

Pre Bid Technical Clarification No2 dtd 07.03.2026 to NIB No.487 dtd 09.01.2026 for EPC execution of Power House EM Works of 240MW Heo HEP

Sl. No.	Volume / Section	Clause No.	Clause Name	Page No.	Tender Provisions	Bidders queries	NEEPCO Replies												
A. General																			
1	Volume-II, Section-I, General Tech. Specification	0.3	Standards	10 of 129	Although Indian or IEC standards for workmanship material and plant have been selected generally in these specifications as a basis of reference, other standards and recommendations of standard international organisations will be acceptable provided they ensure equal or higher quality than those specified, and provided, furthermore, that the Contractor submits for approval, detailed standards which he proposes to use.	We request you to modify this Paragraph as "Although Indian or IEC standards for workmanship material and plant have been selected generally in these specifications as a basis of reference, other standards and recommendations of standard international organisations will be acceptable provided they ensure equal or higher quality than those specified, and provided, furthermore, that the Contractor submits for approval, detailed standards extracts of the standard which he proposes to use, as Standards are copyright products and cannot be shared". Please accept the above modification in the specification and confirm.	Agreed.												
2	Volume-II, Section-I, General Tech. Specification	0.7	Design Co-ordination Meeting	18 of 129	The Contractor will be called upon to attend design co-ordination meetings with the Corporation and their Consultants during the currency of the Contract.	The Contractor will be called upon to attend design co-ordination meetings with the Corporation and their Consultants during the currency tenure of the Contract. Please accept the above modification in the specification and confirm.	Bid stipulations shall prevail.												
3	Volume-II, Section-I, General Tech. Specification	2.1.1	Mandatory Spare Parts	43 of 129	At least the quantity of general spare parts specified in various subsections of the Particular Technical Specifications (Volume-II, Section II) and the Schedule of Requirements (Volume II, Section III) shall be included in the Total Tender Price and consequently in the Scope of Works of the Contract.	Volume II, Section III is for Tender drawings and Schedule of Requirements is missing in the tender document. Please clarify or provide the Schedule of Requirements.	Volume II Section III is for SOR and Volume II Section IV is for Tender Drawings and same are already published.												
4	Volume-II, Section-I, General Tech. Specification	3.4	Quality of Materials and Plant	47 of 129	Any steel castings which have been repaired by welding with the Engineer's consent shall be subjected (after the final heat treatment) to whatever crack detection, dye-penetration, ultra-sonic, X-ray (radiography) or any other tests which the Engineer may require.	Any steel castings which have been repaired by welding with the Engineer's consent shall be subjected (after the final heat treatment) to whatever crack detection, dye-penetration, ultra-sonic, X-ray (radiography) or any other tests which the Engineer may require. Please delete the requirement of X-ray (radiography) as above and confirm.	Bid stipulations shall prevail.												
5	Volume-II, Section-I, General Tech. Specification	3.5	Noise	47 of 129	The noise level caused by the installed plant shall not exceed the following values if not otherwise stated in the Particular Technical Specifications: - machine hall, workshops, etc. max. 80 dB(A) at any place 1 m distant from operating plant.	- machine hall, workshops, etc. max. 90 dB(A) at any place 1 m distance from operating plant. Please accept the above proposal and confirm.	Accepted.												
6	Volume-II, Section-I, General Tech. Specification	3.11.3.2	Non-Destructive Examinations	56 of 129	<table border="1"> <thead> <tr> <th>Type of weld</th> <th>Type of Inspection</th> <th>Extent of Inspection</th> </tr> </thead> <tbody> <tr> <td>Groove weld on tension butt joint</td> <td>Radiographic</td> <td>100%</td> </tr> <tr> <td>Groove weld on compression butt joint</td> <td>Radiographic</td> <td>10%</td> </tr> <tr> <td>Groove weld on joints not suitable for radiographic inspection</td> <td>Ultrasonic</td> <td>100%</td> </tr> </tbody> </table>	Type of weld	Type of Inspection	Extent of Inspection	Groove weld on tension butt joint	Radiographic	100%	Groove weld on compression butt joint	Radiographic	10%	Groove weld on joints not suitable for radiographic inspection	Ultrasonic	100%	Radiographic testing of weld joints is not recommended as radiography poses health issues of the persons, in view of this we proposes to have ultrasonic testing of all type of weld joints which fulfils all the design and quality requiremnts. Please review and accept.	100 % Ultrasonic testing of weld joints shall be accepted.
Type of weld	Type of Inspection	Extent of Inspection																	
Groove weld on tension butt joint	Radiographic	100%																	
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7	Volume-II, Section-I, General Tech. Specification	4.1	General	66 of 129	Revolving parts shall be truly balanced both statically and dynamically that when running at normal speed and at any load p to the maximum, there will be no vibration due to lack of such balance.	Please note that the rotating parts shall be balanced as per design application and applicable standards. Please confirm.	Bid stipulations shall prevail.												
8	Volume-II, Section-I, General Tech. Specification	6.1.2	Standards	100 of 129	If the Contractor intends to apply Standards and Regulations other than those specified, he shall provide the Engineer with two (2) sets of such documents, which shall be complete, unabridged and written in the Contract Language.	If the Contractor intends to apply Standards and Regulations other than those specified, he shall provide the Engineer with two (2) sets of such documents, which shall be complete, unabridged and written in the Contract Language. He shall provide the extract of the applicable standard written in contract language. Please accept the above modification in the specification and confirm.	Agreed.												
9	Volume-II, Section-I, General Tech. Specification		General		Tender drawings are in pdf format	Request you to please provide the tender drawings in AutoCAD format.	Tender Drawings in Pdf format may be used.												

10	Volume-II, Section-I, General Tech. Specification		General		Technical Data Sheets are in pdf format	Request you to please provide the Technical Data Sheets in Word / Excel format.	Technical Data Sheets in Word/ Excel format has been attached.
B. Hydraulic							
11	PTS, Volume II, Section II, Sub sec 01 Turbine governor and Main Inlet Valve	1.2.5	1.2.5.1 Smooth, Stable and Quiet Operation and Noise Limit	15 of 75	The peak to peak pressure pulsations at any of the taps to be provided below the runner shall not exceed 3% of the rated net head	Considering the project paramters and project specific speed range, the pressure pulsation requirement is stringent. We propose to modify the pressure pulsation requirement as follows: "The peak pressure pulsations at any of the 4 taps located below the runner shall not exceed 3 % (6% peak to peak) of the rated net head at rated Power." Kindly accept.	Bid stipulations shall prevail.
12	PTS, Volume II, Section II, Sub sec 01 Turbine governor and Main Inlet Valve	1.2.5	1.2.5.1 Smooth, Stable and Quiet Operation and Noise Limit	15 of 75	4. The peak-to-peak power pulsations shall not exceed 1% of the rated power. (Ignoring however any isolated sharp peaks).....	Considering the project paramters and project specific speed range, the power pulsation requirement is stringent. We propose to modify the power pulsation requirement as follows: "The peak power pulsations shall not exceed 2% of the rated power. (Ignoring however any isolated sharp peaks)." Kindly accept.	Bid stipulations shall prevail.
13	PTS, Volume II, Section II, Sub sec 01 Turbine governor and Main Inlet Valve	1.2.1	1.2.1.2 Main Technical parameters of turbine	8 of 75	Operating Conditions The operational net head range will be 201.80 m to 199.80 m	We understand that the given net head range (201.8m to 199.8m) is based on FRL & MDDL condition while all 3 units are in operation, however maximum net head will occur while 1 unit shall be in operation at FRL condition. So in view of this kindly confirm the below details: Maximum net head while 1 unit in operation and corrsponding TWL.	Maximum net head is 201.80 m and corresponding TWL is EL 1189.00
14	PTS, Volume II, Section II, Sub sec 01 Turbine governor and Main Inlet Valve	1.2.4	Guarantees for turbine output efficiency & penalties for shortfall	12 o 75	As the turbine has to operate under varying heads as per rule curve, the weighted average efficiency shall be calculated from the following formula: Weighted average efficiency, $\eta_{t\ av} = 0.2\eta_{110} + 0.4\eta_{100} + 0.15\eta_{75} + 0.25\eta_{50}$ Where, $\eta_{t\ av}$ = weighted average efficiency of turbine $\eta_{110}, \eta_{100}, \eta_{75}$ and η_{50} are the efficiency of turbine at 110%, 100%, 75% and 50% of rated output respectively at rated net head of 201.8m.		The weighted average efficiency shall be subjected to guarantees as per clause 1.2.4.
15	PTS, Volume II, Section II, Sub sec 01 Turbine governor and Main Inlet Valve	A.04, A.05 & A.06	A.04 Turbine efficiency A.05 Weighted Average Efficiency of Turbine Generator Unit A.06 Turbine Discharge for the following outputs	1 of 11	A.04 Turbine efficiency: Guaranteed efficiency of Turbine at rated head for the following outputs: A.04.a 110% % A.04.b 100% % A.04.c 75% % A.04.d 50% % A.04.e Weighted Average Efficiency of Turbine % A.05 Weighted Average Efficiency of Turbine Generator Unit: % A.06 Turbine Discharge for the following outputs: A.06.a Guaranteed max. Output at rated head (153.3 m) m3/sec A.06.b Guaranteed rated Output at rated head (153.3m) m3/sec A.06.c Guaranteed max. Output at max. head m3/sec A.06.d Guaranteed max. Output at min. head m3/sec A.06.e Guaranteed max. Output at 75% of rated head m3/sec A.06.f Guaranteed max. Output at 50%of rated head m3/sec	We understand that the only Weighted average efficiency shall be subjected to guarantee/ LD/ penalty purpose. The efficiency/ discharge/ guide vane opening values at single operating points shall not be subjected to guarantee and shall be only for information purpose. Kindly accept.	
16	PTS, Volume II, Section II, Sub sec 01 Turbine governor and Main Inlet Valve	1.14	1.14 Index and fild acceptance (Efficiency) Tests	75 of 75	Complete details of test method, agency which will conduct the test, provisions to be made for field testing, calibration of instruments for tests and all other relevant details to be given in the offer. Contractor shall be under obligation to accept these tests for liquidated damages. Corporation reserves the right to appoint the Contractor or any independent agency or agency recommended by the Contractor for conducting these tests.	Field testing by E&M supplier shall also be acceptable. Please review and confirm.	Bid stipulations shall prevail.

17	PTS, Volume II, Section II, Sub sec 01 Turbine governor and Main Inlet Valve	1.2.4.1	1.2.4.1 Cavitation guarantee	14 of 75	Excessive pitting shall be defined as the removal of metal from runner and other water passage components, exceeding a weight of $W = 0.05 D^2$ per 1000 hours of operation during the guarantee period, defined above where 'w' is metal weight removed due to cavitation in kilograms and D is the throat or discharge diameter of runner in metres. If the guarantee expires before 8000 hours or operation the weight loss for guarantee purpose shall be on pro-rata basis. If excessive cavitation pitting occurs, the Contractor shall repair the resulting damage during the turbine guarantee period. All areas where the depth of pitting exceeds 1 mm shall be restored to their original contours by welding with stainless steel and grinding to a smooth surface equal in finish to the adjacent undamaged areas. The Turbine after such modifications, repairs and replacements shall be subject to same cavitation guarantees as per the original equipment.	Any revolving cavitation guarantee shall not be offered. In case of excessive cavitation pitting and after modification/ repair/ replacement, cavitation guarantee shall be extended by 12 months from the time such replacement/repair subject to maximum time period of thirty-six (36) months from the date of putting plant and equipment into operation. Kindly accept.	Bid stipulations shall prevail.
18	PTS, Volume II, Section II, Sub sec 01 Turbine governor and Main Inlet Valve	1.2.6.6	1.2.6.6 Presentation of Model test Report		k) Curves showing relationship between wicket gate angle and also wicket gate opening in mm vs servomotor stroke related to maximum opening of guide vane and clear opening between two adjacent wicket gates	The curve showing relationship between guide vane angle/ guide vane opening in mm Vs servomotor stroke is related to prototype design/ engineering, hence same shall be provided during detailed engineering of prototype. Kindly accept.	As per Tender, Model test report should be as per IEC 60193.
19	Volume II Section IV Tender Drawings		Power house general arrangement cross section-A & B WAP/Heo/E&M/ TD/01 & 02	pdf 2& 3 of 18	Draft Tube dimensions : Depth, length, exist width/ height	We understand that the draft tube dimensions (bottom point elevation, length, exit height & exit width) defined in the power house cross section and plan drawing are preliminary/ tentative. However, final dimensions of draft tube shall be defined by bidder based on the selected hydraulic solution and shall be informed in bid. Kindly accept.	Agreed. However any major changes must be justified based on Model Test and informed well in advance for the required civil work modifications.
20	Volume II Section III Tender Drawings		General			Kindly request you to share the below details/ drawings (in AutoCAD) for transient analysis purpose: 1. Waterways L section from intake to tail race 2. Waterways cross-section details at different section. 3. Surge Tank detailed drawing (having orifice dia, height, maximum/ minimum water level) 4. Head loss coefficient in HRT/ penstock 5. Discharge coefficient (inflow/ outflow) of surge tank orifice.	Required Drawings has been attached.
21	TDS, Volume II, Section-V, Sub sec-01 Turbine , Governors and Main Inlet Valve	A.02 & A.03	A.02 Guaranteed output at generator terminal for the following heads: A.03 Guaranteed turbine output	1 of 11	A.02.i Guaranteed max. Output at 75% of rated head A.02.j Guaranteed max. Output at 50% of rated head & A.03.e Guaranteed max. Output at 75% of rated head A.03.f Guaranteed max. Output at 50% of rated head	As project net head range is fixed (201.8m to 199.80m), so kindly delete the ouput guarantee requirement at 75% & 50% of rated head.	The Required data shall be provided for information purpose.
22	TDS, Volume II, Section-V, Sub sec-01 Turbine , Governors and Main Inlet Valve	A.06	A.06 Turbine Discharge for the following outputs:	3 of 16	A.06.e Guaranteed max. Output at 75% of rated head m3/sec A.06.f Guaranteed max. Output at 50% of rated head m3/sec	1. The request discharge value in clause A.06 shall be for information purpose. Kindly update the TDS accordingly. 2. As project net head range is fixed (201.8m to 199.80m), so kindly delete the guarantee requirement at 75% & 50% of rated head in cluase A.06.e & A.06.f	The Required data shall be provided for information purpose.
23	TDS, Volume II, Section-V, Sub sec-01 Turbine , Governors and Main Inlet Valve	A.12	A.12 Max. Water Hammer Pressure: % of rated head	4 of 16	A.12 Max. Water Hammer Pressure: % of rated head	Kindly update the clause as: A.12 Max. Water Hammer Pressure: % of maximum static head	Agreed.
C. Balance of Plant - Mechanical (BOPM)							
24	PTS, Volume II, Section II, Sub sec 01 Turbine governor and Main Inlet Valve	1.5.4.12	Working Oil Pre	54 of 75	ii) The normal working pressure for the governor oil shall be 100 kg/cm2 (max). For piston accumulator 120 bar system will be applicable. The OPU shall have high pressure compressed air system or piston type accumulator with nitrogen bottles battery.	To have optimized solution, contractor propose to use working pressure of governor in the range of 110 - 160 bar. Please accept.	Agreed.

