a blow lamp. The surface should be well cleaned with smooth brushed to make it dust free. The coating shall be allowed to dry and kept in dry condition till final setting takes place. The sub-surface preparation and curing is to be done as specified is para 2.7.3 and 2.7.4 respectively above.

4.20 Codes and standards for D.I. Pipes

This Indian Standard (Third Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Pig Iron and Cast Iron Sectional Committee had been approved by the Metallurgical Engineering Division Council.

This standards was first published in 1977 and then revised in 1990 and 1994. While revising this standard, in light of the experience gained during these years, the committee has decided to revise this standard taking note of the revision and publication of EN 545 : 1994 and ISO 2531 : 1998 (E).

In this revision the following main modifications have been made :

a) Definition of various terms have been included to avoid ambiguity;
b) Dimensions from DN 80 to DN 2000 have been incorporated aligning them with ISO 2531 : 1998 (E) and EN 545 : 1994;
c) Thickness of Class K7 and K8 have been increased based on current International practice and method of production facilities in this country;
d) Requirement for coating and lining have been modified;
e) To have a proper control on the quality of the pipes, a clause on quality assurance has also been incorporated;
f) The standard has been generally updated taking into account the modern trend in this respect in other International specifications particularly the current changes made in EN 545 : 1994 and ISO 2531 (E); and
g) As per current international practice, requirement of mass has been deleted from the standard.

Ductile iron, also called nodular iron or spheroidal graphite iron, is characterized by the presence of graphite in nodular or spheroidal from in the resultant casting. It differs from cast iron by greater tensile strength and its significant elongation at break. Ductile iron offers :

a) high resistance against breakage due to impact;
b) high tensile strength, comparable to that of mild steel so that the pipes can be used for higher working pressure;
c) traditional corrosion resistance, comparable to that of cast iron; and
d) lighter in mass as compared to cast iron pipes.

In order to have international co-ordination and harmonization with other International Standards, assistance has been derived from the following publications:

ISO 2531 : 1998 (E)	Ductile iron pipes, fittings and accessories and their joints for water or gas application, issued by International Organization for Standardization (ISO)
ISO 7186 : 1996 (E)	Ductile iron products for sewage applications
ISO 4179 : 1985	Ductile iron pipes for pressure and non pressure piplines - Centrifugal cement mortar lining – General requirement.
ISO 8179-1 : 1985	Ductile iron pipes – External coating : Part 1 Metallic zinc with finishing layer.
ISO 8179-2 : 1995	Ductile iron pipes – External coating : Part 2 Zinc rich paint with finishing layer.
ISO 8180 : 19985	Ductile iron pipes – Polyethylene sleeving.

4.21 Codes and standards for M.S. Pipes

This Indian Standards (Part I) (Sixth Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Steel tubes, pipes and fittings sectional committee had been approved by the Metallurgical Engineering Division Council.

This standard was first published in 1958 and subsequently revised in 1964, 1968,, 1973, 1979 and 1990 respectively.

In latest I.S. code follow should have to comply.

a) All the amendments on the fifth revision have been incorporated.
b) Chemical composition for seamless tubes (ladle analysis) has been incorporated and for manufacturing of welded tubes, IS 10748 ‘Hot-rolled steel strip for welded tubes and pipes’ have been included.
c) Permissible variation in case of product analysis of seamless tubes for all specified elements have been incorporated.
d) Provision for supply of tubes with bevel end has been incorporated.

The following standards contain provision, which through reference in this text, constitute provisions of this standard. At the time of publication, the edition indicated were valid. All standards are subject to revision and parties to agreements based on this standards are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below :

228	Method for chemical analysis of steel.
513 : 1994	Cold-rolled low carbon steel sheets and strips (forth revision).
554 : 1999	Pipe threads where pressure-tight joints are made on the threads – Dimensions, tolerances and designation (forth revision).
1239 (Part 2) : 1992	Mild steel tubes, tubular and other wrought steel fittings : Part 2 Mild steel socket, tubular and other wrought steel pipe fittings (forth revision)
1387 : 1993	General requirements for the supply of metallurgical materials (second revision)
1608 : 1995	Mechanical testing of metals – Tensile testing (second revision)
2328 : 1983	Method for flattening test on metallic tubes (first revision).
2329 : 1985	Method for bend test on metallic tubes (in full section) (first revision).
4711 : 1974	Methods for sampling of steel pipes, tubes and fittings (first revision)
4736 : 1986	Hot dip zinc coatings on mild steel tubes (first revision).
4740 : 1979	Code of practice for packaging of steel tubes (first revision)
8999 : 1979	Gauging practice for pipe threads where pressure tight joints are required on the threads.

10748 : 1995 Hot rolled steel strip for welded tubes and pipes (first revision)
12278 : 1988 Method for ring tensile test on metallic tubes.

4.22 Codes and Standards

All applicable standards, specifications, etc. and codes of practice shall generally be the latest editions, including all applicable official amendments and revisions. A complete set of all these documents shall generally be available at site, with the contractor.

All work shall be carried out as per the stipulations contained in various sections of these specifications and the latest Indian Standards, Acts, Codes and best practices.

In case of conflict between the stipulations contained in various' sections of these specifications and stipulations of Indian Standard, Codes, etc. the requirements of stipulations contained in various sections of these specifications, shall prevail over that of Indian Standards, Codes, etc.
Some of the applicable Indian Standard Codes, etc. are referred to here below:

IS:73	Specification for paving bitumen
IS:2060	Specification for structural steel
IS:8112	Specification for Ordinary Portland cement 43 grade.
IS:280	Specification for mild steel wire for general engineering purposes
IS:383	Specification for coarse and fine aggregates from natural sources for concrete
IS:432 (Part I & II)	Specification for mild steel and medium tensile steel bars and hard drawn steel wire for concrete reinforcement
IS:455	Specification for Portland Slag Cement
IS:456	Code of practice for plain and reinforced concrete
IS:457	Code of Practice for general construction of plain & reinforced concrete for dams and other massive structure.
IS:516	Method of test for strength of Concrete
IS:650	Specification for standard sand for testing of cement
IS:702	Specification for industrial bitumen
IS:816	Code of practice for use of metal as welding for general construction in mild steel
IS:1199	Methods of sampling and analysis of concrete
IS:1200 (Part II, V, VIII, XVIII, SVIII)	Method of measurement of building and civil engineering works, water proofing and damp proofing
IS:1367	Technical supply conditions for threaded steel fasteners
IS:1489	Specification for Portland puzzolana cement (Part I) Fly ash based & (Part II) Calcified clay based
IS:1566	Specification for Hard drawn steel wire fabric for concrete reinforcement
IS:1609	Code of practice for laying damp proof treatment. using bitumen felts.
IS:1786	Specification for high strength deformed steel bars and wires for concrete reinforcement
IS:1791	General requirements for batch type concrete mixer.
IS: 1838	Specification for performed fillers for expansion joints in concrete pavements and structures (non-extruding and resilient type)

IS:2204	Code of practice for construction of reinforced concrete shell roof
IS:2210	Criteria for the design of reinforced concrete shell structures and folded plate
IS:2386 (Part 1 to VIII)	Methods for test of aggregates for concrete
IS:2438	Specification for roller pan mixer
IS:2502	Code of practice of bending and fixing of bars for concrete reinforcement
IS:2505	General requirements for concrete vibrators, immersion type
IS:2506	General requirements for concrete vibrators, screen board type
IS:2514	Specification for concrete vibrating tables
IS:2571	Code of practice for laying in situ cement concrete flooring
IS:2645	Specification for integral cement water proofing compounds
IS:2722	Specification for portable swing weigh batchers for concrete (single and double bucket type)
IS:2750	Specification for steel scaffoldings
IS:2751	Code of practice for welding of mild steel plain and deformed bars for reinforced concrete construction
IS:3025	Methods of sampling and test waste water
IS:3067	Code of practice for general design details and preparatory work for damp proofing & water proofing of buildings
IS:3150	Specification for hexagonal wire netting for general purposes
IS:3366	Specification for pan vibrators
IS:3370 (Part I & II)	Code of practice for concrete structures for the storage of liquids
IS:3384	Specification for bitumen primer for use in water proofing & damp proofing
IS:3414	Code of practice for design and installation of joints in buildings
IS:3550	Methods of test for routine control for water used in industry
IS:3558	Code of practice for use in immersion vibrators for consolidating concrete
IS:3696 (Part I & II)	Safety code for scaffolds and ladders
IS:4014 (Part I & II)	Code of practice for steel tubular scaffolding
IS:4031	Methods for physical tests for hydraulic cement
IS:4130	Safety code for demolition of buildings.
IS:4326	Code of practice for earthquake resistant design and construction of buildings
IS:4461	Code of practice for joints in surface hydroelectric power stations
IS:4656	Specification for form vibrators for concrete
IS:4925	Specification for batching and mixing plant
IS:4990	Specification for plywood for concrete shuttering work
IS:4995 (Part I & II)	Criteria for design of reinforced concrete bins for the storage of granular and powdery materials
IS:5121	Safety code for piling and other deep foundations
IS:5256	Code of practice for sealing joints in concrete lining on canals

IS:5525	Recommendations for detailing of reinforcement in reinforced concrete work
IS:5624	Specification for foundation bolts
IS:6461	Glossary of terms relating to cement concrete
IS:6494	Code of practice for water proofing of underground water reservoirs and swimming pools
IS:6509	Code of practice for installation of joints in concrete payments
IS:7193	Specification for glass fibre base coal tar pitch and bitumen felts
IS:7293	Safety code for working with construction machinery
IS:7861 (Part I & II)	Code of practice for extreme weather concreting
IS:9012	Recommended practice for shuttering
IS:9103	Specification for admixtures for concrete
IS:9417	Recommendations for welding cold worked steel bars for reinforced concrete construction.
IS:9595	Recommendations for metal-arc welding of carbon and carbon manganese steels
IS:10262	Recommended guidelines for concrete mix design
IS:11384	Code of practice for composite construction in structural steel and concrete
IS:12118	Specification for two parts poly sulphide
IS:122000	Code of practice for provision of water slops at transverse contraction joints in masonry and concrete dams
IS:12269	53 grade ordinary Portland cement
IS:12600	Portland cement, low heat
IS:23	Handbook of concrete mixes
IS:24	Explanatory Handbook on IS:456-1978
IS:34	Handbook on concrete reinforcement and detailing.

5. Roadways, Pathways & Hard standings

a. Internal roads shall be provided around the treatment plant to link in with the existing units and the approach road and permit access to the plant for necessary maintenance, delivery of consumables and personnel access. All roads shall be of asphalt macadam and minimum 3.75 meters wide. Vehicular access shall be provided for all Plant structures and buildings. All roads shall be provided with drainage and shall be constructed to prevent standing water.

b. Hard standing areas with shading facility shall be provided to permit the parking of vehicles involved in the delivery of consumables from blocking site roadways during unloading or loading.

6 BITUMINOUS, CC, BOE & INTERLOCKING TILE ROAD

6.1 All work shall be carried out as per IRC detailed specifications where there are no IRC specifications M.O.S.T. specifications/P.W.D. specifications will be followed unless otherwise specified or directed by the Engineer in charge.

6.2 The contractor shall take all necessary measures for the safety of traffic during construction and provide, erect and maintain such barricades, including signs, marking flags, lights and flagman, as necessary at either end of work site and at such intermediate points as directed by the Engineer in charge for the proper identification of the construction area. He shall be

responsible for all damages and accidents caused due to negligence on his part. The temporary warning lamps or reflective barriers or sign boards shall be installed at all barricades during the hours of darkness.

6.3 Stone ballast / Stone grit should be stacked at site for satisfaction regarding quantity of material to Engineer in charge.

6.4 The material collected for use in the work shall satisfy all requirements for the particular work, failing which the material will be rejected. The gauge of stone ballast shall be as per detailed specification for the respective items and deduction will be made for the under gauge/ over gauge material as per Engineer in charge.

6.5 During construction care shall be taken to ensure there is least disturbance to the traffic. Adequate barriers, red flags in day time and light in night hours shall be provided to guide and inform the traffic. All necessary precautions shall be taken to avoid any road accident at work-site but if there happens any the responsibility will be of the contractor and he shall be responsible for all consequences and damages/ claims etc.

6.6 The consolidation will be in specified layers. Proper and adequate camber or super elevation etc. shall be provided as per directions of Engineer in charge.

6.7 Next coat of consolidation shall be allowed after checking of the crust and quality of previously consolidated layer by the Engineer in charge and found satisfactory.

6.8 The material of the different layer will be spread in required loose thickness so as to achieve the desired compacted thickness.

6.9 The binding material for consolidation shall be soil having plasticity index not more than 6 which is to be arranged by the contractor from a suitable place as directed by Engineer in charge. The soil shall be got approved from the Engineer in charge before start of consolidation and nothing extra shall be paid either for the cost of binding material or for its cartage.

6.10 Proper arrangement of water and its storage for consolidation shall have to be made by the contractor at his own cost.

6.11The stone ballast shall confirm to the following sieves.

Name of metal		Percentage by weight passing					
.	63-45 mm gauge	90 mm 10%	63 mm 90-100%	53 mm 25-75%	45 mm 0-15%	22.4 mm 0-5%	1.2 mm -
.	53-22.4 mm gauge	- 	100% 	95-100% 	65-90% 	0-10% 	0-5%

6.12 (a) 16-22.4 mm size grit shall pass 100% from 22.4 mm square mesh And all retained on 16 mm square mesh sieve.

(a) 10-16 mm size shingle / grit shall pass 100% from 16 mm square Sieve and all retained on 10 mm square mesh sieve.

6.13 (A) Material for Ist coat painting shall be as follows:-

(i) Grit 16-22.4 mm size (crushed) 1.9 cum per% sqm

(ii) Bitumen

(a) For Pre coating 15 kg per cum of shingle/grit

(b) For tack coat 180 kg per% sqm.

(B) Material for IInd coat painting shall be as follows:-

(i) Grit /Shingle 10-16 mm size 1.20 cum per% sqm.

(ii) Bitumen

(a) For Pre coating 15 kg per cum of shingle/grit

(b) For tack coat 110 kg per% sqm.

(C) Material for open Graded Premix Carpet shall be as follows:-

(i) Aggregates for Carpet

(a) Stone chippings 13.2 mm size, passing 22.4mm sieve and retained on 11.2 mm sieve 1.8 cum per% sqm

(b) Stone chippings 11.2 mm size, passing 13.2 mm Sieve and retained on 5.6 mm sieve 0.9 cum per% sqm

(ii) Bitumen

(a) For tack coat 180 kg per% sqm

(b) For stone chipping of 13.2 mm size 52 kg per cum

(c) For stone chipping of 11.2 mm size 56 kg per cum

(D) Material for type 'A' seal coat shall be as follows:-

(i) Stone chippings 6.7 mm size passing through 11.2 mm sieve and retained on 2.36 mm sieve - 0.9 cum per% sqm

(ii) Bitumen 98 kg per % sqm

(E) Material for type 'B' seal coat shall be as follows:-

(i) Chippings aggregates passing 2.36 mm sieve and be retained on 180 micron sieve- 0.6 cum per% sqm

(ii) Bitumen 68 kg per % sqm

6.14 Stone ballast/Grit/Shingle of approved quarry only, confirming to I.R.C. Specifications shall be used. Before using stone ballast/Stone Grit/River shingle the quality & size has to be approved by the Engineer in charge.

6.15 Contractor shall always cooperate in procurement of sample, conduction of tests as may be directed and no extra payment shall be made for the same. Test samples shall be taken carefully in accordance with the standard method of taking the test sample.

6.16 The contractor shall at all times keep the premises free from accumulated waste materials or rubbish caused by his employee on the works and on completion of the work, he shall clear away and remove from site all surplus materials, rubbish and temporary works of any kind and fill up borrow pits dug by his. He shall leave whole of the site and work clean and in a workman like condition to the entire satisfaction of the Engineer in charge.

6.17 The cement concrete road shall be constructed with concrete mix of M-20 grade as per IS code-456.

6.18 The permanent reinstatement of all types of roads shall be executed as per PWD specifications. Where PWD specifications are not available CPWD specifications shall be followed. The material used shall be conforming to relevant IS codes with its latest revision.

6.19 C.C. Road will be prepared with 10 cm thick P.C.C. 1:2:4 Cement: Coarse Sand & 20 mm Stone grit over base concrete 15 cm. P.C.C. 1:4:8 with cement coarse sand & 40 mm stone ballast after compacting the earth surface properly. The C.C. surface must be compacted with surface vibrator.

Interlocking Tile: Tiles must be of the thickness & grade of the disconnected tiles over base concrete 75 mm thick 1:6:12 Cement: Local Sand: Brick Ballast Tiles must be fixed over 40 mm thick local sand layer with proper pointing.

Other Works Details

1 Site Drainage

The operatorshall provide a site drainage system. The system shall comprise of the following:

- Storm Water Drainage
- Foul Drainage (if any)

1.1 Storm Water Drainage

(a) Storm water drains adjacent to the existing and proposed roads (under this Contract) shall be sized for a rainfall intensity of 50 mm/hr, allowing for 100% runoff. Drains adjacent to roads shall be in stone masonry in CM (1:4) of appropriate thickness, topped with 75 mm thick M10 concrete and internally flush pointed in cement mortar (1:4), 20 mm thick. The minimum width of drain shall be 450mm.

(b) The storm water drainage system shall also be designed to cater the run-off from the existing plot areas and structures, if necessary depending upon the site topography.

1.2 Foul Drainage

(a) The foul drainage system shall accept discharge from toilets, washrooms, offices and the laboratory. The foul drainage system shall be conveyed to the nearest public sewer wherever exist or to a pumping station or a new soak pit followed by septic tank shall be constructed.

2 Cable and Pipe work Trenches

(a) Cable and pipe work trenches shall generally be constructed in reinforced concrete. However, 500 mm x 500 mm size or smaller trenches, not on fill may be constructed in 200 mm thick solid cement concrete blocks over 150mm thick M 15 PCC base. The trenches will be 20mm thick plastered internally with cement mortar (1:4) and externally in cement mortar (1:3).

(b) All floor cut-outs and cable ducts, etc. shall be covered with M20 precast concrete covers (Heavy Duty) or MS grating as per direction of Engineer in outdoor areas and M.S. chequered plates, suitably painted of adequate thickness in indoor areas. All uncovered openings shall be protected with hand railing. The pipe, cable trenches shall be suitably sloped to drain off rainwater to a suitable location.

(c) Layout of trenches outside the buildings shall allow space for construction of future trenches where necessary with due consideration for planning for future developments. This aspect shall be brought to the notice of the Engineer while planning the works.

3 Pipes and Ducts

(a) R.C.C ducts for drainage shall have minimum 1 metre pre-cast cover (M20 concrete, Heavy duty) while laid under roads. Access shafts of size not less than 600 mm x 1000 mm shall be provided.

(b) All drains (except storm water drains adjacent to roads) shall be covered and designed structurally for appropriate loads.

4 Main Gate

(a) Proposed treatment plant shall have minimum one main gate to access the plant irrespective of existing gate at the premises of existing plant site. Minimum width of main gate shall be 6m. Main gate shall have 1.5m wide wicket gate. Main gate shall have as external framework of GI pipes and internal framework of MS flats. Gate shall be fixed on RCC columns. The design and pattern of gate with drawing shall be submitted for approval of the Engineer. The gate shall have all necessary hinges, locking arrangement, rolling arrangement and painting complete, as approved by the Engineer.

5 Landscaping

(a) The site shall be landscaped once the works are substantially complete. Landscaping area shall be marked in the layout plan of STP.

(b) Landscaping shall include planting of suitable trees and development of lawn/grassed areas. Landscaping in general shall meet ecological and environmental conditions of the site. Road widths shall determine the size of the tree height and spread to be selected for planting. Trees suitable for local conditions shall be selected as approved by the Engineer. Medicinal and fruit trees shall be avoided. Landscaping shall be maintained in good condition till the completion of the contract.

6 Tree Planting

(a) Pits dug a few days in advance of actual planting shall be allowed to weather and be filled with top soil mixed with manure. Size of the pit shall be as per standard requirement. Only one tree shall be planted in each pit. A guard made of bamboo with wire mesh or bricks or M.S. ring as approved by Engineer, shall be provided.

7 EARTH WORK AND EXCAVATION

11.1General

Applicable provisions of Conditions of contract shall govern work under this section. The Bidder shall report any water conditions encountered and will be given directions as to the type of procedure to be adopted in such cases. The Indian Standards wherever referred to herein shall be the latest edition of such Standards.

11.2Excavation for Foundation, Trenches, Pits, etc.

All foundation trenches shall be excavated to the full-widths and depths shown on the drawings or to such greater or smaller depths as may be found necessary or so ordered to him.

Should any excavation be taken down below the specified levels, the operatorshall fill in such excavation at his own cost with concrete as specified for foundations, well rammed in position until it is brought up to the level. The operatorshall notify to the Owner when the excavation is completed and no concrete or masonry shall be laid until the Owner has approved of the soil for each individual footing, rafts, etc.

The operatorshall keep the site clear of water at all times. To this end he shall provide arrangements for building or pumping of water as required. All foundation pits shall be refilled to the original surface of the ground with approved material, which shall be suitably consolidated.No extra will be paid for bailing out water collected in excavation due to rains, ordinarysprings etc.

11.3Earth Filling

The space around the foundations in the trenches or sites shall be cleared of all trash and loose debris and filled with approved excavated earth, all clods being broken. Filling shall be done in 200 mm layers; each layer to be moistened and well rammed. This shall be done in step with the foundation masonry or foundation concrete work the difference between the tops of masonry and filling not exceeding a day's work. The top of filling shall be finished off 150 mm above ground level to allow for settlement only pit or depressions occurring within twelve months of completion shall be filled up and rammed by the Bidder or his own expense.

11.4Shoring, Planking & Shuttering

Shoring shall be done when sides of excavation do not stand up by themselves and sloping or stepping is not feasible or economical.

The shoring shall consist of vertical planks 38 mm to 50 mm thick and of Available width and required length. The planks shall be held by walling, vertical places and struts, and this to form a frame. The struts shall be not more than 1.5 m. apart, and the timber shall be sufficiently strong not to wrap. The planks shall be held tight by means of wedges between them and walling. The planks shall be driven in by cutting the earth beneath their toes or driving each plank separately after removing the wedges. The planks shall be driven in vertically and shall be set touching one another.

The shoring shall be adequate to prevent caving in of the trench walls of subsidence of areas adjacent to the trench. In narrow trenches of limited depth, a simple form of shoring shall consist of a pair of 40 to 50 mm thick and 30 cm wide planks set vertically at intervals and firmly strutted. For wider and deeper trenches a system of wall plates (Wales) and struts of heavy timber section is commonly used. Continuous sheeting shall be provided outside the wall plates to maintain the stability of the trench walls. The number and the size of the wall plates shall be fixed considering the depth of trench and type of soil. The cross struts shall be fixed in a manner to maintain pressure against the wall plates which in turn shall be kept pressed against the timber sheeting by means of timber wedges or dog spikes.

