



## NAYA RAIPUR DEVELOPMENT AUTHORITY

1st floor, Utility block, Capitol Complex, Sector- 19, Naya Raipur- 492 002,  
Chhattisgarh Website: [www.nayaraipur.com](http://www.nayaraipur.com)

### Corrigendum-3

Date: 28/09/2013

With reference to NIT No: 45 / SZ-1, 2 & 3 /EE PHE / CE (E) / NRDA / 2013-14, Raipur, Dated: 07. 08. 2013 for the work of “**Development of Sewerage collection, Treatment, and Reuse system including Operation and Maintenance for Zone 1, 2, 3 & specified area at Naya Raipur**”, the following corrigendum-1 is made:-

Description	In place of	Read As
Last Date and time of submission of Tender	30-09-2013 15.00Hrs	& 10-10-2013 & 15.00Hrs
Date and time of opening of Tender	30-09-2013 16.00Hrs	& 10-10-2013 & 16.00Hrs

Reply to prebid queries & Amendment in tender has been uploaded on the website. However the intending tenderer are advised to go through the modified document thoroughly before submission. All other terms and conditions shall remain same.



Chief Executive Officer

**Reply to Pre Bid Queries for the**  
**Development of Sewerage collection, Treatment, and Reuse system including Operation and Maintenance for**  
**Zone 1, 2, 3 & specified area at Naya Raipur**

Sr.No	Bidder Query	Clarification
1	Special Conditions of contract :Security deposit : Clause 5 ,Page 3 of 47We presume that the 50% of the security deposit will released on completion of the project and remaining 50% will released against the issue of defect liability certificate. Kindly confirm	It is clarified that, the time of completion of project is 24months including 3months trial run and commissioning. After successful commissioning, the contractor will operate and maintain ( <u>Part A &amp; B works</u> ) for a period of 60months. This O & M period shall include defect liability period for the project.
2	Schedule D, Section-II, Part C (e): O & M period is mentioned as 06 years which is in contract of 05 years as mentioned in Detailed NIT	
3	SCHEDULE- D Section-II Scope of work; Part B:Turnkey Works, 2)Defect liability period page no 13 of 32 Defect liability period for sewerage system should be for 12 months otherwise contractor should upload the cost in price bid. Please reduce the DLF for 12 months instead of 60 months.	
4	As per Clause, the defect liability is five years after completion. And O & M is also demanded for five years. We presume that both will start after the trial run period from the date of commissioning.	
5	It is to submit that, these retention of money is very huge, and un necessarily increasing the financing cost of the project. Hence it is requested to make it total 5% i.e 2.5 % as PSD and 2.5 % SD from the RA bills. Or total 5% in form of Bank Guaranty. As this is a general practice followed in various states.	The retention money / Security Deposite could be released incase a Bank Gurrentee of equal amount for the period required as per the terms of contract.
6	The clause for refund of SD is not clear. We presume that, the all the SDs with NRDA against this work will be released after 12 months from the date of successful commissioning.	
7	Special Conditions of contract: Release of performance guarantee We presume that the performance guarantee will be released after the issue of completion certificate.	It is clarified that, performance guarantee shall be released after the issue of completion certificate of Part <del>A</del> and Part B works including successful trial run and commissioning.
8	GCC: 12.2 Page 55 Quantity variation :Variations for item rates: In	It is clarified that, In the case of such item (s) for which the

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	<p>the case of such item (s) for which the actual quantities exceed the quantity quantities shown in Price Bid of the tender document by more than 25%the quantity in excess of 25% will be paid at the essential rate of the items minus the overall percentage of accepted tender above or below as the case may be the total cost of work as per Price Bid at theestimated rates. We request you to clarify the meaning of "essential rate" and oblige.</p> <p>It is clarified that, In the case of such item (s) for which the actual quantities exceed the quantities shown in Price Bid of the tender document by more than 25%, the quantity in excess of 25% will be paid at the fair market rate after adding 15% for contractors profit as approval by NRDA. In such case, the decision of Chief Engineer NRDA shall be final and binding.</p> <p>Rates for quantity variation: In the case of such item (s) for which the actual quantities exceed the quantity shown in Price Bid of the tender document by more than 25%the quantity in excess of 25% will be paid at the essential rate of the items on the date of invitation of tender plus or minus the overall percentage of accepted tender above or below. The rates for items with quantity variation more than plus 10%, should be worked out depending on the market rate at the time and upon mutual of Employer and Contractor in the case of such ítem(s) for which the actual quantites exceed the quantity quantities shown in Price bid of the tender document by more tan 25% the quantity in excess of 25% will be paid. We request quantity variation to be allowed for plus or minus 10% of individual quantities given in Price bid.</p>	<p>actual quantities exceed the quantities shown in Price Bid of the tender document by more than 25%, the quantity in excess of 25% will be paid at the fair market rate after adding 15% for contractors profit as approval by NRDA. In such case, the decision of Chief Engineer NRDA shall be final and binding.</p>
9	Precast RCC mahole : Kindly provide the detailed drawing along with the detailed specifications	<p>It is clarified that, the bidder shall design, construct and install the manholes as specified in the BOQ and specifications in item of Schedule A, Price tender.</p>
10	HDPE Manhole: Kindly provide the detailed drawings for HDPE manholes	
11	Please provide your standard drawings of manholes and manholes with SCI drop connection.	

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12	General/ Design Scope; Item Rate Works: We presume that PART-A, an Item Rate contract. The payment shall be paid to the contractor on actual quantities executed. The construction drawings shall be issued by NRDA within 1 month from signing of contract; We presume that no design is involved in PART A in the bidder's scope. Please confirm	It is clarified that, no detailed design and drawing will be provided by NRDA. The contractor shall carry out detailed geotechnical investigation, survey, detailed design and prepare working drawings on the basis of conceptual layout and will get it approved by the Employer's Representatives for part A & B works. These are clearly described in item no. 4.3 Part (A, B, &C) of NRDA F-1-Schedule-D- Section-II – SCOPE OF WORK, Page 3 of 32.
13	In the said tender It is presumed that all the design work has been done by NRDA, and the contractor has only to review the same, please clarify. Further, during review any changes are required and diameters are changed. How will the financial implications be meet out ?	
14	For items of trench less technology please provide the following information	
a)	Depth of pipe below road surface. (Above pipe top).	As per the approved design of sewerage networks
b)	Please provide the individual length of trenchless works at each location.	As per site conditions
c)	Sub soil water conditions. if work will involve dewatering etc.	Bidder has to verify same before submitting the tender.
d)	Availability of space for thrust pit and reception pit. ( ie minimum 6 m space is required on either sides.)	Available
e)	Tentative Soil strata at various locations.	Bidder has to verify same before submitting the tender.
f)	Probable existing utilities at the level of alignment.	Probable existing utilities at the level of sewerage alignment are Water supply line and electrical cable ducts.
g)	It is presumed that no Railway crossing is to be executed in the scope of work. As per norms 0.30 m vertical deviation on either side and 0.45 m horizontal deviation is permitted. but the work under reference, is drainage line hence if there is any scope for deviation is possible, because to push pipe for a length more tan 30 m is very difficult. it can be pushed horizontally but to provide particular gradient is very difficult.	Yes, at present there are no railway crossings. However, the railway line is proposed to plan within the city. If railway is encountered, the same shall be carried out through trenchless technology and the permission of railway shall have to be obtained by the contractor.
15	General: We presumed that all the statutory permissions required for the work from various Departments shall be obtained by NRDA, and	It is clarified that, all the statutory permissions required for the work from various departments shall be obtained by the

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	required technical support shall be provided by the bidder Please confirm.	bidder.NRDA will assist for the same.
16	General/ Felling of trees: We presume all forest approvals & a charge towards approvals is not in our present scope of work. Kindly give exact location & lead for disposal of these trees. Also these trees are to be retained by contractors.	All permissions, approvals from relevant authorities for shifting of utilities, tree cutting, traffic and other environmental permissions, etc shall be in the scope of the bidder . NRDA will assist for the same. The trees if cut with in the site area will be the property of NRDA / forest department.
17	General: We presume complete ROW is in possession of PWD. Kindly give width of ROW	It is clarified that, complete ROW is in the possession of NRDA.
18	General: Please provide L section dwgs. For 77 km DWC sewerage network for conveying raw sewage to STP.	Sewerage network alignment is provided in the tender. The contractor shall carry out detailed geotechnical investigation, survey, detailed design and prepare working drawings on the basis of conceptual layout and will get it approved by the Employer's Representatives for part A & B works
19	L-section drawing of 77Kms sewerage collection system and 36Kms treated sewage system. Route map for sewage collection system & treated sewerage system	
20	Land for STP and SPS: Kindly confirm whether land has been acquired for STP & SPS by NRDA. Also we presume that ROW shall be under the scope of NRDA.	Land for construction of pipeline works, sewage pumping station and treatment plant and allied works is available with NRDA. Part of the land has been acquired and part is under process of acquisition.
21	SCHEDULE- D Section-II Scope of work; Part B: Turnkey Works, 2a) site clearance page No. 10 of 32 Please confirm that site for proposed STP & Pumping station is in possession of NRDA.	
22	General : We presume that service tax is exempted for this project.Kindly Confirm	It is clarified that, there is no change in taxes clause, The bidders are advised to enquire and verify the applicable taxes and duties and shall quote rates including the applicable taxes.
23	General: Since treated wastewater from this project is intended to be recycled & reused, whether any exemption in excise duty or import duties will be available for this project? Pl advice	
24	General: Ground water table: It is mentioned that all the foundation & substructure shall be designed for submerged or saturated soil condition as the case may be considering the ground water table (GWT) for the design of work, purpose. Please specify at what level	Preliminary soil investigation has been carried out at the site of STP on the basis of the sam the SBC, which could be considered for tendering purpose as as below.

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	GWT is to be considered for design purpose.	<p>STP 1: 30T/sqm at 3m below</p> <p>STP2 : 20T/sqm at 3m below</p> <p>STP3: 30T/Sqm at 3m below.</p> <p>However the designed SBC shall be established by carrying out detailed geotechnical investigation.</p> <p>Before actual design is done in terms of contract conditions and got approved from NRDA and any organization appointed by NRDA.</p>
25	Please furnish soil data, borehole data, SBC along Sewerage Network and STP area.	
26	Please provide the ground water table level	
27	Please provide the following site details 1. Ground water table level 2. Average Natural Ground level available in the site	
28	SCHEDULE- D Section-II Scope of work (a) Investigations, Surveys and Submissions page No.4 of 32 We request you to provide soil investigation report for pre estimation purpose.	
29	SCHEDULE- D Section-II: Scope of work; Part B: Turnkey Works, 2c)Geotechnical investigation page no. 11 of 32 Please provide preliminary soil investigation report and also request you to send approved specialist firm for the same.	<p>It is clarified that,</p> <p>a) Power and chemical supply is in the contractor's scope, during testing, 3months trial run and commissioning period.</p> <p>b) After successful completion and commissioning of project, only power charges shall be reimbursed as detailed in para , c under Part C: Operation And Maintenance (60months) , NRDA F-1-Schedule-D- Section-II – SCOPE OF WORK, Page 20 of 32.</p>
30	Power Requirement: Please confirm scope of supply wrt power & chemicals for testing, commissioning, 3 months trial runs, 1 yr DLP & 6yrs O & M period. Does 3 months trial run period includes 7 days testing & 15 days commissioning	
31	It is presumed that, During O & M period the Power, Water, and chemicals required will be provided by NRDA free of cost at the work site.	
32	Special conditions of contract (page 40 of 47) / Payment terms; Payment on account: Within the 14th day of receipt on bill. We request that 75% payment to be paid within 7 days of submission of invoice and remaining within 15 days from submission. Also E Billing shall be allowed.  Final Bill: Bill to be submitted within one month of completion. We request that final payment to be paid within 30 days from submission of invoice.	No Change
33	General: Please furnish the Contour / Spot levels, FGL at STP area.	It is clarified that, Contour survey is to be done by the

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34	General: Sewage pumping stations (Sewage & Treated effluent) GA Drawings and levels. Please provide the Pumping stations GA drawing and levels (min.water level etc.) and STP &TTP inlet chamber max. water levels, According to the above we find out the Pump static heads	contractor before submitting the design for approval.
35	Contour map for sewage pumping station, STP, Treated pumping station.	
36	Invert level of receding sewer at sewage pumping station, existing ground level are required. Finished ground level at STP and PS site and HFI	
37	Exact location of STP sewage pumping system, treated sewage pumping station and location. Where treated sewage is to be pumped. Area available for STP and pumping station/plot plan.	
38	SCHEDULE- D Section-II Scope of work; Part B:Turnkey Works, 2f)layout plan page no 11 of 32 We request you to provide soft copy of layout plan in Auto cad this will help us to place preliminary layout on drawing. Also provide existing ground level & finished ground level of plot.	It is to be designed by the successful bidder.
39	General/ Raw sewage We presume the raw sewage is purely municipal sewage and there is no mixing of industrial effluents. Please confirm.	It is clarified that, the raw sewage is municipal sewage and there is no mixing of industrial effluents. However non-polluting industries shall be a part of the influents in zone 1. The inlet and outlet (treated effluent) Parameters are defined in Annexure 1.
40	SCHEDULE- D Section-II Scope of work; Part B: Turnkey Works, Annexure DESIGN Parameters FOR SEWAGE TREATMENT PLANTS; page No. 22 of 32 Please provide us Total Kjeldahl Nitrogen, Ammonia Nitrogen & Total Phosphorous Value for Raw water influent sewage and Treated Sewage Effluent.	
41	Annexure1, pg 22 of 32 Treated sewage outlet parameters do not specify the nitrogen and Phosphorous guarantees. Since treated water is recycled, nutrient removal (N&P) shall be included.	
42	General/ Layout Drawings The Layout drawing provided in the tender is in PDF Format. Kindly	The contour survey including other survey shall be carried out by the contractor before getting the design approved.

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	provide the same in AUTOCAD format with contour levels.	
43	Soft copy of Sewage Pumping Station & Sewage Treatment Plant Layout Drawings not given. Available area for construction SPS and STP not given.	
44	Part-1/ Section II/ Scope of work page 18 of 32/ Disposal of Sludge/Screenings As per the project scope, disposal of screens, grit and other comes under contractor's scope. And hence please provide the disposal point location and kindly provide us the distance of disposal point from the plant boundary.	
45	Disposal of sludge The land shall be provided by the NRDA for the disposal of sludge generation from STP. NRDA shall mention the approximate distance between land and STP. Kindly confirm	Disposal of screens, grit, Treated stabilized Sludge and others will be disposed to suitable location as directed by NRDA within a distance of 10kms of STP site by the contractor at his cost.
46	SCHEDULE- D Section-II Scope of work; Part B: Turnkey Works, 9 Disposal of Sludge; page No. 18 of 32 It is requested to provide distance between disposal site and proposed treatment plant site. It will helpful to calculate the amount for disposal of sludge.	
47	SCHEDULE- SECTION - IV (V) Standard Technical Specifications; civil specification; 1.3.10 Disposing Excavated Material page no. 9 of 64 Please provide the distance for disposal of excess excavated material.	
48	Part-1/ Section II/ Annexure – II page 23 of 32/ Peak flow duration	To be designed as per standards.
49	Part-1/ Section II/ Annexure – II page 23 of 32/ Lean Flow	
50	Schedule 3/ Section III/ Technical Specification of Works page 14 of 49/ Tertiary Treatment As per the clause, it is mentioned as "the helminth removal can be achieved by using rapid sand filtration". The objective of Tertiary treatment is to remove Helminth Ova removal. Can the bidder propose alternate filtration treatment technology (Other than rapid	Work shall be carried out as detailed in the Scope of work.



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	sand filtration) to remove the Helminth Ova.	
51	<p>Part-1, Schedule-D, Section -II, Scope of Work, Annexure II page 23 of 32 In tender document it is mentioned that “ In capacity of development of STP, its menctioned that SBR process units (2.5 MLD X 4 Modules)</p> <p>For designing of SBR process units for 10 MLD STP, 2 modules is ideal for that capacity. If we provide 4 modules, No of equipments in SBR process (Blowers, Soft Starters, VFD, Decanters, DO meter, level Transmitter, etc.) will increase double, Ultimately, project capital cost will suit up as well as power cost/electrical load will increase in that case. Kindly confirm.</p>	No Change
52	Invert level of incoming sewer to Receiving chamber of SPS is not given.Kindly provide the same.	The approximate invert level of the raw sewage pipeline in the last manhole for zone 1,2 & 3 is RL 287.60m, 282.80m & 307.80m respectively. However “The contractor is required to design of the sewerage collection system based on the actual survey.
53	<p>SCHEDULE- D Section-III Techincal Specification of work; 1.1 TECHNICAL SPECIFICATION FOR VARIOUS COMPONENTS TURNKEY WORK a) Wet well &amp; Sewage Pumping station; page No.4 of 49 For hydraulic calacultion, invert level of gravity outfall sewer is required hence request you to provide the same.</p>	Sewerage collection network is to be designed by the successful bidder as per the good engineering practice. Hydraulic calculations are to be done after the survey, which is in the scope of work of the contractor.
54	<p>Sub-Section-II &amp; IV, Clause no. 2 &amp; 1, page 30 &amp;191/ General Scope of work &amp; ELECTRICAL</p> <p>As per the Section-II, Pg. No. 30, Clause 2.0 we observed that, "An 11kV electric feeder shall be made available to contractor within 200meters of campus boundary."</p> <p>But as per the Section-IV, Pg. No. 191, Clause 1.0 mentioned as "The main Power supply will be provided by CSPDCL for which the funds will be deposited through the provisional sum. The work for up to DP and transformer will be carried out by them and the contractor will be required to make the remaining power supply and electrical activity." Kindly confirm which statement needs to consider.</p>	<p>1) It is clarified that, LT electrical network including substation control and cabling, 33/0.433KV transformer etc. is in Contractor's scope of work. The distribution transformer should be on plinth mounted structure.</p> <p>The incoming power supply shall be in double circuit. 33KV Incoming supply through cable trenches shall be provided by NRDA upto the 33/0.433KV transformer inside the campus boundary of plant area.</p> <p>2) The pumping station is a part of STP.</p>

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55	Sub-section- IV/ clause 21.1 page 220/ System fault level details From the Mentioned clause we observe that, "Electrical power supply for each pumping station will be availed from nearby RELIANCE ENERGY supply point. According to the load requirement HT at 11KV/22KV or LT at 415V - 3 Phase will be availed from RELIANCE ENERGY." w.r.t above statement, kindly inform us the following details. Incoming supply voltage level from Reliance energy. Fault level details of Reliance Energy system. Approx. Distance between Reliance energy point to Proposed Raw Sewage pumping station.	
56	General/ Power supply We Understood that, 1) For Raw Sewerage Pumping station Incoming supply will be feed from Reliance Energy. 2)For STP and Treated Sewerage pumping station incoming supply will be feed from CSPDCL Kindly confirm the same	
57	It is presumed that, The power of required capacity for all Pumping stations and STPs will be provided by NRDA up to the Input point of the substation.	
58	General /Transformer Stand by requirement Kindly confirm whether we need to consider Transformer stand by at each Zone.	It is clarified that, one working and one stand by transformer shall be provided for the entire load at each Zone.
59	Sub-section- IV/ clause no. 4.3/ page 197/ SLD From the mentioned clause we observed that, "The phase and neutral bus bars shall be of rating indicated in the corresponding single line diagram. Bus bars shall be of aluminum and shall be provided with minimum clearances as specified." Kindly provide us the Single Line diagram.	It is clarified that, single line diagram should be provided by bidder and approval to be taken from NRDA.
60	Sub-section- IV/ Clause 4.22 (Si. No. 13)/ page 203/ Motor Starters From the stated technical particulars we observed, "For motor < 22 kW - DOL." Kindly inform us the Starter selection types for motor	It is clarified that, soft starter should be used for all type of motors.

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	ratings above 22kW.	
61	General/ LT fault level: Kindly inform us the LT fault level details.	The details shall be obtained from CSPDCL
62	Sub-section- III/clause point(i) page 58/ DG Sizing We presume that DG sizing shall be done for the loads of raw Sewerage wet well pumps and Campus lighting only. Kindly confirm the same. Also Kindly provide us the specification of the DG Set.	It is clarified that, i. DG set including panel board should be designed and provided for the entire plant load i.e. sewage pumping station, Treatment plant with Treated sewage effluent pumping station and allied works. Auto start / stop arrangement shall be provided in the DG with maintenance free battery system. ii. The diesel storage arrangement should be at least for 2 days. iii. The Diesel Gen Sets should be Silent type as per IS Standards. (Refer Approved Make List). iv. It is clarified that, full power back-up system shall be provided by the contractor during O & M with DG Set in case of the any power break down.
63	It is mentioned that POL to the DG sets will be provided by the contractor for pumping stations, Please Confirm the Power cut hours per day, as this will ease to load the cost of POL in O&M cost. Page 22/49 para 2.5 / 3.0.	
64	Sub-section- III/Clause 1.1.a Page 3 of 49/ Instrumentations & Automation (PLC/SCADA)works at Wet well and sewage Pumping station We presume that, wet well & sewage pumping station area instrumentations work & Automation works (PLC/SCADA works) are not in scope of work. Kindly confirm.	It is clarified that, instrumentations & Automation works ( PLC & SCADA work) is to be provided for the entire system (i.e Sewage pumping station, STP, TTP and treated water pumping station etc.)
65	Sub-section- III/ page 11 of 49/ Automation (PLC/SCADA) works for STP As per referred clause, We understand that automation & control works for SBR unit is in scope of work, But automation works (PLC/SCADA) for rest of STP is not envisaged in the tender document. Kindly confirm.	
66	Eligibility Criteria/ Joint venture :We request that JV shall be allowed to have better and healthy competition in the bid	No Change
67	Clause 4.2, Detailed NIT :Experience of job executed for Corporate/ Private/ companies should also be considered as the complexity	No Change

Sr.No	Bidder Query	Clarification
	methodology & technology adopted remains same	
68	PQ Criteria : Bidders with experience abroad should also be allowed to participate with Indian Bidders to allow more bidders to participate, resulting in efficient techno-commercial bid	No Change
69	PQ Criteria : Kindly consider construction experience of 5 MLD STP on desired technology so as to construct 7 & 10 MLD STPs	No Change
70	Bid submission date :In order to prepare a thorough Techno Commercial offer, we humbly request you to kindly extend the last date of bid submission by Two weeks i.e. upto 20th September, 2013	Kindly Refer to Coorigendum-1
71	ROU/ROW :Please clarify if all requisite approvals have been obtained from respective authorities by the client. OR is it the bidder's responsibility to get such approvals.	All permissions, approvals from relevant authorities for shifting of utilities, tree cutting, traffic and other environmental permissions, etc shall be in the scope of the bidder. NRDA will assist for the same.
72	PQ Criteria: We request you to kindly consider Water pipeline laying experience besides sewer pipeline experience as similar technology and methods are being used in laying of pipes	No Change
73	Schedule D, Section-V, list of approved makes; We request you to add reputed makes Omron & Mitsubishi in the Approved List of Instrumentation works. This will not only provide enhanced technical options but also to quote best.	Please refer modified tender document.
74	Liquidated Damages; Kindly clarify the clause to levy LD	Refer GCC and other clauses of the Document.
75	Price Escalation; We request you to please allow Price Escalation and provide the formula / Star Rate for calculating the same	It is clarified that, no reimbursement / refund on account of any price escalation shall be applicable. The rates /prices quoted shall be firm and fixed.
76	Considering the trend of increase in POL prices and market trend of various materials, we request you to make the escalation clause applicable for this tender.	No Change
77	PAC for Exemption : Please provide PAC for availing ED and other relevant Statutory exemptions.	No Exemption certificate shall be issued by this office
78	Disposal of Sludge: We understand that Authority will provide bidder the space to dispose the sludge but kindly clarify the maximum	Disposal of screens, grit, Treated stabilized Sludge and other will be disposed to suitable location as directed by NRDA with in

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	distance to consider from facility to allotted space.	a distance of 10kms of STP site by the contractor.
79	Schedule D, Section-II, Clause 4.3 (11) :We request to kindly provide bidder the dumping area within a range of 5Km for the disposal of excavated stuff. However, responsibility of transportation of stuff lies with contractor/ bidder.	
80	Schedule-D: Kindly specify distance to dispose off the sludge.	
81	Evaluation and qualification criteria Tender part-I: 4.1 PAGE 2/7 The financial criteria: Tender Document Part-I: 4.1 Page 2/7 The Financial Criteria: Average Annual Turnover: Minimum average annual gross turnover of the bidder shall be INR 80.00Crores during last three Complete financial years. As per CVC Guide lines No.12-02-1-CTE-6 Central Vigilance Commission (CTE'S Organisation) Satarkta Bhawan, Block 'A' GPO Complex, INA New Delhi -110023 Dated the 17th December, 2002 OFFICE MOMORANDUM Subject: prequalification criteria Average Annual financial turnover during the last 3 years, ending 31st March of the previous financial year should be at least 30% of the estimated cost.	Please refer modified tender document.
82	Criteria 4.2 page 3/7 In the tender total length of sewer line is 77Km. and reuse pipe line is 36Km. so total length is 113Km. so as per CVC guide lines A) one work of 80% of total length laid or B) Two work of 60% of length laid or C) Three work of 40% of length laid. And same should be applied for STP and Pumping station. we are requesting please clarify the above points so we can quote the tender.	
83	STP P/Q criteria for STP and Pumping station there will be two STP of 23.5mld and one 20.4 mid as per cvc guideline one stp of 80%, Two STP of 60%, Three STP of 40% so please clarify.	
84	Technology On page 22 part II the out let parameter of BOD is 5 to 10 if our technology give the BOD less than 5 without Tertiary treatment	Tertiary treatment is mandatory as detailed in the scope of work.

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	than can we avoid it.	
85	Security deposit Performance guarantee Schedule E page 2/2 performance guarantee is 5% and security deposit is 5% whether 5%SD will be deducted from bill or it will submit along with performance guarantees	Refer GCC Clause no. 1 & 1A
86	As per the tender you have asked for 5 % PSD and 5 % as regular SD. Regarding we presume that, 5% PSD should be deposited in the form of bank guaranty after receipt of letter of intent. The further 5 % SD will be deducted from the RA bills. Plz confirm.	yes
87	It is to submit that, these retention of money is very huge, and un necessarily increasing the financing cost of the project. Hence it is requested to make it total 5% i.e 2.5 % as PSD and 2.5 % SD from the RA bills. Or total 5% in form of Bank Guaranty. As this is a general practice followed in various states.	As per tender
88	Escalation The project period is two year execution and five year O/M, total project time is 7 years so consider the market today's condition the escalation clause should be added in the tender please consider.	No Change
89	Detail NIT Cl. No. 4.1 Financial Criteria Page no. 2 of 7 Average Annual Turnover: Minimum average anual gross turnover of the bidder shall be INR 80.00Crores during last three complete financial years (i.e 2010-11, 2011-12 &2012-13). (UnAudited balance sheet for 2012-2013 & Audited balance sheet for remaining two years duly signed by CA should be enclosed). Many india firms are closing their accounts at the end of October as per Govt Of India norms.	UnAudited balance sheet for the financial year 2012-2013 duly certified by CA should be considered for evaluation
90	Detail NIT Cl. No. 4.2 Technical Criteria Page no. 3/7 Sewerage collection network include DI/RCC Pipeline work. Please confirm.	Sewerage collection network in diameter of 200mm and above should be considered for all types of pipe laid.
91	Clause No. 4.2/Page 3 of 7 : Since it is technology driven plant and long terms O&M, it shall be mandatory to all bidders to necessarily tie up with a Technology Provider for providing	Accepted, Please see modified tender document.

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	design/performance guarantee/key equipment for Sequential Batch Reactor (SBR) Technology. Kindly confirm.	
92	Clause No. 4.2/Page 3 of 7 : Kindly include the pre-qualification - technical criteria for technology provider as follows: Technology provider should have provided SBR technology for minimum two STPs of 10 MLD capacity in India based on SBR technology and are in working satisfactory for 2 years. Kindly confirm.	Please see modified tender document.
93	Detail NIT Cl. No.7 no. 4 of 7b): All nationalised Banks are issuing demand draft valid for 90 days hence request you to accept cost of tender in the form Demand Draft valid for 75 days from the date of submission.	No Change
94	SCHEDULE- D Section-II Scope of work; System Components IX, page No.8 of 32 , Availability of Sulphate resistance cement is rear hence request you to accept Portland Pozzalan Cement instead of SRC.	No Change, Sulphate resistance cement shall be required for the construction of all the sewerage infrastructures, such as Manholes, Wetwells, sewage pumping stations and Sewage treatment plants.
95	SCHEDULE- D Section-III Technical Specification of work; 1.1 TECHNICAL SPECIFICATION FOR VARIOUS COMPONENTS TURNKEY WORK a) Wet well & Sewage Pumping station b) Sewage treatment plant c) Tertiary Treatment Plant As per latest IS 3370 : 2009; for water retaining structure M30 grade concrete is recommended hence amend the specification. Also allow the Portland Pozzalan cement which is having similar characteristics of Sulphate Resistant Cement.	OPC shall be used for the construction of office, lab. Administrative building and other buildings works.
96	Sulphate resistant cement has been insisted upon for all works, It is to submit that, there are some companies who manufacture the said cement, but currently the same is not available in the nearby markets. Due to major transportation factor, The cement bag FOR site cost will be substantially very high, We therefore request you to supply the same by NRDA at fixed rates at sites.	
97	SCHEDULE- D Section-II Scope of work; System Components XVI, page No.8 of 32	No Changes and as per Standards

Sr.No	Bidder Query	Clarification
	As per CPHEEO Manual page no. 74 for sewers above 900 mm dia. centre to centre between manholes shall be 90 to 150 mtr hence we request you not to restrict the CIC distance between Manhole is 30 mtr. for 900 mm dia and above diameters.	
98	Page 10 of 49 Since, in India more than 50 STPs with moving weir arm type decanter are working satisfactorily, we recommend moving weir arm type decanter of SS 304 material. Kindly confirm.	No Change
99	SCHEDULE- D Section-III Technical Specification of work; 1.1 TECHNICAL SPECIFICATION FOR VARIOUS COMPONENTS TURNKEY WORK b) Sewage treatment plant; page no. 13 of 49 For hydraulic calculation, high flood of river is required hence request you to provide the same. We also request you to provide treated sewage disposal length.	It is clarified that all the sewage is to be collected, treated , recycled and reused for gardening / horticulture, flushing and construction works etc., However in case of exigency, the excess treated and chlorinated sewage shall be discharged by gravity to the natural drain after with due approval of NRDA. RCC NP3 pipes with manholes shall be provided for the disposal. The Nala disposal location is approximately 150m from the STP boundary limit.
100	SCHEDULE- D Section-III Technical Specification of VARIOUS COMPONENTS TURNKEY WORK (i) Compound Wall and Gate page no. 17 of 49 We request you to provide the length of safeguard boundary of premises.	It is clarified that, Compound wall shall be constructed by NRDA at latter stage, However the contractor shall be responsible for safeguard of the entire premises of the plant area. The tentative length of each side of is 200mts, So the total length shall be approximately 800mts.
101	SCHEDULE- SECTION -IV (V) Standard Technical Specifications civil specification; 1.3 General Excavation page no. 6 of 64 If any depressions/Loose pockets are formed due to removal of boulders, they shall be made good by filling with plum concrete up to the bottom layer of the footing/raft. Please confirm.	No Change, As per Design approved.
102	SCHEDULE- SECTION - IV (V) Standard Technical Specifications; civil specification; 2.8.2.1 Controlled Concrete page no. 21 of 64 The minimum cement content for each grade of concrete	The grade of concrete shall be as per Mix Design ( IS Standards)



Sr.No	Bidder Query	Clarification
	shall be as per IS 456. Please confirm.	
103	SCHEDULE D- SECTION -III Standard Technical Specifications of works; Mech.Coarse screen channel page no. 4 of 49 As the MOC's of Gates are contradicting, Please clarify the MOC of Gate.	It is clarified that, material of construction of Gate is Aluminum.
104	Volume 1, Standard Technical specifications. SUBSECTION - III Valve Specifications; valve Actuators, Clause no. 1.1.10.3- Features of Construction: page no. 5 of 9 Please note that in actuators with integral starters, as the starters are field mounted, the maintenance of the actuators will be more. Also the controlling of Valves via PLC will be difficult. So we suggest to go for actuators without Integral starters.	No Change
105	SECTION V List of approved makes- Mechanical Works We request you to add Mis Aqua Macheneries also in the list.	Please see modified tender document.
106	SECTION V List of approved makes - Mechanical Works We request you to add Crompton Greaves and Siemens also in the list.	Accepted, Please see modified tender document.
107	Price variation Pleaee put General Price variation clause in tender document. It will reduce the contractors price bid amount.	No Change
108	Mobilization Advance Recovery We request you to start the recovery mobilization advance after 30% of work done to 80% of work done.	Please see modified tender document.
109	Date of submission We request you to extended the date of submission by 21 days form replay of prebid queries.	Refer Corrigendum 1
110	In the qualification criteria of said tender, completion of 100 crores sewage project is insisted. As per the general practice, 50% experience is insisted upon. We therefore request you to consider the qualifying criteria of 80 crores in single sewage project.	Please see modified tender document.

Sr.No	Bidder Query	Clarification
111	It is learnt that the some part of the said work is balance work of left out work of any contractor. Please clarify.	There is no balance work, The bid contains the original work only
112	It is presumed that the date of commencement of work will be, from the date of issue of work order	As per tender condition.
113	Please inform us the year of estimate framed, i.e. SOR on which the estimate is framed. The estimated cost seems to be less considering the conditions of the contract.	The estimate is based on the Current CG PHE SoR, CG PWD Road work, 2009 CG PWD Building works and Market Rates, However this being an item rate/Lumpsum tender , the rates shall be quoted
114	It is presumed that NRDA will pass & pay the Bill amounts within 15 days from the date of submission by the contractor.	As per GCC Clause
115	As per the agreement, we have to provide various equipments like Vehicles, Computers UPS, camera, Projector, Printer etc. Regarding we have to mention that we have to provide one set of each software mentioned (expect Antivirus) and one number of UPS of capacity suitable to run 4 nos computers at a time etc. at one place only. Please confirm.	Please see modified tender document.
116	The cost of various materials to be supplied and tasks to be executed which are to be supplied or executed as per the scope given in the tender but however not in the item rate schedule are to the tune of Rs. 2.5 crores. We presume all these costs will be considered during the evaluation of the bid.	The list of item of works shall be incidental to the work and the capital as well as operational cost of these items are deemed to have been included in the rates quoted by the agency.Nothing extra shall be payable on this account
117	Various Approved List of Manufactures has been given in the tender; There are many other reputed manufacturers in the market who can supply equivalent quality material at reasonable prices. However the contractor must have the liberty to procure the materials from other reputed manufacturers also. Please confirm.	The contractor should follow the Approved Make List.
118	As per the tender, we have to provide various items such as staff quarters, internal roads etc. at STP premises. Generally these items are not the essential part of STP. Please confirm whether costs of all such items will be considered for evaluation of bid.	The contractor should provide all the items as detailed in the scope of work and quote accordingly.

Sr.No	Bidder Query	Clarification
119	It is presumed that the reinforcement steel of grade FE415/ 500 is acceptable.	Acceptable
120	Considering the scope of work, we kindly request you to consider the time limit as 30 months.	No Change
121	Mobilization advance @ 10% is being given by NRDA against BG, we presume that the same will carry no interest and will be deducted @ 10% from every RA bill.	No Change
122	It is presumed that all the right of ways will be responsibility of NRDA. All the required permissions from the competent authorities have been taken by NRDA. For any type of hurdles and payments regarding the statutory permissions etc will be responsibility of NRDA.	It is clarified that, complete ROW is in the possession of NRDA. It is clarified that, all the statutory permissions required for the work from various departments shall be obtained by the bidder.NRDA will assist for the same.
123	Part-A We request to either provide us the details of underground utilities coming the alignment before the commencement of work. If not possible, and if the same are damaged during the execution, the rectification cost should be considered for financial implications.	It is clarified that, this is a green field project and therefore not much underground utilities are likely to be met. However in case of any underground utilities the contractor shall be responsible for the protection of utilities as detailed in the clause 8 ,of Page 18 of 32 in section II, of NRDA F1, for all the works ( Item rate and turn key works). During the construction of sewerage system, if any utility is damaged it has to be rectified/modified at the cost of the contractor.
124	Regarding the damages to the water connections, it is to submit that, we try our level best to save the said connection during the excavation, but after refilling th e trenches, we have to use roller for proper compaction, During the compaction these water connection are damaged very badly. Hence the repairs of such water connections should be paid separately.	
125	You are already holding 10% of the contract amount as security. Payment breakup of part B & C are given in the tender, we kindly request you to make the various payments of the materials supplied under part A as follows,	No Change
	a. On supply = 90%	
	b. On lowering & laying = 5	
	c. On testing & commissioning = 5%	
126	The tender does not include any items of nalla diversion, dewatering, barricading, and other safety majors etc. It is reviewed that the cost	Nalla Diversion and dewatering if required shall be included in the excavation work item for Part A works.

Sr.No	Bidder Query	Clarification
	put to tender and scope mentioned in the tender will differ substantially, There are many such items, which are included in the specifications, and in the nomination of the item, but however does not have any separate rates in schedule. Hence some items are required to be quoted at higher side. This matter may kindly be considered during the process of evaluation.	Barricading and other safety majors etc shall be carried out by the contractor at its own cost .The above shall be incidental to the work and nothing extra shall be payable on this account.
127	It is presumed that the work of interconnection of newly laid sewer line and old sewer lines, is not in the scope of this contract. Please confirm.	The work of interconnection of newly laid sewer line and old sewer lines is in the scope of contractor, nothing extra shall be paid on this account.
128	At many places, due to insufficient width of road , we have no space for keep the excavated stuff beside the trench. In this case we have to transport the entire stuff to nearby storage point, execute the laying work, and than bring back the stuff to refill the trench. In such case we will get the payment of excavation, and disposing of the stuff to suitable distance, further we will also get the payment of providing and filling the soil from out side. Please confirm.	It is clarified that, this is a green field project and sufficient ROW is available for keeping the excavated stuff beside the trench. However surplus excavated stuff should be disposed to suitable location as directed by NRDA with in a distance of 10kms from the site by the contractor no extra amount shall be paid.
129	During the excavation on roads by mechanical means, more width of road is excavated than prescribed. Or foot paths or curbs are damaged during the excavation. However It is presumed that construction/reinstating of roads and other damaged paths and curbs etc, is not in the scope of this tender. Further we presume that the actual width excavated will be considered for payment. Please confirm.	The contractor is not allowed to damage any existing roads / structures. If any road crossings are required on existing road / structures , Horizontal directional drilling shall be carried out as per BOQ Provisions.
130	The manhole is constructed during the sewer line laying. It is observed that again the manholes are required to be raised during construction of roads. We presume that repairs to existing manhole or raising the existing manhole will be considered for payment.	If the extra height of the manhole is required as per approved drawing during construction , extra cost shall be paid as per the terms of contract
131	Please give the standard width and slope allowed for the excavation for the various dia of pipes. At various depths.	The work shall be carried out as per Standard engineering practice.
132	It is presumed that, any other item other than mentioned in the schedule, if asked to be executed or insisted upon will be considered for financial implications.	Yes as per the terms of contract

Sr.No	Bidder Query	Clarification
133	The item of shoring and strutting, is included in the item of excavation. However this item should be a separate item and both the trench sides measurements shall be considered for the payment. i.e for a trench of one meter length both the sides area will be considered for the payment. Please clarify.	No Change
134	Please give the details of follows	
	a) How will the HDPE sewer line be treated as tested after lowering and laying.	It will be tested by conducting hydro test as per Norms.
	b) How will the manholes be treated as tested after completion?	
135	We kindly request you to allow ISI marked Vertical cast socket Spigot RCC pipes also in lieu of DWC pipes in the said tender.	No Change
136	Pre cast Manholes have been asked to be provided. Regarding we request you to allow brick masonry manholes also.	No Change
137	Regarding DWC pipes, it has been prescribed to supply the DWC pipes with reference to IS 16098 Part II. Further another specification EN : 13476-3 for outer Dia. has been asked for. In this regards, it is to submit that IS has referred all the diameters with respect to ID only. We therefore, request you to allow the supply of DWC pipes & specials with respect to above IS only.	The standards for “manufacturing, supplying, transportation, handling, stacking, installation, jointing, and testing of Class SN 8 Structured Double Wall (Non-Smooth External Annular Corrugated wall & Smooth Internal wall) Polyethylene Piping System for non-pressure underground Sewerage & Drainage Applications are specified in Sub Section 3- Civil Specification, Technical specification; Page 55 of 64
138	Part B: It is presumed that the work of STP & Pumping stations shall be in lump sump form and design & drawing for the same shall be provided by the contractor.	OK
139	It is presumed that all the 3 pumping stations and STPs are approachable with all season roads. Please confirm.	It is clarified that, length of approach road is approximately 200m long of 5.5m wide and 3m wide tree plantation in two rows shall be provided on both side of approach road all along the length.
140	It the part B, it is insisted that STPs and Tertiary Plants are to be constructed for x capacity. Further it has been asked to keep the provision to expand the same to Y capacity. In this case we presume that, we have to design the STP layout in such a way that in future expansion can be possible considering the space point of view. Were	The STP and allied works shall be designed for ultimate capacity, but the capacity development of STP and allied works at present should be made as per Annexure II and as per the scope of work defined in the tender document.

Sr.No	Bidder Query	Clarification
	as all the structures are to be provided as per the design criteria as prescribed in the tender.	
141	Sewage of required quantity for running and commissioning the plant will not be the responsibility of the contractor.	The contract is for a period of 24months construction and 60 months O & M period, In case the adequate sewage is generated at a latter date the commissioning will be reconned from that date. However the SBR units of STP are divided into modules as detailed in Annexure II. Therefore the commissioning of SBR shall be considered module wise.
142	If the work is completed and however if not commissioned due to want of required quantity of sewage after one year after construction, the same should be treated as commissioned.	
143	Considering the three zones, all the three zones may not be commissioned simultaneously. Considering this factor, The O & M of five years period should be treated from the completion of individual works and not for the whole work.	No Change.

**Note :***Modified Bid document is uploaded and the same be downloaded from the website before submission.Only modified document shall be submitted .The places where major changes made with respect to the earlier uploaded document are given below.*



**NAYA RAIPUR DEVELOPMENT AUTHORITY**

**Modified**

**Tender Document for the Development of Sewerage  
collection, Treatment, and Reuse system including  
Operation and Maintenance  
for Zone 1, 2, 3 & specified area at  
Naya Raipur**

**(Following Three-Envelope Tender Procedure)**

**TENDER DOCUMENT (PART ONE)**

**NIT No:** 45 / SZ-1, 2 & 3 /EE PHE / CE (E) / NRDA / 2013-14, Raipur,

**Dated:** 07- 08 - 2013

**Issued by:** Chief Executive Officer,  
Naya Raipur Development Authority (NRDA)  
Near DKS Bhawan, Old Mantralaya Mahanadi Dwar  
Raipur 492 001, Chhattisgarh  
Tel: (0771) 4066011, Fax: (0771) 4066188,  
E-mail: ceo@nayarapur.com

## Tender Document Contains

- (a) Only schedule "A" and Section-I of schedule "D" are to be filled & signed by the tenderer
- (b) All the certificates as per pre qualification criteria shall be appended with relevant forms of schedule "D"

### 1. PART ONE (NRDA F-1)-(Attached herewith, to be submit along the tender)

#### Part (A)

- a) Press Notice
- b) Detailed NIT

#### Part (B)

- a) Schedule-A
  - (i) Cost Abstract
  - (ii) Bill of Quantities

- b) Schedule-B –NIL
- c) Schedule-C –NIL
- d) Schedule-D

#### Section-I..... Technical tender forms

- (i) Letter of Technical Tender
- (ii) Tenderer's Information Sheet
- (iii) Annual Turnover
- (iv) Specific Construction Experience
- (v) Declaration
- (vi) Check list for Technical tender evaluation

#### Section –II .....Scope of work

#### Section –III..... Technical specifications of work

#### Section –IV..... Special Conditions of Contract

#### Section –V..... List of approved makes.

#### Section –VI..... Drawings

- e) Schedule-E
- f) Schedule-F

### 2. PART TWO (NRDA F-2/3) )-Standard form (Not Attached herewith, and not to be submitted along the tender)

**Important note: - Link site [http:// nayaraipur.com/documents/gcc.pdf](http://nayaraipur.com/documents/gcc.pdf)**

- 1. General Guidelines
- 2. Tender
- 3. General rules and directions
- 4. Conditions of contract
- 5. Clauses of contract
- 6. Model rules relating to labour, water supply and sanitation in labour camps safety code
- 7. Sketch of cement Godown
- 8. Contract forms
  - (a) Draft Format for Performance Security
  - (b) Earnest Money Deposit Form (Bank Guarantee)
  - (c) Format of Contract Agreement
  - (d) Draft Format for Performance Guarantee for Water Proofing and Anti-termite Works
  - (e) Indemnity Bond
  - (f) Indenture Bond
  - (g) Notice for Appointment of Arbitrator
- 9. Proforma of schedules (Schedule 'A' to Schedule 'F')





## NAYA RAIPUR DEVELOPMENT AUTHORITY

Near DKS Bhawan, Old Mantralaya, Raipur-492001, Chhattisgarh  
Ph:0771-4066011 Fax:0771-4066188, Website: [www.nayaraipur.com](http://www.nayaraipur.com)

### Tender Notice

NIT No: 45 / SZ-1, 2 & 3 / EE PHE / CE (E) / NRDA / 2013-14, Raipur,

Dated: 07. 08. 2013

Sealed tenders are invited from registered contractor with any Central/ state Govt. /local body or PSU in appropriate class, who fulfill the Pre-Qualification criteria, for the work of **"Development of Sewerage collection, Treatment, and Reuse system including Operation and Maintenance for Zone 1, 2, 3 & specified area at Naya Raipur"**.

Registered Contractor in CGPWD or in appropriate class in other dep't.	Time allowed inc. rainy season	Estimated Cost (INR Crore)	EMD (INR Lacs)	Cost of Tender Doc. (INR)	Avg. Annual turnover in last three financial years (INR Cr.)
A-5 / S-5 Class	24 (twenty four) Months for construction & 60 months for O & M	160	160	20,000	80

Bids are invited in three envelope system. Eligibility and qualification criteria are available in the detailed NIT and tender documents. While submitting the tender, the tenderer should submit documentary proof in support of eligibility and qualification. Tender documents can be downloaded from the website [www.nayaraipur.com](http://www.nayaraipur.com). The duly completed documents shall be submitted by speed post/registered post/ courier so as to reach the office latest by **15.00hrs on 06.09.2013**. Technical Documents shall be opened thereafter on same day after **16.00hrs**. **Amendment in tender, if any, will only be uploaded on the website and shall not be published in any newspaper.**



Chief Executive Officer

Signature of Contractor.....

Signature of NRDA.....

## NAYA RAIPUR DEVELOPMENT AUTHORITY (NRDA) RAIPUR, CHHATTISGARH

### DETAILED NIT

NIT No: 45 / SZ-1, 2 & 3 /EE PHE / CE (E) / NRDA / 2013-14, Raipur,

Dated: 07.08.2013

**Last date and time for submission of tenders: 15.00 hrs on 06.09.2013**

1. Item Rate Tenders are invited in the prescribed tender documents by the Chief Executive Officer, Naya Raipur Development Authority (NRDA), Raipur Chhattisgarh from eligible contractors registered with any Central / state /semi Government of India or public sector undertaking. Who fulfill the prequalification criteria,
2. **The detailed NIT is as under:-**

Name of work	Development of Sewerage collection, Treatment, and Reuse system including Operation and Maintenance for Zone 1, 2, 3 & specified area at Naya Raipur
Estimated Cost (INR in Crores)	160
EMD (INR in Lacs)	160
Time allowed including rainy season	24 months
Cost of Tender (In INR)	20,000.00
Tender to be uploaded on NRDA website to enable download	07-08-2013
Pre Bid Quarries	19.08.2013 at 12.00Hrs
Pre Bid Meeting	19.08.2013 at 12.00Hrs
Pre tender Clarification/ amendments	Available in the NRDA Website
Last Date and time of submission of Tender	06-09-2013 at 15.00Hrs
Date and time of opening of Tender	06-09-2013 at 16.00Hrs

3. Intended eligible Tenderers may obtain further information from the office of Employer and inspect the Tender Document at, NRDA Raipur from 11 AM to 4 PM on all working days.
4. **Pre Qualification Criteria** -To be eligible under the contract, the intending tenderer should meet the following mandatory criteria **4.1 and 4.2 (A & B):**

#### **4.1 Financial Criteria**

**Average Annual Turnover:** Minimum average annual gross turnover of the bidder shall be INR 80.00Crores during last three complete financial years (i.e 2010-11, 2011-12 & 2012-13). (Audited balance sheet duly signed by CA should be enclosed).

Annual turnover is total certified payments received for contracts in progress or completed during the financial year

**For above, the Tenderer has to submit audited balance sheets of their financial turn over/ accounts along with profit and loss account for the last three(3) years, along with the Tender. Where necessary, the Employer can make enquiries with the Tenderer's Bankers.**

Signature of Contractor.....

Signature of NRDA.....

#### 4.2 Technical Criteria

<b>A</b>	<p>Intending tenderer shall be registered contractor with any Central/ state Govt/ Local Body or PSU in A-5 category and above in CG PWD or in appropriate class in other departments.</p> <p style="text-align: center;"><b>AND</b></p> <p>Those intending tenderer's, who have executed similar work, i.e. successfully completed at least one sewerage project costing more than <b>80crores</b> during last 5 years.</p>
<b>AND</b>	
<b>B</b>	<p>Should have completed satisfactorily following works during last five years i.e after 30/07/2008, in any Central/ State Govt/ Local Body/ PSUs as below: -</p> <p>(a) Intending tenderer should have successfully executed more than <b>50km of sewerage collection network</b> of diameter 200mm and above, in not more than two contracts.</p> <p style="text-align: center;"><b>AND</b></p> <p>(b) Intending tenderer should have completed successfully, either of the following and the plants should be successfully functioning for more than one year anywhere in India.</p> <p style="padding-left: 40px;">(i) Two sewage treatment plants with SBR technology of minimum capacity 6.0mld each.</p> <p style="text-align: center;"><b>or</b></p> <p style="padding-left: 40px;">(ii) One sewage treatment plant with SBR technology of minimum capacity 8.0mld.</p>
<p><b>However for complete eligibility and qualification requirements, tender document should be referred.</b></p>	

**Note: -**

- a) For the purpose **value of executed works and financial turnover shall be brought to current costing level by enhancing the actual value of work at the rate of 10% per annum (compounded annually), calculated from the date of completion to last date of receipt of applications for tenders.**
- b) Ongoing project / part project experience shall not be considered for evaluation.
- c) For the benefit of the intending tenderers a checklist is enclosed at Schedule-D (vi), for the documents to be submitted along with tender.
- d) **All the intending tenderer's should have MoU with a technology provider, who has provided technology in India for at least one STP with SBR technology of capacity not less than 4mld and has been working successfully for a minimum period of one year after commissioning .The notarized certified copy of the MoU must be submitted with technical offer.**
- e) **One technology provider could have MoU with many intending bidders.**
- f) If tenderer qualifies on the basis of experience of one/ two components of scope of work, in such circumstance, tenderer shall have to employ sub vendor who has experience in execution of that component, for which tenderer does not have experience.  
That sub vendor should have successfully completed work in any central/ state Govt. / Local Body or PSU in respect of particular component as below.
  - i. One completed work of 80% of the value of that component
  - OR**
  - ii. Two completed works of 50% of the value of that component.  
In a Central/State Govt. department/ Local Body or PSU

#### Certificates:

- a) All tenderers should submit the valid registration certificate. Commercial tax certificate, balance sheet with profit and loss statement for at least 3 years.
- b) The tenderers shall also submit satisfactory completion certificates in support of each quoted experience along with work order. The satisfactory completion certificate should be signed by an officer not below the rank of Executive Engineer concerned in case of Government department or the rank of General Manager in case of public sector as the case may be.
- c) **All the documents to be submitted shall be duly notarized.**

Signature of Contractor.....