25	PTS, Volume II, Section II, Sub sec 01 Turbine governor and Main Inlet Valve	1.5.5	Specified spare	54 of 75	2. Main distributing valve, 2 nos. of each type	Main distributing valve is part of complete proportional valve assembly, so it is not considered separately, please confirm.	Agreed.
26	PTS, Volume II, Section II, Sub sec 01 Turbine governor and Main Inlet Valve	1.5.5	Specified spare	55 of 75	10. Jockey oil pump-motor set 1 no.	Jockey oil pump-motor set is not mentioned in the main technical description of turbine governor, please confirm the requirement.	Irrespective of whether mentioned or not in the Main Technical description, if the Jockey Pump is a part of the Governor Assemblies for Turbine and MIV as per the manufacturer's design, the spares shall be provided.
27	PTS, Volume II, Section II, Sub sec 01 Turbine governor and Main Inlet Valve	1.5.5	Specified spare	55 of 75	25. Nitrogen cylinders, 1 set	Practically nitrogen cylinders are not required as spares, therefore not considered in spares, please accept.	Bid stipulations shall prevail.
28	PTS, Volume II, Section II, Sub sec 01 Turbine governor and Main Inlet Valve	1.6 /1.6.1.11	Turbine Main Inlet	57 of 75	1.6.1.11 The oil supply system will be designed for a working pressure of 100 Kg per cm2. For piston accumulator 120 bar system will be applicable.	To have optimized solution, contractor propose to use working pressure of governor in the range of 110 - 160 bar. Please accept.	Agreed.
29	PTS, Volume II, Section II, Sub sec 01 Turbine governor and Main Inlet Valve	1.6 /1.6.1.13	Turbine Main Inlet	57 of 75	One emergency D.C. pump, for black start, complete with motor shall be supplied.	Bidder proposes to use Hand pump, instead of D.C. pump, Please accept	Bid stipulations shall prevail.
30	PTS, Volume II, Section II, Sub sec 01 Turbine governor and Main Inlet Valve	1.7.1/ (4)	Oil Pumps	67 of 75	The pumps shall operate intermittently to replenish the accumulator volume.	Contractor propose to select the pump as per IEEE125 standard, please confirm. Also please confirm the requirement of continuous running jockey pump for leakage compensation in the system.	Bid stipulations shall prevail. Bidder may provide detailed justification if not required.
31	PTS, Volume II, Section II, Sub sec 01 Turbine governor and Main Inlet Valve	1.7.1.3	Leakage Oil Tank	69 of 75	An oil leakage tank, screw type pump and necessary piping and valves shall be provided .	Screw pumps are used generally where flow requirement is on higher side, for leakage tank, flow requirement shall be on lower side, therefore bidder proposes to use gear pump, please accept.	Bid stipulations shall prevail.
32	PTS, Volume II, Section II, Sub sec 03 Cooling water system	3.1	Scope of work	3 of 14	C) As well as, supply of sufficient quantity of water for Air Handling Units of the HVAC System (if required) and Fire Water Storage Tank. The fire water tank shall be filled up from Cooling Water header from time to time, by running the cooling water pumps	As the pressure requirement of cooling water system & AHU's shall be different, it is proposed to have a dedicated filtration & pump arrangement for HVAC system. Also please confirm that the common header for cooling water system shall be at the suction side of the pumps, so that for fire fighting system can be operated without operating cooling water pumps.	Bidder may propose alternate design if it meets all technical requirement w/o any major change.
33	PTS, Volume II, Section II, Sub sec 03 Cooling water system	3.1.1	Design and Layout Conditions	3 of 14	The system shall also be designed to supply cooling water requirements of Ventilation system, (if required) and Fire Water Storage Tank.	Bidder proposes to supply cooling water to Fire Water Storage Tank through independent fire water filling system which will include required components like valves, pump, filters etc., please accept	may be considered during Detailed engineering.
34	PTS, Volume II, Section II, Sub sec 03 Cooling water system	3.4.2	Valves and Piping For Cooling Water And Shaft Seal Water Systems	10 of 14	All piping shall be of seamless carbon steel material and medium class.	As the system working pressure of cooling water system shall be on lower side i.e. approx. 6 bar, therefore seamless pipe is not required. Bidder propose to use ERW carbon steel pipe for water application, please accept	Bid stipulation shall prevail.
35	PTS, Volume II, Section II, Sub sec 05 HP & LP compressed air system	5.2	General Requirement	3 of 7	A common HP & LP compressed air system shall be supplied for all the units of the Powerhouse. The compressed air system will be required for continuous or intermittent supply of air to cater the requirements of governor oil pressure for governing of turbine and low pressure air supply for generator braking for all the units.	As high pressure Oil-nitrogen accumulator system shall be used for governor oil pressure system & MIV OPU, so HP compressed air system is not required, please accept.	Accepted. However, a separate dedicated HP Compressed Air System for synchronous condenser mode of operation shall be required.

36	PTS, Volume II, Section II, Sub sec 05 HP & LP compressed air system	5.2	General Require	3 of 7	AC motor driven air cooled reciprocating air Compressors, one acting as main and one acting as stand by for HP System, one acting as a main and one acting as stand by for LP system, and another one for the synchronous condenser mode	The operating pressure of HP compressor for synchronous condenser mode & LP compressor are different, so one main & one stand-by Compressor for both type of systems should be used. Please confirm.	Accepted.
37	PTS, Volume II, Section II, Sub sec 05 HP & LP compressed air system	5.2	General Require	5 of 7	HP Air Receiver Nominal Pressure : 6.9 MPa Capacity : 2500 L Pressure Rating : 7.9 Mpa	Please note that the nominal pressure of HP receiver for synchronous condenser mode shall be approx. 80 bar & size shall be according to the system requirement.	Accepted.
38	PTS, Volume II, Section II, Sub sec 09 Pressure shaft valve	9.10.3	Command Valves And Hydraulic System For The Servomotors	19 of 32	The pressurized hydraulic oil for the servomotors shall be provided by the high-pressure pumping unit for the associated TG unit.	Contractor propose to use working pressure of governor in the range of 110 - 160 bar. Please accept.	Accepted.
39	PTS, Volume II, Section II, Sub sec 19 EOT crane	19.3.3	GIS Hall Crane	10 of 42	C. Normal speeds & with full loads i) Hoisting speed for hook hoist 5 m/min Reduced speed for hook hoist 0.5 m/min ii) Trolley Travel (Cross) 15.0m/min iii) Bridge Travel (long travel) 30.0 m/min	Speed mentioned for the crane operation is very much on higher side in view of the usage in GIS hall. Kindly consider following speeds for the same : MH : 1 m/min CT : 3 m / min LT : 10 m / min With creep speed for all motions as 10% of main speed.	Bid stipulation shall prevail.
40	PTS, Volume II, Section II, Sub sec 19 EOT crane	19.4.2.8	Walkways and L	16 of 42	Walkways and Ladders	Please be noted that walkway & ladders mentioned under this clause shall be applicable for the walkway structure & ladders in in the crane only, same shall be provided by E&M contractor. However ladder required to access the crane from power house service bay / Butterfly valve house floor / GIS hall floor shall be provided by Civil /Customer	Ladder required to access the crane from Power House service bay/ Butterfly valve house floor / GIS hall floor shall be provided by NEEPCO.
41	PTS, Volume II, Section II, Sub sec 19 EOT crane	19.4.3.1	Bridge Travel M	17 of 42	For the Powerhouse and Valve House crane, the mechanism shall comprise of four (4) electric motors and totally enclosed speed reduction helical gear units, two (2) for each end of the bridge, to drive the four (4) bridge wheels and shall ensure equal speed. For GIS crane, the mechanism shall comprise of two electric motors.	Selection of No. of motors shall be as per the design requirement of the respective crane. Mentioned motors in this clause is on higher side. Specially for butterfly valve house crane & GIS hall crane. Kindly review the same and update the clause as it shall be as per the requirement of the crane manufacturer for the safe operation of the crane.	Bid stipulation shall prevail.
42	PTS, Volume II, Section II, Sub sec 19 EOT crane	19.5.3	Brakes	25 of 42	a) Bridge Travel i) Main Braking by means of frequency speed control of motors down to zero (0) (regenerative braking). ii) Automatic DC electro-magnetic brake for each motor drive. iii) Foot actuated hydraulically operated brakes for wheels on both sides of bridge of double (2) brake discs.	In place of foot actuated brake we recommend to have thruster type brake only as mentioned for the other motions. This is standard industry practice and is more reliable and fail safe type.	Bid stipulation shall prevail. However, shall be examined during detail engineering.
43	PTS, Volume II, Section II, Sub sec 20 Electric Lift and elevators	21.4.3	Car, Counterwe	7 of 15	The car roof shall be provided with a 600 mm x 600 mm emergency exit with cover of flap type. A telescope ladder shall be mounted to the cover to allow easy access from the car bottom to the roof.	Emergency exit on car top is more risky and not recommended by elevator supplier. Kindly delete this clause. To access the car top from cabin is itself at challenge for the person to get him self out from the car and moreover after reaching to the car top again person cannot further connect with any of the floor as there shall not be any access ladder in the elevator shaft. Kindly review the requirement and update the respective section accordingly.	Bid stipulations shall prevail. However, will be discussed during detailed engineering.
44	PTS, Volume II, Section II, Sub sec 21 fire fighting system	21.2	Detailed Scope	3 of 21	ix) Automatic inert gas clean agent fire extinguishing system complete with clean agent cylinders, manifolds, directional valves, pipes, discharge nozzles bracket supports, hangers and such other fittings as necessary for the complete installation of the system.	Scope is not clear, that for which location this system is applicable /required. Kindly update the clause for exact requirement. We have considered it to Control Room & Office Room Only. Please check & Update.	Please refer to the table of Clause No. 21.3
45	PTS, Volume II, Section II, Sub sec 21 fire fighting system	21.3	Specific Design	5 of 21	2 Equipment / Area : Generator Smoke and heat Detectors, Fire sensing Devices : Aspirator Type smoke detectors, Manual pull station Fire Fighting Arrangement : Automatic CO2 Flooding	Fire Protection System is not mentioned under main scope of supply under Clause 21.2. Kindly update the clause accordingly.	Fire Sensing devices and Fire Fighting arrangement for Generators and Excitation Cubicles are included in the scope of work. Clause No. 21.2 may be read accordingly.

46	PTS, Volume II, Section II, Sub sec 21 fire fighting system	21.5	Design and Construction	9 of 21	<p>Piping, valves and appurtenances</p> <p>All required pipes, flanges, fittings, supports, fasteners, valves and other related material necessary for completion of the system shall be supplied as a part of this contract. All embedded and exposed water pipes size 25mm and above shall be made of carbon steel of minimum schedule 40. Pipe size less than 25mm shall be of minimum schedule 80. Gravity drain pipes shall be of minimum schedule 20. The outdoor pipe line shall be preferably Ductile iron type conforming to latest IS/ ISO standard. Heavy duty gate valves suitable in fire application shall be used in fire fighting system for isolation and control. Pipes crossing roads, trenches etc. shall be provided with mild steel sleeves. Water pipes shall be insulated against condensation wherever required with approved type insulation and be provided with vapour proof cover.</p>	<p>As per the specification Schedule based pipe with schedule 80 & Schedule 40 has been asked for pipe line size <25 mm and >25 mm respectively. Additionally it is also asked that pipe line shall be of ductile iron conforming to latest IS / Iso standard.</p> <p>We request you to clarify the requirement of exact type of piping. In over view piping with Indian Standard with Medium or Heavy duty grade is sufficient (IS 1239 or IS 3589) as per the system pressure design requirement.</p>	<p>Bid stipulation shall prevail.</p> <p>The <u>outdoor</u> pipe line shall be preferably Ductile iron type conforming to latest IS/ ISO standard.</p>
47	PTS, Volume II, Section II, Sub sec 22 Air conditioning and ventilation system	7.1.2	Exhaust Air Fan	4 of 17	<p>i) Required nos. of exhaust air fans for exhaust of air from the Power house with 100% stand by capacity.</p> <p>ii) Required nos. of exhaust air fans for exhaust of air from the toilets, kitchen, battery rooms and mechanical work, each of 100% of required capacity with separate exhaust duct.</p>	<p>Exhaust Air Fans with 100% standby capacity is practically not feasible. For this requirement additional cutout for standby fans shall also be required.</p> <p>We request you to review the requirement and maximum by 1 or 2 fans can be considered only for power house exhaust fans. However same should not be applicable for other rooms fans required for exhaust.</p> <p>Ducting for exhaust fans shall not be applicable. Kindly update the clause accordingly.</p>	<p>shall be dealt during detailed engineering.</p>
48	PTS, Volume II, Section II, Sub sec 22 Air conditioning and ventilation system	7.1.4	Auxiliary System	5 of 17	<p>ii) Central computerized control panel for HVAC system complete with all wiring, instrumentation and associated accessories etc.</p>	<p>Control panel for HVAC system shall be of hard wire type. Kindly update the clause.</p>	<p>Bid stipulation shall prevail.</p>
49	PTS, Volume II, Section II, Sub sec 22 Air conditioning and ventilation system	7.5.1	Automatic Control and Regulation	13 of 17	<p>The HVAC system shall be equipped with a fully independent computerized automatic control system for efficient operation, which shall be included in the supply. It should automatically stop the supply of fresh/recirculated air to the affected zone immediately in case of fire detection and initiate smoke extraction.</p>	<p>In case of malfunctioning of the computerized panel later during the operation of the plant will create problem in the plant and complete computerized control panel needs to be replaced, which is not as per the standard hydro practice.</p> <p>In view of the same request you to accept the MCC panel with hard wire logic system only.</p>	<p>Bid stipulation shall prevail.</p>
50	PTS, Volume II, Section II, Sub sec 22 Air conditioning and ventilation system	7.11.1	Main Equipment & Accessories	16 of 17	<p>7 Lot Air duct distribution system for supply and return air of all HVAC systems, with necessary galvanized sheet metal ducts (for battery room exhaust air system, special rust, acid and corrosion proof ducts etc.), elbows, tees, supports, fixations, including all necessary grills, louvers, outside air louvers, adjusting duct dampers, motorized air dampers, heating and cooling insulations, etc.</p> <p>8 Lot Central computerized control panel for HVAC system complete with all wiring, instrumentation and associated accessories etc</p>	<p>7. please note that exhaust air duct is not applicable for this system.</p> <p>8. necessary centralized control panel is not required, necessary monitoring signal shall be made available in plant SCADA.</p>	<p>Bid stipulations shall prevail.</p>
D. Balance of Plant - Electrical (BOPe)							
51	Volume-II, Section II Sub-Sec. 08 Protection and Metering	8.1.1.3, S.no. d	Components Details	14 of 16	<p>d. Line Protection Boards (LPB-1):</p> <ul style="list-style-type: none"> • LPB-1 is located in the Control Room; • Transmission line protection philosophy shall be in accordance with clauses of the IEGC-2023 notified by the CERC. • Panel-1 to include Protection-A two Line Differential & Distance Protection Multifunctional Numerical relay (L1A-1 & 2) (ex: GE Relay) , two Line Bay Controller Units (BCU-L1 & L2) (ex: GE F650), two high speed Lockout relays (86LA-1 & 2), two Breaker Control Switches (52CS-L1 & 2), two Local-Remote Switches, CT circuit Test Switches, Protection-A Ethernet Switch, supervision relays, contact multiplication relays, • Panel-2 to include Protection-B two Line Differential & Distance Protection Multifunctional Numerical relay (LB-1 & 2) (ex: Siemens Relay), two high speed Lockout relays (86LB-1 & 2), two high speed Trip relays (94LB-1 & 2), Protection-B Ethernet Switch, supervision relays, contact multiplication relays, interface relays, miscellaneous accessories and communication interfacing with LAN-1 and LAN-2 Network Patch Panels comprised of patch cords, hubs, Ethernet switches, etc.; • The Fibre Optic cable and raceways to interface with the Patch Panels for PLCC interface and network integration. 	<p>As per our understanding, each line feeder bay shall be provided with one (1) Line Differential Protection relay and one (1) Distance Protection relay configured as Main and Backup protection, along with one (1) Bay Controller and two (2) Lockout relays.</p> <p>Please confirm the above, as the tender description appears to be contradictory in this regard.</p>	<p>Depending on the line length, selection of Distance and differential protection relay shall be decided during detailed Engineering. The scope/details of item shall be as given in the schedule of requirements.</p>

