

NABINAGAR POWER GENERATING CORPORATION LIMITED

3x660 MW NABINAGAR STPP

TECHNICAL SPECIFICATION FOR MISCELLANEOUS FGD TANKS

SPECIFICATION NO.: PE-TS-457-167-A101



BHARAT HEAVY ELECTRICALS LIMITED

POWER SECTOR

PROJECT ENGINEERING MANAGEMENT

NOIDA, INDIA



3x660 MW NABINAGAR STPS

SPECIFICATION No:PE-TS-457-167-A101

**MISC. FGD TANKS
TECHNICAL SPECIFICATION**

SECTION

REV. 00

SHEET : 1 OF 2

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3x660 MW NABINAGAR STPP
TECHNICAL SPECIFICATIONS FOR
MISC. FGD TANKS

SPECIFICATION No: PE-TS-457-167-A101

SECTION-I, SUB-SECTION-A

REV. 00

DATE: FEB 2020

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INTENT OF SPECIFICATION

	3X660 MW NABINAGAR STPP TECHNICAL SPECIFICATION FOR MISCELLANEOUS FGD TANKS	SPECIFICATION NO. PE-TS-457-167-A101	
		SECTION I , SUB-SECTION-A	
		REVISION 00	DATE: FEB.2020

1.0 **SCOPE OF ENQUIRY/ INTENT OF SPECIFICATION**

- 1.1 This specification includes, but not limited to Supply part, Services part comprising of design (i.e. Preparation and submission of drawing /documents including “As Built” drawings and O&M manuals), engineering, manufacture, fabrication, assembly, inspection / testing at vendor's & sub-vendor's works, painting, maintenance tools & tackles(as applicable) along with spares for erection, start up and commissioning as required, forwarding, proper packing, shipment and delivery at site, unloading, handling, transportation & storage at site, in-site transportation, assembly, erection & commissioning, Rubber lining, final painting at site, minor civil work and carrying out Performance guarantee / Functional / Demonstration tests at site (as applicable) and handover in flawless condition of Miscellaneous FGD Tanks turnkey package specified above for **3X660 MW NABINAGAR FGD Project** complete with all accessories for the total scope defined as per BHEL NIT & tender technical specification, amendment & agreements till placement of order.
- 1.2 The contractor shall be responsible for providing all material, equipment & services, which are required to fulfil the intent of ensuring operability, maintainability, reliability and complete safety of the complete work covered under this specification, irrespective of whether it has been specifically listed herein or not. Omission of specific reference to any component / accessory necessary for proper performance of the equipment shall not relieve them of the responsibility of providing such facilities to complete the supply, erection and commissioning, performance and guarantee/demonstration testing of **Miscellaneous FGD Tanks** within quoted price.
- 1.3 It is not the intent to specify herein all the details of design and manufacture. However, the equipment / system shall conform in all respects to high standards of design, engineering and workmanship and shall be capable of performing the required duties in a manner acceptable to purchaser who will interpret the meaning of drawings and specifications and shall be entitled to reject any work or material which in his judgement is not in full accordance herewith.
- 1.4 The extent of supply under the contract includes all items shown in the drawings, notwithstanding the fact that such items may have been omitted from the specification or schedules. Similarly, the extent of supply also includes all items mentioned in the specification and /or schedules, notwithstanding the fact that such items may have been omitted in the drawing. Similarly, the extent of supply also includes all items required for completion of the system for its safe, efficient, reliable and trouble free operation and maintenance shall also be in supplier's scope unless specifically excluded and notwithstanding that they may have been omitted in drawings / specifications or schedules.
- 1.5 Items though not specifically mentioned but needed to make the system complete as stipulated under these specifications are also to be furnished unless otherwise specifically excluded.
- 1.6 The general terms and conditions, instructions to tenderer and other attachment referred to elsewhere are hereby made part of the tender specifications. The equipment / material and works covered by this specification is subject to compliance to all the attachments referred in the specification. The tenderer shall be responsible for adherence to all requirements stipulated herein.
- 1.7 While all efforts have been made to make the specification requirement complete & unambiguous, it shall be bidders' responsibility to ask for missing information, ensure completeness of specification, to bring out any contradictory / conflicting requirement in different sections of the specification and within a section itself to the notice of BHEL and to seek any clarification on specification requirement in the format enclosed under Sec.-III of the specification within 10 days

	3X660 MW NABINAGAR STPP TECHNICAL SPECIFICATION FOR MISCELLANEOUS FGD TANKS	SPECIFICATION NO. PE-TS-457-167-A101	
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of receipt of tender documents. In absence of any such clarifications, in case of any contradictory requirement, the more stringent requirement as per interpretation of Purchaser/Customer shall prevail and shall be complied by the bidder without any commercial implication on account of the same. Further in case of any missing information in the specification not brought out by the prospective bidders as part of pre-bid clarification, the same shall be furnished by Purchaser/Customer as and when brought to their notice either by the bidder or by purchaser/ customer themselves. However, such requirements shall be binding on the successful bidder without any commercial & delivery implication.

- 1.8 Deviations, if any, should be very clearly brought out clause by clause in the enclosed schedule otherwise, it will be presumed that the vendor's offer is strictly in line with NIT specification.
- 1.9 In case all above requirements are not complied with, the offer may be considered as incomplete and would become liable for rejection.
- 1.10 Unless specified otherwise, all through the specification, the word contractor shall have same meaning as successful bidder/vendor and Customer/Purchaser/Employer will mean BHEL and/or Customer as interpreted by BHEL in the relevant context. Please refer GCC/SCC for better clarity.
- 1.11 The equipment covered under this specification shall not be dispatched unless the same have been finally inspected, accepted and dispatch release issued by BHEL/Customer.
- 1.12 BHEL's Customer's representative shall be given full access to the shop in which the equipment's are being manufactured or tested and all test records shall be made available to him.
- 1.13 Various codes and standards to be used shall be as indicated in various parts of the specification. In case bidder uses any standard other than those indicated in the specification, the onus of establishing equivalence of the same with the specified standards will rest with the bidder and acceptance of the same shall be sole prerogative of customer. The bidder will also arrange for BHEL a copy of the standards in ENGLISH language. The cost of such service will be deemed to have been included by the bidder in the total cost of the package. BHEL will not entertain any additional cost on account of the same.
- 1.14 All text/ numeric in the document / drawings to be generated by the successful bidder will be in English language only.
- 1.15 The bidder's offer shall not carry any sections like clarification, interpretations and /or assumptions.

Note:

Bidder to note that BHEL reserves the right for drawing/document submission through web based Document Management System. Bidder would be provided access to the DMS for drawing/document approval and adequate training for the same. Detailed methodology would be finalized during the kick-off meeting. Bidder to ensure following at their end.

- Internet explorer version – Minimum Internet Explorer 7.
- Internet speed – 2 mbps (Minimum preferred).
- Pop ups from our external DMS IP (124.124.36.198) should not be blocked.
- Vendor's internal proxy setting should not block DMS application's link (<http://dmsserver.bhelpem.com/Wrench%20Web%20Access/Login.aspx>).



TITLE:

**3x660 MW NABINAGAR STPP
TECHNICAL SPECIFICATION FOR
MISC. FGD TANKS**

SPECIFICATION No: PE-TS-457-167-A101

SECTION-I, SUB-SECTION-B

REV. 00

DATE: FEB'2020

SHEET : 1 OF 1

PROJECT INFORMATION WITH WIND AND SEISMIC DESIGN CRITERIA

CLAUSE NO.	PROJECT INFORMATION			
1.00.00	BACKGROUND A Joint Venture Agreement was signed between NTPC and BSEB/ Govt. of Bihar on 14.02.2008 for Establishment and Operation & Maintenance of 3x660 MW capacity coal based thermal power project near Nabinagar Distt Aurangabad Bihar and thereafter a Joint Venture company namely, Nabinagar Power Generating Company Private Limited (NPGCPL) was incorporated with equity structure of 50% each by NTPC and BSEB on 09.09.2008.The project shall be a mega project and shall be implemented during XII Plan period.			
1.01.00	Location The plant is located in Aurangabad district of Bihar at a distance of about 15 kms. from Barun in Aurangabad district of Bihar and is approachable from NH-2 through a 20 kms (approx.) long single lane metalled road. The Aurangabad city is about 55 kms. from project site. Nearest railway station is Ankorha on Sone – Garwa Road Section of Eastern Central Railway at about 1.0 Kms. from the project site. Airport The nearest airport at Gaya is at a distance of about 120 Kms from project site. The distances of site from Patna Airport and Varansi Airport are about 250 Kms & 220 Kms respectively. Vicinity plan of the proposed project is placed at Annexure -I			
1.02.01	Land About 2500 acres of land required for the project (main plant, township, ash disposal areas and corridors etc.) has been identified. Govt. of Bihar have accorded in-principle clearance for availability of land vide letter dated 15.06.2007 and 27.02.2009.			
1.02.02	Coal Coal requirement for the project is estimated about 11.25 million tonnes/annum corresponding to 90% PLF. Likely coal source for the project is North Karanpura coalfields of CCL. Application for Long Term Coal Linkage has been submitted to Ministry of Coal, Govt. of India on 21.06.2007 & 06.10.2008.			
1.02.03	Water The project site is located near the river Sone and the make up water requirement for the project is proposed to be drawn from the pondage created by Indrapuri Barrage on river Son, which is about 3 kms from the proposed site. Make up water requirement for this project would be about 7550 Cu.M/hr with ash water recirculation system and about 8480 Cu.M/hr with once through ash water system.			
LOT-IA PROJECTS FLUE GAS DESULPHURISATION (FGD) SYSTEM PACKAGE		TECHNICAL SPECIFICATION SECTION-VI, PART-A BID DOC. NO.:CS-0011-109(1A)-2	SUB SECTION-II-A8 PROJECT INFORMATION NABINAGAR STPP-I (3X660MW)	PAGE - 1 - OF 31

CLAUSE NO.	PROJECT INFORMATION
1.03.00	Govt. of Bihar has accorded water commitment for availability of 125 cusecs of water vide letter dated 06.06.2007. Railway Siding Employer intends to construct the Railway siding to project site from the nearest existing railway line. However, the same may not be available to the bidder for his use to transport equipment & material. Bidder may visit the site and acquaint themselves with the facilities available.
1.04.00	(i) Coal Quality Parameters / Fuel Oil Characteristics & Plant Water details: The coal quality parameters and Fuel oil Characteristics are indicated in Table-1 & Table-2A & 2B resp. below. Water data (ii) Process water: Source: Terminal point: Process water quality is based on COC given in Table-3. (iii) Clarified water: Terminal point: Clarified water quality is indicated in Table-3. (iv) DM water for Equipment cooling water system. Terminal point: DM water quality is indicated in Table-4.
1.05.00	Steam Generator and ESP data: refer Table-5.
1.06.00	Drawings are enclosed as per Table-6 for initial overview to the Bidder.
2.00.00	NOT USED
3.00.00	Capacity : 3 x 660 MW
4.00.00	Metrological Data Important meteorological data from nearest observatory at Dehri is placed at Annexure -II.
5.00.00	CRITERIA FOR EARTHQUAKE RESISTANT DESIGN OF STRUCTURES AND EQUIPMENT All structures and equipment shall be designed for seismic forces adopting the site specific seismic information provided in this document and using the other provisions in accordance with IS:1893 (Part 1 to Part 4). Pending finalization
LOT-IA PROJECTS FLUE GAS DESULPHURISATION (FGD) SYSTEM PACKAGE	TECHNICAL SPECIFICATION SECTION-VI, PART-A BID DOC. NO.:CS-0011-109(1A)-2 SUB SECTION-II-A8 PROJECT INFORMATION NABINAGAR STPP-I (3X660MW) PAGE - 2 - OF 31