Signature of NRDA.....

5. The tender document for the above work is available on NRDA's websites: [www.nayaraipur.com](http://www.nayaraipur.com) and [www.cg.gov.in](http://www.cg.gov.in) Tenderer will have to download the tender document, and shall submit the tender along with the tender cost as mentioned in the Para 2 above. For tender cost, DD drawn in favor of "CHIEF EXECUTIVE OFFICER, NRDA" should be enclosed. The tenderers shall attach the cost of tender document along with EMD as mentioned in the Para 2 above.
6. Three envelope Tender procedures shall be followed. Tenderer has to submit three sealed envelopes containing the documents as detailed below simultaneously, enclosed in a **Fourth Envelope duly mentioned in the top the name of work, NIT No. and firm address.**

<b>ENVELOPE-1</b>	EMD & Cost of tender in the prescribed format
<b>ENVELOPE-2</b>	Technical Tender consisting of the documents/ certificate in proof of prequalification criteria PART ONE (NRDA F-1) excluding schedule-A
<b>ENVELOPE-3</b>	Financial Tender PART ONE (Schedule-A) ( Price Bid should also be submitted as soft copy in MS Excel 2007,in CD)

All the three tenders shall be put in a fourth envelope which shall be dully sealed. **All the 4 envelopes shall be super-scribed with the Name of Work and Name of intending tenderer. Respective envelopes shall also be marked as envelope 1, envelope 2, and envelope 3 as detailed above.** Tenders who do not conform to the specified requirements will be held non-responsive.

Initially, only the **envelope -1** shall be opened, if found responsive then the **envelope-2** (Technical tender) shall be opened at the date and time given in the Tender Document. The Price tender shall remain sealed and unopened in the custody of NRDA.

After technical evaluation, date and time of opening of price bid shall be communicated by NRDA to the successful tenderer in technical evaluation. The Price tenders of only the tenderer found qualified as per the PQ criteria shall be opened in presence of the tenderer who wish to be present. The Contract shall be awarded to the tenderer whose tender has been determined to be the lowest evaluated as per tender conditions.

7. All Tenders must be accompanied with the
  - a) **Earnest money** as mentioned in the Para 2 above. The Earnest money shall be payable in favour of *Chief Executive Officer NRDA*, in the form of a **Bank Draft payable at Raipur/ Bank Guarantee operatable at Raipur drawn from a nationalized bank/ Scheduled Bank** which shall be valid for a period of **3 (three) months** from the date of submission of tender.
  - b) **Cost of tender** as mentioned in the Para 2 above. The Cost of tender money shall be payable in favour of *Chief Executive Officer NRDA*, in the form of a **Bank Draft payable at Raipur drawn from a nationalized bank/ Scheduled Bank** which shall be valid for a period of **3 (Three) months** from the date of submission of tender.
8. Tenders shall be submitted at the address below on or before due date. Tenders received after the due date or time for tender submission (Late tenders) will either not be accepted or if inadvertently accepted, will not be opened and shall be rejected and returned back to the tenderer subsequently.
9. (a) NRDA reserves full rights to reject any or all the tenders without assigning any reason, and to seek any further information from the tenderers. The selection shall be at the entire discretion of NRDA and the NRDA's decision in this respect shall be final and binding. Further NRDA reserves right to split the contract in two or more parts. This shall be at the entire discretion of NRDA and NRDA's decision in this matter shall be final and without appeal.  
(b) The competent authority on behalf of NRDA does not bind himself to accept the lowest or any other tender, and reserves to himself the authority to reject any or all of the tenders received without the assignment of a reason. All tenders in which any of the prescribed conditions is not fulfilled or any condition including that of conditional rebate is put forth by the tenderer, shall be summarily rejected.

Signature of Contractor.....

Signature of NRDA.....

10. Tenders shall be valid for 90 (Ninety) days from the last date of submission of the tender. NRDA will not be responsible for any costs or expenses incurred by Tenderers in connection with the preparation or delivery of Tenders. If any tenderer withdraws his tender before the said period or issue of letter of acceptance/intent, whichever is earlier, or makes any modifications in the terms and conditions of the tender which are not acceptable to the NRDA, then the NRDA shall, without prejudice to any other right or remedy, be at liberty to forfeit entire amount of Earnest Money as aforesaid.
11. Pre tender meeting with the tenderers will be held as mentioned above in the Office of **Chief Executive Officer**, NRDA, Raipur. Tenderers are advised to participate in the pre-tender meeting. The intending tenderers are advised to send their queries to NRDA either by post or by email to [ceo@navaraipur.com](mailto:ceo@navaraipur.com) and [cee@navaraipur.com](mailto:cee@navaraipur.com) upto the date mentioned in the Para 2 as above.
12. **Clarification/ amendments, if any shall be uploaded on website only.**
13. Period for completion of work as mentioned above at Para 2 is inclusive of rainy season.
14. Approved hard copy of the standard document is available in the office of the employer and could be seen on any working day during office hours at the following address:-  
**Chief Engineer (Engg), NRDA**  
**Opp. Police Station, Near Water Tank, VIII, New Rakhi,**  
**Naya Raipur-492002, Phone: 0771-4066189**
15. The intending tenderers are advised to cross check the downloaded version of the tender document with the hard copy available with NRDA.
16. In case of any discrepancy between the downloaded tender and the approved hard copy, the approved hard copy shall hold good for contractual as well as legal purposes.
17. Tenderers are advised to inspect and examine the site and its surroundings and satisfy themselves before submitting their tenders, as to the nature of the ground and sub-soil (so far as is practicable), the form and nature of the site, the means of access to the site, the accommodation they may require and in general, shall themselves at their own cost obtain all necessary information as to risks, contingencies and other circumstances which may influence or affect the execution of work and shall incorporate the cost of such effects while quoting the tender, A tenderer shall be deemed to have full knowledge of the site whether he inspects it or not and no extra charges consequent on any misunderstanding or otherwise shall be allowed, The tenderer shall be responsible for arranging and maintaining at his own cost all materials tools & plants, water, electricity, access facilities for workers and on all other services required for executing the work unless otherwise specifically provided in the contract documents. Submission of tender by a tenderer implies that he has read this notice and all other contract documents and has made himself aware of the scope and specifications of the work to be done and local conditions and other factors having a bearing on the execution of the work.
18. Canvassing whether directly or indirectly, in connection with tenders is strictly prohibited and the tenders submitted by the contractors who resort to canvassing will be liable to rejection.
19. The successful tenderer shall be required to execute an agreement on a non judicial stamp paper of appropriate value with the **Chief Engineer (Engineering), NRDA** in the Proformas annexed to the tender document, within 7 days of the issue of letter of acceptance/ award by the NRDA. The cost of non judicial stamp paper shall be borne by contractor. In the event of failure on the part of the successful tender to sign the agreement within 7 days, the entire earnest money will be forfeited and tender shall be cancelled.
20. The successful tenderer, upon issue of letter of acceptance, in addition to execution of an agreement on a non judicial stamp paper of appropriate value, shall also be required to furnish an irrevocable Performance Bank Guarantee of requisite amount to the **Chief Engineer (Engineering), NRDA** in the Performa annexed to the tender document, within 7 days of the issue of the letter of acceptance /award of Tender by the NRDA. In the event of failure on the part of the successful tenderer to furnish the Performance Bank Guarantee within 7 days, the earnest money will be forfeited and tender shall be cancelled.

Signature of Contractor.....

Signature of NRDA.....

21. This Notice Inviting Tender shall form a part of the contract document. In accordance with clause 1 of the contract, the letter of acceptance/ award shall be issued in favour of the successful tenderer/ contractor. After submission of the performance guarantee, by the contractor, the General arrangement drawings and other details for commencement of work shall be issued. The contract shall be deemed to have come into effect on issue of communication of letter of acceptance of the tender. On such communication of acceptance, the successful Tenderer/ Contractor shall, within 7 days from such date, formally sign the agreement consisting of:-
- PART ONE of the Tender documents along with detailed NIT as issued to the contractor at the time of invitation of tender and acceptance thereof together with any correspondence leading thereto and
  - PART TWO of the Tender document i.e. "General conditions of contract duly modified / corrected to the extent as specified under PART ONE (though not issued to the contractor but always available for inspection on written demand at the office of the officer inviting tenders specified under Schedule F of PART ONE of the Tender Document) and deemed to have been consulted, inspected, understood and considered by the tenderer before quoting and submitting his tender.
  - Agreement signed on non-judicial stamp paper of appropriate value as per prescribed proforma of tender documents.
22. **GCC is available as a standard NRDA Publication and can also be downloaded free of cost from the NRDA web site under title "General conditions of contract" for Contractors in construction Contracts" However contractors are advised to refer to PART ONE of the tender document carefully and thoroughly for corrections/ modifications in the "General conditions of contract" Standard form NRDA F-2/3 is also available for inspection in the office of the Engineer in charge on written demand from contractors. Link site [http:// nayaraipur.com/documents/gcc.pdf](http://nayaraipur.com/documents/gcc.pdf)**
23. While submitting the tender the contractor shall clearly and legibly write his full mailing address including PIN code, Telephone/ mobile no./ Fax Numbers/ e-mail address etc for communication purposes and shall inform the Engineer in Charge about any change from time to time in his postal/ mailing address. The communication shall be dispatched only at the contractor's such latest informed address and NRDA shall in no way be responsible for non-receipt of correspondence by the contractor.
24. It is found that the contractor has misrepresented that facts or has attempted to secure or has secured the work by misrepresenting the facts or by submitting false or forged documents then the Entire Earnest Money submitted by the contractor and or the Performance Guarantee and/ or the Security Deposit as the case may be, shall be liable to be absolutely forfeited and such contractor/ individuals shall also be liable to be prosecuted for cheating/ forgery/ fraud etc as per law.
25. **Bill of quantities is enclosed with tender document, the rate shall be quoted against each item separately in figures as well as in words**

During price Tender evaluation, the Employer will correct arithmetical errors on the following basis:

- if there is a discrepancy between words and figures, following procedure shall be followed:
  - the unit price which correspond to the total price for the item worked out by the Tenderer shall be followed;
  - If the total price of an item is not worked out by the Tenderer or it does not correspond with the rates written either in words or figures then the rate quoted by the Tenderer in words shall be taken as correct.
- 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;
- 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.
- The unit wise amounts will be rounded to the nearest rupee

Signature of Contractor.....

Signature of NRDA.....

- e) The tendered rates of items against which no rate or price is entered by the tenderer will be taken as zero and the price of the same shall be deemed to have been covered by the rates/amount quoted in other items.
26. The tender document shall be written legibly and free from erasure, overwriting or conversion of figure. Any correction where unavoidable shall be made by crossing out, rewriting and attestation by the tenderer.
27. All royalties be paid by the contractor as also all tolls, duties, local and other levies including sales tax, insurances & workman compensation act etc.
28. Contractor will be bound to follow CG Model rules relating to its water supply & sanitation in labour camp.
29. The contractor shall pay not less than the minimum wages to labours engaged by him on the work.
30. Department reserves the right to take up the work departmentally or to award any work on contract in the vicinity without prejudice to the terms of contract.
31. If the rate quoted by the lowest (L1) of the tenderer is considered unbalanced (in relation to the Department's estimate of cost of work to be performed under the contract) by the CEO, NRDA, then tenderer shall submit detail price/rate analysis of major items of the work within 7 days of such notice so as to demonstrate the internal consistency of these price/rate(s) with his quoted price/rate(s). After evaluation by tender sanctioning authority CEO, NRDA may require the tenderer to submit additional Security upto 5% of the estimated cost put to tender for the performance of the agreement in the shape of F.D. Or a BG receipt in favor of the CEO, NRDA before signing of the agreement, which shall be refunded along with the normal S.D. after Completion of work. If he fails to complete the work or leave the work in complete, this 5% additional SD, shall also be forfeited by the department, in addition to other provision of the contract & the agreement shall be terminated and action shall be taken in accordance of relevant contract clause of the agreement.
32. **Important Instructions to Tenderers** :The tenderers who have down loaded the tender documents from the web site, should read the following important instructions carefully before actually quoting the rates & submitting their tender on the tender document downloaded from the web site:
- a) The tenderer should see carefully & ensure that all the pages of PART ONE (NRDA F-1) of the tender document including schedule of quantities of items of work (NRDA F-1 Schedule-A) has been down loaded properly & completely.
- b) The printout of the downloaded tender document shall be taken on A-4 size plain white paper only & the printer settings shall be dept to ensure that the downloaded document is printed in the same manner and pattern/ setting as appearing on the web site & there is no change in the formatting, number of paras etc.
- c) The tenderer should ensure that no page in the down-loaded tender document is missing and all pages in the down-loaded tender document as printed are legible & clear & are printed on a good quality paper.
- d) The tenderer should ensure that every page of the down-loaded tender document is signed by tenderer himself.
- e) The tenderer should ensure that the down loaded tender document is properly bound and wax sealed before submitting the same in the envelope. **Loose/ Spiral binding** shall be liable to be rejected.
- f) In case of any correction/ addition/ alteration/ omission in the downloaded tender document Vis a Vis that in the **Standard DRAFT Tender Document** available in the office of NRDA, it shall be liable to be rejected.
- g) The tenderer shall furnish a declaration to this effect that no addition/ deletion/ corrections have been made in the downloaded tender document being submitted by him and it is identical to the tender document appearing on the Web-site and with the **Standard DRAFT Tender Document** available in the office inviting the tenders.

Chief Executive Officer, NRDA

Signature of Contractor.....

Signature of NRDA.....

Near DKS Bhawan, Old Mantralaya,  
Raipur 492 001 Chhattisgarh  
Phone No (0771) 4066011, 4268643.

Signature of Contractor.....

Signature of NRDA.....



# **SCHEDULE– D**

## **Section-I**

## **Technical Tender Forms**

## **Schedule-D**

### **Section I - Tender Forms Technical**

This Section contains the forms which are to be completed by the Tenderer and submitted as part of his  
PART ONE (NRDA F-1).

#### **Table of Forms**

LETTER OF TECHNICAL TENDER.....	2
TENDERER'S INFORMATION SHEET .....	4
ANNUAL TURNOVER .....	5
SPECIFIC CONSTRUCTION EXPERIENCE .....	6
DECLARATION ON DOWNLOADED TENDER DOCUMENT.....	7
CHECK LIST FOR TECHNICAL TENDER EVALUATION.....	8
AFFIDAVIT OF CORRECT INFORMATION.....	10

Signature of Contractor.....

Signature of NRDA.....

## (i) Letter of Technical Tender

Date: \_\_\_\_\_

NIT No.: \_\_\_\_\_

To:

Chief Executive Officer,  
NRDA, Near DKS Bhawan, Old Mantralaya, Raipur 492 001,  
Chhattisgarh.

Ref for NIT no:-----

**Subject:** Name of the work:- -----

Dear Sir,

I/We, the undersigned, declare that:

- (a) I/We have examined and have no reservations to the Tender Document, including Addendum if any, minutes of meeting, clarification to the queries etc.
- (b) I/We offer to execute the subjected under in conformity with the Tender Documents and the addendums.
- (c) I/We have satisfied ourselves as to the location of the site and working conditions, examined the requirements of NRDA and have obtained all the information necessary for the successful and timely completion of the work.
- (d) I/We have submitted the Earnest Money Deposit as specified in the tender document which will not bear any interest and shall be subjected to forfeited on following defaults.
  - (i) if we withdraw our Tender during the period of tender validity as specified in Detailed NIT Para 9 or
  - (ii) if we fail to:
    - furnish a Performance Security in accordance with Detailed NIT Para 19 or
    - sign the Contract in accordance with Detailed NIT Para 18; or
    - Accept the correction of its Tender Price pursuant to Detailed NIT Para 24.
  - (iii) If we have given the false documents in support of qualification with the technical tender.
- (e) My/Our Tender shall be valid for a period of 90 days from the date fixed for the tender submission deadline in accordance with the Tender Document, and it shall remain binding upon us and may be accepted at any time before the expiration of that period;
- (f) If my/our Tender is accepted, we commit to obtain a Performance Security in the amount as specified in the tender document for the due performance of the Contract and sign the agreement;
- (g) I/We are not participating, as Tenderers, in more than one Tender in this Tendering process, in accordance with the Tender Document;
- (h) My/our firm, its affiliates or subsidiaries, including any subcontractors or suppliers for any part of the Contract, has not been declared ineligible by NRDA, Raipur;

Signature of Contractor.....

Signature of NRDA.....

- (i) I/We understand that this Tender, together with your written acceptance thereof included in your letter of acceptance, shall constitute a binding contract between us, until a formal Contract is prepared and executed;
- (j) I/We understand that you are not bound to accept the lowest evaluated tender or any other tender that you have received.
- (k) I/We hereby pay the Earnest Money Deposit of required amount in the form of a demand draft on a nationalized bank/ Scheduled Bank (-----Bank Name and address) and operatable at Raipur in favour of the 'Chief Executive Officer, NRDA, Raipur' for the said amount and is attached.
- (l) I/We hereby declare that, the entire work including Addendum/ Corrigendum, if any, shall be completed in all respect within the time limit specified in the NIT.
- (m) I/We here by authorize the Employer to get all bank guarantee verified and got confirmed from concerned Bank.

Signature: -----

Signed by: -----(Name)

Designation: -----

For and on Behalf of -----(Name of Tenderer)

Date:

## (ii)Tenderer's Information Sheet

Tenderer's Information		
<b>Tenderer's legal name</b>		
<b>Tenderer's legal address</b>		
<b>Tenderer's authorized representative</b> (name, address, telephone numbers, fax numbers, e-mail address)	Name:	Address:
	Telephone : Fax :	E-Mail:
<b>Tenderer's details of Incorporation</b>	Place of incorporation/ registration:	Year of incorporation:
<p><b>Attached are copies of the following original documents.</b></p> <p><input type="checkbox"/> 1. Articles of incorporation or constitution of the legal entity named above.</p> <p><input type="checkbox"/> 2. In the case of government-owned entity, documents establishing legal and financial autonomy and compliance with commercial law.</p>		

### Details of the office closest to Raipur (if available)

1.	Address of Office	
2.	Telephone :	Contact :
3.	Fax :	E-Mail :

Signature of Tenderer

Date:\_\_\_\_\_

Signature of Contractor.....

Signature of NRDA.....

### (iii) Annual Turnover

Annual Turnover Data for the Last 3 Years			
Year	Amount and Currency	Exchange Rate if any	INR Equivalent
2010-11			
2011-12			
2012-13			
Average Annual Turnover for the last 3 years in INR			

All Tenderers are requested to complete the information in this form

The information supplied should be the Annual Turnover of the Tenderer in terms of the amounts billed to clients for each year for contract in progress or completed, converted to INR at the rate of exchange at the end of the period reported.

As a proof of the above, the contractor shall submit the copies of the balance sheet for last three years along with audited profit & loss statement duly signed by the chartered accountant.

Signature of Tenderer

Date: \_\_\_\_\_

Signature of Contractor.....

Signature of NRDA.....

### (iv) Specific Construction Experience

Fill up one (1) form per contract.

Details of Contract			
Contract No . . . . . of . . . ...	Name of work		
Award Date		Completion Date	
Role in Contract	<input type="checkbox"/> Contractor	<input type="checkbox"/> Sub-contractor	
Total Contract Amount	INR		
Employer's Name Address Telephone/Fax Number E-mail			
Description of the work executed			

**Note:** Attach copies of work order and satisfied completion certificates in support of each quoted experience. The completion certificate should be signed by the officer not below the rank of concerned Executive Engineer in case of Government department or in the rank of General Manager in case of public sector/private sector as the cases may be.

Signature of Tenderer

Date:\_\_\_\_\_

Signature of Contractor.....

Signature of NRDA.....

## (v)DECLARATION ON DOWNLOADED TENDER DOCUMENT

### (TO BE SIGNED BY THE TENDERER SUBMITTING THE TENDER ON DOWNLOADED TENDER DOCUMENT)

I/We hereby declare and certify that:

1. I/We are submitting the tender in the tender document downloaded by me /us from the website & we certify that there is no change in formatting, numbering of pages etc. In the downloaded documents.
2. I/We are submitting the tender in the tender document which is exactly similar and identical to the one available on the website and also as available with the officer inviting tenders.
3. I / We have not made any modifications / corrections / additions / omissions etc in the tender documents downloaded from web by me / us.
4. I / We have checked that no page in the downloaded tender document is missing and all the pages as per web site are available & that all the pages of tender document submitted by us are clear & legible.
5. I / We have signed (with stamp) all the pages of the tender document before submitting the same.
6. I / we have wax sealed the tender documents properly before submitting the same.
7. I / We have submitted the application for issue of tender documents on the prescribed format separately along with the cost of tender documents and also the attested Xerox copies of the eligibility documents prescribed for respective work in the NIT.
8. I / We have read carefully & understood the entire Tender document including important instructions to the tenderers submitting the downloaded tender.
9. In case at any stage whatsoever at a later date it is found/ revealed that there is a difference in our downloaded tender documents from the original **Standard DRAFT Tender Document**, NRDA shall have the absolute right to take any action as deemed fit without any prior intimation to me / us.
10. In case at any stage whatsoever at a later date it is found that there is difference in our downloaded tender document from the Standard DRAFT Tender Document, we clearly understand that our work shall be liable to be cancelled and Earnest Money/ Performance Guarantee / Security deposit etc all are liable to be forfeited by NRDA and in such an eventuality I / We shall have no right or claim for any damages / compensation from NRDA on this account. Further in such case I / We may also be debarred by NRDA for further participation in the tendering in the concerned NRDA & be removed from the approved list of contractors of NRDA.

Dated.....

(TENDERER)  
(SIGNATURE WITH SEAL/ STAMP)



## (vi) CHECK LIST FOR TECHNICAL TENDER EVALUATION

Name of the Agency:																			
S. No	Document	Details	Enclosed at annexure																
			Page No																
			From	To															
1	Tender Document Cost	<b>Downloaded from NRDA Website</b> <b>Details of DD</b> <table border="1"> <tr> <td>Amount</td> <td colspan="2"></td> </tr> <tr> <td>Name of the Bank &amp; Branch</td> <td colspan="2"></td> </tr> <tr> <td>Date</td> <td colspan="2"></td> </tr> <tr> <td>D.D no &amp; Photo copy attached</td> <td>Yes</td> <td>No</td> </tr> </table>	Amount			Name of the Bank & Branch			Date			D.D no & Photo copy attached	Yes	No					
Amount																			
Name of the Bank & Branch																			
Date																			
D.D no & Photo copy attached	Yes	No																	
2	Earnest Money Deposit (EMD)	<table border="1"> <tr> <td>Amount</td> <td colspan="2"></td> </tr> <tr> <td>Form of EMD</td> <td colspan="2"></td> </tr> <tr> <td>Issuing Bank &amp; Branch</td> <td colspan="2"></td> </tr> <tr> <td>No &amp; Date Photo copy attached</td> <td>Yes</td> <td>No</td> </tr> </table>	Amount			Form of EMD			Issuing Bank & Branch			No & Date Photo copy attached	Yes	No					
Amount																			
Form of EMD																			
Issuing Bank & Branch																			
No & Date Photo copy attached	Yes	No																	
1	Contractor Registration Certificate	<table border="1"> <tr> <td>Class in which registered</td> <td colspan="2"></td> </tr> <tr> <td>Name of Department</td> <td colspan="2"></td> </tr> <tr> <td>Registration Number &amp; Date</td> <td colspan="2"></td> </tr> <tr> <td>Validity</td> <td colspan="2"></td> </tr> <tr> <td><b>Notarized</b></td> <td colspan="2"><b>Yes/No</b></td> </tr> </table>	Class in which registered			Name of Department			Registration Number & Date			Validity			<b>Notarized</b>	<b>Yes/No</b>			
Class in which registered																			
Name of Department																			
Registration Number & Date																			
Validity																			
<b>Notarized</b>	<b>Yes/No</b>																		
4	Commercial Tax Certificate	<table border="1"> <tr> <td>Registration Number:</td> <td colspan="2"></td> </tr> <tr> <td>Name of the Office</td> <td colspan="2"></td> </tr> <tr> <td><b>Notarized</b></td> <td colspan="2"><b>Yes/No</b></td> </tr> </table>	Registration Number:			Name of the Office			<b>Notarized</b>	<b>Yes/No</b>									
Registration Number:																			
Name of the Office																			
<b>Notarized</b>	<b>Yes/No</b>																		
5	Average Annual Turnover in Lacs	<table border="1"> <tr> <td>2009-2010</td> <td colspan="2"></td> </tr> <tr> <td>2010-2011</td> <td colspan="2"></td> </tr> <tr> <td>2011-2012</td> <td colspan="2"></td> </tr> <tr> <td colspan="3">Chartered accountant certificate in original or photo copy duly notarized can be submitted</td> </tr> </table>	2009-2010			2010-2011			2011-2012			Chartered accountant certificate in original or photo copy duly notarized can be submitted							
2009-2010																			
2010-2011																			
2011-2012																			
Chartered accountant certificate in original or photo copy duly notarized can be submitted																			

Signature of Contractor.....

Signature of NRDA.....

<b>Name of the Agency:</b>				
S. No	Document	Details	Enclosed at annexure	
			Page No	
			From	To
6	Details of the projects/works completed as pre-qualification criteria	Name of the Work		
		Work Completed	Yes/No	
		Cost of the Project		
		Certificate Enclosed	Yes/No	
		<b>Notarized</b>	Yes/No	
		Name of the Work		
		Work Completed	Yes/No	
		Cost of the Project		
		Certificate Enclosed	Yes/No	
		<b>Notarized</b>	Yes/No	

Note: The above check list only provides for those documents which are mandatory for the tender pre-qualification criteria. Tenderers are required to append, other documents also with the technical tender as required in the detailed NIT or elsewhere in the PART ONE (NRDA F-1).

Signature of Tenderer

Date: \_\_\_\_\_

Signature of Contractor.....

Signature of NRDA.....

## Format for Affidavit of Correct Information

[Rs.100/- (Rupees Hundred only) Stamp Paper duly notarised]

To,

**Naya Raipur Development Authority**

Near Mantralaya Mahanadi Dwar,

Raipur 492 001, CHHATTISGARH

With reference to the documents submitted to NRDA, we hereby undertake that other than the details provided under Lit Form 1, Section III of Volume I of the bid document, we have no dispute/ litigation/ legal proceedings against any of our clients, in any of our projects other than the listed.

All documents and information submitted in Technical Tender (including the above undertaking) are certified to be accurate, correct and final. In the event that any of the documents or information submitted by us is found to be in-accurate/ incorrect/ misleading, we understand that our Tender is liable to be cancelled or if contract is awarded, contract is liable to be terminated, without prejudice to any of the rights of NRDA, which otherwise may be accruable to NRDA.

I also undertake that I will furnish all other documents required under the Tender document (clause 33 of ITT) or contract, after signing the agreement during execution of work.

Signature of Tenderer

Date: \_\_\_\_\_

Signature of Contractor.....

Signature of NRDA.....

**SCHEDULE– D**  
**Section-II**  
**Scope of work**

## WORKS REQUIREMENT

**This section contains the brief idea of scope of work, supplementary information drawings etc. regarding the work to be executed under instant tender, may vary as per site requirement. In case of any change the decision of Engineer-in-charge will be final and binding to the contractor. The work however shall be executed as per BOQ and working drawings.**

This Section contains the Scope of Works, Specifications of Work, Supplementary Information, and Drawings that describe the works to be executed. It is strongly recommended that the bidders physically visit the site of the proposed works before bidding in order to assess the quantum and nature of works.

SCOPE OF WORK : The Scope of work shall include, but not limited to;

- A) Item Rate Works
- B) Turnkey Works
- C) Operation and Maintenance
- D) Training
- E) Taking over
- F) Defect Liability Period

### Scope of Work

#### PROJECT OBJECTIVE

Naya Raipur Development Authority wishes to develop the city of Naya Raipur with state of art type of features and is aiming to provide world class facility in the region.

The project, being green field development, necessitates the construction of totally new infrastructure systems. According to the development plan of Naya Raipur, the new capital city will have its own water supply and distribution, sewerage, storm water drainage and solid waste management systems in line with the planning and development norms with the appropriate agencies, as applicable.

#### TIME OF COMPLETION

Time of completion of all the works shall be **24months (inclusive of moonsoon period)** from the date of issue of notice to commence.

Signature of Contractor.....

Signature of NRDA.....

## SCOPE OF WORK

The scope of work includes “Development of Sewerage collection, Treatment, and Reuse system including Operation and Maintenance for Zone 1, 2, 3 & specified area at Naya Raipur” with the following Works for the specified components on item rate and turnkey basis as detailed below:-

Description of Works	Tender Basis
<b>Part A:</b> Sewerage collection system and conveyance of recycled treated sewage effluent system	
a) Survey, Investigation, Design, Supply, installation, testing, and commissioning of 77kms of sewerage collection networks having diameters ranging from 290mm to 1200mm with manholes having depths ranging up to 6.0m as per the design along with the allied items & works. b) Survey, Investigation, Design, Supply, installation, testing, and commissioning of rising main of 36kms PN10 rating, HDPE pipe made of PE 100 grade for distribution of treated sewage effluent.	Item Rate Works
<b>Part B:</b> Sewage Treatment Plant, Treated Sewage Effluent Pumping Station and all other Civil works	
Survey, Investigation, Design, Supply, Construction, Erection, testing, training, 3 months Trial run and commissioning of following capacity of Sewage treatment plant based on Sequential Batch Reactor Technology with tertiary treatment for reuse including Approach road, internal roads, pathway, storm water drain, utility ducts, administrative block, Laboratory, toilet block, Staff qtrs., Landscaping and Gardening, internal lighting and external street lighting, Substation all complete as per the requirement detailed in the specification. a) <b>Sewerage Zone 1:</b> STP capacity of 10.0mld in Phase 1 extendable up to 23.5mld in Phase 2; Tertiary treatment for reuse capacity 10.0mld in Phase 1 extendable up to 23.5mld in Phase 2; Construction of sewage pumping station and wet well ; Construction of treated Sewage Effluent Pumping Station and storage reservoir etc.; Providing and fixing of Electro-mechanical works. b) <b>Sewerage Zone 2:</b> STP capacity of 10.0mld in Phase 1 extendable up to 25.3mld in Phase 2; Tertiary treatment for reuse capacity 10.0mld in Phase 1 extendable up to 25.3mld in Phase 2 ; Construction of sewage pumping station and wet well ; Construction of treated Sewage Effluent Pumping Station and storage reservoir etc. ; Providing and fixing of Electro-mechanical works. c) <b>Sewerage Zone 3:</b> STP capacity of 7.0mld in Phase 1 extendable up to 20.4mld in Phase 2; Tertiary treatment for reuse capacity 7.0mld in Phase 1 extendable up to 20.4mld in Phase 2; Construction of sewage pumping station and wet well ; Construction of treated Sewage Effluent Pumping Station and storage reservoir etc.;Providing and fixing of Electro-mechanical works.	Turnkey Works
<b>Part C:</b> Operation and maintenance	
a) Operation, maintenance and successful defect liability period of 60months for part A works. b) Operation, maintenance and successful defect liability period of 60months for part B works.	Turnkey Works (However the payment shall be made on monthly basis as per details given in clause 6 of GCC )

### (a) Part A: Item Rate Works

#### 1. Preamble

Signature of Contractor.....

Signature of NRDA.....

This is a Contract for Survey, Investigation, design, supply, construction, operation and maintenance of a sewage collection system and Treated sewage effluent Rising main for Naya Raipur City. The Employer has carried out surveys, investigations and preliminary designs of important components. Suitable locations of Sewage treatment plant have been finalized and the required land identified and acquired or being acquired. The details of the same have been presented in the subsequent subsections and elsewhere in the document. The main parameters and specifications decided upon and laid out in the document are to be honored and maintained. However, detailed design and preparation of working drawings are required to be done before construction and procurement commences, and form a part of the Contractor's responsibility. The Contractor is responsible for ensuring that the Project when commissioned fulfills the objectives for which it has been designed. The Contractor is required to double check the stipulations, surveys, investigations and design of the system independently. He may propose upgrades where he feels that a change is required to achieve the objectives.

It is the intent of the Employer to construct a facility using the highest standards for construction and supply of Plant and equipment to enable a sustained, reliable system for performance over next 50/100 years.

## **2. General Scope of Work**

The scope of work under this Contract includes the design and construction of all Works for the sewerage system as described in subsequent paras, sufficient to collect the sewage, and other works listed herein or any other works necessary to achieve the above objective and complete the system as per the specifications and Employer's Requirements, including operation and maintenance of the entire system for 5 years.

A 11 KV electric power feeder shall be made available to contractor within 200 meters of campus boundary. The contractor shall have to make his own arrangements for carrying the 11 KV main, inside boundary and for construction of electric sub stations of 11/0.44 capacity as per requirement. The connection at take-off structures with necessary equipment (such as insulators, ACSR, hardware, clamps and connectors etc.) shall be in the scope of Contractor.

Generally the following activities shall be carried out for each component of this Contract, but shall not be limited to:

### **(a) Investigations, Surveys and Submissions**

- (i) Setting up fully equipped/staffed field offices to carry out the required surveys and investigations and preparing the necessary designs and drawings at the very start of the Contract. The design offices shall interact with the Employer's staff to ensure team work for early submission and approval of the design and drawings required.
- (ii) Carrying out necessary topographical survey/sub soil investigations for sewage collection system, in consultation with the Employer's Representative so as to verify and check the data provided in the document.
- (iii) Carrying out required subsoil investigations for design of foundations including the tests for determination of safe load. Carrying out various other subsoil investigations such as the type of soil, the strata, and the level of ground water, optimum moisture content, soil resistivity and chemical composition, bearing capacity, etc., as may be required.
- (iv) Carrying out required raw water quality analysis if required.
- (v) Preparation of system designs where required (e.g. sewage collection system) for

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approval of the Employer's Representative. The alternate proposal shall be included in the offer.

- (vi) Planning, design and preparation of the working drawings for the proposed Works. Preparation and submission of the L-sections, layout plans and cross sections and conceptual drawings etc. and all other drawings at appropriate scale and details for planning and construction of all components of the project.
- (vii) Submission of documents (designs, drawings, data sheets, etc.) and samples required according to the Contract for approval by the Employer's Representative of all design and drawings, material to be used, equipment specifications, etc., prior to construction.
- (viii) Preparation and submission of Drawing of all structures proposed to be constructed for approval.
- (ix) Preparation of the structural design and drawings (including reinforcement detailing) for all the Works taking into consideration the functional reliability and structural safety of the buildings.
- (x) Preparation and submission of all detailed working drawings on the basis of conceptual designs and plans approved by the Employer's Representative.

**(b) Works**

- (i) Setting up of suitably equipped/manned field offices for supervision of the works for the Contractor's staff and the Employer's Representative and Engineers.
- (ii) Development of suitable storage spaces for construction material and equipment to be received for the works.
- (iii) Identification of suitable quarries/sources for construction material and get them approved from the Employer's Representative.
- (iv) Setting up, and staffing with qualified engineers/ technicians, of suitable laboratories for following the Quality Assurance Program.
- (v) Setting up of suitable labour camps with all water and sanitation arrangements and other facilities required under the relevant Labor laws.
- (vi) Implementation of all the environmental and relevant social mitigation measures as required.
- (vii) Making arrangements for equipment and material required for maintaining safety of the sites and the workmen on site (helmets, boots, jackets, safety belts, gloves, scaffolding, barricading, etc.)
- (viii) Submission of initial work program and updating the same every month for approval by the Employer's Representative.
- (ix) Site clearance and levelling of site. Layout of the works as per the approved drawings.
- (x) Disposal of surplus soils as directed by Employer's Representative, construction of civil components of all the units, and maintaining the construction site in orderly manner.
- (xi) Carrying out tests on materials received and finished works and maintaining complete records and registers required on site.
- (xii) Manufacturing, shop testing, pre-dispatch inspection, packaging, transportation to site, providing transit insurance, storage, handling at site, installation, sectional

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testing, pre-commissioning testing, trial runs and commissioning of all components of the system including the pipes, fittings, hydraulic, mechanical, electrical, electro-mechanical and instrumentation equipment.

- (xiii) Providing spares, tools and tackles.
  - (xiv) Remedying the defects during the Contract period
  - (xv) Site Clearance and tidying up and restoration of the premises after completion of the Works
  - (xvi) Submission of 'As Built' drawings and Operation and Maintenance Manuals
- (c) **Operation and maintenance, preventive maintenance and repair of complete system for 60 months.**
- (d) **Training of the NRDA staff on all aspects of Operation and maintenance of the full system.**
- (e) **Handing over of the full system at the end of the O&M Period to NRDA.**

### 3. **System Components**

The project contemplates execution and satisfactory commissioning of Underground Sewerage System for the Naya Raipur City and the major components of the system are:

#### (a) **Collection & conveyance System**

Survey, Investigation, Design, Supply, installation, testing, and commissioning of 77kms of sewerage collection networks having diameters ranging from 290mm to 1200mm with manholes having depths ranging up to 6.0m as per the design along with the allied items & works.

**Diameter wise abstract of pipelines:** The quantity given in the BOQ is tentative. The final length of sewers to be laid may vary at the time of design and execution.

Contractor should follow following criteria/norms while designing sewage collection system.

#### I. **General**

This system design shall be essentially based on design criteria based on present practice as spelt in the manual on sewerage and sewage treatment published by CPHEEO, manuals and codes of other nations, studies reported in literature and papers in journals etc. Where possible, changes may be suggested to evolve a more efficient design to effect economy in cost, within the constraints of an acceptable performance level for individual components and without comprising engineering.

#### II. **Design Year**

The design for wastewater system shall be done for 30 years.

#### III. **Design Flow**

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The design flow shall be based on the wastewater expected to be generated in the year 2041 and would include wastes from domestic use in residential, commercial and institutional areas and non domestic use in industrial areas and infiltration.

Avg. dry weather flow [Q avg.] per manhole = {Population [ P ] X Sewerage Flow (Water Supply [lpcd] X Expected Sewer 80 % as per CPHEEO manual page No. 39 point 3.2.4)} + Infiltration 5% of flow.

= P x (135 lpcd X 0.80) + Infiltration 5% of flow.

= (P x 108lpcd)+ Infiltration 5% of flow.

#### IV. Per Capita Wastewater Flow

For the purpose of design the wastewater generated shall be estimated considering population and water supply rate as 135lpcd for domestic use and as per detailed calculations available with NRDA. The sewage generation may be assumed as 80% of the water supply to reach the sewers.

#### V. Rate of Infiltration

The infiltration allowance may be considered as 250lpcd/manhole.

#### VI. Peak Factor

The peak factor for the purpose of sewer design may be taken as 2.25 as per recommendations of CPHEEO manual based on contributory population. As pipes deteriorate with age, a roughness coefficient shall be assumed for the design period assuming fair condition in sewers as per CPHEEO Manual.

#### VII. Design of Collection System

Manning's formula may be adopted for the design of sewers.

Q = A X  $v_f$

Q = Discharge in cum/sec

$v_f$  =  $1/n R^{2/3} S^{1/2}$  given that Where

$v_f$  = Velocity when pipe flows full in mps.

A = Cross sectional area of pipe in sqm.

n = Manning's roughness coefficient when pipe flows full

R = Hydraulic radius.

S = Slope of energy gradient

#### VIII. Design Aspects

Sewers are to be designed to carry estimated peak flows generated in the year 2042 and to run partially full at all flows. The pipes designed to flow at depths where the maximum permissible depth of flow in sewers for established velocity criteria shall be tabulated. From considerations of ventilation in wastewater flow, sewers shall be designed to flow partially full at ultimate peak flow. To ensure that deposition of suspended solids does not take place, minimum self-cleansing velocities to be attained once in a day need to be considered in the design of

sewers. The minimum partial velocities during peak flow suggested are 0.8 m/s and the maximum velocity 3.0 m/s. This velocity is adequate to keep a wide range of particles encountered in the wastewater system in suspension.

**IX. Pipe Material for Collection System**

DWC HDPE pipe class SN8, with joints are proposed for sewers as those are proven.

**Sulphate Resistance Cement shall be used for the construction of manholes for sewerage system.**

**X. Other Aspects**

**XI. Minimum size of sewers**

The minimum size of sewers may be adopted is 295 mm diameter for analysis and identification of proposed sewers under this study, along the major roads.

**XII. Minimum depth of cover**

The minimum depth of cover on sewers shall be as 1.0 meters.

**XIII. Recommended Maximum Depth of Flow in Pipes**

All sewers shall be designed to flow 0.8 full at ultimate peak flow.

**XIV. Type of bedding**

Type of bedding for various pipes (first class bedding, concrete cradle etc.) depends on the depth at which the sewer is laid, type of pipes used, load due to backfill and super imposed load. Accordingly, suitable bedding A Class, B Class and C Class for pipes shall be provided.

**XV. Appurtenances**

**XVI. Manholes**

Manholes will be provided at all junctions, change of sewer size, gradient and alignment. The maximum C/C distance between manholes shall be 30 m on a straight run.

The item includes Supplying , Installation testing and commissioning of prefabricated HDPE manhole: Providing, lowering, laying, aligning, fixing in position at all level/ depths High Density Poly Ethylene (HDPE) manhole conforming to EN 13598-2:2009, man entry type of 1000mm diameter for depth specified below, shall be of single wall construction OR modular construction conforming to EN 681-1 with triple safety seal (three side lip/element) made of 100% virgin PE material without recycling or foam content, including connecting the according to EN 681-1 and the manholes shall be safeguarded against uplift pressure with solid horizontal reinforcement ribs of appropriate thickness and with at regular intervals all along the outside of the manhole. The item is inclusive of Excavation,Dewatering,Layerwise backfilling and compaction of granular material ,Provision of corrosion resistant steps at a vertical distance of 25cm.Providing and fixing of FRP Manhole frame and cover with locking

arrangement fitting to 600mm dia manhole openings. Providing and fixing of Precast RCC M35 grade load distribution ring 1050mm OD & 635mmID and designed to handle heavy load as approved by Engineer placed around the neck of the manhole of 150mm thickness including reinforcement. Providing RCC M20 grade concrete thick 200mm slab (Dia 1500mm outer dia and inner dia 635mm) around the manhole below the Precast RCC distribution Ring. Providing and laying Manhole bottom PCC (1:3:6) of 200mm thick and 1.5m dia.

The entire inlet, outlet connections to the manhole shall be complete with all accessories/ fittings, material, labour, jointing materials, testing and commissioning as per detailed specifications, drawings all complete as directed by Engineer in charge.

## XVII. Flushing Arrangements

Flushing arrangements shall be provided to extreme upstream manholes of the systems wherever required. Sudden enlargement depends upon the ratio of diameters. Each individual case needs to be studied from various aspects such as operation of pumps, the specified limits, availability of land required for duplicating the main in future, etc.

### (b) Rising main

The treated sewage effluent from sewage treatment plant and after tertiary treatment is to be pumped for reuse purpose as directed through HDPE pipes of diameter as per BOQ. All design procedure shall be as per CPHEEO manual with relevant IS codes.

## (b) Part B: Turnkey Works

### 1. Preamble

This is a Contract for Survey, Investigation, Design, Supply, Construction, Erection, testing, training, 3 months Trial run and commissioning of following capacity sewage pumping station and Sewage treatment plant based on Sequential Batch Reactor Technology with tertiary treatment for reuse including Approach road, internal roads, pathway, storm water drain, utility ducts, administrative block, Laboratory, toilet block, Staff qtrs., Landscaping and Gardening, internal lighting and external street lighting, Substation all complete as per the requirement detailed in the specification.

#### Sewerage Zone 1:

- i. Construction of sewage pumping station and wet well.
- ii. STP capacity of 10.00mld in Phase 1 extendable up to 23.50mld in Phase 2,
- iii. Tertiary treatment for reuse capacity 10.0mld in Phase 1 extendable up to 23.50mld in Phase 2,
- iv. Construction of treated Sewage Effluent Pumping Station and storage reservoir etc.
- v. Providing and fixing of Electro-mechanical and allied works.

#### Sewerage Zone 2:

- i. Construction of sewage pumping station and wet well
- ii. STP capacity of 10.00mld in Phase 1 extendable up to 25.30mld in Phase 2, Tertiary treatment for reuse capacity 10.00mld in Phase 1 extendable up to 25.30mld in Phase 2.
- iii. Construction of treated Sewage Effluent Pumping Station and storage reservoir etc.
- iv. Providing and fixing of Electro-mechanical and allied works.

### **Sewerage Zone 3:**

- i. Construction of sewage pumping station and wet well.
- ii. STP capacity of 7.00mld in Phase 1 extendable up to 20.40mld in Phase 2, (2) Tertiary treatment for reuse capacity 7.00mld in Phase 1 extendable up to 20.40 mld in Phase 2.
- iii. Construction of treated Sewage Effluent Pumping Station and storage reservoir etc.
- iv. Providing and fixing of Electro-mechanical and allied works.

The Employer has carried out surveys, investigations and preliminary designs of important components. Suitable locations of Sewage treatment plant have been finalized and the required land identified and acquired/ being acquired. The details of the same have been presented in the subsequent subsections and elsewhere in the document. The main parameters and specifications decided upon and laid out in the document are to be honored and maintained. However, detailed survey, investigation, design and preparation of working drawings are required to be done before construction and procurement commences, and form a part of the Contractor's responsibility. The Contractor is responsible for ensuring that the Project when commissioned fulfills the objectives for which it has been designed. The Contractor is required to double check the stipulations, surveys, investigations and design of the system independently. He may propose upgrades where he feels that a change is required to achieve the objectives.

It is the intent of the Employer to construct a facility using the highest standards for construction and supply of Plant and equipment to enable a sustained, reliable system for performance over design period.

## **2. General Scope of Work**

The scope of work under this Contract includes the design and construction of all Works for the Wet well with pumping station, sewerage treatment plant and tertiary treatment plant complete with treated water tank and pumping arrangement complete system on turnkey basis with all related works listed herein or any other works necessary to achieve the above objective and complete the system as per the specifications and Employer's Requirements, including operation and maintenance of the entire system for 60months.

An 11KV electric power feeder shall be made available to contractor within **200 meters of campus boundary**. The contractor shall have to make his own arrangements for carrying the 11 KV main, inside boundary and for construction of electric sub stations of 11/0.44 capacity as per requirement The connection at take-off structures with necessary equipment (such as insulators, ACSR, hardware, clamps and connectors etc.) shall be in the scope of Contractor.

Generally the following activities shall be carried out for each component of this Contract, but shall not be limited to:

### **(a) Site clearance:**

The contractor can take up the works of site clearance and grading and other mobilization works with the permission of the Engineer after award of the contract , however before taking up construction,contractor shall be responsible for preparing and submitting for checking and approval by the Engineer.

### **(b) Topographic Survey:**

The contractor shall carry out detailed topographic survey by setting up fully

equipped/staffed field offices to carry out the required surveys for the proposed feasible location of all the pumping station, treatment plants and preparing the necessary survey drawings at the very start of the Contract. The design offices shall interact with the employer's staff to ensure team work for early submission and approval of the drawings as required.

**(c) Geotechnical Investigations:**

The contractor shall carry out geotechnical Investigation work at the proposed location of treatment plant through a specialist firm, approved by the engineer. The no. of bore holes to be taken, depth of boring etc. shall be decided in consultation with the Engineer-in-Charge. The contractor has to provide the hard and soft copies of the test reports for the parameters such as, the type of soil, the strata, and the level of ground water, optimum moisture content, soil resistivity and chemical composition, bearing capacity, etc., as may be required. If the bearing capacity of the soil found lower than that is mentioned in the soil report provided with the tender document, the lower of the two values shall be considered for design.

**(d) Design of Treatment units**

The contractor shall prepare system designs where required (e.g. Sewage treatment plant, tertiary treatment plant, pumping stations refurbishment, surge protection system, power supply system, automation, local SCADA systems for monitoring and control, communications etc.) for approval of the Employer's Representative.

Sewage treatment plant shall be designed based on Sequential Batch Reactor Technology with tertiary treatment for irrigation usages. The design parameter value given in **Annexure 1** and the guidelines wherever given in bid document shall be adopted for the design of treatment units and mentioned in the latest CPHEEO manual on sewerage and sewage treatment, GoI .

Contractor shall provide his own Concept of SCADA system for the turnkey works for smooth operation and proper monitoring of the system subject to approval by employer.

**(e) Design and Drawing Preparation:**

Preparation of process , hydraulic , general arrangement, piping and structural designs drawings of all units including civil, architectural,electrical,mechanical, plumbing, pumping main and erection drawings and submission of all these designs and drawings for approval of Engineer.

Schedule for designs,drawings and execution, Bar Charts-CPM –Pert network for stage wise activities of construction sewage treatment plant,pumping stations. etc.

During the course of construction and its completion the contractor shall submit the following drawings /documents for civil, Mechanical and electrical works.

- i. Revised drawings and design according to the requirement of engineer.
- ii. Six sets of final and approved drawings and design duly bound.
- iii. Six sets of manual of operation and maintenance of the plant with as built drawings and operation and maintenance document from the equipment manufacturer.

**(f) Layout Plan:**

The layout plan shall be prepared for the entire site showing the location of pumping stations, treatment plant and disposal and reuse pipeline on the basis of process / sizing design indicating sizes of various units with in the area of the site. The minimum distance of the two structures shall be 2.5m and is to be got approved from the engineer.

**(g) Architectural Drawings:**

The architectural drawings for all building and pumping stations shall be prepared and got approved from the engineer.

**(h) Structural Design:**

Civil structural design calculations, reinforcement drawings and details of Bar bending schedule for each unit to be submitted for approval and for execution purpose. Structural design of for all structures shall be done in accordance with the provisions in IS Code. Water Retaining structures and building works shall be designed for M25 grade concrete as per IS Code specification. All the foundations and sub structures shall be designed for submerged or saturated soil condition as the case may be considering the ground water table for design purpose. All the buildings shall be only framed structure and designed as per IS code latest Revision. For relevant concrete grade.

**(i) Electrical and Mechanical design:**

Preparation of design details for electrical and mechanical equipment, technical details of pipes, valves, pen stock gates and other drawings including single line diagram etc. As per specification mentioned under this chapter "Electrical and mechanical Specification"

**(j) Design and Drawings Approval:**

The Contractor shall supply to the Employer's Representative **3 (three) copies** along with soft copies each of the initial design calculations for the process and sizing of all components of the System including architectural, structural, mechanical, electrical and instrumentation equipment, supported by flow diagrams and general arrangement drawings for approval. It is a matter of high priority that the Contractor ensures the submission and finalization of such designs and drawings in the stipulated time schedules as elaborated elsewhere. It is the intention of the Employer to ensure that the approval of such submissions is made expeditiously and in time. The Contractor is therefore required to setup his design office in Naya Raipur (fully equipped and staffed) to enable continuous submission, interaction and timely clearances. **The Employer intends to keep a team of experts / PMC available constantly during the initial six months** to review and comment / approve the submissions expeditiously.

The Employer shall arrange to send observations if necessary **within 14 (fourteen) days** of submission of the design and drawings for modifications to the Contractor. The Contractor shall incorporate all necessary comments of the Employer's Representative in the above design and drawings, if any, and shall re-submit further 3 (three) copies each of the revised design and drawings within 14 (fourteen) days for final approval of the Employer's Representative. The Contractor shall thereafter submit 6 (six) copies each of the approved design and 6 (six) copies each of the approved drawings together with one copy each of the reproducible tracings. This ensures approval of the final design/drawing within one month of first submission. If the submissions require more than one round of revision on account of incomplete compliance from Contractor, the



delay will be on account of the Contractor. If new observations are given by the Employer's Representative, the Contractor will be entitled to take an additional 14 day period for compliance.

**(k) Construction of pumping stations and treatment plant**

Design, Supply, construction, erection, of ultimate capacity sewage & effluent pumping station, present capacity of Sewage treatment plant based on Sequential Batch Reactor Technology with tertiary treatment for urban usages.