52	Volume-II, Section II Sub-Sec. 08 Protection and Metering	8.1.1.3, S.no. e	Components Details	14 of 16	e. Unit Bay Controller and Metering Board (BMB-1): * BMB-1 is located in the Control Room; * Panels-1 and 2 to include three (3) Production Bay Controller Units (BCU-GT1 to GT3) (ex: GE F650), three (3) Bay Production Energy Meters (BEM-1 to 3) (ex:Schneider ION7650), three (3) Breaker Control Switches (52CS-GT1 to3), three (3) Local-Remote Switches, CT circuit Test Switches, VT Test Switches,	Under this clause, the Bay Controller Unit (e.g., GE F650) is again mentioned for GT-1 to GT-3 bays, which duplicates the requirement already specified under Clause 8.1.1.3, SI. No. (a). Please confirm that as Bay Controller unit as unit control is not required.	To be finalised during detailed engineering as per standard practice.
53	Volume-II, Section II Sub-Sec. 08 Protection and Metering	8.1.3	Design Requirements	28 of 16	The Contractor shall further guarantee a 15-years minimum availability of identical replacements and spare parts. The Contractor shall submit a signed affidavit from each component and software supplier as proof.	It is not feasible to guarantee the availability of identical replacements and spare parts for a minimum period of fifteen (15) years, as component hardware and software are subject to continuous technological advancements, obsolescence, and product lifecycle changes determined by the original manufacturers. Accordingly, this requirement may kindly be reviewed and amended to allow supply of compatible or equivalent replacements, in line with standard industry practice.	The 15-year availability requirement stands, but "identical" may be interpreted as functionally equivalent replacements that maintain original performance specifications. Supplier affidavits remain required, with "equivalent" acceptable where manufacturer discontinuation is documented.
54	Volume-II, Section II Sub-Sec. 08 Protection and Metering	8.4.1	Short - Circuit and Protective Coordination Study	42 of 16	ix. The studies shall be performed using the latest revision of the SKM Systems Analysis Power Tools for Windows (PTW) software program or other software considered equivalent but approved by the engineer.	The studies shall be carried out in accordance with applicable IEC and IS standards using a reputed and industry-accepted software tool. The studies shall not be limited to SKM Power Tools only, as multiple equivalent software tools are available like ETAP etc. Kindly confirm acceptance.	As already specified in the specification equivalent software is acceptable subject to approval of purchaser during detailed engineering.
55	Volume-II, Section II Sub-Sec. 08 Protection and Metering	8.4.1	Short - Circuit and Protective Coordination Study	42 of 16	Data CollectionAfter award of the contract, the Contractor shall gather all data as required to realize the power system studies such as: Utility's transient three-phase and line to ground contribution during a fault, three-phase X/R, line to ground X/R, impedances of the 220 kV overhead lines, electrical characteristics of both generators and transformers, etc.	The Contractor shall be responsible for collection of all Power Unit-related data. The 220 kV grid-related data shall be provided by the Employer. Kindly confirm acceptance.	Accepted.
56	Volume-II, Section II Sub-Sec. 08 Protection and Metering	8.4.3	Short - Circuit and Protective Coordination Study	47 of 16	8.4.3 Stability Study	The Contractor shall not perform any stability studies, as such studies are related to overall grid stability and require extensive grid-level data. Accordingly, it is requested that the Employer undertake these studies directly. The Contractor's scope shall not include grid or system stability studies. Kindly confirm acceptance.	Bid stipulation shall prevail.
57	Volume-II, Section II Sub-Section 11 DC System and UPS System	11.7	DC Distribution Boards	14 of 43	Each DC distribution board shall comprise motor operated molded type circuit breakers,	Only the Main DCDB in-comer feeder shall be provided with a motorized MCCB. All other DCDB's in-comer & outgoing feeders shall be provided with fixed-type MCCBs or MCBS, as per the respective load requirements. Kindly accept and confirm.	In-comer of main and sub DCDBs shall be motor operated MCCBs. For all outgoing feeders manual operated MCCBs shall be provided.
58	Volume II Section-III Schedule of Requirements (SOR)		General			As the Gas Insulated Switchgear (GIS) system is not within the scope of the Bidder, it is understood that the cables between the GIS and the Local Control Cubicles (LCCs) shall be provided by the GIS supplier as part of the complete GIS package. This shall also include all associated foundation structures and interface equipment required for integration with the Plant Control System. Further, it is understood that the Bay Controller Unit (BCU) shall also be within the scope of the GIS manufacturer, as all reputed GIS manufacturers provide their own proprietary Bay Controller Units. Accordingly, the Bay Controller mentioned under the Protection System Technical Specification may be deleted from the Bidder's scope. Kindly confirm the above understanding.	Cable from LCC to GIS panel shall be under the scope of GIS contractor. However from E&M contractor panel to LCC shall be in the scope of E&M contractor. Regarding BCU, same shall be under the scope of bidder (E&M contractor) for remote operation.

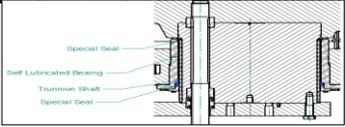
59	Volume II Section-III Schedule of Requirements (SOR)		General			As all the transformers are not within the scope of the Bidder, it is understood that the cables between the individual single-phase Generator Step-Up Transformer marshalling boxes, including the Common Marshalling Box, as well as the interconnecting cables between these marshalling boxes, shall also be included as part of the complete transformer package. This shall further include transformer rails, socket pits, and all other associated accessories required for complete installation. Kindly confirm the above understanding.	Confirmed.
60	Volume II Section-III Schedule of Requirements (SOR)		General			As the Power Line Carrier Communication (PLCC) system is not within the scope of the Bidder, it is understood that the coaxial cables related to this system shall also be provided by the PLCC system supplier as part of the complete PLCC package. Kindly confirm the above understanding.	Confirmed.
61	Volume-II Section II Sub-Section 13 Power and Control Cables	13.1	Scope	Page 3 of	HT Cable 11 kV, if required, stranded Aluminum Conductor, XLPE insulated, FRLS cables, 33 kV, of required size, stranded Aluminum Conductor, XLPE insulated, FRLS cables,	It is requested to Kindly provide the following route distance for estimation of 33 kV Cables : 1) From Local Supply termination to 33 kV Switchgear at Power House 2) From 33 kV Switchgear at Power House towards Termination for Local Distribution 1 & 2 3) From 33 kV switchgear at Power House towards the termination for Intake supply (Remote sites)	The following cables shall be required and the distance may be assessed from the layout drawings provided. 1. 220/33kV transformer (SST) to 33kV Power Supply Board (MVSSB)-1 set. (Double run) 2. 33kV Power Supply Board (MVSSB) to 33/0.433kV, 1.5MVA (SSAT) - 2 Set. 3. From 33kV panel to Pole structure near power house for Intake and Valve House power supply through overhead 33 kV line- 1 set. 4. From Pole structure near Valve House to Valve house transformer- 1 set. 5. From Pole structure near Intake to Intake transformer- 1 set
62	Volume-II, Section II Sub-Section 16 Earthing System		General		Earthing system	It is requested to kindly provide the soil resistivity values for the following areas for bidding purposes, so that the estimation can be carried out accordingly: Power House Area Transformer Area Pothead Yard Area Intake Area Valve House Area	The Bidder shall have to measure the resistivity on his own and design the earthing system subsequent to the purchaser's approval.
63	Volume-II, Section II Sub-Section 17 Illumination System		General	Page 4 of	Contractor shall perform all necessary work for the design, supply of material /equipment, installation, testing and commissioning of the Lighting system for Power House area, GIS Building, outdoor areas around powerhouse, Pothead yard area, approach road near power house, Valve House, Intake area and its approach roads etc. as per relevant standards and as specified hereafter.	It is requested to kindly provide the length of the approach roads where Illumination is required to be considered within the Bidder's scope, so that the estimation can be carried out accordingly.	Illumination requirement for approaches to Power House, Dam Site, Valve House, Pothead yard shall be 500 m each
E. Turbine							
64	VOLUME- II SECTION II SUB-SECTION 01 Turbines, Governors and Main Inlet Valve	1.1	Scope	5 of 75	All parts are to be delivered directly on site. All workshop-manufactured parts should be coated and be treated as per anti-rust coating requirements.	It shall be noted that the many turbine parts like spiral case, stay ring, draft tube and pit liner etc. would be fabricated at site hence their final coating shall be done at site only. However, anti rust prime coat shall be done for their respective sections while delivering to the site. Kindly accept.	Agreed.
65	VOLUME- II SECTION II SUB-SECTION 01 Turbines, Governors and Main Inlet Valve	1.2.4.2	Limit on Erosion By Silt	14 of 75	Limit on Erosion By Silt: With the silt of the given characteristics & quantity suspended in the waters going to the turbines, the abrasion resistance of the under water parts including runner of the turbine shall be such that interval between erosion maintenance shall not be less than 12000 hrs of operation.	The interval between erosion maintenance shall be decided during the detailed Engineering after study of the detailed water petrographic analysis report. Please review the requirement.	Bid stipulation shall prevail.

66	VOLUME- II SECTION II SUB-SECTION 01 Turbines, Governors and Main Inlet Valve	1.2.5.1	Smooth, Stable & Quiet Operation and Noise Limit	15 of 75	Turbine design shall be such as would ensure smooth and quiet operation with low vibrations, pressure pulsations, power fluctuations and noise etc. The vibration amplitude at the shaft shall not exceed the recommended values specified in ISO-7919 (part 1), ISO-3945, ISO-20816-5 and VDI-2056 or as per latest revision of applicable standards.	The vibrations amplitude shall be as per the values specified in ISO- 20816-5. The standards ISO-10816 and ISO 7919-5 shall be read as ISO-20816-5 now. Please review and confirm.	As per latest revision of applicable standards.																								
67	VOLUME- II SECTION II SUB-SECTION 01 Turbines, Governors and Main Inlet Valve	1.2.5.4	Design Stress Limits	16 of 75	Direct or combined steady stresses: (1) For materials used in the construction of the equipment, the maximum stress due to maximum normal rated load operating conditions shall not exceed one-third of the minimum yield point or one-fifth of the minimum ultimate strength of the material, whichever is lower. The minimum factor of safety under the worst conditions shall not be less than 1.5 on yield point (Y.P.) or 3 (three) on ultimate tensile strength (UTS).	The design stress limit shall be followed as for the conditions occurring in normal operation shall not exceed one-half (1/2) of the yield strength of the material. Please review the requirement and confirm the above mentioned stress criteria as followed for the hydro turbines world wide based on the advanced tool/ software's calculations.	Bid stipulations shall prevail.																								
68	VOLUME- II SECTION II SUB-SECTION 01 Turbines, Governors and Main Inlet Valve	1.3.5.2	Joining	22 of 75	The joints between the various sections and quadrants of the scroll casing and stay ring shall be of welded and bolted flanged type respectively. Alternatively shop welded Stay Ring is also acceptable. Stay ring in a single piece is preferable.	The joints between the various sections and quadrants of the scroll casing and stay ring shall be as per the bidder standard design practice.	Agreed.																								
69	VOLUME- II SECTION II SUB-SECTION 01 Turbines, Governors and Main Inlet Valve	1.3.6	Manufacture & Materials of Components	24 of 75	<table border="1"> <tr> <td>9. Stay ring</td> <td>Welded Plate Steel Fabricated Structure or Casting, Stainless Steel Plate</td> <td>ASTM A537 or equivalent</td> </tr> <tr> <td>10. Spiral casing</td> <td>Welded Plate Steel Fabricated Structure, Stainless Steel Plate</td> <td>ASTM A537 or equivalent</td> </tr> <tr> <td>11. Top cover / bottom ring</td> <td>Welded Plate Steel Fabricated Structure, Stainless Steel Plate</td> <td>ASTM A537 or equivalent</td> </tr> <tr> <td>12. G.V. servomotor cylinder</td> <td>Carbon steel plates Boiler steel</td> <td>DIN 17100, St 37-2 St 52-3, ASTM A 283 Grade B ASTM A 287, Grade B IS 2002 Gr 2A</td> </tr> <tr> <td>13. Discharge ring</td> <td>Welded Plate Steel Fabricated Structure or Casting, Stainless Steel Plate</td> <td>ASTM A537 or equivalent</td> </tr> <tr> <td>14. Draft tube Cone(Bottom)</td> <td>- do -</td> <td>- do -</td> </tr> <tr> <td>15. Pit liner</td> <td>- do -</td> <td>- do -</td> </tr> <tr> <td>16. Shaft Runner Fasteners</td> <td>Stainless Steel</td> <td>AISI420 or equivalent</td> </tr> </table>	9. Stay ring	Welded Plate Steel Fabricated Structure or Casting, Stainless Steel Plate	ASTM A537 or equivalent	10. Spiral casing	Welded Plate Steel Fabricated Structure, Stainless Steel Plate	ASTM A537 or equivalent	11. Top cover / bottom ring	Welded Plate Steel Fabricated Structure, Stainless Steel Plate	ASTM A537 or equivalent	12. G.V. servomotor cylinder	Carbon steel plates Boiler steel	DIN 17100, St 37-2 St 52-3, ASTM A 283 Grade B ASTM A 287, Grade B IS 2002 Gr 2A	13. Discharge ring	Welded Plate Steel Fabricated Structure or Casting, Stainless Steel Plate	ASTM A537 or equivalent	14. Draft tube Cone(Bottom)	- do -	- do -	15. Pit liner	- do -	- do -	16. Shaft Runner Fasteners	Stainless Steel	AISI420 or equivalent	Material IS 2062 E250/ E350, IS S235 J2/ 355 J2/ Equivalent for stay ring & Stay Vanes, Spiral Casing, Draft Tube Cone, Discharge ring, Bearing Housing, Bottom Ring, Head Cover, Servomotor Body, Piston & Rings shall also be acceptable in addition to the mentioned in tender specification as these standard materials for the similar type of Turbines are accepted worldwide also and worked successfully. For Coupling Bolts 34CrNiMo6/ 42 CrMo 4/ Equivalent material shall also be acceptable.	Bid stipulations shall prevail. Refer ' Note' at the end of Table 2 of clause 1.3.6.2
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70	VOLUME- II SECTION II SUB-SECTION 01 Turbines, Governors and Main Inlet Valve	1.3.9.5 and 1.3.9.7	1.3.9.5 and 1.3.9.7	26 of 75 & 27 of 75	1.3.9.5 In addition to the removal of turbine components through stator bore as mentioned above, turbine construction shall provide for removal of the following components from bottom without dismantling generator. vi) The facing plates, and 1.3.9.7 Further the removal and replacement of worn out labyrinth wearing rings, cheek plates, shaft gland, guide bearing and such other components shall be fast and easy. Where possible the design shall provide for the removal and replacement of these components particularly the labyrinth wearing rings, cheek plates, shaft gland etc. from below.	For Head Cover Facing plate replacement the removal of head cover is required and it shall be done from top side that needs the removal of Generator Rotor. Please review the requirement and allow the same.	Noted.																								
71	VOLUME- II SECTION II SUB-SECTION 01 Turbines, Governors and Main Inlet Valve	1.3.10	General Physical Layout & Arrangement	29 of 75	Easy access for repair and maintenance of removable/ renewable under water parts of turbine such as wearing rings, cheek plates, guide vanes sealing elements and turbine guide bearing and shaft seals shall be provided from the turbine pit without resorting to dismantling of turbine runner.	It shall be noted that the for repair and maintenance of removable/ renewable under water parts of turbine such as wearing rings, cheek plates, guide vanes sealing elements and turbine guide bearing and shaft seals needs to dismantle the turbine runner after considering the turbine size and silt in the water.	To be decided during Detailed engineering.																								
72	VOLUME- II SECTION II SUB-SECTION 01 Turbines, Governors and Main Inlet Valve	1.4.1	Runner	30 of 75	The runner shall be of cast stainless steel, in one piece and shall be designed to provide the best hydraulic profile so that it gives the maximum efficiency with minimum cavitation.	The runner shall be cast-welded type. However it shall be supplied at the site in one piece. Please accept.	As per Manufacturer's standard practice.																								