11.5Wet Foundation:

As soon as water is encountered in foundations, a sump shall be dug for removing the water. The bottom level of this sump shall be kept 500 mm or more below the lowest level of the excavation. The difference between the levels of the bottom of the excavation and of the sump shall be kept constant as excavation depth is increased. If the excavation is to be taken to a substantial depth and a large quantity of water is encountered, two sumps shall be excavated and deepened alternatively so that the pump does not require to be stopped whilst the sump is deepened.

11.6Earthwork in Site Levelling

All materials required for the purpose of filling shall be taken from high areas and stockpile, which are to be levelled to specified reduced level as required. Roots, sods, wood or other organic matter shall not be placed in the fill. Before a new layer is laid the existing ruts or other unevenness in the surface of the layer shall be removed and the surface of the layer shall be scarified and roughened by borrowing and ploughing to obtain bond with the material to be placed. The materials shall be placed continuous horizontal layers not greater than 200 mm thickness. The earth fill shall be kept slightly sloping from center to the edges to avoid formation of pools during the rain.

(D). DETAILED SPECIFICATIONS OF SEWER WORKS:

1.0 EXCAVATION:

(i) The excavation in sewer trenches for the laying of sewers, manhole chamber, sumps, gully pits in all types of soil i.e. loam, clay, sand mixed with mooram, shingle, boulders and all type of rocks etc. shall be dug. Different rates for 1.5m intervals below ground level shall be applicable for the purpose of measurement and payment according to the classification of soil under the respective schedule or quantities. The sides of the excavated trenches shall be left plumb where the nature of soil admits of it, but the sides must be sloped back or shored up carefully where the soil appears likely to fall in or the depth exceeds 3.30 meters. The excavated materials be placed 1.5 m away from the excavated earth or half the depth of trench whichever is more from each edge the excavated trench or as directed by the PD/Engineer-in-Charge.

(ii) **BOTTOM FINISHING OF TRENCHES :**

The bottom of the trenches must be perfectly leveled both longitudinally and transversely according to the level pillars given on the ground level in the alignment longitudinally. The bottom of the trench shall be slightly watered (where necessary) and well rammed. If any soft places come to light on inspection they will be dugout and dealt with as ordered by the Engineer. The contractor shall sort out and remove boulders, or any other serviceable material found during excavation as well as during preparation of bed, the bed of such places be again leveled and hard dressed after consolidation or as per direction of Engineer.

If however, the contractor without the sanction of the Engineer makes the excavation deeper or wider than the desired one, he shall fill the extra depth or width with cement concrete 1:4:8 (1 cement, 4 coarse sand & 8 approved stone ballast 40 mm) at his own cost. Roots of all trees and plants encountered in digging trenches shall be removed completely, if possible, otherwise they shall be cut upto a distance of 300 mm beyond side/ bottom of trench and shall then be burnt and smeared with boiling coal/tar at the expense of the contractor. The hole thus occurring in the trench shall be filled with cement concrete 1:4:8 (1 cement, 4 coarse sand & 8 approved stone ballast 40 mm) to made it finished with the bottom or side of trench for which no payment will be made to the contractor.

(iii) **FINDS:**

Any finds found on the site such as antique, relics, coins and fossils or any other valuable article shall be immediately handed over to the care of Engineer for safe custody on behalf of Govt.

(iv) **WIDTH OF TRENCHES:**

In case of pipe line, sewer, rising main etc. the width of trenches for depth up to 1.5 meter below ground level shall be outer diameter of the pipe plus 30 cms rounded to nearest cm. For depth greater than 1.5 meter below ground level, the trenches shall be excavated in telescopic form in intervals from the ground level with off-sets of 250 mm at every 1.5 m depth on either side of the trench and the width of lower most section will be governed by the above criteria. The actual width or as described above which ever is less shall be measured for payment. The depth of excavation shall be measured from the invert level to the ground level. Any extra width excavated shall not he paid to contractor.

(v) This item of work also includes the work and expenses on laying out, making level pillars, fixing of telltales, photographs of nearby building site clearance before taking up the work and completion of the work.

(vi) The rates quoted by the contractor are inclusive of the filling back of trenches in 15 cm. layers after laying and jointing of pipes, watering, ramming, dressing and disposal of surplus earth with in the specified distance. The extra lead and lift shall be paid, as per item given separately. The pumping of water from trenches which finds its way in to the trenches from drains or rains or by any means (except sub-soil water) shall be done by the contractor at his own cost.

(vii) Cutting of road surfaces including sorting out of serviceable materials etc. will be paid extra and the depth of excavation in such cases shall be measured from the bottom of the lower most soling layer of the road.

(viii) Proper barricading and fencing shall be done along with the excavation. Red flags and caution board during day and red lights during night shall be displayed so as to avoid any accident etc. Contractor shall undertake all responsibility for slips or subsidence and shall make good all damages to any adjoining property and pay compensation for loss of life and property at his own cost and to the satisfaction of Engineer. The contractor shall be held liable to indemnify the owner for any damage done to any adjoining property or to any of the works in progress or partly completed by and settlement of ground

which is in the opinion of the Engineer attributable to any of the excavation, trenching work, timbering or refilling done by the contractor.

2.0 TIMBERING (OPEN & CLOSED) :

Normally trenches upto 1.50 meter depth shall be excavated without timbering, but where the depth of excavation exceed from 1.50 meter, timbering shall be provided, open or close, as the case may be. Where the sides of the trenches covered shall be 33-1/3 percent it will be called open timbering and where the sides of trenches covered shall be 100% by the timbering materials it will be called close timbering. Open / close timbering shall be providing as per site and soil conditions. The thickness of country wood planks shall be 40 mm up to 3.30 meter and 50 mm where the trenches depth exceeds 3.30 meter from the ground level. The sizes of Wallers and struts at various depths have been given in the respective item of works.

The contractor will have to provide the timbering, open and close as per direction of Engineer. In case there is sufficient space available for excavation of trenches at site, the contactor may be required to excavate the trenches in requisite slopes in lieu of timbering as per direction of Engineer.

The contractor are advised to see the site and working conditions, specification and quote their rates accordingly which should be including the cost of all timbering materials, labour for making the timbering as and when required, and removal of timbering after completion of laying, jointing etc. in any case no weakened polling board, wallers and strut will be used.

As already indicated under the item of bill of quantities both sides of timbering shall be measured as one side for the purpose of measurement and payment. The removal of timbering shall be started as per direction of the Engineer.

3.0 LAYING OF SEWER:

3.1 LAYING & JOINTING OF D.I. PIPE & M.S. PIPE :

Laying & jointing of D.I. pipe and M.S. pipe. The laying and jointing of pipes shall be strictly as per IS 9523, IS 13382 or its latest amendment. The contractor will will make the suitable arrangement of carting upto the site / alignment of work including loading and unloading in such away so as to avoid damage to any portion of the pipe and will then place along the excavated trench for laying of these pipe into the trenches in accordance detailed specification laid in sewerage manual and U.P.BUIDCodetailed specification (Sewerage).

3.2 HDPE PIPE:

The laying and jointing of pipe shall be strictly as per relevant IS code or Manual of sewer manual & treatment. The contractor will make the suitable arrangement of carting upto the site / alignment of work including loading & unloading in such a way so as to avoid damage to any portion of the pipes and will then place along the excavated trench for laying of these pipes in to the trenches in accordance detailed specification laid in sewerage manual & BUIDCo detailed specification (sewerage).

staff shall be marked on both sides to indicate its full length.

Measurement & Payment :

The work of laying and jointing of RCC pipes shall be recorded from the inner surface of the first M.H. wall to the inner face of the wall of the next M.H. in meters and paid as per rates marked/ quoted in bill of quantities for the respective depth (invert level) of work below ground level.

TESTING:

Each length of sewer line from manhole to manhole shall be tested by contractor at his own cost as per relevant I.S. specification / sewerage manual by filling the water in to the sewer. The results of testing

shall be produced by the contractor properly signed by engineer in charge. The water required for testing of sewers will have to be arranged by the contractor at his own cost.

As soon as a stretch of sewer is laid and tested a double disc or solid or closed cylinder of 75 mm less in dimension than the internal dimensions of the sewer pipe shall be run though the stretch of the sewer to ensure that it is free from any obstruction.

4 PIPE BEDDING:

As soon as the bed of trenches is ready according to the desired slope, depth and width, the bottom shall be got leveled and rammed properly. After preparation of bed, P.C.C. or R.C.C. bedding of specified mix or of any type of bedding shall be laid as per specification and as per direction of Engineer in proper thickness, width and bed slope before laying of the pipe on it.

In case of concrete/RCC cradle beddings, pipes shall be allowed to be laid at least 10 hours after the laying of base concrete bedding following type of bedding shall be provided.

Concrete Cradle: - It will consist of 1:2:4 (1 cement 2 coarse sand and 4 hard stone grit) cement concrete with carefully compact back fill as mentioned in bill of quantities

After laying the first layer of bedding, laying of RCC pipes and jointing shall be done. As soon as the jointing of pipes has been completed after proper leveling, the portion of concrete of bedding (between pipe and trench face) on both the sides of pipe shall be done as per drawing and as directed by Engineer.

4.1 RCC BEDDING:

1:1-1/2:3 RCC bedding shall be provided where sub soil condition exists during laying of sewer line. In such case 0.8% steel in total (0.4% on each faces of bottom and top) shall have to be provided for which no extra payment shall be admissible.

The measurement of the bedding shall be recorded and paid as per rates in bill of quantities on the basis of volumetric quantity.

5 MANHOLES AND SEWER CONNECTING CHAMBERS :

All manholes and sewer connecting chambers shall be constructed in accordance with the dimensions shown in the approved drawing, All the works related to construction of manhole should be carried out in accordance with detailed specifications for the respective items of works. The inner surface of the wall of M.H. /S.C.C. shall be plastered in mortar of mix as specified in Schedule –G. The plaster below sub-soil water level must be finished with a floating coat of neat cement on both sides along with the water proofing compound as per direction of Engineer. The manhole covers shall be precast RCC heavy duty circular type conforming to I.S. 2592. However on highways and on important roads extra heavy duty manhole covers shall be provided as desired by E/I. The footsteps shall be of C.I./P.V.C. coated MS conforming to relevant I.S. code as per approval and direction of E/I. The spacing of C.I. footsteps shall not exceed 25-cm. No separate measurement for manhole cover and footsteps shall be made as they are part of manhole as per bill of quantities. If the manholes are constructed in sub soil conditions, the PCC 1:2:4 shall be replaced by RCC 1:1½:3 with nominal reinforcement on both faces of R.C.C. foundation. The plaster shall be 20mm thick on both sides in sub soil conditions.

5.1 MANHOLE SHAFT:

The contractor shall quote rates per meter run of shaft for manholes. These rates shall be used for regulating payments for variation of depth of manholes.

5.2 BRICK WORK :

The brick work in manholes and sewer connecting chambers shall consist of M-100 class bricks in mortar of mix as specified in Schedule G. The bricks shall conform to the PWD detailed specification and mortar to relevant I.S. specification according to the type of mortar specified. The work shall be executed as per I.S. detailed specification.

6.0 DISMANTLING OF ROADS :

Dismantling of various road surfaces before the excavation in trenches shall be carried out in following two parts:-

(i) Breaking and sorting out the top coat and stacking the dismantled materials properly so as to be placed at the top of trench after re-filling with excavated earth in 20 cm. layers and its proper compaction by watering and ramming.

(ii) Breaking and sorting out the serviceable materials from inter and soling coat of the road, carting and stacking the same up to 50 m. from the trench, which shall also be used after re-filling and compaction of trench as soon as the pipe laying is completed.

The payment for dismantling of road surfaces will be made per sq.m. as per rate quoted in bill of quantities. The thickness of road cutting during dismantling of road surfaces will not be measured in the item of excavation. The thickness of road may vary up to any extent as per site condition, so contractor should make allowance for same while quoting rates for this item. No extra claim in this item shall be entertained on any ground. As soon as the laying of pipe, refilling of trenches and consolidation of the excavated earth is completed, the road materials of different coats which were sorted out at the time of cutting of road will be placed on top in layers as they were in original position to avoid inconvenience to the public/ traffic. No extra payment to the contractor will be made on this account.

7 DRY BRICK BALLAST PADDING :

The work of dry brick ballast 65 mm gauge broken from the Ist class and over burnt bricks bats only shall be spread over the entire area of trench before laying of R.C.C or P.C.C. of the specified mix and after preparation of base of trench. The measurement shall be taken as per consolidated thickness of the ballast padding in entire area of trench specified for the purpose. The payment shall be made as per rates marked and quoted in schedule 'G'.

8 DISPOSAL OF SURPLUS EARTH:

The Contractor will dispose off the extra/surplus earth from the site of work to the place or places specified by the Engineer. The Contractor is advised to quote his rates inclusive of loading carting, unloading & spreading the surplus earth. The measurement shall be recorded on basis of earth volume disposed off by the Contractor in any of the following methods-

(1) Where the disposal of earth is to be done in a large area the contour plan shall be prepared & record measurements of levels shall be taken prior to start of the work and after completion of the work and the volume of earth shall be worked out.

(2) Where the disposal is to done in a small area, volume of earth disposal shall be got measured in respective vehicle or any other means of disposal.

In both the methods as mentioned above 20% reduction towards the bulk age of earth shall be done to arrive at the quantity of earth to be actually paid for disposal.

9 OTHER WORKS:

Other works which have/have not been specified in schedule 'G' and are essential to be executed shall be carried out as per BUIDCo, (LSGED) or PWD/CPWD specifications, along with the procedure of measurements and payment.

For extra items of works the Contractor profit on the issue rate of materials shall not be added while working out the extra rate in case the material is issued from the Deptt. For purpose of payment of quantities of P.C.C. & R.C.C. cradle and brick padding in various lifts, the center line of the thickness of particular quantity of the item shall be considered for measurement & payment of the same.

10 DEWATERING FOR REDUCTION OF SUB-SOIL WATER LEVEL DURING CONSTRUCTION:

Dewatering is the removal of excess water from saturated soil mass, which is necessitated to make working easier in wet conditions and possible below natural water level, during construction. The Dewatering work is done as per the site conditions to enable for laying of sewer system and the construction of RCC / brick structures in dry conditions and maintain factor of safety against uplifting of structure. The subsoil water will be disposed off by the contractor as decided by PD/Engineer-in-Charge. The Dewatering shall be done as per IS: 9759-1981.

The choice of the dewatering system depends upon the type of the soil and its characteristics and depth of water table to be lowered. The objective and main purpose of well point dewatering is to drain out water only at the actual site of work. This avoids excessive dewatering over a large area and provides dry working conditions to enhance the workability and manpower and machinery in a very short time, and in most economical way. Accordingly dewatering whenever required shall be done by well point equipment as per direction of E/I.

Extra payment shall be made for dewatering for excavation in sub soil condition during excavation, laying of R.C.C, cradle, laying and jointing of pipes, construction of manholes, testing and back-filling etc. shall be admissible for the sewer line under sub soil only and the contractor should quote their price accordingly. No extra payment on this account shall be admissible for other sewer lines.

Annexure-1

Appendix to Condition of Contract

SALIENT FEATURES OF SOME MAJOR LABOUR LAWS APPLICABLE TO ESTABLISHMENTS ENGAGED IN BUILDING AND OTHER CONSTRUCTION WORK.

a) Workmen Compensation Act 1923: - The Act provides for compensation in case of injury by accident arising out of and during the course of employment.

b) Payment of Gratuity Act 1972: - Gratuity is payable to an employee under the Act on satisfaction of certain conditions on separation if an employee has completed the prescribed minimum years (say, five years) of service or more or on death the rate of prescribed minimum days'(say, 15 days) wages for every completed year of service. The Act is applicable to all establishments employing the prescribed minimum number (say, 10) or more employees.

c) Employees P.F. and Miscellaneous Provision Act 1952: The Act Provides for monthly contributions by the Employer plus workers at the rate prescribed (say, 10% or 8.33%). The benefits payable under the Act are:

i. Pension or family pension on retirement or death as the case may be.

ii. Deposit linked insurance on the death in harness of the worker.

iii. Payment of P.F. accumulation on retirement/death etc.

d) Maternity Benefit Act 1951: - The Act provides for leave and some other benefits to women employees in case of confinement or miscarriage etc.

e) Contract Labour (Regulation & Abolition) Act 1970: - The Act provides for certain welfare measures to be provided by the Contractor to contract labour and in case the Contractor fails to provide, the same are required to be provided, by the Principal Employer by Law. The principal Employer is required to take Certificate of Registration and the Contractor is required to take license from the designated Officer. The Act is applicable to the establishments or Contractor of Principal Employer if they employ prescribed minimum (say 20) or more contract labour.

f) Minimum Wages Act 1948: - The Employer is to pay not less than the Minimum Wages fixed by appropriate Government as per provisions of the Act if the employment is a scheduled employment. Construction of buildings, roads, runways is scheduled employment.

g) Payment of Wages Act 1936: - It lays down as to by what date the wages are to be paid, when it will be paid and what deductions can be made from the wages of the workers.

h) Equal Remuneration Act 1979: - The Act provides for payment of equal wages for work of equal nature to male and female workers and for not making discrimination against female employees in the matters of transfers, training and promotions etc.

i) Payment of Bonus Act 1965: - The Act is applicable to all establishments employing prescribed minimum (say, 20) or more workmen. The Act provides for payments of annual bonus within the prescribed range of percentage of wages to employees drawing up to the prescribed amount of wages, calculated in the prescribed manner. The Act does not apply to certain establishments. The newly set-up establishments are exempted for five years in certain circumstances. States may have different number of employment size.

j) Industrial Disputes Act 1947: - The Act lays down the machinery and procedure for resolution of industrial disputes, in what situations a strike or lock-out becomes illegal and what are the requirements for laying off or retrenching the employees or closing down the establishment.

k) Industrial Employment (Standing Orders) Act 1946: - It is applicable to all establishments employing prescribed minimum (say, 100, or 50). The Act provides for laying down rules governing the conditions of employment by the Employer on matters provided in the Act and get these certified by the designated Authority.

l) Trade Unions Act 1926: - The Act lays down the procedure for registration of trade unions of workmen and Employers. The Trade Unions registered under the Act have been given certain immunities from civil and criminal liabilities.

m) Child Labour (Prohibition & Regulation) Act 1986: - The Act prohibits employment of children below 14 years of age in certain occupations and processes and provides for regulations of employment of children in all other occupations and processes. Employment of child labour is prohibited in building and construction industry.

n) Inter-State Migrant Workmen's (Regulation of Employment & Conditions of Service) Act 1979: - The Act is applicable to an establishment which employs prescribed minimum (say, five) or more inter-state migrant workmen through an intermediary (who has recruited workmen in one state for employment in the establishment situated in another state). The Inter-State migrant workmen, in an establishment to which this Act becomes applicable, are required to be provided certain facilities such as Housing, Medical-Aid, Travelling expenses from home up to the establishment and back etc.

o) The Building and Other Construction workers (Regulation of Employment and Conditions of Service) Act 1996 and the Cess Act of 1996: - All the establishments who carry on any building or other construction work and employs the prescribed minimum (say, 10) or more workers are covered under this Act. All such establishments are required to pay cess at the rate not exceeding 2% of the cost of construction as may be modified by the Government. The Employer of the establishment is required to provide safety measures at the building or construction work and other welfare measures, such as canteens, first-aid facilities, ambulance, housing accommodations for workers near the work place etc. The Employer to whom the Act applies has to obtain a registration certificate from the Registering Officer appointed by the Government.

p) Factories Act 1948: - The Act lays down the procedure for approval of plans before setting up a factory, health and safety provisions, welfare provisions, working hours, annual earned leave and rendering information regarding accidents or dangerous occurrences to designated authorities. It is applicable to premises employing the prescribed minimum (say, 10) persons or more with aid of power or another prescribed minimum (say, 20) or more persons without the aid of power engaged in manufacturing process.

q) Arbitration and Conciliation Act, 1996: - The Act lays down the procedure for appointment of Arbitrator, Arbitration and conciliation, Jurisdiction of Arbitral Tribunals, Recourse against Arbitral award appeals.

MD
BUIDCo

Signature of contractor

Annexure-2

Appendix to Condition of Contract
SAFETY CODE

1. Suitable scaffolds should be provided for workmen for all works that cannot safely be done from the ground, or from solid construction except such short period work as can be done safely from ladders. When a ladder is used, an extra mazdoor shall be engaged for holding the ladder and if the ladder is used for carrying materials as well suitable footholds and hand-hold shall be provided on the ladder and the ladder shall be given an inclination not steeper than ¼ to 1(¼ horizontal and 1 vertical.)

2. Scaffolding of staging more than 3.6 m (12ft.) above the ground or floor, swung or suspended from an overhead support or erected with stationary support shall have a guard rail properly attached or bolted, braced and otherwise secured at least 90 cm. (3ft.) high above the floor or platform of such scaffolding or staging and extending along the entire length of the outside and ends there of with only such opening as may be necessary for the delivery of materials. Such scaffolding or staging shall be so fastened as to prevent it from swaying from the building or structure.
3. Working platforms, gangways and stairways should be so constructed that they should not sag unduly or unequally, and if the height of the platform or the gangway or the stairway is more than 3.6 m (12ft.) above ground level or floor level, they should be closely boarded, should have adequate width and should be suitably fastened as described in (2) above.
4. Every opening in the floor of a building or in a working platform shall be provided with suitable means to prevent the fall of person or materials by providing suitable fencing or railing whose minimum height shall be 90 cm. (3ft.)
5. Safe means of access shall be provided to all working platforms and other working places. Every ladder shall be securely fixed. Uniform step spacing of not more than 30 cm shall be kept. Adequate precautions shall be taken to prevent danger from electrical equipment. No materials on any of the sites or work shall be so stacked or placed as to cause danger or inconvenience to any person or the public. The contractor shall provide all necessary fencing and lights to protect the public from accident and shall be bound to bear the expenses of defence of every suit, action or other proceedings at law that may be brought by any person for injury sustained owing to neglect of the above precautions and to pay any damages and cost which may be awarded in any such suit; action or proceedings to any such person or which may, with the consent of the contractor, be paid to compensate any claim by any such person.
6. (a) Excavation and Trenching - All trenches 1.2 m. (4ft.) or more in depth, shall at all times be supplied with at least one ladder for each 30 m. (100 ft.) in length or fraction thereof, Ladder shall extend from bottom of the trench to at least 90 cm. (3ft.) above the surface of the ground. The side of the trenches which are 1.5 m. (5ft.) or more in depth shall be stepped back to give suitable slope or securely held by timber bracing, so as to avoid the danger of sides collapsing. The excavated materials shall not be placed within 1.5 m. (5ft.) of the edges of the trench or half of the depth of the trench whichever is more. Cutting shall be done from top to bottom. Under no circumstances, undermining or undercutting shall be done.