The contractor shall ensure the technical feasibility of their offer, after inspecting the site. It must be understood that part B, portion of work is a turnkey contract and the firm shall be required to execute every such item of work which is considered necessary for satisfactory completion and commissioning of the plant, even though such items are not specified in the tender documents. All the above mentioned works under the Turnkey contract scope are to be designed and executed in respect to civil, electrical, mechanical and instrumentation technical specifications and requirements.

**(m) Testing and Trial Run ( 3 months)**

After execution of the works the Contractor shall make testing and trial runs of the individual components. A continuous operation of the component for a period of 7 days to the satisfaction of the Employer's Representative will be deemed to demonstrate satisfactory completion of trial run for the individual component. **The cost of electricity, chemicals and other consumables for operation and maintenance of the System during the period of this trial run will be borne by the Contractor.** The costs towards the Contractor's Representative and other operating personnel during the said period of trial run, along with cost of tools and spare parts, which are required for operation and maintenance of the plant and equipment during the trial run period shall also be borne by the Contractor and shall be included in Contract Price. In the event that the System or any of the facilities do not satisfactorily achieve the required performance standards during this period, the trial run period shall be extended until such time as the Contractor has satisfactorily rectified any deficiencies as may be necessary to satisfy the performance requirements, at the risk and cost of the Contractor.

**(n) Commissioning**

On completion of the Trial Run, commissioning of the System shall be done by the Contractor. The commissioning of the system shall be considered as fully achieved after the full system has run continuously for a period of 15 days during trial period without any breakdown to the satisfaction of Employer's Representative. If continuous run is not achieved fully to the satisfaction of Employer's Representative, the Contractor has to do the needful to achieve the same at his cost. All the costs thereof, including the cost of staff, maintenance, and any other consumables for operation and maintenance of the system during the period of commissioning except for the chemicals used and electricity consumed during the commissioning period shall be borne by the Contractor.

**(o) Any other item of works:**

Any items of work, either supply and or erection of material/equipment which have not been specifically mentioned in the specification but are necessary for operation and guaranteed performance of the entire plant, and equipment offered shall be deemed to be included within the broad scope of this specifications and shall be provided by the Contractor without any extra cost to the Employer and the total cost will be borne by the



Contractor.

It is advisable that the Bidder should visit the site and appraise him-self of all site conditions prior to preparation and submission of the bid. No extra payment on any account whatsoever over the quoted lump sum prices shall be paid to the contractor.

### 3. Services to be provided by the contractor

- i. The Contractor shall take the responsibility for all testing and inspection to be conducted in manner as specified in these specifications and as per relevant I.S/International codes such as BS ASTM, and DIN. IS codes shall prevail over other codes wherever applicable. This bid document shall prevail over IS codes/ international codes. The contractor shall have to get the following equipments / materials inspected through any third agency as decided by the authority:

- a. RCC and HDPE Pipes.
- b. All type of Valves and Specials.
- c. All type of Motors / Pumping Sets and Blowers.
- d. Transformers, electric cables and all electric switch gears.
- e. Centrifuge sludge drying equipment.

Authority reserves the right to ask the contractor for getting any other item not included above for third party inspection if deemed necessary.

- ii. Setting up, and staffing with qualified engineers/ technicians, of suitable laboratories for following the Quality Assurance Program.
- iii. Setting up of suitable labour camps with all water and sanitation arrangements and other facilities required under the relevant Labour laws.
- iv. Implementation of all the environmental and relevant social mitigation measures as required.
- v. Making arrangements for equipment and material required for maintaining safety of the sites and the workmen on site (helmets, boots, jackets, safety belts, gloves, scaffolding, barricading, etc.)
- vi. Submission of initial work program and updating the same every month for approval by the Employer's Representative.
- vii. Transportation of all equipment from manufacturers work to the project site inclusive of all-intermediate handling and loading/ unloading / storage at site.
- viii. Supply, erection, inspection, testing, and start up and running of the equipment during trial run / performance guarantee period at rated capacity and speed.
- ix. Erection, trial run and commissioning of the entire plant. The Contractor shall also arrange for maintenance of equipment during performance guarantee and commissioning period & operation & maintenance period.
- x. Application of the final paints of approved color shall be done by the Contractor after completion of erection, testing & commissioning.

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- xi. The Contractor shall also arrange technical experts of equipment from proprietary suppliers as and when necessary until the commissioning, for the entire project period.
- xii. Where the equipment is intended for use under corrosive / chlorinated atmosphere such as laboratory building, Chlorine dosing tanks, the design and material of equipment shall be such that it can withstand these corrosive conditions to minimize effect of corrosion on the equipment.
- xiii. **Operation and Maintenance (O&M) manuals** - The Contractor shall submit 1 month before start of trial run and commissioning of the plant, 2 copies of well documented O&M manual of the entire plant with catalogues, details of treatment units, all calculations of chemicals & power etc, general operating instructions for the plant, trouble shooting, instructions for identifications of problems in running of all plant and equipment, and the remedial measures, preventive maintenance of the plant and equipment, documentation and records to be maintained for operation and maintenance of the plant for the approval of the Engineer. After Engineer's approval, the Contractor shall submit final O&M manual, well bound, in 6 sets, incorporating Engineer's comments and with original catalogues of the suppliers and as built drawings. The contractor shall provide the operating staff as per the list given in Annexure for operation and maintenance of the Collection networks, Manholes, Wetwells, Sewage pumping station, Tertiary treatment plant,
- xiv. **Mandatory Spares, Laboratory Equipment** etc. as per Annexure V & Annexure VI respectively shall be supplied 1 month before trial run period.
- xv. Contractor's labourers and supervisors shall have to normally observe office timings of general shift.
- xvi. Plant and equipment covered under this contract shall be totally attended to by the contractor including any "Trouble Shooting" to ensure smooth and trouble free operation.
- xvii. The maintenance period shall be 06 years from the date of completion of successful performance run of pipeline work.
- xviii. The contractor shall take operational measures that there shall be no flooding.
- xix. The contractor shall abide by all central/state govt./Semi govt./Local Bodies rules regulations, pertaining to this contract, without any extra cost.
- xx. In the event of any damage/loss of life/theft of property, due to negligence on the part of contractor, the contractor shall be solely responsible and liable for compensation and damages, regarding negligence and the decision of Engineer-in-charge shall be final.
- xxi. The contractor should maintain all kinds of securities in the premises round the clock for that he should arrange manpower to prevent theft, robberies and malpractice. The site will be open for inspection by the designated officers/official of NRDA at all times during the contract period.
- xxii. The contractor should observe all safety rules and regulations corresponding to electricity, factory act, bio-chem process fire and as per building codes. Any

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accident causing by overlooking the rules, the contractor at his own cost and risk shall handle the related cases. Insurance of the entire staff at site is compulsory under insurance policy drawn from Govt. of Chhattisgarh. The copy of the cover note should be submitted to NRDA.

- xxiii. The sewerage contractor should provide guidance for sectoral developers for the development of individual sectors and provide sewerage connection after approval from NRDA.
- xxiv. The Sewerage Contractor should arrange the required sewer maintenance equipments and machineries during execution, operation and maintenance period.

#### **4. Guidance to contractor:**

The following data are enclosed only for guidance of the Contractor,

- i. Tentative location plan of treatment plant
- ii. Sub-Soil investigation details of the site, which is available with the employer, are attached for reference for the contractor. The bidder shall conduct necessary soil investigation and adopt critical of the two for SBC viz. Data furnished in the tender and the data collected by him in the soil investigation at no extra cost.
- iii. Characteristics of the raw sewage required for the design of sewage treatment plant are given in the document. Any additional data required shall be collected by the contractor at his own cost for design of Sewage treatment plant.
- iv. The performance standards of the treated effluent after STP and after TTP.

#### **5. Equivalency of Standards and Codes**

Wherever reference is made in the Contract to specific standards and codes to be met by the goods and materials to be furnished, and work performed or tested, the provisions of the latest current edition or revision of the relevant standards and codes in effect shall apply, unless otherwise stated in the contract. Where such standards and codes are national or related to a particular country or region, other authoritative standards which ensure an equal or higher quality than the standards and codes specified will be acceptable subject to the Engineer's prior review and written approval. Differences between the standards specified and the proposed alternative standards must be fully described in writing by the contractor and submitted to the Engineer at least 28 days prior to the date when the Contractor desires the Engineer's approval. In fee event the Engineer determines that such proposed deviations do not ensure equal or higher quality, the Contractor shall comply with the standards specified in the Bid Documents.

#### **6. Sign Board**

The Contractor at his own cost, shall provide sign boards at approved locations, in English and Hindi at the site of the Works of approved size and design which provides

- i. the name of the Project,
- ii. the name and addresses of the Employer, the Contractor and the Consultant;

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- iii. the name and short description Of me Project,
- iv. the amount of the Contract Price; and
- v. the starting and completion dates. Contractor shall take care of signboard and redo it in case of loss, damage, theft etc., as desired by the Engineer-in-Charge.

#### **7. Assurance Programme/Sample Tests**

Contractor shall be responsible to develop a quality control program and to all necessary materials, apparatus, instruments, equipment, facilities and qualified staff for sampling, testing and quality control of the materials and the under the Contractor. Without limiting the generality of the foregoing, the actor shall either

- i. establish a testing laboratory at the site of Works which be adequately equipped and staffed to carry out all sampling and testing in accordance with the requirement set out in the tender document specifications provide all field equipment and apparatus as necessary to conduct all in-situ tests and/or any Tests on Completion, or
- ii. Arrange for routine sampling, testing and reporting, as required, through a certified independent laboratory acceptable to the Engineer-in-Charge. The Contractor shall obtain the approval of the Engineer-in-Charge for the quality control programme developed by him and incorporate any modifications suggested by the Engineer-in-Charge at no extra cost.

All costs of such sampling, testing and reporting of test results will be borne the Contractor, and the Contractor shall include sufficient provisions in his; tendered rates to allow for independent sampling and laboratory testing under the direction of the Engineer-in-Charge. The Contractor shall furnish certified copies of all test reports to the Engineer-in-Charge within 3 days of completion of the specified tests. The Contractor shall, within 14 days after the date of the issue of Letter of Acceptance, submit to the Engineer-in-Charge for his consent a detailed description of the arrangements for conducting the quality control programme during execution of the Work, including details of his testing laboratory,]equipment, staff and general procedures. If following submission, or at any time during the progress of Works, it appears to the Engineer-in-Charge that the Contractor's quality control programme is not adequate to ensure the quality of the Works, the Contractor shall produce a revised programme, as desired by the! Engineer-in-Charge, which will be adequate to ensure satisfactory quality control, in case of the contractor will fail to ensure quality control program the action deem fit will be taken against the contractor. NRDA shall carry out supervision and quality control and monitoring the progress of works.

#### **8. Protection of Utilities**

The Contractor is required to carefully examine the location of the Works and their alignments and to make special enquiries with all authorities concerning utility lines such as water supply, sewers, gas pipe, telephone (underground and/or overhead) lines, electric cable (underground and/or overhead), Trees etc., and determine and verify to his own satisfaction the character, sizes, position and lengths of such utilities from authentic records. The Contractor shall be wholly responsible for the protection and/or facilitating relocation of such utilities as may be required and shall not make any claim for extra work or extra time that may be required to protect or facilitate relocating such utilities. If

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any major shifting realignment of water supply, sewers, gas pipes, electric and telephone lines is necessary due to their interference with the proposed Works, the same may be done by the contractor. The cost of such relocations will be borne by the contractor

**9. Disposal of sludge**

The dewatered sludge from centrifuge shall be disposed off to a suitable location as directed by Authority for further drying. The responsibility of sludge withdrawal and disposing off lies with the contractor within the operation and maintenance period. The contractor should explore the possibility promoting it as manure.

**10. Reuse and Disposal of Treated Effluent**

A portion of the treated effluent from TTP, has to be used for gardening / horticulture, flushing and construction works, for which HDPE pipes are to be laid as per BOQ. And rest will be discharged in the near by Nala with a permission and approval from NRDA.

**11. Disposal of Excavated Stuff**

It will be the responsibility of contractor to dispose all the excavated stuff within the NRDA limits as directed by Engineer-in-charge.

**12. General Utilities**

For the proper functioning of the proposed works of treatment plant, connection for rising mains, effluent channel, the other general utilities necessary for the proper functioning of the proposed works which shall be included under this Contract but not limited to the following are :

- i. Access to the site from the main road.
- ii. Site development and general site fill etc. Internal road network, horticulture, landscaping, storm drainage, outdoor lighting, plant water supply and sanitation, storm water drainage, waste
- iii. disposal, chemical drains etc.
- iv. Electric substations and distribution of power supply to all necessary points
- v. Mechanical, sanitary and chemical drains.
- vi. Street and yard lighting and fire hydrant system for all pumping stations and plants.
- vii. Miscellaneous buildings, garages, maintenance facilities, workshop for testing meters etc at STP site.
- viii. Fence, gates, security systems at the site.

**13. Safety Equipment**

Safety Equipments should be provided at sewage pumping station and treatment plant site shall be as per the recommendation of Inspector of Industries. Contractor shall also take care of safety compliance as applicable from time to time as per safety

rules/Factory act/Indian Electricity regulations/manuals/manufacture's special instructions.

#### 14. Model of the Project

A model of the project shall also be submitted by the contractor of the scale such that the size is not less than 1.5m x 2.5m. Model shall be kept over a table and fitted within a wooden box having glass on its top.

### (c) Part C: Operation And Maintenance ( 60months)

The Contractor shall be responsible for operation and maintenance of the sewerage collection, treatment, and reuse system for **Zone 1, 2, 3 & specified area** at Naya Raipur, entire system for the period of 60months after successful completion of trial run period and commissioning. Notwithstanding the above, the Contractor will be required to rectify any deficiencies which are attributable to defects in the workmanship or quality of materials, Plant or equipment during the Contract Period.

The cost of chemicals and other consumables for operation and maintenance of the System during the O & M period will be borne by the Contractor; However power charges shall first be paid by contractor and later shall be reimbursed by the authority along with the monthly bill. The costs towards the Contractor's Representative and other operating personnel during the said period of will have to be born by the contractor, along with cost of tools and spare parts, which are required for operation and maintenance of the plant and equipment.

#### (d) Training

The bidder shall, as a part of his technical proposal, provide a detailed staffing Schedule which identifies the personnel required for operating and maintaining the Plant and facilities, a description of their individual duties and responsibilities, and the required qualifications of such personnel. All personnel selected by the Employer to be responsible for the operation, maintenance and repair of the facilities shall be provided with practical training in all aspects of the operation, maintenance and repair of the Plant, equipment and facilities. For this purpose, the Contractor shall provide a training program for the Employer's personnel during the last three months of operation and maintenance period thereafter as may be reasonably required to ensure that the designated personnel are adequately trained to take up their responsibilities.

The bidder shall submit separately, with his bid documents, details of his proposed training program, the facilities required, and the training personnel to be provided. All costs for the bidder's personnel and the training facilities required for the training, and any incidental training expenses, shall be included in the bid price. All costs of the Employer's personnel shall be borne by the Employer

#### (e) Taking over

The sewerage system entire work will be taken over on satisfactory completion of the operation and maintenance of the contract for 60months provided that,

- i. The plant/equipment is in good running condition.
- ii. All records of operation and maintenance during the 60months period are handed over to NRDA in proper condition.

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- iii. The O & M manuals have been updated following 60months period operational experience and approved by NRDA.

In case taking over is delayed on account of Contractor's failure, the O & M period will be extended further till it meets the above requirement without any extra cost to NRDA.

**(f) Defect Liability period (60months)**

The defect liability Period shall be for a period of 60monthsfor part A & B Works, which shall start with effective from the date of completion including trial run of contract.The Contractor should compulsorily provide and maintain minimum number of staff as mentioned in Annexure -IV of Employer's Requirement for the 60 months Defects Liability Period, following successful completion of the Trial Run period and issuance of the Taking - Over Certificate. The personnel provided by the Contractor shall be fully experienced in managing, repairing and maintaining all aspects of the plant and facilities and shall be responsible to monitor and ensure the successful performance of the system throughout the Defects Liability Period, and shall be responsible to ensure that the Employer's Personnel are provided with on the job training as may be necessary to ensure uninterrupted and satisfactory performance of the plant and facilities by the Employer's Personnel after completion of the Defects Liability Period, and issuance of the Performance Certificate.

The Contractor will be required to rectify any deficiencies which are attributable to defects in the workmanship or quality of material; plant or equipment during this period.

The contractor will be responsible for ensuring uninterrupted working of the plant ,for this, it is the duty of the contractor to keep ready the spares required in case of break down in electrical or mechanical site (that means replacement or non availability of spare parts should not be an excuse for keeping the plant shut in the event of malfunction or break down)

Besides above, during the defect liability period the contractor shall be responsible for -

- a. Repair, maintenance, replacement of (networks, treatment plant, laboratory equipments).
- b. System monitoring
- c. Contingent arrangement,
- d. Arrangement of water for flushing ,
- e. Provision of spares, tools & plants,
- f. Manpower for maintenance
- g. All required consumables

***The cost on all the above shall be deemed to be included in capital, operation and maintenance cost coated by the contractor.***

**LIST OF ANNEXURES**

<b>ANNEXURE I</b>	<b>DESIGN PARAMETERS FOR SEWAGE TREATMENT PLANTS</b>
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ANNEXURE II	CAPACITY OF DEVELOPMENT OF SEWAGE TREATMENT PLANTS
ANNEXURE III	MINIMUM NUMBER OF REQUIRED STAFF DURING 3 MONTHS TRIAL RUN PERIOD FOR EACH ZONE
ANNEXURE IV	MINIMUM NUMBER OF REQUIRED STAFF DURING 60 MONTHS O&M PERIOD FOR EACH ZONE
ANNEXURE V	LIST OF LABORATORY EQUIPMENTS FOR EACH STP SITE
ANNEXURE VI	LIST OF MANDATORY SPARES FOR EACH STP SITE
ANNEXURE VII	LIST OF FURNITURES TO BE SUPPLIED IN THE OFFICE BUILDING FOR EACH STP SITE
ANNEXURE VIII	LIST OF SPECIAL TOOLS TO BE SUPPLIED IN THE OFFICE BUILDING FOR EACH STP SITE
ANNEXURE IX	LIST OF CONSUMABLES FOR EACH STP SITE
ANNEXURE X	LIST OF MECHANICAL EQUIPMENTS IN THE WORKSHOP FOR EACH STP SITE
ANNEXURE XI	MILESTONE FOR DEVELOPMENT OF THE PROJECT

**ANNEXURE I**  
**DESIGN PARAMETERS FOR SEWAGE TREATMENT PLANTS**

Sr.No.	Parameters	Parameters	Units	Value	
1	Input parameters	Peak factor		2.25	
		<b>Inlet Design Parameters</b>			
		Design temperature	Deg Cent	20-35	
		pH		6 -8	
		BOD5 at 20 deg	mg/lit	300	
		COD	mg/lit	500	
		TSS	mg/lit	250	
		Oil and grease	mg/lit	10	
2	Output parameters	<b>Treated sewage characteristics</b>	<b>Units</b>	<b>After secondary Treatment</b>	<b>After Tertiary treatment</b>
		pH		6- 8.5	6 – 8.5
		BOD 5 at 20 deg	mg/lit	15	5 – 10
		TSS	mg/lit	30	5
		COD	mg/lit	100	70 – 80
		Coliform fecal		As per CPHEEO Guidelines	
		Oil and grease	mg/lit	10	5 – 10



**ANNEXURE II**  
**CAPACITY OF DEVELOPMENT OF SEWAGE TREATMENT PLANTS**

Sr. No.	Description of Works	STP 1		STP 2		STP 3	
		Civil Works	Electro Mech. works	Civil Works	Electro Mech. works	Civil Works	Electro Mech. works
<b>A</b>	<b>Wet well and sewage Pumping station</b>						
1	Receiving Chamber	23.50	-----	25.30	-----	20.40	-----
	Mechanical Coarse Screen Channels.	23.50	23.50	25.30	25.30	20.40	20.40
2	The coarse screens shall be designed for both mechanical and manual arrangements. i.e 2 mechanical working (Each 50% peak flow)+ 1 Manual standby (100% peak flow)						
3	Raw Sewage Sump and Pump House	23.50	10.00 x 2.25 (PF)	25.30	10.00 x 2.25 (PF)	20.40	7.00 x 2.25 (PF)
4	Wastewater Conveyance main & Flowmeter	23.50	23.50	25.30	25.30	20.40	25.30
<b>B</b>	<b>Sewage Treatment Plant</b>						
1	Inlet Chamber	23.50	-----	25.30	-----	20.40	-----
	Mechanical Fine Screen Channels;	23.50	23.50	25.30	25.30	20.40	20.40
2	The fine screens shall be designed for both mechanical and manual arrangements. i.e. 2 mechanical working (Each 50% peak flow) + 1 Manual stand by ( 100% peak flow)						
	Mechanical Grit removal facility	23.50	23.50	25.30	25.30	20.40	20.40
3	Two mechanical grit chambers shall be provided each for average flow with a peak factor of 2.25.						
4	Division Box	23.50	-----	25.30	-----	20.40	-----
<b>5</b>	<b>SBR Process Units</b>	<b>(2.5mld x 4 modules)</b>	<b>(2.5mld x 4 modules)</b>	<b>(2.5mld x 4 modules)</b>	<b>(2.5mld x 4 modules)</b>	<b>(3.5mld x 2 modules)</b>	<b>(3.5mld x 2 modules)</b>
6	Chlorine Contact Tank and Dossing pump and accessories	23.50	10.00	25.30	10.00	20.40	7.00
7	Chlorine House	23.50	-----	25.30	-----	20.40	-----
8	Outlet Channel	23.50	-----	25.30	-----	20.40	-----
9	Sludge Sump	23.50	-----	25.30	-----	20.40	-----
10	Sludge pump house	23.50	10.00	25.30	10.00	20.40	7.00
11	Centrifuge	23.50	10.00	25.30	10.00	20.40	7.00
12	Admn. Building, Plant utilities & Allied works	As in Bid document					
13	Blower Room	23.50	10.00	25.30	10.00	20.40	7.00

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15	Interconnecting Piping	23.50	-----	25.30	-----	20.40	-----
<b>C</b>	<b>Tertiary Treatment Plant</b>						
1	Rapid sand filters	10.00	10.00	10.00	10.00	7.00	7.00
2	Treated water reservoir in ml	2.5	-----	2.5	-----	2.5	-----
3	Electrical & Inst. Works	As in Bid document					
4	Treated water Pumping station	23.50	10.00	25.30	10.00	20.40	7.00

**ANNEXURE III**  
**MINIMUM NUMBER OF REQUIRED STAFF**  
**DURING 3 MONTHS TRIAL RUN PERIOD FOR EACH ZONE**

Sr. No	Staff Category	No. of Staffs	Expected level of Qualification
1	Plant Manager	1	Graduate Engineer having sufficient experience in PH Engineering
2	Chemist ( Analyst)	1	The chemist shall be minimum science graduate having background and experience in chemistry, biology and bacteriology.
3	Plant operators	2	ITI Pass with experience in STP works
4	Electrician cum mechanic	2	
5	Helper	2	
6	Watchman	3	
<b>Total</b>		<b>13</b>	

*Note: If any additional staff is required to complete the trial run the same shall be provide by the contractor.*

**ANNEXURE IV**  
**MINIMUM NUMBER OF REQUIRED STAFF**  
**DURING 60 MONTHS O&M PERIOD FOR EACH ZONE**

Sr. No	Staff Category	No. of Staffs	Expected level of Qualification
1	Plant Manager	1	Graduate Engineer having sufficient experience in PH Engineering
2	Chemist	1	The chemist shall be minimum science graduate having background and experience in chemistry, biology and bacteriology.
3	Laboratory Assistant	2	Science Graduate
4	Plant operators	8	ITI Pass with experience in STP works
5	Electrician	2	
6	Mechanic cum Fitter	2	
7	Helper	8	
8	Watchman	3	
<b>Total</b>		<b>27</b>	

*Note: If any additional staff is required to complete the 60months O &M, the same shall be provide by the contractor*

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**ANNEXURE V**  
**LIST OF LABORATORY EQUIPMENTS FOR EACH STP SITE**

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- i. Analytical Balance electronic type with an accuracy of 1 mg and accuracy of +/-3%
- ii. Autoclave for sterilization of 100 litres capacity.
- iii. Laboratory Centrifuge
- iv. Chlorine Comparator Apparatus
- v. Distilled Water Apparatus
- vi. Dissolved Oxygen Meter
- vii. Drying Oven Hot Air (105 Deg)
- viii. Hot Plates
- ix. Incubator settable for both 27 deg and 20 Deg for BOD
- x. Magnetic Stirrers
- xi. COD Apparatus
- xii. Muffle Furnace 600 Deg of 20 litres capacity
- xiii. pH Meter
- xiv. Refrigerator 230 liters with 2 separate compartment – i.e. separate freezer (65 liters) and lower compartment maintaining a temperature of 8 deg C +/- 2 Deg C of 165 liters capacity
- xv. Soxhlet Extraction Unit – for Oil/Grease
- xvi. Spectrophotometer for above tests
- xvii. Hydro Extractor
- xviii. Water Bath – Thermostat Control
- xix. Laboratory Furniture comprising of Laboratory bench, 1.0 m wide x 4.0 long, treated with anticorrosive paint, comprising of almirah underneath for storage of glass wares, side racks for storage of reagents bottles, two laboratory sinks with taps, valves and drain pipe etc.
- xx. Glass Ware comprising of beakers, conical flask, burette, pipette, volumetric flask titration and gravimetric analysis, sampling bottles etc.
- xxi. Chemicals for six months testing.

**Note: If any additional Laboratory equipments are required to complete O & M Period, the same shall be provide by the contractor**

#### ANNEXURE VI LIST OF MANDATORY SPARES FOR EACH STP SITE

1. Gland packing for Valves- 2 sets for each size.

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2. Oil seal for gear box- 2 sets for each size and type.
3. Fans for motor- one number for each size and type.
4. One set of rubber bushes, bolts & nuts for each flexible coupling.
5. One set of fuses for all rating used.
6. Indicator lamps- 2 nos for each colour.
7. Contractors- one number of each rating used.
8. Thermal overload relay- one number of each rating used.
9. Push button- one number for start & one number for stop.
10. Rubber Squeegees- one set for Grit Separator and one set for thickener

#### **ANNEXURE VII**

#### **LIST OF FURNITURES TO BE SUPPLIED IN THE OFFICE BUILDING FOR EACH STP SITE**

- i. One wooden conference table 3m x 1.5 m with twelve chairs.

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- ii. Six nos. 1.5m x 0.9m tables with both side drawers
- iii. Four nos. 1.2 m x 0.75 m table with drawers on both sides
- iv. Four nos. 0.9 m x 0.6 m tables with single side three drawers
- v. Twelve nos. chairs
- vi. Chairs for computers
- vii. Four nos. steel cupboards (store well or any other approved make)
- viii. Two nos. filing cabinet with 4 drawers
- ix. Vertical blinds to all Windows
- x. Air Conditioning systems with ceiling fan systems for the entire Office Building including labrotory.
- xi. All necessary required Lab. Testing furnitures ( Table, chairs and cupboards etc)

**ANNEXURE VIII**  
**LIST OF SPECIAL TOOLS TO BE SUPPLIED IN THE**  
**OFFICE BUILDING FOR EACH STP SITE**

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- i. Set of 3 large spanners,
- ii. 2 large pliers
- iii. 2 Buckets 20 l drum 100
- iv. Cutters, hacksaws
- v. Pipe threading equipment
- vi. Super sieve pipe cutters
- vii. Grease gun
- viii. Large scissors, tongs
- ix. Lubrication cans with long necks
- x. Pipe wrench
- xi. Sheer legs and tripods
- xii. Set of 4 large screw drivers
- xiii. Chain pulley blocks with hooks, portable, 1000 kg
- xiv. 2 shovels
- xv. Man winch
- xvi. Set of 4 chisels
- xvii. Ladders, telescopic aluminum, max. height 5 m
- xviii. Set of 3 hammers

**ANNEXURE IX**  
**LIST OF CONSUMABLES FOR EACH STP SITE**

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- i. Cotton waste
- ii. Oils of different grades
- iii. Greases of different grades
- iv. Kerosene, Diesel, petrol, spirit as per the requirements for the plant  
machinery operation
- v. Nuts, bolts, washers, nipples etc. shall be as per the compilation on the basis  
of manufacturer's recommendations for various equipments.
- vi. Rubber hose 1", L =50 m with coupling
- vii. Neoprene rubber pads
- viii. Liquid Chloreine Gas, Lime solution, Allumina ferric

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**ANNEXURE X**  
**LIST OF MECHANICAL EQUIPMENTS IN THE WORKSHOP FOR EACH STP SITE**

- i. 1 work benches
- ii. 6 running meters of shelves, 2 m high
- iii. 1 steel almirahs, 1 m wide, 2 m high, with shelves
- iv. 2 vices
- v. 1 grinder
- vi. Drilling machine for metals and concrete (hammer) (1 kW)
- vii. Various type of bits for drilling of steel and concrete
- viii. Single phase welding transformer
- ix. Hand tools such as, wrenches, grease guns and any other special tools, gauges, test rings, jigs, which may be required during the life of the plant.

The tools shall not be used for the erection of the equipment being supplied and must be handed over to Engineer in a completely new and unused condition after completion of project and start of O& M contract period.

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# **SCHEDULE– D**

## **Section-III**

### **Technical Specification of Works**

**I. TECHNICAL SPECIFICATION OF WORK**

a) Item Rate and Turnkey Works

b) Operation and Maintenance works

**II. QUALITY ASSURANCE AND QUALITY CONTROL**

**III. SUPPLEMENTARY INFORMATION**

**IV. SOIL INVESTIGATION REPORT, DRAWINGS , MILESTONES AND ANNEXURES**

## I. TECHNICAL SPECIFICATION OF WORKS

The broad design parameters and specifications for the works are provided in this section of document, but the general specifications for all works are provided in subsequent sections.

### 1. ITEM RATE AND TURNKEY WORKS:

#### 1.1 TECHNICAL SPECIFICATION FOR VARIOUS COMPONENTS TURNKEY WORK

The turnkey work shall have the following major components as detailed below.

##### (a) Wet well and sewage Pumping station

- (i) Receiving Chamber
- (ii) Mechanical Coarse Screen Channels
- (iii) Raw Sewage Sump and Pump House with Diesel Generating Set
- (iv) Pumped Wastewater Conveyance & Flowmeter

##### (b) Sewage Treatment Plant

- (i) Inlet Chamber
- (ii) Mechanical Fine Screen Channels
- (iii) Mechanical Grit removal facility
- (iv) Division Box
- (v) SBR Process Units
- (vi) Chlorine Contact Tank
- (vii) Chlorine House
- (viii) Outlet Channel
- (ix) Sludge Sump
- (x) Sludge pump house
- (xi) Centrifuge platform
- (xii) Administration building (Office, conference room, wash room, workshop/ tool room, laboratory, MCC and Control Room)
- (xiii) Blower Room
- (xiv) Security cabin & Toilet Block
- (xv) Interconnecting Piping
- (xvi) Plant Utilities
- (xvii) Electrical & Instrumentation Works
- (xviii) Landscaping and gardening and Boundary wall

##### (c) Tertiary Treatment Plant

- (i) Rapid sand filters
- (ii) Treated water reservoir and Pumping station

**(a) WET WELL AND SEWAGE PUMPING STATION**

**(i) Receiving Chamber with velocity control device**

The gravity outfall sewer will discharge the raw sewage into a Receiving chamber. The function of the Receiving chamber is to distribute the flow for process units. The Receiving Chamber shall be designed for peak flow. The Receiving chamber shall consist of sluice gate on down stream for flow regulation. Sluice gate shall be installed such that it is possible to operate them manually, inspection as well as operation by standing on a platform constructed at a suitable elevation adjoining and circumventing the inlet chamber. There shall be a provision of one bye pass channel along with gates. Alternatively, plant bypass can be provided from existing / proposed manhole before pumping station. The inlet chamber shall be of adequate size to meet the requirements of workability inside it. The receiving chamber shall be provided with an odour control arrangement (**Covered with odour treatment arrangement**) and shall be water tight to prevent seepage of the sewage out of the inlet chamber. The entire construction shall be in M25 grade concrete (Sulphate resistant Cement) and as per IS 3370. RCC access platform minimum 1000 wide with railing as per specifications shall be provided on one side of the chamber: Information related to receiving chamber is summarized below:

Parameters	Values STP-1	Values STP-2	Values STP-3
<b>Total Average Flow</b>	<b>23.50mld</b>	<b>25.30mld</b>	<b>20.40mld</b>
Peak factor	2.25	2.25	2.25
Number of units	One No.	One No.	One No.
Detention period	30 seconds	30 seconds	30 seconds
Free Board	0.5 meter	0.5 meter	0.5 meter

**(ii) Mechanical Coarse Screen Channels**

Two mechanical screens of 20 mm working with one manual standby screen is proposed in the screen chamber. The screen channels shall be designed for peak flow. The mechanical and manual bar screens shall be made of 10 mm thick Stainless Steel (SS 316) flats. Conveyor Belt and chute arrangement shall be provided to take the screenings to the screenings dropped from chute will be collected in a container (to be supplied by contractor) of approx. 1.5 m<sup>3</sup> capacity. Manually operated aluminum gates are provided at the upstream and down stream ends to regulate the flow.

RCC Platforms shall be provided at the upper level to enable operation of the railings shall be provided around the entire periphery of the as well as for the platform. The entire structure is to be M 25 sulphate resistant concrete and as per IS 3370 including the platform for the gates.

RCC staircase 900 mm wide shall be provided for access from the ground level to the top of the unit & to the operating platforms. Information related to screen and screen channel is summarized below:

Parameters	Values
------------	--------

Cross section of the bars	50 mm x 10 mm
Opening in screen	20 mm
Free board	0.5m
Angle of inclination	75
Gates 1 for each channel at inlet and outlet.	Manual CI Gate
MOC	MS
Operation	Timer operated
Reduction Gear Box Type	Worm / helical
Reduction gear Material of Construction	Standard
Motor HP	As per approved design
Accessories	Conveyor belt for conveying away the screened materials, 2 Wheeled trolleys

**(iii) Raw Sewage Sump and Pump House with Diesel Generating Set**

Sewage enters into wet well of the pumping station after screening. The wet well shall be circular in shape and shall be designed for an average flow. The capacity of the wet well should be kept such that the detention time in the wet well shall be minimum 5 minutes of peak flow and the maximum detention time shall not exceed 30 minutes at average flow.

Following criteria's shall be considered to size the sump:

- (i) That the pump of the minimum duty/ capacity would run for at least 5 minutes considering no inflow or
- (ii) The capacity of the sump is to be so kept that with any combination of inflow and pumping the operating cycle for any pump will not be less than 5 minutes and
- (iii) The arrangement of the submersible pumps as per pump manufacturer's data i.e. spacing between pumps, minimum space between pump and wall etc.
- (iv) The side water depth (live liquid depth) shall be minimum 2.5 meter. In addition to the above liquid depth an additional depression shall be provided to ensure adequate submergence of the pump as per the manufactures recommendations Pumping station should have a room adequate for installing electrical panels. Suitable arrangement should be provided for lifting of pumps.

The wet well, piping and appertenances have to be designed for ultimate capacity for each zone. IS: 3370 and IS: 4111 (part 4) shall be followed for the design and construction of wet well. Pumping machinery shall be designed for **present capacities with** average flow and a peak factor of 2.25. There shall be minimum four submersible pumps (2 working + 2 standby) . The pumps shall be Submersible raw sewage pumps with centrifugal, non-clog type design. The speed of pump shall be 1450 rpm. The impeller should be of a non-clog design with smooth passage and solid handling capability of 100 mm size.

The pumps shall have cutting edges facing the impellor to share the floating and suspended clogging materials like fibers, plastics, etc. The pumps will have automatic coupling arrangement at discharge end for removal and a guide pipe and chain in SS 304 will be provided for removal and lowering of pumps. Pump shall run smooth without undue noise and vibration. Noise level shall be limited to 85db at 1.86m. Vibration shall be limited as per BS 4675 Part I.

Bearing shall be easily accessible for inspection and maintenance. The bearings shall be



having a minimum life of 25000 hours of working. The motor shall be squirrel cage type. Suitable for three phase supply continuous duty with class 'F' insulation. Motor shall have integral cable parts and the cable entries shall be sealed. The cables shall be leak tight with respect to liquids and firmly attached to the terminal block. The Motor shall be designed for non-overloading characteristic of quantity. The Motor HP shall be at least 10% more than required at duty point.

The critical speed of the rotor shall be at least 30% above the operating speed. Complete rotor shall be balanced dynamically. The moisture sensor of the tripping unit shall be located inside the oil chamber. Information related to wet well is summarized below:

Parameters	Values
No. of pumps	2 Nos. Working + 100% Stand by
Capacity of each pump	As per approved design
Wet Well material of Construction	RCC with sulphate resistant cement
Speed (nominal)	1450 RPM
Motor	HP, 415 V, 3 phase, 50 Hz f
MOC	CI casing, CF-8M impeller, SS-410 shaft
Insulation	Class F
Protection	IP 68
Hrs of operation	24hours
Type of pump	Submersible, non clog, Centrifugal
MOC	CI
Level switch	Level switch in pump for tripping off at low level and high level with alarm
Accessories	MS rigid type base plate suitable for mounting both pump and motor, flexible coupling, coupling guards, foundation bolts.

The size of the sump shall be suitable to accommodate the number of pumps required for operation and easy maneuverability of pumps. There shall be an Integral Electrical cum Control Panel room for the pumps and coarse Screens located near the sump.

The room shall be suitably sized to house the Electrical cum Control Panel, space for spare parts and a maintenance area, etc. and be complete with the following accessories:

- (i) A Diesel Generator Set of suitable capacity to operate wet well pumps and campus lighting shall be installed near to wet well, to take care of gravity inflow of sewage during power break downs. Suitable electric panel with change over mechanism shall also be provided.
- (i) Hoist – comprising of I- Girder and a 3 ton or more chain pulley (the chain pulley block capacity to be 1½ Ton or 3 times the maximum single unit/ weight that may be required to be removed for maintenance) with horizontal travel on the I-beam.
- (ii) The room shall be so covered from sides to protect it from the elements and be suitable for protection from the natural elements. Ventilation in the sheds shall be as per NBC norms specified in the Civil Construction manual.
- (iii) The shed shall be suitably designed to avail of natural lighting

- (iv) Adequate number of fire extinguishers is to be provided as per Electricity Authority norms.
- (v) Internal Illumination and campus lighting shall be of levels as per relevant BIS and National Building Code.

**Testings :**

- (i) Hydrostatic Testing : All pressure parts of pumps prior to assembly, shall be subjected to hydrostatic tests at 1.5 times the maximum pressure obtained with the delivery valve closed and suction pressure at maximum, or twice the working pressure whichever is higher for a duration of 10 minutes.
- (ii) Balancing Test: Impeller and pump rotating assembly shall be dynamically balanced.
- (iii) Performance Test: Each pump shall be tested for full operating range individually to BS: 5316: Part 2. Test shall be carried out for performance at rated speed with minimum NPSH as available at site.
- (iv) Pump performance shall be within the tolerance limits specified in BS: 5316: Part 2.

**(iv) Pumped Wastewater Conveyance & Flow meter**

The pumped flow from the pumping station to the elevated head works inlet chamber of the plant shall be taken through a CI / DI K-9 Class pipeline. The rising main shall be designed for ultimate average flow with a peak factor of 2.25. An electromagnetic flowmeter shall be installed in the rising main for measurement of flow.

- (a) The pipeline shall be adequately sized to have a minimum velocity of at least 1.2 m/s at minimum flow conditions and not more than 2.5 m/sec at pumped peak flow.
- (b) The pump head shall be adequately sized to give a residual discharge head as per CPHEEO manual.

**(b) SEWAGE TREATMENT PLANT**

**(i) Inlet Chamber**

Inlet Chamber will receive raw sewage from the raw sewage pumping station. Inlet chamber shall be designed for average flow of ultimate capacity with a peak factor of 2.25. The entire construction is in M25 grade concrete (Sulphate resistant cement) and as per IS 3370. RCC access platform minimum 1000 wide with railing as per specifications shall be provided on one side of the chamber: RCC staircase 900 mm wide shall be provided for access from ground level to the top of the unit & to the operating platforms. Information related to inlet chamber is summarized below:

Parameters	Values
Total Average Flow in mld	Ultimate Capacity
Peak factor	2.25
Number of units	One No.
Detention period	30 seconds
Free Board	0.5 meter

**(ii) Mechanical Fine Screen Channels**

Two mechanical screens of 6 mm as working and one manual screen of 10mm opening as standby are proposed in the screen chamber. The screen channels shall be designed for peak flow. The clear opening for mechanical screen shall be 6mm. The mechanical and manual bar screens shall be of 3mm thick Stainless Steel (SS316) flats. Conveyor Belt and chute arrangement shall be provided to take the screenings to the drop point, from where it will be collected in a trolley of approx. 1 m<sup>3</sup> capacity. This trolley will be housed in a roofed enclosure with proper access, screen washing arrangement and drain. Manually operated gates shall be provided at the upstream and down stream ends to regulate the flow. RCC Platforms shall be provided at the upper level to enable operation of the gates. Railings shall be provided around the entire periphery of the platform. The entire structure is to be M 25 concrete with sulphate resistant cement and as per IS 3370 including the platform for the gates. RCC staircase 900 mm wide shall be provided for access from the ground level to the top of the unit & to the operating platforms. Information related to fine screen is summarized below:

Parameters	Values
Number of screen channels	3 Nos
Number of Screens	2 Mechanical working (Each 50% Peak flow) + 1 Manual standby (100% Peak flow)
Design flow considered to each Channel	Peak Flow
Approach Velocity at Average Flow ( m/s)	0.3 minimum
Velocity through Screen at Average flow ( m/s)	0.6
Velocity through Screen at Peak Flow in m/s	1.2
Opening in screen	6 mm for Mechanical and 10 mm for manual
Channel Size	Approved Design
Minimum Free Board	0.5m
Angle of inclination	45
MOC	3 mm thick Stainless Steel (SS316)
Operation	Timer operated
Reduction Gear Box Type	Worm / helical
Reduction gear Material of Construction	Standard
Motor HP	As per design
Accessories	Conveyor belt for conveying away the screened materials with 2 wheeled trolleys

### (iii) Mechanical Grit Removal Facility

Two mechanical grit chambers, both working, are proposed after screening unit. The mechanical grit chambers shall be Square Mechanical Detritus Tank each designed for average flow of Ultimate capacity with a peak factor of 2.25.

Detritus tank chamber shall have the following:

- One tapered inlet channel running along one side with deflectors for entry of sewage into the grit chamber. The minimum SWD of the units shall be adopted on the basis of design requirement of the unit.
- One tapered outlet channel for collecting the degritted sewage, which overflow over a weir into the outlet channel. Outlet channel of adequate size and shall be designed to ensure that no settling takes place.
- One sloping grit classifying channel into which the collected grit will be classified.

- The grit from classifier will be collected in a wheeled trolley (to be supplied by contractor) of approx. 1.5 m<sup>3</sup> capacity. This trolley will be housed in a roofed enclosure with proper access, grit washing arrangement and drain.
- A grit scraping mechanism with adjustable influent deflector.
- Reciprocating rake mechanism to remove the grit.
- Organic matter return pump

Aluminum gates shall be provided at the entrance and at the outlet of the chamber. To enable easy operation of the gates, RCC platforms with GI railing shall be provided at the upper level. Access shall be provided from this level to a mechanism supporting beam of the grit chamber. The entire construction shall be in M25 grade concrete (Sulphate resistant Cement) and as per IS 3370. RCC staircase 900 mm wide shall be provided for access from the ground level to the top of the unit & to the operating platforms. Information related to grit chamber is summarized below,

Parameters	Values
No. of grit chambers	2
Type	Square type RCC construction
Detention Time	1 min
Particle size to be removed	0.15 mm or more
Grit storage space	As per design
Free board to be provided	500 mm
MOC	M25 ,RCC
Accessories	Scraper mechanism with bridge, screw conveyor, chute for grit dumping

#### (iv) Division Box

The designed peak flow shall be equally divided using adjustable aluminum overflow weir plates and distributed to SBR Process units via pipe / channel. Sluice gates including all specials shall be provided on all weirs for isolation. RCC access platform, staircase, railing and covers over division boxes are provided as per requirement.

#### (v) SBR Process Units

##### (a) SBR Unit

- The biological treatment section comprising SBR process has to be installed and equipped for the present average flow **only**. However, suitable space provisions shall be made for the future unit of additional balance ultimate flows while planning the layout,.

The civil works shall be carried out in such a way that the additional unit can be integrated into the system without any shut downs.

- The complete biological system has to be designed for handling peak flow capacity. In addition, 0.5m free board shall be provided to each tank. Maximum liquid depth of tank shall be restricted to 5.5m.
- SBR Process basins will be constructed in M25 grade concrete (Sulphate resistant Cement) and as per IS 3370. RCC staircase 900 mm wide is provided to each basin for access from the ground level to the operating platforms. All platforms and walkways shall be provided with hand railings as per tender specifications. 1.2 m Plinth protection along periphery shall be provided as per technical specifications.

- (iv) The system should work on a intermittent influent condition. No influent / effluent equalization tanks or flash filling is accepted

**(b) Decanting Device**

Clarified effluent is removed during the decant period .The contractor shall provide necessary suitable decant mechanisms for the purpose to achieve the performance parameters as per bid document . There should be minimum 1 decanter per basin.

**(c) Aeration System**

**Diffusers**

- The Aeration facility shall be provided for present units of 10 mld, but planning shall be done for future extension from 10 to ultimate capacity.
- Only fine bubble EPDM / PU membrane diffusers shall be acceptable with minimum membrane diffuser to floor coverage area of 5%. Diffusers shall be submerged fine bubble / fine pore, high transfer efficiency, low maintenance, non-buoyant type. Diffusers shall be tubular (membrane) type. Material of construction for (entire under water system including accessories shall be of non corrosive. Complete diffuser as a unit shall be assembled at the manufacturing factory level.

**Blowers**

- The air blower arrangement shall be capable of handling Total Water Level and Bottom Water Level operation conditions, controlled by process sensors such as DO, temperature and level.
- Each set of blower shall have dedicated standby. Minimum One working air blower in each set shall operate via VFD into each tank while others may be operating at a fixed constant speed on soft starter configuration.
- The blowers for air diffuser system shall be positive displacement (roots) type, and head for blowers shall be decided on the basis of standard oxygen requirements (S.O.R). of diffusers and maximum liquid depth in tank duly considering the losses governing point of delivery (diffusers) and the blowers. The number of standby blower shall be minimum 50% (fifty percent) of the number of working blowers. Blowers shall be complete with motor and accessories like base frame, anti vibratory pad, silencer, non return valve, air filter etc. as per requirements. Vibration due to operation of blowers shall be restricted so as to avoid damage to structures.
- The blower and air diffuser system shall include PLC based control for diffuser operation. The operation and speed of blowers shall be automatically adjusted using parameters like Oxygen Uptake Rate, Dissolved Oxygen and Temperature, Incoming flow and liquid level in the basin such that the DO is supplied as per demand and power utilisation for operation of blowers is optimised.
- The main air header/ring main shall be in MS as per relevant IS painted both outside and inside with corrosion resistant paint as per manufacture's recommendations. The header / ring main shall be supported on saddles at suitable intervals or will be protected against external corrosion in case they are laid below ground. The header shall have auto valves to facilitate switch over aeration cycle from one basin to other by PLC operation. The header shall supply air to diffuser grids at various locations through air supply pipes.
- Air supply pipe above water level shall be in GI and below water level it shall be of uPVC as per relevant standards. All under water lateral pipes shall be of

uPVC. Junction between air header and air supply pipe shall be suitably protected against corrosion due to dissimilar materials.

- All other accessories, whether specified or not, but required for completeness shall form part of contractors scope.

**(d) Excess Sludge Pumps**

Excess sludge pumps shall be provided for each basin. The pump shall be of submersible / horizontal centrifugal type suitable for handling biological sludge of 1 – 2% solids consistency. Capacity and heads shall be decided based on SBR Process requirements. Each SBR Process basin shall be provided with suitable lifting arrangements to facilitate lifting of pump, if required for maintenance.

**(e) Return Sludge Pumps**

Return sludge pumps shall be provided for each basin. The pump shall be of submersible / horizontal centrifugal type suitable for handling biological sludge of 1 – 2% solids consistency. Capacity and heads shall be decided based on SBR Process requirements. Each SBR Process basin shall be provided with suitable lifting arrangements to facilitate lifting of pump, if required for maintenance.

**(f) Automation and Control of SBR Unit**

- PLC based automation system with application software based on Rockwell hardware or equal to control all pumps, valves, blowers, VFD, decanters, limit switches and probes as per bidder's design including I/Os with 20 % spares, power supplies, UPS.
- HMI Panel to comprise up-to-date standard PC with monitor, printer, mouse, internet connection, RS-view, RS-links (gateway version), entire process and operator software with dynamic flow charts, pictures, screens, alarms, historical trends, reports etc.
- SACDA based Automation system to monitor continuously in each tank the followings:
  - (a) Filling volume
  - (b) Filling quantity
  - (c) Discharge quantity
  - (d) DO-level
  - (e) Temperature
  - (f) Oxygen Uptake Rate
  - (g) Energy requirements
  - (h) Blower speeds
  - (i) Decanter speed
  - (j) Equipment operation hours

**(g) Chlorine Contact Tank**

For Chlorination of final treated sewage a provision shall be made so that no harm is caused to the receiving water body such as river. Decanted treated water from SBR Process shall be taken to chlorine contact tank by RCC channel/pipe. Tank shall be

provided for dosing of chlorine to the effluent from SBR Process. The tank shall be constructed in M 25 grade concrete (Sulphate resistant Cement) and as per IS 3370. RCC platform 1000mm as per specifications shall be provided. RCC staircase 900 mm wide shall be provided for access from the ground level to the top of the unit and to the operating platforms. Baffle walls shall be provided to achieve proper disinfection. The baffle walls shall be constructed in M 25 grade concrete and 20 cm thick plaster in CM 1:3 on either side.

Parameters	Values
Number of chambers	1
Design Flow	Ultimate Flow
MoC	M25, RCC
Internal mixing arrangement	Longitudinal Baffle Wall at 2.5 m c/c distance
Maximum Water depth	2.5m
Detention Period	20 minutes
Free Board	0.5m

#### (h) Chlorine House

There will be one chlorinator with evaporator as working and one as standby in the chlorination plant. Liquid chlorine shall be drawn from chlorine tonner and it will then pass through evaporator for vaporization. The gaseous chlorine shall be injected through ejector after mixing with water. Ultimate chlorine solution shall be dosed in chlorine contact tank. In chlorine contact tank, chlorine solution diffuser shall be provided for proper mixing of the solution. Besides chlorinators in chlorination plant there will be 2 nos chlorine tonners to supply chlorine. One toner shall be connected to the chlorinator and other shall remain as standby.

Chlorination system covering chlorine tonners.(1 working, 1 standby and 1 in transit for each STP), chlorinator, water feed pumps, piping, booster pumps, ejector, trunions, lifting device with weighing scale, leak detection and leak absorption system, safety equipments like canisters, gasmasks etc. and other ancillary shall be provided in the chlorine house. Chlorine house of minimum 40-sqm plinth area shall be provided. It shall have sufficient ventilation as per the latest norms for safety purpose with necessary lifting arrangement and EOT of minimum 2 T capacity etc. complete. All other accessories, whether specified or not, but required for completer shall form part of contractors scope.

Parameters	Values
No.	Two (1 Working & 1 standby)
Capacity	6kg/hr
Type	Vacuum Type
No. of evaporator	Two (1 working + 1 standby)
Chlorine leak detector	One no. to sense chlorine in atmosphere and to give alarm
Safety and handling devices	One set
Chlorine absorption system for Leakage	One set consisting of absorption tower, caustic solution tank, caustic solution recirculation pump,
No. of chlorine toners ( min)	3 Nos.