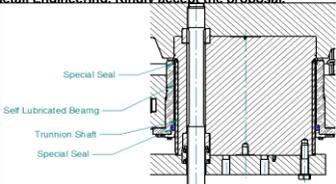
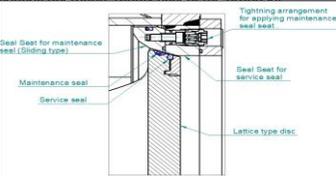
73	VOLUME- II SECTION II SUB-SECTION 01 Turbines, Governors and Main Inlet Valve	1.4.1.2	Materials	31 of 75	The Turbine Runners shall be made of stainless steel of 13 % chromium, 4 % nickel (DIN 17.445, Werkstoff-Nr. 1.4113, G-X5 CrNi 13.4, ASTM A 743 CA 6 NM), with ultra low sulphur and nitrogen content. The minimum Charpy V-notch impact strength at -10°C shall be 30 J, to be fulfilled by each of 3 specimens.	The minimum Charpy V-notch impact strength shall be as per the applicable standard of the corresponding material. Kindly confirm.	Bid stipulations shall prevail.			
74	VOLUME- II SECTION II SUB-SECTION 01 Turbines, Governors and Main Inlet Valve	1.4.3.7	1.4.3.7	35 of 75	The turbine guide bearing shall be designed for the following conditions: d. Safely withstand turbine going to run away speed due to any fault for a period of 15(fifteen) minutes with cooling water supply intact and subsequent closing down period without any damage to the guide bearing.	The requirement for 15 minutes on higher side. It shall be for the 10 minutes for the compact and efficient design of the turbine. Please review the requirement and confirm.	Bid stipulations shall prevail.			
75	VOLUME- II SECTION II SUB-SECTION 01 Turbines, Governors and Main Inlet Valve	1.4.6	Stay-Ring	37 of 75	For fabricated stay ring designs, the stay vanes shall protrude through the upper and lower shroud plates and shall be shop-welded with full penetration welds. Fabrication of the stay ring in the field will not be allowed.	If stay ring would be provided in two pieces/ sections then its fabrication is required at site and fabrication of stay ring at site is standard practice where transport limitation forced the design of these parts in to the sections. Please review the requirement and confirm.	To be decided during Detailed engineering.			
76	VOLUME- II SECTION II SUB-SECTION 01 Turbines, Governors and Main Inlet Valve	1.4.12.7	1.4.12.7	43 of 75	Suitable shear pin shall be provided between each wicket gate stem and gate operating ring which shall be strong enough to withstand the maximum normal operating forces but will break or yield due to forces in opening or closing direction and will protect the rest of the mechanism from damage when one or more of the wicket gates become jammed.	Considering the size and rating of the turbine, the bending link shall also be allowed in place of the shear pin device. The bending link design would provide more compact turbine design. Please accept.	Noted. Bidder to justify the alternative design without affecting any functional requirement, during detailed design.			
77	VOLUME- II SECTION II SUB-SECTION 01 Turbines, Governors and Main Inlet Valve	1.13	Inspection and Testing at Site	75 of 75	g) The machine shall be designed to withstand the runaway speed test for 15 minutes. Runway speed test is envisaged to be carried out on completely assembled turbine generators at site by the Contractor, at the discretion of the Employer. In case of failure, the Contractor shall rectify the damage and inherent defects and make such modifications as well make the turbines capable of withstanding the designed "Runway Speed". The Contractor shall demonstrate the same by conducting this test again.	Runaway speed test shall not be performed at site, as it requires the complete inspection of the Power Unit and may cause adverse impact on the foundation of the machine and civil structure. However Power Unit would be designed to withstand the runaway speed for the said duration. Please accept.	Bid stipulations shall prevail. However, final decision regarding conducting of Runaway speed test shall be taken during detailed engineering stage.			
F. Generator										
78	Particular Technical Specifications Volume II Section-II : Sub-Sec. 02 Generator and Excitation System	2.3	2.3.4 Technical Parameters 2.3.5.4 H Constant and Fly wheel effect (WR2)	8 of 72 10 of 72	<table border="1" data-bbox="728 845 1153 901"> <tr> <td>20</td> <td>Generator WR² H Constant.</td> <td>Not less than 3.0 KW-SEC / kVA (exact value to be based on hydraulic transient and stability studies).</td> </tr> </table> 2.3.5.4 H Constant and Fly wheel effect (WR2): Inertia constant H of the generating unit shall not be less than 4.0 KW-sec. / kVA based on rating of 103.5 MVA.	20	Generator WR ² H Constant.	Not less than 3.0 KW-SEC / kVA (exact value to be based on hydraulic transient and stability studies).	There are discrepancy in the minimum inertia requirement in different clauses. We understand that the inertia requirement of the generating unit shall be suitably defined based on hydraulic transient analysis considering the speed rise and pressure limit at any operating condition including maximum continuous overload condition. Inertia constant shall be considered according to the Bidder design. Kindly accept.	The Minimum H constant for Generator is 3.0 KW-SEC/KVA and The Minimum H Constant for turbine-generator unit is 4.0 KW-SEC/KVA
20	Generator WR ² H Constant.	Not less than 3.0 KW-SEC / kVA (exact value to be based on hydraulic transient and stability studies).								
79	Particular Technical Specifications Volume II Section-II : Sub-Sec. 02 Generator and Excitation System	2.3	2.3.4 Technical Parameters 2.3.7.9 Thrust & Guide Bearings	7 of 72 23 of 72	2 - Type Salient Pole / Suspended Vertical shaft type synchronous generator 2.3.7.9 Thrust & Guide Bearings The generator coupled to francis turbine shall be suspended type i.e. with the thrust and upper guide bearings located above the rotor and lower guide bearing below the rotor.	For machines with rated speed of 300 rpm of similar capacity, it is preferable to have construction semi-umbrella type (as per IEC 60034-7) IM 8225. Main advantages for this type of construction: - The thrust load gets transferred directly to concrete - Maintenance friendly - Better power unit stability due to combined thrust & guide bearing in center of power unit Please allow bidder to choose the type of generator construction type as per their best practice.	Bid stipulations shall prevail.			
80	Particular Technical Specifications Volume II Section-II : Sub-Sec. 02 Generator and Excitation System	2.3.2	Mode of Operation	6 of 72	- One (1) maximum runaway speed condition per year - About 104 tripping per year - A useful life of 50 years	As per IEC 60034-33: 2022, clause no. 9.7 : - Three (3) maximum design speed for the complete life time. - 500 full-load rejections for the complete life time - Useful life of 40 years shall be considered Kindly accept the criteria stated in IEC standard above.	Bid stipulations shall prevail.			

81	Particular Technical Specifications Volume II Section-II : Sub-Sec. 02 Generator and Excitation System	2.3.5.2	Insulation and Temperature Rise	9 & 10 of 72	- The maximum temperature rises in condition of one cooler out of service and unit operating at specified overload shall be guaranteed as the following while operating at maximum continuous overload rating of 103.5 MVA. Stator winding by embedded temperature detectors = 75°C Rotor winding by resistance = 80°C Collector rings by thermometer = 75°C <u>The maximum temperatures shall not exceed the following:</u> Guide bearing Babbitt temperature = 65°C Thrust bearing Babbitt temperature (if applicable) = 65°C Oil sump temperature = 55°C.	As per IEC 60034-33: 2022, clause no. 6.1 : Temperature rise up to class B (Thermal class - 130) shall be: For Stator winding = 85°C For Rotor winding = 90°C Based on reference of recent executed projects: Absolute temperature will be following: Guide bearing Metal temperature = 70°C Thrust bearing Babbitt temperature = 80°C Kindly Accept.	Bid stipulations shall prevail.
82	Particular Technical Specifications Volume II Section-II : Sub-Sec. 02 Generator and Excitation System	2.3.5.5	Short Duration Overloads	10 of 72	The generator shall be capable of withstanding overloads upto 1.5 times the rated current for short durations not exceeding 30-45 second each time.	As per IEC 60034-1, capable of withstanding overloads will be provided upto 1.5 times the rated current for short durations not exceeding 30 sec. Kindly accept.	Bid stipulations shall prevail.
83	Particular Technical Specifications Volume II Section-II : Sub-Sec. 02 Generator and Excitation System	2.3.5.6	Wave Form & Telephone Influence Factor (TIF)	11 of 72	The total harmonic distortion shall not exceed 1.5 percent according to IS.	As per IEC 60034-33: 2022, clause no. 5.10 : Total Harmonic Distortion (THD) ≤ 3% is applicable. Kindly accept.	Bid stipulations shall prevail.
84	Particular Technical Specifications Volume II Section-II : Sub-Sec. 02 Generator and Excitation System	2.3.5.8	Runaway Speed Withstand Capability	11 of 72	The runaway speed test shall be conducted at site and shall be considered successful if, after undergoing the test for two (2) minute, no damage or injury is apparent. The Contractor shall furnish the detailed calculations to prove the Runaway speed withstand capability of the generators at the time of submitting the bid.	Bidder do not recommend runaway speed test due to invasive nature of the test. Kindly accept.	Bid stipulations shall prevail. However, final decision regarding conducting of Runaway speed test shall be taken during detailed engineering stage.
85	Particular Technical Specifications Volume II Section-II : Sub-Sec. 02 Generator and Excitation System	2.3.6	Efficiency and Output Guarantees of the Generator and TG Unit	12 of 72	Field efficiency tests shall be carried out on one of the Generators, in accordance with the IEC 60034-2 and IEC 60034-2A standards, and the weighted average efficiency will be determined. Individual losses shall also be established using those standards. No positive tolerance in the guaranteed efficiency shall be permitted. The Generator to be tested will be chosen by Employer. Losses to be considered for calculation of efficiency, shall be summation of individual losses as per IEC-34-2 or IS-4889 including static excitation losses. The losses shall be based on reference temperature of 90 deg. C and shall also include bearing losses.	As per IEC 60034-2, the losses shall be provided based on the reference temperature of 95°C. Please accept.	Bid stipulations shall prevail.
86	Particular Technical Specifications Volume II Section-II : Sub-Sec. 02 Generator and Excitation System	2.3.7 2.3.7.1	2.3.7 Design and Construction 2.3.7.1 General	14 of 72	The unit maximum material stresses in the equipment and embedded parts under the combination of all loads during continuous operation shall not exceed 30% of the yield point strength or 20% of the ultimate strength of the material whichever is lower.	Based on the reference of recent executed projects: The generator component are mainly made of structural steel material which is ductile in nature. In this case only yield criteria (1/3) YP is recommended. Kindly accept.	Bid stipulations shall prevail.
87	Particular Technical Specifications Volume II Section-II : Sub-Sec. 02 Generator and Excitation System	2.3.7 2.3.7.1	2.3.7 Design and Construction 2.3.7.1 General	15 of 72	In addition to the above, Contractor may also consider other severe conditions as applicable for the equipment. In pre-tensioning bolts, the pre stressed level shall be between 33% and 60% of yield point strength.	In pre tension bolts, the pre stressed level shall be 80% of the yield point strength. Kindly accept.	Bid stipulations shall prevail.
88	Particular Technical Specifications Volume II Section-II : Sub-Sec. 02 Generator and Excitation System	2.3.7.9	Thrust & Guide Bearings	24 of 72	i) Maximum permissible operating temperature ≤70°C. ii) Alarm temperature 75°C. iii) Trip temperature 80°C.	Considering the size and speed of machine: a) Thrust bearing metal temp : 80° C with 85° C (alarm)/ 90° C (trip) b) Guide bearing metal temp : 70° C with 75° C (alarm)/ 80° C (trip) Kindly accept.	Bid stipulations shall prevail.

89	Particular Technical Specifications Volume II Section-II : Sub-Sec. 02 Generator and Excitation System	2.3.11.4	Wet Commissioning Tests	45 of 72	Sudden short circuit test from not less than 0.50 rated terminal voltage to determine reactance and time constants.	It is requested to note that for determination of reactance & time constants we need to conduct Sudden short circuit test. Being an invasive test, bidder do not recommend to conduct this test. Transient and sub transient & time constant calculation shall be furnished during detailed engineering. Bidder requests that these test may be deleted. Kindly confirm and accept.	Bid stipulations shall prevail. However, the requirement may be reviewed during detailed engineering
G. Main Inlet Valve							
90	Particular Technical Specifications, Volume II Section II Sub-Section 01 - Turbines, Governors and Main Inlet Valve	1.3	1.3 General Technical Requirements TABLE 2 MATERIALS SPECIFICATIONS FOR MAJOR COMPONENTS B) Main Inlet Valve	25 of 75	#VALUE!	We propose equivalent and better materials based on application and as per International Practice : Sliding Service / Maintenance Seal - X3CrNiMo 13-4 EN 10250-4 Stationary Service / Maintenance Seal - ASTM A240 TYPE 316L Valve Body - Cast Fabricated Design : S355 J2+N (Plate material) + ASTM A216 GR WCC (Cast material) Valve Rotor - Cast Fabricated Design : S355 J2+N (Plate material) + ASTM A216 GR WCC (Cast material) Valve Trunnion - 34CrNiMo6 EN 10250-3 Bypass Valve Body - Bypass Valve Needle & Seat Surface - Apart from above exact details of all part will be shared during detail Engineering. Kindly accept the above proposal.	Bid stipulations shall prevail. Refer ' Note' at the end of Table 2 of clause 1.3.6.2
91	Particular Technical Specifications, Volume II Section II Sub-Section 01 - Turbines, Governors and Main Inlet Valve	1.6.1.1 1.6.1.8 1.6.1.12	Description and Operation Requirements	56 of 75, 57 of 75 57 of 75	Each turbine shall be provided with an inlet Spherical valve of 2750 mm nominal size. The maximum static head on the valves will be 215.2 m and with water hammer and upsurge in surge shaft, the maximum pressure shall be 290.52 m. The Spherical valve therefore shall be designed for operation against this pressure. The Main Inlet Valve shall be of Spherical type. 2750 mm is the minimum nominal diameter of the MIV. If the bidder wishes to select MIV of higher size, the necessary provisions for matching with the penstock shall be in the bidder's scope. The valves shall conform to IS 7326. The valve opening and closing time shall be adjustable to a closing time range of 50-60 sec. and opening time range of 50-120 sec. Valve shall have two stainless steel working seals; one at downstream (service seal) for use during normal closure operations and other at the upstream (maintenance seal) for use during maintenance of service seal. Both seals shall be water operated with oil operated solenoid valves. The seals shall be of material having high resistance to silt erosion. Suitable protection against abrasion shall be provided to ensure high reliability of sealing and long life. Leakage, if any, shall be stated and guaranteed. Permissible leakage shall be guided by IS:7326 (Part-1). The valves shall conform to IS: 7326 or any other internationally approved standard.	We understand that IS 7326 mentioned in the clauses is a typographical error and should be IS 7332 for Spherical Valve. Main Inlet Valves (Spherical Type) will conform to IS 7332.	Agreed

92	Particular Technical Specifications, Volume II Section II Sub-Section 01 - Turbines, Governors and Main Inlet Valve	1.6.1.5 1.6.1.7 1.6.2	Description and Operation Requirements Basic data/ other data for Spherical Valves Design and Installation. Basic Data	56 of 75, 56 of 75 58 of 75	<p>The inlet Spherical valve shall comprise of valve body and rotor, double acting servomotor(s) for opening and closing operation of the valve, control gear for operation, penstock inlet pipe, outlet pipe with compensator and dismantling joint, and other essential accessories and auxiliaries viz. by-pass valves, sealing valve, air valve, piping with valves, for water, air and oil, master switch, slide valves with electromagnets etc.</p> <p>The closing operation of the MIVs shall be with counterweight to ensure positive and reliable closure. The supplier may also indicate any other suitable closing system or consideration of purchaser highlighting the merits over the above described system. Such proposal shall be discussed during design stage.</p> <p>B) Operation of Spherical Valves i) Closing : At no flow as well as against rated turbine flow under equal/ unbalanced pressure condition (Normal as well as emergency closing), the closing time under balanced conditions shall be adjustable between 60 to 120 sec. and is to be stated and guaranteed by the bidder. Closing time under emergency condition shall be stated by the Bidder. Full closer shall be achieved with the weights only independent of any assistance from the oil pressure system.</p>	<p>We propose to offer normal opening by single acting oil operated servomotor(s) and normal / emergency closing independently by counterweight(s) only.</p> <p>Kindly accept the proposal.</p>	Bid stipulation shall prevail.
93	Particular Technical Specifications, Volume II Section II Sub-Section 01 - Turbines, Governors and Main Inlet Valve	1.6.4.1	Valve Body	60 of 75	<p>i) The valve body shall be made of high strength steel plates equivalent. The valve body shall be suitably split for assembly and transport and shall have integral support feet. Bidder has the liberty to offer the MIV in a single piece, without vertical split joint, if transport limits allow the same.</p>	<p>We propose to offer following material :</p> <p>Valve Body - Cast Fabricated Design : S355 J2+N (Plate material) + ASTM A216 GR WCC (Cast material)</p> <p>Kindly accept.</p>	Bid stipulations shall prevail. Refer ' Note' at the end of Table 2 of clause 1.3.6.2
94	Particular Technical Specifications, Volume II Section II Sub-Section 01 - Turbines, Governors and Main Inlet Valve	1.6.4.1	Valve Body	60 of 75	<p>ii) Valve body shall have following provisions:8 a) Piping connections for drainage at bottom. b) Bearing bushes of bronze or Ni-Pb gun-metal, for rotor trunnions, grease lubricated type. Bidder has the liberty to offer MIV bearing bush of selflubricating material with bronze backing and without grease lubrication. c) Glands and packings for trunnions. It shall be possible to replace the packings under water pressure in the valve.</p>	<p>As per proven design, two special seals are provided at each trunnion shaft location with self lubricating bearing, refer enclosed image. We will offer same design of trunnion shaft for this project. Exact detail will be shared during detail Engineering. Kindly accept the proposal.</p> 	To be decided during Detail Engineering.
95	Particular Technical Specifications, Volume II Section II Sub-Section 01 - Turbines, Governors and Main Inlet Valve	1.6.4.2	Rotor, Trunnions & Bearing	60 of 75	<p>i) The valves rotor shall be made of high strength steel plates corresponding to ASTM-537 class-2 modified, or steel casting corresponding to A 148 Grade 80- 50, or equivalent. Materials of different standards such as ASTM, DIN EN, EN, IS can be offered if they are better or at least equivalent in terms of chemical composition, properties etc. A side by side comparison of both the materials shall be carried out during detailed engineering. The 2 (two) trunnions of the rotor shall be integrally cast with the rotor, or made as forgings of carbon steel machined all over and shall be fixed to the valve rotor either by welding or byfasteners.</p>	<p>We propose to offer the following material :</p> <p>Valve Rotor - Cast Fabricated Design : S355 J2+N (Plate material) + ASTM A216 GR WCC (Cast material)</p> <p>Kindly accept the above offer.</p>	Bid stipulations shall prevail. Refer ' Note' at the end of Table 2 of clause 1.3.6.2
96	Particular Technical Specifications, Volume II Section II Sub-Section 01 - Turbines, Governors and Main Inlet Valve	1.6.4.3	Service and Maintenance Seals	61 of 75	<p>ii) The service seal system shall consist of the movable sealing ring of step-piston type design located in the valve body and the fixed seal ring fitted on to the valve rotor. The sealing rings shall be castings of 13-4 Cr-Ni stainless steel or better, of suitable grades and machined over. The maintenance sealing rings shall be identical to the service seal system as above.</p>	<p>We propose to offer the following material :</p> <p>Sliding Service / Maintenance Seal - X3CrNiMo 13-4 EN 10250-4</p> <p>Stationary Service / Maintenance Seal - ASTM A240 TYPE 316L</p> <p>Kindly accept the above offer.</p>	Bid stipulations shall prevail. Refer ' Note' at the end of Table 2 of clause 1.3.6.2
97	Particular Technical Specifications, Volume II Section II Sub-Section 01 - Turbines, Governors and Main Inlet Valve	1.6.4.3	Service and Maintenance Seals	61 of 75	<p>iii) When closed, the sealing systems shall provide a drip tight seal both on the downstream and upstream. The movable seals shall be pressed hydraulically against the fixed seals. Permissible leakage shall be guided by IS:7326 (Part-1).</p>	<p>We understand that IS 7326 mentioned in the clauses is a typographical error and should be IS 7332 for Spherical Valve.</p> <p>Permissible leakage rate from Main Inlet Valves (Spherical Type) will be as per IS 7332 leakage rate clause.</p>	Agreed.