CLAUSE NO.	PROJECT INFORMATION														
	of Part 5 of IS:1893, provisions of part 1 shall be read along with the relevant clauses of IS:1893:1984, for embankments. A site specific seismic study has been conducted for the project site. The peak ground horizontal acceleration for the project site, the site specific acceleration spectral coefficients (in units of gravity acceleration 'g') in the horizontal direction for the various damping values and the multiplying factor (to be used over the spectral coefficients) for evaluating the design acceleration spectra are as given at Appendix-I. Vertical acceleration spectral values shall be taken as 2/3rd of the corresponding horizontal values. The site specific design acceleration spectra shall be used in place of the response acceleration spectra, given at figure-2 in IS:1893 (Part 1) and Annex B of IS:1893 (Part 4). The site specific acceleration spectra along with multiplying factors specified in Appendix-I includes the effect of the seismic environment of the site, the importance factor related to the structures and the response reduction factor. Hence, the design spectra do not require any further consideration of the zone factor (Z), the importance factor (I) and response reduction factor (R) as used in the IS:1893 (Part 1 to Part 4). Damping in Structures The damping factor (as a percentage of critical damping) to be adopted shall not be more than as indicated below for: <table><tr><td>a) Steel structures</td><td>:</td><td>2%</td></tr><tr><td>b) Reinforced Concrete structures</td><td>:</td><td>5%</td></tr><tr><td>c) Reinforced Concrete Stacks</td><td>:</td><td>3%</td></tr><tr><td>d) Steel stacks</td><td>:</td><td>2%</td></tr></table> Method of Analysis Since most structures in a power plant are irregular in shape and have irregular distribution of mass and stiffness, dynamic analysis for obtaining the design seismic forces shall be carried out using the response spectrum method. The number of vibration modes used in the analysis should be such that the sum total of modal masses of all modes considered is at least 90 percent of the total seismic mass and shall also meet requirements of IS:1893 (Part 1). Modal combination of the peak response quantities shall be			a) Steel structures	:	2%	b) Reinforced Concrete structures	:	5%	c) Reinforced Concrete Stacks	:	3%	d) Steel stacks	:	2%
a) Steel structures	:	2%													
b) Reinforced Concrete structures	:	5%													
c) Reinforced Concrete Stacks	:	3%													
d) Steel stacks	:	2%													
LOT-IA PROJECTS FLUE GAS DESULPHURISATION (FGD) SYSTEM PACKAGE	TECHNICAL SPECIFICATION SECTION-VI, PART-A BID DOC. NO.:CS-0011-109(1A)-2	SUB SECTION-II-A8 PROJECT INFORMATION NABINAGAR STPP-I (3X660MW)	PAGE - 3 - OF 31												

CLAUSE NO.	PROJECT INFORMATION		
	performed as per Complete Quadratic Combination (CQC) method or by an acceptable alternative as per IS:1893 (Part 1). In general, seismic analysis shall be performed for the three orthogonal (two principal horizontal and one vertical) components of earthquake motion. The seismic response from the three components shall be combined as specified in IS:1893 (Part 1). The spectral acceleration coefficient shall get restricted to the peak spectral value if the fundamental natural period of the structure falls to the left of the peak in the spectral acceleration curve. For buildings, if the design base shear (V_B) obtained from modal combination is less than the base shear ($\bar{V}_B$) computed using the approximate fundamental period (T_a) given in IS:1893:Part 1 and using site specific acceleration spectra with appropriate multiplying factor, the response quantities (e.g. member forces, displacements, storey forces, storey shears and base reactions) shall be enhanced in the ratio of $\bar{V}_B/ V_B$. However, no reduction is permitted if $\bar{V}_B$ is less than V_B. For regular buildings less than 12m in height, design seismic base shear and its distribution to different floor levels along the height of the building may be carried out as specified under clause 7.5, 7.6 & 7.7 of IS:1893 (Part 1) and using site specific design acceleration spectra. The design horizontal acceleration spectrum value (A_h) shall be computed for the fundamental natural period as per clause 7.6 of IS:1893 (Part 1) using site specific spectral acceleration coefficients with appropriate multiplying factor given in Appendix-I. Design/Detailing for Ductility for Structures The site specific design acceleration spectra is a reduced spectra and has an in-built allowance for ductility. Structures shall be engineered and detailed in accordance with relevant Indian/International standards to achieve ductility.		
LOT-IA PROJECTS FLUE GAS DESULPHURISATION (FGD) SYSTEM PACKAGE	TECHNICAL SPECIFICATION SECTION-VI, PART-A BID DOC. NO.:CS-0011-109(1A)-2	SUB SECTION-II-A8 PROJECT INFORMATION NABINAGAR STPP-I (3X660MW)	PAGE - 4 - OF 31

CLAUSE NO.	PROJECT INFORMATION			
	<u>APPENDIX – I</u> <u>SITE SPECIFIC SEISMIC PARAMETERS FOR DESIGN OF STRUCTURES AND EQUIPMENT</u> The various site specific seismic parameters for the project site shall be as follows: 1) Peak ground horizontal acceleration : 0.16g 2) Multiplying factor to be applied to the site specific horizontal acceleration spectral coefficients (in units of gravity acceleration 'g') to obtain the design acceleration spectra a) for ordinary moment resisting steel frames designed and detailed as per IS:800 : 0.04 b) for braced steel frames designed and detailed as per IS:800 : 0.03 c) for special moment resisting RC frames designed and detailed as per IS:456 and IS:13920 : 0.024 d) For RCC chimney : 0.08 e) For Liquid retaining tanks : 0.048 d) for Steel chimney and Absorber tower : 0.06 d) for design of structures not covered under 2 (a) to 2 (f) above and under 3 below : 0.04 3) Multiplying factor to be applied to the site specific horizontal acceleration spectral coefficients (in units of gravity acceleration 'g') for design of equipment and structures where inelastic action is not relevant or not permitted : 0.08 Note: g = Acceleration due to gravity The horizontal seismic acceleration spectral coefficients are furnished in subsequent pages.			
LOT-IA PROJECTS FLUE GAS DESULPHURISATION (FGD) SYSTEM PACKAGE	TECHNICAL SPECIFICATION SECTION-VI, PART-A BID DOC. NO.:CS-0011-109(1A)-2	SUB SECTION-II-A8 PROJECT INFORMATION NABINAGAR STPP-I (3X660MW)	PAGE - 5 - OF 31	