   (b) Safety Measures for digging bore holes:-

(i). If the bore well is successful, it should be safely capped to avoid caving and collapse of the bore well. The failed and the abandoned ones should be completely refilled to avoid caving and collapse;

(ii). During drilling, Sign boards should be erected near the site with the address of the drilling contractor and the Engineer in-charge of the work;

(iii). Suitable fencing should be erected around the well during the drilling and after the installation of the rig on the point of drilling, flags shall be put 50m around the point of drilling to avoid entry of people;

(iv). After drilling the bore well, a cement platform (0.50m x 0.50m x 1.20m) 0.60m above ground level and 0.60m below ground level should be constructed around the well casing;

(v). After the completion of the bore well, the contractor should cap the bore well properly by welding steel plate, cover the bore well with the drilled wet soil and fix thorny shrubs over the soil. This should be done even while repairing the pump;

(vi). After the bore well is drilled the entire site should be brought to the ground level.

7. Demolition - Before any demolition work is commenced and also during the progress of the work,

(i) All roads and open areas adjacent to the work site shall either be closed or suitably protected.
(ii) No electric cable or apparatus which is liable to be a source of danger or a cable or apparatus used by the operator shall remain electrically charged.
(vi) All practical steps shall be taken to prevent danger to persons employed from risk of fire or explosion or flooding. No floor, roof or other part of the building shall be so overloaded with debris or materials as to render it unsafe.

8. All necessary personal safety equipment as considered adequate by the PD/Engineer-in-Charge should be kept available for the use of the person employed on the site and maintained in a condition suitable for immediate use, and the contractor should take adequate steps to ensure proper use of equipment by those concerned:- The following safety equipment shall invariably be provided.
(i) Workers employed on mixing asphaltic materials, cement and lime mortars shall be provided with protective footwear and protective goggles.
(ii) Those engaged in white washing and mixing or stacking of cement bags or any material which is injurious to the eyes, shall be provided with protective goggles.
(iii) Those engaged in welding works shall be provided with welder's protective eye shields.
(iv) Stone breaker shall be provided with protective goggles and protective clothing and seated at sufficiently safe intervals.
(v) When workers are employed in sewers and manholes, which are in active use, the contractors shall ensure that the manhole covers are opened and ventilated at least for an hour before the workers are allowed to get into the manholes, and the manholes so opened shall be cordoned off with suitable railing and provided with warning signals or boards to prevent accident to the public. In addition, the contractor shall ensure that the following safety measure are adhered to :-
(a) Entry for workers into the line shall not be allowed except under supervision of the JE or any other higher officer.
(b) At least 5 to 6 manholes upstream and downstream should be kept open for at least 2 to 3 hours before any man is allowed to enter into the manhole for working inside.
(c) Before entry, presence of Toxic gases should be tested by inserting wet lead acetate paper which changes colour in the presence of such gases and gives indication of their presence.
(d) Presence of Oxygen should be verified by lowering a detector lamp into the manhole. In case, no Oxygen is found inside the sewer line, workers should be sent only with Oxygen kit.
(e) Safety belt with rope should be provided to the workers. While working inside the manholes, such rope should be handled by two men standing outside to enable him to be pulled out during emergency.
(f) The area should be barricaded or cordoned of by suitable means to avoid mishaps of any kind. Proper warning signs should be displayed for the safety of the public whenever cleaning works are undertaken during night or day.
(g) No smoking or open flames shall be allowed near the blocked manhole being cleaned.
(h) The malba obtained on account of cleaning of blocked manholes and sewer lines should be immediately removed to avoid accidents on account of slippery nature of the malba.
(i) Workers should not be allowed to work inside the manhole continuously. He should be given rest intermittently. The PD/Engineer-in-Charge may decide the time up to which a worker may be allowed to work continuously inside the manhole.
(j) Gas masks with Oxygen Cylinder should be kept at site for use in emergency.
(k) Air-blowers should be used for flow of fresh air through the manholes. Whenever called for, portable air blowers are recommended for ventilating the manholes. The Motors for these shall be vapour proof and of totally enclosed type. Non sparking gas engines also could be used but they should be placed at least 2 metres away from the opening and on the leeward side protected from wind so that they will not be a source of friction on any inflammable gas that might be present.
(l) The workers engaged for cleaning the manholes/sewers should be properly trained before allowing to work in the manhole.
(m) The workers shall be provided with Gumboots or non sparking shoes bump helmets and gloves non sparking tools safety lights and gas masks and portable air blowers (when necessary). They must be supplied with barrier cream for anointing the limbs before working inside the sewer lines.
(n) Workmen descending a manhole shall try each ladder stop or rung carefully before putting his full weight on it to guard against insecure fastening due to corrosion of the rung fixed to manhole well.

(o) If a man has received a physical injury, he should be brought out of the sewer immediately and adequate medical aid should be provided to him.

(p) The extent to which these precautions are to be taken depend on individual situation but the decision of the PD/Engineer-in-Charge regarding the steps to be taken in this regard in an individual case will be final.

(vi) The Contractor shall not employ men and women below the age of 18 years on the work of painting with products containing lead in any form. Wherever men above the age of 18 are employed on the work of lead painting, the following precaution should be taken:-

(a) No paint containing lead or lead products shall be used except in the form of paste or readymade paint.

(b) Suitable face masks should be supplied for use by the workers when paint is applied in the form of spray or a surface having lead paint is dry rubbed and scrapped.

(c) Overalls shall be supplied by the contractors to the workmen and adequate facilities shall be provided to enable the working painters to wash during and on the cessation of work.

9. Safety Measures for laying of pipe lines and sewers:

9.1 Measures as provided in Manual on water supply and Manual on sewerage shall be complied with strictly along with safety measures to be followed as per BUIDCo/LSGED orders issued from time to time. Some important measures are given below:

9.2 Proper barricading of trenches shall be done and caution boards and red flags shall be displayed along with lighting arrangements and watchmen during night and

9.3 Watchmen shall be deployed during construction for diversion of traffic and necessary permission shall be taken before excavation of trenches from local administration/traffic police/ULB/PWD/BSNL/POER CORPORATION etc.

9.4 Mouth of pipe or sewer shall be properly capped with end caps or steel plates to avoid entry of soil/mud/water, before leaving the site at the end of days work and as for as possible no trench shall be left open at the end of days work or shall be left unguarded.

9.5 Open timbering should be done as per norms if the trench is more than 1.5 meter deep and close timbering should be done when more than 3.0 meter deep.

9.6 Excavated earth should be kept at sufficiently safe distance from the sides of trench not less than 60 cm away.

9.7 Special care should be taken during rains against collapse of trench or settlement of soil which may take place and may pose danger to life and property.

9.8 If any trench which is more than 1.5 meter deep and within 3.0 meter adjacent to any structure or building, then close timbering should be done.

10. When the work is done near an y place where there is risk of drowning, all necessary equipments should be provided and kept ready for use and all necessary steps taken for prompt rescue of any person in danger and adequate provision, should be made for prompt first aid treatment of all injuries likely to be obtained during the course of the work.

11. Use of hoisting machines and tackle including their attachments, anchorage and supports shall conform to the following standards or conditions :-

(i) (a) These shall be of good mechanical construction, sound materials and adequate strength and free from patent defects and shall be kept repaired and in good working order.

(b) Every rope used in hoisting or lowering materials or as a means of suspension shall be of durable quality and adequate strength, and free from patent defects.

(ii) Every crane driver or hoisting appliance operator, shall be properly qualified

(iii) In case of every hoisting machine and of every chain ring hook, shackle swivel and pulley block used in hoisting or as means of suspension, the safe working load shall be ascertained by adequate means. Every hoisting machine and all gear referred to above shall be plainly marked with the safe working load. No part of any machine or any gear referred to above in this paragraph shall be loaded beyond the safe working load except for the purpose of testing.

12. Motors, gearing, transmission, electric wiring and other dangerous parts of hoisting appliances should be provided with efficient safeguards. Hoisting appliances should be provided with such means as will reduce to the minimum the risk of accidental descent of the load. Adequate precautions should be taken to reduce to the minimum the risk of any part of a suspended load becoming accidentally displaced. When workers are employed on electrical installations which are already energized, insulating mats, wearing apparel, such as gloves, sleeves and boots as may be necessary should be provided. The worker

should not wear any rings, watches and carry keys or other materials which are good conductors of electricity.

13. All scaffolds, ladders and other safety devices mentioned or described herein shall be maintained in safe condition and no scaffold, ladder or equipment shall be altered or removed while it is in use. Adequate washing facilities should be provided at or near places of work.
14. These safety provisions should be brought to the notice of all concerned and the person responsible for compliance of the safety code shall be named therein by the contractor.
15. To ensure effective enforcement of the rules and regulations relating to safety precautions the arrangements made by the contractor shall be open to inspection by the Labour Officer or PD/Engineer-in-Charge of the department or their representatives.
16. Notwithstanding the above clauses from (1) to (15), there is nothing in these to exempt the contractor from the operations of any other Act or Rule in force in the Republic of India.

Certificate: I hereby certify that I have read/been explained contents of safety code above and shall be abide by above rules fully and shall take all responsibility arising out of any lapses on the part of my men and labour/workers and shall bear all costs and expenses, claims what so ever etc. following any mishappening.

Signature of contractor

Annexure-3

(DRAFT)

BANK GUARANTEE FOR ADVANCE MOBILISATION LOAN

The Managing Director
---------- ,
BUIDCo,

Name of the work: ----------

WHEREAS M/s ----------and having its registered office at---------- (hereinafter called" the Contractor / Bidder") has undertaken, in pursuance of Work Order No. ---------- to execute the work ---------- from ----------called "the Contract").

AND WHEREAS it has been stipulated by you in the said contract that the contractor/ Bidder shall furnish you with a Bank Guarantee by a recognized Bank for the sum specified therein as security for compliance with his obligations in accordance with the contract for getting mobilization advance from you.

AND WHEREAS we have agreed to give the Contractor/bidder such a Bank Guarantee.

NOW THEREFORE, We , ----------hereby affirm that we are the Guarantor and responsible to you on behalf of the Contractor/bidder, up to a total of amount of Guarantee i.e---------- (Rupees ----------.)

We, ---------- undertake to pay you upon your written demand and without cavil and argument, any sum or sums within the limits of Rs. ---------- (Rupees ---------- only) as aforesaid without your heeding to prove or to show the grounds or reason for your demand for the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the Contractor/bidder before presenting us with the demand.

We further agree that no change or addition to or other modifications of the terms of the contract or of few works to be performed there under or any of the contract documents which may be made between you and the Contractor/bidder shall in any way release us from any ability under this guarantee, and we hereby waive notice of any such change, addition or modification.

This guarantee is valid up to ----------

The bank guarantee can be en-cashed by you at our branch _____ (at our branch at the city/place of work).

We---------- lastly undertake not to revoke this guarantee during its currency except with the previous consent of the Authority in writing.

Notwithstanding any contained hereinabove.

a) Our liability under this Bank Guarantee shall not exceed Rs---------- (Rupees Thirty ---------- ---------- only.)
b) This Bank Guarantee shall be valid up to ----------(60 days beyond date of completion)
c) We are liable to pay the guaranteed amount or any part thereof under this Bank Guarantee only and only if you serve upon us a written claim on or before ----------

The _____has here unto set his hand at _____ the day of ----------2017

SIGNATURE AND SEAL OF THE GUARANTOR

ANNEXURE—4

A FORM OF BANK GUARANTEE FOR SECURITY DEPOSIT
(SPECIMEN)

Name of Employer._____
Address of Employer:_____
WHEREAS (Name & Address of Contractor/bidder _____dated _____Herein after called "the contractor/bidder") has undertaken, in pursuance of contract no._____ dated _____ to execute (Name of Contract & Brief description of works _____called "the contract")
AND WHEREAS it has been stipulated by you in the said contract that the Contractor/ Bidder shall furnish you with a Bank Guarantee by a recognized bank for this sum specified therein as security for compliance with his obligations in accordance with the contract.

AND WHEREAS we have agreed to give the Contractor/ bidder such a Bank Guarantee_____

_____we undertake to pay you upon your written demand and without cavil or argument, any sum or sums within the limits of amount of guarantee _____as aforesaid without your heeding to prove or to show the grounds or reason for your demand for the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the Contractor/ bidder before presenting us with the demand.

We further agree that no change or addition to or other modifications of the terms of the contract or of few works to be performed there under or any of the contract documents which may be made between you and the Contractor/ bidder shall in any way release us from any ability under this guarantee, and we hereby waive notice of any such change, addition or modification.

This guarantee is valid until the date --- months from the date_____ month after the issuing of the maintenance certificate.
(Guarantee period shall be minimum for ----------months.

The bank guarantee can be encashed by you at our local branch at---------- .

SIGNATURE & SEAL OF THE GUARANTOR_____
Name the Bank_____
Address _____
Date _____

Engineer-in Charge Contractor

ANNEXURE—5

Environmental Management Plan (EMP) and Environmental, Social, Health and Safety Management Implementation Plan (ESHS-MSIP)

Part 1: Environmental Management Plan

Please include EMP chapter of ESMP Report (without cost details of the EMP) here

Part 2: Environmental, Social, Health and Safety Management Implementation Plan (ESHS-MSIP)

The operator shall submit Management Strategies and Implementation Plans (MSIP) to manage the following key Environmental, Social, Health and Safety (ESHS) risks, specific to the detailed design of the contract.

The plan should integrate environmental protection, occupational and community health and safety, gender, equality, child protection, vulnerable people (including those with disabilities), gender-based violence (GBV), HIV/AIDS awareness and prevention and specific to the activities involved in the execution of the Works.The plan should also include mechanisms for monitoring, continuously improving processes and activities and for reporting on the compliance with the policy.

As a minimum, the plan should, include:

1. traffic management plan to ensure safety of local communities from construction traffic];
2. water resource protection plan to prevent contamination of drinking water];
3. boundary marking and protection strategy for mobilization and construction to prevent offsite adverse impacts];
4. strategy for obtaining Consents/Permits prior to the start of relevant works such as opening a quarry or borrow pit].
5. apply good international industry practiceto protect and conserve the natural environment and to minimize unavoidable impacts;
6. provide and maintain a healthy and safe work environment and safe systems of work;
7. protect the health and safety of local communities and users, with particular concern for those who are disabled, elderly, or otherwise vulnerable;
8. ensure that terms of employment and working conditions of all workers engaged in the Works meet the requirements of the ILO labour conventions to which the host country is a signatory;
9. be intolerant of, and enforce disciplinary measures for illegal activities. To be intolerant of, and enforce disciplinary measures for GBV, child sacrifice, child defilement, and sexual harassment;
10. incorporate a gender perspective and provide an enabling environment where women and men have equal opportunity to participate in, and benefit from, planning and development of the Works;
11. work co-operatively, including with end users of the Works, relevant authorities, contractors

and local communities;

12. engage with and listen to affected persons and organizations and be responsive to their concerns, with special regard for vulnerable, disabled, and elderly people;
13. provide an environment that fosters the exchange of information, views, and ideas that is free of any fear of retaliation;
14. minimize the risk of HIV transmission and to mitigate the effects of HIV/AIDS associated with the execution of the Works;

Part 3: **Environmental, Social, Health and Safety (ESHS) - Content of Progress Report**

Contents for regular reporting:

environmental incidents or non-compliances with contract requirements, including contamination, pollution or damage to ground or water supplies;

health and safety incidents, accidents, injuries and all fatalities that require treatment;

interactions with regulators: identify agency, dates, subjects, outcomes (report the negative if none);

status of all permits and agreements:

work permits: number required, number received, actions taken for those not received;

status of permits and consents:

list areas/facilities with permits required (quarries, asphalt & batch plants), dates of application, dates issued (actions to follow up if not issued), dates submitted to resident engineer (or equivalent), status of area (waiting for permits, working, abandoned without reclamation, decommissioning plan being implemented, etc.);
list areas with landowner agreements required (borrow and spoil areas, camp sites), dates of agreements, dates submitted to resident engineer (or equivalent);
identify major activities undertaken in each area this month and highlights of environmental and social protection (land clearing, boundary marking, topsoil salvage, traffic management, decommissioning planning, decommissioning implementation);
for quarries: status of relocation and compensation (completed, or details of monthly activities and current status).
health and safety supervision:

i. safety officer: number days worked, number of full inspections & partial inspections, reports to construction/project management;
ii. number of workers, work hours, metric of PPE use (percentage of workers with full personal protection equipment (PPE), partial, etc.), worker violations observed (by type of violation, PPE or otherwise), warnings given, repeat warnings given, follow-up actions taken (if any);

worker accommodations:

iii. number of expats housed in accommodations, number of locals;
iv. date of last inspection, and highlights of inspection including status of accommodations' compliance with national and local law and good practice, including sanitation, space, etc.;
v. actions taken to recommend/require improved conditions, or to improve conditions.

HIV/AIDS: provider of health services, information and/or training, location of clinic, number of non-safety disease or illness treatments and diagnoses (no names to be provided);

gender (for expats and locals separately): number of female workers, percentage of workforce, gender issues raised and dealt with (cross-reference grievances or other sections as needed);

training:

vi. number of new workers, number receiving induction training, dates of induction training;

vii. number and dates of toolbox talks, number of workers receiving Occupational Health and Safety (OHS), environmental and social training;

viii. number and dates of HIV/AIDS sensitization training, no. workers receiving training (this month and in the past); same questions for gender sensitization, flaglady/flagman training.

environmental and social supervision:

ix. environmentalist: days worked, areas inspected and numbers of inspections of each (road section, work camp, accommodations, quarries, borrow areas, spoil areas, swamps, forest crossings, etc.), highlights of activities/findings (including violations of environmental and/or social best practices, actions taken), reports to environmental and/or social specialist/construction/site management;

sociologist: days worked, number of partial and full site inspections (by area: road section, work camp, accommodations, quarries, borrow areas, spoil areas, clinic, HIV/AIDS center, community centers, etc.), highlights of activities (including violations of environmental and/or social requirements observed, actions taken), reports to environmental and/or social specialist/construction/site management; and

community liaison person(s): days worked (hours community center open), number of people met, highlights of activities (issues raised, etc.), reports to environmental and/or social specialist /construction/site management.

Grievances: list this month's and unresolved past grievances by date received, complainant, how received, to whom referred to for action, resolution and date (if completed), data resolution reported to complainant, any required follow-up(Cross-reference other sections as needed):

x. Worker grievances;

xi. Community grievances

Traffic and vehicles/equipment:

xii. traffic accidents involving project vehicles & equipment: provide date, location, damage, cause, follow-up;

accidents involving non-project vehicles or property (also reported under immediate metrics): provide date, location, damage, cause, follow-up;

overall condition of vehicles/equipment (subjective judgment by environmentalist); non-routine repairs and maintenance needed to improve safety and/or environmental performance (to control smoke, etc.).

Environmental mitigations and issues (what has been done):

xiii. dust: number of working bowsers, number of waterings/day, number of complaints, warnings given by environmentalist, actions taken to resolve; highlights of quarry dust

control (covers, sprays, operational status); % of rock/muram/spoil lorries with covers, actions taken for uncovered vehicles;

erosion control: controls implemented by location, status of water crossings, environmentalist inspections and results, actions taken to resolve issues, emergency repairs needed to control erosion/sedimentation;

quarries, borrow areas, spoil areas, asphalt plants, batch plants: identify major activities undertaken this month at each, and highlights of environmental and social protection: land clearing, boundary marking, topsoil salvage, traffic management, decommissioning planning, decommissioning implementation;

blasting: number of blasts (and locations), status of implementation of blasting plan (including notices, evacuations, etc.), incidents of off-site damage or complaints (cross-reference other sections as needed);

spill cleanups, if any: material spilled, location, amount, actions taken, material disposal (report all spills that result in water or soil contamination;

waste management: types and quantities generated and managed, including amount taken offsite (and by whom) or reused/recycled/disposed on-site;

details of tree plantings and other mitigations required undertaken this month;

details of water and swamp protection mitigations required undertaken this month.

compliance:

xiv. compliance status for conditions of all relevant consents/permits, for the Work, including quarries, etc.): statement of compliance or listing of issues and actions taken (or to be taken) to reach compliance;

compliance status of ESMP/ESIP requirements: statement of compliance or listing of issues and actions taken (or to be taken) to reach compliance

other unresolved issues from previous months related to environmental and social: continued violations, continued failure of equipment, continued lack of vehicle covers, spills not dealt with, continued compensation or blasting issues, etc. Cross-reference other sections as needed.

Summarizes the generic environmental management plan for low category investment that identifies the potential issues of various activities that are anticipated in the design and development, construction, and operation phases of the proposed STP in Pahari area Patna. The Project Components Includes:

I&D and allied works with 6 numbers SPSs and STP of capacity 9 MLD.;

The environmental management plan ensures to suggest appropriate mitigation measure against the issues/ concerns identified during the environmental and social assessment study.

In general, the BUIDCO (with assistance from DBO Operator and Independent Engineer/Supervision Consultant) is the responsible entity for ensuring that the mitigation measures as suggested in the ESMP. The roles and responsibilities of the involved institutes are described below.

1.1.1 Implementation of EMP Specific activities by BUIDCO

The role of BUIDCO in the implementation of EMP involves the following activities:

1.1.2 Specific activities by Design Built Operate (DBO) Operator

The operator shall implement the mitigation measures as recommended in EMP attached to the bid document.

1.1.3 Implementation of EMP

The DBO Operator shall have prime responsibility to implement the EMP. "The DBO engineer" shall monitor the compliance of the EMP. DBO engineer and BUIDCo will have secondary responsibility for implementation of EMP.

The Operator shall ensure that:

- Ensure that sewer laying process does not create hazardous movement situation. Also ensure that public is pre-warned about the activities, construction area is barricaded, all debris is well managed causing minimum inconvenience to public and other measures are implemented as indicated under EMP.
- Specific area shall be earmarked for intermittent storage of biodegradable and non-biodegradable waste at STP site.
- Tree plantation (minimum two row) shall be made on the periphery of STP to prevent spread of bad odour and undertake landscaping to enhance aesthetic at STP locations.