98	Particular Technical Specifications, Volume II Section II Sub-Section 01 - Turbines, Governors and Main Inlet Valve	1.6.4.6	Inlet Pipe	62 of 75	The inlet pipe shall be fabricated high strength steel plates ASTM-537, class-2 modified steel. It shall have provision for bolted flanged and connection to the Spherical valve inlet and welding end for connection to the penstock of 2750 dia. The flare angle shall not exceed 7.50 and length of the inlet pipe provided shall be fixed accordingly with sufficient extra length as trim allowance for errors in installation. Welding of the inlet pipe to the penstock shall be the responsibility of the supplier.	For Inlet pipe, we propose S355 J2 +N Material. Kindly accept the proposal.	Bid stipulations shall prevail. Refer ' Note' at the end of clause 1.6.4.7
99	Particular Technical Specifications, Volume II Section II Sub-Section 01 - Turbines, Governors and Main Inlet Valve	1.6.4.7	Outlet Pipe Compensator (Dismantling Pipe)	63 of 75	i) Outlet pipe shall be of fabricated steel of high strength steel plates ASTM-537, class-2 modified. It shall comprise of pipes, compensating ring, packing and fasteners. One side shall be connected to the spherical valve and other end shall remain free over the scroll casing with packings for sealing.	For Outlet pipe, we propose S355 J2 +N Material. Kindly accept the proposal.	Bid stipulations shall prevail. Refer ' Note' at the end of clause 1.6.4.7
100	Particular Technical Specifications, Volume II Section II Sub-Section 01 - Turbines, Governors and Main Inlet Valve	1.12.5	Manufacture, Inspection, Shop Assembly, Measurements and Testing Tests on Steel Plates	72 & 73 of 75 The components which operate under pressure of water, air, oil etc. (excepting those which cannot be pressure tested in shop) shall be subjected to hydrostatic pressure tests in shop using a tests pressure of 150% (one hundred and fifty percent) of the working pressure for a duration of 120 minutes. The inlet valves shall be completely assembled and pressure tested in the shop a pressure equal to 150% of design pressure for 120 minutes to check the valves bodies strength. Leakage tightness of the repair seals shall be carried out at design pressure for 30 minutes. Servomotors and oil piping shall also be pressure tested at 1.5 times working oil pressure. Spherical valves shall be thoroughly inspected, assembled and dimensionally checked. Their operation shall be demonstrated comprehensively covering all main working parts, accessories, attachments.	Pressure test duration will be as per clauses mentioned in IS 7322.	Agreed.
H. Pressure Shaft Valve							
101	Particular Technical Specifications, Volume II, Section II, Sub-Section 09 - Pressure Shaft Valve	9.8.1	Valve Body	10 of 32	The construction of valve body shall be made in a single/two piece flanged together, reinforced with ribs, brackets and sole plate for anchoring to the foundation. The features of construction shall be as per IS: 7326 (Part I&II)/AWWA C-504. The material for the valve body shall be of carbon steel conforming to ASTM A537 Gr.2 or A516 Grade 70. The fabrication work shall be done so as to fully meet the provisions of ASME Section VIII Division I or equivalent. The interior of the valve body shall be smoothly finished so as to have low resistance and a free & full flow is ensured through the system. A stainless steel ring shall be crewed inside the body near the downstream side of the valve to serve as seating ring for the valve disc when the valve is in the closed position. The Tenderer may propose their own design as an alternative for approval. The valve body shall be flanged at both ends, and the flanges shall be shop-drilled and spot-faced. The valve flanges shall match the flanges for transition and expansion sections.	We propose to offer the following material : Valve Body - Cast Fabricated Design : S355 J2+N (Plate material) + ASTM A216 GR WCC (Cast material) Kindly accept the above offer.	Any alternative material offered must be equivalent or better than the material specified in the Tender specification both in terms of chemical composition and material properties. However, the detailed comparison of chemical composition and material properties must be submitted to the Purchaser for approval during detail engineering stage.
102	Particular Technical Specifications, Volume II, Section II, Sub-Section 09 - Pressure Shaft Valve	9.8.2	Valve Disc	10 of 32	The valve disc shall be of the biplane lattice type to offer minimum head loss in the fully open position and to sustain the full differential pressure across the closed valve. The disc shall be of streamline section to minimize local eddy currents and sudden velocity changes. All surfaces of the disc in contact with water shall be smooth and free from hollows, depressions, cracks or projections that might cause pitting due to cavitation. The disc shall be cast-fabricated/fabricated in single piece. The material shall be of carbon steel conforming to ASTM A537 class II or A516 Gr. 70, in case of fabricated steel. The disc shall be stress relieved before machining. The centreline of the valve disc shall be slightly off centre to the valve body centre line to provide a hydro-dynamic closing to the valve.	We propose to offer the following material : Valve Disc - Cast Fabricated Design : S355 J2+N (Plate material) + ASTM A216 GR WCC (Cast material) Kindly accept the above offer.	Any alternative material offered must be equivalent or better than the material specified in the Tender specification both in terms of chemical composition and material properties. However, the detailed comparison of chemical composition and material properties must be submitted to the Purchaser for approval during detail engineering stage.
103	Particular Technical Specifications, Volume II, Section II, Sub-Section 09 - Pressure Shaft Valve	9.8.3	Valve Shaft, Bearing and Shaft Seal	11 of 32	The valve shafts shall be mounted in horizontal positions. The shafts shall have a minimum diameter extending through the valve bearings and into the valve disc to withstand the maximum torque required to operate the valve. The Contractor shall furnish the calculation to show the maximum stresses in the shaft and any keys or dowels, etc, under the operating conditions specified. The valve shafts shall be of forged carbon steel construction (In case of fabricated disc) with hardened stainless steel sleeves. Self-lubricated bearings, to be housed in both ends of the hubs of the valve body, shall be provided. The friction coefficient of shaft bearings to be taken for calculation, is to be adjusted so that any increase in friction coefficient due to use/aging shall not be a bottleneck in weight as well as closing of valve, against full flow.	We propose to offer following material : Valve Trunnions forged with Stainless Steel sleeves on the portion of trunnion which rotates in the bearings. Kindly accept the above offer.	Bid stipulations shall prevail.

104	Particular Technical Specifications, Volume II, Section II, Sub-Section 09 - Pressure Shaft Valve	9.8.3	Valve Shaft, Bearing and Shaft Seal	11 of 32	<p>The valve shafts shall be mounted in horizontal positions. The shafts shall have a minimum diameter extending through the valve bearings and into the valve disc to withstand the maximum torque required to operate the valve. The Contractor shall furnish the calculation to show the maximum stresses in the shaft and any keys or dowels, etc, under the operating conditions specified.</p> <p>The valve shafts shall be of forged carbon steel construction (in case of fabricated disc) with hardened stainless steel sleeves. Self-lubricating bearings, to be housed in both ends of the hubs of the valve body, shall be provided. The friction coefficient of shaft bearings to be taken for calculation, is to be adjusted so that any increase in friction coefficient due to use/aging shall not be a bottleneck in weight as well as closing of valve, against full flow.</p> <p>The shaft seal at each end shall preferably be of the gland and stuffing box type. The stuffing box shall be easily accessible for adjustment and replacement of packing without disturbing any other part of the valve.</p>	<p>As per standard proven design, two special seals are provided at each trunnion shaft location with self lubricating bearing, refer enclosed image. We will offer the same design of trunnion shaft for this project. Exact detail will be shared during detail Engineering. Kindly accept the proposal.</p> 	To be decided during detail Engineering.
105	Particular Technical Specifications, Volume II, Section II, Sub-Section 09 - Pressure Shaft Valve	9.8.4	Valve Seals	11 of 32	<p>The valve shall be provided with two seals –</p> <ul style="list-style-type: none"> • one as service seal located downstream of the valve disc and • the other as reserve or maintenance seal located upstream of the valve disc. <p>It should be possible to adjust service seal from downstream side of the valve by applying upstream seal and without dewatering upstream side of the valve. A provision shall also be made for rotation of valve disc to facilitate repair / adjustment of upstream maintenance seal without dewatering upstream of the valve.</p> <p>Butterfly Valve shall be with eccentricity and 90° rotation.</p> <p>Both seals shall be mounted on the periphery of the valve disc and be secured in position by means of clamping rings and screws.</p> <p>The sealing arrangement shall be Stainless Steel seat ring in body and synthetic nitrile rubber seal with retaining ring on the disc. The leakage at the seals shall be zero to achieve water tight enclosure when the valve is pressurized.</p> <p>The maintenance seal shall be inflatable hose seal type and shall held in position by clamping ring.</p>	<p>We propose to offer maintenance and service seal on bipalae lattice type discs as per following image. Service seal will be self-engagement type while maintenance seal will be applied by giving sliding movement to seal seat of maintenance seal by manual operation. Kindly accept the proposal.</p> 	Bid stipulations shall prevail.
106	Particular Technical Specifications, Volume II, Section II, Sub-Section 09 - Pressure Shaft Valve	9.8.4	Valve Seals	11 of 32	<p>The sealing arrangement shall be Stainless Steel seat ring in body and synthetic nitrile rubber seal with retaining ring on the disc. The leakage at the seals shall be zero to achieve water tight enclosure when the valve is pressurized.</p>	<p>Permissible leakage will be as per leakage clause mentioned in IS 7326 (PART-1). Please confirm.</p>	Bid stipulations shall prevail.
107	Particular Technical Specifications, Volume II, Section II, Sub-Section 09 - Pressure Shaft Valve	9.8.4	Valve Seals	12 of 32	<p>.....The shape of mating parts (stainless steel ring / profile rubber sealing ring) shall be exactly same on whole circumference. Contact between stainless steel and rubber shall be line contact (i.e. tangent). The design / material of sealing system shall be such that the life of seal shall be not less than 10 years.</p> <p>Tenderer shall furnish the complete details showing the seal system in the bid submission.</p>	<p>As parts may deteriorate due to combination of various factors viz. silt content in water, no. of operations (Opening/Closing), flow variation, etc. Request you to please review this clause and modify suitably.</p>	Bid stipulation shall prevail.
108	Particular Technical Specifications, Volume II, Section II, Sub-Section 09 - Pressure Shaft Valve	9.8.5	Lever Assembly & Counterweights	12 of 32	<p>A lever arm shall be assembled to each of the valve disc drive shaft by taper drive key with sleeve assemblies. The lever arm shall be connected to the piston rod of a hydraulic cylinder(s). The lever arm shall carry the cast iron counterweights, preferably on both sides, which provides the necessary force to initially move the valve to the closed position. The lever arms shall incorporate locking pins to be retained by a padlock. The locking pin shall be capable of holding the valve in the closed position against full cylinder force.</p>	<p>We propose to offer new design of lever assembly with the disc trunnion (shaft), in this arrangement lever will be bolted with the trunnion for better and easy assembly / disassembly for maintenance of valve.</p> <p>Kindly accept the proposal.</p>	To be discussed during detail engineering.
109	Particular Technical Specifications, Volume II, Section II, Sub-Section 09 - Pressure Shaft Valve	9.8.7	By – Pass Valve Assembly and Drainage System	13 of 32	<p>The Butterfly valve shall be provided with a by-pass arrangement of suitable design for balanced opening of the valve. The same shall be suitable for automatic operation in sequential order. The bypass line shall be of minimum 250 mm diameter which shall connect the upstream and downstream companion pipes. The bypass valve shall be sized in such a way that it shall take care of leakages from GUIDE VANES and equalizes the pressure in the present time. In case this time exceeds, we shall get alarm. The bypass line shall be provided with a manually operated isolating gate valve on upstream side, which shall normally be fully opened all times, and a hydraulic cylinder operated needle valve with auxiliaries on downstream side. The needle of the valve shall be of stainless steel and all piping and valve shall be carbon steel/cast steel construction.</p> <p>The Contractor shall provide one flexible coupling in the by-pass line. The Hydraulic operated By pass needle and Seat rings shall be of stainless steel while body shall be of carbon steel.</p>	<p>Based on our experience in previous projects, we do not recommend for dismantling joint in bypass system, technically it leads to excessive vibrations and leakage. We offer bypass system design without dismantling joint.</p> <p>Kindly accept the proposal.</p>	To be decided during Detail Engineering.