CLAUSE NO.	PROJECT INFORMATION																																																																																																																																																														
	APPENDIX – I HORIZONTAL SEISMIC ACCELERATION SPECTRAL COEFFICIENTS In units of 'g' for BRBCL project <table><tr><th rowspan="2">Time Period (Sec)</th><th colspan="3">Damping Factor (as a percentage of critical damping)</th></tr><tr><th>2%</th><th>3%</th><th>5%</th></tr><tr><td>0.000</td><td>1.000</td><td>1.000</td><td>1.000</td></tr><tr><td>0.030</td><td>1.000</td><td>1.000</td><td>1.000</td></tr><tr><td>0.050</td><td>1.750</td><td>1.607</td><td>1.443</td></tr><tr><td>0.100</td><td>3.737</td><td>3.060</td><td>2.374</td></tr><tr><td>0.104</td><td>3.904</td><td>3.174</td><td>2.443</td></tr><tr><td>0.123</td><td>3.904</td><td>3.401</td><td>2.753</td></tr><tr><td>0.150</td><td>3.904</td><td>3.401</td><td>2.753</td></tr><tr><td>0.200</td><td>3.904</td><td>3.401</td><td>2.753</td></tr><tr><td>0.250</td><td>3.904</td><td>3.401</td><td>2.753</td></tr><tr><td>0.300</td><td>3.904</td><td>3.401</td><td>2.753</td></tr><tr><td>0.350</td><td>3.904</td><td>3.401</td><td>2.753</td></tr><tr><td>0.400</td><td>3.904</td><td>3.401</td><td>2.753</td></tr><tr><td>0.450</td><td>3.904</td><td>3.401</td><td>2.753</td></tr><tr><td>0.500</td><td>3.904</td><td>3.401</td><td>2.753</td></tr><tr><td>0.516</td><td>3.904</td><td>3.401</td><td>2.753</td></tr><tr><td>0.550</td><td>3.662</td><td>3.401</td><td>2.753</td></tr><tr><td>0.600</td><td>3.357</td><td>3.142</td><td>2.753</td></tr><tr><td>0.607</td><td>3.320</td><td>3.105</td><td>2.753</td></tr><tr><td>0.670</td><td>3.006</td><td>2.813</td><td>2.493</td></tr><tr><td>0.700</td><td>2.877</td><td>2.693</td><td>2.386</td></tr><tr><td>0.750</td><td>2.685</td><td>2.513</td><td>2.227</td></tr><tr><td>0.800</td><td>2.518</td><td>2.356</td><td>2.088</td></tr><tr><td>0.850</td><td>2.369</td><td>2.218</td><td>1.965</td></tr><tr><td>0.900</td><td>2.238</td><td>2.094</td><td>1.856</td></tr><tr><td>0.950</td><td>2.120</td><td>1.984</td><td>1.758</td></tr><tr><td>1.000</td><td>2.014</td><td>1.885</td><td>1.670</td></tr><tr><td>1.050</td><td>1.918</td><td>1.795</td><td>1.590</td></tr><tr><td>1.100</td><td>1.831</td><td>1.714</td><td>1.518</td></tr><tr><td>1.150</td><td>1.751</td><td>1.639</td><td>1.452</td></tr><tr><td>1.200</td><td>1.678</td><td>1.571</td><td>1.392</td></tr><tr><td>1.250</td><td>1.611</td><td>1.508</td><td>1.336</td></tr><tr><td>1.300</td><td>1.549</td><td>1.450</td><td>1.285</td></tr><tr><td>1.350</td><td>1.492</td><td>1.396</td><td>1.237</td></tr><tr><td>1.400</td><td>1.439</td><td>1.346</td><td>1.193</td></tr><tr><td>1.450</td><td>1.389</td><td>1.300</td><td>1.152</td></tr><tr><td>1.500</td><td>1.343</td><td>1.257</td><td>1.113</td></tr><tr><td>1.550</td><td>1.299</td><td>1.216</td><td>1.077</td></tr></table>				Time Period (Sec)	Damping Factor (as a percentage of critical damping)			2%	3%	5%	0.000	1.000	1.000	1.000	0.030	1.000	1.000	1.000	0.050	1.750	1.607	1.443	0.100	3.737	3.060	2.374	0.104	3.904	3.174	2.443	0.123	3.904	3.401	2.753	0.150	3.904	3.401	2.753	0.200	3.904	3.401	2.753	0.250	3.904	3.401	2.753	0.300	3.904	3.401	2.753	0.350	3.904	3.401	2.753	0.400	3.904	3.401	2.753	0.450	3.904	3.401	2.753	0.500	3.904	3.401	2.753	0.516	3.904	3.401	2.753	0.550	3.662	3.401	2.753	0.600	3.357	3.142	2.753	0.607	3.320	3.105	2.753	0.670	3.006	2.813	2.493	0.700	2.877	2.693	2.386	0.750	2.685	2.513	2.227	0.800	2.518	2.356	2.088	0.850	2.369	2.218	1.965	0.900	2.238	2.094	1.856	0.950	2.120	1.984	1.758	1.000	2.014	1.885	1.670	1.050	1.918	1.795	1.590	1.100	1.831	1.714	1.518	1.150	1.751	1.639	1.452	1.200	1.678	1.571	1.392	1.250	1.611	1.508	1.336	1.300	1.549	1.450	1.285	1.350	1.492	1.396	1.237	1.400	1.439	1.346	1.193	1.450	1.389	1.300	1.152	1.500	1.343	1.257	1.113	1.550	1.299	1.216	1.077
	Time Period (Sec)	Damping Factor (as a percentage of critical damping)																																																																																																																																																													
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6.00.00	APPENDIX – I HORIZONTAL SEISMIC ACCELERATION SPECTRAL COEFFICIENTS In units of 'g' for BRBCL project <table><tr><th rowspan="2">Time Period (Sec)</th><th colspan="3">Damping Factor (as a percentage of critical damping)</th></tr><tr><th>2%</th><th>3%</th><th>5%</th></tr><tr><td>3.500</td><td>0.575</td><td>0.539</td><td>0.477</td></tr><tr><td>3.550</td><td>0.567</td><td>0.531</td><td>0.470</td></tr><tr><td>3.600</td><td>0.559</td><td>0.524</td><td>0.464</td></tr><tr><td>3.650</td><td>0.552</td><td>0.516</td><td>0.458</td></tr><tr><td>3.700</td><td>0.544</td><td>0.509</td><td>0.451</td></tr><tr><td>3.750</td><td>0.537</td><td>0.503</td><td>0.445</td></tr><tr><td>3.800</td><td>0.530</td><td>0.496</td><td>0.439</td></tr><tr><td>3.825</td><td>0.527</td><td>0.493</td><td>0.437</td></tr><tr><td>3.850</td><td>0.523</td><td>0.490</td><td>0.434</td></tr><tr><td>3.900</td><td>0.516</td><td>0.483</td><td>0.428</td></tr><tr><td>3.950</td><td>0.510</td><td>0.477</td><td>0.423</td></tr><tr><td>4.000</td><td>0.504</td><td>0.471</td><td>0.418</td></tr></table>				Time Period (Sec)	Damping Factor (as a percentage of critical damping)			2%	3%	5%	3.500	0.575	0.539	0.477	3.550	0.567	0.531	0.470	3.600	0.559	0.524	0.464	3.650	0.552	0.516	0.458	3.700	0.544	0.509	0.451	3.750	0.537	0.503	0.445	3.800	0.530	0.496	0.439	3.825	0.527	0.493	0.437	3.850	0.523	0.490	0.434	3.900	0.516	0.483	0.428	3.950	0.510	0.477	0.423	4.000	0.504	0.471	0.418
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	CRITERIA FOR WIND RESISTANT DESIGN OF STRUCTURES AND EQUIPMENT All structures shall be designed for wind forces in accordance with IS:875 (Part-3) and as specified in this document. See Annexure – B for site specific information. Along wind forces shall generally be computed by the Peak (i.e. 3 second gust) Wind Speed method as defined in the standard. Along wind forces on slender and wind sensitive structures and structural elements shall also be computed, for dynamic effects, using the Gust Factor or Gust Effectiveness Factor Method as defined in the standard. The structures shall be designed for the higher of the forces obtained from Gust Factor method and the Peak Wind Speed method. Analysis for dynamic effects of wind must be undertaken for any structure which has a height to minimum lateral dimension ratio greater than "5" and/or if the fundamental frequency of the structure is less than 1 Hz. Susceptibility of structures to across-wind forces, galloping, flutter, ovalling etc. should be examined and designed/detailed accordingly following the recommendations of IS:875(Part-3) and other relevant Indian standards. It should be estimated if size and relative position of other structures are likely to enhance the wind loading on the structure under consideration. Enhancement																																																										
	LOT-1A PROJECTS FLUE GAS DESULPHURISATION (FGD) SYSTEM PACKAGE		TECHNICAL SPECIFICATION SECTION-VI, PART-A BID DOC. NO.:CS-0011-109(1A)-2	SUB SECTION-II-A8 PROJECT INFORMATION NABINAGAR STPP-I (3X660MW)	PAGE - 8 - OF 31																																																						

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	factor, if necessary, shall suitably be estimated and applied to the wind loading to account for the interference effects. Damping in Structures The damping factor (as a percentage of critical damping) to be adopted shall not be more than as indicated below for: <table><tr><td>a) Welded steel structures</td><td>: 1.0%</td></tr><tr><td>b) Bolted steel structures</td><td>: 2.0%</td></tr><tr><td>c) Reinforced concrete structures</td><td>: 1.6%</td></tr><tr><td>d) Steel stacks</td><td>: As per IS:6533 & CICIND Model Code whichever is more critical.</td></tr></table> <u>ANNEXURE-B</u> <u>SITE SPECIFIC DESIGN PARAMETERS</u> The various design parameters, as defined in IS: 875 (Part-3), to be adopted for the project site shall be as follows: <table><tr><td>a) The basic wind speed "V_b" at ten</td><td></td></tr><tr><td>b) The risk coefficient "K₁"</td><td>: 1.07</td></tr><tr><td>c) Category of terrain</td><td>: Category-2</td></tr></table>				a) Welded steel structures	: 1.0%	b) Bolted steel structures	: 2.0%	c) Reinforced concrete structures	: 1.6%	d) Steel stacks	: As per IS:6533 & CICIND Model Code whichever is more critical.	a) The basic wind speed "V _b " at ten		b) The risk coefficient "K ₁ "	: 1.07	c) Category of terrain	: Category-2
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c) Category of terrain	: Category-2																	
7.00.0	FOUNDATION SYSTEM AND GEOTECHNICAL DATA																	
7.00.01	Geotechnical data and foundation system for the respective project are enclosed at annexure-III. The corresponding bore logs are enclosed at annexure-IV.																	
7.00.02	The available soil data is of vicinity of proposed structures, therefore, bidder shall carryout his own detailed soil investigation for facilities under this package and shall be as per the scheme approved by owner. The scheme for geotechnical investigation shall be as given at Clause 7.07.00 and shall be approved by owner before execution. Geotechnical investigation work shall got executed by the Contractor through the agencies as mentioned in Clause No. 7.07.03. However, no time extension shall be given on account of soil investigation carried out by the Bidder. The geotechnical investigation report shall be prepared with detailed recommendations regarding type of foundation and allowable bearing pressure for various structures/ facilities and other soil parameters. The report shall be submitted for Owner's approval prior to commencement of design of foundation.																	
7.00.03	The Bidder should note that nothing extra whatsoever on account of variation between soil data collected by Owner and that found by the Bidder during geotechnical investigation by him or during execution of works, shall be payable.																	
LOT-IA PROJECTS FLUE GAS DESULPHURISATION (FGD) SYSTEM PACKAGE		TECHNICAL SPECIFICATION SECTION-VI, PART-A BID DOC. NO..CS-0011-109(1A)-2	SUB SECTION-II-A8 PROJECT INFORMATION NABINAGAR STPP-I (3X660MW)	PAGE - 9 - OF 31														