Feedback from the local residents can also be taken from time to time to cross check the contractor's report. Project management consultants should make inspection visits at construction site to check

the implementation of Environment Management Plan as per the contract. Broad Institutional arrangement for implementation of EMP is shown in figure 8.1 below:

Activity		Potential Negative Impact/Concern	Duration of impact	Mitigation Measures	Responsible agency
A. Design and Development Phase					
Sewage Treatment plant	Treated water disposal into nearby stream	• Pollution of received water body (river) or land due to inefficient treatment or non-operation of STP	Temporary	• The treated water quality shall comply with the prescribed standards of the bid document and other applicable conditions of consent to establish issued by the state pollution control board. • Selection of best available sewage treatment technology with High BOD removal efficiency. • Ensuring development and compliance to standard operation and maintenance practices. • Provision of effective screening at inlet of STP for removal of grit, fine plastics and other suspended solids • Provision of effective separation and controlled disposal of digested sludge • Provision effective disinfection before discharge	DBO Operator

				of treated water for irrigation or to river • Ensure that reuse of waste water after treatment in different purposes i.e Urban Development, Industrial reuse, agriculture purposes, Recreational reuse, Flushing of sewers, gardening, house floor cleaning, Power sectors etc for its utilization and to minimize disposal load on river Ganga.	
	STP Breakdown	• Discharge of untreated sewage leading river pollution.	Temporary	• Provision of adequate holding capacity adequate for storage of sewage to prevent flow of untreated sewage to river.	DBO Operator
	Flooding due to rain water run off	• Rain water may flood the STP area in absence of adequate provision of diverting rain water flow towards STP from periphery area.	Temporary	• Suitable drainage provision shall be made to divert the rain water likely to be accumulated from peripheral catchment area of STP, to natural drainage stream or area.	DBO Operator
	Sludge disposal	• Disposal of sludge leading to contamination of land and water.	Permanent	• Efficient Sludge dewatering with minimum land involvement shall be adopted.	DBO Operator

				• Provision shall be made for intermittent storage of digested sludge at STP site. • The digested sludge shall be utilised as manure or disposed to suitable site as approved by DBO engineer. If disposal is made for land fill, the site shall be located away from habitation and water bodies and shall be pre-approved by concerned authorities like Municipal corporation, Pollution Control Board or urban development authority.	
	Provision for safety of workers and safe operation of STPs	• Accidents leading to injury or death of workers (Fall of workers from Height, Fall into deep water tanks, Short Circuiting) • Accidental slip, trip and fall in walk ways or work areas • Fire • Exposure to toxic gas	Permanent	• Ensure adequate provision of Handrails on both sides of walkways close to deeper tanks and STPs need to be ensured; • All electric switches (including unit specific on-off switches installed at respective units) and panels should have adequate protection from rain water to prevent short circuiting • Proper earthling	DBO Operator

				with installation of earth circuit breakers shall be made • Walk ways designs shall be made with proper slope to avoid accumulation of rain water. Material handling and storage shall be so designed that walk way surface remains free from wet or oil surface situation to prevent slips, trip or fall accidents. • Provision of interlock system to either stop STP or divert untreated effluent to holding tanks in case of short circuiting, or mall functioning of STP • Prepare emergency preparedness plan including identification of assembly area in case of fire	
	Location of STP	• Noise/Odour/fly nuisance hazards to neighbouring areas. • Cutting of Trees	Permanent	• Ensure minimum noise generation; at pump station in STP • Minimize Tree cutting if involved. • Tree plantation of at least two rows around the periphery of STP site and landscaping to	DBO Operator

				prevent spread of bad odour with large canopy/ broad leaves trees like Sesum, Neem, Bargad, Teak, Sal, etc. • Accumulated sludge and solid waste to be cleared within 24 hours and spraying of suitable herbicides on accumulated sludge/solid waste to reduce odour.	
B. Construction phase					
Sewage treatment plant	Excavation	Loss of topsoil due to excavation activities.	Temporary	• The existing STP shall not be demolished till alternate arrangement for treatment of existing sewage is made to ensure that untreated sewage is not discharged to river. • Excavation shall be planned in such a manner that such that no damage occurs to existing structures. • Top soil should be separately stockpiled and utilized for green belt development or landscaping after completion of work	DBO Operator
		Construction waste	Temporary	• All the associated construction waste should be properly	DBO Operator

				managed by storing and disposing off at suitable refusal sites approved by DBO engineer.	
		Nuisance due to domestic solid waste disposal	Temporary	• Provide two bins for recyclable and non-recyclable wastes. • Ensure that recyclable and non-recyclable wastes are collected in segregated manner in theses bins before disposal. Recyclable material should be sold. Non-recyclable material should be disposed to designated land fill area of the city. • Provide adequate sanitation facility for workers at construction sites.	DBO Operator
		Dust Generation due to construction activities	Temporary	• Excavated material transported by trucks will be covered and/or wetted to prevent dust nuisance. • Suppressing dust generation by spraying water on stockpiles and unpaved movement areas • Water sprinkling over excavated	• DBO Operator

				areas, unpaved movement areas and stockpiles. • Transportation of loose construction material through covered trucks. • Use dust curtains (polysheets/ sheets) around the construction area for containing dust spread. • Construction equipment must comply with pollution norms and carry Pollution Under Control certificate.	
		Temporary flooding due to uneven dumping of construction waste	Temporary	• The construction waste material should be stored on the higher areas of the site and or areas where water may accumulate creating flooding like situation	DBO Operator
		Spillage of fuel and oil	Temporary	• Care to be taken to store fuel and oil (if required) at a place away from any drainage channel/nalla preferably to be stored in drums mounted on a concrete paved platform with slop draining to small spills collection pit.	DBO Operator
		Noise and vibration disturbances to residents and businesses	Temporary	• Construction activities to be carried out in day time with prior intimation	DBO Operator

				to local residents and shop keepers. • Use of low noise and vibrating equipment (such as enclosed generators with mufflers, instruments with built in vibration dampening and improved exhaust), to meet standards as prescribed by CPCB[1]. • Provision of protective equipment (PPE) like ear muffs and plugs for construction workers. • Provision of noise barriers as feasible in inhabited areas, particularly near sensitive zones like hospitals, schools etc. • DG set to be fitted acoustic enclosure.	
Construction camps	Sanitation	Nuisance due to absence of facility of sanitation and solid waste management	Temporary	• Labour camp if provided, must have adequate provision of shelter, water supply, sanitation and solid waste management	DBO Operator
General: safety during construction	Safety and Health Hazard	Safety hazards to labours and public. Workers are seen to working without any PPE even at height.	Temporary	• Comply with the Occupational health and Safety act of India • Ensure that the contact details of	DBO Operator

[1]http://moef.gov.in/citizen/specinfo/noise.html

				the police or security company and ambulance services nearby to the site. • Ensure that the handling of equipment and materials is supervised and adequately instructed. • Follow safe practices for working at height or confined area or underground working for safety of workers • Erect warning signs/ tapes and temporary barriers and/or danger tape, marking flags, lights and flagmen around the exposed construction works warn the public and traffic flow of the inherent dangers. • Provide adequate PPE to workers such as helmets, safety shoes, gloves, dust masks, gumboots, etc. to workers • Provide handrails on both sides of walkways close to deeper tanks and STPs need to be ensured; • Smaller on and off switches at STP units to be installed with	

				protection from rain water to minimize electrical short circuit; • Monthly reporting of all accidents and immediate reporting to DBO engineer and owner.	
C. Operation phase					
Sewage treatment plant	Treatment and Disposal of Treated Water and Sludge	River, land or ground water pollution due to discharge of untreated or partially treated sewage due to inadequate or inefficient STP operations.	Temporary	• Monitor the treated sewage quality and ensure compliance with PCB standards for effluent disposal into surface water bodies, on land or for the agricultural use. • Follow standard operating procedures for operation and maintenance. • Undertake periodic audit as per these procedures. • Comply with all applicable condition of consent to operate • Quarterly monitoring of influent sewage, treated sewage, upstream and downstream point of treated sewage	DBO Operator

				disposal point to river	
		Problems arising due to bad odour, insects, polluted air,	Temporary	• Maintain the green belt as per provision of design to prevent spread of bad odour with large canopy/ broad leaves trees like Sesum, Neem, Bargad, Teak, Sal, etc. • Accumulated sludge and solid waste to be cleared within 24 hours and spraying of suitable herbicides on accumulated sludge/solid waste to reduce odour. • Quarterly monitoring of Ambient Air Quality with respect to PM10, PM2.5, Sox and NOx, CO and Odour at three locations (at STP site, minimum 500 m away from STP site in up-wind and down-wind direction of STP area.	DBO Operator
		Increase in Ambient Noise Level and discomfort to neighbouring people	Temporary	• Proper handling and regular maintenance of operating machines including	DBO Operator

				pumps, generators, air diffusers, etc. • Quarterly Monitoring of Ambient Noise level to check compliance to standards. • Quarterly monitoring of ambient noise levels (day and night) at same locations as of ambient air monitoring	
		Indiscriminate disposal of sludge leading to contamination of land and soil.	Temporary	• Prepares sludge disposal plan as per desire stage provisions and guidelines and adhere to the same. • Ensure proper functioning of STP for digestion of sludge and ensure adequate functioning of dewatering units for efficient functioning of system	DBO Operator
		River, land or ground water pollution due to discharge of untreated or partially treated sewage due to inadequate or inefficient STP operations.	Temporary	• Ensure compliance with PCB standards for effluent disposal into surface water bodies, on land or for the agricultural use. • Follow	DBO Operator

				standard operating procedures for operation and maintenance. • Undertake periodic audit as per these procedures. • Comply with all applicable condition of consent to operate	
General Safety	Workers exposure to hazardous materials/situations	• Serious/health/ safety hazards	Temporary	• Ensure availability of PPE for maintenance workers. • Follow safety measures and Emergency preparedness plan evolved at design stage	DBO Operator

Table: Environmental Management Plan for Naugachiya I & D work with STP of 9 MLD.

Details of E&M Works

General Information regarding the E&M works to be executed

1- The payment for power connection shall be made to the NBPDCL/SBPDCLdirectly as per actual estimate received from NBPDCL/SBPDCL at the time of power connection. However, the estimate shall have to be collected by the contractor from NBPDCL/SBPDCL.

2- The drawing & design of E&M equipments obtained from vendors shall have to be submitted by the contractor for their approval by the competent authority before its testing at manufacturer's works. The material shall be tested at manufacturer's works to ensure the guaranteed figures quoted by the contractor.

3- All the E&M equipments shall be supplied after testing of the same at manufacturer's works and after getting clearance for dispatch by the inspector of the department.

4- The contractor shall have to inform the department for the testing of equipments at works well in advance so that the department may depute and arrange to send the representative/engineer incharge for this purpose.

5- The payment against supply of the materials shall be made after receipt of the materials at site in good condition and satisfaction to the engineer incharge.

6- All the supplied materials shall be Erected/Installed in good engineering manner and followed with IS specifications.

7- All the installed E&M equipment shall be commissioned and tested at site against guaranteed figures.

8- After successful commissioning of the equipments six months trial run of the equipments shall be done by the contractor.

9- During trial run oil and lubricant & other consumable including electricity shall be borne by the contractor.

10- In case of operation of D.G. set during trial run one hour per day power cut shall be considered.

11- During trail run the contractor shall have to depute their own staff for which no Payment shall be made.

12- All the E&M equipments shall be guaranteed for a period of 2 years after successful completion of the trial run which will be the defect liability period.

13- During trial run and defect liability period contractor shall have to maintain, repair & replace the damaged parts free of cost.

14- All civil works required for installation & commissioning of the equipment shall be done by the contractor.

Price quoted should be F.O.R. destination basis at Naugachiya

Brief description of E&M works

(E&M works of construction at Naya tola basti Nala Tapping & SPS)

1. Construction of Sub- Station as per requirement which includes SITC (Supply, Installation, Testing & commissioning) of HT Panel, LT Panel Transformer, Bus coupler, APFC Panel, Load distribution Panel, Power wiring & Earthing & Earthing complete in all respect.

2. SITC of non clog Sewage submersible pumping Plant to handle 0.59 MLD average discharge and 2.25 peak factor along with all electrical and mechanical equipments and accessories which includes Pumping plant, Control Panel, Main Pining & Valves , Metering Operates, Lifting Arrangements, Spare for Pumping plant, Tools & Plant required for pumping plant & sub-station, Chequered plate & guard, Local transportation, painting of E&M equipments, Internal & External Light wiring of Building & Campus, M.S. Trusses etc.

3. SITC of D.G. set in Acoustic enclosures of required capacity having two no. of half capacity of required load & required control panels as well as Synchronising panel too. This will also include the supply & laying of power & control cables, earthing, chequered plate & guard electric resistance rubber sheet tools & plants etc. complete in all respect.

4. SITC of Mechanical & Manual Bar Screens including Sluice gate.

5. Six months trial run after successful completion of installation & commissioning of equipment.

6. Operation & maintenance of 15 Years after successful completion of commissioning & trial run during which consumable like oil & lubricants of DG set & electricity shall be provided contractor.

N.B.: All the works are required to be done in the best engineering manner and as per relevant IS specifications.

Brief description of E&M works

(E&M works of construction of Milan chowk and Tara bhawan Nala Tapping & SPS)

1. Construction of Sub- Station as per requirement which includes SITC (Supply, Installation, Testing & commissioning) of HT Panel, LT Panel Transformer, Bus coupler, APFC Panel, Load distribution Panel, Power wiring & Earthing & Earthing complete in all respect.
2. SITC of non clog Sewage submersible pumping Plant to handle 4.45 MLD average discharge and 2.25 peak factor along with all electrical and mechanical equipments and accessories which includes Pumping plant, Control Panel, Main Pining & Valves , Metering Operates, Lifting Arrangements, Spare for Pumping plant, Tools & Plant required for pumping plant & sub-station, Chequered plate & guard, Local transportation, painting of E&M equipments, Internal & External Light wiring of Building & Campus, M.S. Trusses etc.
3. SITC of D.G. set in Acoustic enclosures of required capacity. This will also include the supply & laying of power & control cables, earthing, chequered plate & guard electric resistance rubber sheet tools & plants etc. complete in all respect.
4. SITC of Mechanical & Manual Bar Screens including Sluice gate.
5. Six months trial run after successful completion of installation & commissioning of equipment.
6. Operation & maintenance of 15 Years after successful completion of commissioning & trial run during which consumable like oil & lubricants of DG set & electricity shall be provided contractor.

N.B.: All the works are required to be done in the best engineering manner and as per relevant IS specifications.

Brief description of E&M works

(E&M works of construction at Station road Nala & durga sthan nalaTapping & SPS)

1. Construction of Sub- Station as per requirement which includes SITC (Supply, Installation, Testing & commissioning) of HT Panel, LT Panel Transformer, Bus coupler, APFC Panel, Load distribution Panel, Power wiring & Earthing & Earthing complete in all respect.
2. SITC of non clog Sewage submersible pumping Plant to handle 0.35 MLD average discharge and 2.25 peak factor along with all electrical and mechanical equipments and accessories which includes Pumping plant, Control Panel, Main Pining & Valves , Metering Operates, Lifting Arrangements, Spare for Pumping plant, Tools & Plant required for pumping plant & sub-station, Chequered plate & guard, Local transportation, painting of E&M equipments, Internal & External Light wiring of Building & Campus, M.S. Trusses etc.
3. SITC of D.G. set in Acoustic enclosures of required capacity as per requirement & required control panels. This will also include the supply & laying of power & control cables, earthing, chequered plate & guard electric resistance rubber sheet tools & plants etc. complete in all respect.
4. SITC of Mechanical & Manual Bar Screens including Sluice gate.
5. Six months trial run after successful completion of installation & commissioning of equipment.
6. Operation & maintenance of 15 Years after successful completion of commissioning & trial run during which consumable like oil & lubricants of DG set & electricity shall be provided by contactor.

N.B.: All the works are required to be done in the best engineering manner and as per relevant IS specifications.

Brief description of E&M works

(E&M works of construction at Ward no 8 Nala Tapping & SPS)

1. Construction of Sub- Station as per requirement which includes SITC (Supply, Installation, Testing & commissioning) of HT Panel, LT Panel Transformer, Bus coupler, APFC Panel, Load distribution Panel, Power wiring & Earthing & Earthing complete in all respect.
2. SITC of non clog Sewage submersible pumping Plant to handle 0.16 MLD average discharge and 2.25 peak factor along with all electrical and mechanical equipments and accessories which includes Pumping plant, Control Panel, Main Pining & Valves , Metering Operates, Lifting Arrangements, Spare for Pumping plant, Tools & Plant required for pumping plant & sub-station, Chequered plate & guard, Local transportation, painting of E&M equipments, Internal & External Light wiring of Building & Campus, M.S. Trusses etc.
3. SITC of D.G. set in Acoustic enclosures of required capacity as per requirement & required control panels. This will also include the supply & laying of power & control cables, earthing, chequered plate & guard electric resistance rubber sheet tools & plants etc. complete in all respect.
4. SITC of Mechanical & Manual Bar Screens including Sluice gate.
5. Six months trial run after successful completion of installation & commissioning of equipment.
6. Operation & maintenance of 15 Years after successful completion of commissioning & trial run during which consumable like oil & lubricants of DG set & electricity shall be provided by contractor.

N.B.: All the works are required to be done in the best engineering manner and as per relevant IS specifications.

Brief description of E&M works

(E&M works of construction at Ward no 9 Nala Tapping & SPS)

1. Construction of Sub- Station as per requirement which includes SITC (Supply, Installation, Testing & commissioning) of HT Panel, LT Panel Transformer, Bus coupler, APFC Panel, Load distribution Panel, Power wiring & Earthing & Earthing complete in all respect.
2. SITC of non clog Sewage submersible pumping Plant to handle 0.35 MLD average discharge and 2.25 peak factor along with all electrical and mechanical equipments and accessories which includes Pumping plant, Control Panel, Main Pining & Valves , Metering Operates, Lifting Arrangements, Spare for Pumping plant, Tools & Plant required for pumping plant & sub-station, Chequered plate & guard, Local transportation, painting of E&M equipments, Internal & External Light wiring of Building & Campus, M.S. Trusses etc.
3. SITC of D.G. set in Acoustic enclosures of required capacity as per requirement & required control panels. This will also include the supply & laying of power & control cables, earthing, chequered plate & guard electric resistance rubber sheet tools & plants etc. complete in all respect.
4. SITC of Mechanical & Manual Bar Screens including Sluice gate.
5. Six months trial run after successful completion of installation & commissioning of equipment.
6. Operation & maintenance of 15 Years after successful completion of commissioning & trial run during which consumable like oil & lubricants of DG set & electricity shall be provided by contractor.

N.B.: All the works are required to be done in the best engineering manner and as per relevant IS specifications.

Brief description of E&M works

(E&M works of construction at Ward no 3 Nala Tapping & SPS)

1. Construction of Sub- Station as per requirement which includes SITC (Supply, Installation, Testing & commissioning) of HT Panel, LT Panel Transformer, Bus coupler, APFC Panel, Load distribution Panel, Power wiring & Earthing & Earthing complete in all respect.
2. SITC of non clog Sewage submersible pumping Plant to handle 0.38 MLD average discharge and 2.25 peak factor along with all electrical and mechanical equipments and accessories which includes Pumping plant, Control Panel, Main Pining & Valves , Metering Operates, Lifting Arrangements, Spare for Pumping plant, Tools & Plant required for pumping plant & sub-station, Chequered plate & guard, Local transportation, painting of E&M equipments, Internal & External Light wiring of Building & Campus, M.S. Trusses etc.
3. SITC of D.G. set in Acoustic enclosures of required capacity as per requirement & required control panels. This will also include the supply & laying of power & control cables, earthing, chequered plate & guard electric resistance rubber sheet tools & plants etc. complete in all respect.
4. SITC of Mechanical & Manual Bar Screens including Sluice gate.
5. Six months trial run after successful completion of installation & commissioning of equipment.
6. Operation & maintenance of 15 Years after successful completion of commissioning & trial run during which consumable like oil & lubricants of DG set & electricity shall be provided by contractor.

N.B.: All the works are required to be done in the best engineering manner and as per relevant IS specifications.

Scope of Work

(E&M works of construction at Naya tola basti Nala Tapping & SPS , Milan chowk and tara bhawan Nala Tapping & SPS, Ward no 8 Nala Tapping & SPS, Ward no 9 Nala Tapping & SPS,Station road Nala and durga sthan Nala Tapping & SPS and Ward no 3 Nala Tapping & SPS.)

A. Sub-Station

A.1 Supply of HT panel comprising of one incoming & three outgoing with required protective system/accessories & power pack arrangement *as per details given in technical specifications of the tender document.*

A.2 Supply of outdoor type 11/.4 KV 3 phase copper wound Transformer with all accessories for protection of transformer having 100% stand by *as per details given in technical specifications of the tender document.*

A.3 Supply of LT Panels (main LT panel, incoming panel, bus coupler, APFC panel, load distribution panel), Power wiring & Earthing materials, Cable jointing & lugging materials, Fencing materials for sub-station as per IE rules & *as per details given in technical specifications of the tender document.*

Testing, Installation & Commissioning of all above equipments supplied by the contractor. Installation/ Erection of the equipments shall have to be done in best engineering manner & as per IE rule/specifications.

B. Pumping Plant

Supply of Non–clog submersible pumping plant of equal duty, composite control panel suitable Starters, guide rail system, main piping & valve, metering apparatus, electro magnetic flow meter, HOT cane, spare for pumping plant, tools & plants required for pumping plant & sub-stations, chequered plate & guards, local transportation, painting of E&M equipments, internal & external light wiring & construction of M.S. trusses etc. *as per details given in technical specifications of the tender document.*

Testing, Installation & Commissioning of all above equipments supplied by the contractor. Installation/ Erection of the equipments shall have to be done in best engineering manner & as per IE rule/specifications.

C. D.G. Set

Supply of D.G. set in acoustic enclosure having half capacity of required load as a back up with required control panels, auto synchronising & auto load sharing panel, outgoing panel, power & control cable, earthing material, chequered plate & guard, tools & spanners required for O&M for D.G. set etc. *as per details given in technical specifications of the tender document.*

Testing, Installation & Commissioning of all above equipments supplied by the contractor. Installation/ Erection of the equipments shall have to be done in best engineering manner & as per IE rule/specifications.

D. Bar Screens & Gates

Supply of Manual & Mechanical Bar Screens including sluice gates required for the control of sewage to be received at the pumping station and operation & maintenance of the screens/screen chamber too etc. *as per details given in technical specifications of the tender document.*

Testing, Installation & Commissioning of all above equipments supplied by the contractor. Installation/ Erection of the equipments shall have to be done in best engineering manner & as per IE rule/specifications.

N.B. – The Quantity, size & specifications of E&M equipments & all required accessories have been given in technical specifications of the tender document. Their specifications are tentative. However, the same will be final after approval of drawing & design by competent authority after

submission of the same by the contractor prior to Testing at manufacturer’s works & Supply of the E&M equipments as per requirement of the site.