110	Particular Technical Specifications, Volume II, Section II, Sub-Section 09 - Pressure Shaft Valve	9.8.9.2	Transition Section Downstream Pipe piece, Dismantling section-cum-expansion joint	14 of 32	The Butterfly valve shall be flanged on the downstream side to a dismantling-cum-expansion joint of telescopic type, for dismantling of the valve during maintenance. The downstream pipe piece shall be of suitable length & shall be site welded/flange bolted to distributor. The connection for by-pass valve, manhole of 600 mm dia, pressure gauge etc., shall be provided in the downstream pipe. The upstream and downstream pipe pieces shall be of fabricated steel construction of ASTM A537 class II / A516 Gr. 70 and shall be supplied with a trim allowance of minimum 200 mm for edge preparation and welding.	For Upstream and Downstream Pipe, we offer S355 J2 +N Material. Kindly accept the proposal.	Any alternative material offered must be equivalent or better than the material specified in the Tender specification both in terms of chemical composition and material properties. However, the detailed comparison of chemical composition and material properties must be submitted to the Purchaser for approval during detail engineering stage.																																				
111	Particular Technical Specifications, Volume II, Section II, Sub-Section 09 - Pressure Shaft Valve	9.10.1	Valve Servomotors	17 of 32	The valve disc shall be actuated by two double-acting oil servomotors with orifice fitting integrated into the servomotor body with counter weights for opening & closing of valve in order to reduce the size of servomotor, which shall be provided. When energized, the servomotors shall move the disk to the open position and keep it in that position against the closing force of the counterweights. For a fail safe provision, the emergency closure has to be without servomotor and with dead weight only.	We propose to offer normal opening by single acting oil operated servomotor(s) and normal / emergency closing by counterweight(s) only. Kindly accept the proposal.	Bid stipulation shall prevail.																																				
112	Particular Technical Specifications, Volume II, Section II, Sub-Section 09 - Pressure Shaft Valve	9.13.1	Performance Test	21 of 32	The valve shall be tested in a fully assembled condition along with hydraulic power pack and control panel. The valve shall be shop operated a minimum of ten (10) times from fully closed to fully open position and ten (10) times vice versa under a no flow condition to demonstrate that the complete assembly is workable. However, if the Employer is not satisfied or would like to test the functioning of the valve even after this, the decision to open and close the valve for more than ten (10) times shall be the Employer's.	At workshop its not possible to assemble hydraulic power pack and control panel as the size of Valve is very big . However we will show full opening and full closing of valve with the help of crane in workshop for 3 times as per IS 7326 . The test required can be performed at site	Bid stipulations shall prevail.																																				
113	Particular Technical Specifications, Volume II, Section II, Sub-Section 09 - Pressure Shaft Valve	9.13.2	Body Hydrostatic Test	22 of 32	Both ends of the valve shall be blanked off (including upstream & downstream sections) so that the valve is subjected to the full pressure stress in all directions induced by the test pressure. With the valve disc in a slightly open position, the entire valve shall be subjected to at least 1.5 times the specified design pressure including pressure rise or twice the maximum operating pressure whichever is higher for at least 30 minutes. Under this pressure there shall be no leakage through the body or any trunnion seals and no parts shall be plastically deformed.	We propose to perform Body Hydrostatic Test & Disc Strength Test jointly by welding test dome on upstream extension pipe and applying service seal on downstream side and than applying test pressure. Test dome cannot be welded on downstream pipe as there will slip type dismantling joint in downstream pipe. UT will be performed on downstream pipe . Kindly accept the proposal.	Bid stipulations shall prevail.																																				
114	Particular Technical Specifications, Volume II, Section II, Sub-Section 09 - Pressure Shaft Valve	9.13.4	Seal Test	22 of 32	With one end of the valve open to atmosphere and disc in the closed position and valve shall be subject to maximum design pressure for a period of 30 minutes. The leakage from the seals shall be zero. Low pressure leak test at working pressure shall also be carried out.	Permissible leakage will be as per leakage clause mentioned in IS 7326 (PART-1)	Bid stipulations shall prevail.																																				
115	Particular Technical Specifications, Volume II, Section II, Sub-Section 09 - Pressure Shaft Valve	9.14	Material of Construction Standards & Codes	25 & 26 of 32	<table border="1"> <thead> <tr> <th>Valve Component</th> <th>Material</th> </tr> </thead> <tbody> <tr> <td>Valve Body</td> <td>Carbon Steel conforming to ASTM A537 class II or A516 Gr. 70</td> </tr> <tr> <td>Valve Disc</td> <td>Carbon Steel conforming to ASTM A537 class II or A516 Gr. 70</td> </tr> <tr> <td>Valve Shaft</td> <td>Forged Steel SS 20/E90</td> </tr> <tr> <td>Sleeves for Shafts (as per manufacturer std)</td> <td>Hardened Stainless Steel ASTM A 743 Gr. 6 NM or CA16</td> </tr> <tr> <td>Maintenance Seal</td> <td>Nitrile rubber of shore hardness 75° A</td> </tr> <tr> <td>Service Seal</td> <td>EDPM rubber of shore hardness 75° A</td> </tr> <tr> <td>Seal "O" ring</td> <td>Nitrile rubber of shore hardness 75° A</td> </tr> <tr> <td>Seal Retaining ring</td> <td>SS 410</td> </tr> <tr> <td>Retaining Ring (Segments are not permissible)</td> <td>AISI 316</td> </tr> <tr> <td>Body Seat ring</td> <td>SS 410</td> </tr> <tr> <td>Companion Flanges</td> <td>Carbon Steel conforming to ASTM A537 class II or A516 Gr. 70</td> </tr> <tr> <td>U/s. & D/s. Pipe Piece</td> <td>Carbon Steel conforming to ASTM A537 class II or A516 Gr. 70</td> </tr> <tr> <td>Flange Nuts & Bolts for Valve (Body)</td> <td>High Tensile Steel SS 15: 1367 CL 12/BS 970 817</td> </tr> <tr> <td>Nuts & Bolts for (By-pass Piping)</td> <td>A 193 Grade B7 / 194 Gr 2H</td> </tr> <tr> <td>Bypass Gate Valve & Reseal Valve</td> <td>Cast Steel ASTM A 216 Gr. WCB with SS trim</td> </tr> <tr> <td>Bypass piping</td> <td>Seamless Carbon Steel ASTM A 106</td> </tr> <tr> <td>Flanges for Bypass piping</td> <td>Carbon Steel ASTM A 106</td> </tr> </tbody> </table>	Valve Component	Material	Valve Body	Carbon Steel conforming to ASTM A537 class II or A516 Gr. 70	Valve Disc	Carbon Steel conforming to ASTM A537 class II or A516 Gr. 70	Valve Shaft	Forged Steel SS 20/E90	Sleeves for Shafts (as per manufacturer std)	Hardened Stainless Steel ASTM A 743 Gr. 6 NM or CA16	Maintenance Seal	Nitrile rubber of shore hardness 75° A	Service Seal	EDPM rubber of shore hardness 75° A	Seal "O" ring	Nitrile rubber of shore hardness 75° A	Seal Retaining ring	SS 410	Retaining Ring (Segments are not permissible)	AISI 316	Body Seat ring	SS 410	Companion Flanges	Carbon Steel conforming to ASTM A537 class II or A516 Gr. 70	U/s. & D/s. Pipe Piece	Carbon Steel conforming to ASTM A537 class II or A516 Gr. 70	Flange Nuts & Bolts for Valve (Body)	High Tensile Steel SS 15: 1367 CL 12/BS 970 817	Nuts & Bolts for (By-pass Piping)	A 193 Grade B7 / 194 Gr 2H	Bypass Gate Valve & Reseal Valve	Cast Steel ASTM A 216 Gr. WCB with SS trim	Bypass piping	Seamless Carbon Steel ASTM A 106	Flanges for Bypass piping	Carbon Steel ASTM A 106	<p>We propose to offer following material :</p> <p>Valve Body - Cast Fabricated Design : S355 J2+N (Plate material) + ASTM A216 GR WCC (Cast material)</p> <p>Valve Disc - Cast Fabricated Design : S355 J2+N (Plate material) + ASTM A216 GR WCC (Cast material)</p> <p>Valve Shaft & Sleeve - Forged + SS Sleeve : 34CrNiMo6+QT / DIN EN ISO 683-2 (Shaft) + ASTM A240 Type 41500 / Equivalent (Trunnion Sleeve)</p> <p>Seal Retaining ring : ASTM A240 Type 415 / Equivalent</p> <p>Body Seat ring : Stainless steel overlay E309 material</p> <p>U/s. & D/s. Pipe Piece - Fabricated : we propose to offer S355 J2+N for shell and flanges and in case flange thickness is more than flange will be of cast material ASTM A216 Gr. WCC or IS 1030, 340-570.</p> <p>Companion Flanges : S355 J2+N (Plate)</p> <p>Nuts & Bolts for Valve (Body) : 34CrNiMo6+QT / DIN EN ISO 683-2 / Equivalent</p>	Any alternative material offered must be equivalent or better than the material specified in the Tender specification both in terms of chemical composition and material properties. However, the detailed comparison of chemical composition and material properties must be submitted to the Purchaser for approval during detail engineering stage.
Valve Component	Material																																										
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I. Quality																																											

116	Volume II Sec- I, General Tech. Specification	5.4.11	Tests	80 of 129	Site Tests: Measurement of polarization Index	Kindly note that PI Value is not defined in IS 325. Same will be provided only for information	Shall be as per relevant standard.
117	Particular Technical Specifications, Volume II Section-II, Sub-Sec. 6: Isolated Phase Busduct & Associated Equipment	6.5.12.1	Type tests	21 of 27	Test for radio interference according to the procedure of measurement set forth in NEMA publication No. 107 " Method of measurement of Radio influence voltage (RIV) of high voltage apparatus" unless such measurement has been made on metal clad bus including at least one flexible or expansion connector and one "L" of substantial design; The maximum radio influence voltage shall not exceed 100 micro volts at 1000kHz;	Pl.note that Radio Interference Test is generally applicable for Voltage class above 33 kV. Since our Bus duct is designed for 11kV Voltage Class, Therefore, this test is not applicable.Moreover, IS:8084 (Standard for Bus Duct), doesn't calls for any Radio Interference test. Kindly accept.	Accepted.
118	Particular Technical Specifications, Volume II Section-II, Sub-Sec. 6: Isolated Phase Busduct & Associated Equipment	6.5.12.2	Factory tests	22 of 27	- Milli volt drop test on samples;	Kindly note that as per IS:8084, Milli-Volt drop test is not a part of routine Test. Hence we propose to accept calculation for the same.	Bid stipulation shall prevail.
119	Particular Technical Specifications, Volume II Section-II, Sub-Sec. 6: Isolated Phase Busduct & Associated Equipment	6.5.12.2	Factory tests	22 of 27	* Dye penetration examination of all shop welded joints and radiographic examination on 2% butt weld joints including joints on flexible and plates / busbars / enclosures.	Pl.note that as per IS:8084, these tests are not a part of routine test. However, VHN will submit in-process report for the same for review. Kindly accept.	Bid stipulation shall prevail.
120	Particular Technical Specifications, Volume II Section-II, Sub-Sec. 6: Isolated Phase Busduct & Associated Equipment	6.5.12.3	Site Commissioning Tests	22 of 27	* Milli-volt drop test on all joints.	This test is applicable on sample length.Test conducted on similar type of bus duct shall be submitted for review.This test is not feasible on entire length at site.	Bid stipulation shall prevail.
121	Particular Technical Specifications-Volume II Section-II-Sub-Sec. 11: DC System and UPS System	11.7.6	Tests	18 of 43	ii. Bum – In Test for Printed Circuit Boards (PCB); iii. Heat Run Test (type test) vi. Audible Noise (type test)	Kindly note that these tests are part of Type Test. Therefore Equivalent test reports will be shared.	Bid stipulation shall prevail.
122	Volume II Section II 01 Turbine, Governors and Main Inlet Valve	1.4.1.2	Materials	31 of 75	Materials The Turbine Runners shall be made of stainless steel of 13 % chromium, 4 % nickel (DIN 17.445, Werkstoff-Nr. 1.4113, G-X5 CrNi 13.4, ASTM A 743 CA 6 NM), with ultra low sulphur and nitrogen content. The minimum Charpy V-notch impact strength at -10°C shall be 30 J, to be fulfilled by each of 3 specimens.	Please note that applicable material test as per approved drawing during detailed Engg shall be followed. Kindly accept.	Bid stipulation shall prevail.
123	Volume II Section II 01 Turbine, Governors and Main Inlet Valve	1.12.1.2	Mechanical test	70 of 75	Mechanical Tests Mechanical tests shall be carried out on all main components according to normal practice and relevant standards to ascertain that material properties conform to the requirements and specifications. Such tests shall include the determination of the yield strength, ultimate strength, elongation / contraction and impact strength in aged / non-aged condition as required. Bend test of plates and sheets shall also be performed as required	Please note that applicable material test as per approved drawing during detailed Engg shall be followed. Kindly accept.	Bid stipulation shall prevail.
124	Volume II Section II 01 Turbine, Governors and Main Inlet Valve	1.12.5	Tests on steel p	72 of 75	Tests on Steel Plates ii) Three ISO, V-notch toughness tests at 0 deg.C. in the "thickness direction".	Please note that applicable material test as per approved drawing during detailed Engg shall be followed. Kindly accept.	Bid stipulation shall prevail.
125	Volume II Section II 01 Turbine, Governors and Main Inlet Valve	1.12.5	Tests on steel p	72 of 75	The components which operate under pressure of water, air, oil etc. (excepting those which cannot be pressure tested in shop) shall be subjected to hydrostatic pressure tests in shop using a tests pressure of 150% (one hundred and fifty percent) of the working pressure for a duration of 120 minutes.	Please note that the duration of hydro test is for 30mins as per international standards/ will be as per approved drawing requirements during detailed Engineering. Kindly accept.	To be discussed during detail engineering.
126	Volume II Section II 02 Generator and Excitation System	2.3.11.2	shop tests	43 of 72	* Thrust and guide bearings white metal- physical and mechanical properties;	Please note that only chemical test is applicable on white metal as per ASTM B23. Mechanical test is not applicable. Kindly accept	Agreed subject to submission of Test Reports of physical and mechanical properties.
127	Volume II Section II 02 Generator and Excitation System	2.3.11.4	Wet Commissioning Tests	45 of 72	Wet Commissioning Tests * Sudden short circuit test from not less than 0.50 rated terminal voltage to determine reactance and time constants	Please note that the sudden short circuit test is a special test coming under destructive category kind of test so bidder does not recommend to perform the same. Request to waive off the test.	Bid stipulations shall prevail. However, the requirement may be reviewed during detailed engineering.

128	Volume II Section II 02 Generator and Excitation System	2.3.11.4	Wet Commissioning Tests	45 of 72	• Full runaway speed test for 2-minute duration;	As Run away test is destructive test, after the test we need to open the unit and complete inspection to be done. Also any mishappening may happen which will lead to loss time. To safeguard the same, multiple speed control protection are given.	Bid stipulations shall prevail. However, final decision regarding conducting of Runaway speed test shall be taken during detailed engineering stage.
129	Volume II Section II 19 EOT Cranes	19.2.1	General Require	5 of 42	ii) The vertical deflection of the main girders caused by the rated load plus all dead loads not to exceed 1/1000 of the crane span.	Please note that permissible deflection will be as per the approved drawing specification IS 3177 during detail Engg. Kindly accept.	shall be as per IS 3177.

Sl. No.	Volume	Page No.	Clause No.	Tender Provision	Bidders Queries	NEEPCO Replies
130	Particular Technical Specifications Volume II Section-II Sub-Sec. 01 Turbine, Governors and Main Inlet Valve	Page 14 of 75	1.2.4.1 Cavitation guarantee	All areas where the depth of pitting exceeds 1 mm shall be restored to their original contours by welding with stainless steel and grinding to a smooth surface equal in finish to the adjacent undamaged areas. The Turbine after such modifications, repairs and replacements shall be subject to same cavitation guarantees as per the original equipment.	"Kindly allow bidders to offer all the cavitation guarantees shall be as per IEC 60609. Also, we offer to undertake maximum 2 number of repair/replacement within guarantee period, as restoration to original guarantee conditions after repair/replacement will lead to an unending process. Please accept & confirm. "	Bid stipulations shall prevail.
131	6.Vol-II Sec-IV_Tender Drawings	Page 2 of 18	General Arrangem drg	Draft Tube Dimensions	Draft tube dimensions are completely governed by the model selected for the subject project to achieve required WAE and performance guarantees. Therefore , bidder should be allowed to offer most optimum dimensions of Draft Tube. Considering this fact the bottom most depth of Draft tube wrt turbine centreline may increase by 500mm approx wrt as specified in tender drawings. As per Pre-bid reply in earlier tender customer reply was as following , "Any major changes must be justified based on Model Test and informed well in advance for the required civil work modifications." We understand that same reply shall prevail for present tender also. Kindly accept	Any major changes must be justified based on Model Test and informed well in advance for the required civil work modifications
132	Volume II Section I-GTS_ Annexes (3)	Page 23 of 30	4.4 Specific Documents for Mechanical Plant and Installations	4.4.1 Documents for all Mechanical Plants as Applicable	The list of drawings / documents as required in tender specification which need to be submitted to customer for approval , shall be finalized mutually during detailed design stage. This is the regular practice which has been followed in almost all the tenders. As this point has already been accepted in previous tender pre-bid replies, so we consider the same shall prevail in present tender also. Kindly accept.	Accepted.
133	Particular Technical Specifications Volume II Section-II Sub-Sec.03 Cooling Water System	Page 9 of 14	COOLING WATER SYSTEM- 3.4.1.4 Cyclone Separators	Filtration efficiency 85% down to 100 microns of particles with specific gravity 2.6 & above	The requirement of filtration of 100 micron for cyclone separator is very high, which may result in drastic increase in overall cost of equipment and unavailability in market. Since this cyclone separator is fulfilling the requirement of complete unit, so its filtration rating should be in range of 500 to 1000 microns. Kindly review and accept.	Bid stipulations shall prevail.
134	Particular Technical Specifications Volume II Section-II Sub-Sec.03 Cooling Water System	Page 8 of 14	COOLING WATER SYSTEM- 3.4.1.1 Motorized Automatic Online Self Cleaning Strainers	Filtration efficiency 98% down to 100 microns.	The requirement of filtration of 100 micron for duplex strainer is very high, which may result in drastic increase in overall cost of equipment and it may be unavailable in market. Since this duplex strainer is fulfilling the requirement of complete unit, so its filtration rating should be around 500 microns. Kindly review and accept.	Bid stipulations shall prevail.
135	Particular Technical Specifications, Volume II Section-II, Sub Sec 01, Turbine, Governors and MIV	Page 12 of 75	1.2.4 Guarantees for Turbine Output, Efficiency & Penalties for Shortfall ",f) Capacity and efficiency tests	The clause states "The capacity and efficiency test at different heads and gate opening on the prototype turbine shall be conducted within one year after commissioning to verify that the power output and efficiency guarantees of the prototype have been fulfilled."	The capacity and efficiency test will be conducted at the head available at the time of field acceptance test and results will be converted to different net heads as per IEC 60041-1999. Please confirm & modify the clause accordingly.	shall be discussed during detail engineering.
136	Particular Technical Specifications, Volume II Section-II, Sub Sec 01, Turbine, Governors and	Page 17 of 75	1.2.6 Turbine Model Test, 1.2.6.2 Model Details, Drawings and Homology	The Clauses states "The model size shall not be less than 300 mm, and the test head shall not be less than 40 m."	Model Test head will be as per IEC 60193-2019. Please confirm & modify the clause accordingly.	The model size, test head, and homology shall be in strict conformity with IEC 60193 standards.
137	Particular Technical Specifications, Volume II Section-II, Sub Sec 01, Turbine, Governors and MIV	Page 18 of 75	1.2.6 Turbine Model Test, 1.2.6.4 Tests on Turbine Model	The Clauses states "g) Air admission test for full sigma range."	Air admission test will be done if pressure pulsation in draft tube cone exceeds permissible limits for the whole sigma range operation. Please confirm & modify the clause accordingly.	Bid stipulations shall prevail.
138	Particular Technical Specifications, Volume II Section-II, Sub Sec 01, Turbine, Governors and MIV	Page 19 of 75	1.2.6 Turbine Model Test, 1.2.6.4 Tests on Turbine Model	The Clauses states "k) Curves showing relationship between wicket gate angle and also wicket gate opening in mm vs servomotor stroke related to maximum opening of guide vane and clear opening between two adjacent wicket gates."	It may be noted that Servo Motor Design is not finalized till the time of Model Witness test, therefore "wicket gate opening in mm vs servomotor stroke" can not be part of Model Test Report. However this information will be given after final design of Servo Motor System. Therefore this point-k) may please be deleted from model test report. Please confirm & modify the clause accordingly.	As per Tender, Model test report should be as per IEC 60193.
139	Particular Technical Specifications, Volume II Section-II, Sub Sec 01, Turbine, Governors and MIV	Page 19 of 75	1.2.6 Turbine Model Test, 1.2.6.7 Witness of Model Turbine Test by Employer's/ Consultants Representatives & Model Acceptance	The Clauses states "The Corporation reserves the right to get the model turbine tested in an independent laboratory."	Our Model Test Laboratory is a NABL accredited and Department of Science & Industrial Research (DSIR), Govt. Of India recognised laboratory and has conducted many successful Francis, Pelton, Kaplan turbine model tests. Turbine design is proprietary of nature and cannot be shared with external agencies. Therefore Model test will have to be done at our Laboratory only. Please confirm & modify the clause accordingly.	Bid stipulations shall prevail.
140	Particular Technical Specifications, Volume II Section-II, Sub Sec 01, Turbine, Governors and MIV	Page 75 of 75	1.14.Index and Field Acceptance (Efficiency) Tests	General query	Detailed Water conductor system drawing not given with tender, please provide the same for deciding the feasibility and applicability of the turbine efficiency test method as per IEC 60041-1999.	Drawing of WCS is attached.