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7.00.04	Tank Foundations a) The tanks shall rest on flexible tank pad foundation, resting on sand with concrete ring wall to retain sand. Base of the concrete ring wall shall not rest on the expansive soil, if any. b) Entire loose/ soft soil inside the concrete ring wall shall be removed and shall be filled with sand. Sand for filling shall be clean and well graded conforming to IS 383 with grading Zone I to III. c) Sand shall be spread in layers not exceeding 30cm compacted thickness over the area. Each layer shall be uniformly compacted by mechanical means like plate vibrators, small vibratory rollers, etc to achieve a relative density of not less than 80%. d) Other requirements of tank foundations shall be as per IS 803 and as specified elsewhere in the specifications.			
7.02.00	Foundation System The requirements for the foundation system to be adopted are as given in subsequent clauses. Depending upon the depth of competent strata/stratum, type of structures, functional requirement of facility, extent of cutting / filling, suitable foundation, open or pile shall be adopted with approval of owner.			
7.02.01	General Requirements a) All structures/equipment shall be supported either on suitable open foundations (isolated, combined, raft) or pile foundations depending on type of structures/facilities, sub-strata, topography etc. b) The roads, ground floor slabs, trenches, pipe pedestals, channels/drain and staircase foundation with foundation loading intensity less than 4 T / M2 may be supported on open / shallow foundations resting on virgin / controlled compacted filled up soil. c) No other foundation (other than as mentioned in (b) above) shall rest on the filled up ground / soil. d) No foundation shall rest on the black cotton soil. e) Before execution of work the bidder shall ensure that there is no obstruction to underground/overground facilities like sewer lines, pipe lines etc. Any such damage and remedial/ rectification measures shall be at the contractors cost. f) Bidder shall also ensure that there is no damage to existing nearby foundations and the foundations pertaining to this package are not placed at shallower depth than the nearby foundations. If required depth of foundation is deeper than the existing foundations, proper protection shall be provided to existing foundations.			
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	g) All foundations shall be designed in accordance with relevant parts of the latest revisions of Indian Standards. h) The water table for design purpose shall be considered at Finished Ground Level. i) A combination of open and pile foundations shall not be permitted under the same equipment / structure / building. j) Foundation for equipments on ground floor For equipments of static weight upto 1.5 T, the equipment may be supported on the ground floor slab by locally thickening the slab. Thickening of the ground floor slab shall be done upto an extent of about 0.6 m beyond the plan area of the equipment on all the sides. Further, the load intensity below the equipment shall be limited to 4T/m2. Other requirements of floor slab and compaction below the floor slab shall be adhered, as specified elsewhere in the specifications. For equipment of static weight more than 1.5 T, the equipment foundation shall be taken to the founding level or shall be built up with PCC from the level as mentioned in the Table 1. The pedestal of equipment foundation or the foundation Block shall be isolated from the adjoining floor slab by providing bitumen impregnated fiber board of minimum 50 mm thick, conforming to IS: 1838 all around the equipment pedestal for the full depth of the floor slab.				
7.02.02	Open Foundations In case open foundations are adopted, following shall be adhered to. a) The minimum width of foundation shall be 1.0 m. b) Minimum depth of foundation shall be 1.0m below Ground Level. c) It shall be ensured that all foundations of a particular structure/ buildings/ facility shall rest on one bearing stratum. d) Wherever the intended bearing sub-strata is virgin soil stratum but the actual stratum encountered during foundation excavation consists of filled up soil at founding level, under such cases either the foundation shall be lowered completely into the virgin stratum or the filled up soil upto the virgin layers shall be removed and built up through PCC (1:4:8) up to designed foundation level.				
7.02.03	Pile Foundations – In case piles are adopted, following shall be adhered to :				
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	i) The pile foundation shall be of RCC, Cast-in-situ bored piles as per IS:2911. Pile boring shall be done using Rotary Hydraulic Rigs/conventional tripod rig. Two stage flushing of pile bore shall be ensured by airlift technique duly approved by the Employer. If required, temporary or permanent MS liner may be provided for piling. ii) The minimum diameter of pile shall be 600 mm. The allowable load capacity of the pile in different modes (vertical compression, lateral and pullout) shall be as per approved geotechnical report & as enclosed in relevant annexure: iii) Only straight shaft piles shall be used. Minimum cast length of pile above cutoff level shall be 1.0 m. iv) The contractor shall furnish design of piles (in terms of rated capacity, length, diameter, termination criteria to locate the founding level for construction of pile in terms of measurable parameter, reinforcement for job as well as test piles, pile load test arrangement, locations of initial test piles etc.) for Engineer's approval. v) The piling work shall be carried out in accordance with IS:2911 (Relevant part) and accepted construction methodology. The construction methodology shall be submitted by the Contractor for Engineer's approval. vi) Number of initial load tests to be performed for each diameter and rated capacity of pile shall be subject to minimum as under. Vertical Lateral Minimum of 2 Nos. in each mode. Uplift vii) The initial pile load test shall be conducted with test load upto three times the estimated pile capacity. In case of vertical compression test (initial test) the method of loading shall be cyclic as per IS:2911 (relevant part). viii) Load test shall be conducted at pile Cut-off Level (COL). If the water table is above the COL the test pit shall be kept dry throughout the test period by suitable de-watering methods. Alternatively the vertical load test may be conducted at a level higher than COL. In such a case, an annular space shall be created to remove the effect of skin friction above COL by providing an outer casing of suitable diameter larger than the pile diameter. ix) Number of routine pile load tests to be performed for each diameter/allowable capacity of pile shall be as under : i) Vertical : 0.5% of the total number of piles provided. ii) Lateral : 0.5% of the total number of piles provided.			
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	x) The routine tests on piles shall be conducted upto test load of one and half times the allowable pile capacity. Piles for routine load tests shall be approved by the Employer. xi) In case, routine pile load test shows that the pile has not achieved the desired capacity or pile(s) have been rejected due to any other reason, then the Contractor shall install additional pile(s) as required and the pile cap design shall accordingly be reviewed and modified, if required. xii) Testing of piles and interpretation of pile load test results shall be carried out as per IS:2911 (Part-4). Contractor shall ensure that all the measuring equipment and instruments are properly calibrated at a reputed laboratory / institute prior to their use. Settlement / movement of the pile top shall be made by Linear Variable Differential Transducers (LVDT) having a least count of 0.01mm. xiii) The test load on initial test piles shall be applied by means of reaction from anchor piles / rock anchors alone or combination of anchor piles / rock anchors and kentledge with concrete blocks. xiv) Low Strain Pile Integrity test shall be conducted on all test piles and job piles. This test shall be used to identify the routine load test and not intended to replace the use of static load test. This test is limited to assess the imperfection of the pile shaft and shall be undertaken by an independent specialist agency to be approved by Engineering department of Owner. The test equipment shall be of TNO or PDI make or equivalent. The process shall confirm to ASTM. xv) High Strain Dynamic Load Test may be carried out for routine load testing of working piles. However, at least two numbers of static routine vertical load tests shall be carried out on pile on which high strain dynamic load test has already been carried out for establishing the correlation between the two tests. In case of discrepancy if any between dynamic and static vertical load tests, then additional static routine vertical load tests shall be conducted as decided by the Engineer and the results of static routine vertical load shall prevail. Number of routine vertical pile load tests as per clause 7.02.03 (ix) shall be total of static routine vertical load test and high strain dynamic load tests. The procedure to carry out the test shall be submitted to the Engineer. The test and equipment shall conform to ASTM D4945-00. The test shall be conducted by an experienced independent test agency approved by the owner. Field data shall be submitted to the site engineer and shall include force velocity curves, pile capacity, simulated static load test curve, net and total pile displacement, pile integrity. A (Case pile wave analysis) CAPWAP or equivalent software analysis shall be conducted on the field data for correct capacity estimation and to evaluate end bearing and skin friction components			
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	of the pile. xvi) From load considerations, single pile may be used under a column/tower. In that case, pile shall be connected with tie beams at pile cut off level in both directions. xvii) Contribution of frictional resistance of filled up soil if any, shall not be considered for computation of frictional resistance of piles. xviii) Reinforcement for job piles shall be designed as following: • Compression + bending piles: For these piles, the allowable safe pile capacities in compression and bending shall be considered. • Tension + bending piles: For these piles, the actual pile forces to be considered. However, maximum 3 types of combinations for varying percentage of tension capacity + bending case may be designed & adopted by contractor for the entire scope of work under this package.			
7.03.00	Special Requirements			
7.03.01	Details of treatment for foundations / underground structures required to counteract soil / water chemical environment shall be as per detailed geotechnical investigation to be carried out by contractor. Contractor shall carry out chemical analysis during detailed geotechnical investigation and required treatment shall be provided accordingly.			
7.04.00	Excavation, Filling and Dewatering			
7.04.01	For excavation works, comprehensive dewatering with well point or deep wells arrangement, if required, shall be adopted. Scheme for dewatering and design with all computations and back up data for dewatering shall be submitted for the owner's information. The water table shall be maintained at 0.5m below the founding depth.			
7.04.02	Excavation for shallow foundations shall be covered with PCC immediately after reaching the founding level. In case of any local loosening of soil or any loose pockets are encountered at founding level during excavation the same shall be removed and compensated by PCC M7.5. The final layer of about 300 mm thickness above the founding level shall be excavated by suitable means, so as to avoid disturbance to founding stratum.			
7.04.03	Backfilling around foundations, pipes, trenches, sumps, pits, plinths, etc. shall be carried out with approved material in layers not exceeding 300 mm compacted thickness (higher thickness of layers upto 500mm with heavy mechanical compacting equipment) and each layer shall be compacted to 90% of standard proctor density for cohesive soils and to 80% of relative density for non-cohesive soils Rock pieces having size less than 150 mm and interstices filled with soil may be used for backfilling around foundation, plinths etc. and shall be compacted to minimum of 85% of original stack of material after filling the interstices.			
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7.04.04	Founding level for trenches/channels shall be decided as per functional requirement. The bottom of excavation shall be properly compacted prior to casting of bottom slab of trenches / channels.			
7.04.05	CBR tests for pavement/road design shall be carried out by the Contractor after earth filling (if applicable) has been completed upto the formation level.			
7.04.06	The contractor shall take all necessary measures during excavation to prevent the hazards of falling or sliding of material or article from any bank or side of such excavation which is more than one and a half meter above the footing by providing adequate piling, shoring, bracing etc. against such bank or sides. Adequate and suitable warning signs shall be put up at conspicuous places at the excavation work to prevent any persons or vehicles falling into the excavation trench. No worker should be allowed to work where he may be stuck or endangered by excavation machinery or collapse of excavations or trenches.			
7.05.00	EXCAVATION IN ROCK Excavation in rock shall be carried out by mechanical means and if blasting is required for founding of some of the structures under this package, control blasting only shall be carried out.			
7.05.01	Controlled blasting shall be done by a specialised agency duly approved by Engineer. All controlled blasting shall be done by using time delay detonators (i.e. excel type).			
7.05.02	a) Contractor shall engage an agency expert in blasting such as, NIRM (National Institute of Rock Mechanics), CMPDIL, Central Institute of Mining and Fuel Research Dhanbad, Dept. of Mining of Govt. Institutions etc. to design detailed blasting scheme and get the same approved from Engineer before carrying out the blasting operation. All blasting shall be done as per the approved blasting scheme & initial blasting operations shall be done under the supervision & guidance of the representative of the blasting expert. b) All the statutory laws, (Explosives Act etc.) rules, regulations, Indian Standards, etc. pertaining to the acquisition, transport, storage, handling and use of explosives, etc. shall be strictly followed. c) The Contractor shall obtain Licenses from Competent Authorities for undertaking blasting work as well as for procuring, transporting to site and storing the explosives as per explosives act. The Contractor shall be responsible for the safe transport, use, custody and proper accounting of the explosive Materials. d) The Contractor shall be responsible and liable for any accident and injury / damage which may occur to any person or property of the project or public on account of any operations connected with the storage, transportation, handling or use of explosive and blasting operations.			
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7.06.00	Sheeting & Shoring The contractor shall ascertain for himself the nature of materials to be excavated and difficulties, if any, likely to be encountered in excavation while executing the work. Sheet piling, sheeting and shoring, bracing and maintaining suitable slopes, drainage, etc. shall be provided and installed by the Contractor, to the satisfaction of the Engineer.			
7.07.00	Geotechnical Investigation The Contractor shall carry out detailed geotechnical investigation in the areas under his scope for establishing the sub-surface conditions and to decide type of foundations for the structures envisaged, construction methods, any special requirements/treatment called for remedial measures for sub-soil/ foundations etc. in view of soft sub-soils, aggressive sub-soils and water, expansive/swelling soils etc. prior to commencement of detailed design/drawings. The Contractor shall obtain the approval for the field testing scheme proposed by him from the Owner before undertaking the geotechnical investigation work.			
7.07.01.00	Scheme of geotechnical Investigation			
7.07.02.01	Field test shall include but not be limited to the following: Boreholes, Standard Penetration Test (SPT), Dynamic Cone Penetration Test (DCPT), collection of disturbed samples (DS) and undisturbed soil samples (UDS), Trial Pits (TP), Plate Load Tests (PLT), Electrical Resistivity Test (ERT), In situ field permeability tests, collection of water samples, etc.			
7.07.02.02	The diameter of borehole shall be minimum 150 mm in soil and 76 mm in rock. The diameter of UDS sampler shall be 100 mm minimum. Core drilling in rock shall be done by using hydraulically feed rotary drill & double tube core barrel with diamond bit.			
7.07.02.03	The minimum tests are indicated in Clause No. 7.08.00. Adequate number of tests shall be conducted up to sufficient depth for complete determination of subsoil conditions. The depth of boreholes shall be as specified in Appendix A. SPT shall be carried out in all types of soil deposits and in all rock formations with core recovery up to 20%, met within a borehole. This test shall be conducted at every 3.0 m interval or at change of strata, up to the final depth. SPT 'N' of 100 and above shall be referred as refusal. UDS shall be collected at every 3.0 m interval or at change of strata up to depth of borehole. UDS may be replaced by additional SPT, if SPT'N' value in the strata is above 50.			
7.07.02.04	Laboratory tests shall be done as per relevant IS codes. The laboratory tests, not be limited to the following shall be conducted on disturbed and undisturbed soil samples, rock samples & water samples collected during field investigations in sufficient numbers. Laboratory Tests on Soil Samples Laboratory tests shall be carried out on disturbed and undisturbed soil samples for Grain Size Analysis, Hydrometer Analysis, Atterberg Limits, Triaxial Shear Tests (UU), Natural Moisture Content, Specific Gravity and Bulk Unit Weight, Consolidation Tests, Unconfined Compression Test, Free swell Index, Shrinkage Limit, Swell			
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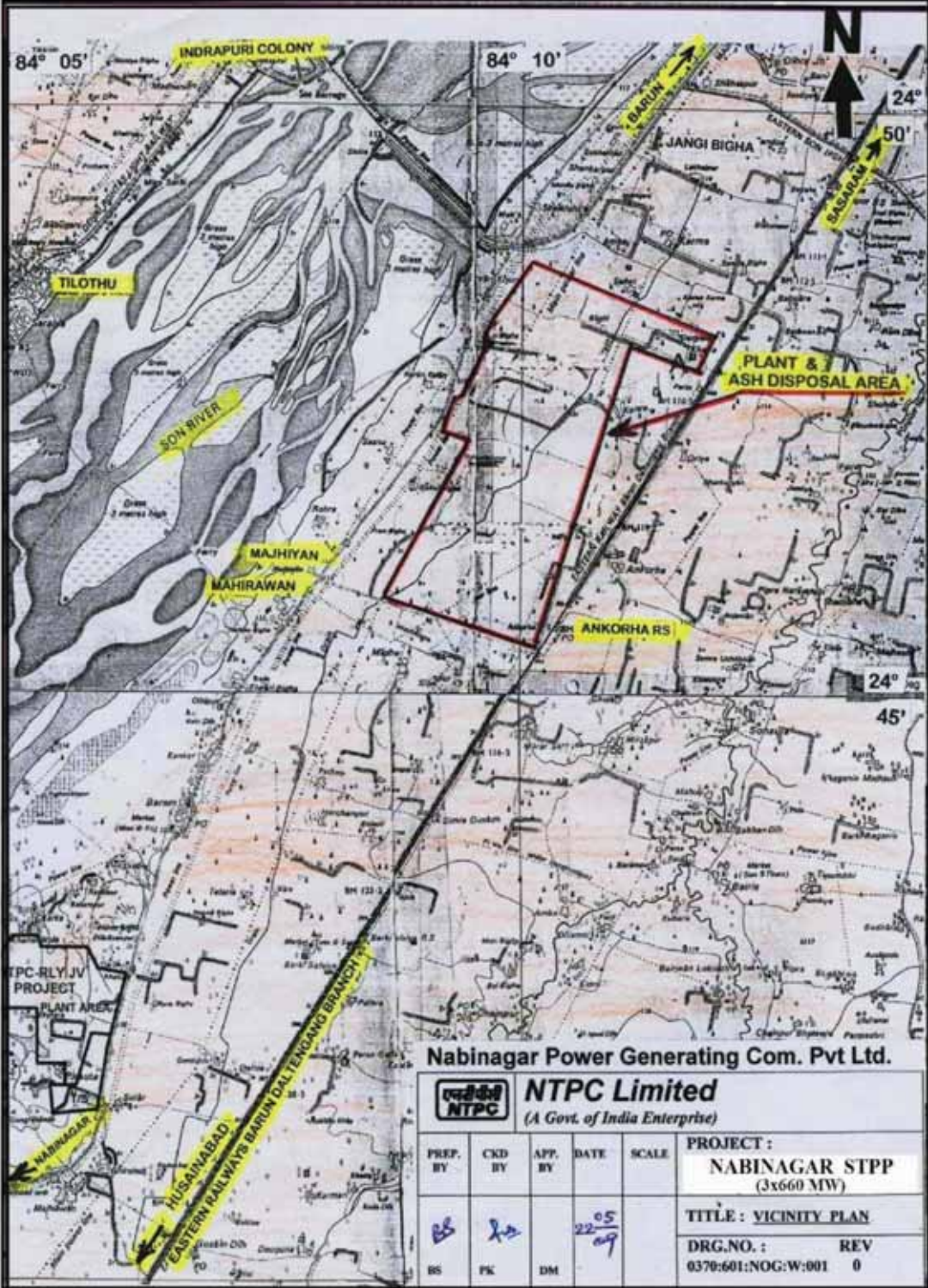
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7.07.02.05	Pressure Test, Chemical Analysis test on soil and water samples to determine the carbonates, sulphates, chlorides, nitrates, pH, organic matter and any other chemicals harmful to concrete and reinforcement/ steel. Laboratory Tests on Rock Samples Moisture content, porosity & density, Specific Gravity, Hardness, Soundness, Slake durability index, Unconfined compression test (Both at saturated and in-situ water content), Point load strength index and deformability test (Both at saturated and in-situ water content) shall be carried out on rock samples.													
	7.07.02.05 Geotechnical investigation (field & laboratory) shall be carried out in accordance with the provisions of relevant Indian Standards. On completion of all field & laboratory work, geotechnical investigation report shall be submitted for Owner's review/approval. The Geotechnical investigation report shall contain geological information of the region, procedure adopted for investigation, field & laboratory observations/ data/ records, analysis of results & recommendations on type of foundation for different type of structures envisaged for all areas of work with supporting calculations. Recommendations on treatment for soil, foundation, based on subsoil characteristics, soft soils, aggressive chemicals, expansive soils, etc. Recommendations on foundation system and the net allowable bearing pressures and pile capacity shall be based on the conservative values of geotechnical investigation data.													
	7.07.03.00 Geotechnical investigation work shall be got executed by the Contractor through the following agencies. 1. C.E.TESTING COMPANY Pvt. Ltd, Kolkata 2. Cengrs Geotechnica Pvt. Ltd, New Delhi 3. M.K. Soil Testing Laboratory, Ahemdabad 4. SECON Pvt Ltd, Bangalore 5. Soil Engineering Consultants, New Delhi 6. Orbital Infrastructure Consultancy & Research Pvt. Ltd. Cuttack 7. KCT Consultancy Services, Ahemdabad 8. ARKITECHNO Consultants (India) Pvt. Ltd. Bhubaneswar													
7.08.00 a)	Geotechnical Investigation Scheme Boreholes (Minimum) <table border="1" data-bbox="360 1675 1465 1966"> <thead> <tr> <th>S.N</th><th>Structure</th><th>Spacing/Number of borehole</th><th>Depth of borehole</th><th>Remarks</th></tr> </thead> <tbody> <tr> <td>1</td><td>FGD</td><td>Minimum 14 Nos.</td><td>Depth of boreholes shall be 25m to 35m.</td><td>Depth of</td></tr> </tbody> </table>				S.N	Structure	Spacing/Number of borehole	Depth of borehole	Remarks	1	FGD	Minimum 14 Nos.	Depth of boreholes shall be 25m to 35m.	Depth of
S.N	Structure	Spacing/Number of borehole	Depth of borehole	Remarks										
1	FGD	Minimum 14 Nos.	Depth of boreholes shall be 25m to 35m.	Depth of										
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	2	Crusher House	Minimum 2 Nos.	Depth of boreholes shall be 25m to 35m.	boreholes shall be as mentioned in column "Depth of Borehole" or 5m continuous in rock with RQD > 25% whichever is earlier.	
	3	Gypsum and Lime storage area	Minimum 10 Nos.	Depth of boreholes shall be 15m to 25m		
	4	Other Structure/Facility	Minimum 2 Nos. boreholes under each area / facility	15 to 20 m		
	5	Chimney	Minimum 2 Nos.	30 to 35m		
	b) Other Field Tests (Minimum)					
	1	Cyclic Plate Load Test (CPLT)	3 nos	Test Depth from 2 to 4 m		
	2	Trial Pit (TP)	5 Nos.	Depth - 3 m		
	3	In Situ Permeability Test In Boreholes	In minimum 3 Nos. of boreholes	Tests shall be conducted at depths of 1.0m, 3.0m, 5.0m, 8.0m and 12.0m.		
	4	ERT	Minimum 10 Nos.			
	• Depth and location of Boreholes and other field tests (PLT, ERT, field permeability tests etc.) shall be approved by Owner before execution of geotechnical investigation work. • Investigation in any other building / structure / facilities / trestles which are not mentioned above shall also be carried out, if required, by the bidder for the facilities under his scope.					
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	Annexure-III (New Nabinagar-I) SOIL DATA AND FOUNDATION SYSTEM Employer has carried out geotechnical investigation in the areas near to this package. Logs of representative boreholes to be used for bidder's information in the vicinity of proposed area are enclosed at Annexure-II. The bidder is required to carry out geotechnical investigation as per clause no. 7.07.00 and ascertain the pile capacity and bearing capacity. The onus of correct assessment / interpretation and understanding of the existing subsoil condition / data is on the Bidder. Ground water table is encountered at a depth of about 12.0 to 14.0m below natural ground level (NGL) at the time of investigation. Fluctuation may occur in ground water table due to seasonal variation. The natural ground level is varying as per enclosed contour/spot level drawing. a) The foundation system to be adopted for different structures shall be as given in Table – 1 below 2.00.00Table – 1: Net Allowable Bearing Pressure <table><tr><th>STRUCTURE</th><th>TYPE OF FOUNDATION TO BE ADOPTED</th></tr><tr><td>FGD and related structures</td><td>Open/Piles</td></tr></table> b) During design the Allowable Bearing Pressure shall be as furnished in Table-2. Bidder is required to carry out geotechnical investigation in this area. The allowable bearing pressure shall be adopted after approval of geotechnical investigation report by owner. However, the maximum allowable bearing pressure shall be as per the approved geotechnical report and shall be limited to the values as furnished in Table-2. 3.00.00 4.00.00Table – 2: Net Allowable Bearing Pressure <table><tr><th rowspan="3">Structure</th><th rowspan="3">Foundin g Level in RL</th><th colspan="3">Net Allowable Bearing Pressure T/m²</th></tr><tr><th colspan="2">Isolated / Strip</th><th rowspan="2">Rafts (width > 6m) for 75mm settlement</th></tr><tr><th>width upto 6 m for 25mm settlement</th><th>Width upto 6m for 40mm settlement</th></tr><tr><td rowspan="2">FGD and related structures</td><td>1.5 m below NGL</td><td>5.0</td><td>6.0</td><td>7.0</td></tr><tr><td>2.5 m below</td><td>6.0</td><td>7.0</td><td>8.0</td></tr></table>	STRUCTURE	TYPE OF FOUNDATION TO BE ADOPTED	FGD and related structures	Open/Piles	Structure	Foundin g Level in RL	Net Allowable Bearing Pressure T/m ²			Isolated / Strip		Rafts (width > 6m) for 75mm settlement	width upto 6 m for 25mm settlement	Width upto 6m for 40mm settlement	FGD and related structures	1.5 m below NGL	5.0	6.0	7.0	2.5 m below	6.0	7.0	8.0
STRUCTURE	TYPE OF FOUNDATION TO BE ADOPTED																							
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		NGL				
		3.5 m below NGL	9.0	10.0		12.0
	The net allowable bearing pressure higher than above mentioned values shall not be permitted. At intermediate levels the bearing capacity shall be same as the net allowable bearing pressure corresponding to the immediate shallower level mentioned above.					
c)	Permissible Settlement of Foundations: For open foundations, the total permissible settlement and differential settlement shall be governed by IS: 1904 and from functional requirements whichever is more stringent. However, total settlement shall be restricted to the following:					
	Isolated, Strip & Raft (Mill foundations/machine foundation)					25 mm
	Isolated & Strip (Other than Mill foundations/machine foundation)					40 mm
	Raft (widths greater than 6 m) (Other than Mill foundations/machine foundation)					75 mm
	In case the total permissible settlement is to be restricted to less than as above specified from functional requirements, then the net allowable bearing pressure shall be reduced after review in consultation with Engineer.					
d)	The diameter of pile, minimum length and maximum allowable capacity of piles shall be as given below:					
	Area/ Location	Pile Diameter (mm)	Minimum Length of Bored Pile Below Cut- off Level (m)	Safe Load Capacity in		
				Vertical Comp. (MT)	Pullout (MT)	Lateral (MT)
	FGD and related structures	600	26.0	140.0	45.0	7.0
		760	27.0	250	75.0	12.5
	- Cut off Level (COL) is assumed at 3.0 m below FGL (RL (+) 121.2m). If the COL is shallower than the assumed COL, then the length of the pile shall be increased accordingly.					
e)	The criteria for Pile Termination (founding level) shall be as given below:					
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	Cement Type Ordinary Portland Cement (OPC)/Portland Pozzolana Cement (PPC) Concrete Grade As specified elsewhere in the specifications Type of Reinforcement As specified elsewhere in the specifications Cover to Reinforcement As specified elsewhere in the specifications The termination level of the pile shall be decided based on the following criterion i) Minimum length of the pile below COL (cut off level) shall be as specified above ii) The minimum pile length for each group of piles shall be determined based on the nearest borelog. A minimum embedment of 4.0m into the very dense sand strata with SPT 'N' value greater than 40 as observed in such borelog shall be ensured, while deciding the minimum length of pile. For pile termination, SPT 'N' values shall be used from the nearby borelog data. The boreholes are in the bidder's scope and shall be conducted as per the enclosed scheme. iii) However, in no case the length of pile shall be less than the minimum length determined as in (i) or (ii) above whichever is longer, for that pile group. g) Special Requirements: 1) Chemicals in ground water and subsoil, as observed during investigation are: <table><tr><th>Chemical</th><th>SO₃</th><th>Chlorides</th><th>pH</th></tr><tr><td>Ground Water</td><td>35 -40</td><td>15 - 22 ppm</td><td>7.2 - 7.7</td></tr><tr><td>Sub-soil</td><td>0.01 - 0.02%</td><td>0.016 -0.02%</td><td>7.0 - 9.0</td></tr></table> 2) In view of the above, the following shall be adopted for all foundations and sub-structures,				Chemical	SO ₃	Chlorides	pH	Ground Water	35 -40	15 - 22 ppm	7.2 - 7.7	Sub-soil	0.01 - 0.02%	0.016 -0.02%	7.0 - 9.0
Chemical	SO ₃	Chlorides	pH													
Ground Water	35 -40	15 - 22 ppm	7.2 - 7.7													
Sub-soil	0.01 - 0.02%	0.016 -0.02%	7.0 - 9.0													
LOT-1A PROJECTS FLUE GAS DESULPHURISATION (FGD) SYSTEM PACKAGE		TECHNICAL SPECIFICATION SECTION-VI, PART-A BID DOC. NO.:CS-0011-109(1A)-2	SUB SECTION-II-A8 PROJECT INFORMATION NABINAGAR STPP-I (3X660MW)	PAGE - 21 - OF 31												