#### (i) Outlet Bypass Channel



Treated sewage after chlorine contact tank shall be taken to the river through RCC by pass channel. Parshall flume along with ultrasonic flow meter shall be provided after chlorine contact tank in the RCC channel to measure the flow. The length of the channel shall be as per site condition.

Capacity of the channel should be such that it can carry peak flow. The channel shall be constructed in M 25 grade concrete (Sulphate resistant Cement) and as per IS 3370. RCC platform 1000mm wide with railing as per specifications shall be provided.

**(j) Sludge Sump**

Sludge sump shall be provided to collect the excess sludge from SBR Process Basins. There shall be one common sludge sump for all basins. There shall be auto gate valves on discharge sludge pipe of each SBR Process basin. Diameter of valve shall be same as that of sludge pipe.

Sludge tank shall be constructed in M 25 grade concrete and as per IS3370. The sump shall be equipped with coarse bubble air grid made from HDPE / PVC pipes and Air Blower Assembly to facilitate mixing of contents of sludge sump on continuous basis.

**(k) Sludge Pump House**

Pump house shall be attached with the sludge sump. This shall be RCC framed brick masonry structure. Minimum height of the pump house shall be 4m from the plinth level. It shall be provided with rolling shutter and doors and windows as per technical specifications. Mono rail gantry of minimum 2 T capacity shall be provided in the pump house to lift the pump assembly. Flooring of the pump house shall be IPS flooring. Pump house shall be plastered from inside and from out side as per tender specifications. Sludge sump shall be painted inside with bituminous paint. All other accessories, whether specified or not, but required for complete shall form part of contractors scope

Centrifuge feed pumps shall be provided in Sludge Pump House to feed secondary Sludge to centrifuge. The pump shall be of screw type suitable for handling biological sludge of 1 – 2% solids consistency.

**(l) Centrifuge Platform**

The SBR Basins operate on an Extended Aeration Mode to generate fully digested sludge. The excess sludge from the SBR Basins is pumped through excess sludge pumps and collected in the Sludge tank. The consistency of this sludge is 0.8 to 1.0%. The sludge is then pumped to Solid Bowl Centrifuge for dewatering up to 20%.

Provision should be made to dose Dewatering Polymer online prior to Centrifuge Feed to enhance the Dewatering capacity of Centrifuge. The Dosing System includes one no of solution preparation and one no of Solution Dosing Tank of minimum 12 Hrs capacity. Each Tank is equipped with Slow Speed Mixers and Metering Type Positive Displacement Pumps with stand by arrangements. The Dewatered Sludge in the form of Truckable Sludge with 20% consistency from Centrifuges will be collected and disposed off suitably. This Sludge can also be used as Manure for Green Belt. The supernatant from centrifuge shall be taken to the wet well by gravity while sludge cakes shall be disposed off by vehicle. The centrifuge building is two storied building, Centrifuge shall be placed on first floor dosing



system shall be located in ground floor.

**(c) TERTIARY TREATMENT PLANT**

Tertiary treatment is mainly needed for meeting coliform and helminth standards which are not met by conventional methods of Sewage treatment. While Coliform are readily removable by chlorination, helminth are not. Helminth removal can be achieved by using rapid sand filtration as per CPHEEO guidelines.

**(i) Rapid sand filters**

These filters shall be designed as per CPHEEO guidelines with one stand by filter unit including all the electromechanical units. The filter tanks and back wash shall be constructed in M 25 grade concrete and as per IS 3370. RCC platform 1000mm as per specifications shall be provided. RCC staircase 900 mm wide shall be provided for access from the ground level to the top of the unit and to the operating platforms.

**(ii) Treated water reservoir and pumping station**

The treated water reservoir shall be designed for a capacity of 2.5ml, with a over flow chamber connected to the by pass channel.

The entire structure is to be M 25 grade of concrete and designed as per IS: 3370 for construction of water reservoir. The pumping macheneries shall be provided for a discharge of 0.116cum/s and head of 36m. There shall be 4 numbers of pumps (2 working + 2 standby). The pumps shall be horizontal split casing pumps with centrifugal, non-clog type design. The Motor HP shall be at least 10% more than required at duty point and shall be suitable for power requirement by pumps at (-) 25% and (+) 10% of design head.

The control panel room and the pump room shall be suitably designed to house the pumping sets required for ultimate capacity of sewage flow. Though the pumping sets shall be provided for present designed sewage flow. The height of pump room shall be minimum 4 meters above plinth, suitably designed in RCC framed structure and brick walls. A mono rail gantry shall be provided for lifting of pumps. Adequate number of fire extinguishers along with Internal Illumination as per National Building Code.

**(a) Interconnecting Piping**

All piping including valves, specials and other appurtenances, auxiliaries and accessories required as per process design and scope of work shall be designed for peak flow. In case of pumping mains thrust blocks shall be provided wherever required. In case of buried pipes warning tapes of appropriate colours shall be provided. The material for major interconnecting piping shall be as follows:

Sr. No.	From	To	Class / Material of Pipe
1	Rising Main	Stilling Chamber	DI-K9
2	Air Blower discharge header	SBR Process	MS Epoxy painted
3	SBR Process	Chlorination Tank	RCC NP3
4	Gravity Bypass Line from Distribution box	Discharge Point	RCC NP3
5	Chlorination Tank	Discharge Point	RCC NP4
6	Air Grid piping	SBR Process	PVC
7	All sludge pipes	SBR Process	SS304

8	All sludge pipes	Sludge Handling system	DI
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**(b) Administration Building**

***Each STP site should have the following provisions as detailed below.***

The administrative building shall be single storey but the structural provision for first floor of equal area have to be made in the foundation and structures. Ground floor shall be of 250 sqmt of built-up area. The building shall accommodate office, workshop, toolroom, administrative block, conference hall, laboratory, wash room, toilets MCC and Control Room for the easy and smooth operation of plant

The building structure shall be RCC framed structure with walls of 230 mm thick brick masonry, plastered and painted with oil bound distemper on the inner face and snowcem on the outer face. RCC slab roofing with roof height of 3 meters from the floor plastered and painted with all bound distemper shall be provided. The doors shall be of first quality wood and aluminium sliding windows of approved quality shall be provided. Before commencing the construction of the office, the contractor shall submit the design and drawing of the building to the Employers Representative for approval. This shall include all the architectural and finishing details fully elaborated. The location of the office building shall be finalized after taking approval of the Employer's representative. The office shall be maintained through out the contract period with office boy, power, water and house keeping. Power and water supply shall be arranged by the contractor either with the available resources or from independent sources (DG sets, bore well, etc.)

The office building shall be provided with adequate forced ventilation and exhaust fans. Flooring for the office shall be of vitrified tiles. Toilets shall be provided on the each floor. Adequate number of toilets and washbasins shall be provided separately for men & women. A covered service water tank shall be suitably provided to cater to the water requirements of laboratory and office building. Space for keeping plant records shall be provided in the administration building. The list of furniture to be supplied in the office building is detailed in **Annexure IX**.

**Workshop/Tool Room**

**Each STP site should have the following provisions as detailed below.**

In addition, to the above, a separate workshop and tool room of 5m x 4m each shall be provided near to the administrative block. Both workshop and tool rooms shall be provided with working platforms and cabinets to store spares and accessories. The tool room shall also be provided with lockers (minimum 6nos.).

The Contractor shall provide the following tools and equipment for routine operation and maintenance works, as well as for emergency breakdowns and limited specials repairs, which can be made locally. Replacement of parts of various machine, equipment (mechanical and electrical) shall be carried out by specialists or at the manufacturer's workshop. Standard tool kits for following trades shall be supplied (1 set in a suitable toolbox each) for:

- (a) Machine mechanic
- (b) Electrician
- (c) Plumber

Special tools/equipment are to be provided (1 set of each item) as listed in **Annexure X**.

The workshop shall have at least the equipment listed in **Annexure XII**.

**(c) Mandatory Laboratory Tests in the treatment plant site**

**Each STP site should have the following provisions as detailed below.**

The following laboratory equipment of reputed make as listed in **Annexure V** shall be provided in the laboratory at plant site for conducting following tests:

- (i) pH
- (ii) Turbidity
- (iii) Suspended Solids – Total , Fixed, Volatile
- (iv) Dissolved Oxygen
- (v) Oil & Grease
- (vi) COD by Chromate Reflux Method
- (vii) BOD at 27 Deg C and 20 deg C
- (viii) Coliform Measurement using both MPN and Millipore Filter/Plate count technique

**(d) Residential quarters**

**Each STP site should have the following provisions as detailed below.**

Contractors has to built residential quarters as detailed below for providing housing facility for the staff of O & M of pumping stations & Sewerage system and Treatment Plant, to have easy access to operators and maintenance staff during emergencies

Sl. No.	Type of Quarter with area	Qty
1	Type I ( 83sqm)	2
2	Type II ( 64sqm, Twin Type)	10

The general specifications for the staff quarters shall be as follows:

Sl. No.	Components	Specification
1	Foundation	RCC Colum footing
2	Plinth	0.60m. above Road Level
3	Wooden frames	Bija, sal, Khair, banteak, haldu.
4	Doors	50mm thick, paneled shutter doors.
5	Windows	35mm thick, partly paneled and partly glazed shutter.
6	Plaster	12mm &15mm thick in 1:6
7	Floor	Kota stone flooring
8	Finishing	Distempering & painting with synthetic enamel.

**(e) Security cabin & Toilet Block**

**Each STP site should have the following provisions as detailed below**

A security cabin shall be provided at each entry gate to plant. Minimum size of security cabin shall be 3m x 3m. A separate toilet block shall be provided for the labourers comprising of 2 numbers of Bathrooms and WC with 4 numbers of Urinals with ventilation, water supply and Disposal facilities.

**(f) Utilities**

**Each STP site should have the following provisions as detailed below**

**(i) Compound Wall and Gate**

Compound wall shall be constructed by NRDA at latter stage , However the contractor shall be responsible for safeguard of the entire primises of the plant area.

**(ii) Storm Water Drainage**

Storm water drains adjacent to the proposed approach road shall be sized for rainfall intensity of 50 mm/hr, allowing for 100% runoff. Drains roads/pathways shall be in RCC NP3 pipe with necessary chambers at appropriate locations. These chambers shall be covered with CI gratings. The storm water drainage system shall be designed and connected to the run-off from the plot and structures, and discharged into the city network nearby storm drain or nallah.

**(iii) Approach Road**

An access road through the site along with a network of pathway provided to link the existing approach road and permit access to the STP site for necessary maintenance, delivery of consumables and personnel access. All internal roads shall be of WBM with asphaltting BM +AC and minimum 6m wide. Vehicular access shall be provided for such plant units that may require frequent access. All roads shall be provided with drainage and constructed to prevent standing water. The approach road shall be 6 m WBM with asphaltting BM + AC and pathways shall be in PCC M15 with nominal reinforcement or pre cast blocks given in the drawing as per IRC standards.

**(iv) Pathways**

Paved pedestrian (Pathways) access ways shall be constructed to network of logical routes inter-linking entire plant areas and road Minimum width of pathways shall be 2 m. Pathways shall be in coloured glossy interlocking blocks. Damage to any existing roads, on account of their use by the Contractor shall be made good to the satisfaction of the NRDA.

Hard standing areas in coloured and glossy interlocking blocks shall be to permit the parking of vehicles involved in the delivery of consumables from blocking site roadways during unloading or loading. The road system designed such that vehicles involved in the delivery of consumables can continuous route through the works and out again. The work of approach road and storm water drainage shall be carried as per approved layout during execution of the contract.

**(v) Fire Extinguishers**

The portable fire extinguishers with ISI mark of approved make shall be provided at the Admin room, MEP room, chlorine house.

Each building shall be provided with following portable fire extinguishers

1. Dry chemical powder type fire extinguishers of 3.2 kg capacity – 6

cylinders

2. Buckets filled with dry clean sand – 6 Nos.

All buildings shall be provided with manual fire alarm system connected main control panel. The alarm system shall be with pillboxes and hoc layout of the fire alarm system shall be in accordance with the relevant ISI standards.

**(vi) Yard Lighting**

Effective yard and building lighting systems shall be incorporated within the treatment plant site in order to provide sufficient illumination for operation and maintenance schedules to be carried out during day and night periods. In addition, the entire treatment plant site shall have sufficient street lights and perimeter lights for various operations, safety and security reasons.

**(vii) Landscaping & Gardening**

Landscaping involves beautification of Sewage Treatment Plant site by cultivating Lands, Plants and Trees of environmental value and suitably modifying the appearance of treatment plant site. It shall add scenic value to the treatment plant site to obtain maximum visual impact. Contractor has to develop proper landscaping in the treatment plant site from professional landscaper approved by NRDA. Area for future expansion shall also be considered for landscaping.

Minimum 10meters wide with three rows of tree plantation of green buffer zone shall be developed allround the treatment plant with in the first phase of 12months of the contract period. About 30 %of the plant area for the total ultimate capacity should be land scaped with various standard species as approved by NRDA.

**(g) Battery Limits**

The assignment is having two parts , part A is a component of Item rate contract and Part B is having Turnkey scope.

The scope of work of part A component starts from laying of sewerage collection network with piping system for supply of tertiary treated water, as per items as defined in the BOQs.

The scope of work of part B component starts from 10 meters prior to Wet well and ends at 10 meters beyond the Tertiary treated water pumping station. The excess of treated and chlorinated sewage shall be discharged by gravity to the natural drain.

## **2. OPERATION AND MAINTENANCE WORKS:**

### **2.1 General**

This section applies to the specifications for operation and maintenance of complete sewerage collection system, complete treatment plant, and treated water supply system for reuse along with related ancillary buildings, roads campus etc. It illustrates for the workmanship, period for

routine maintenance, specifications for the acceptable quality of treated water to satisfy the standards of CPHEEO, maintenance of records, and responsibilities during operation and maintenance period. **The period of Operation, Maintenance and defect liability shall be 60 months after 3 months of trial run period.**

## **2.2 O & M for Sewerage collection and effluent System**

The primary effort of the tenderer is to maintain sewers free flowing and unobstructed. The sewer system with its components properly designed and installed is handed over to the person in charge of maintenance who assumes the responsibility to make it function satisfactorily for the benefit of the community. One should have sufficient experience in the design and construction of the system to enable him to, perform his task efficiently with an understanding and appreciation of the problems that may arise during maintenance. One has not only to be a technical man but has also to deal with human relations in order to be successful in his work. In, service training shall be imparted to the maintenance personnel to improve upon the methods adopted based on the latest trends. Failure to develop a better understanding of human relations and also lack of development of the concept of service to the community generally results in the maintenance pan becoming unpopular. The general public is also to be made aware of do's and don'ts to help in keeping the sewers free flowing and unobstructed.

## **2.3 O & M for Pumping station and treatment plant**

Operation and maintenance of the pumping station and' treatment plant is essential for the sustainability of the entire system and to achieve discharge standards. The operational aspects include regular checking of the units (which include the electrical and mechanical equipment), to identify any non-functionality of the units and to evolve the strategic measures to be taken, so as to run the plant efficiently.

The Engineer-in-charge and technical supervisor will look after the operation and maintenance of the pumping station and treatment plant. All the activities of the pumping station and treatment plant are scheduled and coordinated by the Engineer - in- charge and his/her assistant along with the technical foreman / supervisor who will execute the instructions. The Maintenance Engineer who is responsible for proper functioning of Electrical and Mechanical equipment will also provide useful inputs. The Engineer-in-charge will also be responsible for taking steps like shutting down the pumping station and treatment plant or to bypass the wastewater in case of emergencies after having proper deliberations with the management and the operational staff.

## **2.4 Specifications**

The specification of materials used for repairs shall be the same as have been used in the original work. Specifications for any materials which were not used during construction shall be approved by the Employer's Representative prior to commencement of the operation and maintenance period and must be incorporated in the O&M manual. Without being limited by this clause, during O&M period the Contractor shall use appropriate material for repairs even if material required for such repairs has not been approved earlier, and no delay in making such repairs shall be subjected to such limitation. However, subsequent to use of such material the Contractor shall submit proposals for the approval of specifications of such material. The approved material will subsequently form a part of the O&M manual.

The Contractor shall be responsible for operation and maintenance of the sewerage collection, treatment, and reuse system for Zone 1, 2, 3 & specified area at Naya Raipur, entire system for the period of 60months after successful completion. Notwithstanding the above, the Contractor will be required to rectify any deficiencies which are attributable to defects in the workmanship or quality of materials, Plant or equipment during the Contract Period.

The operation & Maintenance cost approved by the Department shall be payable on quarterly basis on completion of every quarterly on submission of bill by the contractor. The contractor shall maintain the attendance record of the staff employed by him, which can be checked by the department any time. The contractor will also submit copy of all the data sheets every month for evaluation.

All sorts of Tool & Plant, required for proper operation & Maintenance of the Pipeline work, shall be arranged by the contractor at his own cost.

The scope of work is given below but not limited to the following. This may include other incidental items of work connected with the regular operation & maintenance of the treatment plant as decided by Engineer-in-Charge from time to time.

- (i) The contractor shall ensure proper running of the plant to give the desired effluent standards as defined in design parameters. The contractor shall also be responsible for overall maintenance of the plant i.e. civil, electrical, and mechanical system. The contractor shall also be responsible for all repairs of equipment/machinery.
- (ii) The contractor shall monitor the quality of raw and treated sewage. The contractor shall intimate and take adequate action to ensure smooth and satisfactory running of the plant. The raw and treated sewage analysis for pH, SS, BOD and oil & grease shall be carried out on weekly basis during O & M period at a reputed laboratory as approved by Engineer-in-Charge.
- (iii) The contractor shall prepare and implement an effective plant maintenance programme in consultation with Engineer-in-Charge (E&M). It shall be absolutely contractor's responsibility to look after all sorts of maintenance whether preventive or break down. The contractor shall maintain the operational activity record as prescribed in this volume.
- (iv) The contractor shall be responsible for keeping updated record of documents including History-Card for equipment and maintaining every day logbook relating to running of machinery, consumption of energy, and other consumables etc. and various analysis performed. In addition to above the contractor shall maintain the operation and maintenance data for the following.
  - (a) Daily status record of STP
  - (b) Daily flow record
  - (c) Daily analysis record
  - (d) Operation records of mechanical screens
  - (e) Operation record of grit channel
  - (f) Operation record of all the components of wet wells, Pumping station and treatment units
  - (g) Operation record of chlorination system
  - (h) Record of quantity of sludge generation
  - (i) Operation record of Centrifuge unit
  - (j) Performance data of aeration system.
  - (k) Performance data of Chlorination system
  - (l) Any other allied works required by EIC during O&M.
- (v) The Contractor shall submit a monthly report to NRDA, about the operation and maintenance indicating the manpower, electric power, chemicals and other



- consumables consumed, problems faced and rectified along with various analysis performed for raw and treated sewage.
- (vi) The contractor shall be responsible to carry out day to day as well as periodic maintenance necessary to ensure smooth and efficient performance/running of all equipment/instruments installed at the Sewage Treatment Plant. The contractor shall hand over the machinery & site to the department after expiry of the contract period in good running condition.
  - (vii) The contractor shall maintain all treatment plant and pumping station units and other civil structures in the STP premises including boundary wall in sturdy manner to complete its natural / designed life. He should paint all MS / CI / GI structures at least once in a year to prevent rusting as and where required and as directed by EIC.
  - (viii) The contractor shall also be responsible for proper upkeep of administrative block of the Sewage Treatment Plant.
  - (ix) He shall be responsible for proper maintenance of all the pumps and allied items including mechanical screens, gates, Aerators, sludge pumps, chlorinator etc.
  - (x) He shall be responsible for timely removal and safe disposal of the dried sludge including transportation, loading and unloading etc. He should get approval for the location of the disposal of the dried sludge from NRDA.
  - (xi) He shall be responsible for maintenance of streetlight, poles & fixtures also.
  - (xii) The sewerage system in the STP premises, roads and pathways provided at the sewage treatment plant shall be maintained properly.
  - (xiii) Round the Clock watch and ward of the entire premises including plants/machinery etc. will also be the responsibility of the contractor.
  - (xiv) The entire STP premises including Administration building will be kept neat and clean.
  - (xv) The records maintained by the contractors shall be produced periodically to the Engineer-in-charge for proper monitoring as desired by him.
  - (xvi) Operation & maintenance of boundary wall of STP, Landscaping and Forestation done in the Sewage Treatment Plant premises etc. shall be carried out.

## 2.5 General Terms and Conditions

1. NRDA shall bear the required power charges for complete O & M period of 60 months. The power bills shall first be paid by the contractor and shall be reimbursed by NRDA along with the monthly O & M charges.
2. During O & M period the contractor is to keep their staff engaged continuously without any break for Operation, Maintenance and Monitoring of the system.
3. The contractor will supply all consumable and reagents including POL of DG set. NRDA will not bear any cost on operation and maintenance of the complete system except the power charges.
4. The contractor will employ its own staff for monitoring quality of sewerage and effluent, however the department will be at liberty to get random sampling & testing done on its own or from any other agency, to the entire satisfaction of Engineer-in-charge. In case of testing from other agency, charges will be borne by NRDA.
5. Contractor's labourers and supervisors shall have to normally observe office timings in the general shift.
6. Plant and equipment covered under this contract shall be totally attended to by the



contractor including any "Trouble Shooting" to ensure smooth and trouble free operation.

7. For effective maintenance of STP, the contractor shall employ sufficient staff with proper qualification. For his guidance the pattern and no. of minimum staff to be engaged is described in this chapter.
8. The contractor shall take operational measures that there shall be no flooding of STP area.
9. The contractor shall abide by all central/state govt./Semi govt./Local Bodies rules regulations, pertaining to this contract, without any extra cost.
10. In the event of any damage/loss of life/theft of property, due to negligence on the part of contractor, the contractor shall be solely responsible and liable for compensation and damages, regarding negligence and the decision of Engineer-in-charge shall be final.
11. The contractor should maintain all kinds of securities in the premises round the clock for that he should arrange manpower to prevent theft, robberies and malpractice. No unauthorised person shall be allowed to enter the STP premises, except authorised staff, officials of NRDA. Educational study visits of the students shall be allowed only on written permission from NRDA.
12. The site will be open for inspection by the designated officers/official of NRDA at all times during the contract period.
13. The contractor should observe all safety rules and regulations corresponding to electricity act, factory act, bio-chem process and fire safety act as per building codes. Any accident caused by over sighting the rules, shall be at the contractor own cost and risk and shall be handled by him at all levels..
14. Insurance of the entire staff working for O & M of the system is compulsory. The copy of the cover note should be submitted to NRDA.

## **2.6 Experience and qualification of staff**

For all operation and maintenance works, the Contractor shall provide skilled staff, which has adequate qualifications and sufficient experience of similar works. CV of key staffs will have to be got approved from the Employer. The Contractor will arrange extra work force, as and when required, so as to smoothly run the operation and maintenance including preventive maintenance, repairs etc. and general cleanliness of the installations. The Contractor shall make appropriate arrangements for maintenance of items like road work, buildings, arboriculture, patrolling and maintenance of civil structures, vehicle operations and other activities to fulfill its obligations under O&M Contract.

## **2.7 Operation and maintenance manual**

The comprehensive manual shall be submitted before the operation and maintenance period, as specified. It shall be periodically updated to incorporate the "best practices" experience gained while carrying out the O&M activities, broadly on the principals listed below:

- (i) Up-dating any changes in the procedures set out in the O&M manual, as deemed necessary based on any limitations observed during the maintenance period, including incorporating additional procedures for maintenance of other repairs/break downs not incorporated in the maintenance manual but faced during O&M period.
- (ii) Procedures for repair of leaks/burst in different types of pipes must be provided, with supporting drawings. The O&M manual must be updated if any differences are observed during O&M period.
- (iii) Records of locations and type of damages observed during maintenance of road which

are of recurring nature must be used in updating the manual.

- (iv) Records of Inventory used must be maintained and the relevant portion of O&M manual must be updated to list out the inventory requirements for maintaining the system for 12 months.
- (v) Records of the sewage and treated water quality, shall be kept intact for complete period of O&M, and shall be handed over to NRDA, after the expiry of Contract period.
- (vi) The chemical requirement in the worst conditions of operation must be identified and incorporated in the manual.. Record keeping must be sufficient so as to assist in forming a relationship between the chemical dosages required for treatment with respect to the raw water input quality.
- (vii) The provisions in the manual must incorporate every aspect of good industrial practices even if not elaborated here or in other parts of the bid document. The provisions in the approved operation and maintenance document shall be valid and binding for both the parties during operation and maintenance along with the additions and deletions made.
- (viii) The manual so prepared must be updated after the end of every year of operation and maintenance, giving effect to the experience gained and the observations made by the Department during the maintenance period.
- (ix) At the time of handing over after completion of O&M period, all the equipment, including standby equipment, must be in good working order as were taken over before commencement of O&M period.

## 2.8 Penalties for failure to achieve the functional guarantees

In case of failure to deliver the required quality of work, liquidated damages shall be imposed for such failure to meet the performance criteria, as described. The Employer will be entitled to recover any such damages from the monthly progress payments to be made to the Contractor in the month in which the failure occurred, or at any time thereafter from the subsequent monthly progress payments.

However, the contractor shall be allowed to take up routine / periodical maintenance as per CPHEEO manual, with prior permission of the Authority.

a. Failure to achieve the specified quality of effluent from STP: Rs. 5000.00 for each time and each parameter.

b. Failure to achieve the specified quality of effluent from TTP: Rs. 5000.00 for each time and each parameter

c. For each breakdown of any unit of plant for more than 1 hour: Rs. 2000.00 each time

d. For complete break down / non operation of plant for more than 15 minutes : Rs. 10,000 each break down of maximum 30 minute time. If break down exceeds 30 minutes second slot of penalty shall be leviable for each slot of 30 minutes.

e. Non redressal of any complaint within 48 hours : Rs. 1000.00 for each such complaint.

f. Penalties for absence of Supervisory / Operating staff shall be as follows:

**Each treatment plant should have the minimum Supervisory / Operating staff**

Sl. No.	Staff Category	No. of Staffs	Penalty for absence
1	Plant Manager	1	Rs. 2000.00 per day
2	Chemist	1	Rs. 1000.00 per day
3	Laboratory Assistant	2	Rs. 700.00 per day
4	Plant operators	8	Rs. 700.00 per day
5	Electrician	2	Rs. 700.00 per day

6	Mechanic cum Fitter	2	Rs. 700.00 per day
7	Helper	8	Rs. 500.00 per day
8	Watchman	3	Rs. 500.00 per day
<i>Note: However contractor can depute substitute staff with permission of the Authority in case leave of any staff member. In such case this penalty shall not be levied.</i>			

## 2.9 Facilities to contractor

The Contractor will be permitted to use the premise and quarters developed under the Contract for use by his staff during operation and maintenance to the extent agreed and approved by the Employer's Representative.

## II. Quality Assurance and Quality Control

### 1. GENERAL

Some of the tests and procedures related to the specific works related to this Contract are laid out here and shall be applicable for this Contract. They shall be in general as an additional stipulation to the QA/QC manual and will not reduce the requirements stipulated in the Manual. The various tests stipulated below will be conducted on the following frequencies and the test report format and other details will be followed as per the QA/QC Manual.

#### 1.1 Civil Engineering Works

##### 1.1.1 Supply of Material

The tests on the construction material received on site shall be carried out as follows:

#### Procedures for Testing Materials on Site

CEMENT			QC-M-01	
Sl. No.	Type of Test	Test Report Format No.	Frequency of Test	Timing of Test/ Inspection
1	Normal consistency	TC-M-01-01	One for each source and when called for by the Engineer	On receipt of material at site and before using as directed by the Engineer. Test certificate to be produced to the Engineer before use.
2	Fineness	TC-M-01-01		
3	Setting time – Initial / final	TC-M-01-01		
4	Compressive strength - 72 hrs, 168 hrs, 672 hrs.	TC-M-01-01		
For sulphate resistant cement as per IS-12330 OPC 43/53 shall conform to IS 8112/ 12269 and both 56 and 90 days strength shall be tested.				

SAND			QC-M-02	
Sl. No.	Type of Test	Test Report Format No.	Frequency of Test	Timing of Test/ Inspection
1	Sieve analysis	TC-M-02-01	One test for 15 m <sup>3</sup>	On receipt at site and test certificate to be produced to the Engineer before use.
2	Fineness modulus	TC-M-02-01	One test for 15 m <sup>3</sup>	
3	Deleterious constituents	TC-M-02-01	One test for 15 m <sup>3</sup>	
4	Bulking test	TC-M-02-01	One test per Source	

WATER FOR CONSTRUCTION WORKS			QC-M-03	
Sl. No.	Type of Test	Test Report Format No.	Frequency of Test	Timing of Test/ Inspection
1	Alkalinity and acidity as per IS-3025	TC-M-03-01	Once per source of supply and when called for by the Engineer	Before use of water from that source
2	Solids	TC-M-03-01		

BRICKS			QC-M-04	
Sl. No.	Type of Test	Test Report Format No.	Frequency of Test	Timing of Test/ Inspection
1	Compressive strength	TC-M-04-01	One test per 50,000 bricks or part thereof	On receipt at site
2	Physical properties	TC-M-04-01		
3	Water absorption test	TC-M-04-01		

SIZE STONE			QC-M-05	
Sl. No.	Type of Test	Test Report Format No.	Frequency of Test	Timing of Test/ Inspection
1	Water absorption test	TC-M-05-01	One test per source and when called for	On receipt at site
2	Dimension check	Lab format	As directed by the Engineer	
3	Type of rock	Lab format		

COARSE AGGREGATE FOR CONCRETE			QC-M-06	
Sl. No.	Type of Test	Test Report Format No.	Frequency of Test	Timing of Test/ Inspection
1	Aggregate Impact or Los Angeles Abrasion Value as per IS-2386 Part-IV	TC-M-06-01/1 TC-M-06-01/2	One for each source of supply and when called for by the Engineer	On receipt of material at site
2	Soundness as per IS-2386 Part-V	TC-M-06-02		
3	Alkali Aggregate Reactivity as per IS-2386 Part-IV	Lab Format		
4	Flakiness Index	TC-M-06-03		
5	Gradation by wet sieve analysis	TC-M-06-04		
6	Water Absorption	TC-M-05-01		
When required, the Contractor shall furnish the mix design along with material properties at least 15 days in advance.				

SOIL/EARTH/SUB-GRADE MATERIAL			QC-M-07	
Sl. No.	Type of Test	Test Report Format No.	Frequency of Test	Timing of Test/ Inspection
1	Swelling index IS 2720 part XL	TC-M-09-01	Two sets for 3000 m <sup>3</sup> or part thereof	On receipt at site
2	Liquid limits and plasticity index	TC-M-09-02		
3	Deleterious material IS 1498	Lab format		
4	OMC and MDD Test	TC-M-09-03		
5	Chemical properties	Lab format		
6	Grain Size Distribution Graph (by wet sieve analysis)	TC-M-09-04		

7	Void ratio gradation	Lab format		
8	Soaked CBR test (optional)	TC-M-07-01	Two sets for 3000 m <sup>3</sup> or part thereof and as directed by the Engineer	

GRANULAR SUB-BASE MATERIAL			QC-M-08	
Sl. No.	Type of Test	Test Report Format No.	Frequency of Test	Timing of Test/ Inspection
1	California Bearing Ratio Test	TC-M-07-01	As required	On receipt at site
2	Material combinations	Daily log		
3	Moisture content as per IS-2270	TC-M-07-02	1 test per 250 m3 or part thereof	Prior to compaction
4	Fineness value BS 812 Part III	Lab format	As required	On receipt at site
5	Soundness of material	TC-M-06-02		
6	Air voids content	Lab format		
7	Gradation by wet sieve analysis	TC-M-06-04	1 test per 200 m3 or part thereof	
8	Atterberg limits	TC-M-09-02		
9	Deleterious constituents	Lab format		
10	OMC and MDD	TC-M-09-03		
The Contractor shall furnish the GSB design mix along with material properties and test results at least 15 days before laying GSB at site.				

MATERIAL FOR WBM			QC-M-09	
Sl. No.	Type of Test	Test Report Format No.	Frequency of Test	Timing of Test/ Inspection
1	Aggregate Impact Value	TC-M-06-01/1	One test for 200 m <sup>3</sup>	On receipt at site
2	Grading by wet sieve analysis	TC-M-06-04	One test for 100 m <sup>3</sup>	
3	Flakiness Index and Elongation Index	TC-M-06-03	One test for 200 m <sup>3</sup> of aggregate	
4	Atterberg limits of binding material	TC-M-09-02	One test for 25m <sup>3</sup> of binding material	
5	Atterberg limits of portion of aggregate passing 425 micron sieve.	TC-M-09-02	One test for 100 m <sup>3</sup> of aggregate	
6	Water Absorption Test	TC-M-05-01	Initially one set of 3 representative specimen for each source of supply and subsequently, when warranted by changes in the quality of aggregate	
7	Soundness Test	TC-M-06-02	One for each source of	On receipt at site and

			supply and when called for by the Engineer	when absorption value is more 2%
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METAL FOR BM / DBM / BC / SURFACE DRESSING / MSS / PRE-MIX CARPET			QC-M-10	
Sl. No.	Type of Test	Test Report Format No.	Frequency of Test	Timing of Test/ Inspection
1	Aggregate Impact Value	TC-M-06-01/1	One test for 50 m <sup>3</sup> of aggregate or part thereof	On receipt at site and before using in the hot mixing
2	Flakiness Index and Elongation Index of aggregates	TC-M-06-03		
3	Water absorption of aggregates	TC-M-06-06	Initially one set of 3 representative specimen for each source of supply and subsequently, when warranted by changes in the quality of aggregate	
4	Stripping value	TC-M-11-01		
5	Gradation by wet sieve analysis	TC-M-06-04	As directed by the Engineer for individual component and for combined coarse, fine aggregate and filler.	
6	Soundness Test	TC-M-06-02	One for each source of supply and when called for by the Engineer	On receipt at site and when absorption value is more than 2%
For DBM and BC, the Contractor shall furnish the material properties and proposed job mix formula at least 20 days in advance.				

BINDER FOR WBM			QC-M-11	
Sl. No.	Type of Test	Test Report Format No.	Frequency of Test	Timing of Test/ Inspection
1	Atterberg Limit Test	TC-M-09-02	One test for 100 m <sup>3</sup> of binding material	On receipt at site

FINE AGGREGATE FOR DBM/BC			QC-M-12	
Sl. No.	Type of Test	Test Report Format No.	Frequency of Test	Timing of Test/ Inspection
1	Passing 2.36 mm sieve and retained on 75 micron sieve	Daily log	As directed by the Engineer	Before use
2	Deleterious matter	Daily log	Visual observation of lot before use	

BITUMEN			QC-M-14	
Sl. No.	Type of Test	Test Report Format No.	Frequency of Test	Timing of Test/ Inspection
1	Grade of bitumen as directed/defined (Penetration Test)	TC-M-10-01	Two samples per test subject to all or some tests as directed by the Engineer	On receipt of material at site before unloading from the truck
2	Ductility Test	TC-M-10-02		
3	Flash and Fire Point Test	Lab format		

4	Viscosity Test	Lab format		
5	Softening Test	Lab format		

### 1.1.2 General Civil Engineering Works

The general civil engineering works will be subjected to a check frequency as follows:

**Table 1: Procedures for Testing General Civil and Structural Works**

Embankment Formation			QC-G-01	
Sl. No.	Type of Test	Test Report Format No.	Frequency of Test	Timing of Test/ Inspection
1	Moisture content as per IS-2720	TC-M-09-03	One test for each 250 m <sup>3</sup> of soil	In-process
2	Field density test as per IS-2720	TC-M-09-03	5-10 density tests for each 1000 m <sup>2</sup> compacted area, or as directed by Engineer	
3	Compaction	Daily log	As per required number of passes	While compacting

Excavation/Backfilling			QC-G-02	
Sl. No.	Type of Test	Test Report Format No.	Frequency of Test	Timing of Test/ Inspection
1	Layout, slopes of excavation, benching and over-burden	Daily log	As directed by the Engineer	After excavation
2	Sub-soil water, shoring and strutting	Daily log		
3	Bottom levels and compaction	Daily log		
4	Soil classification	Daily log		
5	Backfilling and compaction	Daily log		After backfilling

Concreting			QC-G-03	
Sl. No.	Type of Test	Test Report Format No.	Frequency of Test	Timing of Test/ Inspection
1	Compressive strength as per IS-516	TC-G-01-01	One test for 1-5 m <sup>3</sup> of concrete Two tests for 6-15 m <sup>3</sup> of concrete Three tests for 16-30 m <sup>3</sup> of concrete Four tests for 31-50 m <sup>3</sup> + one set every 50 m <sup>3</sup> of additional concrete work.	Test samples to be taken while pouring. Testing to be done as specified in Contract.
2	Slump test per IS-1199	TC-G-01-02	Random checks throughout concreting as directed by the Engineer	Before pouring concrete
3	Inspection of steel reinforcement placement and bending, and formwork	Daily log	Before pouring concrete	Before pouring concrete
4	Concrete Pour Report	TC-G-01-03	When pouring is done	Immediately after



				pouring
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Mortar			QC-G-04	
Sl. No.	Type of Test	Test Report Format No.	Frequency of Test	Timing of Test/ Inspection
1	Compressive strength as per IS-2250	TC-G-01-01	One sample for every 2 m <sup>3</sup> of mortar subject to a minimum of three samples for a day's work	Test samples to be taken while before mortaring. Testing to be done as specified in Contract.
2	Consistency as per IS-2250	TC-G-02-01		

### 1.1.3 Pipe Line and Water Retaining Works

The general pipe line works and water retaining works will be tested as follows:

**Table 3: Procedures for Testing Pipeline Works and Liquid Retaining Structures**

Earth Bedding			QC-P-01	
Sl. No.	Type of Test	Test Report Format No.	Frequency of Test	Timing of Test/ Inspection
1	Moisture content as per IS-2720	TC-M-09-03	One test for each 250 m <sup>3</sup> of soil	In-process
2	Field density test as per IS-2720	TC-M-09-03	One test for each 100 m <sup>2</sup> of compacted area	

Concreting			QC-P-02	
Sl. No.	Type of Test	Test Report Format No.	Frequency of Test	Timing of Test/ Inspection
1	Compressive strength as per IS-516	TC-G-01-01	One test for 1-5 m <sup>3</sup> of concrete Two tests for 6-15 m <sup>3</sup> of concrete Three tests for 16-30 m <sup>3</sup> of concrete Four tests for 31-50 m <sup>3</sup> of concrete + one set every 50 m <sup>3</sup> of additional concrete work.	Test samples to be taken while pouring. Tests to be done as specified in the Contract.
2	Slump test per IS-1199	TC-G-01-02	Random checks throughout concreting period as directed by the Engineer	Before pouring concrete
3	Steel reinforcement placement and bending	Daily log	Before pouring concrete	Before pouring concrete
4	Concrete Pour Report	TC-G-01-03	When pouring is done	Immediately after pouring

Mortar			QC-P-03	
Sl. No.	Type of Test	Test Report Format No.	Frequency of Test	Timing of Test/ Inspection
1	Compressive strength as per IS-2250	TC-G-01-01	One sample for every 2 m <sup>3</sup> of mortar subject to a minimum of three samples for a day's work	Test samples to be taken while placing. Tests to be done as specified in the Contract.
2	Consistency as per IS-2250	TC-G-01-02		

Completion of Pipeline Laying and Jointing			QC-P-04	
Sl. No.	Type of Test	Test Report Format No.	Frequency of Test	Timing of Test/ Inspection
1	Hydrostatic test for NP pipes	TC-P-04-01	One test for defined stretch	On completion of stage
2	Hydrostatic test for pressure pipes	TC-P-04-02	One test for defined stretch	On completion of stage

Completion of Manhole/Valve Chamber			QC-P-05	
Sl. No.	Type of Test	Test Report Format No.	Frequency of Test	Timing of Test/ Inspection
1	Leakage Test	TC-P-05-01	100% inspection	On completion of stage

Completion of Liquid Retaining Structures			QC-P-06	
Sl. No.	Type of Test	Test Report Format No.	Frequency of Test	Timing of Test/ Inspection
1	Water tightness for underground structures	TC-P-06-01	One test per structure	On completion of stage
2	Water tightness for elevated structures	TC-P-06-02	One test per structure	

## 2. MATERIALS, PLANT AND EQUIPMENT

### 2.1 Extent and Procedure for Submission for Pre Construction Testing and Review Data

All goods and materials to be incorporated into the Works shall be new, unused, of the most recent or current models, and shall incorporate all recent improvements in design and materials.

The Contractor shall place orders for the material and the equipment only after approval of the Employer's Representative. The Contractor shall submit the detailed drawings from the approved manufacturer and the procedure of submission, review and revision shall be as specified in clause 4.1.8 of Sub section 1.

### **2.1.1 Works Tests**

These shall be as per applicable IEC/BIS standards unless otherwise detailed in the technical requirements. The results of all works tests shall be recorded and submitted to the Employer's Representative no later than the date of delivery of ex-works.

### **2.1.2 Scope of Inspection**

The test equipment, meters, instruments, etc. used for testing shall be calibrated at recognized test laboratories at regular intervals and valid certificates shall be made available to the Employer's representative at the time of testing. The calibrating instruments used as standards shall be traceable to International standards.

All type (as applicable), routine and acceptance tests shall be conducted in the presence of Employer/ Employer's Representative / Third Party Inspector on all the equipment as per latest applicable IS/IEC at no extra cost. Any modification / revision in the equipment as required by the Inspector shall be carried out by the Contractor without any extra cost. All such costs / fees for revisions / modifications shall be deemed to be included in the prices of supply of equipment as quoted by the Contractor. Typical type test reports for other equipment shall be submitted by the Contractor for approval by Employer.

### **2.1.3 Dispatch**

The Plant / accessories shall not be shipped / dispatched unless shipping release from Employer / Employer's Representative is issued subsequent to acceptance of test results.

### **2.1.4 Packing and Shipping**

Any items liable to be damaged in transit shall be effectively protected and securely fixed in their cases. All cases shall be marked to show where slings should be placed.

All cases shall be clearly identified giving particulars of manufacturer's name and type of equipment. All identification marks on the outside of cases shall be waterproof and permanent. All electrical equipment shall be adequately sealed and desiccating agents shall be used where necessary to prevent damage from condensation. All equipment shall be packed and protected, bearing in mind that it will be shipped to a harsh environment, that a considerable period may elapse between its arrival on site and its unpacking and that covered storage may not always be possible.

All wood and other materials used in packing cases shall be insect free. Adequate protection and precautions shall be taken to exclude termites and other vermin, noxious insects, larvae or fungus from the packing materials or plant. All contents shall be clearly marked for easy identification against the packing list.

The Contractor shall protect all steelwork before shipment, to prevent corrosion and / or damage. Bundles of steel sections shall be properly tied together by an approved method and care shall be taken to ensure that they are robust and that they can be handled easily during shipment.

Bolts and nuts shall be double bagged and crated for shipment. Crating of dissimilar metals is not acceptable.

Packing cases where used, shall be strongly constructed and in no case shall timber less than 25 mm in thickness be used. The contents of packing cases shall be securely bolted or fastened in position with struts or cross battens. Cross battens supporting weight in any direction shall not rely for their support on nails or screws driven lengthwise into the grain of the wood, but shall be supported by cleats secured from inside.

### 2.1.5 Labels

All equipment / components / parts shall be provided with labels or name plates, giving a description of the equipment, together with information regarding the rating, nominal voltage, nominal current and the like under which the item of plant in question has been designed to operate. The labels shall be permanently attached in a conspicuous position. Where this is not practicable, such labeling shall be provided on packaging to the Employer's Representative approval.

Labels shall be made of non-rusting metal. Labels shall have white letters on black or dark blue background. The lettering size shall be 6 mm for panel designation and minimum 3 mm for device labels. The label inscriptions shall be subject to the Employer's approval.

Each item shall be clearly and permanently labeled on the outside of its container with its description and purpose. When several items are packed in one case, a general description of the contents shall be given on the outside of the case. Spare parts shall not be shipped in the same cases as components, which are used for erection. The cases shall be clearly labeled to indicate that they contain spare parts or tools and each spare part tool or appliance shall be clearly marked with its size and purpose.

## 2.2 Quality Assurance

The Bidder shall submit in the bid an outline of the quality assurance practices that will be applied to all aspects of the manufacturing, installation and commissioning process.

The Contractor shall submit a detailed Quality Assurance Manual, which conforms generally to the requirements of ISO 9002. Approval to proceed with manufacture of equipment within this Contract will not be given until this Quality Assurance Manual and drawings of the equipment / systems has been received and approved by the Employer's Representative. Delays to the Contract completion date due to non-compliance with this requirement will be the Contractor's responsibility.

Major features of the Quality Assurance Scheme practiced by the Contractor and detailed in his Quality Assurance Manual shall include:

- (a) The Contractor has defined all staff responsibilities and the QA systems operating within the organization for the purpose of ensuring adequate quality of the end product.
- (b) Regular and systematic programs of testing are carried out for all incoming raw materials.
- (c) Regular calibration checks are carried out on all measuring equipment used in the manufacturing operations.
- (d) All production operations and test functions are properly documented and available to any relevant member of the Contractor's workforce.
- (e) All checking activities, test results, etc. are recorded on appropriate standardized forms and these are verified, certified, recorded and filed in a systematic manner.
- (f) A detailed inspection and test plan is prepared for the whole manufacturing operation.
- (g) Statistical analyses are carried out regularly on appropriate test results to confirm that all processes are performing within the specified tolerances.
- (h) Adequate procedures are planned for corrective action in the event that quality checks show that performance is not satisfactory.
- (i) The Contractor has a senior officer with the authority to resolve matters of quality to the satisfaction of the Employer's Representative.

- (j) The Contractor has adequate facilities under the control of properly trained staff to perform the quality control duties.

The Contractor shall inform the Employer's Representative about the likely dates of manufacturing, testing, and dispatching of any material and equipment to be incorporated into the Permanent Works. The Contractor shall notify the Employer's Representative for inspection and testing, at least twenty-eight (28) days prior to packing and shipping and shall supply the manufacturer's test results and quality control certificates. The Employer's Representative will decide whether he or his representative will inspect and test the material / equipment or whether he will approve it on the basis of the manufacturer's certificate.

The following inspection and test categories shall be applied prior to delivery of the equipment, of various categories as indicated in the technical specifications for each type of the equipment:

**Category A:** The drawing has to be approved by the Employer's Representative before manufacture and testing. The material has to be inspected by the Employer's Representative or a third party inspecting agency approved by the Employer's Representative at the manufacturer's premise before packing and dispatching. The inspection charges of the agency will be borne by the Employer. Initially the Contractor will deposit the inspection charges and same shall be reimbursed by the Employer's Representative. The Contractor shall provide the necessary equipment and facilities for tests and the cost thereof shall be borne by the Contractor.

**Category B:** The drawings of the equipment have to be submitted and approved by the Employer's Representative prior to manufacture. The material has to be tested by the manufacturer and the manufacturer's test certificates are to be submitted and approved by the Employer's Representative before dispatching of the equipment. Notwithstanding the above, the Employer's Representative, after examination of the test certificates, reserves the right to instruct the Contractor for retesting, if required, in the presence of the Contractor's representative.

**Category C:** Samples of the materials and/or equipment shall be submitted to the Employer's Representative for pre-construction review and approval in accordance with the provisions of Sub-Clause 5.5, Section 2. Following approval by the Employer's Representative, the material may be manufactured as per the approved standards and delivered to the Site.

## 2.3 Conditions for Supply and Inspections

For material/equipment under Category "A" and "B", the Employer's Representative will provide an authorization for packing and shipping after inspection.

The testing and approval for dispatching shall not absolve the Contractor from his obligations for satisfactory performance of the System.

The Employer or his duly authorized representative shall have access to the Contractor/Manufacturer's premises at suitable time to inspect and examine inspections (including testing for chemical analysis and physical properties) the material and workmanship of the material, plant and equipment during manufacture. The Contractor will be responsible for obtaining permission for such at the manufacturer's premise if he is himself not the manufacturer as if he was himself the manufacturer. The testing will be carried out by the Contractor/Manufacturer and certificates submitted to the Employer's Representative, who will have the right to witness or inspect the above mentioned inspection/testing at any stage desired by him. The Contractor shall forward to the Employer 3 Nos. duly certified copies of the Test Certificates and Characteristics Performance Curves for all Equipment.

If any material or any part of the works fails to pass any inspection/test, the Contractor shall either rectify or replace such materials or part of the works and shall repeat the inspection and/or test upon giving a notice. Any fault or short coming found during any inspection or test

shall be rectified to the satisfaction of the Employer's Representative without any extra cost before proceeding with further inspection or wiring of that item. Any circuit previously tested, which may have been affected by the rectifications work shall be retested.

Where the Plant and Equipment is a composite unit of several individual pieces manufactured in different places, it shall be assembled and tested as one complete working unit at the Maker's works.

Neither the Inspection / Testing of the material or any part of the works, nor the attendance by the Employer's Representative(s), nor the issue of any Inspection Test Certificate shall relieve the Contractor from the responsibilities under the Contract.

The Test Equipment, Meters, Instruments etc., used for testing shall be calibrated at Recognized Test Laboratories at regular intervals and valid certificates shall be made available to the Employer's

Representative at the time of testing. The calibration instruments used as Standard shall be traceable to National/International Standards. The calibration certificates for the test instruments shall be produced for Employer's Representative consent in advance of testing and if necessary instruments shall be recalibrated or substituted before the commencement of the test.

## 2.4 Category of Inspection

The categorization of the various material, equipment and plant for purpose of inspections is as below. However this list can be altered and additions or subtractions done or categories changed in due course during the implementation of the Contract by the Employer's Representative.