Special Conditions for E/M Works

1. The E/M works of this tender documents include S.I.T.C. of Sub-Station, Pumping Plant, D.G.Set as power backup, Manual & Mechanical Bar Screens and Sluice Gates with all its accessories.

2. The bidders shall have to submit the drawing & design of all the equipments to be supplied for approval before testing/inspection of the equipments.

3. Guarantee:

Equipment supplied shall be guaranteed for a period of 2 years which shall be reckoned from successful completion of 6 months of trial run & commissioning. This covers repair/replacement of equipment found defective up to completion of two years from the successful trial run & commissioning of the equipments. For which no extra payment shall be made.

4. Testing:

The equipments shall be tested/inspected on the guaranteed figure provided by the tenderer as per manufacturer standard at manufacturer's work / O.E.M. works. contractor shall have to inform the department well in advance for testing & inspection before dispatch of equipments.

5. Installation:

Installation of all the equipment shall be done in best engineering manners as per requirement of site.

6. Commissioning:

Commissioning of all the equipments shall be done after installation of the equipments.

7. Trial Run:

Trial run of six month period shall be done by the contractor. During trial run consumables (Oil, Lubricants & Power) will be provided by the contractor.

8. ***Civil Works:***

All civil works required for installation & commissioning of the equipment shall be done by the contractor.

9. ***Penalty Clause:***

Penalty will be imposed as per clause 3 on page of lump-sump cum item rate of this tender document.

10. ***Delivery:***

Price quoted should be on F.O.R. destination basis at Naugachiya, Distt- Bhagalpur duly freight paid.

11. ***Payment:***

(i) ***Supply Item*****:** 70% payment shall be made after receipt of material in satisfactory condition

(ii) ***Installation***: 20% payment shall be made after successful installation of the equipment.

(iii) ***Commissioning***: 10% payment shall be made after successful commissioning of the equipments i.e. after successful completion of trial run.

12. Price should be quoted inclusive of excise duties and taxes. However, Form 'C' will be provided on demand by the department ***which should be clearly mentioned in the offer if required.***

E/M WORKS OF CONSTRUCTION AT NAYA TOLA SPS, NAUGACHIYA.

DATA SHEET FOR D.G. SET

(To be filled by Tenderer)

A (1) DIESEL ENGINE-

(i) Make
(ii) Manufacturer
(iii) Model
(iv) Rating BHP
(v) RPM
(vi) H.S.D. consumption per hour.

Load	**Fuel Consumption**
	Diesel Consumption
Full load	
75% Load	
50% load	

(vii) Specific Lub. Oil consumption
(viii) No. of cylinder
(ix) Weight
(x) Dimension
  (a) Length
  (b) Width
  (c) Height
(xi) Noise level
(xii) Type of cooling system
(xiii) Additional information, if any.

B. ALTERNATOR-

(i) Manufacturer
(ii) Type
(iii) Enclosure
(iv) Rated speed (RPM)
(v) Out Put (KW/KVA)
(vi) Rated Voltage
(vii) Rated coolant
(viii) Power Factor
(ix) No. of Phases
(x) Frequency
(xi) Excitation
(xii) Class of Insulation
(xiii) Rating
(xiv) Dimension
  (a) Length
  (b) Width
  (c) Height
(xv) Additional information, if any.

E/M WORKS OF CONSTRUCTION AT NAYA TOLA BASTI SPS, NAUGACHIYA.

DATA SHEET FOR SEWAGE PUMPING SET

(To be filled by Tenderer)

1-	Capacity in LPM		
2-	N.E.H. in meter		
3-	Total Head in meter	-	15 Meter
4-	W.H.P. in N.E.H.		
5-	W.H.P. at total Head		
6-	Efficiency of Pump at duty point		
7-	B.H.P. at Pump Shaft		
8-	B.H.P. at Motor Shaft		
9-	Efficiency of Motor		
10-	B.H.P. input to Motor		
11-	K.W.I. to Motor		
12-	B.O.T. (KWI/WHP)		
13-	Over all Efficiency		
14-	H.P. of Motor		
15-	Dia of Pump/Motor		
16-	No. of Stages		

TECHNICAL DATA OF DISTRIBUTION TRANSFORMER
FOR SPS NAYA TOLA BASTI NALA
(To be filled by Tenderer)

Sl. No.	Description	FOR 50 KVA
1.	Service	
2.	Type	
3.	Rating in KVA	
4.	Rated frequency (in Hz)	
5.	No. of phase (i) HV side (ii) LV side (iii) Neutral site (separate outside)	
6.	Rated voltage (i) HV winding (ii) LV winding	
7.	Vector group	
8.	Type of cooling (ONAN/ONAF)	
9.	Tappings (i) Range (ii) No. of steps (iii) In steps (iv) Tapping provided on HV side	
10.	Tap changer type	
11.	Impedance voltage at 75^0 C (i) at principal tapping percentage	
12.	Temperature rise above 50^0 C ambient (Deg.C) (i) Top of oil by thermometer (ii) Winding by resistance	
13.	Terminals (i) HV side (ii) LV Side	
14.	Insulation level (i) Impulse (a) HV KV peak (b) LV KV peak (ii) Power frequency (a) HV ……KV rms. (b) LV ……..KV rms. (c) LV Neutral KV rms.	
15.	Winding conductor material (i) HV (ii) LV	
16.	Losses (at 75^0 C) and principal tappings (i) No load loss at rated voltage and frequency KW. (ii) Load loss at rated current (ONAN) KW (iii) Total loss at maximum rated power	
17.	Efficiency at 75^0 C and UPF (i) At full load (ONAN) %age (ii) At 75% load (ONAN) %age	

	(iii) At 50% load (ONAN) %age	
18.	Approximate weights (i) Core and windings ……KG. (ii) Tank and fittings …… KG. (iii) Oil weight ……. KG. (iv) Total weight ……. KG. (v) Oil volume ……. Liters	
19.	Dimensions (i) Height (ii) Width (iii) Length	
20.	Painting (i) colour (reference of standards)	Synthetic enamel 631 of IS:5, IS:2026 part I to part IV

E/M WORKS OF CONSTRUCTION AT MILAN CHOWK & TARA BHAWAN SPS, NAUGACHIYA
DATA SHEET FOR D.G. SET
(To be filled by Tenderer)

A (1) DIESEL ENGINE-

(i) Make
(ii) Manufacturer
(iii) Model
(iv) Rating BHP
(v) RPM
(vi) H.S.D. consumption per hour.

Load	**Fuel Consumption**
	Diesel Consumption
Full load	
75% Load	
50% load	

(vii) Specific Lub. Oil consumption
(viii) No. of cylinder
(ix) Weight
(x) Dimension
  (a) Length
  (b) Width
  (c) Height
(xi) Noise level
(xii) Type of cooling system
(xiii) Additional information, if any.

B. ALTERNATOR-

(i) Manufacturer
(ii) Type
(iii) Enclosure
(iv) Rated speed (RPM)
(v) Out Put (KW/KVA)
(vi) Rated Voltage
(vii) Rated coolant
(viii) Power Factor
(ix) No. of Phases
(x) Frequency
(xi) Excitation
(xii) Class of Insulation
(xiii) Rating
(xiv) Dimension
  (a) Length
  (b) Width
  (c) Height
(xv) Additional information, if any.

E/M WORKS OF CONSTRUCTION AT MILAN CHOWK AND TARA BHAWAN SPS, NAUGACHIYA
DATA SHEET FOR SEWAGE PUMPING SET

(To be filled by Tenderer)

17-	Capacity in LPM		
18-	N.E.H. in meter		
19-	Total Head in meter	-	15 Meter
20-	W.H.P. in N.E.H.		
21-	W.H.P. at total Head		
22-	Efficiency of Pump at duty point		
23-	B.H.P. at Pump Shaft		
24-	B.H.P. at Motor Shaft		
25-	Efficiency of Motor		
26-	B.H.P. input to Motor		
27-	K.W.I. to Motor		
28-	B.O.T. (KWI/WHP)		
29-	Over all Efficiency		
30-	H.P. of Motor		
31-	Dia of Pump/Motor		
32-	No. of Stages		

TECHNICAL DATA OF DISTRIBUTION TRANSFORMER
FOR SPS MILAN CHOWK & TARA BHAWAN
(To be filled by Tenderer)

Sl. No.	Description	FOR 50 KVA
1.	Service	
2.	Type	
3.	Rating in KVA	
4.	Rated frequency (in Hz)	
5.	No. of phase (iv) HV side (v) LV side (vi) Neutral site (separate outside)	
6.	Rated voltage (iii) HV winding (iv) LV winding	
7.	Vector group	
8.	Type of cooling (ONAN/ONAF)	
9.	Tappings (v) Range (vi) No. of steps (vii) In steps (viii) Tapping provided on HV side	
10.	Tap changer type	
11.	Impedance voltage at 75^0 C (i) at principal tapping percentage	
12.	Temperature rise above 50^0 C ambient (Deg.C) (iii) Top of oil by thermometer (iv) Winding by resistance	
13.	Terminals (iii) HV side (iv) LV Side	
14.	Insulation level (ii) Impulse (a) HV KV peak (b) LV KV peak (ii) Power frequency (a) HV ……KV rms. (b) LV ……..KV rms. (c) LV Neutral KV rms.	
15.	Winding conductor material (iii) HV (iv) LV	

16.	Losses (at 75^0 C) and principal tappings (iv) No load loss at rated voltage and frequency KW. (v) Load loss at rated current (ONAN) KW (vi) Total loss at maximum rated power	
17.	Efficiency at 75^0 C and UPF (iv) At full load (ONAN) %age (v) At 75% load (ONAN) %age	

	(vi) At 50% load (ONAN) %age	
18.	Approximate weights (vi) Core and windings ……KG. (vii) Tank and fittings …… KG. (viii) Oil weight ……. KG. (ix) Total weight ……. KG. (x) Oil volume ……. Liters	
19.	Dimensions (iv) Height (v) Width (vi) Length	
20.	Painting (ii) colour (reference of standards)	

E/M WORKS OF CONSTRUCTION AT STATION ROAD & DURGA STHAN NALA SPS, NAUGACHIYA.

DATA SHEET FOR D.G. SET

(To be filled by Tenderer)

A (1) DIESEL ENGINE-

(i) Make
(ii) Manufacturer
(iii) Model
(iv) Rating BHP
(v) RPM
(vi) H.S.D. consumption per hour.

Load	**Fuel Consumption**
	Diesel Consumption
Full load	
75% Load	
50% load	

(vii) Specific Lub. Oil consumption
(viii) No. of cylinder
(ix) Weight
(x) Dimension
  (a) Length
  (b) Width
  (c) Height
(xi) Noise level
(xii) Type of cooling system
(xiii) Additional information, if any.

B. ALTERNATOR-

(i) Manufacturer
(ii) Type
(iii) Enclosure
(iv) Rated speed (RPM)
(v) Out Put (KW/KVA)
(vi) Rated Voltage
(vii) Rated coolant
(viii) Power Factor
(ix) No. of Phases
(x) Frequency
(xi) Excitation
(xii) Class of Insulation
(xiii) Rating
(xiv) Dimension
  (a) Length
  (b) Width
  (c) Height
(xv) Additional information, if any.

E/M WORKS OF CONSTRUCTION AT PARAMIYA NALA SPS, NAUGACHIYA.
DATA SHEET FOR SEWAGE PUMPING SET

(To be filled by Tenderer)

33-	Capacity in LPM		
34-	N.E.H. in meter		
35-	Total Head in meter	-	15 Meter
36-	W.H.P. in N.E.H.		
37-	W.H.P. at total Head		
38-	Efficiency of Pump at duty point		
39-	B.H.P. at Pump Shaft		
40-	B.H.P. at Motor Shaft		
41-	Efficiency of Motor		
42-	B.H.P. input to Motor		
43-	K.W.I. to Motor		
44-	B.O.T. (KWI/WHP)		
45-	Over all Efficiency		
46-	H.P. of Motor		
47-	Dia of Pump/Motor		
48-	No. of Stages		

TECHNICAL DATA OF DISTRIBUTION TRANSFORMER
FOR SPS STATION ROAD & DURGA STHAN NALA
(To be filled by Tenderer)

Sl. No.	Description	FOR 50 KVA
1.	Service	
2.	Type	
3.	Rating in KVA	
4.	Rated frequency (in Hz)	
5.	No. of phase (vii) HV side (viii) LV side (ix) Neutral site (separate outside)	
6.	Rated voltage (v) HV winding (vi) LV winding	
7.	Vector group	
8.	Type of cooling (ONAN/ONAF)	
9.	Tappings (ix) Range (x) No. of steps (xi) In steps (xii) Tapping provided on HV side	
10.	Tap changer type	
11.	Impedance voltage at 75^0 C (i) at principal tapping percentage	
12.	Temperature rise above 50^0 C ambient (Deg.C) (v) Top of oil by thermometer (vi) Winding by resistance	
13.	Terminals (v) HV side (vi) LV Side	
14.	Insulation level (iii) Impulse (a) HV KV peak (b) LV KV peak (ii) Power frequency (a) HV …….KV rms. (b) LV ……..KV rms. (c) LV Neutral KV rms.	
15.	Winding conductor material (v) HV (vi) LV	

16.	Losses (at 75^0 C) and principal tappings (vii) No load loss at rated voltage and frequency KW. (viii) Load loss at rated current (ONAN) KW (ix) Total loss at maximum rated power	
17.	Efficiency at 75^0 C and UPF (vii) At full load (ONAN) %age (viii) At 75% load (ONAN) %age	

	(ix) At 50% load (ONAN) %age	
18.	Approximate weights (xi) Core and windings ……KG. (xii) Tank and fittings …… KG. (xiii) Oil weight ……. KG. (xiv) Total weight ……. KG. (xv) Oil volume ……. Liters	
19.	Dimensions (vii) Height (viii) Width (ix) Length	
20.	Painting (iii) colour (reference of standards)	Synthetic enamel 631 of IS:5, IS:2026 part I to part IV

E/M WORKS OF CONSTRUCTION AT WARD NO 3 NALA SPS, NAUGACHIYA.

DATA SHEET FOR D.G. SET

(To be filled by Tenderer)

A (1) DIESEL ENGINE-

(i) Make
(ii) Manufacturer
(vii) Model
(viii) Rating BHP
(ix) RPM
(x) H.S.D. consumption per hour.

Load	**Fuel Consumption**
	Diesel Consumption
Full load	
75% Load	
50% load	

(vii) Specific Lub. Oil consumption
(viii) No. of cylinder
(ix) Weight
(x) Dimension
  (a) Length
  (b) Width
  (c) Height
(xi) Noise level
(xii) Type of cooling system
(xiii) Additional information, if any.

B. ALTERNATOR-

(i) Manufacturer
(ii) Type
(iii) Enclosure
(iv) Rated speed (RPM)
(v) Out Put (KW/KVA)
(vi) Rated Voltage
(vii) Rated coolant
(viii) Power Factor
(ix) No. of Phases
(x) Frequency
(xi) Excitation
(xii) Class of Insulation
(xiii) Rating
(xiv) Dimension
  (a) Length
  (b) Width
  (c) Height
(xv) Additional information, if any.

E/M WORKS OF CONSTRUCTION AT WARD NO 3 NALA SPS, NAUGACHIYA.
DATA SHEET FOR SEWAGE PUMPING SET

(To be filled by Tenderer)

49-	Capacity in LPM		
50-	N.E.H. in meter		
51-	Total Head in meter	-	15 Meter
52-	W.H.P. in N.E.H.		
53-	W.H.P. at total Head		
54-	Efficiency of Pump at duty point		
55-	B.H.P. at Pump Shaft		
56-	B.H.P. at Motor Shaft		
57-	Efficiency of Motor		
58-	B.H.P. input to Motor		
59-	K.W.I. to Motor		
60-	B.O.T. (KWI/WHP)		
61-	Over all Efficiency		
62-	H.P. of Motor		
63-	Dia of Pump/Motor		
64-	No. of Stages		

TECHNICAL DATA OF DISTRIBUTION TRANSFORMER FOR SPS WARD NO 3 NALA

(To be filled by Tenderer)

Sl. No.	Description	FOR 50 KVA
1.	Service	
2.	Type	
3.	Rating in KVA	
4.	Rated frequency (in Hz)	
5.	No. of phase (x) HV side (xi) LV side (xii) Neutral site (separate outside)	
6.	Rated voltage (vii) HV winding (viii) LV winding	
7.	Vector group	
8.	Type of cooling (ONAN/ONAF)	
9.	Tappings (xiii) Range (xiv) No. of steps (xv) In steps (xvi) Tapping provided on HV side	
10.	Tap changer type	
11.	Impedance voltage at 75^0 C (i) at principal tapping percentage	
12.	Temperature rise above 50^0 C ambient (Deg.C) (vii) Top of oil by thermometer (viii) Winding by resistance	
13.	Terminals (vii) HV side (viii) LV Side	
14.	Insulation level (iv) Impulse (a) HV KV peak (b) LV KV peak (ii) Power frequency (a) HV …….KV rms. (b) LV ……..KV rms. (c) LV Neutral KV rms.	
15.	Winding conductor material (vii) HV (viii) LV	

16.	Losses (at 75^0 C) and principal tappings (x) No load loss at rated voltage and frequency KW. (xi) Load loss at rated current (ONAN) KW (xii) Total loss at maximum rated power	
17.	Efficiency at 75^0 C and UPF (x) At full load (ONAN) %age (xi) At 75% load (ONAN) %age (xii) At 50% load (ONAN) %age	
18.	Approximate weights	

	(xvi) Core and windings ……KG. (xvii) Tank and fittings …… KG. (xviii) Oil weight ……. KG. (xix) Total weight ……. KG. (xx) Oil volume ……. Liters	
19.	Dimensions (x) Height (xi) Width (xii) Length	
20.	Painting (iv) colour (reference of standards)	Synthetic enamel 631 of IS:5, IS:2026 part I to part IV

E/M WORKS OF CONSTRUCTION AT WARD NO 8 NALA SPS, NAUGACHIYA.

DATA SHEET FOR D.G. SET

(To be filled by Tenderer)

A (1) DIESEL ENGINE-

(i) Make
(ii) Manufacturer
(xi) Model
(xii) Rating BHP
(xiii) RPM
(xiv) H.S.D. consumption per hour.

Load	**Fuel Consumption**
	Diesel Consumption
Full load	
75% Load	
50% load	

(vii) Specific Lub. Oil consumption
(viii) No. of cylinder
(ix) Weight
(x) Dimension
  (a) Length
  (b) Width
  (c) Height
(xi) Noise level
(xii) Type of cooling system
(xiii) Additional information, if any.

B. ALTERNATOR-

(i) Manufacturer
(ii) Type
(iii) Enclosure
(iv) Rated speed (RPM)
(v) Out Put (KW/KVA)
(vi) Rated Voltage
(vii) Rated coolant
(viii) Power Factor
(ix) No. of Phases
(x) Frequency
(xi) Excitation
(xii) Class of Insulation
(xiii) Rating
(xiv) Dimension
  (a) Length
  (b) Width
  (c) Height
(xv) Additional information, if any.

E/M WORKS OF CONSTRUCTION AT WARD NO 8 NALA SPS, NAUGACHIYA.
DATA SHEET FOR SEWAGE PUMPING SET

(To be filled by Tenderer)

65-	Capacity in LPM		
66-	N.E.H. in meter		
67-	Total Head in meter	-	15 Meter
68-	W.H.P. in N.E.H.		
69-	W.H.P. at total Head		
70-	Efficiency of Pump at duty point		
71-	B.H.P. at Pump Shaft		
72-	B.H.P. at Motor Shaft		
73-	Efficiency of Motor		
74-	B.H.P. input to Motor		
75-	K.W.I. to Motor		
76-	B.O.T. (KWI/WHP)		
77-	Over all Efficiency		
78-	H.P. of Motor		
79-	Dia of Pump/Motor		
80-	No. of Stages		

TECHNICAL DATA OF DISTRIBUTION TRANSFORMER
FOR SPS WARD NO 8 NALA
(To be filled by Tenderer)

Sl. No.	Description	FOR 50 KVA
1.	Service	
2.	Type	
3.	Rating in KVA	
4.	Rated frequency (in Hz)	
5.	No. of phase (xiii) HV side (xiv) LV side (xv) Neutral site (separate outside)	
6.	Rated voltage (ix) HV winding (x) LV winding	
7.	Vector group	
8.	Type of cooling (ONAN/ONAF)	
9.	Tappings (xvii) Range (xviii) No. of steps (xix) In steps (xx) Tapping provided on HV side	
10.	Tap changer type	
11.	Impedance voltage at 75^0 C (i) at principal tapping percentage	
12.	Temperature rise above 50^0 C ambient (Deg.C) (ix) Top of oil by thermometer (x) Winding by resistance	
13.	Terminals (ix) HV side (x) LV Side	
14.	Insulation level (v) Impulse (a) HV KV peak (b) LV KV peak (ii) Power frequency (a) HV ……KV rms. (b) LV ……..KV rms. (c) LV Neutral KV rms.	
15.	Winding conductor material (ix) HV (x) LV	

16.	Losses (at 75^0 C) and principal tappings (xiii) No load loss at rated voltage and frequency KW. (xiv) Load loss at rated current (ONAN) KW (xv) Total loss at maximum rated power	
17.	Efficiency at 75^0 C and UPF (xiii) At full load (ONAN) %age (xiv) At 75% load (ONAN) %age (xv) At 50% load (ONAN) %age	

18.	Approximate weights (xxi) Core and windings ……KG. (xxii) Tank and fittings …… KG. (xxiii) Oil weight ……. KG. (xxiv) Total weight ……. KG. (xxv) Oil volume ……. Liters	
19.	Dimensions (xiii) Height (xiv) Width (xv) Length	
20.	Painting (v) colour (reference of standards)	Synthetic enamel 631 of IS:5, IS:2026 part I to part IV

E/M WORKS OF CONSTRUCTION AT WARD NO 9 NALA SPS, NAUGACHIYA.

DATA SHEET FOR D.G. SET

(To be filled by Tenderer)

A (1) DIESEL ENGINE-

(i) Make
(ii) Manufacturer
(xv) Model
(xvi) Rating BHP
(xvii) RPM
(xviii) H.S.D. consumption per hour.

Load	**Fuel Consumption**
	Diesel Consumption
Full load	
75% Load	
50% load	

(vii) Specific Lub. Oil consumption
(viii) No. of cylinder
(ix) Weight
(x) Dimension
  (a) Length
  (b) Width
  (c) Height
(xi) Noise level
(xii) Type of cooling system
(xiii) Additional information, if any.

B. ALTERNATOR-

(i) Manufacturer
(ii) Type
(iii) Enclosure
(iv) Rated speed (RPM)
(v) Out Put (KW/KVA)
(vi) Rated Voltage
(vii) Rated coolant
(viii) Power Factor
(ix) No. of Phases
(x) Frequency
(xi) Excitation
(xii) Class of Insulation
(xiii) Rating
(xiv) Dimension
  (a) Length
  (b) Width
  (c) Height
(xv) Additional information, if any.