CLAUSE NO.	PROJECT INFORMATION																					
	ANNEXURE – I EXHIBIT - 1  Nabinagar Power Generating Com. Pvt Ltd. <table border="1" style="width: 100%; border-collapse: collapse;"><tr><td colspan="5" style="text-align: center;"> NTPC Limited (A Govt. of India Enterprise)</td><td colspan="2" style="text-align: center;">PROJECT : NABINAGAR STPP (3x660 MW)</td></tr><tr><td style="width: 10%;">PREP. BY</td><td style="width: 10%;">CKD BY</td><td style="width: 10%;">APP. BY</td><td style="width: 10%;">DATE</td><td style="width: 10%;">SCALE</td><td colspan="2" style="text-align: center;">TITLE : VICINITY PLAN</td></tr><tr><td style="text-align: center;">BS</td><td style="text-align: center;">PK</td><td style="text-align: center;">DM</td><td style="text-align: center;">22-05-09</td><td></td><td colspan="2" style="text-align: center;">DRG.NO. : REV 0370:601:NOG:W:001 0</td></tr></table>	 NTPC Limited (A Govt. of India Enterprise)					PROJECT : NABINAGAR STPP (3x660 MW)		PREP. BY	CKD BY	APP. BY	DATE	SCALE	TITLE : VICINITY PLAN		BS	PK	DM	22-05-09		DRG.NO. : REV 0370:601:NOG:W:001 0	
 NTPC Limited (A Govt. of India Enterprise)					PROJECT : NABINAGAR STPP (3x660 MW)																	
PREP. BY	CKD BY	APP. BY	DATE	SCALE	TITLE : VICINITY PLAN																	
BS	PK	DM	22-05-09		DRG.NO. : REV 0370:601:NOG:W:001 0																	
LOT-IA PROJECTS FLUE GAS DESULPHURISATION (FGD) SYSTEM PACKAGE	TECHNICAL SPECIFICATION SECTION-VI, PART-A BID DOC. NO..CS-0011-109(1A)-2	SUB SECTION-II-A8 PROJECT INFORMATION NABINAGAR STPP-I (3X660MW)	PAGE - 22 - OF 31																			