### 2.4.1 Mechanical and Instrumentation Work

Sr. No.	Items	Category of Inspection
<b>A)</b>	<b>Mechanical Works</b>	
1.	Sewage pumps	Category A
2.	Sluice Valves with / without Actuators	Category A
3.	Butterfly valve with the actuator	Category A
4.	Non-Return Valves	Category A
5.	Pipe work above 300mm	Category A
6.	Sluice gates	Category A
7.	E.O.T Crane	Category A
8.	Air vessel and Pressure Filter	Category A
9.	Air compressor	Category A
10.	Chlorinator	Category A
11.	Motor above 90kW	Category A
12.	Motor below 90kW	Category B
13.	Cooling water pumps	Category B
14.	Lubricating water pumps	Category B
15.	M.O.T Crane	Category B
16.	Blower	Category B
17.	Metallic bellows, Expansion Joints and Dismantling joints	Category A
18.	Air washers	Category B
19.	Air Valves	Category B

20.	Drain and dewatering Pump sets	Category B
21.	Pipe Work 300mm and below	Category B
22.	Exhaust Fans	Category B
23.	Portable Fire Extinguisher	Category B
24.	Air Conditioners	Category B
<b>B)</b>	<b>Instrumentation Works</b>	
1.	Instrument Control Panel for RWPS comprising of PLC system, digital indicators, digital flow indicator and integrator, alarm annunciator, pushbuttons etc.	Category A
2.	Instrument Control Panel for CWPS comprising of PLC system, digital indicator, alarm annunciator, pushbuttons etc.	Category A
3.	Instrument Control Panel for Water Treatment Plant along with PLC System.	Category A
4.	Local SCADA Systems (Integrated testing with PLC system) for RWPS and for CWPS.	Category A
5.	Temperature scanners	Category A
6.	Flow switches	Category A
7.	Digital panel meters	Category A
8.	Conductivity level switches	Category A
9.	Control panel for surge protection system	Category A
10.	Filter consoles	Category A
11.	Full Bore Electromagnetic Flow meters	Category A
12.	Clarifier and dosing control panel	Category A
13.	Pressure Switches	Category B
14.	Differential pressure switches	Category B
15.	Ultrasonic type level measuring systems	Category B
16.	Ultrasonic flow meter	Category B
17.	Float type Level Switches	Category B
18.	Instrumentation and Control cables	Category B
19.	Battery and Battery Charger Panel	Category B
20.	Surge Protection Devices	Category B
21.	Radar type level meter	Category B
22.	Pressure transmitter	Category B
23.	Flow indicator and integrator	Category B
24.	Alarm Annunciator	Category B
25.	Motorised Actuators for valves	Category B
26.	Chlorine dosing control panel	Category B
27.	Open channel flow meter	Category B
28.	Turbidity meters	Category B
29.	Residual chlorine meter	Category B
30.	PH meter	Category B
31.	Laboratory instruments and equipment	Category B
32.	Pressure Gauges	Category B
33.	Portable temperature monitor	Category B



34.	Portable sound level meter	Category B
35.	Portable vibration meter	Category B

## 2.4.2 Electrical Works

Sr. No.	Items	Category of Inspection
1.	HV Outdoor Current Transformer	Category A
2.	HV Outdoor Switch Disconnector/ Isolator	Category A
3.	/HV Outdoor Lightning Arrester	Category A
4.	Gantry/ Structure for Switchyard/ Transmission Line	Category A
5.	Transformer (including OLTC, RTCC panel)	Category A
6.	MV and LV Capacitors and APFC Panel	Category A
7.	HV, MV and LV switchboards	Category A
8.	LV Variable Frequency Drive	Category A
9.	Reactance Starter for MV motors	Category A
10.	Battery and Battery Charger and DCDB	Category A
11.	EPABX System	Category A
12.	Cathodic protection- Transformer/ Rectifier (T/ R) units	Category A
13.	Outdoor 33kV accessories for substation (i.e. Fuse, ACSR Conductor, Clamps and connectors, hardwares,	Category B
14.	Cathodic Protection equipment other than T/ R units	Category B
15.	Neutral Grounding Resistor	Category B
16.	Sub-Distribution Boards, Lighting Panels	Category B
17.	Lighting System	Category B
18.	VHF Communication System	Category B
19.	UPS System	Category B
20.	HV, MV and LV Power and Control Cables	Category B
21.	MV/LV Cable Termination	Category B
22.	Laptop Computers	Category B
23.	Printers	Category B
24.	Earthing System	Category B
25.	Local Push Buttons	Category C
26.	Cable tray and accessories	Category B

## 2.5 Electro Mechanical (Indicative QA/QC Plan)

Sr. No.	Material/ Equipment	Tests/ Frequency of test	Size of Sample	Authority to conduct test	Witness to test	Location of conducting test- manufacturer's place/ Site/ laboratory	Remarks
1	Raw water/ Clear water / Back wash pumps	Material test certificate	100%	Manufacturer	Record verification	Manufacturers works/ Laboratory	



		Dynamic balancing	100%	Manufacturer	Record verification	Manufacturers works	
		NDT/ Surface finish on shaft and impeller	100%	Manufacturer	NRDA	Manufacturers works/ Laboratory	
		Hydro test of casing	100%	Manufacturer	Record verification	Manufacturers works	
		Performance test	100%	Manufacturer	NRDA	Manufacturers works	BS 5316 Part 2
2	Valves- Sluice/ Butterfly/ Non return	Material test certificate	100%	Manufacturer	Record verification	Manufacturers works/ Laboratory	
		Hydro test	100%	Manufacturer	NRDA	Manufacturers works	BS 5150/ BS EN 593/ API 594
3	EOT Crane	Material test certificate	100%	Manufacturer	Record verification	Manufacturers works/ Laboratory	
		Load test	100%	Manufacturer	NRDA	Manufacturers works	IS 3177
4	Surge vessels / Pressure filters	Material test certificate	100%	Manufacturer	Record verification	Manufacturers works/ Laboratory	
		Welding qualification		Manufacturer	Record verification	Manufacturers works	
		Heat treatment	100%	Manufacturer	Record verification	Manufacturers works	
		Hydro test	100%	Manufacturer	NRDA	Manufacturers works	IS 2825
5	Piping above 300mm	Material test certificate	100%	Manufacturer	Record verification	Manufacturers works/ Laboratory	
		Hydro test	100%	Manufacturer	NRDA	Manufacturers works	IS 3589
6	Expansion bellow/ Dismantling joint	Material test certificate	100%	Manufacturer	Record verification	Manufacturers works	
		Hydro test	100%	Manufacturer	NRDA	Manufacturers works	
<b>ELECTRICAL</b>							
1	Transformers	Temp. rise test	100%	Manufacturer	NRDA	Manufacturers works	
		One minute power frequency withstand voltage	100%	Manufacturer	NRDA	Manufacturers works	
		Impulse voltage withstand	100%	Manufacturer	NRDA	Manufacturers works	
		Measurement of resistance of windings	100%	Manufacturer	NRDA	Manufacturers works	
		Measurement of no load current, losses	100%	Manufacturer	NRDA	Manufacturers works	
		Measurement of load losses	100%	Manufacturer	NRDA	Manufacturers works	
		Measurement of efficiency and regulation	100%	Manufacturer	NRDA	Manufacturers works	
		Magnetic balance test	100%	Manufacturer	NRDA	Manufacturers works	
		Separate source voltage withstand	100%	Manufacturer	NRDA	Manufacturers works	
		Test on OLTC	100%	Manufacturer	NRDA	Manufacturers works	

		Test on RTCC	100%	Manufacturer	NRDA	Manufacturers works	
2	Switchboards HV/ MV/ LV	One minute power frequency voltage on main and aux. circuits	100%	Manufacturer	NRDA	Manufacturers works	
		HV pressure test for CB	100%	Manufacturer	NRDA	Manufacturers works	
		Milli- volt drop test for CB	100%	Manufacturer	NRDA	Manufacturers works	
		Operation of closing and trip coils	100%	Manufacturer	NRDA	Manufacturers works	
		Functionality checks	100%	Manufacturer	NRDA	Manufacturers works	
		Primary injection test for CTs/ VTs	100%	Manufacturer	NRDA	Manufacturers works	
3	MV Motors and LV Motors > 90kW	HV test	100%	Manufacturer	NRDA	Manufacturers works	
		No load/ Full load test for efficiency, power factor and slip	100%	Manufacturer	NRDA	Manufacturers works	
		Momentary overload	100%	Manufacturer	NRDA	Manufacturers works	
		Over speed test	100%	Manufacturer	NRDA	Manufacturers works	
		Locked rotor readings at reduced voltage	100%	Manufacturer	NRDA	Manufacturers works	
		Test for vibration severity of motor	100%	Manufacturer	NRDA	Manufacturers works	
4	MV/ LV Capacitors	Load test at 110% rated voltage	100%	Manufacturer	NRDA	Manufacturers works	
		Leak proof ness test	100%	Manufacturer	NRDA	Manufacturers works	
		Capacitor losses	100%	Manufacturer	NRDA	Manufacturers works	
5	LV variable frequency drives	Efficiencies at various loads at different frequency levels	100%	Manufacturer	NRDA	Manufacturers works	
6	Battery, Battery Charger	Capacity test	100%	Manufacturer	NRDA	Manufacturers works	
		Test for voltage charging and discharging	100%	Manufacturer	NRDA	Manufacturers works	
		Ampere- hour and watt- hour efficiency test	100%	Manufacturer	NRDA	Manufacturers works	
7	Starters for MV Motors	Characteristics during starting and acceleration	100%	Manufacturer	NRDA	Manufacturers works	
8	Transformer/ Rectifier Unit	Efficiencies at 25%, 50%, 75% and 100% loads for Transformer/ Rectifier units and 100% rated current for transformer after isolating rectifier unit.	100%	Manufacturer	NRDA	Manufacturers works	
		Ratio and polarity test at 25%, 50%, 75% and 100% rated for all T/ R units.	100%	Manufacturer	NRDA	Manufacturers works	
		Insulation resistance test at 2kV between primary and	100%	Manufacturer	NRDA	Manufacturers works	

		secondary, primary and earth and secondary and earth					
		Electronic current control for supply voltage variation and load resistance from 25% to 100%	100%	Manufacturer	NRDA	Manufacturers works	
		Electronic current limiting feature.	100%	Manufacturer	NRDA	Manufacturers works	

## 2.6 Manufacturer's Works Acceptance Tests

The Contractor shall carry out further specified tests of Equipment as indicated in corresponding sub sections. Visual Inspection for all equipments shall cover:

- Material Certificates for all the specified material.
- Welding Qualifications
- Dimension Checking
- Stage Inspections (in process inspection)
- Dynamic balancing for all rotating parts
- Hydrostatic / Leak testing for all pressure parts, Pneumatic Leak Test wherever applicable
- Operation check
- Liquid penetrant tests or magnetic particle tests for all machined surfaces of pressure parts.
- Ultrasonic test for forging materials viz.,
- Plates of thickness 20mm and above for pressed / formed parts such as heads, etc.
- Plates, flanges and bars of thickness / dia 40mm and above used for fabrication of pressure and load bearing members and rotating parts.
- Radiographic testing for all but welded parts, as per applicable codes.
- Hardness tests for all Hardened surfaces.
- Type, routine and acceptance test, as applicable

The Contractor shall maintain proper identification of all materials used, along with reports for all internal / stage inspection work carried out, based on the specific job requirement and or based on the datasheets / drawings / specifications.

Works Testing and Inspection shall be carried out at the manufacturer's works in accordance with the Specification. The Contractor shall in addition to any obligations under the Conditions of Contract inform the Engineer's duly appointed designated representative of the date when the Plant and Equipment will be ready for inspection and witness testing.

## 3. LABORATORY

The Contractor is required to establish a field laboratory for ensuring the timely inspection of the material and works. The laboratory will be equipped with testing facilities sufficient to cope with the requirements of the tests to be conducted on site. It should have at least the following equipment which may be supplemented with additional equipment as may be found necessary by the Employer's Representative/Contractor.

The Test Equipment, meters, instruments etc., used for testing shall be calibrated at Recognized Test Laboratories at regular intervals and valid certificates shall be made available to the Employer's Representative. The calibration certificates should be produced in advance for the approval of the Employer's Representative and if necessary they shall be got recalibrated or substituted before commencement of the tests.

### List of Minimum Laboratory Equipment

S.No.	General
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1.	Oven -Electrically operated, thermostatically controlled, range upto 2000°C sensitivity 1°C
2.	Platform balance 300 kg capacity
3.	Balance 20 kg capacity-self indicating type
4.	Electronic Balance 5 kg capacity accuracy 0.5 gm
5.	Water bath-electrically operated and thermostatically controlled with adjustable shelves, sensitivity 1°C
6.	Thermometers: Mercury-in-glass thermometer range 0° to 250°C Mercury-in-steel thermometer with 30 cm stem, range upto 300°C
7.	Kerosene or gas stove or electric hot plate
8.	Glasswares, spatulas, wire gauzes, steel scales, measuring tape, casseroles, karahis, enamelled trays of assorted sizes, pestle-mortar, porcelain dishes, gunny bags, plastic bags, chemicals, digging tools like pickaxes, shovels etc.
9.	Set of IS sieves with lid and pan: 450 mm diameter: 63 mm, 53 mm, 37.5 mm, 26.5 mm, 13.2 mm, 9.5 .mm, 6.7 mm and 4.75 mm size
10.	200 mm diameter: 2.36' mm, 2.0 mm, 1.18 mm, 600 micron, 425 micron, 300 micron, 150 micron, and 75 micron
11.	Water testing kit
12.	Hydrometer
13.	Gauges to measure diameter of pipe
14.	Total station equipment
15.	Measuring tape, vernier scale, die for concrete cubes, vibrating platform, tools and tackles
16.	Core drilling equipment
17.	First aid box
	<b>For soils and aggregates</b>
1.	Riffle Box
2.	Atterberg Limits (liquid and plastic limits) determination apparatus
3.	Compaction Test Equipment both 2.5 kg and 4.5 kg rammers (Light and Heavy compactive efforts)
4.	Dry Bulk Density Test apparatus (sand pouring cylinder, tray, can etc.) complete
5.	Speedy Moisture Meter complete with chemicals
6.	Post -hole Auger with extensions
7.	Core cutter apparatus 10 cm dia, 10/15 cm height, complete with dolly, rammer etc.
8.	Aggregate Impact Value Test apparatus/Los Angeles Abrasion Test apparatus
9.	Flakiness and Elongation Test Gauges
10.	Standard measures of 30, 15 and 3 liters capacity along with standard tamping rod
11.	California Bearing Ratio test apparatus
12.	Unconfined compression test apparatus
	<b>For Cement and cement concrete</b>
1.	Vicat apparatus for testing setting times
2.	Slump testing apparatus
3.	Compression and Flexural strength testing machine of 200 tonne capacity with additional dial for flexural testing
4.	Needle Vibrator and plate vibrators

5.	Air Meter
6.	Vibrating hammer for vibrating dry mix as for Dry Lean Cement concrete sub-base
	<b>For M.S. Pipe</b>
1.	Ultrasonic Test Equipment
2.	Radiographic Test Equipment
3.	Coating, Lining Thickness Checking Equipment
4.	Holiday Checking Equipment
5.	Ultra sonic gauges for thickness measurement of coating, lining and MS Plate – 4 Nos.
6.	Hydraulic Testing Equipments calibrated pressure gauge
	<b>For Pumps</b>
1.	Portable Temperature Measuring Equipment
2.	Portable Sound Measuring Equipment
3.	Portable Vibration Measuring Equipment
4.	Illumination Measuring Equipment
5.	Portable Tachometer
	<b>For Electrical Works</b>
1.	----- Volt Megger (hand driven)
2.	----- KV Megger (Motorised)
3.	Earth Megger (Electrically Operated)
4.	Digital Multimeter
5.	Tongue Tester (with current and voltage measurement provisions)
6.	Insulating Oil tester
7.	Electronic Stop Watch
	<b>For bitumen and bituminous mixes</b>
1.	Penetrometer with standard needles
2.	Centrifuge type bitumen extractor, hand operated, complete with petrol/commercial benzene
3.	Marshall stability test apparatus, complete with all accessories
4.	Field density bottle along with cutting tray, chisel, hammer and standard sand
5.	3 m straight edge
6.	Camber board
7.	Core cutting machine with 10 cm dia diamond cutting edge
8.	Vacuum pump and 3 specific gravity bottles

### III. GENERAL INFORMATION FOR COMPLETE NAYA RAIPUR (THREE ZONES)

The Design abstracts of the sewerage planning area is detailed as follows,

#### 1.0 Description of System Components

##### a) Collection & conveyance System

The Collection & conveyance System consists of providing & laying of 77077 m of DWC HDPE pipe class SN8, ranging from 300 mm to 1200 mm.

**Table 2.1: Zone wise Length of the Sewage Collection Network**

Description	Length of Network (m)	No. of Manholes
Zone 1	32882	1096
Zone 2	28795	960
Zone 3	15400	513
<b>Total</b>	<b>77077</b>	<b>2569</b>

##### b) Sewage Treatment Plants

Three nos. of sewage treatment plants (STPs) at following location and capacities are proposed under this project. The STPs are proposed to be of modern treatment technology with adequate recycling for reuse in non-domestic purposes.

**Table 2.2 Zone wise List of STPs Capacity**

Description	STP Capacity (MLD)	Up-to Extendable STP Capacity (MLD)
Zone 1	10.00	23.50
Zone 2	10.00	25.30
Zone 3	7.00	20.40
<b>Total</b>	<b>27.00</b>	<b>69.20</b>

##### c) Treated Sewage Pumping main for reuse (Rising Mains)

The Treated Sewage Effluent will be supplied to bulk industrial customers by pumping. The pipe material used for rising main is **High Density Polyethylene pipes**, (PE-100, 6Kg/sq.cm).

**Table 2.3 Length and Diameter of Rising Main**

Description	Length of Network (m)
Zone 1	13451
Zone 2	17586
Zone 3	5318

<b>Total</b>	<b>36355</b>
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**d) Miscellaneous Works**

Miscellaneous works consisting of construction of Security Guard Rooms, Meter Rooms, Compound walls, etc. around STPs.

**2.0 Generation of Sewage / Wastewater Flows**

The wastewater generation is estimated based on the allocation of water to various landuse. This will include the wastewater generated from Industrial use, Domestic use, Commercial use and Public and Semi-public areas. The average wastewater flows is estimated assuming the followings:

- For Residential Area: 80 % of water supply (Ref. CPHEEO Manual on Sewerage and Sewage Treatment, Chapter 3, Cl.3.2.4)
- For Institutional Areas: 80% of water supply
- For Industrial Areas: 80% of water supply

**Table 2.4: Zone-wise Sewage Generation and Sector nos.**

<b>Zone No.</b>	<b>Sector Nos.</b>	<b>Sewage Generation for Ultimate design year (MLD)</b>
1	1, 2, 3, 4, 5, 6, 7, 8, 9 & 10	23.50
2	7, 11, 12, 13,14, 15, 16, 17, 18, 19, 20 & 21	25.30
3	22, 23, 24, 34, 35 & 40	20.40
	<b>Total</b>	<b>69.20</b>

**3.0 Recycling and Reuse of Wastewater**

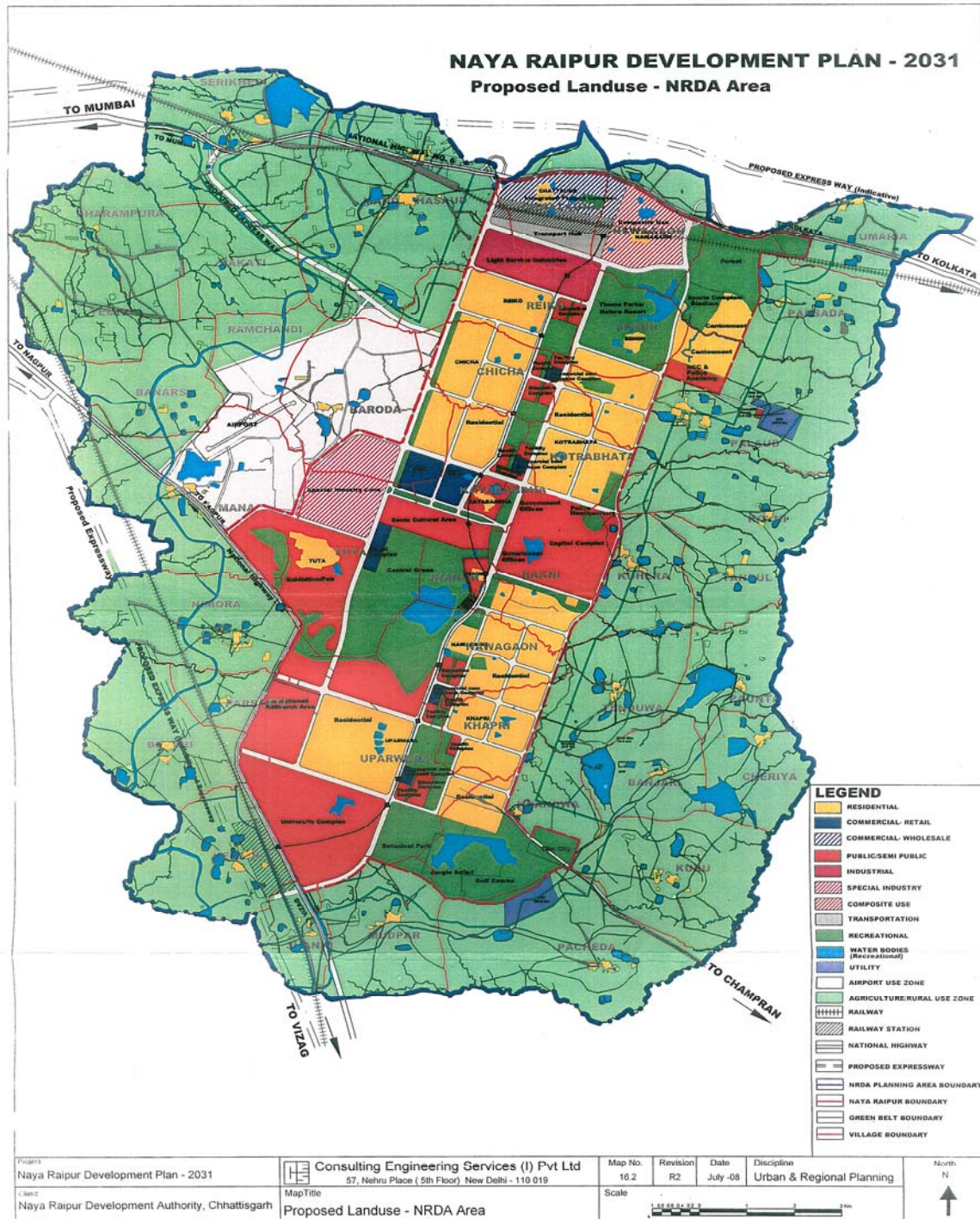
The option of recycling of wastewater and reusing it for non-domestic purposes is becoming a very popular option with the depleting water resources in various regions. Many countries have developed their water quality standards. Table 2.12 presents some guidelines (as per USEPA Standards) for the utilization of treated wastewater, indicating the type of treatment required and resultant water quality specifications.

**Table 2.5 Guidelines for Water Reuse**

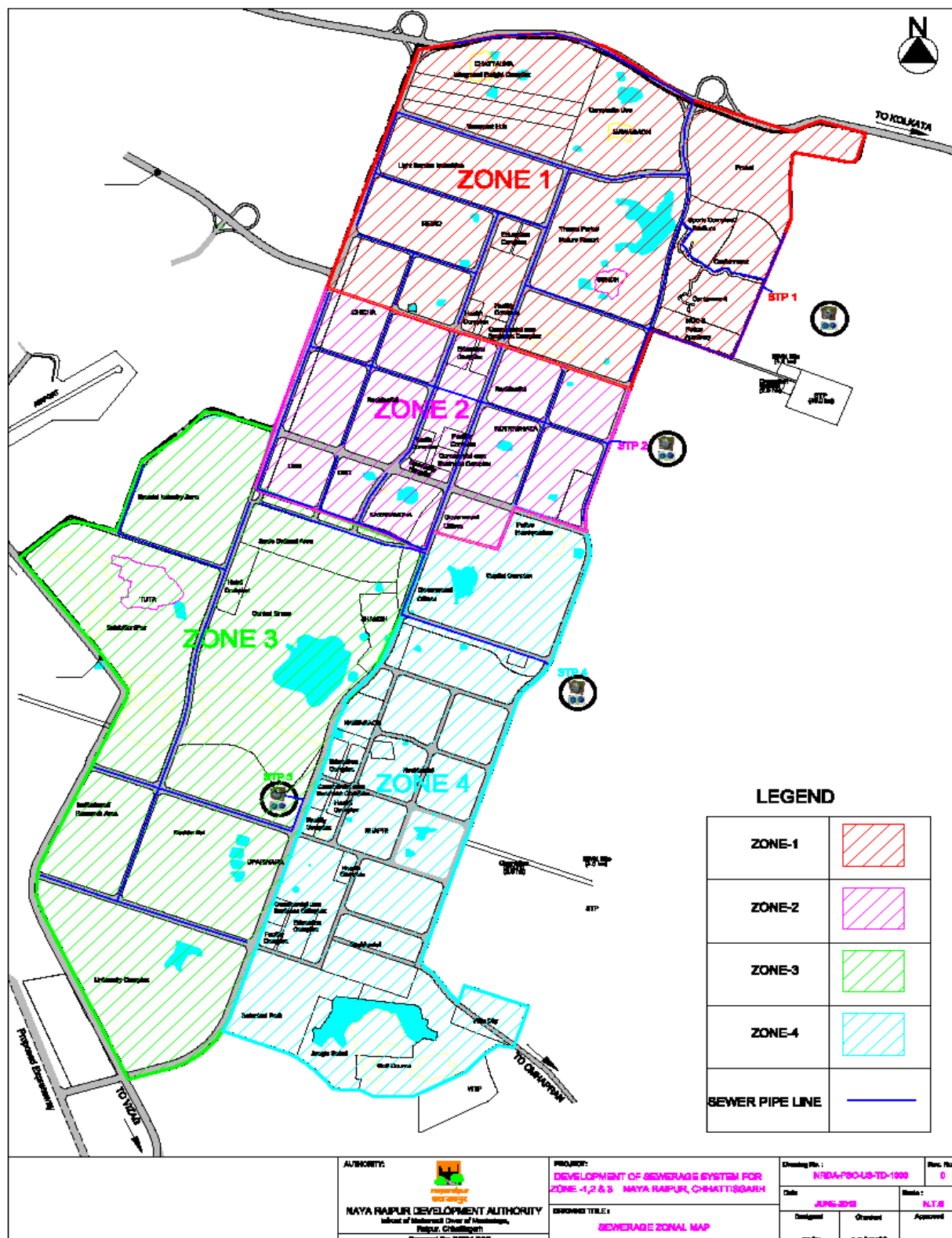
<b>Type of Reuse</b>	<b>Reclaimed Water Quality</b>
<b>URBAN REUSE</b>	
All types of landscape irrigation, (e.g. golf courses, parks) – also vehicle washing, toilet flushing, use in fire protection systems and commercial air conditioners and other uses with similar access or exposure to the water	<b>CPHEEO Standards</b>

One of the most critical steps in any reuse program is to protect the public health, especially that of workers and consumers. To this end, it is most important to neutralize or eliminate any infectious agents or pathogenic organisms that may be present in the wastewater









**SCHEDULE– D**  
**Section-IV**  
**Special Conditions of Contract**

## Special Conditions of Contract

### 1. GENERAL

The Special Conditions of Contract are to be read in conjunction with General Conditions of Contract. If there are any variations or discrepancies or conflicting provisions, the provisions in Special Conditions shall take precedence over the provisions in the General Conditions of Contract. All additional facilities/equipment/ office etc to be provided by the contractor, as mentioned in the tender, document outside the BOQ shall not be paid separately, and shall be deemed to have been included in the rates quoted by the contractor.

### 2. ACCESS

The Contractors are to verify the work site details including:-

- a) Access,
- b) Availability of water supply and electrical energy,
- c) Space for dumping stores and materials and
- d) Space for erection of site office,

The Contractors are deemed to have catered for all contingencies connected with the site, access, water & electricity.

### 3. SUPPLY OF WATER

Water will not be supplied by NRDA and the Contractor shall make his own arrangements. NRDA will give recommendatory letter to the concerned authority if so requested by the Contractor. However, NRDA shall be in no way responsible for obtaining permission and no claim on account of this will be entertained.

### 4. ELECTRIC SUPPLY

- (a) Electric power both for construction and lighting shall not be made available to contractor. Contractor shall arrange at his own cost power with necessary switch boards, energy meter etc. and shall be responsible for their maintenance.
- (b) Further distribution by the Contractor at his cost shall be done as per approved layout. He shall provide required clearances for overhead lines to facilitate easy movement of heavy machinery such as cranes etc. These shall be shifted and rerouted at Contractors cost during execution of work if the same are found to obstruct any other work of any agency working at site or requires shifting due to unforeseen reasons.
- (c) On completion of the work the Contractor shall remove all wiring installed by him and make good to the satisfaction of Engineer if any disturbance or damage is done.
- (d) The Contractor shall employ an Electrical Agency as approved by the Engineer for carrying out this work.
- (e) The Contractor has to keep alternative arrangement ready at his own cost for any failure/interruption of electric power that takes place and under no circumstances can this be deemed to be reason for any consequential delay in the works.
- (f) Any disputes in sharing of power obtained directly/ indirectly from CSEB with other agencies shall be resolved by the contractor at his risk and cost. NRDA shall not be responsible or a party for such disputes.

5. **DEFECT LIABILITY**

Refer Scope of work page 18 of 30.

**Clause 17 of the GCC is modified to the extent that: -**

The release of full Security Deposit shall be made after the month of issue of the Defect Liability Certificate. However, 50% Security Deposit shall be released on satisfactory completion (based on completion certificate from NRDA) of one year after the completion of work ( Part A & B).

6. **DEFECT LIABILITY CERTIFICATE**

The Contract shall not be considered as completed until a Defect Liability Certificate shall have been signed by the Engineer and delivered to the Employer, with a copy to, the Contractor, stating the date on which the Contractor shall have completed his obligations to execute and complete the works remedy any defect therein to the Engineers satisfaction. The Defect Liability Certificate shall be given by the Engineer within 28 Days after the expiration of the Defect Liability Period, or, if different defects liability periods shall become applicable to different section or parts of the Permanent Works, the expiration of the latest such period, or as soon thereafter as any works instructed, pursuant to Clauses 17 of GCC, have been completed to the satisfaction of the Engineer.

7. **SAMPLES**

**7.1 Material**

(a) The Contractor shall furnish to Engineer for approval, with reasonable promptness and with reasonable time for consideration, adequate numbers of samples of all the materials to be used in the work, irrespective of whether material/product is from approved list given in tender. He shall permit and account for all costs in his quotation toward supply, testing, examination at site or at any approved place by the Engineer. The choice of approval of materials rests with NRDA unless otherwise specified.

(b) All material samples shall be delivered to the Engineer's office at the Contractor's cost. Each sample shall be in duplicate and properly labelled as under-

- Name of Project
- Name of Contractor
- Name of Product
- Name of Manufacturer
- Item reference of BOQ
- Date of Submission

(c) Samples shall be accompanied with technical specifications/ catalogues/ test results of manufacturer.

(d) In case the Contractor intends to keep an approved sample in his possession, he shall submit additional set of samples for Engineer's approval.

**7.2 Standards of Acceptability**

(a) In order to establish the standards of acceptability for materials and finishes, the Contractor shall finish in all respect a mock up for each pro-type room. The material

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used in this shall be as approved and special attention shall be paid to establish the workmanship and finishing standards to be achieved for the project. Works such as form finished concrete & finishing items such as joinery, floor finishes, false ceiling, wall finishes, toilets including sanitary fittings and fixtures, electric fitting and fixtures etc. shall be provided as per drawings and specifications. All mock-ups, except for exposed concrete finish to be made within the building blocks. For exposed concrete finish a maximum of 3 (three) mock-ups (approx. 36 (thirty six) SqM each), independent of the main building block shall be prepared for approval jointly by C E & Architect.

- (b) The Contractor shall give notice in writing in this respect and shall obtain approval through Engineer in Charge from the CE NRDA. Approval should be taken well in advance so as not to delay execution of work.

**8. TESTING OF MATERIALS IN OTHER LABORATORY**

As a valedictory measure, in addition to establishing testing a full-fledged site laboratory, 10 % (ten percent) of the samples shall be sent every month for testing in one of the following laboratory:-

- i) Chief Engineer (PWD) Laboratory, Raipur
- ii) National Institute of Technology, Raipur
- iii) Govt. Engineering College, Raipur
- iv) B.I.T., Durg / Raipur
- v) Sriram Test House N. Delhi
- vi) National Test House N. Delhi

**7.1** In case, certain testing facility for typical/ special materials are not available in Chhattisgarh, then it can be tested at a recognized laboratory anywhere in India.

**7.2** All testing charges for the above shall be borne by the Contractor. In case, the testing charges demanded by the testing authorities is not paid by the Contractor within 15 (fifteen) days, then the same will be paid by NRDA with due recovery from the Contractor's bill for the project.

**9. CRECHE FACILITIES FOR THE CHILDREN OF CONSTRUCTION LABOURER**

Contractor undertakes to provide creche facilities for the children of construction labour through a volunteer agency within one month from start of work. The facility is open to children of construction labourers employed by the Contractor. In case the Contractor fails to provide this facility within stipulated time, following charge shall be levied on the Contractor.

Range of Contract Amount	Amount of Creche fund
Upto Rs. 50 lacs	Nil
Above Rs. 50 lacs to Rs. 5 Crores	Rs. 50000/-
Above Rs. 5 Crores	Rs. 5 lacs.

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- 9.1 The amount shall be recovered if such facility is not provided by the Contractor from running account bills in one or more instalments but not exceeding 6 (six) instalments.
- 9.2 IF THE FACILITY IS PROVIDE AFTER 3 MONTH 50% OF The amount shall be refunded to the contractor, after 6 month 25% will refunded.

**10. SUBMISSION OF DETAILED BAR/ PERT CHART OF COMPLETION**

The Contractor shall, within the stipulated time in Tender, submit to the Engineer for his approval a detailed programme covering-

- a) Descriptive note explaining sequence of various activities.
- b) Network (PERT/ CPM), bar chart.
- c) Quarterly programme of supply of materials by the Employer.
- d) Quarterly cash flow indicating money to be earmarked by the Employer for the purpose of the contract.
- e) Programme for supply of working drawing.
- f) Phased requirements of plant and equipment to be deployed by the Contractor.

**11. PROJECT MONITORING**

- 11.1 Within 7 (seven) days the Engineer shall give their approval to proceed with the work, with or without modification. However acceptance of programme and method of working as submitted by the Contractor or with any modification there to in the opinion of the Engineer, shall not relieve the Contractor of any of his contractual obligation.
- 11.2 All these programmes and plans submitted by the Contractor and approved by the Engineer shall become part of the contract.
- 11.3 The acceptance of programmes as submitted by the Contractor or with any modification thereto in the opinion of the Engineer, shall not relieve the Contractor of any extension of time unless delay, if any, is expressly sanctioned by the Engineer.

**12. CONSTRUCTION PHOTOGRAPHS**

A General: Contractor will provide construction photographs taken, developed, printed, and mounted by a recognized commercial photographic studio or reputable photographer acceptable to Owner, in the number and type and at construction stages enumerated below:-

- (i) Before Starting Work: Have photographs taken at site from different points of view sufficient in number to show site (and conditions at existing structures) but not fewer than 30 photographs.
- (ii) During Progress of the Work: Have not fewer than 15 photographs taken at least once a week from points of view (both inside and outside), as necessary to show progress of construction and site development for each part of the Work. Co-ordinate taking photographs with utility Work and back filling. Photograph each buried utility line before back filling. During later stages of the Work, have photographs taken from suitable locations inside the building

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showing the progress of various stages of the Work, such as piling, centering, reinforcement, water proofing, concreting, etc. Size of photographs will be 125 mm X 250mm. Photographs shall be supplied with negatives/ CD to the Engineer. Each photograph shall be attached with date of photograph and location of work. These photographs shall be from location as fixed by the Engineer at start of work

**13. QUARRY RELATED DEDUCTIONS**

The royalty for Minor minerals used in the work like murrum, stone metals, sand, rubble etc. will be levied as per prevailing practice in PWD of Chhattisgarh and shall be recovered suitably through R.A./ Final bill and will be kept in deposit. The above royalty charges kept under deposit shall be refunded as soon as the Contractor submits relevant NOC from Collector, Raipur, Chhattisgarh.

**14. CONTRACTORS ALL RISK POLICY (C.A.R. POLICY)**

The successful Contractor shall take out a C.A.R. policy from any approved company by IRDA India. The policy so obtained shall cover the entire period of construction (including all extensions) and also shall cover the defects liability period. The policy shall be for the total contract amount including cost of free supply material by NRDA, if any. All amounts/ charges towards premium etc. on this account shall be borne by the Contractor.

**15. INSURANCE OF WORKS AND CONTRACTOR'S EQUIPMENT**

The Contractor shall, without limiting his or the Employer's obligations and responsibilities, insure:

- a. the Works, together with materials and Plant for incorporation therein, to the full replacement cost (the term "cost" in this context shall include profit). It is being understood that such insurance shall provide for the compensation to be payable in the types and proportions of currencies required to rectify the loss or damage incurred.
- b. an additional sum of 15 percent of such replacement cost, or as may be specified in Para II of these conditions, to cover any additional costs of and incidental to the rectification of loss or damage including professional fees and the cost of demolishing and removing any part of the Works and of removing debris of whatsoever nature, and
- c. the Contractor's Equipment and the other things brought onto the Site by the Contractor, for a sum sufficient to provide for their replacement at the Site.
- d. the insurance shall be issued by an insurance company which has been determined by the Contractor to be acceptable to the Employer.

**16. SCOPE OF COVER**

The insurance shall be in the joint names of the Contractor and the Employer and shall cover:

- (a) the Employer and the Contractor against all loss or damage from whatsoever cause arising, other than as provided in the agreement, from the first working day after the Commencement Date at the site until the date of issue of the relevant Taking-Over Certificate in respect of the works or any section or part thereof as the case may be, and
- (b) the Contractor for his liability:
  - i) during the Defect Liability Period for loss or damage arising from a cause occurring prior to the commencement of the Defect Liability Period, and
  - ii) for loss or damage occasioned by the Contractor in the course of any operations carried out by him for the purpose of complying with his obligation under clause of Defect Liability Period.

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- a) It shall be the responsibility of the Contractor to notify the Insurance Company of any change in the nature and extent of the Works and to ensure the adequacy of the Insurance cover at all times during the Period of Contract.

**17. EXCLUSIONS**

There shall be no obligation for the insurances in loss or damage caused by:

- a) war, hostilities (whether war be declared or not), invasion, act of foreign enemies,
- b) rebellion, revolution, insurrection or military or usurped power, or civil war,
- c) ionizing radiations, of contamination by radio-activity from any nuclear fuel, or from any nuclear waste from the combustion of nuclear fuel, radio-active toxic explosive or other hazardous properties of any explosive nuclear assembly or nuclear component thereof, or
- d) pressure waves caused by aircraft or other aerial devices travelling at sonic or supersonic speeds.

**18. CROSS LIABILITIES**

The insurance policy shall include a cross liability clause such that the insurance shall apply to the contractor and to the employer as separate insured.

**19. EVIDENCE AND TERMS OF INSURANCES**

The Contractor shall provide evidence to the Employer as soon as practicable after the respective insurances have been taken out but in any case that the insurance required under the contract have been effected and shall, within 84 days of the Commencement Date, provide the insurance policies to the Employer. When providing such evidence and such policies to the Employer, the Contractor shall notify the Engineer of so doing. Such insurance policies shall be consistent with the general terms agreed prior to the issue of the Letter of Acceptance. The Contractor shall effect all insurances for which he is responsible with insurers and in terms approved by the Employer.

**20. RESPONSIBILITY FOR AMOUNTS NOT RECOVERED**

Any amount not insured or not recovered from the insurers shall be borne by the Employer and Contractor in accordance with their responsibilities.

**21. SOURCE OF INSURANCE**

The Contractor shall be entitled to place all insurance relating to the Contract with insurers from India, which have been determined by the Contractor to be acceptable to the Employer.

**22. INSURANCE AGAINST ACCIDENT TO WORKMAN**

The Contractor shall insure against such liability and shall continue such insurance during the whole of the time that any persons are employed by him on the Works, provided that, in respect of any person employed by contractor, the Contractor obligations to insure as aforesaid under this Sub-Clause shall be satisfied if the contractor shall have insured against the liability in respect of such persons in such manner that the Employer is indemnified under the policy.

**23. ACCIDENT OR INJURY TO WORKMEN**

The Employer shall not be liable for or in respect of any damages or compensation payable to any workman or other person in the employment of the Contractor, other than death or injury resulting from any act, other than death or injury resulting from any act or default of the Employer, his agents or servants. The Contractor shall indemnify and keep indemnified the Employer against all such damages and compensation, other than those for which the employer is liable as aforesaid, and against all



claims, proceedings, damages, costs, charges and expenses whatsoever in respect thereof or in relation thereto.

**24. ADEQUACY OF INSURANCES**

The Contractor shall notify the insurers of changes in the nature, extent of programme for the execution of the Works and ensure the adequacy of the insurances at all times in accordance with the terms of the contract and shall, when required, produce to the Employer the insurance policies in force and the receipt for payment of current premiums.

**25. REMEDY ON CONTRACTOR'S FAILURE TO INSURE**

If the Contractor fails to effect and keep in force any of the insurances required under the Contract, or fails to provide the policies to the Employer within the period required as per agreement, then and in any such case the Employer may effect and keep in force any such insurances and pay any premium as may be necessary for that purpose and from time to time deduct the amount so paid from any monies due or to become due to the Contractor, or recover the same as a debt due from the Contractor.

**26. COMPLIANCE WITH POLICY CONDITIONS**

In the event that the contractor or the Employer fails to comply with conditions proposed by the insurance policies effected pursuant to the Contract, each shall indemnify the other against all losses and claims arising from such failure.

**27. INSPECTIONS AND AUDIT BY THE NRDA**

The Contractor shall permit the NRDA to inspect the Contractor's accounts and records relating to the performance to the contract and to have them audited by auditor appointed by the NRDA, if so required by the NRDA.

**28. INDEMNITY BOND**

The Contractor shall require to execute an Indemnity Bond for satisfactory performance of the entire project on stamp paper of Rs.100/- (Rupees Hundred only) in the format approved by the NRDA Ltd. This Indemnity Bond shall remain in force for the Defect Liability period after completion of the project to be furnished in contract form E of GCC.

**29. LABOUR REGISTRATIONS**

The Contractor has to ensure their registration of labours with Labour Commissioner in compliance with the applicable laws. He shall be obliged to follow all the applicable rules and acts in relation to the labour engaged by him.

**30.** For any contradiction in items mentioned in Bill of Quantity, the "General Notes" of Schedule of Rates for Road & Bridges works of CG PWD SOR 2010 shall be followed. Further, for any ambiguity in Technical Specifications, the 'Ministry of Road, Transport & Highways' specification for road and bridge works shall prevail.

**31.** NRDA undertakes to release funds to Contractor for work done, measured & certified by the Consultant based on monthly RA bills submitted and certified by the 'Consultant'. The measurements will be as per guidelines as laid down by MORTH. Release of funds/payments to Contractor by NRDA shall be adjusted at source for deduction of advances, other recoveries in terms of the agreement & other taxes as applicable under the law.

**32. ACCIDENTS**

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If any accidents, fatal or otherwise occur, a detailed report about the same shall be made promptly by the Contractor to the Engineer. The Contractor should at all times during execution of work keep the NRDA fully indemnified against all risks, claims, litigations and financial burdens arising out of all incidental operations on work and accidents.

### 33. TRAFFIC

The Contractor shall have to make all necessary arrangements for regulating traffic day and night during the period of construction and to the entire satisfaction of the Engineer. This includes the construction and maintenance of diversion, if necessary, at no extra cost to the NRDA. The Contractor shall provide necessary caution boards, barricades, flags and lights, watchmen etc. so as to comply with the latest Motor Vehicle Rules and Regulations and for traffic safety. The Contractor shall be responsible for all claims for the accidents which may arise due to his negligence whether in regulating traffic, in stacking materials on the road or by any other reason. The contractor must comply with the following:-

- A. *General:* Plan and control use of site and access to site in co-operation with Owner and other contractors working at site to minimise disruption of use of other facilities; portions of buildings and site areas affected by this Contract and to remain in use; and the work of other contractors.
- B. *Temporary Access Drives:* Construct on the premises as necessary, and maintain in good usable condition; remove when no longer needed. Until permanent improvements have been completed, when necessary to prevent excessive dust, periodically water temporary unpaved access roads.
- C. *Construction Site Access:* Use most direct route from public streets as agreed to by Owner. Construction traffic elsewhere on Owner's property is prohibited.
- D. *Driveways Between and Around Combustible Storage Piles:* Maintain at least 15 feet wide and free of accumulation of rubbish, equipment, and materials.
- F. *Access for Fire-Fighting Equipment:* Maintain.
- G. *Access:* Refer to other sections for requirements to keep access to site and buildings open to Owner, other contractors, and fire-fighting equipment.
- H. *Use of Streets and Sidewalks on Public Property:* Make arrangements with authorities having jurisdiction for use. Restrictions shall be those of the Municipal Authorities. Be solely responsible for adherence.
- J. *Roadways, Driveways, and Walkways:* Where outside indicated Contract limit on Owner's property and on public property, keep open to pedestrian and vehicular traffic at all times. When temporary closing of a roadway, driveway, or walkway is absolutely unavoidable, provide alternative access routes. Such temporary closings shall be approved by Owner in each case and shall be for the shortest possible time. Strictly adhere to requirements of governmental authorities having jurisdiction.
- K. *Parking:* Owner will issue temporary parking permits for use by construction personnel and will make available, at the location shown. Construction personnel shall not park in any other location on Owner's property, even when bearing permits. Access to allocated parking spaces shall be by most direct route from public streets. Construction personnel shall not drive vehicles elsewhere on Owner's property and shall take the most direct pedestrian way along walks and roadways (not on lawns) from parking lot to construction site.
- L. *Barricades and Signs:* Should barricades or directional signs for traffic control be necessary, prepare and install such signs and barricades of approved size, colour, and lettering or other markings. Remove signs when no longer needed, or at Substantial Completion, whichever is latest.

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M. *Restricted Use of Premises:* Enforce Contract requirements, local ordinances and Owner's instructions pertaining to signs, fires, smoking, trucking, parking, and other use of premises.

N. *On-Site Storage:-*

1. *General:* Extent of Work and site area available limits amount of on-site material and equipment storage. Do not unnecessarily encumber job site with excess materials or equipment and means of delivery of materials, equipment, and supplies, removal of rubbish, and hours during which deliveries may be made. Determine, and take into account in the Work, limitations on storage space and of times, rates, and means of deliveries to and removals from the job site whether such limitations are imposed by laws, rules, ordinances, or physical conditions. Owner will not pay extra amounts due to such limitations. Co-ordinate arrangements for delivery and storage of materials.
2. *Paved Areas:* Do not use paved areas on Owner's property to stockpile excavated materials or to store construction materials except where shown. Use of paved areas on public property is subject to requirements of authorities having jurisdiction, and arrangements for such use are solely Contractor's responsibility.
3. *Protection and Repair:* Protect roadways, walks, and other permanent site improvements, and access ways subject to damage. Satisfactorily repair improvements and surfaces damaged during construction operations, or remove damaged improvements or surfaces and provide new acceptable improvements or surfaces. Except where new Work is required, return areas used for temporary access to original condition.

#### 34. ALIGNMENT AND BENCH MARKS

The alignment of the work to be carried out under the contract shall be marked on the ground as per the drawing and as per the instructions of the Engineer. For the purpose of facilitating the work, the series of temporary bench marks on masonry pillars will have to be established. These pillars will be constructed along with the alignment and such other locations as may be initiated by the Engineer. The temporary bench-marks shall be established for the work line-out and its connections to other proposed roads in Naya Raipur using the DGPS instrument and Total Station software. All expenses involved in the process of marking alignment on ground, checking the alignment, constructing masonry pillars in establishing bench marks thereon, shall be borne by the Contractor. It will be responsibility of the Contractor to ensure that the masonry pillars so constructed are not damaged during the period of work in progress.

#### 35. PREVENTION OF MOSQUITO BREEDING AT CONSTRUCTION SITE

The Contractor shall on the respective construction site install mosquito proof and accessible water storage tanks or to cover/protect the present water storage tanks properly. The Contractor shall periodically give larvaecidal treatment to water storage tanks, sites of water stagnation, water collection.

Any expenditure that may be incurred by NRDA to ensure that the above conditions are fulfilled by the Contractor will be debitable to Contractor's account and will be recovered from the bills of the Contractor from time to time.

#### 36. INSPECTION OF SITE AND SUFFICIENCY OF THE TENDER

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If the NRDA is not in a position to deliver to the Contractors the site of the Contract work for any reason whatsoever at the agreed time, delaying the commencement of the contract work, or part thereof not beyond 50 % (fifty percent) of contract period for completion, such omissions of the NRDA shall not be breach of any its obligations under the contractor and the Contractor shall not be entitled to claim from the NRDA for loss or damage, if any, caused thereby, but shall be entitled to a reasonable extension of the period agreed for the completion of contract work. If the contractor shall be obstructed in the execution of the work by any person other than an agent or servant of the NRDA, the Contractor shall exclusively deal with such set by the due process of law but shall not be entitled to attribute thereby the beach of any obligation under the contract to the NRDA compensation for damage or loss, if any, thereby suffered but shall be entitled to an appropriate extension of period agreed for the completion of the contract work, provided that the contractor has reported to the NRDA every such act of obstruction with particular soon after its occurrence and the NRDA has after enquiry found the same to be substantially true and has determined the duration of such obstruction.

### 37. PROGRESS OF WORK

The Contractor shall carry out the work as per the programme approved by the Department from time to time. He will also not be allowed to proceed with the work in a scattered manner.

### 38. FIELD LABORATORY

The following items of laboratory equipment procured from reputed manufacturers duly approved by the Engineer shall be provided in the field laboratory.

Laboratory equipment shall be provided by the Contractor for laboratory, sufficient to carry out all the field and site quality acceptance testing required in the Specifications. It shall include the following:

#### A. General

i)	<b>Balance</b>	
	<b>a) 10 kg capacity semi-self indicating type – Accuracy 1 gm</b>	
	Electronic	2 No.
	Mechanical	2 No.
	<b>b) 500 gm capacity semi-self indicating type – Accuracy 0.01 gm</b>	
	Electronic	2 No.
	Mechanical (semi-self indicating)	2 No.
	<b>c) Chemical balance (electronic) 100 gm capacity</b>	
	Accuracy 0.001 gm	2 No.
	d) Pan balance 5 kg capacity Accuracy 0.5 gm.	3 No.
	e) Platform scale – 300 kg capacity	1 No.
ii)	<b>Ovens-electrically operated, thermostatically controlled (including thermometer), stainless steel interior</b>	
	a) Temperature range ambient to 300° C, Sensitivity 1° C, capacity 120 Litre.	2 No.
	b) Temperature range, ambient to 150° C, sensitivity 1° C, capacity 250 Litre.	2 No.

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iii)	<b>Sieves: as per IS. 460</b> a) Test sieve set 450mm internal dia. as per IS complete with lid and pan of hole sizes 75mm, 63mm, 53mm, 37.5mm, 26.5mm, 13.2mm, 9.5mm, 6.7mm, and 4.75mm. b) Test sieve set 200mm internal dia (brass frame and steel/or brass wire cloth mesh) as per IS complete with lid and pan of aperture sizes 2.36mm, 2mm, 0.18mm, 6.0micron, 4.25micron, 3.0micron, 450micron and 75micron. c) 200mm dia. Brass – 1 mm 75micron, smaller than 425micron	2 Set  4 Set  3 each
iv)	Sieve shaker capable of taking 200mm and 450mm dia sieves-electrically operated with time switch assembly	1 No.
v)	Universal Testing Machine	1 No.
vi)	Stop watches 1/5 sec. accuracy	2 No.
vii)	Glassware comprising beakers, pipettes, dishes, measuring cylinders (100 to 1000cc capacity) glass rods and funnels, glass thermometers range 0°C to 100°C and metallic thermometers range upto 300° C.	1 Doz. Each
viii)	Hot plates 200mm dia (1500 watt.)	6 Nos.
ix)	<b>Enamel trays</b> a) 600mm x 450mm x 50mm b) 450mm x 300mm x 40mm c) 300mm x 250mm x 40mm d) Circular plates of 250mm dia	12 Nos 12 Nos 12 Nos 12 Nos
x)	<b>Aluminium Tins</b> a) 50mm x 30mm b) 55mm x 35mm c) 70mm x 45mm d) 70mm x 50mm e) 80mm x 50mm	36 Nos. 36 Nos. 36 Nos. 36 Nos. 36 Nos.
xi)	Spatula set of 100 and 200 long	6 Sets
xii)	Water testing kit	1 Set
xiii)	First aid box	1 Set
xiv)	Riffle box of slot size 50mm as per ASTM C-136	1 No.
xv)	Water still, 3litre/ht. with fittings and accessories	2 Set
xvi)	Rebound Hammer	2 Set
xvii)	Vernier Calliper	2 Nos.