E/M WORKS OF CONSTRUCTION AT WARD NO 9 SPS, NAUGACHIYA
DATA SHEET FOR SEWAGE PUMPING SET

(To be filled by Tenderer)

81-	Capacity in LPM		
82-	N.E.H. in meter		
83-	Total Head in meter	-	15 Meter
84-	W.H.P. in N.E.H.		
85-	W.H.P. at total Head		
86-	Efficiency of Pump at duty point		
87-	B.H.P. at Pump Shaft		
88-	B.H.P. at Motor Shaft		
89-	Efficiency of Motor		
90-	B.H.P. input to Motor		
91-	K.W.I. to Motor		
92-	B.O.T. (KWI/WHP)		
93-	Over all Efficiency		
94-	H.P. of Motor		
95-	Dia of Pump/Motor		
96-	No. of Stages		

TECHNICAL DATA OF DISTRIBUTION TRANSFORMER
FOR SPS WARD NO 9 NALA
(To be filled by Tenderer)

Sl. No.	Description	FOR 50 KVA
1.	Service	
2.	Type	
3.	Rating in KVA	
4.	Rated frequency (in Hz)	
5.	No. of phase (xvi) HV side (xvii) LV side (xviii) Neutral site (separate outside)	
6.	Rated voltage (xi) HV winding (xii) LV winding	
7.	Vector group	
8.	Type of cooling (ONAN/ONAF)	
9.	Tappings (xxi) Range (xxii) No. of steps (xxiii) In steps (xxiv) Tapping provided on HV side	
10.	Tap changer type	
11.	Impedance voltage at 75^0 C (i) at principal tapping percentage	
12.	Temperature rise above 50^0 C ambient (Deg.C) (xi) Top of oil by thermometer (xii) Winding by resistance	
13.	Terminals (xi) HV side (xii) LV Side	
14.	Insulation level (vi) Impulse (a) HV KV peak (b) LV KV peak (ii) Power frequency (a) HV …….KV rms. (b) LV ……..KV rms. (c) LV Neutral KV rms.	
15.	Winding conductor material (xi) HV (xii) LV	

16.	Losses (at 75^0 C) and principal tappings (xvi) No load loss at rated voltage and frequency KW. (xvii) Load loss at rated current (ONAN) KW (xviii) Total loss at maximum rated power	
17.	Efficiency at 75^0 C and UPF (xvi) At full load (ONAN) %age (xvii) At 75% load (ONAN) %age	

	(xviii) At 50% load (ONAN) %age	
18.	Approximate weights (xxvi) Core and windings ……KG. (xxvii) Tank and fittings …… KG. (xxviii)Oil weight ……. KG. (xxix) Total weight ……. KG. (xxx) Oil volume ……. Liters	
19.	Dimensions (xvi) Height (xvii) Width (xviii) Length	
20.	Painting (vi) colour (reference of standards)	Synthetic enamel 631 of IS:5, IS:2026 part I to part IV

LIST OF ACCEPTABLE MAKES OF E&M EQUIPMENTS

Sl. No.	MATERIAL/WORK	SUPPLIER/MANUFACTURER/VENDOR/AGENCY
1	C.I. Pipes & Fittings	BIC, Electro steel casting, any make having ISI marked
2	S.F.U. (max. upto 400 Amp.)	L&T/Siemens/Schneider/A.B.B./Crompton/Areval/Havells
3	Indicating digital meters	AE/L&T/Minilec
4	Crimping lugs/Glands of double compression type	Dowell/Jainson
5	MCB/RCCB	Siemens/Schneider/Crompton/Havells
6	Main L.T. Panels/H.T. Panels	L&T/Schneider/Areval/Kirloskar/ABB/Havells
7	PVC Copper wires (FRLS Grade)	Finolex/Havells
8	Motors	Siemens, ABB, Kirloskar, BHEL, Crompton
9	Cable glands and lugs	Dowell, Comet, Braco
10	Lighting Fixture	Philips/Crompton/Havells
11	Fans & Air- Circulators	Crompton/Usha/Orient/Havells
12	Distribution Transformers	Crompton, Kirloskar, BHEL, Siemens, ABB, Kanohar, Vardhman, Electromake, Voltamp, Sonal (upto 400 Kva)
13	11 KV VCB breaker & Panel	ABB, Siemens, Kirloskar, Crompton, Areva
14	Relays	L&T, EE, ABB
15	11 Kv end termination & Straight through joint	Raychem, Mahindra, CCI
16	Measuring Instruments	Rishab (L&T), A.E., Mimilec
17	Cables	Finolex, Polycab, Gloster, Havells, CCI, Incab, KEI,
18	C.T./P.T.	A.E., MEI, ABB, Kappa
19	Starter	MEI, Jyoti, UEI, Advance, C&S, L&T
20	Soft Starter	ABB, L&T, Siemens, Schneider, Jayshree Electron
21	Trivector Meter	UPPCL approved
22	PVC conduits, PVC Pipes, HDPE Pipes	Garware, Finolex, Jain Irrigation, reliance, Duro Life.
23	G.O.D. Switches and Dropout fuse outfit	Kiran, Pactil, Atas or UPCL approved
24	Chain pulley block/ Lifting Tackles/ Gantry Cranes	Indef, Morris, Waster
25	Lugs	Dowels, Lotus, AG Electricals
26	Motor Protection relays	Universal, Thresold, L&T, Minilac, Siemens, C.S. Telemechanique, Indo-Asian
27	Feder Pillar/ Mini Pillar	Popular Brass Metal works, Anil Elect, Ind. Or any other manufacturer approved by dept or UPCL
28	HRC Fuses	L&T, Indo Asian, Siemens, Havells
29	HC Fuse Distribution Board	CPL, EE, KEW, Kalki, Slandered
30	Air/Oil Circuit Breakers (HT/LT)	Kibum, Siemens, L&T, Telemechanique, Crompton, Schneider, Areva, Havells
31	Energy Meters	Jaipur of UPCL approved
32	Pawer Capacitors	Khatau Junkar, Crompton, L&T, Momaya, Siemens, NGEF
33	Steel Tubular Poles	Indian Electric poles, Bambay tubes, Nityanand, Rajan tubes
34	GI pipes/Poles	Zenith, Tata, Bharat, Jindal, Suryaprakash
35	Terminal Box, Barcket, Junction Box, Control Pillar	ELM, United, DVK, Lacally fabricated as per CIDCO's approved drg/Specification
36	Street Lighting luminaries	Bajaj, Crompton, Philips, Genelec, Mysore, Wipro,

		Havells
37	Chokes/lgnitors	Bajaj, Crompton, Philips, Genelec, Havells, Indo- Asian
38	Power Contactors	L&T, Siemens, Bharat Cutter & Hammer, Telemechanique, Kurloskar, Crompton, Schneider.
39	Lamps	Bajaj, Crompton, Philips, Electron, Havells, Mysore, Sylvania-Laxman.
40	Rotary/Select or switches	L&T, Siemens, Kaycee, EE, BISONS, (ELM), Havells
41	Post top Lantern	Philips, Crompton, Glolite, Bajaj, Parimal, Tulip, Keselec.
42	Street light controller/ timer	L&T, (TSQ 100) 24 hrs. Dial, ELM
43	ASCR Conductor	UPCL approved
44	Alternators for D.G. set	Kirloskar, Stamford, BHEL, Crompton
45	Diesel Engines for D.G. set	Kirloskar, Cummins, Cterpillar, Greaves, Perkins
46	Cable Jointing kit	Raychem, Xicon, Benson, Mahindra (Push on) M Seal.
47	Pole Paint	Jenson & Nicholson, Asian (S+M), Nerolac
48	Fluorescent Fixlures	Bajaj, Crompton, Philips, GEC, Genelec, Mysore, Wipro, Glolite, Lit well, Prestolite, Indo- Asian
49	CVT	Sukam/ Microtech
50	Terminals	Elemex/Wago (C&S)
51	HT Cable Terminations	Raychem/Mahindra/CCI
52	Push Buttons	L&T/ Siemens/Technik
53	Control Panels	Industrial control & Appliances (P) Ltd. / Electric Automation/ Jaisum & Hutchion Controls (P) Ltd. Industrial switch gear & Controls/Advance, L&T, Siemens, C&S, Crompton
54	Voltage Stabilizers	V.Gaurd/Electorn/Vaoltsafe/Consule/Bluebird
55	Non Clog Sewage Submersible Pumps	Kirloskar, Kishor, Mather & Platt (willow), Aqua, KSB Modi (upto 75 HP) Flyght
56	Mechanical Screen	Voltas, Shivpad, Emico-KCP
57	Sluice Gate	Jash, IVC, BIC
58	Valves	Kirloskar, IVC, AVK, Intervalve, Bray
59	Pressure Gauges	H. Guru, Fiebig.

SCHEDULE 'A'

PURPOSE:

Provision for all E&M equipments in this tender document have been made to divert the sewage of naya tola basti Nala,Milan chowk &tara bhawan Nala, ward no 8 Nala, ward no 9 nala, station road nala & durga sthan nala and ward no 3 nala to the STP situated in ward no 15, near Makhtakiya area.for its treatment and to reduce the pollution load of river Ganga.

WITNESS **CONTRACTOR**

DATED **DATED**

SCHEDULE ‘B’

CONTRACT DRAWING ACCOMPANYING THE SPECIFICATION:

Plan and elevation of all the equipment along with detail showing modification suggested for complete work. Literature, characteristic curves, layout drawing etc. Should also be furnished with the other.

WITNESS **CONTRACTOR**

DATED **DATED**

SCHEDULE 'C'

List OF DRAWING IN DUPLICATE TO BE SUBMITTED BY THE CONTRACT TO THE ENGINEER FOR APPROVAL DURING THE COURSE OF CONSTRUCTION OF WORKS

1- Completed and final to scale general arrangement drawing showing all the electrical and mechanical equipments.
2- Completed and final to scale foundation plans.
3- Completed and final to scale other detailed dimensioned and sectional working drawings required by the Engineer from time to time.

COMPLETION PLAN

03-03 bound set of above drawing together with the printed instructions, characteristic curves and bulletins of the various equipment installed at the site of work.

WITNESS **CONTRACTOR**

DATED **DATED**

SCHEDULE 'D'

TEST CERTIFICATES TO BE SUPPLIED:

Copies of test certificate of all the Electrical & Mechanical equipments tested at manufacture's works shall be sent to the Engineer by the Tenderer.

WITNESS **CONTRACTOR**

DATED **DATED**

SCHEDULE ‘E’

Testing and performance of Pumping Plants, D.G. Sets and 11/0.4 KV Sub-Stations with connected works shall be carried out at manufacturer’s works as detailed in the scope of work under testing of equipment. Working and performance of all the equipments shall also be conducted at site of work as per relevant ISS/IER.

WITNESS **CONTRACTOR**

DATED **DATED**

SCHEDULE 'F

The complete supply, installation of all the equipment and other appurtenant works will be completed, tested and commissioned to the satisfaction of Engineer with **18 (eighteen)** months from the date of start of work including 2 months trial run for stabilization of system will be carried out. After this period maintenance & running will be carried out by the firm for a period of **180 months**. The completion schedule is as below:-

1-	Construction Work	-	16 months
2-	Trial run, testing, commissioning and stabilization period	-	2 months
3-	O & M	-	180 months

WITNESS **CONTRACTOR**

DATED **DATED**

Technical Specification For Electrical & Mechanical Components of Milan Chauk Nala

Sl.No	Description	Unit	Quantity
1.0	**EARTHING**		
1.1	Neutral Earthing - Earthing with Copper earth plate 600mmx600mmx3mm thick including accesseries, and providing masonary enclosure with cover plate having locking arrangement and watering pipe of 2.7m long etc with charcoal/coke and salt as required.	No.	2
1.2	Body Earthing - Earthing with Gi earth pipe 4.5m long, 40mm dia including accesseries, and providing masonary enclosure with cover plate having locking arrangement and watering pipe etc with charcoal/coke and salt as required.	No	2
2.0	**LT PANEL BOARD (Indoor type)**		
2.1	Supplying and fixing following way prewired SP&N MCB distribution board of steel sheet for 240 volts on surface/ recess complete with loose wire box, terminal connectors for all incoming and outgoing circuits, duly prewired with suitable size FRLS PVC insulated copper conductor up to terminal blocks, tinned copper bus bar, neutral link, earth bar, din bar, detachable gland plate, interconnections, powder painted including earthing etc. as required. (But without MCB/ RCCB/ Isolator) 2 + 8 way/10 way, Double door	No	1
	2 + 8 way/10 way, Double door		
2.2	**MCCB DISTRIBUTION BOARDS**		
	Providing and fixing 100A rating and 16KA breaking capacity and pole TP MCCB in existing cubicle panel board including drilling holes in cubicle panel, making connections, ets as required.	No	1
2.3	**MINIATURE CIRCUIT BREAKERS**		
	Supplying and fixing 32A, triple pole and neutral, curve, miniature circuit breaker for inductive load of triple 415V, "C" curve, miniature circuit breaker for inductive load of triple pole and neutral in the existing MCB DB complete with connections, testing and commitioning etc as required.	No	2
2.4	**MINIATURE CIRCUIT BREAKERS**		
	Supplying and fixing 32A, single pole and neutral, 240V, "C" curve, miniature circuit breaker for inductive load of single pole and neutral in the existing MCB DB complete with connections, testing and commitioning etc as required.	No	1
2.5	**EARTHING**		
	Body Earthing - Earthing with Gi earth pipe 4.5m long, 40mm dia including accesseries, and providing masonary enclosure with cover plate having locking arrangement and watering pipe etc with charcoal/coke and salt as required.	No	2
3.0	**DISTRIBUTION BOARD**		
3.1	Supply and fixing 4+12 way, single door, horizontal type thee pole and neutral, sheet steel, MCB DB, 415V, on surface/recess, complete with tinned copper bus bar, neutral bus bar, earth bar, din bar, interconnections, powdered painted including earthing etc as required. (but without MCB/RCCB/isolators)	m	1
3.2	**EARTHING**		
	Body Earthing - Earthing with Gi earth pipe 4.5m long, 40mm dia including accesseries, and providing masonary enclosure with cover plate having locking arrangement and watering pipe etc with charcoal/coke and salt as required.	No	2

4	**CABLES**			
	Supply of LT UG cable having Copper conductor PVC			
	insulated,Sheathed ,galvanised steel wire /steel tap armoured cable with PVC outer sheathing 1.1 KV class)			
4.1	4Cx16 sq mm + 2x16 sq mm earth wire		m	1
4.2	4Cx10 sq mm + 2x10 sq mm earth wire		m	6.5
4.3	4Cx4 sq mm + 2x4 sq mm earth wire		m	15
4.4	2Cx2.5 sq mm + 1x2.5 sq mm earth wire		m	14
5.0	**LUMINARIES, SOCKETS AND SWITCHES**			
5.1	120W Gate lamp with fitting		No	2
5.2	40W flourescent lamp		No	4
5.3	70W MH Lamp for site lighting		No	4
5.4	Single switched socket with multi purpose		No	2
5.5	Switches		No	6

Sl.No	Description	Unit	Quantity
1.0	**DIESEL GENERATOR 50 KVA**		
1.1	50 KVA, 40KW, 415V, 50 Hz, comprising of Perkins Engine Coupled to Stamford make Alternator, complete with all Standard accessories and ATS with Acoustic enclosure.	No	1
1.2	**EARTHING**		
1.2.1	Neutral Earthing - Earthing with Copper earth plate 600mmx600mmx3mm thick including accesseries, and providing masonary enclosure with cover plate having locking arrangement and watering pipe of 2.7m long etc with charcoal/coke and salt as required.	No	2
1.2.2	Body Earthing - Earthing with Gi earth pipe 4.5m long, 40mm dia including accesseries, and providing masonary enclosure with cover plate having locking arrangement andwateringpipeetc with charcoal/coke and salt as required.	No	2
2.0	**LT PANEL BOARD (Indoor type)**		
2.1	Supplying and fixing 4 ways surface/recess mounting, vertical type, 415V, TPN MCB distribution board of sheet steel, dust protected , duly powder painted, inclusive of 200A tinned copper busbar,common neutral link,earth bar, din bar for mountingMCB's, with provision of 100A TP 16KA MCCB as incommer, interconnection between incomer MCCB and bus bars (but without MCB,s /MCCB's) as required. (Note :Vertical type MCB TPDB is normally used where 3 phase outlets are required.)	No	1
2.2	**MCCB DISTRIBUTION BOARDS**		
	Providing and fixing 100A rating and 16KA breaking capacity and pole TP MCCB in existing cubicle panel board including drilling		

	holes in cubicle panel, making connections, ets as required.	No	1
2.3	**MINIATURE CIRCUIT BREAKERS**		
	Supplying and fixing 32A, triple pole and neutral, 415V, "C" curve, miniature circuit breaker for inductive load of triple pole and neutral in the existing MCB DB complete with connections, testing and commitioning etc as required.	No	2
2.4	**MINIATURE CIRCUIT BREAKERS**		
	Supplying and fixing 32A, single pole and neutral, 240V, "C" curve, miniature circuit breaker for inductive load of single pole and neutral in the existing MCB DB complete with connections, testing and commitioning etc as required.	No	1
2.5	**EARTHING**		
	Body Earthing - Earthing with Gi earth pipe 4.5m long, 40mm dia including accesseries, nd providing masonary enclosure with cover plate having locking arrangement ndwateringpipeetc with charcoal/coke and salt as required.	No	2
3.0	**DISTRIBUTION BOARD**		
3.1	Supply and fixing 4+12 way, single door, horizontal, type, thee, pole, and neutral, sheet, steel, MCB, DB, 415V, on surface/recess,complete with tinned copper bus bar, neutral bus bar, earth bar, din bar, interconnections, powdered painted including earthing etc as required. (but without MCB/RCCB/isolators)	m	1
3.2	**EARTHING**		
	Body Earthing - Earthing with Gi earth pipe 4.5m long, 40mm dia including accesseries, nd providing masonary enclosure with cover plate having locking arrangement ndwateringpipeetc with charcoal/coke and salt as required.	No	2
4.0	**CABLES**		
	Supply of LT UG cable having Copper conductor PVC insulated,Sheathed ,galvanized steel wire steel tap armoured cable with PVC outer sheathing 1.1 KV class)		
4.1	4Cx16 sq mm + 2x16 sq mm earth wire	m	1
4.2	4Cx10 sq mm + 2x10 sq mm earth wire	m	6.5

Technical Specification For Electrical & Mechanical Components of Naya Tola Nala

Sl.No	Description	Unit	Quantity
1.0	**EARTHING**		
1.1	Neutral Earthing - Earthing with Copper earth plate 600mmx600mmx3mm thick including accesseries, and providing masonary enclosure with cover plate having locking arrangement and watering pipe of 2.7m long etc with charcoal/coke and salt as required.	No.	2
1.2	Body Earthing - Earthing with Gi earth pipe 4.5m long, 40mm dia including accesseries, and providing masonary enclosure with cover plate having locking arrangement and watering pipe etc with charcoal/coke and salt as required.	No	2
2.0	**LT PANEL BOARD (Indoor type)**		
2.1	Supplying and fixing following way prewired SP&N MCB distribution board of steel sheet for 240 volts on surface/ recess complete with loose wire box, terminal connectors for all incoming and outgoing circuits,	No	1

	duly prewired with suitable size FRLS PVC insulated copper conductor up to terminal blocks, tinned copper bus bar, neutral link, earth bar, din bar, detachable gland plate, interconnections, powder painted including earthing etc. as required. (But without MCB/ RCCB/ Isolator) 2 + 8 way/10 way, Double door 2 + 8 way/10 way, Double door		
2.2	**MCCB DISTRIBUTION BOARDS**		
	Providing and fixing 100A rating and 16KA breaking capacity and pole TP MCCB in existing cubicle panel board including drilling holes in cubicle panel, making connections, ets as required.	No	1
2.3	**MINIATURE CIRCUIT BREAKERS**		
	Supplying and fixing 32A, triple pole and neutral, curve, miniature circuit breaker for inductive load of triple 415V, "C" curve, miniature circuit breaker for inductive load of triple pole and neutral in the existing MCB DB complete with connections, testing and commitioning etc as required.	No	2
2.4	**MINIATURE CIRCUIT BREAKERS**		
	Supplying and fixing 32A, single pole and neutral, 240V, "C" curve, miniature circuit breaker for inductive load of single pole and neutral in the existing MCB DB complete with connections, testing and commitioning etc as required.	No	1
2.5	**EARTHING**		
	Body Earthing - Earthing with Gi earth pipe 4.5m long, 40mm dia including accesseries, and providing masonary enclosure with cover plate having locking arrangement and watering pipe etc with charcoal/coke and salt as required.	No	2
3.0	**DISTRIBUTION BOARD**		
3.1	Supply and fixing 4+12 way, single door, horizontal type thee pole and neutral, sheet steel, MCB DB, 415V, on surface/recess, complete with tinned copper bus bar, neutral bus bar, earth bar, din bar, interconnections, powdered painted including earthing etc as required. (but without MCB/RCCB/isolators)	m	1
3.2	**EARTHING**		
	Body Earthing - Earthing with Gi earth pipe 4.5m long, 40mm dia including accesseries, and providing masonary enclosure with cover plate having locking arrangement and watering pipe etc with charcoal/coke and salt as required.	No	2
4	**CABLES**		
	Supply of LT UG cable having Copper conductor PVC insulated,Sheathed ,galvanised steel wire /steel tap armoured cable with PVC outer sheathing 1.1 KV class)		
4.1	4Cx16 sq mm + 2x16 sq mm earth wire	m	1
4.2	4Cx10 sq mm + 2x10 sq mm earth wire	m	6.5
4.3	4Cx4 sq mm + 2x4 sq mm earth wire	m	15
4.4	2Cx2.5 sq mm + 1x2.5 sq mm earth wire	m	14
5.0	**LUMINARIES, SOCKETS AND SWITCHES**		

5.1	120W Gate lamp with fitting	No	2
5.2	40W flourescent lamp	No	4
5.3	70W MH Lamp for site lighting	No	4
5.4	Single switched socket with multi purpose	No	2
5.5	Switches	No	6