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CLAUSE NO.	PROJECT INFORMATION						
	TABLE – 1						
	COAL CHARACTERISTICS						
	Sl. No.	Description	Symbol	Design Coal	Worst Coal	Best Coal	Range of Adequacy Coal
	1	2	3	4	5	6	7
	A.	PROXIMATE ANALYSIS (As received basis)					
	1.	Total Moisture	%	15.00	17.00	12.00	11.00-17.00
	2.	Ash	%	45.00	48.00	38.00	36.00-49.00
	3.	Volatile matter	%	18.00	17.00	22.00	23.00-17.00
	4.	Fixed carbon	%	22.00	18.00	28.00	30.00-17.00
	B.	ULTIMATE ANALYSIS (As received basis)					
	1.	Carbon	C%	29.80	25.40	39.00	41.20-24.90
	2.	Hydrogen	H2%	3.00	2.80	3.20	3.30-2.60
	3.	Nitrogen	N2%	0.8	0.70	1.00	1.30-0.50
	4.	Oxygen (By difference)	O2%	5.4	5.10	5.70	6.00-5.00
	5.	Sulphur	S%	0.3	0.50	0.20	0.20-0.60
	6.	Carbonates	CO3%	0.50	0.40	0.60	0.70-0.30
	7.	Phosphorous	P2%	0.2	0.10	0.30	0.30-0.10
	8.	Total Moisture	H2O%	15.00	17.00	12.00	11.00-17.00
	9.	Ash	%	45.00	48.00	38.00	36.00-49.00
	10.	Gross Calorific Value	KCal/Kg	3200	2800	4000	4200 - 2700
	11.	Hard grove index		55	50	60	65-45
	12.	YGP Index		70	80	60	85-55
	C.	ASH ANALYSIS					
	1.	Silica	(SiO2)%	58.65	59.00	58.20	56.9-59.20
	2.	Alumina	(Al2O3)%	28.80	28.00	29.50	27.70-30.00
	3.	Iron Oxide	(Fe2O3)%	5.50	6.00	4.70	4.50-6.50
LOT-IA PROJECTS FLUE GAS DESULPHURISATION (FGD) SYSTEM PACKAGE			TECHNICAL SPECIFICATION SECTION-VI, PART-A BID DOC. NO.:CS-0011-109(1A)-2		SUB SECTION-II-A8 PROJECT INFORMATION NABINAGAR STPP-I (3X660MW)		PAGE - 25 - OF 31

CLAUSE NO.	PROJECT INFORMATION						
	Sl. No.	Description	Symbol	Design Coal	Worst Coal	Best Coal	Range of Adequacy Coal
	1	2	3	4	5	6	7
	4.	Titania	(TiO ₂)%	1.80	2.00	1.70	1.50-2.10
	5.	Phosphoric Anhydride	(P ₂ O ₅)%	0.70	0.60	0.90	0.40-0.95
	6.	Lime	(CaO)%	1.50	1.20	1.90	1.00-2.10
	7.	Magnesia	(MgO)%	1.30	1.50	1.20	1.50-2.10
	8.	Sulphuric Anhydride	(SO ₃)%	0.50	0.60	0.40	0.40-0.62
	9.	Sodium Oxide	(Na ₂ O)%	0.10	0.08	0.30	0.35-0.08
	10.	Balance Alkalies (By Difference)	%	1.15	1.02	1.2	1.20-0.90
	D.	ASH FUSION RANGE (Under reducing atmosphere)					
	a)	Initial Deformation Temperature (IDT)	°C	1100	1100	1100	1150-1100
	b)	Hemispherical temperature	°C	1300	1250	1350	1400-1250
	c)	Flow temperature	°C	1400	1400	1400	1400-1400
LOT-IA PROJECTS FLUE GAS DESULPHURISATION (FGD) SYSTEM PACKAGE			TECHNICAL SPECIFICATION SECTION-VI, PART-A BID DOC. NO.:CS-0011-109(1A)-2		SUB SECTION-II-A8 PROJECT INFORMATION NABINAGAR STPP-I (3X660MW)		PAGE - 26 - OF 31