## B. For Soils and Aggregates

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i)	Liquid limit and plastic limit a) Liquid limit device with Casagrande and grooving tools and as per IS: 2720 b) Liquid Limit device UPAL as per IS: 2720 c) Moisture content cans d) Ground glass plate with rounded edges 600mm x 600mm x 10mm	2 No. 1 No. 200Nos 2 No.
ii)	<b>Hydrometer analysis</b> a) High speed stirrer with stainless still beaker b) Soil hydrometer set including jar to ASTM E100 and C422	1 No. 1 Set
iii)	Sampling pipettes fitted with pressure and suction inlets, 10ml. Capacity	1 Set
iv)	<b>Laboratories compaction</b> a) Compaction apparatus (Proctor) to the requirements of IS: 2720 complete with collar, base plate & 2.5kg rammer. b) Compaction apparatus (heavy) to the requirements of IS: 2720 complete with collar, base plate and 4.89kg rammer. c) Vibratory hammer to the requirements of Test 14 – BS	1 No. 3 Nos. 1 Set
v)	Sand pouring cylinder (150mm) with conical funnel and top and base plate (with 152mm dia of sand cone) to the requirements of IS: 2720 Part 28.	4 Sets
vi)	Sampling tins with lids 100mm dia x 75mm ht. 1/2kg capacity	30 Nos.
vii)	<b>Laboratory C.B.R. testing equipment to the requirements of IS-2720 Part-16 and consisting of following:</b> a) Floor mounted electro-mechanical load frame 5 tonne capacity with automatic strain control b) CBR moulds complete with collar, base plate, etc. c) Swell stands for holding dial gauge d) CBR plunger with penetration dial gauge holder e) Surcharge weight with central hole of 2 kg. weight f) Spacer disc with handle g) Perforated brass swell plate with adjustable cap on handle h) Soaking tank for accommodating 9 CBR moulds i) High tensile steel calibrated proving rings of 1000 kg. 2500 kg and 5000 kg capacity j) Dial gauge, 25mm travel-0.01mm/division	1 Set  1 No. 36 Nos. 9 Nos. 1 No. 100Nos 2 Nos. 36 Nos. 2 No. 1 Set 12 Nos.
viii)	Standard Penetration Test equipment IS: 2131 including solid cone attachment to fit drive and	1 No.
ix)	Dynamic Cone Penetrometer equipment IS: 4968 Part 3	1 Nos.
x)	10% fines value test BS-812	1 Set
xi)	Speedy moisture tester complete with carrying case and supply of reagent	1 No.

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xii)	Sand equivalent apparatus complete along with chemicals to the requirements of IS: 2720	2 Set
xiii)	Reagent grade Sodium Sulphate for soundness test of aggregate chemical Sodium Sulphate to the requirements of IS-2386 Part-5	30 Kgs
xiv)	Specific Gravity test IS: 2720	1 No.
xv)	Post-hole Augur with extension	1 Set
xvi)	Core cutter apparatus 10cm dia. 10/15cum length height complete with 20kg hammer	1 Set
xvii)	Flakiness and Elongation test gauge as per IS: 2386	2 Set
xviii)	Standard measures of 30, 15, 3 litre capacity along with tamping rod	1 Set
xix)	Direct Shear & Triaxial Shear Test as per IS – 2720	1 Set each
xx)	Nuclear gauge for density and moisture content determination to the requirements of AASHTO 238 and 239	1 Set

*C. For Bitumen and Bituminous Mixes*

i)	Constant temperature bath for accommodating bitumen test specimen, electrically operated, and thermostatically controlled, stainless steel interior, 50 l capacity, temperature range ambient to 80° C	1 No.
ii)	Bitumen penetrometer automatic type, including adjustable weight arrangement, and needles to the requirements of AASHTO T – 49 & IS: 1203	1 Set
iii)	Centrifuge type motorized bitumen extraction apparatus to the requirements of AASHTO T164 with stock of solvent & filter paper	1 Set
iv)	Bitumen laboratory mixer planetary action, 2 litre capacity, including required accessories electrically operated and fitted with heating jacket	1 No.
v)	Marshall compaction apparatus to the requirements of AASTHO 245 as per ASTM 1559-62 T and complete with electrically operated automatic loading unit, compaction pedestal, heating unit, head breaking assembly, flow meter, load transfer bar, specimen moulds 100mm dia with base plate, collars, specimen extractor, compaction hammer 4.53kg x 457mm fall, (with constant temperature bath)	1 Set
vi)	Dial type thermometer reading 0-200° C range, accuracy 2° C	2 Nos.
vii)	Ring and Ball Apparatus as per IS: 1205	1 Set
viii)	Asphalt Institute Vacuum Viscometer as per IS: 1206 (Part II)	1 Set
ix)	Apparatus for Determination of Ductility Test as per IS: 1208.	1 Set
x)	Flash and fire point test as per IS: 1209.	1 Set
xi)	Apparatus for Determination of water content (Dean and Stark Method) IS: 1211.	1 Set
xii)	Apparatus for Determination of Loss on Heating IS: 1212.	1 Set
xiii)	Apparatus of Determination of specified Gravity IS: 1202.	1 Set

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xiv)	Thin Film Oven Test apparatus to the requirements of IS-9382, including accessories	1 Set
xv)	BS U – Tube Modified Reverse Flow Viscometer IS 1206 (Part-III)	1 Set
xvi)	Apparatus for Float Test – IS-1210	1 Set
xvii)	GMM (Max. Specific gravity) ASTM D 2041, Vacuum Pump	1 Set

**D. For control of profile and surface Unevenness**

i)	Camber templates 3-lane straight run cross-section	2 Sets
ii)	String line arrangement with paving with sensor pavers	4 Sets
iii)	Towed Fifth Wheel Bump Integrator	1 No.
iv)	Benkelman Beam Deflection apparatus	1 No.

**E. For Cement, Cement Concrete and Materials**

i)	Vicat needle apparatus for setting time with plungers, as per IS: 5513	1Set
ii)	<b>Moulds</b> a) 150 mm x 300 mm ht. Cylinder with capping component along with the capping set and compound as per IS b) Cube moulds (150mm x 150mm x 150mm) as per IS: 516 c) Beams 750 mm x 150 mm x 150 mm moulds	48 Nos. 100 Nos. 18 Nos.
iii)	High frequency mortar cube vibrator for cement testing	1 No.
iv)	Concrete mixer power driven, 1 cu. ft. capacity	1 No.
v)	Variable frequency and amplitude vibrating table size 1m, as per the relevant British Standard	1 No.
	Impact test apparatus as per IS: 2386	1 no.
vi)	Flakiness index test apparatus as per IS: 2386	2 No.
vii)	Elongation index test apparatus as per IS: 2386	2 No.
viii)	Aggregate crushing value impact test apparatus as per IS: 2386	1 No.
ix)	Los-Angeles abrasion test apparatus as per IS: 2386	1 No.
x)	Flow table as per IS: 712	1 Nos.
xi)	a) Slump test Apparatus as per IS: 7320	12 Nos.
	b) Compacting Test apparatus as per IS: 5515	1 Nos.

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xii)	Equipment for determination of specific gravity for fine and coarse aggregate as per IS: 2386 (Part 3)	4 Nos.
xiii)	Flexural attachment to compression testing machine	2 Nos.
xiv)	Core cutting machine with 10cm dia diamond cutting	2 Nos.
xv)	Air entrainment meter ASTM C – 231	1 No.
xvi)	0.5 Cft, 1 Cft cylinder for checking bulk density of aggregate with tamping rod	As reqd.
xvii)	Soundness testing apparatus for cement	1 Set
xviii)	Chemicals solutions and consumable	As reqd.
xix)	Chloride Testing kit for chemical analysis of chloride content	1 No.
xx)	Setting time of Concrete as per IS: 8142	1 Set
xxi)	Non-destructive Test (Rebound hammer) as per IS: 13311 part II	1 Set
xxii)	ION Exchange kit for rapid determination of sulphate content	1 No.
xxiii)	Concrete permeable apparatus as per MOST	1 Set
xxiv)	Needle Vibrator	1 No.
xxv)	Water Still	1 No.
xxvi)	All relevant IS Codes, IRC Codes, ASTM Codes, BS Codes	1 Set each

Construction of Laboratory building well-equipped with equipments as listed above is incidental to the work and no separate payment will be made for this.

The Contractor shall carry out other various tests for various items and materials at National Institute of Technology or any other approved laboratory as directed by the Engineer at Contractor's own cost. At the end of each month for each category of the work, e.g. RCC work, masonry work, etc. the Contractor shall give statistical analysis of all the test results in the format prescribed by the Engineer and take corrective action in the work in accordance with these results.

The Contractor shall keep all relevant IS/ BIS/ special publications at site lab for various items of works covered in the present Contract.

### 39. ENGINEER

**25.1** Engineer for this project shall be the Executive Engineer or the person nominated or appointed by NRDA from time to time and shall include any person duly authorised by them.

**25.2** Engineer shall be responsible for the execution of the project with regards to management and supervision. Instructions issued by the Engineer to the Contractor shall be deemed to be the Employer's instructions in respect of-

1. Day to day supervision including material testing using ISO formats proforma of which should be got approved from Engineer.

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2. Approval of material and workmanship using ISO formats proforma of which should be got approved from Engineer.
  3. Matter of urgency involving safety or protection of person or property.
  4. Monitoring progress of work using System Application of Projects (SAP).
  5. Interpretation of drawings
  6. Interpretation of specifications
  7. Issue of additional drawings
  8. Certification of measurements and bills and issue of certificates accordingly for interim and final bills.
- 25.3 Engineer shall hold fortnightly progress meetings at site for evaluation and execution of works. The Contractor shall assist in providing revised programmes, cash flow charts in the format required by Engineer/ NRDA.
- 25.4 The Engineer shall coordinate works at site of all agencies appointed by the Employer.
- 25.5 The time within which the detailed cash flow estimate shall be submitted shall be 28 days.

#### 40. EXCAVATED OBJECTS

All the materials obtained during the process of excavation shall remain the property of the NRDA and shall be disposed off as instructed by the Engineer. The Contractor is supposed to use the selected materials for filling in plinth, pipe bedding, and providing embankment where required, filling the trenches and also filling low lying areas. All operations including loading, unloading, transportation of materials where required with all leads and lifts and handling them and levelling at disposal site etc., shall be included in the quoted cost and no extra payment whatsoever shall be made to the Contractor on the account.

#### 41. ENGINEER'S SITE OFFICE

The Contractor shall provide site office for the Engineer's use of area admeasuring about 600 (Six hundred) Sq.mt. with central Air Conditioners & ceiling insulation for entire office premises including conference hall (Upto 20 person) as per the detailed drawings approved for the site office. There should be provision toilet facilities for the use of Engineers in charge and PMC usages. Broad details about construction of office and other facilities to be provided at the minimum shall be as follows:-

- (a) Overall size of the office shall be 600sqm. This shall include individual cabins, Conference hall and Server/Printer rooms. The drawing will be furnished by NRDA.
- (b) The above office shall be fully furnished including furniture, fittings, fixtures etc. such as Lockers, Chairs, Sofas for waiting, Cabinets for storage of drawings/ tracings, Cabinets for storage of books, Cupboards for storage of box files & flat presentations, Soft boards – 4nos for display of CPM charts, White board - 4nos, 1 no. Refrigerator, 1 no Microwave, RO Filter (Aquaguard /Kent) and water Cooler (Blue star) of 2 nos. of induction & Gas arrangement, Office stationary incl. papers, CDs, envelopes, pen holders etc. Minimum equipments required for providing tea/ coffee/ snacks etc shall be arranged by the contractor. The items shall be approved by EIC.

The Contractor shall arrange to maintain this office by daily sweeping the floor and keeping the premises clean. The Contractor shall also arrange to deploy 4 (four) office boys for the pantry and for NRDA's Engineer's office. The Contractor is also required to provide one computer operator and stenographer for NRDA's Engineer's office.

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Cost of all this shall be deemed to have been included in the tender as incidentals and no separate payment shall be made for providing these facilities.

If the facilities are not provided by the contractor, the same will be got executed at the cost of the contractor and will be recovered from their RA bills.

#### 42. TRANSPORTATION

**The Contractor shall provide 4 (four) number new vehicles.**

1 Number 25 seater AC Bus with audio visual connection with good quality interiors (Approved by NRDA) , 1 (one ) number Mahindra Scripio latest top model fully loaded and 2 (two) numbers of Mahindra Bolero 8 seated all new vehicles latest top model (air-conditioned) with chauffeur and fuel at the disposal of the Engineer for the use by NRDA and its representatives in connection with the project during the period of the execution of the Project. The Contractor will bear all expenses, connected with the operation and maintenance of this vehicle including driver's wages, overtime and other benefits, cost of the fuel, lubricant, repairs and maintenance, insurance, etc. to the satisfaction of NRDA. The Contractor shall be required to bear the fuel expenses towards 4000kilometers of cumulative distance travelled by each vehicle per month. Vehicle shall be subject to an average maximum mileage of 48,000 kilometers per annum per vehicle. The vehicle shall be replaced with new vehicle after maximum run of 1, 00,000 kilometres. In case of break down or non-availability of vehicle the NRDA will hire the vehicle at the risk and cost of the contractor. The vehicle may be withdrawn after 3 (three) months of completion of work including O& M Period. The vehicle should be under name of his firm/contractor and will remain fully dedicated to NRDA. The vehicle should be provided within 15 days after issuing the work order.

If the facilities are not provided by the contractor, the same will be got executed at the cost of the contractor and will be recovered from their RA bills.

#### 43. PROVIDING COMPUTER & OTHER EQUIPMENTS AT SITE OFFICE

The Contractor shall install new computers including server for the office of Engineer and provide necessary stationery and furniture.

The configuration of computer, laptop and other equipments is as under:-

- a) 4 (Four) SONY/DELL/ LENOVO Desktop with Intel I-5 Processor, 4GB Ram, 1 GB Graphics Card, Hard drive 500GB , 17" TFT LCD Color Monitor and 3 years warranty.( Latest Model)
- b) 4 (Four) I-PAD 4 (APPLE)/Galaxy Note – 3 (Samsung), 3 years warranty. (Latest Model)
- c) LICENSED SOFTWARE LICENSED SOFTWARE: (Latest versions, where available),
  - i. Window -7 (4 Sets),
  - ii. AutoCad 2013 (4 Sets) ,
  - iii. Microsoft Office 2013 (4 Sets),
  - iv. Microsoft Project 2012 (4 Sets) and
  - v. Antivirus (8 License for 3 years)
- d) PRINTERS AND OTHER PERIPHERALS including tonner, cartridges + backup  
(Latest Model, 3 years warranty)  
HP Laser Jet: A3 Latest Model Printer 1 Nos

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HP LaserJet: A4 Latest Model (All-in-one Printer)	1 Nos
HP Plotter Colour T770 (A-0 Size)	1 Nos
Work Centre Xerox 5225 with copier, Printer and Scanner A3 Printer	1 Nos
Digital camera (18mega pixel)	1 Nos
Projector Lunar 4K (SONY / CANNON/EPSON)	1 Nos
UPS for all equipments	

All computers at site and head office shall be interconnected by LAN connection as well as with a 24 hour broadband / WI FI internet connection for 3 years having a minimum bandwidth of 4MBPS.

e) Safety Helmets 80Nos

**If the facilities are not provided by the contractor, the same will be got executed at the cost of the contractor and will be recovered from their RA bills.**

#### 44. TELEPHONECONNECTION

The Contractor shall provide 6(six) nos. of Mobile phones (Nokia, Samsung, Blackberry) for use of NRDA staff including instrument with prepaid card of minimum value Rs.1,000 (Rupees one thousand only) per instrument per month. The minimum cost of handset should be Rs. 10000.00with Latest Model. This arrangement may be withdrawn after 3 (three) months of completion of the work including O& M Period. If the facilities are not provided by the contractor, the same will be got executed at the cost of the contractor and will be recovered from their RA bills.

#### 45. TIME SCHEDULE FOR COMPLIANCES

The tenderers should please note the following time schedule for various compliances and follow the same:

a) The Initial Security Deposit shall be paid within 15 (fifteen) days of receipt of Letter of Acceptance.

The Contractor should construct the site office within 1 (one) month of date of work order. The site office should be as per agreement in the tender document.

The CAR policy and Labour license shall be taken by the Contractor within 1 (one) month from the date of work order.

d) The M.S. Project formatted programme (Physical and Financial Programme) shall be submitted by the Contractor within 10 (ten) days of the date of work order and detailed breakup of quantities. The successful tenderer has to furnish Quality Assurance Manual along with programme within 15 (fifteen) days from the date of paying Initial Security Deposit.

#### 46. APPROVAL OF ENGINEER

The material as well as steel reinforcement provided in all RCC members shall be got approved from the NRDA/ Engineer or his authorised representative. At every stage of work, approval of the Engineer shall be taken by the Contractor. Before starting any work detailed information of the work in the prescribed proforma shall be given to the Engineer and his approval shall be taken by the Contractor. It is the responsibility of the Contractor to get all the hidden measurements recorded before covering the same. All the measurements shall be taken jointly by NRDA's representative and the Contractor's authorized representative and then only the measurements will be forwarded by the Engineer, who will forward it for payment to Chief Executive Officer, NRDA through Chief Engineer, NRDAand directions on any matter whether mentioned explicitly or otherwise.

#### 47. PERMISSION FOR CONSTRUCTION OF SITE OFFICE/ GODOWN/ LABOUR HUTS:

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The Contractor shall be permitted to construct temporary structures such as site office, godown, labour huts, Engineer site office, etc. on the land of NRDA within 1 Km radius of site.

The Contractor will have to submit requirement of land for Godown/ Labour Camp/ Batching Plant etc. with logistic layout in Technical Bid. The land shall be provided to the Contractor on Lumpsum lease rent of Rs. 100/- (Rupees Hundred only) per year with Lease Agreement as per prevailing NRDA format. However the Contractor shall require permission of NRDA for erecting site office, labour huts. In the event the Contractor fail to remove site office/ godown and labour huts from the land immediately after construction is over, NRDA will charge rent as per the rules prevalent at the time. No final bill payment shall be made, unless the site is cleared by the contractor in all respects.

The Contractor shall number the structures and display name of the Company, period for which permission is granted, etc. at such approved sites.

No final bill payment shall be made unless the site is cleared in all respects by the Contractor.

**48. CONDITIONAL TENDER**

The Tenderer shall note that the clarifications shall be obtained in the pretender meeting and the tender should be submitted without any conditions, whatsoever. Clarifications given to the various tenderers in the pre-tender meeting would be summarized by NRDA and would be issued to every tenderer as "Minutes of Pre-Tender Meeting". The same will be binding on all the tenderers irrespective of whether they have attended the pre-tender meeting or not. The Minutes of the Pre-Tender Meeting would form part of the Contract Agreement and the Tenderers should submit the Financial Offer taking into consideration the same. The Tender submitted with conditions would be summarily rejected.

**49. SITE ORDER BOOK& OTHER BOOKS REQUIRED**

The Engineer will maintain Site Order Book at the site of work. The Contractor or his authorized representative shall sign all the instructions received therein, in token of having received the same and shall comply with them forthwith.

All other books of record at site shall have to be maintained as required in the CPA Code of works.

**50. POURCARD SYSTEM**

Pour card system/RFI system to be introduced for approval of individual activity as per the format given by NRDA.

**51. CLEANING OF SITE**

- a) All water which may accumulate on the site during the progress of the works or in trenches and excavation shall be removed from the site to the satisfaction of the Engineer at the Contractor's cost. Site shall be maintained free from rubbish. Engineer's decision in this matter shall be final.
- b) The Contractor shall not, at any time, do cause or permit any nuisance on the site or do anything which shall cause unnecessary disturbance or inconvenience to Employer, tenants or occupiers of other properties near the site and to the public in general. The Contractor shall install mosquito proof and accessible water storage tanks for construction and drinking water.
- c) Prior to handing over the contractor shall appoint Professional Cleaning Agency to clean the building works prior to handing over. The Agency shall have minimum 5 (five) years prior experience in the hospitality industry and shall be appointed with the prior approval by the Engineer.

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- d) Any expenditure that may be incurred by NRDA to ensure that the above conditions are fulfilled by the Contractor will be debitable to Contractor's account and will be recovered from the running bills of the Contractor from time to time.
  - e) Cleaning: Remove staining or reactive materials from new surfaces immediately during course of the Work.
  - f) Debris: Remove hazardous accumulations of debris promptly, at least daily.
  - g) Dust: Confine dust producing operations during painting and finishing. Vacuum immediately after completion.
  - h) TRASH DISPOSAL
  - i) General: Keep new buildings and site free from accumulations of waste materials.
  - j) Removal: Remove cartons, crates, wrappings, lunch trash, and other trash from each room daily. Provide trash receptacles on each floor of each building and in convenient locations on the site.
  - k) Burning: Do not burn trash or other materials on Owner's property.
  - l) EXCESS MATERIAL; General: Remove excess materials, including demolished materials, excess earth, and excess building materials from Owner's property and dispose of legally.
  - m) Clean: Keep paved drives on Owner's property and public streets and alleys clean, by cleaning daily, or more often if necessary, of earth and debris spillage from trucking involved in construction operations.
52. The bituminous courses will be laid only after the approval of job mix formula. The bitumen content will be as per Job mix formula only. However, minimum bitumen content will be as per MORTH specification- 5<sup>th</sup> edition.
53. All Concrete M-20 and above grade shall be as per the mix design to be carried out by Contractor and subject to the approval of NRDA.
54. Rates for the items of Semi dense bituminous concrete, bituminous concrete and dense bituminous macadam are based on the bitumen percentage in these items. Additional bitumen required as per job mix formula will have to be taken into account and be accommodated by the contractors in their tender rates. No separate payment shall be made on this account.
55. Laboratory shall be established by the Contractor within 30 days after issue of work order with due satisfaction of Engineer.
56. Surplus earth has to be disposed at suitable location beyond Naya Raipur, or directed by Engineer, at the cost of the Contractor.
57. All equipment & machinery must be registered under the name of firm only.
58. The Contractor will carry out foot load test on all Minor Bridge foundations to determine safe bearing capacity at his own cost prior to start of construction.

**59. ENGINEER'S DUTIES AND AUTHORITY**

The Engineer shall obtain the specific approval of the Employer before taking any of the following actions specified in Section II.

- a) issuing the order to commence the works.
- b) Certifying additional cost
- c) approving new rates or prices
- d) Determining an extension of time

“Notwithstanding the obligation, as set out above, to obtain approval, if, in the opinion of the Engineer, an emergency occurs effecting the safety or life or of the Works or of adjoining property, he may, without relieving the Contractor of any of his duties and responsibilities under the Contract, instruct the Contractor to

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execute all such work or to do all such things as may, in the opinion of Engineer, be necessary to abate or reduce the risk. The Contractor shall forthwith comply, despite the absence of approval of the Employer, with any such instruction of the engineer. The engineer shall determine an addition to the Contract Price, in respect of such instruction, in accordance with Clause 12 of GCC and shall notify the Contractor accordingly, with a copy to the Employer.

**60. PRIORITY OF CONTRACT DOCUMENTS**

**60.1 INTERPRETATION OF AMBIGUITIES**

If the Contractor discovers any ambiguities, omissions, errors, faults and other defects in the drawings or in other Contract Documents, he shall immediately notify the same in writing to the Engineer, who will resolve ambiguity or correct the error and will notify the Contractor of the interpretation to be adopted.

**60.2 PRIORITY OF CONTRACT**

Subject to the foregoing provisions and unless otherwise provided in the Contract, the priority of the documents forming the Contract shall be as follows:

- 1) The Contract Agreement (if completed)
- 2) The Letter of Acceptance
- 3) The Special Conditions of Contract
- 4) The General Condition of Contract
- 5) The Technical Specifications
- 6) The Priced Bill of Quantities
- 7) The Drawings

**61. CONTRACTOR'S GENERAL RESPONSIBILITIES**

The Contractor shall promptly inform the Employer and the Engineer of any error, omission, fault, or any other defect in the design or, drawings or specifications for the Works which he discovers when reviewing the Contract Documents and drawings or in the process of execution of the works.

**62. NOTICE TO THE ENGINEER**

The Contractor shall give the Engineer not less than 48 (forty eight) hours notice of his intention to set out or give levels for any part of the works and/or testing for any part of the works so that timely arrangement may be made for checking or issuing instructions.

**63. MAINTENANCE OF RIGHT OF WAY**

Throughout the period of the Contract, the Contractor shall at all times maintain public vehicular access along the right-of-way and from the right-of-way to all public and private access and land, as exists immediately prior to his commencement of the works.

The Contractor may on written request to the Engineer, (including a drawing, programme and specification), be given approval to operate;

- b) a road diversion suitable for the road traffic and of suitable width, or
- c) traffic on a one way system using manual coordinated direction control or automatic traffic lights having a source of power.

**64. FENCING**

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During the construction, care shall be taken so that, areas around are not polluted and where required Hessian cloth shall be tied around, while work is in progress.

Further, it is obligatory on the part of the Contractor to fence the area allotted and earmarked by NRDA for labour camp, batching plant of the Contractor within a month of issuance of work order. The temporary fencing shall be provided in the area as directed by Engineer using vertical blinds using corrugated GI sheets about 3m high with necessary metal frame work and staging to cordon off the view of the premises. The Contractor shall maintain the fencing properly throughout the construction period.

## 65. WATCH AND WARD

The Contractor shall make necessary watch and ward arrangement for a period of three months from the date of total completion of work. No claim shall be paid to the Contractor towards the watch and ward during this period.

Protection General Requirements:

- a) **Laws:** Comply with applicable laws, ordinances, rules, regulations, and orders of authorities having jurisdiction for safety of people and protection of property from damage, injury, or loss.
- b) **Responsibility:** Be solely responsible for initiating, maintaining, and supervising safety precautions and programs concerning Project security, but obtain Owner's approval of methods to be used and location of safeguards. Submit to NRDA, through Engineer, drawings and written description of methods and devices Contractor intends to use and do not begin Work at the site until such means and methods are mutually agreed on by Owner and Contractor.
- c) **On Public Property:** In addition to other means used in the interest of safety or security, comply with the requirements of governmental agencies having jurisdiction
- d) **Safeguards:** Erect and maintain, as required by conditions and progress of the Work, necessary safeguards, for safety and protection, including temporary fences, guards, railings, barricades, canopies, lighting, shoring, directional and danger signs, signals, and other warnings against hazards.
- e) **Security:** Protect and secure the site, new materials and equipment from theft and damage by whatever reasonable means are effective. Use methods such as the following, singly or together: locks, fences, signs, patrols, radio, alarms, locked storage on-site, and off-site warehousing.
- f) **Wall Closures:** Unless other acceptable means are provided, provide temporary closures for openings in walls along adjoining to make the building and site secure. Secure temporary closures when Work is not in progress using suitable means such as dead bolts inaccessible from the public side or locks or padlocks construction master keyed in accordance with Section, "Finish Hardware."
- g) **Entrances:** Do not block entrances to premises to remain in use or in any way inhibit access to them.
- h) **Design Live Loads:** Do not permit placing materials or equipment on new to exceed design load of structure or endanger structure or people.
- i) **Trenches:** Do not permit trenches to remain open for prolonged periods without adequate board covering or fencing.
- j) **Broken Glass:** Be responsible for glass broken during construction period; at completion,

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- replace broken glass.
- k) **Weather Protection:** During construction, provide protection against weather (rain, wind, storms, frost, or heat), and maintain work, materials, apparatus, and fixtures free from damage. At end of each workday, cover new work likely to be damaged.
  - l) **Dust:** Take precautions necessary to keep Work under this Contract and adjoining property reasonably free of dust.
  - m) **Protection of Construction Materials:** Refer to other specification sections for specific requirements.
  - n) **Materials Hoist:** Do not permit transporting of people on materials hoisting facilities.
  - o) **Removals:** Except for fences, remove temporary construction and protection specified in this section promptly when no longer needed and when removal is approved.
  - p) Maintain temporary fences until date of Substantial Completion, unless approval is obtained for earlier removal; then remove the temporary fence.
  - q) **Damaged Site Improvements:** Repair and restore to condition at beginning of construction, or better, existing site improvements, such as pavements, curbs, buildings, fences, lawns, plantings, and lighting which are not to be removed under this Contract but are damaged or defaced by Contractor's operations, except where new Work is required by the Contract.
  - r) **First Aid Equipment:** Provide at the site. Also provide continually available trained and qualified personnel to render first aid when needed.
  - s) **Emergency Signs:** Provide signs posted at telephones listing telephone numbers of emergency medical services, physicians, ambulance services, and hospitals.

#### 66. MOBILISATION PERIOD

This clause shall be read in continuation of Clause No 10 (B) (ii) of GCC. The mobilization advance shall be limited to 10% of value of work order after submission of the Bank Guarantee of equal amount in the prescribed format. The mode of release of mobilization advance shall be as follows:-

Phase I: 3% shall be released after issue of work order.

Phase II: 4% shall be released after completion of activities listed below.

Phase III: 3% shall be released after completion of activities listed below.

Mobilization period for the Contractor shall be 30 (thirty) days from date of issue of work order. It shall be in phases and the Contractor is obliged to adhere to these timings.

##### Phase II

This shall be of 15 (fifteen) days and the Contractor shall carry out following:

- Construction of approach road.
- Contractor's Site Office (part), Engineer's Site Office.
- Establishing full site godown for cement and steel yard.
- Mobilization of Key Personnels, identification/finalizing of Borrow area/Quarry.
- Construction of temporary hutment of labour.
- Arrangement for water supply.
- Arrangement for electric supply.
- Submission of Work Plan.
- Submission of Bar Chart programme for approval by Engineer with details of temporary works, plants, equipment and machinery list.
- Establishing laboratory with testing equipments.

##### Phase III

This shall be of balance 15 (fifteen) days and shall cover the following activities:-

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- Establishing laboratory with testing equipments.
- Submitting proposal for concrete mixes and casting trial cubes.
- Approval of Bar Chart programme by Engineer with details of temporary works, plants, equipment and machinery list. Equipment/Vehicles shall be deployed.
- Commencement of initial Survey, testing and approval of borrow area.
- Establishing of Plant and successful installation of Batching Plant/Hot Mix Plant.

#### 67. METHOD OF CARRYING OUT THE WORKS

The Contractor shall, within 15 (fifteen) days of receipt of the Employer's order to commence work under respective clause of General Conditions of Contract submit for his approval a detailed programme and statement with drawings and diagrams showing how he proposes to carry out the works based on the tender programme. The statement shall describe the methods to be employed in carrying out the works, the Constructional Plant and temporary works which the Contractor intends to supply or use and shall include a list, classified into trades of labour force envisaged. The programme shall give the estimated dates on which the various sections of the works will commence together with the estimated date of completion and estimated output so that the whole of the works may be completed within the Contract Period.

- a) In addition, the Contractor shall submit to the Engineer drawings and full particulars of Temporary Works he intends to construct at least 8 (eights) days before he intends to commence such works. The Engineer may require modifications to be made if he considers the proposals to be insufficient and the Contractor shall give effect to such modifications at his own cost but shall not be relieved of his responsibility for the sufficiency thereof.
- b) The Contractor shall prepare a detailed survey of existing services on the site which he shall clearly mark up on a drawing for the approval by the relevant service authorities prior to commencement of the works.
- c) The Contractor is to progress the works thoroughly and to take such action as is necessary in order to ensure that the approved programme is strictly adhered to in all its stages. The Contractor shall submit detailed programmes of the various sections of the works as and when required by the Engineer, the Contractor shall take all precautions and cover all contingencies to ensure that adequate spare equipment and materials are available at all times to ensure completion of this work in accordance with the agreed programme.
- d) The acceptance of programmes as submitted by the Contractor or with any modification thereto, in the opinion of Engineer, shall not relieve the Contractor of his responsibility to complete the work within period specified in as per agreement unless extension of time limit is expressly sanctioned under respective clause of standard General Conditions of Contract or Special Conditions of Contract.
- e) The Contractor shall prepare the CPM programme on computer and the same to be monitored by proper installation of PC and printer facilities at the site.
- f) The bills shall be on computer and the programme will incorporate the deductions of Mobilisation Advance and other items.

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**68. CONTRACTOR RESPONSIBLE FOR SUFFICIENCY OF MEANS EMPLOYED**

The Contractor shall take upon himself the full and entire responsibility for the sufficiency of plant, centering, scaffolding, timbering, machinery, tools or implements and generally for all means used for the fulfilment of the Contract. In the event of any of these means proving insufficient, the Contractor is still fully and entirely responsible for the sufficiency of these means notwithstanding any previous approval or recommendation that may have been given by the Engineer.

**69. DRAWINGS**

The Contractor will receive from the Engineer, 2 (two) prints of the tender drawings listed hereof, together or thereafter with any further drawings issued for Road, Working drawings shall be progressively issued as per the approved construction schedule submitted by the contractor & approved by NRDA.

**70. AS BUILT DRAWINGS**

The Contractor shall during the course of execution, prepare and keep updated a complete set of 'as- built' drawings recording all works on the blue prints, which shall be corrected daily, if necessary, to show each and every change from the Contract Drawings as a approved working drawings, shop drawings and the exact 'as-built' location, sizes and kinds of work etc. This set of drawings shall be kept on the site and shall be used for record purposes. Changes recorded shall be countersigned by the Engineer and the Contractor. Copies of 'as-built' drawings shall be supplied to the CE), NRDA/ and the Engineer on request.

The Contractor shall submit complete 'as-built' drawings (in scale 1:2000 horizontal and 1:200 vertical) of entire work on reproducible tracings and ammonia prints 10 (ten) sets in form of bound sets and Compact Discs 2 nos. for road work and all services as directed by the Engineer within 30 (thirty) days of the completion of entire work by using AutoCAD facility. Maintenance manuals and original warranties shall be submitted at the time of submitting the As-built drawings. In case the Contractor fails to submit complete 'as-built' drawings as aforesaid [in form of bound sets [10 (ten) sets] and Compact Discs [2 (two) nos.], he shall be liable to pay a sum equivalent to 0.1 percent of the value of work subject to maximum of Rs.10 lakhs (Rupees ten lac only) or as may be fixed by NRDA and this decision shall be final and binding. Pre-final & Final Bill shall not be released until all the as-built drawings are submitted & approved.

**71. STANDARDS**

In various places throughout this specification and the bills of quantities, reference is made to the standards, specifications and byelaws issued by the Indian Standard Institutions and other similar organizations. These references shall in every case be deemed to include the latest edition or issue of such standards, specifications and byelaws including all revisions, amendments and addendum subsequently issued. Where materials are not specified and standard exists in respect of such materials, then the materials shall in all respects comply with relevant and current I.S.I. In such cases where I.S.I. do not exist, the best manufacturers' specification shall be followed; in absence of all these, Engineer's instruction shall be followed.

**72. SUPERVISORY STAFF (As per clause 36 (i) of schedule F of the tender)**

The Contractor shall engage on the work qualified and experienced Engineers, Supervisor, capable of managing and guiding the work properly as detailed in Cl.36(i) of schedule F of the tender Form F-1. This supervisor shall be authorized by the Contractor in

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writing to receive the orders issued by the Engineer from time to time. The Contractor shall be responsible for carrying out these orders promptly.

**73. FIRE PRECAUTIONS**

The Contractor shall comply with fire regulations of the controlling authority in force at the site of the works relating to the precautions to be taken against fire hazards.

**74. USE OF SITE**

The Contractor shall not use any portion of the site for purpose not connected with the works without the prior written approval of the Engineer. He shall maintain permanent and site access roads free of spillage and shall not interfere with the flow of traffic. Also same shall apply to terraces and other developed areas.

**75. SAFETY ENGINEER**

The Contractor shall employ and depute at site on full time basis a fully qualified Safety Engineer(s) who shall be responsible to ensure observance of safety precautions and measure required to be taken at site. Further he shall make sure stipulations laid down in safety code as provided in GCC.

**76. QUALITY ASSURANCE MANUAL AND SAFETY MANUAL**

Successful tenderers will be required to submit Quality Assurance Manual and Safety manual made as per applicable specification for various items of work and get the same approved from Engineer before start of work and the adhere the same during actual execution of work.

**i. Quality Assurance Manual (QAM)-**

A quality assurance manual constituting a base document outlining quality policy of the agency, procedures, name of action, compliance, acceptance criteria and documentation etc. Shall be prepared by the successful tenderer and submitted to the Engineer for approval within 15 (fifteen) days from the date of receipt of work order. The QAM shall be prepared in such a way that it follows all the applicable specifications. The document shall generally cover aspects listed below, but not limited to the same.

**Scope of work**

- a) Planning for items to be executed including method statement and resource deployment both physical and financial.
- b) Identification of all parties involved in QA and their inter-relationship.
- c) Execution plan of Quality System giving reference - standard - frequency and acceptance criteria.
- d) Levels of cross checking/ verification in case of multiple verifications/ controls, including systems of inspection and audit, wherever applicable.
- e) Organization of personnel, responsibilities and lines reporting for QA purpose.
- f) Testing and statistical analysis.
- g) Inspection reports at the end and during defect liability period/ maintenance period.

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- h) Items to be covered for maintenance manual,
- i) Check list viz. Forms and formats.
- ii. **Inspection of Works at Factory/ Workshop**

For any visits that maybe necessary for the purpose of performance of testing, inspection of factory made goods/ equipments, at a location other than the site ,or Raipur, the actual cost of travel (to & fro airfare/ train A/c 1st class), boarding & lodging, local transport & per diem (per person per day) costs at the rate of Rs. 3000 (Rupees three thousand only) for any visit made by officials from NRDA/ PMC/ Architect/ Consultant (maximum 3 (three) persons per instance), shall be borne by the Contractor. Such visits may be necessary for the inspection of chillers, panels, elevators, transformers, DG sets, fabricated doors, etc. that require inspection prior to shipping from the place of its manufacture. Any other item which is required to be tested before being processed / fabricated in the factory, such visits shall require the prior written approval from the NRDA.

## **77. QUALITY ASSURANCE SYSTEM**

A quality assurance procedure covering all aspects of the work shall be adopted for this work to ensure the desired quality. Details of the procedure shall be decided by mutual consultation between the Engineer and the contractor at the start of the works.

- a) The contractor shall submit within the time stipulated by the Engineer in writing, the details of actual methods that would be adopted by the contractor for the execution of any item as required by the Engineer at each of the locations, supported by necessary detailed drawings and sketches including those of the equipment and machinery that would be used, their locations, arrangements for conveying and handling materials etc., and obtain prior approval of Engineer well in advance of starting of such item of work.
- b) The Engineer reserves the right to suggest modifications or make complete changes in the methods proposed by the contractor, whether accepted previously or not, at any stage of work, to obtain the desired accuracy, quality safety and progress of work which shall be binding on the contractor and no claim on account of such change in method of execution will be entertained by the Employer so long as Specifications of the items remains unaltered.
- c) The Contractor shall furnish within the period of 15 (fifteen) days a detailed programmed schedule using PERT/ CPM technique in quadruplicate including the date of actual start, the monthly progress expected to be achieved and the anticipated completion date of each major item of work to be done by him, also indicating, plant and machinery and material procurement schedule.
- d) The schedule is to be such as is practicable of achievement towards the completion of the whole work in the time limit and of the particular items, if any, on the due date specified in the contract and shall have the approval of the Engineer. No revised schedule shall be operative without such acceptance in wiring. The Engineer is further empowered to ask for more detailed schedule or schedules say weekly for any item or items, in any case of urgency of work as will be directed by him and the contractor shall supply the same as and when asked for.
- e) The contractor shall furnish sufficient plant, equipment and labour as may be necessary to maintain the progress schedule. The working and shift hours for operations to be done under.

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- f) Further, the contractor shall submit the progress of work in forms and statements etc. at periodical intervals in the form of progress charts, forms, statements and/ or reports as may be approved by the Engineer.
- g) The contractor shall maintain proforma, charts, details regarding machinery, equipment, labour, materials, periodical returns thereof as may be specified by the Engineer.

#### 78. EQUIPMENT MAINTENANCE MANUAL

The Contractor shall mention the list of machinery procured at site for the work in this manual. This manual shall also reflect the name of the manufacturer, age of machinery and the agency entrusted with the maintenance work of the machinery listed in the manual.

#### 79. PLANT, MACHINERY AND SHUTTERING

The contractor is required to submit details of plants and machineries to be deployed by him in apro form as indicating all details such as make, year of manufacture, registration etc. be submitted. The details are to be provided with in 30days after award of contract.

#### 80. MINIMUM PLANTS&EQUIPMENTS

Sr. No	Particulars	Capacity	Quantity
1	Computerised and Fully Automatic Concrete batching plant	15 Cum /hr	1 No. minimum or as required
	Cement Silos with direct feeding and batching facility	2 (two) days capacity	
	Hoppers for fine and course aggregate		
	Approved Plasticizer dozing facility		
	Software programme compatible to make corrections to batching /mix design.		
2	Concrete Pump	Max vertical reach not less than 15m pumping 30 cum/hr.	2 Nos.
3	Transit Mixer	6 Cum	2 Nos.
4	MS concrete Piping system for pumping		1 set per Pump set
5	JCB		4 Nos.
6	Poclain / excavator		2 No.
7	Excavator with Rocker Breaker		2 No.
8	Vibrators		As per requirement
A	Generator	Minimum 30 KVA	4Nos.
B	Needles - 20		4 Nos.
C	Needles - 40		4Nos.
D	Needles - 65		4 No.
9	Bar Bending Machine up to 40mm dia.		2 No.
10	Bar cutting Machine up to 40mm dia.		2 No.

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Sr. No	Particulars	Capacity	Quantity
11	Material Hoist		2 Nos.
12	Curing Pumps		4 Nos.
13	Double legged tubular scaffolding System		As per requirement
14	Pan mixer of not less than 0.5 Cum		2 Nos.
15	Plate Vibrators	1 ton capacity	2 Nos.
16	Minimum shuttering material to be provided by the contractor (Good quality steel platesinc steel propos etc.)		1000sqm
17	Hot Mix Plant ( Batch type with electronic and computer controls and vibratory screens)	120 Tonne/hr capacity	Minimum 1 no.
18	Paver with electronic sensor for automatic level control for bituminous work	Capable of paving 9.0m width	Minimum 2 nos.
19	Paver with electronic sensor for automatic level control for laying WMM	Capable of paving 5.5m width	Minimum 2 nos.
20	Motor grader , 120HP	Above 150kw engine output	2 Nos.
21	WMM mixing plant	160 Tonne/Hour	1 Nos.
22	Pneumatic tyred Roller	Operating weight not less than 8 tonne; minimum 8 tyred with self-inflating system.	4 Nos.
23	Vibratory Roller (Soil Compactor)	Minimum 10T operating Wt. Compactor	8 Nos.
24	Tandem Vibratory Roller	Minimum 8T operating Wt.	4Nos.
25	Bitumen Sprayer		2 No.
26	Total Station		5 Nos.
27	Kerb Casting Machine		2 Nos.
28	Stone Crusher cum screening unit (Cone Crusher with VSI unit)	200 Tonne/ Hour	2 Nos.
29	Hydraulic Crane	Minimum 25 Tonne	2 Nos.

**Note:**The details referred to herein above are only for the purpose of quantitative assessment. The specifications & qualitative aspects of the shuttering material shall be in accordance with the BOQ & Technical specifications. The maximum age of the equipment shall not be more than 3 years as on date of work order. The details are to be provided with in 30days after award of contract.

- 81. SUBMITTALS** Unless otherwise specified or directed by NRDA, the Contractor shall submit to NRDA for his review and approval all Co-ordinated services drawings, shop drawings, samples, materials lists, equipment date, instruction manuals, record documents, manufacturers' equipment manuals, design calculations for proprietary items of work, technical submittals, and other information required by the Contract Documents. Submittals and their contents including deviation shall be properly prepared, identified, and transmitted as provided herein or as the Owner may otherwise direct. Except for record documents and instruction manuals for operation and maintenance, submittals including deviation shall be approved before the material or

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equipment covered by the submittal is delivered to the site. The contractor shall furnish an authority if required from material suppliers.

82. **Subject** work is strictly to be completed within stipulated work completion period and in accordance with the activities listed below completely as per the directives from Engineer. The charges and the expenses for completing the following listed activities should be included in the quoted offer and no separate payments against this will be made.

1. Successful agency will have to obtain and submit the Contractor All Risk Insurance Policy (CAR) in original within 1 (one) week from date of work order from Director of Insurance, Government Insurance Fund, Raipur, Chhattisgarh. The Contractors All Risk (CAR) Policy as said above shall be inclusive of insurance coverage under workman's compensation insurance policy for all workmen employed by contractor to complete the works covered under present contract. Further the contractors All Risk Policy period completely as stated in the tender. In case of time period extension (If any), it is essential that, premium of CAR policies should be timely paid by agency in order to ensure the continuity of CAR policy without any break in the same, suitable action will be taken against defaulters as per General Conditions of Contract unless and until the Contractors All Risk Policy as stated in above manner is submitted to the office of Engineer no payments will be released against any work executed.

2. Obtaining necessary scheme sanctions in detail towards execution and completion of subject work in all respect, from concerned CSEB/ applicable local authority. This activity includes required co-ordination and follow-up with concerned CSEB/ applicable local authority for obtaining necessary scheme sanctions. The scheme sanction should

be inclusive of specifications and required layout and other drawings etc. completely as per the requirement.

The payment towards the supervision charges of CSEB/ applicable local authority shall be paid directly to CSEB/ applicable local authority on behalf and in the name of NRDA by the agency.

The original scheme sanctions along with original certified drawings, specification details, quotations, payment receipt against supervision charges etc. should be submitted to the Engineer.

The supervision charges paid in the name of NRDA as mentioned above shall be reimbursed on submission of original payment receipts.

3. If required, preparation and submission of execution drawing in co ordination with concerned planning authority of NRDA by engaging Govt. approved Surveyor for confirmation and marking of proposed cable routes, location of control pillar, existing services along the proposed route under the present contract as per the sanctioned scheme obtained from CSEB Reports and marked computerized plans duly certified by surveyor in 3 sets of should be submitted after carrying out the details survey as mentioned above.

4 Obtaining necessary road/ soil/ footpath etc. cutting permission for cable trenching from concern authorities like NRDA/ CSEB/applicable local authority/ RMNN/ PWD etc. as applicable along the approved route and submit the approval in original along with the drawings and permission to Engineer.



The charges required for obtaining the approvals and permission as mentioned above should be directly paid on behalf and in the name of NRDA by the agency.

The charges paid in the name of NRDA as mentioned above shall be reimbursed on submission of original payment receipt to the Engineer

5. Preparation and submission of shop/ execution drawing to Engineer for approvals. Submitting list of Makes of various items and material to be used under present contract for approvals.

The Contractor or his qualified engineer having updated technical knowledge for execution of the subject work should invariably remain present and co-ordinate during every inspection and testing programme at manufacturers works, similarly during every joint site visits and when required.

7. After supply of material at site, all the documents such as delivery challan, excise gate pass, material test report (in original), etc. should be submitted to Engineer for obtaining installation clearance.\*

The complete work under the present contract shall be carried out with required supervision, stage-wise inspection from concerned authority of CSEB / applicable local authority & Electrical Inspector authority in co-ordination with Engineer complete with required power shutdowns. The record of all inspection and shutdowns shall be submitted to Engineer.

8. The execution work of cable trenching/ foundation for poles/ foundation of feeder pillar/excavation and trenching in all types of surfaces rocks, soils etc. shall be carried out as per approved route plan by using appropriate tools and machines in close co-ordination with concerned authorities from NRDA, CSEB/ applicable local authority, etc. completely as per the requirement so as to avoid the damages to the existing services.

9. Obtaining clearance certificate from concern authority of NRDA, RNN, PWD, CSEB/ applicable local authority, etc. as applicable, towards completion of re-surfacing work of cable trenches, excavated surfaces and removal of debris and submission of this clearance certificate in this regard obtained from concerned authorities to Engineer.

\* In absence of activity No. 1 & 15 above, the payment towards cable trenches erection and installation will not be released.

10. Arranging and carrying out pre & post testing and commissioning of the completed installation in presence of Engineer, his representative and the representative of any other statutory authorities like CSEB/ applicable local authority & Electrical Inspector etc. as required.

11. Excess saving statement as per final execution of work, item wise measurement break up in detail and escalation claim as applicable along with detail calculations and copies of confirmed indices etc. to be submitted to Engineer.

It is mandatory to complete all the activities listed above from Sr.No.1 to 11 for releasing the final payment.

**83.** Following conditions are the essential conditions of contract for carrying out and completing the subject work in all respect within stipulated time period. The successful agency will be responsible for completing the same as per the directives of Engineer. The charges and expenditure if any required for completing the same should be including in the quoted offer, and noseparate payments against this will be made.

1. The contractor shall visit the site to access the actual quantum of work and period required for completing the same before quoting the offer.

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2. Scheme specifications and quantity of the material to be used for the subject work under the contract and specified in the tender document is only for guideline purpose. However it will be the responsibility of the successful agency to obtain the measurements and specifications in detail of each and every item before starting the execution of work and complete the work in accordance with the approvals, clearances obtained for the same. All cost required for completion of work as per statutory approval, shall be deemed to have included in the offer quoted.
  3. It will be Agency's responsibility to obtain necessary sanctions and permissions by paying necessary charges towards;
    - a) Obtaining necessary scheme sanctions and permissions for completing the subject work in all respect from any concerned statutory authority.
  5. The successful agency will be completely responsible for accidents occurred if any during the execution of work as well as during 24 (twenty four) months defect liability period under this contract. It will also be the responsibility of agency, for making police complaints against any thefts and accidents etc. under intimation to NRDA.
  6. Charges against following listed activities should be included in the quoted offer itself and no separate payments will be made against same.
    - a) Arranging and carrying out the material inspecting at respective manufactures unit.
    - b) Arrangements for performing site visits and other connected activities as and when required by Engineer or his representative.
    - c) Carrying out necessary co-ordination and follow up with concern authorities for obtaining necessary sanctions and permissions as required towards completion of work in all respects.
    - d) Appointing Govt. approved surveyor for carrying out site survey and preparation of computerized shop drawing, Execution drawing, As built drawing etc. with soft copy.
    - e) Any other incidental charges required towards completion of work in all respect.
  7. Bills submitted against the executed and completed works at site, will be processed further by Engineer, after necessary scrutiny and verification.
84. The services/ tasks/ works as referred to under clauses shall be suitably applicable to all Utility services executed by the contractor, whether specifically mentioned herein above or no.
85. **SAFETY, SECURITY AND PROTECTION OF THE ENVIRONMENT**  
The Contractor shall, throughout the execution and completion of the Works and the remedying of any defects therein:
  - (a) have full regard for the safety of all persons entitled to be upon the Site and keep the Site (so far as the same is under his control) and the Works (so far as the same are not completed or occupied by the Employer) in an orderly state appropriate to the avoidance of danger to such persons,
  - (b) provide and maintain at his own cost all lights, guards, fencing, warning signs and watching, when and where necessary or required by the Engineer or by any duly constituted authority, for the protection of the Works or for the safety and convenience of the public or others, and

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(c) take all reasonable steps to protect the environment on and off the Site and to avoid damage or nuisance to persons or to property of the public or others resulting from pollution, noise or other causes arising as a consequence of his methods of operation.

**86. CARE OF WORKS**

The Contractor shall take full responsibility for the care of the works and materials and the plant for incorporation therein from the Commencement Date until the date of issue of the Taking-Over Certificate for the whole of the works, when the responsibility for the said care shall pass to the Employer. Provided that:

- a. if the Engineer issues a Taking-Over Certificate for any section or part of the Permanent, Works the Contractor shall cease to be liable for the care of that section or part from the date of issue of the Taking-Over Certificate, when the responsibility for the care of that Section or part shall pass to the Employer, and
- b. the Contractor shall take full responsibility for the care of any outstanding works and materials and plant for incorporation therein which he undertakes to finish during the Defect Liability Period until such outstanding Works have been completed as per the agreement.

**87. DAMAGE TO PERSONS AND PROPERTY**

The Contractor shall, except if and so far as the Contract provides otherwise, indemnify the Employer against all losses and claims in respect of:

- (a) death of or injury to any person, or
- (b) loss of or damage to any property (other than the Works),

which may arise out of or in consequence of the execution and completion of the works and the remedying of any defect therein, and against all claims, proceedings, damages, costs, charges and expenses whatsoever in respect thereof or in relation thereto, subject to the exceptions as per agreement.

**88. EXCEPTION**

- a) the permanent use or occupation of land by the Works, or any part thereof,
- b) the right of the Employer to execute the Works, or any part thereof, on, over, under, in or through any land,
- c) damage to property which is the unavoidable result of the execution and completion of the Works, or the remedying of any defects therein, in accordance with the contract, and
- d) death or injury to persons or loss of or damage to property resulting from any act or neglect of the Employer, his agents, servants or other contractors not being employed by the contractors, or in respect of any claim, proceedings, damages, costs, charges and expenses in respect thereof or in relation thereof or, where the injury or damage was contributed to by the Contractor, his servants or agents, such part of the said injury or damage was contributed to by the Contractor, his servants or agents, such part of the said injury or damage as may be just and equitable having regard to the extent of the responsibility of the Employer, his servants or agents or other contractors for the injury or damage.