Sl.No	Description	Unit	Quantity
1.0	**DIESEL GENERATOR 50 KVA**		
1.1	50 KVA, 40KW, 415V, 50 Hz, comprising of Perkins Engine Coupled to Stamford make Alternator, complete with all Standard accessories and ATS with Acoustic enclosure.	No	1
1.2	**EARTHING**		
1.2.1	Neutral Earthing - Earthing with Copper earth plate 600mmx600mmx3mm thick including accesseries, and providing masonary enclosure with cover plate having locking arrangement and watering pipe of 2.7m long etc with charcoal/coke and salt as required.	No	2
1.2.2	Body Earthing - Earthing with Gi earth pipe 4.5m long, 40mm dia including accesseries, and providing masonary enclosure with cover plate having locking arrangement andwateringpipeetc with charcoal/coke and salt as required.	No	2
2.0	**LT PANEL BOARD (Indoor type)**		
2.1	Supplying and fixing 4 ways surface/recess mounting, vertical type, 415V, TPN MCB distribution board of sheet steel, dust protected , duly powder painted, inclusive of 200A tinned copper busbar,common neutral link,earth bar, din bar for mountingMCB's, with provision of 100A TP 16KA MCCB as incommer, interconnection between incomer MCCB and bus bars (but without MCB,s /MCCB's) as required. (Note :Vertical type MCB TPDB is normally used where 3 phase outlets are required.)	No	1
2.2	**MCCB DISTRIBUTION BOARDS**		
	Providing and fixing 100A rating and 16KA breaking capacity and pole TP MCCB in existing cubicle panel board including drilling holes in cubicle panel, making connections, ets as required.	No	1
2.3	**MINIATURE CIRCUIT BREAKERS**		
	Supplying and fixing 32A, triple pole and neutral, 415V, "C" curve, miniature circuit breaker for inductive load of triple pole and neutral in the existing MCB DB complete with connections, testing and		

	commitioning etc as required.		No	2
2.4	**MINIATURE CIRCUIT BREAKERS**			
	Supplying and fixing 32A, single pole and neutral, 240V, "C" curve, miniature circuit breaker for inductive load of single pole and neutral in the existing MCB DB complete with connections, testing and commitioning etc as required.		No	1
2.5	**EARTHING**			
	Body Earthing - Earthing with Gi earth pipe 4.5m long, 40mm dia including accesseries, nd providing masonary enclosure with cover plate having locking arrangement ndwateringpipeetc with charcoal/coke and salt as required.		No	2
3.0	**DISTRIBUTION BOARD**			
	Supply and fixing 4+12 way, single door, horizontal type thee pole and neutral, sheet steel, MCB DB, 415V, on surface/recess, complete with tinned copper			
3.1	bus bar, nuetral bus bar, earth bar, din bar, interconnections, powdered painted including earthing etc as required. (but without MCB/RCCB/isolators)		m	1
3.2	**EARTHING**			
	Body Earthing - Earthing with Gi earth pipe 4.5m long, 40mm dia including accesseries, nd providing masonary enclosure with cover plate having locking arrangement ndwateringpipeetc with charcoal/coke and salt as required.		No	2
4.0	**CABLES**			
	Supply of LT UG cable having Copper conductor PVC insulated,Sheathed ,galvanized steel wire steel tap armoured cable with PVC outer sheathing 1.1 KV class)			
4.1	4Cx16 sq mm + 2x16 sq mm earth wire		m	1
4.2	4Cx10 sq mm + 2x10 sq mm earth wire		m	6.5

4.3	4Cx4 sq mm + 2x4 sq mm earth wire	m	15
4.4	2Cx2.5 sq mm + 1x2.5 sq mm earth wire	m	14
5.0	**LUMINARIES, SOCKETS AND SWITCHES**		
5.1	120W Gate lamp with fitting	No	2
5.2	40W flourescent lamp	No	4
5.3	70W MH Lamp for site lighting	No	4
5.4	Single switched socket with multi purpose	No	2
5.5	Switches	No	6

Sl.No	Description	Quantity	Units
1	**Manually Cleaned Bar Screen** The screen shall be of removable type and shall consist of a welded stainless steel (AISI410) frame with vertical flats paced at 30 mm. The flats shall not be less than 10 mm in thickness and not less than 50 mm deep. The flats shall not have any oint. The spacing between the flats shall be uniform and preferably so maintained by adequate number of spacers, which shall be o located as not to interfere with the raking operation. To facilitate the manual cleaning of the screen the inclination of the creen shall be between 45º and 60º to the horizontal. Single piece screen width should not be more than 1.5 m.Two numbers tainless steel rollers shall be fixed on each side of frame to facilitate rolling contact with guide channel during lifting and owering of screen.		
1.2	(500 X 1500) mm	4	Nos
2	Providing, erecting and giving test of Non clog sewage submersible pump set with SS CF8 M impeller,CI casing,SS 316 shaft uitable for 3 Ph ,415 V , 50 Hz A.C. Supply, submersible motor having TEFC encloouser with class F insulation and IP 68 protection The pump shall be operated at 1450 RPM .The scope shall include required accessories viz automatic coupling device,guide pipe,,chain with shakle,flat submersible cable upto starter panel through suitable GI pipe (30 mtr 3 Core flat copper for each ump with necessary electrical connection with the starter panel and as perspecifications. (HP) 1.5 HP 4 Pumps for 2 lean, 1 peak and 1 average flow 2 pumps for lean flow		nos
	1 pump for peak flow		nos
	1 pump for average flow		nos
3	Providing Supplying erection testing and commissioning of 2 Tonne capacity Mobile Crane		
3.1	1 T Capacity for 7 m lift.	1	Nos

4.3	4Cx4 sq mm + 2x4 sq mm earth wire	m	15
4.4	2Cx2.5 sq mm + 1x2.5 sq mm earth wire	m	14
5.0	**LUMINARIES, SOCKETS AND SWITCHES**		
5.1	120W Gate lamp with fitting	No	2
5.2	40W flourescent lamp	No	4
5.3	70W MH Lamp for site lighting	No	4
5.4	Single switched socket with multi purpose	No	2
5.5	Switches	No	6

Sl.No	Description	Quantity	Units
1	**Manually Cleaned Bar Screen** The screen shall be of removable type and shall consist of a welded stainless steel (AISI410) frame with vertical flats paced at 30 mm. The flats shall not be less than 10 mm in thickness and not less than 50 mm deep. The flats shall not have any oint. The spacing between the flats shall be uniform and preferably so maintained by adequate number of spacers, which shall be o located as not to interfere with the raking operation. To facilitate the manual cleaning of the screen the inclination of the creen shall be between 45º and 60º to the horizontal. Single piece screen width should not be more than 1.5 m.Two numbers tainless steel rollers shall be fixed on each side of frame to facilitate rolling contact with guide channel during lifting and owering of screen.		
1.2	(500 X 1500) mm	4	Nos
2	Providing, erecting and giving test of Non clog sewage submersible pump set with SS CF8 M impeller,CI casing,SS 316 shaft uitable for 3 Ph ,415 V , 50 Hz A.C. Supply, submersible motor having TEFC enclooser with class F insulation and IP 68 protection The pump shall be operated at 1450 RPM .The scope shall include required accessories viz automatic coupling device,guide pipe,,chain with shakle,flat submersible cable upto starter panel through suitable GI pipe (30 mtr 3 Core flat copper for each ump with necessary electrical connection with the starter panel and as perspecifications. (HP) 10 HP 4 Pumps for 2 lean, 1 peak and 1 average flow		
	2 pumps for lean flow		nos
	1 pump for peak flow		nos
	1 pump for average flow		nos
3	Providing Supplying erection testing and commissioning of 2 Tonne capacity Mobile Crane		
3.1	1 T Capacity for 7 m lift.	1	Nos

Technical Specification For Electrical & Mechanical Components of Station Road Nala

Sl. No	Description	Unit	Quantity
1.0	**EARTHING**		
1. 1	Neutral Earthing - Earthing with Copper earth plate 600mmx600mmx3mm thick including accesseries, and providing masonary enclosure with cover plate having locking arrangement and watering pipe of 2.7m long etc with charcoal/coke and salt as required.	No.	2
1.2	Body Earthing - Earthing with Gi earth pipe 4.5m long, 40mm dia including accesseries, and providing masonary enclosure with cover plate having locking arrangement and watering pipe etc with charcoal/coke and salt as required.	No	2
2.0	**LT PANEL BOARD (Indoor type)**		
2.1	Supplying and fixing following way prewired SP&N MCB distribution board of steel sheet for 240 volts on surface/ recess complete with loose wire box, terminal connectors for all incoming and outgoing circuits, duly prewired with suitable size FRLS PVC insulated copper conductor up to terminal blocks, tinned copper bus bar, neutral link, earth bar, din bar, detachable gland plate, interconnections, powder painted including earthing etc. as required. (But without MCB/ RCCB/ Isolator) 2 + 8 way/10 way, Double door 2 + 8 way/10 way, Double door	No	1
2.2	**MCCB DISTRIBUTION BOARDS**		
	Providing and fixing 100A rating and 16KA breaking capacity and pole TP MCCB in existing cubicle panel board including drilling holes in cubicle panel, making connections, ets as required.	No	1
2.3	**MINIATURE CIRCUIT BREAKERS**		
	Supplying and fixing 32A, triple pole and neutral, curve, miniature circuit breaker for inductive load of triple 415V, "C" curve, miniature circuit breaker for inductive load of triple pole and neutral in the existing MCB DB complete with connections, testing and commitioning etc as required.	No	2
2.4	**MINIATURE CIRCUIT BREAKERS** Supplying and fixing 32A, single pole and neutral, 240V, "C" curve, miniature circuit breaker for inductive load of single pole and neutral in the existing MCB DB complete with connections, testing and commitioning etc as required.	No	1
2.5	**EARTHING**		
	Body Earthing - Earthing with Gi earth pipe 4.5m long, 40mm dia including accesseries, and providing masonary enclosure with cover plate having locking arrangement and watering pipe etc with charcoal/coke and salt as required.	No	2
3.0	**DISTRIBUTION BOARD**		
3.1	Supply and fixing 4+12 way, single door, horizontal type thee pole and neutral, sheet steel, MCB DB, 415V, on surface/recess, complete with tinned copper bus bar, neutral bus bar, earth bar, din bar, interconnections, powdered painted including earthing etc as required. (but without MCB/RCCB/isolators)	m	1

3.2	**EARTHING**		
	Body Earthing - Earthing with Gi earth pipe 4.5m long, 40mm dia including accesseries, and providing masonary enclosure with cover plate having locking arrangement and watering pipe etc with charcoal/coke and salt as required.	No	2
4	**CABLES**		
	Supply of LT UG cable having Copper conductor PVC insulated,Sheathed ,galvanised steel wire /steel tap armoured cable with PVC outer sheathing 1.1 KV class)		
4.1	4Cx16 sq mm + 2x16 sq mm earth wire	m	1
4.2	4Cx10 sq mm + 2x10 sq mm earth wire	m	6.5
4.3	4Cx4 sq mm + 2x4 sq mm earth wire	m	15
4.4	2Cx2.5 sq mm + 1x2.5 sq mm earth wire	m	14
5.0	**LUMINARIES, SOCKETS AND SWITCHES**		
5.1	120W Gate lamp with fitting	No	2
5.2	40W flourescent lamp	No	4
5.3	70W MH Lamp for site lighting	No	4
5.4	Single switched socket with multi purpose	No	2
5.5	Switches	No	6

Sl.No	Description	Unit	Quantity
1.0	**DIESEL GENERATOR 50 KVA**		
1.1	50 KVA, 40KW, 415V, 50 Hz, comprising of Perkins Engine Coupled to Stamford make Alternator, complete with all Standard accessories and ATS with Acoustic enclosure.	No	1
1.2	**EARTHING**		
1.2.1	Neutral Earthing - Earthing with Copper earth plate 600mmx600mmx3mm thick including accesseries, and providing masonary enclosure with cover plate having locking arrangement and watering pipe of 2.7m long etc with charcoal/coke and salt as required.	No	2
1.2.2	Body Earthing - Earthing with Gi earth pipe 4.5m long, 40mm dia including accesseries, and providing masonary enclosure with cover plate having locking arrangement andwateringpipeetc with charcoal/coke and salt as required.	No	2
2.0	**LT PANEL BOARD (Indoor type)**		
2.1	Supplying and fixing 4 ways surface/recess mounting, vertical type, 415V, TPN MCB distribution board of sheet steel, dust protected , duly powder painted, inclusive of 200A tinned copper busbar,common neutral link,earth bar, din bar for mountingMCB's,	No	1

	with provision of 100A TP 16KA MCCB as incommer, interconnection between incomer MCCB and bus bars (but without MCB,s /MCCB's) as required. (Note :Vertical type MCB TPDB is normally used where 3 phase outlets are required.)		
	2.2 MCCB DISTRIBUTION BOARDS		
	Providing and fixing 100A rating and 16KA breaking capacity and pole TP MCCB in existing cubicle panel board including drilling holes in cubicle panel, making connections, ets as required.	No	1
	2.3 MINIATURE CIRCUIT BREAKERS		
	Supplying and fixing 32A, triple pole and neutral, 415V, "C" curve, miniature circuit breaker for inductive load of triple pole and neutral in the existing MCB DB complete with connections, testing and commitioning etc as required.	No	2
	2.4 MINIATURE CIRCUIT BREAKERS		
	Supplying and fixing 32A, single pole and neutral, 240V, "C" curve, miniature circuit breaker for inductive load of single pole and neutral in the existing MCB DB complete with connections, testing and commitioning etc as required.	No	1
	2.5 EARTHING		
	Body Earthing - Earthing with Gi earth pipe 4.5m long, 40mm dia including accesseries, nd providing masonary enclosure with cover plate having locking arrangement ndwateringpipeetc with charcoal/coke and salt as required.	No	2
3.0	**DISTRIBUTION BOARD**		
	Supply and fixing 4+12 way, single door, horizontal type thee pole and neutral, sheet steel, MCB DB,		
	415V, on surface/recess, complete with tinned copper		
3.1	bus bar, nuetral bus bar, earth bar, din bar,	m	1
	interconnections, powdered painted including earthing etc as required. (but without MCB/RCCB/isolators)		
	3.2 **EARTHING**		
	Body Earthing - Earthing with Gi earth pipe 4.5m long, 40mm dia including accesseries, nd providing masonary enclosure with cover plate having locking arrangement ndwateringpipeetc with charcoal/coke and salt as required.	No	2
4.0	**CABLES**		
	Supply of LT UG cable having Copper conductor PVC insulated,Sheathed ,galvanized steel wire steel tap armoured cable with PVC outer sheathing 1.1 KV class)		
4.1	4Cx16 sq mm + 2x16 sq mm earth wire	m	1
4.2	4Cx10 sq mm + 2x10 sq mm earth wire	m	6.5

4.3	4Cx4 sq mm + 2x4 sq mm earth wire	m	15
4.4	2Cx2.5 sq mm + 1x2.5 sq mm earth wire	m	14
5.0	**LUMINARIES, SOCKETS AND SWITCHES**		
5.1	120W Gate lamp with fitting	No	2
5.2	40W flourescent lamp	No	4
5.3	70W MH Lamp for site lighting	No	4
5.4	Single switched socket with multi purpose	No	2
5.5	Switches	No	6

Sl.No	Description	Quantity	Units
1	**Manually Cleaned Bar Screen** The screen shall be of removable type and shall consist of a welded stainless steel (AISI410) frame with vertical flats paced at 30 mm. The flats shall not be less than 10 mm in thickness and not less than 50 mm deep. The flats shall not have any oint. The spacing between the flats shall be uniform and preferably so maintained by adequate number of spacers, which shall be o located as not to interfere with the raking operation. To facilitate the manual cleaning of the screen the inclination of the creen shall be between 45º and 60º to the horizontal. Single piece screen width should not be more than 1.5 m.Two numbers tainless steel rollers shall be fixed on each side of frame to facilitate rolling contact with guide channel during lifting and owering of screen.		
1.2	(500 X 1500) mm	4	Nos
2	Providing, erecting and giving test of Non clog sewage submersible pump set with SS CF8 M impeller,CI casing,SS 316 shaft uitable for 3 Ph ,415 V , 50 Hz A.C. Supply, submersible motor having TEFC encloouser with class F insulation and IP 68 protection The pump shall be operated at 1450 RPM .The scope shall include required accessories viz automatic coupling device,guide pipe,,chain with shakle,flat submersible cable upto starter panel through suitable GI pipe (30 mtr 3 Core flat copper for each ump with necessary electrical connection with the starter panel and as perspecifications. (HP) 1 HP 4 Pumps for 2 lean, 1 peak and 1 average flow		
	2 pumps for lean flow		Nos
	1 pump for peak flow		Nos
	1 pump for average flow		Nos
3	Providing Supplying erection testing and commissioning of 2 Tonne capacity Mobile Crane		
3.1	1 T Capacity for 7 m lift.	1	Nos

Technical Specification For Electrical & Mechanical Components of Ward No. 8 Nala

Sl.No	Description	Unit	Quantity
1.0	**EARTHING**		
1.1	Neutral Earthing - Earthing with Copper earth plate 600mmx600mmx3mm thick including accesseries, and providing masonary enclosure with cover plate having locking arrangement and watering pipe of 2.7m long etc with charcoal/coke and salt as required.	No.	2
1.2	Body Earthing - Earthing with Gi earth pipe 4.5m long, 40mm dia including accesseries, and providing masonary enclosure with cover plate having locking arrangement and watering pipe etc with charcoal/coke and salt as required.	No	2
2.0	**LT PANEL BOARD (Indoor type)**		
2.1	Supplying and fixing following way prewired SP&N MCB distribution board of steel sheet for 240 volts on surface/ recess complete with loose wire box, terminal connectors for all incoming and outgoing circuits, duly prewired with suitable size FRLS PVC insulated copper conductor up to terminal blocks, tinned copper bus bar, neutral link, earth bar, din bar, detachable gland plate, interconnections, powder painted including earthing etc. as required. (But without MCB/ RCCB/ Isolator) 2 + 8 way/10 way, Double door 2 + 8 way/10 way, Double door	No	1
2.2	**MCCB DISTRIBUTION BOARDS**		
	Providing and fixing 100A rating and 16KA breaking capacity and pole TP MCCB in existing cubicle panel board including drilling holes in cubicle panel, making connections, ets as required.	No	1
2.3	**MINIATURE CIRCUIT BREAKERS**		
	Supplying and fixing 32A, triple pole and neutral, curve, miniature circuit breaker for inductive load of triple 415V, "C" curve, miniature circuit breaker for inductive load of triple pole and neutral in the existing MCB DB complete with connections, testing and commitioning etc as required.	No	2
2.4	**MINIATURE CIRCUIT BREAKERS** Supplying and fixing 32A, single pole and neutral, 240V, "C" curve, miniature circuit breaker for inductive load of single pole and neutral in the existing MCB DB complete with connections, testing and commitioning etc as required.	No	1
2.5	**EARTHING**		
	Body Earthing - Earthing with Gi earth pipe 4.5m long, 40mm dia including accesseries, and providing masonary enclosure with cover plate having locking arrangement and watering pipe etc with charcoal/coke and salt as required.	No	2
3.0	**DISTRIBUTION BOARD**		
3.1	Supply and fixing 4+12 way, single door, horizontal type thee pole and neutral, sheet steel, MCB DB, 415V, on surface/recess, complete with tinned copper bus bar, neutral bus bar, earth bar, din bar, interconnections, powdered painted including earthing etc as required. (but without MCB/RCCB/isolators)	m	1

3.2	**EARTHING**		
	Body Earthing - Earthing with Gi earth pipe 4.5m long, 40mm dia including accesseries, and providing masonary enclosure with cover plate having locking arrangement and watering pipe etc with charcoal/coke and salt as required.	No	2
4	**CABLES**		
	Supply of LT UG cable having Copper conductor PVC insulated,Sheathed ,galvanised steel wire /steel tap armoured cable with PVC outer sheathing 1.1 KV class)		
4.1	4Cx16 sq mm + 2x16 sq mm earth wire	m	1
4.2	4Cx10 sq mm + 2x10 sq mm earth wire	m	6.5
4.3	4Cx4 sq mm + 2x4 sq mm earth wire	m	15
4.4	2Cx2.5 sq mm + 1x2.5 sq mm earth wire	m	14
5.0	**LUMINARIES, SOCKETS AND SWITCHES**		
5.1	120W Gate lamp with fitting	No	2
5.2	40W flourescent lamp	No	4
5.3	70W MH Lamp for site lighting	No	4
5.4	Single switched socket with multi purpose	No	2
5.5	Switches	No	6

Sl.No	Description	Unit	Quantity
1.0	**DIESEL GENERATOR 50 KVA**		
1.1	50 KVA, 40KW, 415V, 50 Hz, comprising of Perkins Engine Coupled to Stamford make Alternator, complete with all Standard accessories and ATS with Acoustic enclosure.	No	1
1.2	**EARTHING**		
1.2.1	Neutral Earthing - Earthing with Copper earth plate 600mmx600mmx3mm thick including accesseries, and providing masonary enclosure with cover plate having locking arrangement and watering pipe of 2.7m long etc with charcoal/coke and salt as required.	No	2
1.2.2	Body Earthing - Earthing with Gi earth pipe 4.5m long, 40mm dia including accesseries, and providing masonary enclosure with cover plate having locking arrangement andwateringpipeetc with charcoal/coke and salt as required.	No	2
2.0	**LT PANEL BOARD (Indoor type)**		
2.1	Supplying and fixing 4 ways surface/recess mounting, vertical type, 415V, TPN MCB distribution board of sheet steel, dust protected , duly powder painted, inclusive of 200A tinned copper busbar,common	No	1

	neutral link,earth bar, din bar for mountingMCB's, with provision of 100A TP 16KA MCCB as incommer, interconnection between incomer MCCB and bus bars (but without MCB,s /MCCB's) as required. (Note :Vertical type MCB TPDB is normally used where 3 phase outlets are required.)		
2.2	**MCCB DISTRIBUTION BOARDS**		
	Providing and fixing 100A rating and 16KA breaking capacity and pole TP MCCB in existing cubicle panel board including drilling holes in cubicle panel, making connections, ets as required.	No	1
2.3	**MINIATURE CIRCUIT BREAKERS**		
	Supplying and fixing 32A, triple pole and neutral, 415V, "C" curve, miniature circuit breaker for inductive load of triple pole and neutral in the existing MCB DB complete with connections, testing and commitioning etc as required.	No	2
2.4	**MINIATURE CIRCUIT BREAKERS**		
	Supplying and fixing 32A, single pole and neutral, 240V, "C" curve, miniature circuit breaker for inductive load of single pole and neutral in the existing MCB DB complete with connections, testing and commitioning etc as required.	No	1
2.5	**EARTHING**		
	Body Earthing - Earthing with Gi earth pipe 4.5m long, 40mm dia including accesseries, nd providing masonary enclosure with cover plate having locking arrangement ndwateringpipeetc with charcoal/coke and salt as required.	No	2
3.0	**DISTRIBUTION BOARD**		
	Supply and fixing 4+12 way, single door, horizontal type thee pole and neutral, sheet steel, MCB DB,		
	415V, on surface/recess, complete with tinned copper		
3.1	bus bar, nuetral bus bar, earth bar, din bar,	m	1
	interconnections, powdered painted including earthing etc as required. (but without MCB/RCCB/isolators)		
3.2	**EARTHING**		
	Body Earthing - Earthing with Gi earth pipe 4.5m long, 40mm dia including accesseries, nd providing masonary enclosure with cover plate having locking arrangement ndwateringpipeetc with charcoal/coke and salt as required.	No	2
4.0	**CABLES**		
	Supply of LT UG cable having Copper conductor PVC insulated,Sheathed ,galvanized steel wire steel tap armoured cable with PVC outer sheathing 1.1 KV class)		
4.1	4Cx16 sq mm + 2x16 sq mm earth wire	m	1
4.2	4Cx10 sq mm + 2x10 sq mm earth wire	m	6.5