Sl. No.	Volume	Page No.	Clause No.	Tender Provision	Bidders Queries	NEEPCO Replies
141	Vol-II Section-II; Sub-section 02	Page 9 of 72	2.3.5.2 Insulation and Temperature Rise	As per this clause temperature rise limit above cold air of 40°C shall be- Stator winding by embedded temperature detectors-75°C Rotor winding by resistance-80°C	As per Table-4 of IEC 60034-33 temperature rise limit above cold air of 40°C shall be- Stator winding by embedded temperature detectors-85°C Rotor winding by resistance-90°C Therefore, kindly review the requirements of stator & rotor temperature rise, in line with IEC.	Bid stipulations shall prevail.
142	Vol-II Section-II; Sub-section 02	Page 17 of 72	2.3.7.3 Stator Core	The overall design shall ensure that there is no more than a 5°C temperature difference between any two points of the core.	Since, temperature variations in stator core are generally observed upto 10°C. It is therefore recommended that temperature difference between any two points of the core should be limited upto 10°C, with max. temperature rise of stator core be limited as per IEC. Kindly review & confirm.	Bid stipulations shall prevail.
143	Vol-II Section-II; Sub-section 02	Page 31 of 72	2.3.7.17 (ii) Control & Monitoring Devices	Vibration Monitoring System- The vibration monitoring system shall be supplied by reputed manufacturers like VibroSystM or GE Bentley Nevada as approved by the purchaser.	The vibration monitoring system shall be procured & supplied, considering the requirements of Make in India policy of GoI. Also, reputed manufacturers, as mentioned in tender document, like VibroSystM or GE Bentley Nevada as approved by the purchaser, may also participate as prospective bidders in the procurement through GeM portal of GoI for public procurement. However, bidder may also supply its own make vibration monitoring system. Kindly confirm.	Bidder may choose alternative vendors, subject to prior approval.
144	Vol-II Section-II; Sub-section 02	Page 32 of 72	2.3.7.17 (iii) Control & Monitoring Devices	Partial Discharge Analyzer- The technical datasheet of Partial Discharge Analyzer.	The technical datasheet of Partial Discharge Analyzer seems to be supplier specific. Therefore, a technical specification of Partial Discharge system shall be submitted to the purchaser during detailed engineering & the system shall be supplied as per approved specification. It may be noted that the procurement of the system shall be through GeM portal of GoI for public procurement & shall be through competitive buying. Also, any reputed bidder may participate as prospective bidders in the open procurement through GeM portal of GoI for public procurement. Kindly confirm.	Bid stipulations shall prevail. However, same may be discussed during detail engineering.
145	Vol-II Section-II; Sub-section 02	Page 32 of 72	2.3.7.17 (iii) Control & Monitoring Devices	Portable type (common to all units) PD monitoring system is specified in this clause.	We propose for Continuous-online type PD monitoring system for each unit for measurement of partial discharge in machine continuously. Total 6 nos. (1 no PD coupler per phase per parallel path) of PD coupler will be provided for measurement of partial discharge in generators continuously.	Bid stipulation shall prevail. As per the specified clause, panel mounted PD Analyzer (common to all units) is to be provided for continuous monitoring of stator insulations. Other details may be examined during detail engineering.
146	Vol-II Section-II; Sub-section 02	Page 32 of 72	2.3.7.17 (iii) Control & Monitoring Devices	Make of PD monitoring systems are specified as GE Energy, GE Omicron.	Please note that Enquiry has to be floated as per Make in India policy. Whatever responses we receive, we will submit the same for your approval.	Bidder may choose alternative vendors, subject to prior approval.
147	Vol-II Section-II; Sub-section 02	Page 35 of 72	2.3.7.17 (iv) Control & Monitoring Devices	Make of Air gap monitoring systems are specified as Vibro System or GEBentley Nevada.	Please note that Enquiry has to be floated as per Make in India policy. Whatever responses, we receive, we receive, we will submit the same for your approval.	Bidder may choose alternative vendors, subject to prior approval.
148	Vol-II Section-II; Sub-section 02	Page 40 of 72	2.3.7.17 (iv) Control & Monitoring Devices	In this clause following Other instruments/ Devices are specified – 1. Multi Chartless temperature recorder with logging in DCS / SCADA; 2. Chartless Rotor temperature recorder with logging in DCS / SCADA	Please note that due to technology upgradation, these recorders are not required anymore. At present RTD temperatures can be monitored and displayed directly in LHMI and also in SCADA. In same manner, for rotor temperature, we can use readings of field voltage and field current from slip ring brushes and then we can convert it in Rotor temperature readings. This is more effective way of Rotor temperature measurement, as per our experience Rotor temperature recorder also are not required any more. Therefore, the requirement of Chartless Rotor temperature recorder may be deleted. Kindly confirm.	The requirement may be reviewed during detailed engineering.

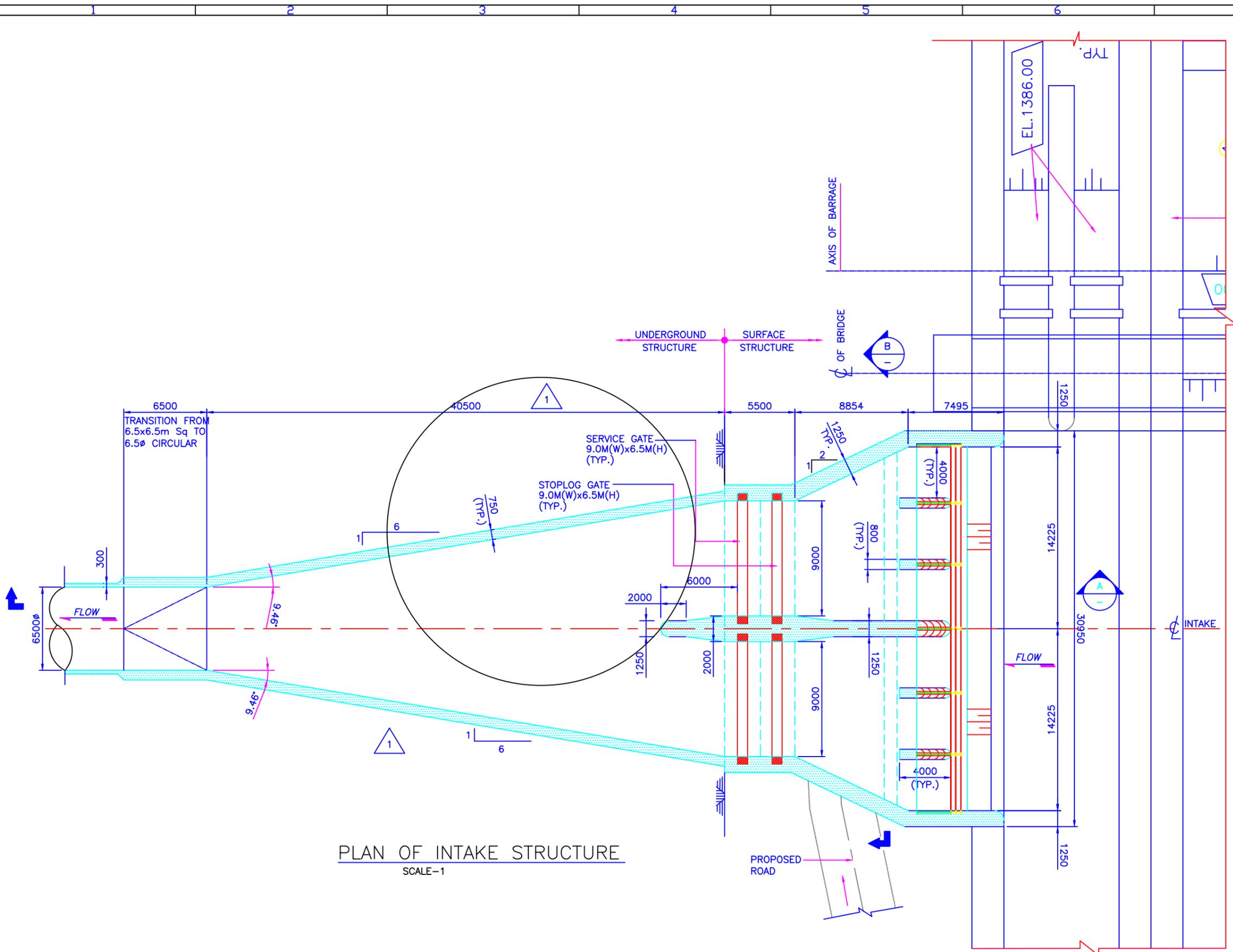
Sl. No.	Volume	Page No.	Clause No.	Tender Provision	Bidders Queries	NEEPCO Replies
149	Vol-II Section-II; Sub-section 02	Page 45 of 72	2.3.7.17 (iv) Control & Monitoring Devices	In this clause following Wet Commissioning tests are specified – 1. Sudden short circuit test from not less than 0.5 rated terminal voltage to determine reactance and time constants; 2. Sustained short circuit test to determine reactance; 3. Zero power factor saturation test; 4. Deceleration curve – determination of moment of inertia; 5. Deceleration loss test 6. Full runaway speed Test for 2 minute duration	1. Sudden short circuit test from not less than 0.5 rated terminal voltage to determine reactance and time constants; 2. Sustained short circuit test to determine reactance; 3. Zero power factor saturation test; Please note that for determination of above specified parameters, we need to conduct Sudden short-circuit test. In our opinion this test is a detrimental test; hence being an invasive test, we do not recommend to conduct this test. However, we will furnish the calculated values of transient and sub transient reactance's and time constants during detail design. Hence these tests may be deleted. Kindly review and confirm the acceptance. 3. Zero power factor saturation test; 4. Deceleration curve – determination of moment of inertia; 5. Deceleration loss test Please note that these tests are not practicably feasible to perform at site, therefore we do not recommend these tests to be performed at site. Kindly review and confirm the acceptance. 6. Full runaway speed Test for 2 minute duration Being a detrimental test, We do not recommend this test. Please review and confirm.	Bid stipulations shall prevail. However, the requirement may be reviewed during detailed engineering.
150	Vol-II Section-II; E1	Page 46 of 72	2.3.11.5 Field Acceptance and Performance Tests	The following tests shall be performed on generator: • Impulse short-circuit test at reduced voltage acc. to IEC 60034-1, Para. 24; • Determination of the values for Xd, X'd, X''d, and Xq; • Determination of the following constants: T'do, T'd, T''d and Ta in accordance with IEC 60034-4;	For determination of reactance & time constants we need to conduct Sudden short-circuit test. Being an invasive test, we do not recommend to conduct this test. However, we will furnish the calculated values of transient and sub transient reactance's and time constants during detail design. Hence these tests may be deleted. Kindly review and confirm the acceptance.	Bid stipulations shall prevail. However, the requirement may be reviewed during detailed engineering.
151	Vol-II Section-II; Sub-Sec.02 Generator & excitation system	Page 14 of 72 & 23 of 72	2.3.7.1 .General & 2.3.7.9 Thrust & guide bearing	Bearing arrangement - Suspended type -The Bearing arrangement of Generator shall be Suspended type with a guide Bearing and a thrust cum guide Bearing above the Generator rotor. -The generator shall have a combined thrust and guide bearing located above the rotor and a guide bearing below the rotor.	For machines with rated speed of 300 rpm of similar capacity, it is preferable to have construction semi-umbrella type. Main advantages for this type of construction are: - The thrust load gets transferred directly to concrete - Maintenance friendly - Better power unit stability due to combined thrust & guide bearing in center of power unit	Bid stipulation shall prevail.
152	Vol-II Section-II; Sub-Sec.02 Generator & excitation system	Page 11 of 72	2.3.5.8 Runaway speed withstand capacity	The runaway speed test shall be conducted at site and shall be considered successful if, after undergoing the test for two (2) minute, no damage or injury is apparent.	We do not recommend runaway speed test due to invasive nature of the test. Kindly accept.	Bid stipulations shall prevail. However, final decision regarding conducting of Runaway speed test shall be taken during detailed engineering stage.
153	Vol-II Section-II; Sub-Sec.02 Generator & excitation system	Page 10 of 72	2.3.5.2 Insulation & Temperature rise	Thrust bearing babbit temperature - 65 degree celcius	The mentioned temperature limit is contradictory. As per practice Thrust bearing temperature are as per following i. Maximum permissible operating temperature ≤ 70 °C; ii. Alarm temperature 75 °C; iii. Trip temperature 80 °C. Kindly confirm the above	Clause no. 2.3.5.2 specifies the maximum temperature of babbit material with one cooler out of service and unit operating at specified overload. Clause no. 2.3.7.9 specifies the temperature limits for bearing metal at 103.5 MVA as below; 1) Maximum permissible operating temperatures 70 degree C 2) Alarm temperature 65 degree C 3) Trip temperature 70 degree C
		Page 24 of 72	2.3.7.9 Thrust & guide bearing	The design of the bearings shall be based on limiting the bearing metal operating temperatures for operation at 103.5 MVA, as given below: i. Maximum permissible operating temperature ≤ 70 °C; ii. Alarm temperature 75 °C; iii. Trip temperature 80 °C.		
154	Vol-II Section-II; Sub-Sec.02 Generator & excitation system	Page 20 of 72	2.3.7.7. III Rotor Rim	Cooling fan blades shall be cast aluminum and constructed to preclude vibration.	As per our practice we propose fabricated type aerofoil Fan blades . Kindly confirm the same	The manufacturer may use their standard design by providing reasons and advantages, subject to prior approval, during detail engineering.
		Page 28 of 72	2.3.7.13 Rotor Fan	The Axial Fans will consist of a large number of specially shaped aerofoil aluminum blades assembled to the fabricated support segments		