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89. If any plant (floating or otherwise) belonging to or hired by the Contractor or any person employed by the Contractor or any materials or things therein or there from sink from any cause whatsoever, it shall immediately be reported by the Contractor to the Competent authorities and the Engineer or his Representative, and the Contractor shall forthwith, at his cost raise and remove any such plant, materials or things or otherwise deal with the same as the Engineer may direct.

The fact that such sunken plant, materials or things are insured or have been declared a total loss or do not represent any further value shall not absolve the Contractor from his obligations under this Clause to raise and remove the same.

Until such sunken plant or materials or things have been raised and removed, the Contractor shall set such buoys and display at night such lights and do all such things for safety purposes as may be required by the competent authorities or by the Engineer.

In the event of the Contractor not carrying out the obligations imposed on him by this clause, the Employer may cause to set buoys and display at night lights on such plant and raise and remove the same with all expenses and consequences thereon and incidental thereto to be borne by the Contractor and shall be recoverable from him as a debt by the Employer or may be deducted by the Employer from any monies due or which may become due to the Contractor.

90. **SUSPENSION OF WORK**

The Contractor shall, on the instruction of the Engineer, suspend the progress of the works or any part thereof for such time and in such manner as the Engineer may consider necessary and shall, during such suspension, properly protect and secure the works or such part thereof so far as is necessary in the opinion of the Engineer, unless such suspension is:

- (a) otherwise provided for the contract.
- (b) necessary by the reason of some default of or breach of contract by the Contractor or for which he is responsible.
- (c) necessary by reason of climatic conditions on the site, or
- (d) necessary for the proper execution of the Works or for the safety of the Works or any part thereof;

91. **ENGINEER'S DETERMINATION FOLLOWING SUSPENSION**

The Engineer shall after due consultations with the Employer and the Contractor, determine:

- (a) any extension of time to which the Contractor is entitled as per agreement, and
- (b) the amount which shall be added to the Contract Price, in respect of the cost incurred by the contractor accordingly, with a copy to the Employer.

92. **SUSPENSION LASTING MORE THAN 84 DAYS**

If the progress of the works or any part thereof is suspended on the instructions of the Engineer and if permission to resume work is not given by the Engineer within a period of 84 Days from the date of suspension, the Contractor may give notice to the Engineer requiring permission, within 28 Days from the receipt thereof to proceed with the works or that parts thereof in regards to which progress is suspended. If within the said time, such permission is not granted, the Contractor may, but not bound, elect to treat the suspension where it affects part only of the works, as an omission of such part by giving a further notice to the Engineer to that effect, or, where it affects the whole of the Works, treat the suspension as an event of default by the Employer and terminate his employment under the Contract in accordance with the provisions given in General Condition of Contract.

93. Clause 7.0 of General Conditions of Contract is amended by deleting the words "within 7 working days" & "within 21 working days" and by substituting therefore the words "within 10 working days" & "within 30 working days".

**94. TRANSPORT OF CONTRACTOR'S EQUIPMENT OR TEMPORARY WORKS**

If it is found necessary for the Contractor to move one or more loads of heavy constructional plant & equipment, materials or pre-constructed units or parts of units of work over roads, highways and bridges on which such oversized and overweight items are not normally allowed to be moved, the Contractor shall obtain prior permission from the concerned authorities. Payments for complying with the requirements, if any, for protection of strengthening of the roads, highways or bridges shall be made by the Contractor and such expenses shall be deemed to be included in his contract price.

**95. USE OF EXPLOSIVES**

Except as may be provided in the Contract or ordered or authorised by the Engineer, the Contractor shall not use of explosives is so provided or ordered or authorised, the Contractor shall comply with the requirements of the following sub-clauses of this clause besides the law of the land as applicable:

- a) The Contractor shall at all times take every possible precaution and shall comply with the appropriate laws and regulations relating to the importation, handling, transportation, storage and use of explosives and shall, at all times when engaged in blasting operations, post sufficient warning flagmen, to the full satisfaction of the Engineer.
- b) The Contractor shall at all times make full liaison with and inform well in advance and obtain such permission as is required from all Government Authorities, public bodies and private parties whatsoever concerned or affected or likely to be concerned or affected by blasting operations.
- c) The Contractor shall pay all license fees and charges, which may be required for storage of explosives or in respect of any other matter whatsoever.

**96. REMOVE OF IMPROPER WORK, MATERIALS OR PLANT**

The representative of NRDA nominated by the Employer, in the presence of Engineer, may inspect the works, ask for testing and write instructions in the site order book/ issue written instructions for necessary action by the Contractor. The Contractor shall carry out such instructions and inform the Employer, through the Engineer, on the action taken by him.

**97. COMMENCEMENT OF WORKS**

The Contractor shall commence the Works as soon as is reasonably possible after the receipt by him of a notice to this effect from the Engineer, which notice shall be issued within the time stated in the Appendix to tender after the date of Letter of Acceptance. Thereafter, the Contractor shall proceed with the Works with due expedition and without delay.

**98. EXTENSION OF TIME FOR COMPLETION**

In the event of:

- a) the amount or nature of extra or additional work,
- b) any cause of delay referred to in these Conditions,
- c) exceptionally adverse climatic conditions,
- d) any delay, impediment or prevention by the Employer, or
- e) other special circumstances which may occur, other than through a default of or breach of contract by the Contractor or for which he is responsible,
- f) being such as fairly to entitle the Contractor to an extension of the Time for completion of the works, or any Section or part thereof, the Engineer shall, after due consultation with the Employer and the Contractor, determine the amount of such extension and shall notify the Contractor accordingly, with a copy to the Employer.

**99. CONTRACTOR TO PROVIDE NOTIFICATION AND DETAILED PARTICULARS**

Provided that the Engineer is not bound to make any determination unless the Contractor has:

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- a) within 28 Days after such event has first arisen notified the Engineer with a copy to the Employer, and
- b) within 28 days, or such other reasonable time as may be agreed by the Engineer, after such notification submitted to the Engineer detailed particulars of any extension of time to which he may consider himself entitled in order that such submission may be investigated at the time.

**100. INTERIM DETERMINATION OF EXTENSION**

Provided also that where an event has a continuing effect such that it is not practicable for the Contractor to submit detailed particulars within the period of 28 days, he shall nevertheless be entitled to any extension of time provided that he has submitted to the Engineer interim particulars at intervals of not more than 28 days and final particulars within 28 days of the end of the effects resulting from the event. On receipt of such interim particulars, the Engineer shall, without undue delay, make an interim determination of extension of time and, on receipt of the final particulars, the Engineer shall review all the circumstances and shall determine an overall extension of time in regard to the event. In both such cases the Engineer shall make his determination after due consultation with the Employer and the Contractor and shall notify the Contractor of the determination, with a copy to the employer. No final review shall result in a decrease of any extension of time already determined by the Engineer.

**101. MATERIALS AND PLANT FOR THE PERMANENT WORKS**

With respect to materials brought by the Contractor to the Site for incorporation in the permanent works, the Contractor shall (i) receive a credit in the month in which these materials are brought to the Site and (ii) be charged a debit in the month in which they are incorporated in to the Permanent Works, both such credit and debit to be determined by the Engineer in accordance with the following provisions;

- a) No credit shall be given unless the following conditions shall have been met to the Engineer's satisfaction;
  - i) The materials are in accordance with the specifications for the works;
  - ii) The materials have been delivered to the site and are properly stored and protected against loss, damage or deterioration;
  - iii) The Contractor's records of the requirements, orders, receipt and use of materials are kept in a form approved by the Engineer, and such records are available for inspection by the Engineer;
  - iv) The Contractor has submitted a statement of his cost of acquiring and delivering the materials to the site, together with such documents as may be required for the purpose of evidencing such cost; and
- b) the amount to be credited to the Contractor shall be the equivalent of 75 per cent of the Contractor's reasonable cost of the materials delivered to the site, as determined by the Engineer after review of the documents listed in paragraph (a) (iv) above, as determined by the Engineer.
- c) the amount to be debited to the Contractor for any materials incorporated into the Permanent Works shall be equivalent to the credit previously granted to the Contractor for such materials pursuant to paragraph (b) above, as determined by the Engineer;

**102. RATE OF PROGRESS**

If for any reason, which does not entitle the Contractor to an extension of time, the rate of progress of the works or any Section is at any time, in the opinion of the Engineer, too slow to comply with the Time for Completion, the Engineer shall so notify the Contractor who shall thereupon take such steps as

Signature of Contractor.....

Signature of NRDA.....



are necessary, subject to the consent of the Engineer, to expedite progress so as to comply with the time for completion. The Contractor shall not be entitled to any additional payment for taking such steps. If, as a result of any notice given by the Engineer under this Clause, the Contractor considers that it is necessary to do any work at night or on locally recognized days of rest, he shall be entitled to seek the consent of the Engineer so to do. Provided that if any steps, taken by the Contractor in meeting his obligations under this clause, involve the Employer in additional supervision costs, such costs shall, after due consultation with the Employer and the Contractor, be determined by the Engineer and shall be recoverable from the Contractor by the Employer, and may be deducted by the Employer from any monies due or to become due to the Contractor and the Engineer shall notify the Contractor accordingly, with a copy to the Employer.

**103. TAKING OVER CERTIFICATE**

When the whole of the Works have been substantially completed and have satisfactorily passed any tests on completion prescribed by the Contract, the Contractor may give a notice to that effect to the Engineer, with a copy to the Employer, accompanied by a written undertaking to finish with due expedition any outstanding work during Defect Liability Period. Such notice and under taking shall be deemed to be a request by the Contractor for the Engineer to issue a Taking-over certificate in respect of the works. The Engineer shall, within 21 days of the date of delivery of such notice, either issue to the Contractor, with a copy to the Employer, a Taking over certificate, starting a date of which, in his opinion, the Works were substantially completed in accordance with the Contract, or give instructions in writing to the Contractor specifying all the works which, in Engineer's opinion, is required to be done by the Contractor before the issue of such Certificate. The Engineer shall also notify the Contractor of any defects in the Works affecting substantial completion that may appear after such instructions and before completion of Over Certificate within 21 days of completion, to the satisfaction of the Engineer, of the Works so specified and remedying any defects so notified.

**104. TAKING OVER THE SELECTION OF PARTS**

Similarly, in accordance with the procedure set out as per agreement, the contractor may request and the Engineer shall issue a Taking-Over Certificate in respect of:

- a) Any Section in respect of which a separate Time for Completion is finalized after approval of Engineer.
- b) Any substantial part of the permanent which has been both completed to the satisfaction of the Engineer and, otherwise than as provided for in the contract, occupied or used by the Employer, or
- c) Any part of the permanent works which the Employer has elected to occupy or use prior to completion (where such prior occupation or use is not provided for in the Contract or has not been agreed by the contractor as a temporary measure).

**105. SUBSTANTIAL COMPLETION OF PARTS**

If any part of the Permanent Works has been substantially completed and has satisfactorily passed any Tests on Completion prescribed by the Contract, the Engineer may issue a Taking-Over Certificate in respect of that part of the Permanent Works before completion of the whole of the works and upon the issue of such Certificate, the Contractor shall be deemed to have undertaken to complete with due expedition any outstanding work in that part of the Permanent works during the Defects Liability Period.

**106. CUSTOMS AND SECURITY REQUIREMENTS**

The Contractor shall comply with all regulations for the time being imposed by the Customs and Port Security Authorities in respect of the passage of plant, vehicles, materials, and personnel through custom barriers.

Signature of Contractor.....

Signature of NRDA.....

**107. CONTRACTOR'S TEMPORARY MOORINGS**

Should the Contractor for the purpose of the Contract desire to provide for his craft and floating plant, he will be allowed to do so in position and manners approved by the Engineer. The Contractor shall not lay such moorings so as to interfere with traffic in the waterways and such moorings shall be removed if and when required by the Engineer.

**108. COMPLETION OF OUTSTANDING WORK AND REMEDYING DEFECTS**

To the intent that works shall, at or as soon as practicable after the expiration of the Defects Liability Period, be delivered to the Employer in the condition required by the Contract, fair wear and tear excepted to the satisfaction of the Engineer, and Contractor shall:

- (a) Complete the work, if any, outstanding on the date stated in the Taking-Over Certificate as soon as practicable after such date, and
- (b) Execute all such work of amendment, reconstruction and remedying defects, shrinkages or other faults as the Engineer may, during the Defects Liability Period or within 14 Days after its expiration, as a result of an inspection made by or on behalf of the Engineer prior to its expiration, instruct the Contractor to execute.

**109. PROCEDURE FOR CLAIMS**

**a) Notice of Claims**

Notwithstanding any other provision of the Contract, if the Contractor intends to claim any additional payment pursuant to any Clause of these Conditions or otherwise, he shall give notice of his intension, to the Engineer, with a copy to the Employer, within 28 Days after the event giving rise to the claim has first arisen.

**b) Contemporary Records**

Upon the happening of the event referred to above paragraph (a), the Contractor shall keep such contemporary records as may reasonably be necessary to support any claim he may subsequently wish to make. Without necessarily admitting the Employers liability, the Engineer shall, on receipt of a notice under paragraph (a) above, inspect such contemporary records and may instruct the Contractor to keep any further contemporary and may instruct the Contractor to keep any further contemporary records as are reasonable and may be material, to the claim of which notice has been given. The Contractor shall permit the Engineer to inspect all records kept pursuant to the Sub-Clause and shall supply him with copies thereof as and when the Engineer to instruct.

**c) Substantiations of Claims**

Within 28 Days, or such other reasonable time as may be agreed by the Engineer, of giving notice under paragraph (a) above, the Contractor shall send to the Engineer an account giving detailed particulars of the amount claimed and grounds upon which the claim is based. Where the event giving rise to the claim has an accounting effect, such account shall be considered to be an interim account and the Contractor shall, at such intervals as the Engineer may reasonably require, send further interim accounts giving the accumulated amount of the claim and any further grounds upon which it is based. In cases where interim accounts are sent to the Engineer. The Contractor shall send a final account within 28 days of the end of the effect resulting from the event. The Contractor shall, of required by the Engineer so to do, copy to the Employer all accounts sent to the Engineer as per the agreement.

**d) Failure to Comply**

Signature of Contractor.....

Signature of NRDA.....



If the Contractor fails to comply with any of the provisions of this clause in respect of any claim which he seeks to make, his entitlement to payment in respect thereof shall not exceed such amount as the Engineer or any arbitrator, arbitrators appointed as per agreement assessing the claim considered to be verified by contemporary records (whether or not such records were brought to the Engineers notice as required under paragraph (b) & (c) above).

**e) Payment of Claims**

The Contractor shall be entitled to have included in any interim payment certified by the Engineers, such amount in respect of any claim as the Engineer, after due consultation with the Employer and the Contractor, may considered due to the Contractor provided that the Contractor has supplied sufficient particulars to enable the Engineer to determine the amount due. If such particulars are insufficient to substantiate the whole of the claim, the Contractor shall be entitled to payment in respect of such part of the claim as such particulars may substantiate to the satisfaction of the Engineer. The Engineer shall notify the Contractor of any determination made under this Sub-Clause, with a copy to the Employer.

**110. CERTIFICATE & PAYMENT**

**a) Monthly Statements**

The Contractor shall submit to the Engineer after the end of each month six copies, each signed by the Contractors representative approved by the Engineer, of a statement, in such form as the Engineer may from time to time prescribe, showing the amount to which the Contractor considered himself to be entitled up to the end of the month in respect of:

- i. The value of Permanent Works executed,
- ii. Any other items in the Bill of Quantities including those for Contractors Equipment, Temporary Works, Dayworks and the like,
- iii. The percentage of the invoice value of listed materials and Plant delivered by the Contractor on the site for incorporation in the Permanent Works but not incorporated in such Works.
- iv. Any other sum to which the Contractor may be entitled under the Contract or otherwise.

**b) Monthly Payments**

The Engineer shall, within 28 Days of receiving such statement, deliver to the Employers an Interim Payment Certificate stating the amount of payment to the Contractor which the Engineer considers due and payable in respect of such statement subject:

- i. Firstly, to the retention of the amount calculated by applying the Percentage of Retention, to the amount to which the Contractor is entitled under (a) paragraph (i), (ii), (iii) and (iv) until the amount so retained reached the Limit of Retention Money, and
- ii. Secondly, to the deduction as per agreement, of any sums which may have become due and payable by the Contractor to the Employer.

Provided that the Engineer shall not be bound to certify any payment under the Sub –Clause if the net amount thereof, after all retentions and deductions, would be less than the minimum amount of Interim Payment Certificates.

Notwithstanding the terms of this Clause or any other Clause of the Contract no amount will be certified by the Engineer for payment until the performance security, if required under the Contract, has been provided by the Contractor and approved by the Employer.

**c) Payment of Retention Money**

- i. Upon the issue of the Taking-Over Certificate with respect to the whole of the works, one half of the Retention Money, or upon the issue of a Taking-Over Certificate with respect to a section or part of the Permanent Works only such proportion thereof as the Engineer determines

having regard to the relative value of such section or Part of the Permanent Works, shall be certified by the Engineer for payment to the Contractor.

- ii. Upon the expiration of the Defect Liability Period for the Works the other half of the Retention money shall be certified by the Engineer for payment to the Contractor, Provided that, in the event of different Defects Liability Periods having become applicable to different sections or parts of the Permanent Works as per the agreement, the expression “expiration of the Defect Liability Period” shall, for the purposes of this Sub-Clause, be deemed to mean the expiration of the latest of such periods. Provided also that if at such time there shall remain to be executed by the Contractor any work instructed, in respect of the works, the Engineer shall be entitled to withhold certification until completion of such work of so much of the balance of the Retention Money as shall, in the opinion of the Engineer, represent the cost of the work remaining to be executed.

**d) Correction of Certificates**

The Engineer may by any Interim Payment Certificate make any correction or modification in any previous Interim Payment Certificate which shall have been issued by him and shall have authority. If any work is not being carried out to his satisfaction, to omit or reduce the value of such work in any Interim Payment Certificate.

**e) Statement of Completion**

Not later than 84 Days after the issue of the Taking-Over Certificate in respect of the whole of the works, the Contractor shall submit to the Engineer six copies of Statement at Completion with supporting documents showing in detail in the form approved by the Engineer:

- i. The final value of all works done in accordance with the Contract up to the date stated in such Taking-Over Certificate,
- ii. Any further sums which the Contractor Considered to be due, and
- iii. And estimate of amount which the Contractor considers will become due to him under the Contract.

The estimated amounts shall be shown separately in such Statement at Completion. The Engineer shall certify payment as per the agreement.

**f) Final Statement**

Not later than 56 Days after the issue of Defect Liability Certificate, the Contractor shall submit to the Engineer for consideration six copies of a draft final statement with supporting documents showing in detail, in the form approved by the Engineer:

- i. The value of all work done in accordance with the contract, and
- ii. Any further sums which the Contractor considers to be due to him under the Contract or otherwise.

If the Engineer disagrees with or cannot verify any part of the draft final statement, the Contractor shall submit such further information as the Engineer may reasonably require and shall make such changes in the draft as may be agreed between them. The Contractor shall then prepare and submit to the Engineer the final statement as agreed (for the purposes of these Conditions referred to as the “Final Statement”).

If following discussion between the Engineer and the Contractor and any changes to the draft final statement which may be agreed between them, it becomes evident that a dispute exists, the Engineer shall deliver to the Employer an Interim Payment Certificate for those parts of the draft final statement, if any, which are not in dispute. The dispute may then be settled as per the agreement.

**g) Discharge**

Signature of Contractor.....

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Upon submission of the Final Statement, the Contractor shall give to the Employer, with a copy to the Engineer, a written discharge confirming that the total of the Final Statement represents full and final settlement of all monies due to the Contractor arising out of or in respect of the Contract. Provided that such discharge shall become effective only after payment due under the Final Payment Certificate issued and the performance security, if any, has been returned to the Contractor.

**h) Final Payment Certificate**

Within 28 Days after receipt of the Final Statement, and the written discharge, the Engineer shall issue to the Employer (with a copy to the Contractor) a Final Payment Certificate stating:

- i. The amount which, in the opinion of the Engineer, is finally due under the Contract or otherwise, and
- ii. After giving credit to the Employer for all amounts previously paid by the Employer and for all sums to which the Employer is entitled, the balance, if any, due from the Employer to the Contractor or from the Contractor to the Employer as the case may be.

**i) Cessation of Employers Liability**

The Employer shall not be liable to the Contractor for any matter or thing arising out of or in connection with the Contract or execution of the works, unless the Contractor shall have included a claim in respect thereof in his Final Statement and (except in respect of matters of things arising after the issue of the Taking-Over Certificate in respect of the whole of the works) in the Statement at completion.

**111. Termination of Contract for Employer's Convenience**

The Employer shall be entitled to terminate this Contract at any time for the Employer's convenience after giving 56 days prior notice to the Contractor, with a copy to the Engineer.

**112. Limit of Price Adjustment**

"Provided that, in determining all such price adjustment in accordance with the aforesaid Sub-Clauses: If the Contractor shall fail to complete the work within time for completion as per agreement, increase or decrease of cost of specified materials shall be made using the indices relating to prescribed time for completion, or the current indices, whichever is more favourable to the Employer, provided that if an extension of time is granted as per the agreement, the above position shall apply to the adjustment made after expiry of such extension of time".

**113. Exemption from Price Adjustment**

"The following items shall not be included in the price adjustment calculation:

- a. Liquidated damages.
- b. Retention withheld and released.
- c. Advance payments in the form of loans and their repayments.
- d. The value of any additional or varied work valued at current prices.

**114. DEFAULT OF CONTRACTOR**

If the Contractor is deemed by law unable to pay his debts as the fall due, or enters into voluntary bankruptcy, liquidation or dissolution (other than a voluntary liquidation for the purposes of amalgamation or reconstruction), or becomes insolvent, or makes an arrangement with, or assignment in favour of, his creditors, or agrees to carry out the Contract under a committee of inspection of his creditors, or if a receiver, administrator, trustee or liquidator is appointed over the any substantial part of his assets, or if, under any law or regulation relating to reorganization, arrangement or readjustment of debts, proceedings are commenced against the Contractor or resolutions passed in connection with dissolution or liquidation or if any steps are taken to enforce any security interest over a substantial part of the Contractor, or under any applicable law has a substantially similar effect to any of the

foregoing acts levied on his goods, or if the Engineer certifies to the Employer, with a copy to the Contractor, that, in his opinion, the Contractor:

- (a) has repudiated the Contract,
- (b) without reasonable excuse has failed.
  - (i) to commence the works, or
  - (ii) to proceed with the works, or any Section thereof, within 28 Days after receiving notice.
- (c) has failed to comply with a notice issued or an instruction issued within 28 Days after having received it.
- (d) despite previous warning from the Engineer, in writing is otherwise persistently or flagrantly neglecting to comply with any of his obligation under the Contract.
- (e) the Employer may, after giving 14 Days' notice to the Contractor, enter upon the site and the works and terminate the employment of the Contractor without thereby releasing the Contractor from any of his obligations or liabilities under the Contract, or affecting the rights and authorities conferred on the Employer or the Engineer by the Contract and may himself complete the works or may employ any other contractor to complete the works. They or such other Contractor may use for such completion so much of the Contractors Equipment, Temporary Works and Materials as he or they may think proper.

**115. VALUATION AT DATE OF TERMINATION**

The Engineer shall as soon as may be practicable after any such entry and termination by the Employer, fix and determine ex parte, or by or after reference to the parties or after such investigations or enquiries as he may think fit to make or institute, and shall certify:

- (a) what amount (if any) had, at the time of such entry and termination, been reasonably earned by or would reasonably accrue to the Contractor in respect of work then actually done by him under the Contract, and
- (b) the value of any of the said unused or partially used materials, any Contractors Equipments and any Temporary Works.

**116. PAYMENT AFTER TERMINATION**

If the Employer terminates the Contractor's employment under this Clause he shall not be liable to pay to the Contractor any further amount (including damages) in respect of the Contract until the expiration of the Defect Liability Period and thereafter until the costs of execution, completion and remedying of any defects, damages for delay in completion (if any) and all other expenses incurred by the employer have been ascertained and the amount thereof certified by the Engineer. The Contractor shall then be entitled to receive only such sum (if any) as the Engineer may certify would have been payable to him upon due completion by him after deducting the said amount. If such amount exceed the sum which would have been payable to the Contractor on due completion by him, then the Contractor shall, upon demand, pay to the employer the amount of such excess and it shall be deemed a debt due by the Contractor to the Employer and shall be recoverable accordingly.

**117. PROGRAMME TO BE SUBMITTED**

"The Contractor shall within 28 Days after the date of receipt of the Letter of Acceptance, Submitted to the Engineer for his consent six copies of a programme, prescribed for the execution of the work. The programme shall conform and satisfy the requirement of Engineer.

Signature of Contractor.....

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Unless otherwise agreed, the programme shall be generally based on the programme submitted with the Bid and shall include:

- a) A detailed method statement defining the Contractor's methodology for construction backed with his proposals for construction equipment planning and deployment duly supported with broad output calculations and details of the quality control procedures proposed to be adopted, justifying his capability of achieving the completion of work in accordance with the milestones specified within the stipulated period of completion. The method statement shall conform and satisfy the requirement as per agreement.
- b) A bar chart showing the quantities of principal work items to be performed each month together with the mechanical equipment, materials and labour which shall be deployed on such activities. The programme shall not be unbalanced and shall be based on the achievement outputs calculated and demonstrated in the method statement submitted. An 'S' curve illustrating anticipated cumulative turnover and the anticipated cumulative progress should be superimposed upon the bar chart.
- c) A CPM analysis of all major activities from commencement of work to completion.
- d) A separate time based monthly programme indicating the Contractor's proposals for the purchase, long term lease, or hire of equipment throughout the duration of the Contract.
- e) A quality assurance procedure covering all aspects of the work shall be adopted for this work to ensure the desired quality. The procedure shall conform and satisfy the requirement as per agreement. Detail of the procedure shall be submitted to the Engineer for his consent.

If the work programme submitted by the contractor is deemed in any way incomplete or unacceptable by the Engineer, the Contractor shall be given 15 Days to revise and resubmit it to the Engineer's satisfaction. Until full compliance is achieved, the Contractor's obligation "to commence the Works at site", this clause shall be deemed unfulfilled."

**118. HANDING OVER PROCESS:-**

The handing over process shall be based on a performance comprising individual activities. The process shall be approved by the Engineer/ NRDA.

**119. EROSION AND SEDIMENTATION CONTROL**

- i. **General:** Prevent pollution of land, air, and water; control erosion, washout, and surface runoff of earth and stockpiled materials. Preclude sedimentation in general and especially in existing on-site and public storm-water system and public right of way.
- ii. **Procedures:** Perform erosion, sedimentation and temporary storm-water control. Follow procedures stipulated in local laws and regulations and as shown on Site work drawings.
- iii. **Maintenance:** Maintain controls in place until permanent controls are functioning. Remove when no longer needed.

**120. NOISE AND VIBRATION CONTROL**

Noise and Existing Building Structure Vibration Generated by Construction Procedures, Equipment, Tools, and Operations: Keep to minimum practicable during demolition and removal from building and site, including loading and removing storage containers. Equipment generated noise levels shall not exceed the following in decibels:-

1. Concrete mixer: 85
2. Concrete pump: 82

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3. Crane: 83
  4. Materials elevator:
  5. Pumps: 76
  6. Generators: 78
  7. Compressors: 81
  8. Pneumatic tools: 86
  9. Saws: 78
  10. Vibrators: 76
  11. Other tools: 85
  - i. Operation of Air Hammers, Compressors, and Reciprocating Equipment: Not permitted inside existing buildings unless specifically approved in writing by Owner.
  - ii. Laws: Comply with applicable noise control laws, ordinances, and regulations.
  - iii. Acoustical Enclosures: Stationary equipment may be enclosed to produce required sound attenuation subject to continued maintenance of such enclosures to ensure that specified sound levels are not exceeded.
  - iv. Violations: Where field sound measurements reveal sound levels exceeding those specified, cease operating such equipment and repair or replace it with equipment that complies with the sound levels specified.
- 121. EXISTING CONDITIONS**
- i. Contractors Examination of Site:-
    1. By executing Contracts, Contractor represent that they have:
      - a. Visited the site and made due allowances for difficulties and contingencies;
      - b. Compared Contract documents with existing conditions and informed themselves of conditions to be encountered, including work by others, if any, being performed; and
    2. Failure to visit the site and become familiar with conditions shall not relieve Contractor from furnishing materials or equipment or completing the Work in accordance with Contract documents at no additional cost.
    3. Contractor will not be given extra payment for Work related to conditions they can determine by examining the site and Contract Documents.
    4. Contractor will not be given extra payment for work related to ambiguities, inconsistencies, or errors within Contract documents, or between Contract documents and existing conditions, when such ambiguities, inconsistencies, or errors are known to Contractor before Contract execution.
  - ii. Make use of public property and make arrangements for that use. No extra compensation will be paid due to costs associated with using public property.
  - iii. Access by Contractor to portions of Owner's property beyond the actual area of Work under this contract is denied, except where necessary to perform the Work, and then only with specific written approval in each case. Refer to other sections for additional requirements.
  - iv. Contractor shall accept the site in the condition in which they exist at the time Contractor is given access to begin the Work.
  - v. Damage caused by Contractor to existing structures, grounds plants, pavements, utilities, work by others, fixtures, or furnishings, shall be repaired by

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Contractor and left in as good condition as existed before the damaging, unless such existing work is shown to be removed or replaced by new Work.

- vi. Immediately upon entering the site for purposes of beginning Work, locate general reference points and take such action as is necessary to prevent their destruction; lay out Work and be responsible for lines, elevations, and measurements, and Work executed under this Contract. Exercise proper precautions to verify figures shown on Drawings before laying out Work. See Section "Field Engineering" for additional requirements.
- vii. Employment of local labour shall be given priority wherever possible. However, this shall not in any way affect/ dilute the Contractors obligations listed within the Tender document.

## 122. LAMINATION OF DRAWINGS

All drawings issued to site shall be kept in lamination condition.

### 1. **Maintainance of installed equipments ,macheneries and fixtures :**

The Contractor, at the time of bidding, will be responsible to ensure the completeness and adequacy of his Bid Price to fulfill the entire responsibilities for Maintaining the installation of all installed equipments , machineries and fixtures minimum for a period of two years from the date of commissioning and imparting training to the workers/staff as asked for maintaining the installations as per IS requirement and exercising.

### 2. **Handing Over:**

At the time of handing over after completion of work, all the equipments, spares including standby equipments etc. must be in good working order as were taken over before commencement of defect liability period.

## 123. ORDER OF PRECEDENCE

In case of any discrepancy between the items mentioned in the BoQs/Specifications/Drawing, the Order of precedence should be as follows:

- i. Item details as mentioned in the BoQs, read along with the specification shall prevail. However in case of conflict specification shall hold good.
- ii. Drawings.

## 124. PAYMENT

- I. The Contractor, at the time of bidding, will be responsible to ensure the completeness and adequacy of his Bid Price to fulfill the entire responsibilities as described above.
- II. Payments to the Contractor by the Employer shall be made in Indian Rupees in the form of RTGS. Contractor shall provide the relevant information to the Employer.
- III. The Contractor (s) shall be paid on each item of Turn Key works under part "B" based on completion of following milestones;

Particulars of component	Milestone percentage	Cumulative percentage
<b>Wet well and sewage Pumping station :</b>	<b>( 8% of the Quoted rate of Part B works)</b>	
• Survey, investigation and all design works	5%	5%
• Completion of civil structures up to Ground level.	10%	15%

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Particulars of component	Milestone percentage	Cumulative percentage
• Completion of civil structures up to roof level including finishing	25%	40%
• Supplying, installation of all electromechanical works	40%	80%
• Testing and commissioning	10%	90%
• After completion of 3 months trial run	2%	92%
• After completion of 60 months Defect Liability period	8%	100%
<b>Sewage Treatment Plant (5mld SBR), all Treated Sewage Effluent Pumping Station and all other civil works:</b>	<b>( 70% of the quoted rate of Part B works)</b>	
• Survey, investigation and all design works	5%	5%
• Completion of civil structures up to Ground level.	10%	15%
• Completion of civil structures up to final level including finishing	25%	40%
• Supplying, installation of all electromechanical works	40%	80%
• testing and commissioning	10%	90%
• After completion of 3 months trial run	2%	92%
• After completion of 60 months Defect Liability period	8%	100%
<b>Sewage Treatment Plant,( 5mld SBR Units)</b>	<b>( 10% of the quoted rate of Part B works)</b>	
Survey, investigation and all design works	5%	5%
Completion of civil structures up to Ground level.	10%	15%
Completion of civil structures up to final level including finishing	25%	40%
Supplying, installation of all electromechanical works	40%	80%
Testing and commissioning	10%	90%
After completion of 3 months trial run	2%	92%
After completion of 60 months Defect Liability period with the defect liability period of 12 months or upto the end of 60months O & M period whichever comes later	8%	100%
<b>Tertiary Treatment Plant :</b>	<b>( 12% of the quoted rate of Part B works)</b>	
• Survey, investigation and all design works	5%	5%
• Completion of civil structures up to Ground level.	10%	15%
• Completion of civil structures above ground level including finishing	25%	40%
• Supplying, installation of all electromechanical works	40%	80%
• Testing and commissioning	10%	90%
• After completion of 3 months trial run	2%	92%
• After completion of 60 months Defect Liability period	8%	100%

**Note:**

Further break-up of the above mentioned items shall be submitted by the contractor after award of the contract and got to be approved by NRDA. However the decision of NRDA shall be final and binding in this matter

**IV. Operation and Maintenance of the system:**

***If the contractor quotes less than 8% of the value of work, Additional Bank Guarantee shall be taken amounting to the difference.***

For Items under part (C ) Operation and Maintenance of the system, the payment towards Operation and Maintenance shall be made on monthly basis calculated as follows: The Contractor, at the time of bidding, will be responsible to ensure the completeness and adequacy of his Bid Price to fulfill the entire responsibilities as described above. His bid price, as quoted for

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complete 60 months ( 5 years) of O & M period shall be bifurcated as below between 1<sup>st</sup> to 5<sup>th</sup> year, which shall further be sub divided in 12 installments for working out monthly payment:

During first year of O & M period : 18% of price quoted for complete O&M period.

During second year of O & M period : 19% of price quoted for complete O&M period.

During third year of O & M period : 20% of price quoted for complete O&M period.

During fourth year of O & M period : 21% of price quoted for complete O&M period.

During fifth year of O & M period : 22% of price quoted for complete O&M period.

- V. If at any time before or after the commencement of the work, NRDA, shall for any reason whatsoever.
- a. Cause Alterations, Omissions or Variation in the drawings and specification involving any curtailment of the works or originally completed; OR
  - b. Not required the whole of work as specified in the tender to be carried out, the Contractor (s) shall have no claim to any payment of compensation whatsoever on account of any profit or advantage which he/they might have derived from the execution of the work in full as specified in the tender but which he/they did not derived in consequence of the curtailment of the works by reason of alterations, omissions or variation or in consequence of the full amount of the work not having been carried out.

**SCHEDULE– D**  
**Section-V**  
**List of approved makes**

For the items missing in the list, the relevant IS Code and specification should be binding on the contractor. The contractor should take approval wrt the approved vendor list prior to any procurement from the Engineer in charge.

### APPROVED MAKE LIST CIVIL WORKS

Sr. No.	Item	Approved Make
1	Cement PPC/OPC	Ultratech/Lafarge/Ambuja/ACC/Birla /Century
2	TMT	TATA/SAIL/RINL/Jindal/ Essar
4	Water proofing compound	Siko/Foas rock/BASF/MC bauchemie/Dr.Fixit
5	MS Steel (Angle/channel/I beam etc )	Jindal /SAIL/ TATA or of original producers
6	Aluminium standard tubular sections/ Appropriate Z sections and other section	Jindal/ Hindalco
7	Glass/Mirror	Saint Gobain / Modi /Pilkington
8	Plastic Emulsion Paint	Asian/Berger/Nerolac
9	Synthetic Enamel Paint /Primer	Asian/Berger/Nerolac
10	Wall putty	Birla ,JK
11	Spider Fittings, WCP profiles ,Patch Fittings	Dorma/ Dline/Heffle/Hattich
12	Texture Paints (Exterior)	Heritage/Ultratech/Asian Paints
13	Texture Paints(Interior)	Heritage/Ultratech/Asian Paints
14	GRC Screens/Louvers	As per approval of Engineer/NRDA
15	Composite Aluminium Panels	Alucobond/Eurobond
16	Polycarbonate Sheets	G.E. / WILSON
17	Adhesives,Grouts and Sealers	FerrousCrete / Weber (Saint Gobain) / Laticrete / Bal-Endura
18	WaterProofing Admixtures	Dr.Fixit/ Pidilite/Kryton/McBouchair/Forsroch/ BASF
19	Gypsum Ceiling	Lafarge/ Saint Gobain / India Gypsum
20	Mineral Fibre Grid Ceilings	Armstrong /DIAKIN
21	Metal Ceilings	Armstrong / Hunter Douglas
22	Acoustical Ceiling tiles	Armstrong / Anutone
23	Wooden Finish Ceilings	Armstrong / Anutone
24	MDF Boads	Panelmax(Greenlam) / TESA(action),
25	Precast concrete tiles	Ultra/ Eurocon/ Duracrete
26	Glass mosaic tiles	Nitco/Bissazza/Alitalia
27	Ply, Commerical board, Blockboards, Particle Boards	Tesa(Action)/ARCHID/Century/Bhutanboad
28	Veneers and Laminates	Greenlam / Century/Merino/Euro
29	Road Signages and Overhead Gantry	Bajaj Electrical/3M

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	( Fulfilling the requirement of IRC : 67)	
30	Vitrified Tiles/Ceramic Tiles	NITCO/ HINDWARE /ASIAN/ KAJARIA/RAK
31	Precast interlocking concrete paver blocks.	Ultra Spectra/ Eurocon/ Duracrete
32	Cement Board	Everest/Bison/Hyderabad Industries
33	DWC HDPE pipe	D Rex / Alom/ Tirupati
34	CRMB	Only from Oil companies
35	Emulsion	Only from Oil companies
36	Bitumen	Only from Oil companies
37	HDPE manhole	ROMOLD , VECTUS INDUSTRIES LTD.

### APPROVED MAKE LIST FOR ELECTO MECHANICAL WORKS

Sr. No.	Item	Approved Make
<b>Electrical Works</b>		
1	Distribution Transformers	EMCO/ Vijay/ Volt Amp/ Kirloskar/ Approved vender of CSPDCL
2	11 KV Lightning Arrestor	Lamco/ Elpro/ Oblum/ Areva/ Raychem
3	H.T. Panels	Schneider/ L & T/ Siemens/ ABB/ C & S/ Legrand
4	Indicating Lamps	L & T/ Siemens/ Schneider
5	Energy Analyzer	Ducati/ L & T/ Schneider
6	Push Buttons	L & T/ Siemens/ Schneider
7	Timers	L & T/ Siemens/ Schneider
8	ACB	L & T/ Siemens/ Schneider/ ABB/ C & S
9	HRC	L & T/ GE/ Schneider/ Standard/ ABB/ C & S
10	Metal clad rewirable porcelain switch fuse unit	SSK/ Standard/ Havells/ C & S
11	Switch disconnecter fuse unit	GE/ L & T/ Schneider/ Siemens/ ABB/ C & S
12	Changeover switch	
i	On load	HPL/ Gerard/ GE/ L & T/ C & S/ ABB
ii	Off Load	Standard/ Havells/ C & S/ Gerard
13	Volt meters, Ampere meters	
i	Analog type meters	Mecon/ ESSVEE/ AE
ii	Digital type meters	Mecon/ ESSVEE/ C & S
14	Current Transformer	C & S/ AE/ Kappa
15	Selector Switches	GE/ C & S/ Siemens/ ABB
16	Static watt-hour meter (kwh meter)	L & T/ Sems/ Genius/ Approved vender of CSPDCL
17	Starters/Contactors	GE/ L & T/ Schneider
18	Relay	Siemens/ ABB/ Schneider
19	MCCB	GE/ L & T/ Schneider/ Siemens/ Legrand/ Andrew Yule/ ABB/ Hagger

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Sr. No.	Item	Approved Make
20	Connectors	Elmex/ Connect well/ Raychem/ Andrew Yule
21	MCB/ Isolator/ RCCB/ DBs/ enclosures	L & T/ ABB/ GE/ Schneider/ Legrand/ Andrew Yule/ Hagger
22	Metal Clad industrial plug top & socket	
i	Pin & sleeve type	Havells/ Legrand/ Schneider/ ABB
ii	Butt Type	BCH/ Millborn
iii	Self Extinguishable Polymer type	Legrand/ Schneider/ ABB
23	Capacitors	
i	Standard duty	Epcos/ Ducati/ Areva/ Unistar/ Schneider
ii	Heavy duty	
iii	Gas filled	
24	Power Switch (upto 32A)	L & T/ GE/ Schneider/ Siemens/ ABB
25	Exhaust Fan/ Light Fitting T-5	GE/ Crompton/ Bajaj/ Orient/ Usha/ Havells
26	Ceiling Fans	GE/ Crompton/ Bajaj/ Orient/ Usha/ Havells
27	Fresh Air Fans	GE/ Crompton/ Bajaj/ Orient/ Usha/ Havells
28	Wall mounting/ Cabin/ Pedestrial Fans	GE/ Crompton/ Bajaj/ Orient/ Usha/ Havells
29	Switches & Sockets	Northwest/ Mafaic/ Legrand/ Crabtree(Varuna)
30	Light Fittings	Philips/ Wipro/ Bajaj/ Schreder/ Thorn
	Lamps	Philips/ Osram/ GE
	LED	Philips/ Osram/ CREE
31	Storage Water Heater and accessories	Bajaj/ CG/ Usha/ Racold/ Jaguar
32	Solar Heating System	Tata/ BP/ BHEL
33	Air Conditioner	LG/ Voltas/ Samsung/ General/ Hitachi/ Diakin
34	Wires	Finolex/ Polycab/ RR Cables/ Gloster/ Havells
35	LAN, UTP Wires	As per IS code
36	Earthing	As per IS code
37	LT Cable	Finolex/ Universal/ Polycab/ Ravin cables/ Gloster/ CCI/ Havells
38	Cable Accessories:	
i	Brass Gland	Comet/ Metal Craft Industries/ Raychem
ii	Aluminium Lugs	Dowells/ Metal Craft Industries/ Raychem
39	Unarmoured Telephone Cable	Delton/ Finolex/ National/ Havells
40	Armoured Telephone Cable	Delton/ Finolex/ National/ Sterlite/ Birla Ericson/ Havells
41	XLPE insulated 33 & 11 KV HT cable	Universal/ Gloster/ CCI/ Polycab/ Ravin cable
42	Outdoor straight through joint	Denson/ Raychem/ 3M
43	Heat shrinkable type indoor/ outdoor terminations/ joint	Denson/ Raychem/ 3M
44	Push-on type indoor/ outdoor terminations/ joint	Denson/ Raychem/ 3M
45	MS cable tray	Venus/ Pasco/ Dolphin/ Metalem/ Asian Ancillaries

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Sr. No.	Item	Approved Make
46	Copper Bus Trunking arrangement	L & T/ Schneider/ EAE (Alcu-Bar)
47	PVC Pipes	Precision/ BEC/ Thermoplast
48	DWC Pipes	D-Rex/ Tirupati/ ALOM
49	Power transformers 33/11 KV	Crompton/ BHEL/ EMCO/ Vijai/ Volt Amp
50	Ring Main units 11 KV & 33 KV	Crompton/ BHEL/ Siemens/ ABB/ Schneider/ Areva
51	11/33 KV Vacuum Circuit Breaker	BHEL/ Crompton/ Siemens/ Schneider/ ABB/ Biecco lawrie/ Jyoti/ Andrew Yule/ Areva
52	Load break switch	Areva/ Crompton/ BHEL/ L & T/ Siemens/ ABB/ Schneider
53	Octagonal Poles	Bajaj/ Transrail/ Valmont
54	Tubular Poles	As per IS code & specification
55	DG Set with panel board	Cummins/ Kirloskar/ Caterpillar/ Jackson/ Sterling Wilson
56	Lift	Otis/ Jhonson/ Thyssen Krupp/ Mitsubishi/ Schindher
57	Packed Substation (All the components in the package substation shall be as per the list only)	Crompton Greaves/ Schneider/ ABB/ C & S/ Siemens
<b>Mechanical works</b>		
1	Submersible Pumping Sets	Kishor/ KSB/ Grundfos
2	Motors	Kirloskar/ Jyoti/ NGEF/ GE
3	EOT Crane	Wh Brady/ Crompton Greaves/ Jay Engineering
4	Mechanical Coarse bar Screen	JASH / JHONSON / SHIVPAD
5	Mechanical Fine bar Screen	JASH / JHONSON / SHIVPAD
6	Sluice Gates	JASH / VAG / KIRLOSKAR
7	Knife Gate Valves	JASH / VAG / TYCO / KEYSTONE
8	STP Equipment :Clarifloculator, Detritor, Floating Surface Aerator, Surface Aerator, Clarifier, Mixers etc.	TRIVENI / VOLTAS / SHIVPAD / DORR OLIVER
9	Actuator	AUMA/ Rotork/ Blue star
10	MS Pipes	Confirming to IS 2062
11	Valves	IVC/ Kirloskar/ IVI/ Kilburn/ Zoloto/ Castle/ CIM
<b>Instrumentation Works</b>		
1	Pressure Gauge	
i	Bourdon type	Fiebig/ H Guru Instruments Pvt Ltd/ Resrohel
ii	Diaphragm type	
2	Pressure Transmitter	Rosemount/ YBL/ Micro/ Endress+Hauser
3	Level Switches in Sludge, Sump/ thickener. Recirculation	V Automat/ Levcon/ Petrole Services/ NIVO/ Siemens
4	Ultrasonic flow meter	Khrone/ Yokogawa/ Krohne Marshall/ Emerson/

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Sr. No.	Item	Approved Make
		Rosemount// Endress+Hauser
5	PLC/ SCADA system	Schneider/ Allan Bradley/ ABB/ Siemens
6	UPS	APC/ Sukam/ Harel
7	Computer (Servers & Workstation)	HCL/ IBM/ HP-Compaq/ DELL
8	Printer	HP/ Canon/ Xerox
9	Remote Control Desk	Crompton/ Andrew Yule/ Siemens/ Sellwin electrical/ Positronics
10	Batteries	Shreetron India Ltd/ Caldine/ Chabbi electrical/ Exide/ Amar Raj
12	Online water quality instruments	HACH/Cole Parmer/GLI/P/ Endress+Hauser
13	Lab Instruments Water Quality	HACH/Perkin Elmer/Crison/Borosil/AGILENT
14	Electromagnetic flow meter	Endress+Hauser/ Siemens/ Khrono
15	Level transmitter	Endress+Hauser/ Siemens/ Vega

### APPROVED MAKE LIST FOR PLUMBING WORKS

Sr. No.	Item	Approved Make
1	Sanitary ware	Hindware/Parryware /Cera/RAK
2	Concealed Cisterns	Hindware/ Parryware /Cera/Jaguar
3	C.P. Fittings	Jaquar/ Parko / Parryware/Hindustan (Hindware)
4	HDPE pipe	Duraline/ Jain/Time Techno plast
5	uPVC pipe	SUPREME/KML CLASSIC/Oriplast/Prince
6	Ductile Iron(DI) pipe	Electro steel casting Ltd./Jindal saw Ltd.
7	Sluice valves and non return valves	Kirloskar/ IVC/IVI
8	FRP/GRP	EVERLAST/TECHNOCRATS/THERMOSET/ Bajaj
9	Specification for EPDM Gasket	Anand Reddiplex, Enviro Seals
10	Manhole Covers & Frame SFRC	K.K/ PERGITY/Neco/SRIF
11	CPVC Pipes & Fittings up to 50 mm dia	ASTRUL/Ashirvad/Supreme
12	CPVC Pipes & Fittings above 50 mm dia	ASTRUL/Ashirvad/Supreme
13	CPVC Valves up to 50 mm Dia	ASTRUL/Ashirvad/Supreme
14	S.S. Sink	Franke / Jayna / Nirali
15	G.I. Pipes	Jindal-Hissar/ Tata/Zenith
16	G.I. Fittings	Unik/ K.S./ Zoloto
17	Gunmetal Valves	Zoloto/ Leader/ Sant/ Kilburn
18	Brass stop & Bib Cock	L&K/ Jaquar/Hind
19	Ball valve with floats	Zoloto/ Leader/ Sant/ Jayco

### APPROVED MAKE LIST FOR FIRE FIGHTING WORKS

Sr. No.	Item	Approved Make
1	Pumps	Kishor/KSB/Grundfos/ Kirloskar/BEACONS /

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Sr. No.	Item	Approved Make
		MATHER & PLATT / CROMPTON / WASP JYOTI / BE / VOLTAS / GREAVES
2	Motors	KIROLISKAR / ALSTOM / SIEMENS / JYOTHI / ABB / CROMPTON
3	Butterfly/Check Valve	Audco/ AIP Valve
4	CP GM Ball Valve	Zoloto/AIP Valve
5	Air Release Valve	Sukan/Leader
6	RRL Hose	Geetach/Safegard
7	STARTERS	SIEMENS / L & T / CUTLER HAMMER / GE POWER / ABB /CONTROL & SWITCHGEAR
8	SINGLE PHASING PREVENTOR/ OVER LOAD PROTECTION UNIT.	L & T / GE POWER / SIEMENS / ABB
9	Fire Extinguishers	Geetach/Safegard / LINTEX / MINIMAX / SAFEX / BHARAT
10	Rubber Tube for Hose reel	Jyoti/Newage
11	Paint	J&N/ Nerolac
12	Welding rods	Victor/Maruti
13	Fasteners(Galvanised)	GKW/Canon
14	Dash fastners/clamps	Cannon/Chilly/Hilti
15	Hose Box/Hose reel drum	Geetach/Safegard
16	Anti vibration pads	Kanwal/Dunlop
17	Mechanical Seal	As per OEM Cert./Duramat
18	Pressure switch	Indfoss /DANFOSS / SWIZER.
19	Pressure Gauge ,THERMOMETERS,	JAPSIN / FIEBIG / GURU / H.GURE /BESTOBELL
20	Cables/wire	Kalinga/National/Polycab
21	PVC conduit	AKG/BEC
22	Sprinklers	SPRAY SAFE / HD/NEWAGE.
23	FIRE HYDRANT LANDING VALVES, FIRE BRIGADE CONNECTION (ISI MARKED).	MINIMAX / SAFEX / NEWAGE / VIJAY / SAFE GUARD.
24	INSTALLATION VALVE (ISI MARKED).	SPRAY SAFE / HD.
25	FIRE HOSE PIPES, FIRST AID HOSE REEL (ISI MARKED)	JAYSREE / MINIMAX / NEWAGE / SAFEX.
26	PRESSURE GUAGE.	JAPSIN / FIEBIG / GURU.
27	HP /LP /OFF SWITCH THERMOSTATS /HUMIDISTATS STRIP HEATERS.	PENN / HONEY WELL / INDFOSS / ESCORTS / DASSPASS.
28	PROPORTIONAL THERMOSTATE	HONEY WELL / JOHNSONS / LANDIS & STEAEFA
29	FILTERS	DYNA / KIRLOSKAR / PUROMATIC / PURAFILL / AITECH /THERMODYNE / AEROSOL / SMIL / PURE AIR
30	GRILLES /DIFFUSERS.	CARRYAIRE / AIRMASTER / VINAYAGA / MATASYS CORPORATION / AJANTA / RAVI STAR
31	INSULATION MATERIAL.	FGP / UP TWIGA / PILKINGTON / BEARDSSELL / LLOYDS / KIMMCO
32	AIR CURTAINS.	ALMONARD / BECON / TECHNOMECH / RUSSEL /