CLAUSE NO.	PROJECT INFORMATION				
	TABLE – 2A				
	FUEL OIL CHARACTERISTICS				
	Sl. No.	Characteristics	Heavy Furnace Oil grade HV (HFO) IS-1593-1982	Low Sulphur Heavy Stock (LSHS) IS-11489-1985	Heavy Petroleum stock (HPS) IS-11489-1985
	1.	Total sulphur content	4.5% Max.	1.0% Max.	4.5% Max.
	2.	Gross calorific value (KCal/kg)	of the order of 10,000	of the order of 10,000	of the order of 10,000
	3.	Flash Point (Min)	66 deg C	76 deg C	66 deg C
	4.	Water content by volume (Max)	1.0%	1.0%	1.0%
	5.	Sediment by weight (Max)	0.25%	0.25%	0.25%
	6.	Asphaltene content by weight (Max.)	2.5%	2.5%	2.5%
	7.	Kinematic viscosity in Centistokes	370 at 50deg C	100 at 100deg C	100 at 100deg C
	8.	Ash Content by weight (Max.)	0.1%	0.1%	0.1%
	9.	Acidity (inorganic)	Nil	Nil	Nil
	10.	Pour Point (Max.)	57 deg C	66 deg C	72 deg C
	11.	Sodium content	—	—	100 ppm
	12.	Vanadium content	25 ppm	25ppm	25 ppm
13.	Specific heat below pour point (KCal/Kg °C)		0.65		
LOT-IA PROJECTS FLUE GAS DESULPHURISATION (FGD) SYSTEM PACKAGE		TECHNICAL SPECIFICATION SECTION-VI, PART-A BID DOC. NO.:CS-0011-109(1A)-2	SUB SECTION-II-A8 PROJECT INFORMATION NABINAGAR STPP-I (3X660MW)	PAGE - 27 - OF 31	

CLAUSE NO.	PROJECT INFORMATION			
	TABLE – 2B			
	LIGHT DIESEL OIL CHARACTERISTICS			
	AS PER IS 1460-2000			
	Characteristics	LDO		
	1.	Pour Point (max)	21 deg.C & 12°C for Summer and Winter respectively	
	2.	Kinematic viscosity in centistokes at 40 deg.C	2.5 to 15.7	
	3.	Sediment percent by mass (max)	0.10	
	4.	Total sulphur percent by mass (max)	1.8	
	5.	Ash percentage by mass (max)	0.02	
	6.	Carbon residue (Rans bottom) percent by pass (max.)	1.50	
	7.	Acidity in organic	Nil	
	8.	Flash point(Min.) - Pensky Martens	66 deg.C	
	9.	Copper strip corrosion for 3 hours at 100°C	Not worse than No. 2	
10.	Water content, % by volume(max)	0.25		
11.	GCV (Kcal/kg)	10,000		
LOT-1A PROJECTS FLUE GAS DESULPHURISATION (FGD) SYSTEM PACKAGE		TECHNICAL SPECIFICATION SECTION-VI, PART-A BID DOC. NO.:CS-0011-109(1A)-2	SUB SECTION-II-A8 PROJECT INFORMATION NABINAGAR STPP-I (3X660MW)	PAGE - 28 - OF 31

CLAUSE NO.	PROJECT INFORMATION			
	Table-3			
	S.No	Constituent	As	mg/l (except pH & turbidity)
	1.	Calcium	CaCO ₃	131
	2.	Magnesium	CaCO ₃	52
	3.	Sodium + Potassium	CaCO ₃	65
	4.	Total Cations	CaCO ₃	248
	5.	Chloride	CaCO ₃	20
	6.	Sulphate	CaCO ₃	93
	7.	Nitrate	CaCO ₃	10
	8.	Alkalinity	CaCO ₃	125
	9.	Total Anions	CaCO ₃	248
	10.	Iron(total)	Fe	0.3
	11.	Total Silica	SiO ₂	22
	12.	pH value	---	7.0-8.2
	13.	Turbidity	NTU	10
Note: Clarified water is used for CW system as make up & the CW system is expected to operate at about 5.0 – 5.5 Cycles of Concentration (COC) with suitable chemical treatment program using acid, scale & corrosion inhibitor dosing. As CW blow down water is tapped from CW system, the water quality of CW blow down shall accordingly be arrived by the bidder.				
Table-4				
ANALYSIS OF DM WATER TO BE USED FOR MAKE-UP WATER TO CONDENSER				
Sl.No.	Characteristics	Value		
1.	Silica (Max.)	0.02 ppm as Sio2		
2.	Iron as Fe	Nil		
3.	Total hardness	Nil		
4.	pH value	6.8 -7.2		
5.	Conductivity	Not more than 0.1 micro mhos/cm excluding the effects of free CO2		
LOT-1A PROJECTS FLUE GAS DESULPHURISATION (FGD) SYSTEM PACKAGE		TECHNICAL SPECIFICATION SECTION-VI, PART-A BID DOC. NO.:CS-0011-109(1A)-2	SUB SECTION-II-A8 PROJECT INFORMATION NABINAGAR STPP-I (3X660MW)	
PAGE - 29 - OF 31				

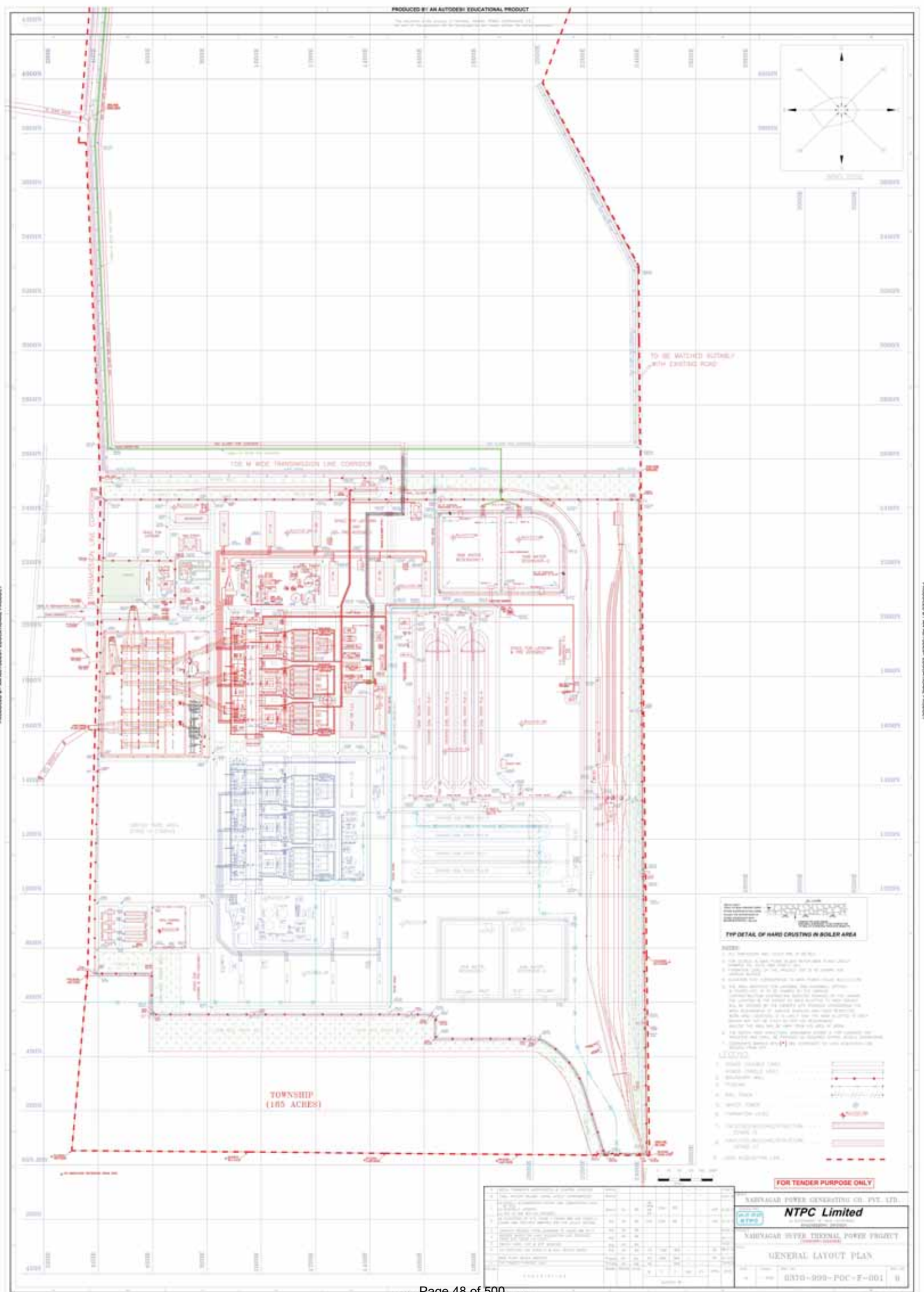
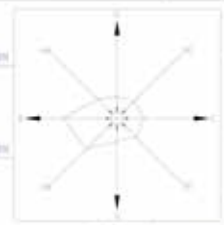
CLAUSE NO.	PROJECT INFORMATION			
9.00.00	STEAM GENERATOR DATA			Table-5
	1.	Location	Outdoor	
	2.	Operation	Base load	
	3.	Type	Pulverised coal fired	
	4.	Maximum Continuous Rating	2120 Tons/hr.	
	5.	Steam pressure at SH outlet	255 Kg/cm ² (a)	
	6.	Steam temperature at SH outlet	568°C	
	7.	Oil for start-up and flame stabilisation	HFO/LSHS/HPS/LDO	
	8.	Fuel oil system sizing	30% of Boiler MCR for Heavy oil/LSHS/HPS (7.5% BMCR for LDO)	
	9.	Pulverised coal size	Minimum 70% through 200 Mesh and 99% thru 50 mesh	
	10.	Type of pulveriser	Vertical spindle mills	
	11.	Type of oil burners	Steam atomised, (Air atomised for LDO)	
	12.	No. of air heaters	Two Bisector(2) for the secondary air side & Two Bisector(2) for the primary air side	
	13.	No. of ID Fans	Two (both working)	
10.00.00	ESP DATA			
	1.	Location:	Downstream side of Air preheaters	
	2.	Operation:	Base load	
	3.	Type:	Rigid Discharge frame	
	4.	Rapping:	Intermittent	
LOT-1A PROJECTS FLUE GAS DESULPHURISATION (FGD) SYSTEM PACKAGE		TECHNICAL SPECIFICATION SECTION-VI, PART-A BID DOC. NO.:CS-0011-109(1A)-2	SUB SECTION-II-A8 PROJECT INFORMATION NABINAGAR STPP-I (3X660MW)	PAGE - 30 - OF 31