4.3	4Cx4 sq mm + 2x4 sq mm earth wire	m	15
4.4	2Cx2.5 sq mm + 1x2.5 sq mm earth wire	m	14
5.0	**LUMINARIES, SOCKETS AND SWITCHES**		
5.1	120W Gate lamp with fitting	No	2
5.2	40W flourescent lamp	No	4
5.3	70W MH Lamp for site lighting	No	4
5.4	Single switched socket with multi purpose	No	2
5.5	Switches	No	6

Sl.No	Description	Quantity	Units
1	**Manually Cleaned Bar Screen** The screen shall be of removable type and shall consist of a welded stainless steel (AISI410) frame with vertical flats paced at 30 mm. The flats shall not be less than 10 mm in thickness and not less than 50 mm deep. The flats shall not have any oint. The spacing between the flats shall be uniform and preferably so maintained by adequate number of spacers, which shall be o located as not to interfere with the raking operation. To facilitate the manual cleaning of the screen the inclination of the creen shall be between 45º and 60º to the horizontal. Single piece screen width should not be more than 1.5 m.Two numbers tainless steel rollers shall be fixed on each side of frame to facilitate rolling contact with guide channel during lifting and owering of screen.		
1.2	(500 X 1500) mm	4	Nos
2	Providing, erecting and giving test of Non clog sewage submersible pump set with SS CF8 M impeller,CI casing,SS 316 shaft uitable for 3 Ph ,415 V , 50 Hz A.C. Supply, submersible motor having TEFC encloouser with class F insulation and IP 68 protection The pump shall be operated at 1450 RPM .The scope shall include required accessories viz automatic coupling device,guide pipe,,chain with shakle,flat submersible cable upto starter panel through suitable GI pipe (30 mtr 3 Core flat copper for each ump with necessary electrical connection with the starter panel and as perspecifications. (HP) 0.5 HP 4 Pumps for 2 lean, 1 peak and 1 average flow 2 pumps for lean flow 1 pump for peak flow 1 pump for average flow		nos nos nos
3	Providing Supplying erection testing and commissioning of 2 Tonne capacity Mobile Crane		
3.1	1 T Capacity for 7 m lift.	1	Nos

Technical Specification For Electrical & Mechanical Components of Ward no3Nala

Sl.No	Description	Unit	Quantity
1.0	**EARTHING**		
1.1	Neutral Earthing - Earthing with Copper earth plate 600mmx600mmx3mm thick including accesseries, and providing masonary enclosure with cover plate having locking arrangement and watering pipe of 2.7m long etc with charcoal/coke and salt as required.	No.	2
1.2	Body Earthing - Earthing with Gi earth pipe 4.5m long, 40mm dia including accesseries, and providing masonary enclosure with cover plate having locking arrangement and watering pipe etc with charcoal/coke and salt as required.	No	2
2.0	**LT PANEL BOARD (Indoor type)**		
2.1	Supplying and fixing following way prewired SP&N MCB distribution board of steel sheet for 240 volts on surface/ recess complete with loose wire box, terminal connectors for all incoming and outgoing circuits, duly prewired with suitable size FRLS PVC insulated copper conductor up to terminal blocks, tinned copper bus bar, neutral link, earth bar, din bar, detachable gland plate, interconnections, powder painted including earthing etc. as required. (But without MCB/ RCCB/ Isolator) 2 + 8 way/10 way, Double door 2 + 8 way/10 way, Double door	No	1
2.2	**MCCB DISTRIBUTION BOARDS**		
	Providing and fixing 100A rating and 16KA breaking capacity and pole TP MCCB in existing cubicle panel board including drilling holes in cubicle panel, making connections, ets as required.	No	1
2.3	**MINIATURE CIRCUIT BREAKERS**		
	Supplying and fixing 32A, triple pole and neutral, curve, miniature circuit breaker for inductive load of triple 415V, "C" curve, miniature circuit breaker for inductive load of triple pole and neutral in the existing MCB DB complete with connections, testing and commitioning etc as required.	No	2
2.4	**MINIATURE CIRCUIT BREAKERS** Supplying and fixing 32A, single pole and neutral, 240V, "C" curve, miniature circuit breaker for inductive load of single pole and neutral in the existing MCB DB complete with connections, testing and commitioning etc as required.	No	1
2.5	**EARTHING**		
	Body Earthing - Earthing with Gi earth pipe 4.5m long, 40mm dia including accesseries, and providing masonary enclosure with cover plate having locking arrangement and watering pipe etc with charcoal/coke and salt as required.	No	2
3.0	**DISTRIBUTION BOARD**		
3.1	Supply and fixing 4+12 way, single door, horizontal type thee pole and neutral, sheet steel, MCB DB, 415V, on surface/recess, complete with tinned copper bus bar, neutral bus bar, earth bar, din bar, interconnections, powdered painted including earthing etc as required. (but without MCB/RCCB/isolators)	m	1

3.2	**EARTHING**		
	Body Earthing - Earthing with Gi earth pipe 4.5m long, 40mm dia including accesseries, and providing masonary enclosure with cover plate having locking arrangement and watering pipe etc with charcoal/coke and salt as required.	No	2
4	**CABLES**		
	Supply of LT UG cable having Copper conductor PVC insulated,Sheathed ,galvanised steel wire /steel tap armoured cable with PVC outer sheathing 1.1 KV class)		
4.1	4Cx16 sq mm + 2x16 sq mm earth wire	m	1
4.2	4Cx10 sq mm + 2x10 sq mm earth wire	m	6.5
4.3	4Cx4 sq mm + 2x4 sq mm earth wire	m	15
4.4	2Cx2.5 sq mm + 1x2.5 sq mm earth wire	m	14
5.0	**LUMINARIES, SOCKETS AND SWITCHES**		
5.1	120W Gate lamp with fitting	No	2
5.2	40W flourescent lamp	No	4
5.3	70W MH Lamp for site lighting	No	4
5.4	Single switched socket with multi purpose	No	2
5.5	Switches	No	6

Sl.No	Description	Unit	Quantity
1.0	**DIESEL GENERATOR 50 KVA**		
	50 KVA, 40KW, 415V, 50 Hz, comprising of Perkins Engine Coupled to Stamford make Alternator, complete with all		
1.1	Standard accessories and ATS with Acoustic enclosure.	No	1
1.2	**EARTHING**		
	Neutral Earthing - Earthing with Copper earth plate 600mmx600mmx3mm thick including accesseries, and providing masonary enclosure with cover plate having locking arrangement and watering pipe of 2.7m long etc with charcoal/coke and salt as		
1.2.1	required.	No	2
	Body Earthing - Earthing with Gi earth pipe 4.5m long, 40mm dia including accesseries, and providing masonary enclosure with cover plate having locking arrangement andwateringpipeetc with		
1.2.2	charcoal/coke and salt as required.	No	2
2.0	**LT PANEL BOARD (Indoor type)**		

2.1	Supplying and fixing 4 ways surface/recess mounting, vertical type, 415V, TPN MCB distribution board of sheet steel, dust protected , duly powder painted, inclusive of 200A tinned copper busbar,common neutral link,earth bar, din bar for mountingMCB's, with provision of 100A TP 16KA MCCB as incommer, interconnection between incomer MCCB and bus bars (but without MCB,s /MCCB's) as required. (Note :Vertical type MCB TPDB is normally used where 3 phase outlets are required.)	No	1
	2.2 MCCB DISTRIBUTION BOARDS		
	Providing and fixing 100A rating and 16KA breaking capacity and pole TP MCCB in existing cubicle panel board including drilling holes in cubicle panel, making connections, ets as required.	No	1
	2.3 MINIATURE CIRCUIT BREAKERS		
	Supplying and fixing 32A, triple pole and neutral, 415V, "C" curve, miniature circuit breaker for inductive load of triple pole and neutral in the existing MCB DB complete with connections, testing and commitioning etc as required.	No	2
	2.4 MINIATURE CIRCUIT BREAKERS		
	Supplying and fixing 32A, single pole and neutral, 240V, "C" curve, miniature circuit breaker for inductive load of single pole and neutral in the existing MCB DB complete with connections, testing and commitioning etc as required.	No	1
	2.5 EARTHING		
	Body Earthing - Earthing with Gi earth pipe 4.5m long, 40mm dia including accesseries, nd providing masonary enclosure with cover plate having locking arrangement ndwateringpipeetc with charcoal/coke and salt as required.	No	2
	3.0 DISTRIBUTION BOARD		
3.1	Supply and fixing 4+12 way, single door, horizontal type thee pole and neutral, sheet steel, MCB DB, 415V, on surface/recess, complete with tinned copper bus bar, nuetral bus bar, earth bar, din bar, interconnections, powdered painted including earthing etc as required. (but without MCB/RCCB/isolators)	m	1
	3.2 **EARTHING**		
	Body Earthing - Earthing with Gi earth pipe 4.5m long, 40mm dia including accesseries, nd providing masonary enclosure with cover plate having locking arrangement ndwateringpipeetc with charcoal/coke and salt as required.	No	2

4.0	**CABLES**		
	Supply of LT UG cable having Copper conductor PVC insulated,Sheathed ,galvanized steel wire steel tap armoured cable with PVC outer sheathing 1.1 KV class)		
4.1	4Cx16 sq mm + 2x16 sq mm earth wire	m	1
4.2	4Cx10 sq mm + 2x10 sq mm earth wire	m	6.5
4.3	4Cx4 sq mm + 2x4 sq mm earth wire	m	15
4.4	2Cx2.5 sq mm + 1x2.5 sq mm earth wire	m	14
5.0	**LUMINARIES, SOCKETS AND SWITCHES**		
5.1	120W Gate lamp with fitting	No	2
5.2	40W flourescent lamp	No	4
5.3	70W MH Lamp for site lighting	No	4
5.4	Single switched socket with multi purpose	No	2
5.5	Switches	No	6

Sl.No	Description	Quantity	Units
1	**Manually Cleaned Bar Screen** The screen shall be of removable type and shall consist of a welded stainless steel (AISI410) frame with vertical flats paced at 30 mm. The flats shall not be less than 10 mm in thickness and not less than 50 mm deep. The flats shall not have any oint. The spacing between the flats shall be uniform and preferably so maintained by adequate number of spacers, which shall be o located as not to interfere with the raking operation. To facilitate the manual cleaning of the screen the inclination of the creen shall be between 45º and 60º to the horizontal. Single piece screen width should not be more than 1.5 m.Two numbers tainless steel rollers shall be fixed on each side of frame to facilitate rolling contact with guide channel during lifting and owering of screen.		
1.2	(500 X 1500) mm	4	Nos
2	Providing, erecting and giving test of Non clog sewage submersible pump set with SS CF8 M impeller,CI casing,SS 316 shaft uitable for 3 Ph ,415 V , 50 Hz A.C. Supply, submersible motor having TEFC encloouser with class F insulation and IP 68 protection The pump shall be operated at 1450 RPM .The scope shall include required accessories viz automatic coupling device,guide pipe,,chain with shakle,flat submersible cable upto starter panel through suitable GI pipe (30 mtr 3 Core flat copper for each ump with necessary electrical connection with the starter panel and as perspecifications. (HP) 2 HP 4 Pumps for 2 lean, 1 peak and 1 average flow		
	2 pumps for lean flow		nos
	1 pump for peak flow		nos
	1 pump for average flow		nos
3	Providing Supplying erection testing and commissioning of 2 Tonne capacity Mobile Crane		
3.1	1 T Capacity for 7 m lift.	1	Nos

Technical Specification For Electrical & Mechanical Components of Ward No. 9 Nala

Sl. No	Description	Unit	Quantity
1.0	**EARTHING**		
1. 1	Neutral Earthing - Earthing with Copper earth plate 600mmx600mmx3mm thick including accesseries, and providing masonary enclosure with cover plate having locking arrangement and watering pipe of 2.7m long etc with charcoal/coke and salt as required.	No.	2
1.2	Body Earthing - Earthing with Gi earth pipe 4.5m long, 40mm dia including accesseries, and providing masonary enclosure with cover plate having locking arrangement and watering pipe etc with charcoal/coke and salt as required.	No	2

2.0	**LT PANEL BOARD (Indoor type)**		
	Supplying and fixing following way prewired SP&N MCB distribution board of steel sheet for 240 volts on surface/ recess complete with loose wire box, terminal connectors for all incoming and outgoing circuits, duly prewired with suitable size FRLS PVC insulated copper conductor up to terminal blocks, tinned copper bus bar, neutral link, earth bar, din bar, detachable gland plate, interconnections, powder painted including earthing etc. as required. (But without MCB/ RCCB/ Isolator) 2 + 8		
2.1	way/10 way, Double door 2 + 8 way/10 way, Double door	No	1
2.2	**MCCB DISTRIBUTION BOARDS**		
	Providing and fixing 100A rating and 16KA breaking capacity and pole TP MCCB in existing cubicle panel board including drilling holes in cubicle panel, making connections, ets as required.	No	1
2.3	**MINIATURE CIRCUIT BREAKERS**		
	Supplying and fixing 32A, triple pole and neutral, curve, miniature circuit breaker for inductive load of triple 415V, "C" curve, miniature circuit breaker for inductive load of triple pole and neutral in the existing MCB DB complete with connections, testing and commitioning etc as required.	No	2
2.4	**MINIATURE CIRCUIT BREAKERS**		
	Supplying and fixing 32A, single pole and neutral, 240V, "C" curve, miniature circuit breaker for inductive load of single pole and neutral in the existing MCB DB complete with connections, testing and commitioning etc as required.	No	1
2.5	**EARTHING**		
	Body Earthing - Earthing with Gi earth pipe 4.5m long, 40mm dia including accesseries, and providing masonary enclosure with cover plate having locking arrangement and watering pipe etc with charcoal/coke and salt as required.	No	2
3.0	**DISTRIBUTION BOARD**		
3.1	Supply and fixing 4+12 way, single door, horizontal type thee pole and neutral, sheet steel, MCB DB, 415V, on surface/recess, complete with tinned copper bus bar, neutral bus bar, earth bar, din bar, interconnections, powdered painted including earthing etc as required. (but without MCB/RCCB/isolators)	m	1
3.2	**EARTHING**		
	Body Earthing - Earthing with Gi earth pipe 4.5m long, 40mm dia including accesseries, and providing masonary enclosure with cover plate having locking arrangement and watering pipe etc with charcoal/coke and salt as required.	No	2
4	**CABLES**		
	Supply of LT UG cable having Copper conductor PVC insulated,Sheathed ,galvanised steel wire /steel tap armoured cable with PVC outer sheathing 1.1 KV class)		
4.1	4Cx16 sq mm + 2x16 sq mm earth wire	m	1
4.2	4Cx10 sq mm + 2x10 sq mm earth wire	m	6.5
4.3	4Cx4 sq mm + 2x4 sq mm earth wire	m	15

4.4	2Cx2.5 sq mm + 1x2.5 sq mm earth wire	m	14
5.0	**LUMINARIES, SOCKETS AND SWITCHES**		
5.1	120W Gate lamp with fitting	No	2
5.2	40W flourescent lamp	No	4
5.3	70W MH Lamp for site lighting	No	4
5.4	Single switched socket with multi purpose	No	2
5.5	Switches	No	6

Sl.No	Description	Unit	Quantity
1.0	**DIESEL GENERATOR 50 KVA**		
1.1	50 KVA, 40KW, 415V, 50 Hz, comprising of Perkins Engine Coupled to Stamford make Alternator, complete with all Standard accessories and ATS with Acoustic enclosure.	No	1
1.2	**EARTHING**		
1.2.1	Neutral Earthing - Earthing with Copper earth plate 600mmx600mmx3mm thick including accesseries, and providing masonary enclosure with cover plate having locking arrangement and watering pipe of 2.7m long etc with charcoal/coke and salt as required.	No	2
1.2.2	Body Earthing - Earthing with Gi earth pipe 4.5m long, 40mm dia including accesseries, and providing masonary enclosure with cover plate having locking arrangement andwateringpipeetc with charcoal/coke and salt as required.	No	2
2.0	**LT PANEL BOARD (Indoor type)**		
2.1	Supplying and fixing 4 ways surface/recess mounting, vertical type, 415V, TPN MCB distribution board of sheet steel, dust protected , duly powder painted, inclusive of 200A tinned copper busbar,common neutral link,earth bar, din bar for mountingMCB's, with provision of 100A TP 16KA MCCB as incommer, interconnection between incomer MCCB and bus bars (but without MCB,s /MCCB's) as required. (Note :Vertical type MCB TPDB is normally used where 3 phase outlets are required.)	No	1
2.2	**MCCB DISTRIBUTION BOARDS**		
	Providing and fixing 100A rating and 16KA breaking capacity and pole TP MCCB in existing cubicle panel board including drilling holes in cubicle panel, making connections, ets as required.	No	1
2.3	**MINIATURE CIRCUIT BREAKERS**		
	Supplying and fixing 32A, triple pole and neutral, 415V, "C" curve,		

		miniature circuit breaker for inductive load of triple pole and neutral in the existing MCB DB complete with connections, testing and commitioning etc as required.	No	2
	2.4	**MINIATURE CIRCUIT BREAKERS**		
		Supplying and fixing 32A, single pole and neutral, 240V, "C" curve, miniature circuit breaker for inductive load of single pole and neutral in the existing MCB DB complete with connections, testing and commitioning etc as required.	No	1
	2.5	**EARTHING**		
		Body Earthing - Earthing with Gi earth pipe 4.5m long, 40mm dia including accesseries, nd providing masonary enclosure with cover plate having locking arrangement ndwateringpipeetc with charcoal/coke and salt as required.	No	2
3.0		**DISTRIBUTION BOARD**		
		Supply and fixing 4+12 way, single door, horizontal type thee pole and neutral, sheet steel, MCB DB,		
	3.1	415V, on surface/recess, complete with tinned copper bus bar, nuetral bus bar, earth bar, din bar,	m	1
		interconnections, powdered painted including earthing etc as required. (but without MCB/RCCB/isolators)		
	3.2	**EARTHING**		
		Body Earthing - Earthing with Gi earth pipe 4.5m long, 40mm dia including accesseries, nd providing masonary enclosure with cover plate having locking arrangement ndwateringpipeetc with charcoal/coke and salt as required.	No	2
4.0		**CABLES**		
		Supply of LT UG cable having Copper conductor PVC insulated,Sheathed ,galvanized steel wire steel tap armoured cable with PVC outer sheathing 1.1 KV class)		
	4.1	4Cx16 sq mm + 2x16 sq mm earth wire	m	1
	4.2	4Cx10 sq mm + 2x10 sq mm earth wire	m	6.5

4.3	4Cx4 sq mm + 2x4 sq mm earth wire	m	15
4.4	2Cx2.5 sq mm + 1x2.5 sq mm earth wire	m	14
5.0	**LUMINARIES, SOCKETS AND SWITCHES**		
5.1	120W Gate lamp with fitting	No	2
5.2	40W flourescent lamp	No	4
5.3	70W MH Lamp for site lighting	No	4
5.4	Single switched socket with multi purpose	No	2
5.5	Switches	No	6

Sl.No	Description	Quantity	Units
1	**Manually Cleaned Bar Screen** The screen shall be of removable type and shall consist of a welded stainless steel (AISI410) frame with vertical flats paced at 30 mm. The flats shall not be less than 10 mm in thickness and not less than 50 mm deep. The flats shall not have any oint. The spacing between the flats shall be uniform and preferably so maintained by adequate number of spacers, which shall be o located as not to interfere with the raking operation. To facilitate the manual cleaning of the screen the inclination of the creen shall be between 45º and 60º to the horizontal. Single piece screen width should not be more than 1.5 m.Two numbers tainless steel rollers shall be fixed on each side of frame to facilitate rolling contact with guide channel during lifting and owering of screen.		
1.2	(500 X 1500) mm	4	Nos
2	Providing, erecting and giving test of Non clog sewage submersible pump set with SS CF8 M impeller,CI casing,SS 316 shaft uitable for 3 Ph ,415 V , 50 Hz A.C. Supply, submersible motor having TEFC enclooser with class F insulation and IP 68 protection The pump shall be operated at 1450 RPM .The scope shall include required accessories viz automatic coupling device,guide pipe,,chain with shakle,flat submersible cable upto starter panel through suitable GI pipe (30 mtr 3 Core flat copper for each ump with necessary electrical connection with the starter panel and as perspecifications. (HP) 1 HP 4 Pumps for 2 lean, 1 peak and 1 average flow		
	2 pumps for lean flow		nos
	1 pump for peak flow		nos
	1 pump for average flow		nos
3	Providing Supplying erection testing and commissioning of 2 Tonne capacity Mobile Crane		
3.1	1 T Capacity for 7 m lift.	1	Nos

Points need to be considering before tendering:-

1. Actual Electricity consumption during trial run and O&M period shall be paid by contractor as per electricity bill.
2. Bidders will provide the contour plan of the proposed site with FGL & NGL.
3. Bidders will provide plant layout.
4. Bidders have to visit before tendering.
5. The design effluent parameters on which plant has to be designed will be provided by bidders.
6. The revenue generated by selling the treated water for reuse shall belong to the department.
7. Sludge shall be dispossed off within 5 Km site provided by BUIDCo. However payment shall be made as per actual lead.
8. For all the SPS LT 415 V 3- Phase power supply shall be made available by Bidders up to site.
9. For STP 11KV single power source shall be made available by Bidders up to site.
10. During trail run and operation and maintenance electricity charges shall be Bourne by the bidders him self.
11. Power and water during constrction and operation phase will be provided by bidders himself.
12. Price escalation is not allowed.
13. Environment Permission of project is in Bidder's scope if required. However BUIDCO will facilitate for obtaining it.
14. For Design of structures, ground water table depth, SBC (Soil Bearing Capacity),soil investigation, IL, FGL, HFL for all the sites etc of STP & all SPSs is in bidders scope.
15. All the design effluentt parameters on which plant has to be designed is in bidder scope.
16. Vendor list of Instrumentation & Control is in bidder scope