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Sr. No.	Item	Approved Make
		AERODYNAMICS
33	MODULATING MOTOR	HONEY WELL / JOHNSON / STEFA CONTROL / RAPID COOL.
34	MODULATING VALVE, SOLENOID VALVE FOR AHU	RAPID COOL / HONEYWELL / JOHNSON
35	BALANCING VALVE	ADVANCE / SANT / CASTLE
36	REFRIGERENT VALVE	BRASMATIC / SANT
37	FILTERS	DYNA / KIRLOSKAR / PUROMATIC / PURAFILL / AITECH /THERMODYNE / AEROSOL / SMIL / PURE AIR
38	HP /LP /OFF SWITCH THERMOSTATS /HUMIDISTATS STRIP HEATERS.	PENN / HONEY WELL / INDFOSS / ESCORTS / DASSPASS.
39	PROPORTIONAL THERMOSTATE	HONEY WELL / JOHNSONS / LANDIS & STEAEFA
40	BMS HARDWARE	COMPAQ /DELL / IBM / ACER /SIEMENS-NITEL / HCL
41	BMS SOFTWARE	SIEMENS ( DESIGA INSIGHT)/JHONSON CONTROLS (METASYS MS / LALNDIS & STEAEFA / HONEYWELL
42	BMS DDC CONTROLLER	SIEMENS / JHONSON CONTROL / HONEYWELL
43	VVVF DRIVE FOR AHU / COOLING TOWER MOTOR	DANFOSS / ALAN BRADLEY./ SIEMENS /ABB
44	FIRE DAMPER MOTORS	BALEMO /JUVANTO / SIEMENS
45	MIXING VALVE WITH MOTOR	SIEMENS / JHONSON CONTROL / HONEYWELL / RAPID COOL
46	Fire Alarm	Honeywell/IAS Morley/Notifier

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# **SCHEDULE– D**

## **Section – VI**

### **Drawings**

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**LIST OF DRAWINGS**

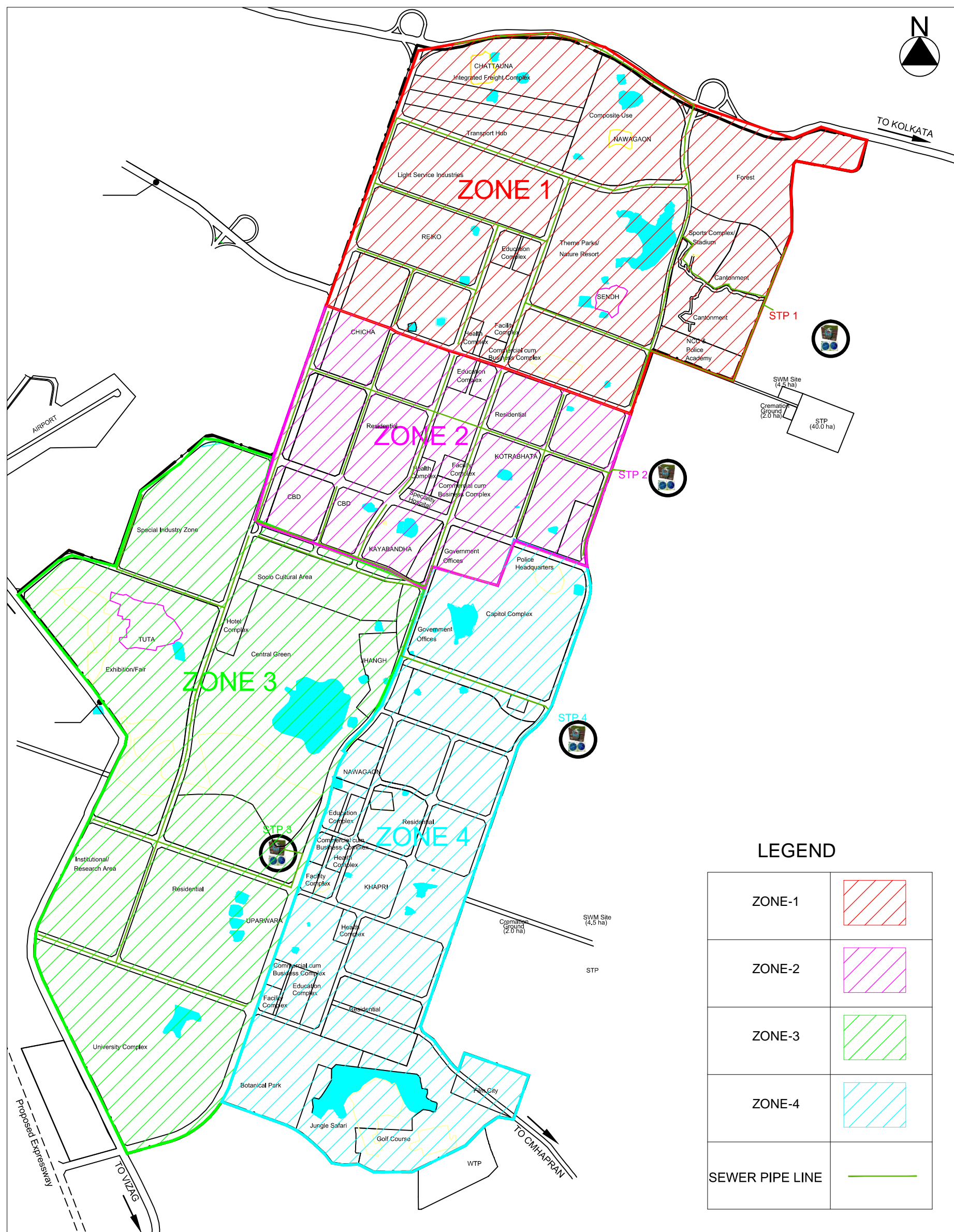
Sr. No	Drawing No	Drawing Title
1	NRDA-PSC-US-TD-1000	SEWERAGE ZONAL PLAN
2	NRDA-PSC-US-TD-1001	SEWERAGE NETWORK PLAN
3	NRDA-PSC-UI-TD-1001	RECYCLING NETWORK PLAN



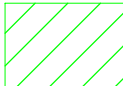
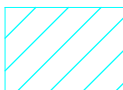

**The drawings enclosed are only for reference/tender purpose.**

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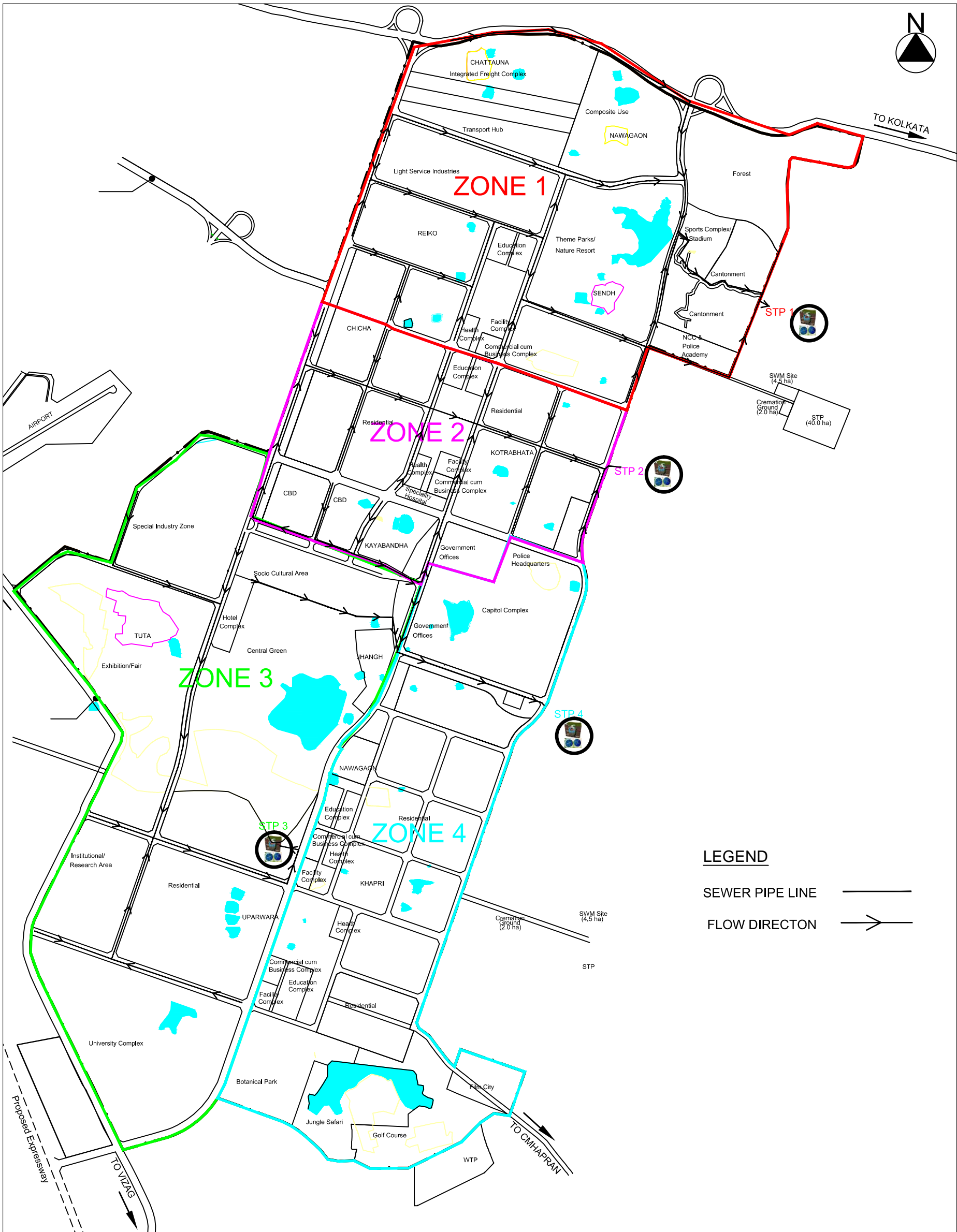
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LEGEND	
ZONE-1	
ZONE-2	
ZONE-3	
ZONE-4	
SEWER PIPE LINE	

 <p><b>NAYA RAIPUR DEVELOPMENT AUTHORITY</b> Infront of Mahanadi Dwar of Mantralaya, Raipur, Chhattisgarh</p> <p>Prepared By: INERA PSC</p>	<p>AUTHORITY:</p>	<p>PROJECT:</p> <p><b>DEVELOPMENT OF SEWERAGE SYSTEM FOR ZONE -1,2 &amp; 3 NAYA RAIPUR, CHHATTISGARH</b></p>	<p>Drawing No. : NRDA-PSC-UD-TD-1000</p> <p>Rev. No. 0</p>
	<p>DRAWING TITLE :</p> <p><b>SEWERAGE ZONAL MAP</b></p>	<p>Date JULY-2013</p> <p>Scale : N.T.S</p>	<p>Designed NAGU</p> <p>Checked A K SAHOO</p> <p>Approved</p>



	<b>AUTHORITY:</b>  <b>NAYA RAIPUR DEVELOPMENT AUTHORITY</b> Infront of Mahanadi Dwar of Mantralaya, Raipur, Chhattisgarh Prepared By: INFRA PSC	<b>PROJECT:</b> DEVELOPMENT OF SEWERAGE SYSTEM FOR ZONE -1,2 & 3 NAYA RAIPUR, CHHATTISGARH  <b>DRAWING TITLE :</b> SEWERAGE NETWORK PLAN	Drawing No. : NRDA-PSC-US-TD-1001		Rev. No. 0
			Date JULY-2013		Scale : N.T.S
			Designed NAGU	Checked A.K.SAHOO	Approved

## **SCHEDULE- E**

**Reference to General Conditions of contract.**

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Signature of NRDA.....

## SCHEDULE-E

**Reference to General Conditions of contract**

**Name of Work:“ Development of Sewerage collection, Treatment, and Reuse system including Operation and Maintenance for Zone 1, 2, 3 & specified area at Naya Raipur”.**

Estimated cost of work : Rs. **160 Crores**

(i) Earnest Money : Rs. **160 Lacs**

(ii) Performance : 5% of tendered value  
Guarantee

(iii) Security Deposit : 5% of tendered value

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Signature of NRDA.....



**SCHEDULE– F**  
**General Rules & Directions**

## SCHEDULE-F

**GENERAL RULES & DIRECTIONS:** Officer inviting tender

Maximum percentage for quantity of items of work to be executed beyond which rates are to be determined in accordance with Clauses 12.2 & 12.3:

See below

**Definitions:**

2(v)	Engineer-in-Charge	<b>Executive Engineer ( PHE), NRDA or Any Officer Appointed by CEO, NRDA</b>
2(viii)	Accepting Authority	<b>Chief Executive Officer, NRDA</b>
2(x)	Percentage on cost of materials and Labour to cover all overheads and profits:	15 %
2(xi)	Standard Schedule of Rates	<b>CG SoR with Updated Amendments</b>
2(xii)	Department	Naya Raipur Development Authority

**Clause 1**

- |      |   |               |
|------|---|---------------|
| (i)  | Time allowed for submission of Performance Guarantee from the date of issue of letter of acceptance | <b>7 days</b> |
| (ii) | Maximum allowable extension beyond the period provided in (i) above                                 | <b>7 days</b> |

**Clause 2**

Authority for fixing **CEO, NRDA**

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compensation under clause 2

### Clause 2A

Whether Clause 2A shall be applicable

**Applicable**

### Clause 5

Number of days from the date of issue **15 days**

of letter of acceptance for reckoning

date of start

Mile stone(s) as per table given below:-

***To be submitted by the tendered on award of work***

Sl. No.	Description of Milestone (Physical)	Time allowed in days(from date of start)	Amount to be with-held in case of non achievement of mile stone
1.		NA	
2.		NA	
3.		NA	
4.		NA	
5.		NA	

Time allowed for execution of work

**24 months including Rainy Season**

Authority to decide:

(i) Extension of time **CEO, NRDA**

(ii) Rescheduling of mile stones **Chief Engineer ( Engineering)**

### Clause 6, 6A

Clause applicable - (6 or 6A)

**6A**

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**Clause 7**

Gross work to be done together with **Rs 100 Lakhs**  
net payment /adjustment of advances  
for material collected, if any, since the  
last such payment for being eligible to  
interim payment

**Clause 10A All the materials as per contract****Clause 10B(ii)**

Whether Clause 10B (ii) shall be **Applicable subjected to Clause as**  
applicable **per Special conditions of contract**

**Clause 10C**

Component of labour expressed as **Applicable 25%**  
percent of value of work

**Clause 10CA****Applicable**

Sl. No.	Material covered under this clause	Nearest Materials (other than cement, reinforcement bars and the structural steel) for which All India Wholesale Price Index to be followed	Base Price of all Materials covered under clause 10 CA*
1.	Bitumen (Bulk)	60/70 grade bitumen	39100 per MT Ex Haldia Refinery excluding taxes
2.	Crumbed Rubber Modified Bitumen (Bulk)	60 grade	38560 per MT Ex Haldia Refinery excluding taxes
3.	Emulsion (Bulk)		
	A) Rapid		31230 per MT Ex Haldia Refinery excluding taxes
	B) Medium		31430 per MT Ex Haldia Refinery excluding taxes
	C) Slow		29860 per MT Ex Haldia Refinery

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Sl. No.	Material covered under this clause	Nearest Materials (other than cement, reinforcement bars and the structural steel) for which All India Wholesale Price Index to be followed	Base Price of all Materials covered under clause 10 CA*
			excluding taxes
4.	POL (Retail Price at Raipur)	High Speed Diesel	56.25 per liter including all taxes

\* Base price of all the materials covered under clause 10 CA is to be mentioned at the time of approval of NIT.

### Clause 11

Specifications to be followed for execution of work

**Tender specification attached with Tender document, CPWD, MORTH and relevant IS Specifications.**

### Clause 12

12.2. & 12.3 Deviation Limit beyond which clauses 12.2 & 12.3 shall apply for road and allied infrastructure work.....

**25%**

12.5 Deviation Limit beyond which clauses 12.2 & 12.3 shall apply for CD works.....

**25%**

### Clause 16

Competent Authority for deciding reduced rates.

**Chief Engineer ( Engineering), NRDA**

### Clause 18

List of mandatory machinery, tools & plants to be deployed by the contractor at site:-

**As per relevant Clause of Special Conditions of Contract**

### Clause 36 (i) :Minimum Technical Representative(s) and recoveryRate

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Sl. No.	Designation (Principal Technical/ Technical Representative)	Number	Educational and Relevant Experience	Rate at which recovery shall be made from the contractor in the event of not fulfilling provision of clause 36(i)
1	Project Manager	1	Graduate in Civil Engg. With Minimum 15 yrs of experience in the construction management, and supervision of Development of Sewerage collection, Treatment, and Reuse system including Operation and Maintenance with minimum 5 years experience in the capacity of project manager capacity project.	5000/day/head
2	Senior Engineer Civil	1	Graduate in Civil Engg. with Minimum 10 yrs of experience in Development of Sewerage collection, Treatment, and Reuse system project and should have at least 8 years of experience in road works.	3000/day/head
3	Senior Engineer Civil	1	Graduate in Civil Engg. with Minimum 10 yrs of experience in Development of Sewerage collection, Treatment, and Reuse system project and should have at least 8 years of experience in water supply/sewerage.	3000/day/head
4	Quality Control Engineer	1	Bachelor in Civil Engg. with Minimum 10 yrs of experience in Development of Sewerage collection, Treatment, and Reuse system project and 8 years experience with laboratory and field testworks	2000/day/head
5	Billing engineer	1	Graduate in Civil Engg. with Minimum 10 yrs of experience in billing of construction projects, out of which minimum 5 years experience should be as a Bill engineer incharge.	2000/day/head
6	Environmental and safety Engineer	1	Graduate in Civil Engg. with Experience of at least 5years in implementation of Environmental and safety standards and procedures of construction projects.	2000/day/head
7	Site Engineer	5	Graduate in Civil Engg. With Experience of at least 5years/ Dip. In Civil Engg. With 8 years of experience in site supervision of construction projects.	1000/day/head
8#	Computer Operator	4	Certificate of Draftmanship with Experience of at least 5 years in Auto CAD and MS Office	500/day/head
9	Lab Tech	5	Graduate in Science With Experience of at least 6 years/ Dip. In Civil Engg. With 5 years of experience in site supervision of construction projects.	800/day/head
10	Surveyor	5	Diploma In Civil Engg. With 8 years of experience in site supervision of construction projects.	700/day/head
11#	Office Attendant	2	HSC Certificate	300/day/person

# Computer Operator ( 4 nos) and Office attendants ( 2 Nos) should be placed with Engineer in Charge of NRDA in his office within ten days from the signing of agreement and up to 30 days beyond the date of completion of work. He shall assist the Engineer in charge in day to day activities.

The above staff shall be required for the proper functioning of the Contract. However, the staff to be deployed with the Engineer's office by Contractor at his own cost is mentioned in the Special Condition of Contract.

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**Clause 42****Not Applicable**

- (i) (a) Schedule/statement for determining theoretical quantity of cement & bitumen on the basis of C.G.S.O.R **Not Applicable**
- (ii) Variations permissible on theoretical quantities:
- (a) Cement  
For works with estimated cost put to tender not more than Rs. 5 lakh. 3% plus/minus.  
For works with estimated cost put to tender more than Rs.5 lakh. 2% plus/minus.
- (b) Bitumen All Works 2.5% plus & only & nil on minus side.
- (c) Steel Reinforcement and structural steel sections for each diameter, section and category 2% plus/minus
- (d) All other materials. Nil

**RECOVERY RATES FOR QUANTITIES BEYOND PERMISSIBLE VARIATION**

Sl. No.	Description of Item	Rates in figures and words at which recovery shall be made from the Contractor	
		Excess beyond permissible variation	Less use beyond permissible variation
1.	Cement	NA	NA
2.	Steel Reinforcement	NA	NA
3.	Structural Sections	NA	NA
4.	Bitumen issued free	NA	NA
5.	Bitumen issued at stipulated fixed price	NA	NA

Signature of Contractor.....

Signature of NRDA.....



**NAYA RAIPUR DEVELOPMENT AUTHORITY**

**Modified**

**Tender Document for the Development of Sewerage  
collection, Treatment, and Reuse system including  
Operation and Maintenance  
for Zone 1, 2, 3 & specified area at  
Naya Raipur**

**(Following Three-Envelope Tender Procedure)**

**Schedule – A  
Price Tender  
To be submitted in ENVELOPE-3**

**NIT No.:** 45 /SZ-1, 2 &3/ EE PHE / CE(E) / NRDA / 2013-14, Raipur,

**Dated:** 07.08.2013

**Issued by:** Chief Executive Officer,  
Naya Raipur Development Authority (NRDA)  
Near DKS Bhawan, Old Mantralaya Mahanadi Dwar  
Raipur 492 001, Chhattisgarh  
Tel: (0771) 4066011, Fax: (0771) 4066188,  
E-mail: ceo@nayaraipur.com



## Tender Document Contains

- (a) Only schedule "A" and Section-I of schedule "D" are to be filled & signed by the tenderer
- (b) All the certificates as per pre qualification criteria shall be appended with relevant forms of schedule "D"

### 1. PART ONE (NRDA F-1)-(Attached herewith, to be submit along the tender)

#### Part (A)

- a) Press Notice
- b) Detailed NIT

#### Part (B)

##### a) Schedule-A

- (i) Cost Abstract
- (ii) Bill of Quantities

- b) Schedule-B –NIL
- c) Schedule-C –NIL
- d) Schedule-D

##### Section-I..... Technical tender forms

- (i) Letter of Technical Tender
- (ii) Tenderer's Information Sheet
- (iii) Annual Turnover
- (iv) Specific Construction Experience
- (v) Declaration
- (vi) Check list for Technical tender evaluation

##### Section –II .....Scope of work

##### Section –III..... Technical specifications of work

##### Section –IV..... Special Conditions of Contract

##### Section –V..... List of approved makes

##### Section –VI..... Drawings

- e) Schedule-E
- f) Schedule-F

### 2. PART TWO (NRDA F-2/3 )-Standard form (Not Attached herewith, and not to be submitted along the tender)

Important note: - Link site <http://nayaraipur.com/documents/gcc.pdf>

1. General Guidelines
2. Tender
3. General rules and directions
4. Conditions of contract
5. Clauses of contract
6. Model rules relating to labour, water supply and sanitation in labour camps safety code
7. Contract forms
  - (a) Draft Format for Performance Security
  - (b) Earnest Money Deposit Form (Bank Guarantee)
  - (c) Format of Contract Agreement
  - (d) Draft Format for Performance Guarantee for Water Proofing and Anti-termite Works
  - (e) Indemnity Bond
  - (f) Indenture Bond
  - (g) Notice for Appointment of Arbitrator
8. Proforma of schedules (Schedule 'A' to Schedule 'F')

Signature of Contractor.....

Signature of NRDA.....

## Naya Raipur Development Authority (NRDA) Raipur, Chhattisgarh

### Document details

**Name of work : Development of Sewerage collection, Treatment, and Reuse system including Operation and Maintenance for Zone 1, 2, 3 & specified area at Naya Raipur”.**

**Name of Tender:**

### Details

- a) Cost of Tender Document : Rs
- b) EMD : Rs

Signature of Tenderer

Date:\_\_\_\_\_

Signature of Contractor.....

Signature of NRDA.....

## Volume – 2: Price Tender

Development of sewerage collection, treatment and reuse system including operation and maintenance for Zone 1, 2 &amp; 3 specified area at Naya Raipur

**GENERAL PROJECT COST ABSTRACT FOR DEVELOPMENT OF SEWERAGE COLLECTION, TREATMENT, AND REUSE SYSTEM INCLUDING OPERATION AND MAINTENANCE FOR ZONE 1, 2, 3 & SPECIFIED AREA AT NAYA RAIPUR”.**

Sr. No.	Description	Amount in INR (in Figures)	Amount in INR (in Words)
1	<b>Part A works:</b> Sewerage collection system and conveyance of recycled treated sewage effluent system.	Rs. -	
2	<b>Part B works:</b> Sewage pumping station, Sewage treatment plant based on SBR Technology with tertiary treatment for reuse, Treated Sewage Effluent Pumping Station and all other allied works .	Rs. -	
3	<b>Part C works:</b> 60 months Operation and maintenance works.	Rs. -	
	<b>Total Amount in INR</b> For development of sewerage collection, treatment, reuse system including operation and maintenance for Zone 1, 2 & 3 at Naya Raipur	Rs. -	

Development of sewerage collection, treatment and reuse system including operation and maintenance for Zone 1, 2 &amp; 3 specified area at Naya Raipur

# **BILL OF QUANTITIES FOR "DEVELOPMENT OF SEWERAGE COLLECTION, TREATMENT, AND REUSE SYSTEM INCLUDING OPERATION AND MAINTENANCE FOR ZONE 1, 2, 3 & SPECIFIED AREA AT NAYA RAIPUR".**

Sr. No.	Description	Unit	Total Quantity	Rate in INR (in Figure)	Rate in INR (in Words)	Amount in INR
<b>Bill of Quantities for Part-A</b>						
<b>Part :A</b>	<b>Sewerage collection system and conveyance of recycled treated sewage effluent system</b>					
1	Detailed Survey, Investigation, Review of designs and design ,detailing the Sewerage collection system and conveyance of recycled treated sewage effluent system along with the allied items & works as per technical specification.	LS	3			Rs. -
	<b>Excavation</b>					
2	Earthwork in excavation in all kinds of soil by mechanical means ( hydraulic excavator) / manual means over areas for pipeline trenches including clearing of vegetation, shoring, strutting, de-watering, bailing of water met due to all causes including lowering of water table required to keep the trench in the dry condition to facilitate for laying, jointing and testing of works, backfilling the trenches with the excavated material as per the specification and disposing the excess surplus earth excavated materials for a lead up to <b>50m and lift</b> as detailed below, including disposal earth to be levelled, neatly dressed as approved by engineer in charge.					
a	0 to 1.5 m	cum	132593			Rs. -
b	1.5 to 3.0 m	cum	131691			Rs. -
c	3.0 to 4.5 m	cum	66612			Rs. -
d	4.5 to 6.0m	cum	82706			Rs. -

## Development of sewerage collection, treatment and reuse system including operation and maintenance for Zone 1, 2 &amp; 3 specified area at Naya Raipur

Sr. No.	Description	Unit	Total Quantity	Rate in INR (in Figure)	Rate in INR (in Words)	Amount in INR
3	Earth work in excavation for pipe trench in ordinary rocks by mechanical means ( hydraulic excavator) / manual means over areas for pipeline trenches including clearing of vegetation, shoring, strutting, de-watering, bailing of water met due to all causes including lowering of water table required to keep the trench in the dry condition to facilitate for laying, jointing and testing of works, backfilling the trenches with the excavated material as per the specification and including dressing, stacking of useful material and disposing the excess excavated earth and materials for a lead up to 5km and lift as detailed below, as approved by engineer in charge.					
a	0 to 1.5 m	cum	7133			Rs. -
b	1.5 to 3.0 m	cum	7096			Rs. -
c	3.0 to 4.5 m	cum	3590			Rs. -
d	4.5 to 6.0m	cum	4457			Rs. -
4	Earth work in excavation for pipe trench in all kinds of rocks by mechanical means ( hydraulic excavator) / manual means over areas for pipeline trenches including clearing of vegetation, shoring, strutting, de-watering, bailing of water met due to all causes including lowering of water table required to keep the trench in the dry condition to facilitate for laying, jointing and testing of works, backfilling the trenches with the excavated material as per the specification and including dressing, stacking of useful material and disposing the excess excavated earth and materials for a lead up to 5km and lift as detailed below, as approved by engineer in charge.					

## Development of sewerage collection, treatment and reuse system including operation and maintenance for Zone 1, 2 &amp; 3 specified area at Naya Raipur

Sr. No.	Description	Unit	Total Quantity	Rate in INR (in Figure)	Rate in INR (in Words)	Amount in INR
a	0 to 1.5 m	cum	471			Rs. -
b	1.5 to 3.0 m	cum	479			Rs. -
c	3.0 to 4.5 m	cum	243			Rs. -
d	4.5 to 6.0m	cum	301			Rs. -
	<b>Providing and Laying Pipes</b>					
5	Providing, lowering, laying, aligning, fixing in position at and jointing at all level/ depth ( Conforming to IS 16098 Part 2) DWC HDPE pipe class SN8 (amended upto date) structured wall polyethelene piping systems with non-smooth external annular corrugated and smooth internal surface (double wall) for non-pressure underground sewerage & Drainage application as per EN:13476-3 of following <b>outer dia with all</b> accessories and specials complete including all material, labour, hydraulic testing and commissioning as per Technical Specifications and as per direction of Engineer incharge.					
a	250 mm ID pipe	Rmt	1850			Rs. -
b	400mm ID pipe	Rmt	35858			Rs. -

## Development of sewerage collection, treatment and reuse system including operation and maintenance for Zone 1, 2 &amp; 3 specified area at Naya Raipur

Sr. No.	Description	Unit	Total Quantity	Rate in INR (in Figure)	Rate in INR (in Words)	Amount in INR
c	600mm ID pipe	Rmt	10399			Rs. -
d	800mm ID pipe	Rmt	18655			Rs. -
e	1000mm ID pipe	Rmt	10315			Rs. -
6	Providing, laying, jointing & field testing of High Density Polyethylene pipes, (PE-100, 6Kg/sq.cm) Conforming to IS 4984/14151/12786/13488 with necessary joining material like mechanical connector or jointing pipes by heating to the ends of pipes with the help of telfon coated electric mirror/ heater to the required temperature and then pressing the ends together against each other, to form a monolithic & leak proof joint by thermosetting process. It may be required to be done with Jacks/Hydraulic/Jacks/ but fusion machine. (50mm & above fusion jointed & below 50mm mechanical jointed)					
a	315 mm diameter pipe	Rmt	12726			Rs. -
b	400 mm diameter pipe	Rmt	23633			Rs. -
	<b>Sand Filling</b>					
7	Providing and filling in pipe trenches as a bedding material below the pipes with River sand as per detailed specification including watering, ramming, consolidation, dressing and cost of labour, materials, T & P etc. complete required for the work as approved by engineer in charge.	cum	8237			Rs. -

## Development of sewerage collection, treatment and reuse system including operation and maintenance for Zone 1, 2 &amp; 3 specified area at Naya Raipur

Sr. No.	Description	Unit	Total Quantity	Rate in INR (in Figure)	Rate in INR (in Words)	Amount in INR
8	Providing and laying plain cement concrete M15 grade (using mechanical concrete mixer) using 20mm graded hard crusher broken stone aggregate, laying in layers of not more than 15cm thick, for bedding having width = outer dia of pipe (OD) + 400mm or 1.25OD (whichever is higher), thickness below pipe = 0.25OD or 100mm (whichever is higher) and haunching = 0.25OD, for pipes of following sizes, including compaction, curing, formwork, etc all complete as directed by Engineer.					
a	250 mm ID pipe	Rmt	2250			Rs. -
b	400mm ID pipe	Rmt	52033			Rs. -
d	600mm ID pipe	Rmt	12769			Rs. -
e	800mm ID pipe	Rmt	24105			Rs. -
f.	1000mm ID pipe	Rmt	13315			Rs. -
9	<b>PCC Work:</b> Providing and laying nominal mix cement concrete with crushed stone aggregate using concrete mixer in all works excluding cost of form work. complete as per specifications and as directed by the Engineer incharge.					
a	PCC Grade M-10	Cum	375			Rs. -



## Development of sewerage collection, treatment and reuse system including operation and maintenance for Zone 1, 2 &amp; 3 specified area at Naya Raipur

Sr. No.	Description	Unit	Total Quantity	Rate in INR (in Figure)	Rate in INR (in Words)	Amount in INR
10	<b>RCC work:-</b> Providing and laying in position machine batched mixed and machine vibrated design mix cement concrete of specified grade for reinforced cement concrete work including concrete laying, cost of centering, shuttering, finishing and including admixtures in recommended proportions as per IS 9103 to accelerate, retard setting of concrete, improve workability without impairing strength and durability as per direction of Engineer-in-charge.M20 grade design mix reinforced cement concrete by using 405 kg. of cement per cum of concrete. All work up to plinth level excluding the cost of reinforcement.					
a	RCC Grade M-20	Cum	5000			Rs. -
11	Providing and fixing form work i/c Centring, shuttering, strutting, staging, propping, bracing etc. complete and i/c removal of formwork					
a	Foundations/ footings/ columns bases/ plinth beam of any shape and size up to plinth level	Sqm	369			Rs. -
12	<b>Reinforcement</b> :Providing and placing in position reinforcement for R.C.C. work including straightening, cutting, bending, binding etc. complete as per drawings including cost of binding wire all complete:					
a	Thermo-Mechanically treated bars	kg	300000			Rs. -

## Development of sewerage collection, treatment and reuse system including operation and maintenance for Zone 1, 2 &amp; 3 specified area at Naya Raipur

Sr. No.	Description	Unit	Total Quantity	Rate in INR (in Figure)	Rate in INR (in Words)	Amount in INR
	<b>Precast R.C.C circular manhole</b>					
13	Construction of Pre-cast RCC M-40 grade circular manhole having 1.2m / 1.5m internal diameter at bottom and 560mm diameter at top, including required excavation of earth in all types of soils such as morum, sand, silt, black cotton soil, hard soil, kankar etc. disposing of surplus excavated materials with in a lead of 50mts. The work includes laying of 150mm thick plain cement concrete 1:2:4( 1cement :2 coarse sand: 4 graded stone aggregate 20mm nominal) (2.2m /2.5m) diameter bedding in foundation and minimum M25 grade RCC foundation over P.C.C and laying of P.C.C 1:2:4 in channels and circular starter base wall up to 50mm above outer diameter of sewer pipe in position and P & F I on of 125mm thick 150/225mm high precast M40 grade Sulphite resistance cement concrete rings at the bottom and consecutive standard size 300mm high rings. The work includes P&F precast reinforced Cement concrete eccentric conical piece of M40 grade , 125mm thick having 560mm dia. and ( 1.2m/1.5m ) internal diameter at top and bottom respectively, fitted with providing and fixing approved make and quality FRP frame and cover of 56 cm dia heavy duty etc., etc to withstand for class AA loading including supply and fixing of footrests. It shall be fixed inside the manholes for access from top. Foot rests shall be of minimum 3mm thick plastic encapsulated (as per IS 10910) on 12mm diameter grade Fe415 steel bar (as per IS 1786). All the joints shall be sealed with CM 1:1 complete job as per detailed specifications, drawings all complete as directed by Engineer in charge.					
i	<b>1200 mm diameter circular manhole</b>					
a	Up to 1.80m depth	No.	76			0.00
b.	1.80m up to 2.60m depth	No.	188			Rs. -
ii	<b>1500mm diameter circular manhole</b>					
a	2.60m up to 3.20m depth	No.	195			Rs. -

Development of sewerage collection, treatment and reuse system including operation and maintenance for Zone 1, 2 &amp; 3 specified area at Naya Raipur

Sr. No.	Description	Unit	Total Quantity	Rate in INR (in Figure)	Rate in INR (in Words)	Amount in INR
b	3.20m up to 3.80m depth	No.	210			Rs. -
c	3.80m up to 4.20m depth	No.	237			Rs. -
d	4.20m up to 4.80m depth	No.	246			Rs. -
e	4.80m up to 5.40m depth	No.	260			Rs. -
f	5.40m up to 6.00m depth	No.	228			Rs. -

## Development of sewerage collection, treatment and reuse system including operation and maintenance for Zone 1, 2 &amp; 3 specified area at Naya Raipur

Sr. No.	Description	Unit	Total Quantity	Rate in INR (in Figure)	Rate in INR (in Words)	Amount in INR
	<b>Construction of prefabricated HDPE manhole:</b>					
	Supplying , Installation testing and commissioning of prefabricated HDPE manhole: Providing, lowering, laying, aligning, fixing in position at all level/ depths High Density Poly Ethylene (HDPE) manhole conforming to EN 13598-2:2009, man entry type of 1000mm diameter for depth specified below, shall be of single wall construction OR modular construction conforming to EN 681-1 with triple safety seal (three side lip/element) made of 100% virgin PE material without recycling or foam content, including connecting the according to EN 681-1 and the manholes shall be safeguarded against uplift pressure with solid horizontal reinforcement ribs of appropriate thickness and with at regular intervals all along the outside of the manhole.					
14	The item is inclusive of Excavation,Dewatering,Layerwise backfilling and compaction of grannular material , Provision of corrosion resistant steps at a vertical distance of 25cm Providing and fixing of FRP Manhole frame and cover with locking arrangement fitting to 600mm dia manhole openings. Providing and fixing of Precast RCC M35 grade load distribution ring 1050mm OD & 635mmID and designed to handle heavy load as approved by Engineer placed around the neck of the manhole of 150mm thickness including reinforcement. Providing RCC M20 grade concrete thick 200mm slab (Dia 1500mm outer dia and inner dia 635mm ) around the manhole below the Precast RCC distribution Ring. Providing and laying Manhole bottom PCC (1:3:6) of 200mm thick and 1.5m dia. All the inlet, outlet connections to the manhole shall be complete with all accessories/ fittings, material, labour, jointing materials , testing and commissioning as per detailed specifications, drawings all complete as directed by Engineer in charge.					
a	Up to 1.80m depth	No.	40			Rs. -
b	1.80m up to 2.60m depth	No.	105			Rs. -

## Development of sewerage collection, treatment and reuse system including operation and maintenance for Zone 1, 2 &amp; 3 specified area at Naya Raipur

Sr. No.	Description	Unit	Total Quantity	Rate in INR (in Figure)	Rate in INR (in Words)	Amount in INR
c.	2.60m up to 3.20m depth	No.	100			Rs. -
d.	3.20m up to 3.80m depth	No.	110			Rs. -
e.	3.80m up to 4.20m depth	No.	117			Rs. -
f.	4.20m up to 4.80m depth	No.	150			Rs. -
g.	4.80m up to 5.40m depth	No.	180			Rs. -
h.	5.40m up to 6.00m depth	No.	127			Rs. -
	<b>Drainage Drops</b>					
15	Providing SCL drop connection with SCL drop pipe and bend encased all-round with Cement concrete grade M-5 (Normal Mix) with stone aggregate 40mm nominal size including holes and making good with brick work in cement mortar 1:5 (1 cement : 5 fine sand) plastered with cement mortar 1:3 (1 cement : 3 coarse sand) on inside walls including lead caulked joints and jointing SW pipes and SCL pipes with stiff cement mortar 1:1 (1 cement : 1 sand) including making required channel etc. complete					

## Development of sewerage collection, treatment and reuse system including operation and maintenance for Zone 1, 2 &amp; 3 specified area at Naya Raipur

Sr. No.	Description	Unit	Total Quantity	Rate in INR (in Figure)	Rate in INR (in Words)	Amount in INR
i	For 150mm dia. drop connection	Each	55			Rs. -
ii	Extra rate shall be payable for depths of drop more than 60 cm.					
a	150mm dia. sand cast iron drop connection	Each	55			Rs. -
	<b>Ventilating Shafts</b>					
16	Providing and constructing RCC ventilating shaft of diameters and height mentioned below with required number of RCC 15X15cm size columns and RCC circular slab or dome over the pillars in M-15 including cost of all materials and labour, providing and fixing steel or wooden frame & providing & fixing G.I fly proof mesh of 26 gauge and providing and applying in 3 coats of oil paint to wooden or steel frame and cement paint to concrete structure. Etc complete as directed by Engineer-in-charge.					
a	0.9 M dia. x 1.35m height	Nos	50			Rs. -

## Development of sewerage collection, treatment and reuse system including operation and maintenance for Zone 1, 2 &amp; 3 specified area at Naya Raipur

Sr. No.	Description	Unit	Total Quantity	Rate in INR (in Figure)	Rate in INR (in Words)	Amount in INR
	<b>Horizontal directional drilling</b>					
17	Providing, Laying, Jointing, and commissioning of sewer networks by trench less method by carrying out horizontal directional drilling (HDD) along roads as per the requirement at various locations as per detailed design and drawing approved by the authority including survey, information collection regarding under ground utilities, sensing of utilities by sensing equipment, pit making, pilot drilling, pre-reaming pulling the ducts of suitable size as per the designed invert levels. Providing barricades and necessary signal lights, closing of pits with excavated earth including cost of casing pipe of 12mm thick MS pipe with epoxy paint and carrier pipe of GRP ,consolidating pit are, including road restoration, cost of all materials, labour, conveyance, hire charges etc. complete preparation of pit by excavated soil/ hard morum & refilling compacting surface as it is position / horizontal drilling across road for pipe line laying propose as per guide line and detail technical specifications all complete as pem respectively, fitted with providing and fixing approved make and quality FRP frame and cover of 56 cm dia heavy duty etc., etc to withstand for class AA loading including supply and fixing of footrests. It shall be fixed inside the manholes for access from top. Foot rests shall be of minimum 3mm thick plastic encapsulated (as per IS 10910) on 12mm diameter grade Fe415 steel bar (as per IS 17					
a	200mm diameter pipe	Rmt	0			Rs. -
b.	250mm diameter pipe	Rmt	0			Rs. -
c.	400mm diameter pipe	Rmt	60			Rs. -

## Development of sewerage collection, treatment and reuse system including operation and maintenance for Zone 1, 2 &amp; 3 specified area at Naya Raipur

Sr. No.	Description	Unit	Total Quantity	Rate in INR (in Figure)	Rate in INR (in Words)	Amount in INR
d.	500mm diameter pipe	Rmt	250			Rs. -
e.	600mm diameter pipe	Rmt	300			Rs. -
f.	800mm diameter pipe	Rmt	200			Rs. -
	<b>Valves</b>					
18	Providing and fixing cast iron Butterfly valves including jointing and testing with cost of jointing material such as bolts, nuts and rubber insertion all complete as per IS: 13095-1991, (Valves above 200mm dia. should be gear operated) as per technical specification and as per direction of Engineer in charge etc, complete.					
a	300 mm dia Class PN - 1.6	No.	5			Rs. -



## Development of sewerage collection, treatment and reuse system including operation and maintenance for Zone 1, 2 &amp; 3 specified area at Naya Raipur

Sr. No.	Description	Unit	Total Quantity	Rate in INR (in Figure)	Rate in INR (in Words)	Amount in INR
b	500 mm dia Class PN - 1.6	No.	5			Rs. -
19	Supply of single chamber D.I. Air valve with body and cover in ductile iron of grade SG 50 or equivalent grade as per I.S 3896- part2-1985 and subsequent revisions. All internal parts such as float shell etc. all cover boltss of stainless steel and gaskets and seals of EPDM. Epoxy powder coating (EP-P) inside and outside colour blue drilled as per IS:1538 all complete,as per technical specification and as per direction of Engineer in charge etc, complete.					
a	100mm diameter (P.N: 1.6)	No.	10			Rs. -
20	Providing and fixing cast iron double flanged sluice valves as per IS: 14846-2000 fitted with cast iron cap including jointing and testing with cost of jointing material such as bolts, nuts and rubber insertion all complete,as per technical specification and as per direction of Engineer in charge etc, complete.					
a	300 mm dia Class PN - 1.6		10			Rs. -
b	400 mm dia Class PN - 1.6		10			Rs. -
21	Providing and laying in position sizes of flanged cast iron standard specials class heavy up to pipe dia. 500mm	Kg	1386			Rs. -

## Development of sewerage collection, treatment and reuse system including operation and maintenance for Zone 1, 2 &amp; 3 specified area at Naya Raipur

Sr. No.	Description	Unit	Total Quantity	Rate in INR (in Figure)	Rate in INR (in Words)	Amount in INR
22	Construction of M20 grade RCC valve chamber size 1.2 X 1.2 X 1.5, bottom PCC 100mm thick 1:3:6 (1 cement: 3 coarse sand: 6 graded stone aggregate 20mm nominal size)., RCC wall thickens 150mm, M-20 (using minimum cement 390 kg/cum concrete), with top cover 110 thick precast RCC M35, including excavation, back filling, formwork, reinforcement of steel as per design, all materials and labours etc. Complete as per drawing, as per specifications and as directed by the Engineer etc.	No	56			Rs. -
	<b>Dismantling works</b>					
23	Dismantling of existing structures like culverts, bridges, retaining walls and other structure comprising of masonry, cement concrete, wood work, steel work, including T&P and scaffolding wherever necessary, sorting the dismantled material, disposal of unserviceable material and stacking the serviceable material with all lifts and lead up to 1000 meters and as per relevant clauses of section-200 in					
i	<b>Lime / Cement Concrete</b>					
a	Cement Concrete Grade M-15 & M-20	cum	300			Rs. -
b	Prestressed / Reinforced cement concrete grade M-20 & above	cum	400			Rs. -
ii	<b>Brick / Tile work</b>					
a	In cement mortar	cum	500			Rs. -
iii	<b>Stone Masonry</b>					
a	Rubble stone masonry in cement mortar.	cum	1000			Rs. -
iv	Removing all type of hume pipes and stacking within a lead up to 1000 meters including earthwork and dismantling of masonry works around pipes.					

## Development of sewerage collection, treatment and reuse system including operation and maintenance for Zone 1, 2 &amp; 3 specified area at Naya Raipur

Sr. No.	Description	Unit	Total Quantity	Rate in INR (in Figure)	Rate in INR (in Words)	Amount in INR
a	Up to 1000 mm dia	meter	1000			Rs. -
b	Above 1000 mm dia	meter	500			Rs. -
24	Dismantling of flexible pavements and disposal of dismantled materials up to a lead of 1000 meters, stacking serviceable and unserviceable materials separately and as per relevant clauses of section-200.					
a	Bituminous courses	cum	200			Rs. -
b	Granular Courses	cum	1750			Rs. -
25	Construction of embankment / sub grade with Material Obtained from Borrow Pits (Construction of embankment with approved material/selected soil having C.B.R. > 5 (unless specified otherwise in the contract) obtained from borrow pits with all lifts and leads, transporting to site, spreading, grading to required slope and compacting to meet requirement of table 300-2)	Cum	1250			Rs. -
26	Construction of granular sub-base by providing close graded Material, , carriage of mixed Material to work site, spreading in uniform layers with motor grader on prepared surface watering, rolling and compacting with vibratory power roller at OMC to achieve the desired density, complete as per clause 401					
i	Plant mix method					
a	for grading- I Material	Cum	600			Rs. -

## Development of sewerage collection, treatment and reuse system including operation and maintenance for Zone 1, 2 &amp; 3 specified area at Naya Raipur

Sr. No.	Description	Unit	Total Quantity	Rate in INR (in Figure)	Rate in INR (in Words)	Amount in INR
27	Wet Mix Macadam (Providing, laying, spreading and compacting graded stone aggregate to wet mix macadam specification including premixing the Material with water at OMC in mechanical mix plant carriage of mixed Material by tipper to site, laying in uniform layers with paver in sub- base / base course on well prepared surface and compacting with vibratory roller to achieve the desired density.)plant carriage of mixed Material by tipper to site, laying in uniform layers with paver in sub- base / base course on well prepared surface and compacting with vibratory roller to achieve the desired density as per drawing and Technical Specifications Clause 406.	Cum	650			Rs. -
28	Prime coat (Providing and applying primer coat with bitumen emulsion on prepared surface of granular Base including clearing of road surface and spraying primer at the rate of 0.85 kg/sqm using mechanical means)	Sqm	1750			Rs. -
29	Tack coat Providing and applying tack coat with bitumen emulsion using emulsion pressure distributor on the prepared bituminous/granular surface cleaned with mechanical broom and as per clause 503 of section 500					
a	Normal bituminous surface @ 0.25 kg / Sqm	Sqm	1750			Rs. -
30	Dense Graded Bituminous Macadam (Providing and laying dense bituminous macadam with 40-60 TPH HMP using crushed aggregates of specified grading, premixed with bituminous binder @ 4.0 to 4.5% by weight of total mix of mix and filler, transporting the hot mix to work site, laying with a hydrostatic paver finisher with sensor control to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MORTH specification clause No. 507 complete in all respects.)					
i	With mechanical paver finishing					
a	for Grading II (19 mm nominal size bitumen content 4.5%)	Cum	125			Rs. -

## Development of sewerage collection, treatment and reuse system including operation and maintenance for Zone 1, 2 &amp; 3 specified area at Naya Raipur

Sr. No.	Description	Unit	Total Quantity	Rate in INR (in Figure)	Rate in INR (in Words)	Amount in INR
31	Bituminous Concrete (Providing and laying bituminous concrete with 40-60 TPH hot mix plant using crushed aggregates of specified grading, premixed with bituminous binder @ 5.0 to 6.0% of mix and filler, transporting the hot mix to work site, laying with a hydrostatic paver finisher with sensor control to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MORTH specification clause No. 509 complete in all respects)material excluding tack coat complete in all respect as per drawing, Technical Specification Clause 509 and 521, as per IRC: SP:53-2002.	Cum				
i	With mechanical paver finishing					
a	for Grading I (19 mm nominal size) with bitumen 5.5 %		110			Rs. -
<b>Sub Total of Part-A</b>						<b>Rs. -</b>

Development of sewerage collection, treatment and reuse system including operation and maintenance for Zone 1, 2 &amp; 3 specified area at Naya Raipur

Sr. No.	Description	Unit	Total Quantity	Rate in INR (in Figure)	Rate in INR (in Words)	Amount in INR
<b>Bill of Quantities for Part-B</b>						
<b>Part : B</b>	<b>Sewage pumping station, Sewage treatment plant based on SBR Technology with tertiary treatment for reuse, Treated Sewage Effluent Pumping Station and all other Civil works</b>					
1	Survey, Investigation, Design, Supply, Construction, Erection, testing, training, 3 months Trial run and commissioning of following capacity of Sewage treatment plant based on Sequential Batch Reactor Technology with tertiary treatment for reuse including Approach road, internal roads, pathway, storm water drain, utility ducts, administrative block, Labrotory, toilet block, Staff qtrs., Landscaping and Gardening, internal lighting and external street lighting, Substation <b>all complete as per the requirement detailed in the specification.</b>					
a	<b><u>Sewerage Zone 1:</u></b> (1) STP capacity of 10.0 mld in Phase 1 extendable upto 23.5 mld in Phase 2, (2) Tertiary treatment for reuse capacity 10.0 mld in Phase 1 extendable upto 23.5 mld in Phase 2, (3) Construction of sewage pumping station and wet well (4) Construction of treated Sewage Effluent Pumping Station and storage reservoir etc. (5)Providing and fixing of Electro-mechanical works.	LS	1			Rs. -
b	<b><u>Sewerage Zone 2:</u></b> (1) STP capacity of 10.0 mld in Phase 1 extendable upto 25.3 mld in Phase 2, (2) Tertiary treatment for reuse capacity 10.0 mld in Phase 1 extendable upto 25.3 mld in Phase 2, (3) Construction of sewage pumping station and wet well (4) Construction of treated Sewage Effluent Pumping Station and storage reservoir etc. (5)Providing and fixing of Electro-mechanical works.	LS	1			Rs. -
c	<b><u>Sewerage Zone 3:</u></b> (1) STP capacity of 7.0 mld in Phase 1 extendable upto 20.4 mld in Phase 2, (2) Tertiary treatment for reuse capacity 7.0 mld in Phase 1 extendable upto 20.4 mld in Phase 2, (3) Construction of sewage pumping station and wet well (4) Construction of treated Sewage Effluent Pumping Station and storage reservoir etc. (5)Providing and fixing of Electro-mechanical works.	LS	1			Rs. -
<b>Sub total of Part-B</b>						<b>Rs. -</b>

Development of sewerage collection, treatment and reuse system including operation and maintenance for Zone 1, 2 &amp; 3 specified area at Naya Raipur

Sr. No.	Description	Unit	Total Quantity	Rate in INR (in Figure)	Rate in INR (in Words)	Amount in INR
<b>Bill of Quantities for Part-C</b>						
<b>Part : C</b>	<b>60 months Operation and maintenance works</b>					
1	Operation, maintenance and successful defect liability period of 60 months for part A works as per detailed technical specification of works all complete.	LS	1			Rs. -
2	Operation, maintenance and successful defect liability period of 60 months for part B works as per detailed technical specification of works all complete.	LS	1			Rs. -
<b>Sub Total of Part-C</b>						<b>Rs. -</b>
<i>Note : Payment for Part C works shall be made on monthly basis</i>						