CLAUSE NO.	PROJECT INFORMATION																																																																											
	Table-6 List of Drawings placed below in this sub section: <table><tr><th>Sl.No.</th><th colspan="3">Drawing Description</th><th colspan="3">Drawing No.</th></tr><tr><td>1.</td><td colspan="3">General Layout Plan</td><td colspan="3">Enclosed</td></tr><tr><td>2.</td><td colspan="3">Equipment Layout Plan</td><td colspan="3">Enclosed</td></tr><tr><td>3.</td><td colspan="3">ID system-Elevation & Plan</td><td colspan="3">Enclosed</td></tr><tr><td>4.</td><td colspan="3">Pipe Cable Trestle Layout</td><td colspan="3">Enclosed</td></tr><tr><td>5.</td><td>Pipe</td><td>Cable</td><td>Trestle Foundation</td><td colspan="3">Enclosed</td></tr><tr><td>6.</td><td colspan="6">Chimney foundation details</td></tr><tr><td></td><td>Chimney shell outer diameter at ground level (m)</td><td>Chimney foundation outer diameter (m)</td><td>Type of foundation</td><td>Level of Top of foundation (m)</td><td colspan="2">Level of Bottom of foundation (m)</td></tr><tr><td>Unit #1</td><td>32</td><td>46.7</td><td>Raft supported on piles</td><td>RL(+) 120.20</td><td colspan="2">RL(+) 115.95</td></tr><tr><td>Unit #2&3</td><td>34.5</td><td>51.22</td><td>Raft supported on piles</td><td>RL(+) 120.20</td><td colspan="2">RL(+) 115.70</td></tr></table>						Sl.No.	Drawing Description			Drawing No.			1.	General Layout Plan			Enclosed			2.	Equipment Layout Plan			Enclosed			3.	ID system-Elevation & Plan			Enclosed			4.	Pipe Cable Trestle Layout			Enclosed			5.	Pipe	Cable	Trestle Foundation	Enclosed			6.	Chimney foundation details							Chimney shell outer diameter at ground level (m)	Chimney foundation outer diameter (m)	Type of foundation	Level of Top of foundation (m)	Level of Bottom of foundation (m)		Unit #1	32	46.7	Raft supported on piles	RL(+) 120.20	RL(+) 115.95		Unit #2&3	34.5	51.22	Raft supported on piles	RL(+) 120.20	RL(+) 115.70	
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TYPE OF SAMPLES	The Designers' Consortium		SOIL PROFILE	NTPC LTD.	Geotechnical Investigation for New Nabinagar STPP (4x660MW)	COORDINATE 625N 1980E Elev. 120.502	Depth of Boring (m) 30.0	DATE from 14/7/2009 to 16/7/2009	WATER TABLE			LOCATION BH-25	SHEET 59	ANNEX. 'A'										
	DEPTH BELOW NGL (m)	SUB SOIL PROFILE	SOIL DESCRIPTION AND ITS CLASSIFICATION	SPT 'N' VALUES	PLOT OF SPT 'N' VALUES	GRAIN SIZE DISTRIBUTION	ATTERBERG'S LIMIT	DENSITY (gm/cm ³)	NATURAL MOISTURE CONTENTS (%)	SPECIFIC GRAVITY	FREE SWELLING	RELATIVE DENSITY	COHESION C (kg/cm ²)	SHEAR PARA - METER	VOID RATIO e ₀	COMPRESSION INDEX C _p	SWELLING PRESSURE (kg/cm ²)							
UDS	1.0	Dark grey silty clay with kankar of high plasticity (CH)	Dark grey silty clay with kankar of high plasticity (CH)	22					Recorded	GRAVEL (%)	SAND (%)	SILT (%)	CLAY (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTIC INDEX	SHRINKAGE LIMIT	BULK DENSITY	DRY DENSITY					
SPT	2.0			Corrected	24	o	x	o	x														o	x
SPT	3.0			3.5	30	o	x	o	x														o	x
SPT	4.0	Dark grey silty clay with kankar of medium plasticity (CI)	Dark grey silty clay with kankar of medium plasticity (CI)	36	o	7	13	65	15	43	24	19	12											
UDS	5.0			33	o																			
SPT	6.0																							
UDS	7.0																							
SPT	8.0																							
SPT	9.0																							
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SPT	11.0																							
SPT	12.0																							
UDS	13.0																							
SPT	14.0																							
SPT	15.0																							

TYPE OF SAMPLES	DEPTH BELOW NGL (m)	SUB SOIL PROFILE	SOIL PROFILE	NTPC LTD.	Geotechnical Investigation for New Nabinagar STPP (4x660MW)	COORDINATE 625N 1800E Elev. 120.502	Depth of Boring (m) 30.0	DATE from 14/7/2009 to 16/7/2009	WATER TABLE			LOCATION BH-25	SHEET 60	ANNEX. 'A'
									NATURAL MOISTURE CONTENTS (%)	SPECIFIC GRAVITY	FREE SWELLING			
GRAIN SIZE DISTRIBUTION	ATTERBERGS' LIMIT	DENSITY (gm/cm ³)	COHESION C (Kg/cm ²)	FRICTION ANGLE ϕ	VOID RATIO e_0	COMPRESSION INDEX C_c	SWELLING PRESSURE (Kg/cm ²)	PLOT OF SPT 'N' VALUES		RELATIVE DENSITY		SHEAR PARA-METER	CONSOLIDATION PARAMTR.	
								Recorded	Corrected	GRAVEL (%)	SAND (%)	SILT (%)	CLAY (%)	
UDS	16.0													
SPT	17.0													
SPT	18.0													
UDS	19.0													
SPT	20.0													
SPT	21.0													
UDS	22.0													
SPT	23.0													
UDS	24.0													
SPT	25.0													
SPT	26.0													
SPT	27.0													
UDS	28.0													
SPT	29.0													
SPT	30.0													



TYP DETAIL OF HARD CRUSTING IN BOILER AREA

- LEGEND**
- 1. 100 M WIDE TRANSMISSION LINE CORRIDOR
 - 2. TO BE WATCHED ROUTE WITH EXISTING ROAD
 - 3. 100 M WIDE TRANSMISSION LINE CORRIDOR
 - 4. 100 M WIDE TRANSMISSION LINE CORRIDOR
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 - 97. 100 M WIDE TRANSMISSION LINE CORRIDOR
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 - 99. 100 M WIDE TRANSMISSION LINE CORRIDOR
 - 100. 100 M WIDE TRANSMISSION LINE CORRIDOR

NO.	DESCRIPTION	UNIT	QTY	REMARKS
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FOR TENDER PURPOSE ONLY

NARYAGAR POWER GENERATING CO. PVT. LTD.

NTPC Limited

NARYAGAR RIVER THERMAL POWER PROJECT

GENERAL LAYOUT PLAN

Scale: 1:1000

Sheet No: 0010-000-POC-F-001

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LEGEND

- PIPE HATCH
- VERTICAL BRACING
- FIRE PROOF DOOR
- GRATING
- CHECKED PLATE
- REMOVABLE
- HAND RAILING
- PIPE & CABLE TRAY
- FIRE BARRIER WALL

NOTES:-

1. THE EQUIPMENT SHALL BE IDENTIFIED IN ACCORDANCE WITH THE LAYOUT AND DIMENSIONAL REQUIREMENTS. THE EQUIPMENT SHALL BE IDENTIFIED BY THE EQUIPMENT NAME, TYPE, MAKE, MODEL, SERIAL NUMBER, AND WEIGHT. THE EQUIPMENT SHALL BE IDENTIFIED BY THE EQUIPMENT NAME, TYPE, MAKE, MODEL, SERIAL NUMBER, AND WEIGHT. THE EQUIPMENT SHALL BE IDENTIFIED BY THE EQUIPMENT NAME, TYPE, MAKE, MODEL, SERIAL NUMBER, AND WEIGHT.
2. NO PIPE, CABLE, OR CONDUIT SHALL BE PLACED BELOW 2.0M (6'6") FROM THE FLOOR LEVEL. NO PIPE, CABLE, OR CONDUIT SHALL BE PLACED BELOW 2.0M (6'6") FROM THE FLOOR LEVEL. NO PIPE, CABLE, OR CONDUIT SHALL BE PLACED BELOW 2.0M (6'6") FROM THE FLOOR LEVEL.
3. LOCATION OF DISCRETE/PORTABLE COMPRESSORS SHOWN IN THE DRAWINGS ARE INDICATIVE AND SHALL BE FINALIZED DURING DETAILED ENGINEERING.
4. ALL DIMENSIONS ARE IN MM'S AND LEVELS ARE IN METRES.
5. FIRE BARRIER WALL IS PROVIDED ON 4-RW BETWEEN AIS NO. 2-4, 14-20 & 26-32.
6. ALL ELEVATIONS INDICATED IN THE Dwg ARE +A.S.L. TO BUILDING GROUND FLOOR ELEVATION 600.000M.
7. FINISHED FLOOR OF FRAMING SLAB IN ROULETTS/TO FAN AREA SHALL BE 1-10.20M.
8. FINISHED FLOOR ELEVATION IN WALL SHY AT SHEDD LEVEL SHALL BE 1.00M.
9. FINISHED FLOOR LEVEL IN 4-RW HALL SHALL BE (+) 0.10M.
10. FINISHED FLOOR LEVEL IN THE VARIOUS BUILDINGS IN MAIN PLANT AREA SHALL BE 1.00M.
11. ALL CABLE SPREADER ROOMS TO BE PROVIDED WITH SHAMANE ARRANGEMENT.
12. BOTTOM OF STEEL OF PIPE / CABLE RACK IN WALL SHY AREA SHALL BE MINIMUM EL. 1.70M.
13. FOR PLY AIR HANDLING EITHER VACUUM PUMPS OR EXHAUST AIR COMPRESSORS SHALL BE PROVIDED.
14. IN CASE OF VACUUM PUMPS FOR GRY AIR SYSTEM, THESE SHALL BE LOCATED BELOW CAP NEAR ITS 1ST FLOOR AND THE SEPA. ROOM FOR THE SAME ALONG WITH TRANSFORMERS SHALL BE LOCATED IN ONE OF THE MAIN PLANT 10. IN CASE OF EXHAUST AIR COMPRESSORS, THESE SHALL BE LOCATED IN ONE OF THE MAIN PLANT 10. IN CASE OF EXHAUST AIR COMPRESSORS, THESE SHALL BE LOCATED IN ONE OF THE MAIN PLANT 10.
15. BRICK WALL REQUIREMENTS:
 - 1) ALL CABLE SPREADER ROOM WALLS
 - 2) WALLS OF SHED ROOM
 - 3) PLY AIR HANDLING ROOMS, ROULETTS ROOM
 - 4) AIR HANDLING UNIT(S)
 - 5) EQUIPMENT ROOM
 - 6) ROULETTS ROOM
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16. LOCATION AND SIZE OF TRANSFORMER SHOWN IN TRANSFORMER HARD IS NEGATIVE ONLY.
17. NO VERTICAL BRACING IN ELECTRICAL BAY AND IF, BUT DUCT MAT SHALL BE PROVIDED.
18. CAP TENDER DRAWING IS TO BE RETAINED FOR AVAILABLE SPACE FOR FID SYSTEM.

FOR FGD TENDER PURPOSE ONLY



NTPC Limited
NATIONAL THERMAL POWER CORPORATION

NEW MAHANGAR SUPER THERMAL POWER PROJECT

EQUIPMENT LAYOUT PLAN AT EL. 0.00M

0370-999-POM-A-001



TITLE:

**3x660 MW NABINAGAR STPP
TECHNICAL SPECIFICATION FOR
MISCELLANEOUS FGD TANKS**

SPECIFICATION No: PE-TS-457-167-A101

SECTION-I, SUB-SECTION-C1

REV. 00

DATE: FEB.2020

SPECIFIC TECHNICAL REQUIREMENT – MECHANICAL