Sl. No.	Volume	Page No.	Clause No.	Tender Provision	Bidders Queries	NEEPCO Replies
155	Vol-II Section-II;Sub-Sec.02 Generator & excitation system	Page 20 of 72	2.3.7.7. III Rotor Rim	The rim shall be shrunk on the rotor spider and shall remain shrunk on the hot rotor when unit is rotating up to 110% of synchronous speed.	As per our practice we supply floating type of rim for rotor. Same type of design is used in more than 500 generators supplied by bidder . In view of this, the design of rim shall be left upon bidder.	The manufacturer may use their standard design by providing reasons and advantages, subject to prior approval, during detail engineering.
156	Vol-II Section-II;Sub-Sec.02 Generator & excitation system	Page 23 of 72	2.3.7.9 Thrust & guide bearing	The bearing shall be lined with ASTM-B23, type 2 antifriction Babbit metal.	As per bidder practice we use babbit material as per IS: 25, 84% TIN based bearing friction alloy .Same material is used in more than 500 generators supplied by bidder . Kindly accept the same	
157	Vol-II Section-II;Sub-Sec.02 Generator & excitation system	Page 22 of 72	2.3.7.8 Generator Shaft	The generator shafts shall be made of the best quality forged carbon steel conforming to ASTM A668 class E, properly heat-treated. A single shaft shall be offered with the condition that there is no change in the height of the power house and no pit shall be allowed in the service bay.	For generator Shaft we propose two shaft system because of following advantages, i) Lower lifting weight by power house crane ii) Required lower lifting clearances iii) Ease of handling top & bottom shaft and generator rotor iv) Suitable in maintenance purpose.	Bid stipulations shall prevail. However, the requirement may be reviewed during detailed engineering.
158	Vol-II Section-II;Sub-Sec.02 Generator & excitation system	Page 23 of 72	2.3.7.8 Generator Shaft	The critical speed of the shaft at balanced condition shall be over 25% of the runaway speed.	Mentioned requirement is very much on higher side .We recommend that first critical speed of combined rotating parts of turbine and generator shall be at least 20% higher than the maximum turbine runaway speed. Please review and confirm the acceptance of above	Bid stipulation shall prevail.
159	Vol-II Section-II;Sub-Sec.02 Generator & excitation system	Page 20 of 72	2.3.7.7. III Rotor Rim	The laminations shall allow for dovetail slots to which the poles shall be installed.	We use T-shaped slots instead of dovetail slots for installation of poles. Kindly accept the same.	The manufacturer may use their standard design by providing reasons and advantages, subject to prior approval, during detail engineering.
160	Vol-II Section-I;GTS	Page 13 of 129	0.3.4 Material standards	Material standards	In this Clause for materials, ASTM Standards are Specified. Kindly accept use of equivalent IS (Indian Standard) in addition to ASTM standard. Material for generator component shall be selected so as to satisfy functional requirement with desired factor of safety (as stipulated in tender specification).	Materials of other equivalent standard may be used. Any alternative material offered must be equivalent or better than the material specified in the Tender specification both in terms of chemical composition and material properties. However, the detailed comparison of Chemical composition and material properties must be submitted to the Purchaser for approval during detail engineering stage. Materials of different standards such as ASTM, DIN EN, EN, IS can be offered if they are better or at least equivalent in terms of chemical composition, properties etc. A side by side comparison of both the materials shall be carried out during detailed engineering.
161	Vol-II, Section-II, SUB SECTION 22 AIR CONDITIONING and VENTILATION SYSTEM system	4 OF 17	7.1.1 Air handling units	7.1.1 Air Handling Units: i) Three (3), sets of Air handling units (AHU's), each of them be of 50 % of the required capacity, one unit serves as standby, for Power house floors, Transformer area, Service bay, drainage gallery etc. If required, additional fresh air blowers of the required capacity / rating against each AHU shall be provided.	As per the Schedule of Requirements (SOR), Transformers and GIS are not specified within the bidder's scope. However, there is a contradiction between the referred clauses regarding the inclusion of HVAC for the Transformer Hall and GIS Room under the bidder's scope. In view of the above, kindly review and confirm the scope of HVAC for the Transformer Hall and GIS Room. Further, if HVAC for the Transformer Hall and GIS Room is included in the bidder's scope, please provide the equipment heat dissipation rates for the Transformer Hall and GIS Room, which are required for HVAC load calculation and system sizing.	Both GIS hall and Transformer hall are included in the scope of HVAC system, the heat load to be calculated accordingly by the bidder considering 8 nos. 220 kV GIS bays/modules and 9 nos. of 35 MVA single phase GTs, 1 no 5 MVA 3 phase SST and 1 no. 3 phase 50 MVAR Bus reactor.
	Vol-II, Section-II, SUB SECTION 22 AIR CONDITIONING and VENTILATION SYSTEM system	5 OF 17	7.2.1	The Power House floors, Erection bay, Transformer area & GIS area shall be divided into suitable areas for heating, ventilation and air conditioning. Type of Ventilation & Air-Conditioning for various areas will be as under: Operating Floor : Forced Supply and Forced Exhaust Air Floors below Operating Floor : Forced Supply Air Ventilation Electrical Room : Forced Supply Air Ventilation Battery Room, : Exhaust Ventilation Control Room and Panel Rooms : Air-conditioning with Temperature & Humidity control Office Rooms & Conference Room : Air-conditioning with Temperature control only Toilets, Kitchen etc. : Exhaust Ventilation		
	Volume II Section-III Schedule of Requirements (SOR)	4	2. MECHANICAL EQUIPMENT/SYSTEM	r) HVAC System for Powerhouse 1 set		
162	Vol-II, Section-II, SUB SECTION 22 AIR CONDITIONING and VENTILATION SYSTEM	4 OF 17	7.1.1 Air handling units	7.1.1 Air Handling Units: i) Three (3), sets of Air handling units (AHU's), each of them be of 50 % of the required capacity, one unit serves as standby, for Power house floors, Transformer area, Service bay, drainage gallery etc. If required, additional fresh air blowers of the required capacity / rating against each AHU shall be provided.	Bidder envisages as following: 1.0 Location of the AHU, is not available in the drawing. Bidder envisaged that AHU of ventilation system of power house bldgs., shall take air suction directly from the ambient in line with general practice followed in the surface type Plant. Hence no separate fresh air blower fan shall be applicable. 2.0 Since there will be no wall on the transformer withdrawal side of transformer hall and same shall be naturally ventilated hence bidder shall not envisage ventilation system for transformer hall located below GIS room.	1.0 Location of AHU shall be finalized during detail engineering in discussion with civil design. 2.0 Ventilation of transformer hall shall be within the scope of bidder.

Sl. No.	Volume	Page No.	Clause No.	Tender Provision	Bidders Queries	NEEPCO Replies
	Vol-II, Section-IV, TEDER DRAWINGS		PWER HOUSE PLAN AT EL. 1193.30M SERVICE BAY / OPERATING FLOOR	DWG NO. WAP/HEO/E&M/TD/03	Customer is to review and confirm.	
163	Vol-II, Section-II, SUB SECTION 22 AIR CONDITIONING and VENTILATION SYSTEM	4 OF 17	7.1.1 Air handling units	ii) Required no. of Split type Air Conditioners of the required capacity for Power house Control room, relay/panel rooms, PLCC room areas, staff room, Conference Room, Office Rooms etc. The no. of the Split type air conditioning units provided in each closed space shall be (N+1), where N is the number of air conditioning units of equal rating/capacity required for the said closed space.	A.0- Since relative humidity control is not feasible / possible in case AC machine as window/ Split Air Conditioners, hence relative humidity (RH 55± 5%) shall not be arrived/ maintained for areas being catered by window / split air conditioners type. Further in view of the above, bidder propose type of the air conditioning system as per the following for Control room, panel rooms, 1. 25-60TR, D-X type Air cooled Condensing Unit along with AHU shall be provided with 3 x 50% redundancy. 2. 11-25 TR, Air cooled Ductable Split AC/ Air cooled Package AC shall be provided with 3 x 50% redundancy. 3. Upto-10TR, with Hi-wall Split AC/ Cassette AC shall be provided with N+1 redundancy configuration. Where N is number of working unit. B.0- Rest of the air conditioned space specified in Cl. No.-ii), type of the AC system shall be envisaged as window/ Split Air Conditioners only. Customer is requested to review type of AC system and accept type of AC system mentioned above..	The temperature and relative humidity control shall be required as specified in the PTS. The requirement / installation of Condensing unit shall be examined during detail engineering.
	Vol-II, Section-II, SUB SECTION 22 AIR CONDITIONING and VENTILATION SYSTEM	5 OF 17	7.2.1 Layout and General Arrangement	All air-conditioned areas will be maintained at 24 ± 1 deg C and RH 55 ± 5% with split/ window type air-cooled air conditioners. All ventilation and air-conditioned areas will be designed to maintain a positive pressure. Air changes in accordance to IS-4720, applicable for Surface Hydrel Stations, will also be applicable for this Power House.		
164	Vol-II, Section-II, SUB SECTION 22 AIR CONDITIONING and VENTILATION SYSTEM	4 OF 17	7.1.2 Exhaust air fans	i) Required nos. of exhaust air fans for exhaust of air from the Power house with 100% stand by capacity.	1.0 Since separate exhaust air fan for exhaust of smoke/ air from all ventilated areas is not specified hence bidder envisage that exhaust fan for exhaust from power house with 100% stand by capacity, shall be used as exhaust air fan for smoke / air exhaust with connection of the emergency power supply. 2.0 Further bidder understand that exhaust fan shall be wall mounted axial exhaust type fan and no centralized ducted exhaust system is applicable. In view of the above customer is requested to review and confirm above.	Shall be dealt during detailed engineering.
165	Vol-II, Section-II, SUB SECTION 22 AIR CONDITIONING and VENTILATION SYSTEM	11 OF 17	7.4.6	Ducts All ducts for the The sheet thickness shall not be less than the thickness indicated in IS 655.	Galvanization of the duct sheet shall be conforming to Class 275 of IS: 277 Customer is to review and confirm.	Bid stipulations shall prevail.
166	Vol-II, Section-II, SUB SECTION 22 AIR CONDITIONING and VENTILATION SYSTEM	4 OF 17	7.1.1 Air handling units	7.1.1 Air Handling Units: i) Three (3), sets of Air handling units (AHU's), each of them be of 50 % of the required capacity, one unit serves as standby, for Power house floors, Transformer area, Service bay, drainage gallery etc. If required, additional fresh air blowers of the required capacity / rating against each AHU shall be provided.	As per the clause 7.1.1 Air handling units, bidder envisages the following, 1.0 Ventilation system envisaged that 100% fresh air supply system through AHU (3 x 50%) and hot air exhaust through multiple wall mounted axial fans only. 2.0 AHU shall take suction directly from ambient passing through air filter. Hence following items mentioned in clause 7.4.2.1, shall not be envisages, iv) Mixing box section: v) Face and bypass damper sections for: a) Multi zone damper section. b) Air mixer section. c) Return fan section. d) Exhaust section. Please review and confirm.	Shall be finalised during detailed Engineering.
				7.4.2 Air Handling Units: 7.4.2.1 General Description: Unit shall be central station air handler. It shall consist of a fan with the following factory-installed components as indicated on the equipment schedule, as per applicability: i) Cooling section with water coils ii) Access and plenum section iii) Filter section iv) Mixing box section: v) Face and bypass damper sections for: a) Multi zone damper section. b) Air mixer section. c) Return fan section. d) Exhaust section.	Further to above, location of the AHUs are not specified in drawings which are required for AHU fans sizing and ducting quantity calculation. Please provide location of AHUs and confirm that AHUs shall be placed inside room or in open.	Location of AHU shall be finalized during detail engineering in discussion with civil design.
167	Vol-II, Section-II, SUB SECTION 22 AIR CONDITIONING and VENTILATION SYSTEM	8 OF 17	7.4.2	7.4.2 Air Handling Units: 7.4.2.1 General Description: Unit shall be central station air handler. It shall consist of a fan with the following factory-installed components as indicated on the equipment schedule, as per applicability: i) Cooling section with water coils ii) Access and plenum section iii) Filter section iv) Mixing box section: v) Face and bypass damper sections for: a) Multi zone damper section. b) Air mixer section. c) Return fan section. d) Exhaust section.	Further to above, location of the AHUs are not specified in drawings which are required for AHU fans sizing and ducting quantity calculation. Please provide location of AHUs and confirm that AHUs shall be placed inside room or in open.	Location of AHU shall be finalized during detail engineering in discussion with civil design.

Sl. No.	Volume	Page No.	Clause No.	Tender Provision	Bidders Queries	NEEPCO Replies
168	Vol-II, Section-II, SUB SECTION 22 AIR CONDITIONING and VENTILATION SYSTEM	4 OF 17	7.1	SCOPE HVAC System for BF Valve House shall be within the scope of the bidder. Dry Type Ventilation System is envisaged for the BF Valve House. Supply, Exhaust, Rate of air change per hour and other design parameters shall be as per system requirements and relevant IS/ IEC Codes.	Details of HVAC system for BF Valve House including the associated access tunnel, is not specified in technical specification. Bidder envisages the following type system and design details for BF Valve House: System Type: Dry-type ventilation system with 100% fresh air, achieved through 2 x 100% centrifugal supply and exhaust fans. The supply air will be delivered via a ducted system, while the exhaust air will be discharged without ducts. Capacity Design: The ventilation system for the BF Valve House shall be designed with consideration of maximum of following: A maximum air change rate of 2.0 air changes per hour, or The heat dissipation rate of equipment, ensuring that the internal design temperature does not exceed 5.0°C above the maximum ambient temperature of 40.0°C. Fan Location: The centrifugal fans for both supply and exhaust will be installed near the entrance adit of the respective tunnels. Adequate space for the installation and maintenance of these fans shall be provided by customer. Bidder requests customer to review and confirm the same.	Shall be finalised during detailed Engineering.
169	Vol-II, Section-II, SUB SECTION 22 AIR CONDITIONING and VENTILATION SYSTEM	4 OF 17	7.1	SCOPE	Bidder understands that HVAC system for access tunnel for surge shaft and pressure shaft is not in bidder's scope. Please confirm scope. In case, same is in bidder's scope please furnish technical specification for HVAC system along with tunnel layout drawings.	HVAC system for access tunnel for surge shaft and pressure shaft is not within the scope of bidder.
170	Vol-II, Section-II, SUB SECTION 22 AIR CONDITIONING and VENTILATION SYSTEM	4 OF 17	7.1	SCOPE	Requirement of HVAC system for barrage and Tato-1 intake gate area is not specified in the scope of bidder in the tender specification. We understand that since rooms in these areas are far & separately located wrt Heo's power house, HVAC requirement for rooms (including for bidder supplied panels) in these areas shall not be in bidder's scope. In case, any such requirement is to be considered by bidder, please specify the scope, system & design requirements to be considered by bidder along with necessary drawings. Please confirm.	Requirement of HVAC system for barrage and Tato-1 intake gate area is not within the scope of bidder.
171	Vol-II, Section-IV, TEDER DRAWINGS	---	---	General	Dwg "GENERAL LAYOUT PLAN & LONGITUDINAL SECTION" is not available in tech specification. Please provide above drawing.	Required Drawings are attached in WCS drawings.
172	Volumn 2 ,Section-II	Page no 38 of 42	19.4.3.3	Point hooks with shanks for general engineering purpose.	As IS:3815 is withdrawn the applicable standard shall be IS 15560.	Latest version of relevant standard shall be applicable.
173	Volumn 2 ,Section-II	Page no 9 of 42	19.3.2	The general arrangement of the crane shall be in accordance with the BF Valve House layout drawings enclosed and as described in the specification at various places	BF Valve House layout drawings is not available in tender drawings. Kindly furnish tender drawing.	Required Drawings are attached IN WCS drawings.
174	Volumn 2 ,Section-II	Page no 38 of 42	19.6.13	The permanent AC illumination system on the crane shall consist of four 1000 watt highway beamed flood lighting units to illuminate uniformly the area under the crane.	160W LED type higher efficiency lamps shall be provided as an alternative as per latest industrial practice. Please confirm.	Shall be finalised during detailed engineering.
175	Volumn 2 ,Section-II	Page 13 of 42 Page 14 of 42	19.4.2.4	The lifting beam shall be supplied by the crane supplier for Powerhouse crane The total length of the lifting beam shall be determined taking into consideration the shortest distance available between the two main hooks of the cranes when operating in tandem.	One (1) No. EOT crane for Power House is in scope. In Crane tandem operation two or more cranes work together to lift and move a equipment .Kindly recheck and confirm lifting beam requirement.	Lifting beam not required.
176	Vol-II Sec-II Sub-sec 22	12 of 17	7.5	The HVAC system shall be equipped with operation on fully automatic mode and manual mode. All the necessary cabling between the control panels and the field HVAC components (as fans, sensors, pumps, valves, air dampers, etc.) shall be included in the supply.	DCS based control system for HVAC shall be provided. Please confirm.	Shall be finalised during detailed engineering
177	Vol-II, Section - II, sub-sec 21	5 of 21	21.3	Fire water tank	We have designed our system considering the static elevation as 90m above MIV floor and elevation lower than 90m will have price impact during contract execution stage if new requirement due to elevation change will warrant for additional system/equipment.	Bid stipulations shall prevail. No price impact will be entertained, since this is an EPC Contract.

Sl. No.	Volume	Page No.	Clause No.	Tender Provision	Bidders Queries	NEEPCO Replies
178	Vol-II, Section - II, sub-sec 21	3 of 21	21.2, ix	Fire fighting system	Inert Gas Clean agent system is applicable for Control Room for which, Inert gas Storage Room space of approx. 7.5 M x 6.5 m x 5.0(Ht) is required, preferably near to the Control Room area. Customer to provide the same.	Location of Inert gas Storage Room shall be finalized during detail engineering in discussion with civil design.
179	Vol-II, Section - II, sub-sec 21	9 of 21	21.5	Mechanical groove type coupling shall be provided for ease of dismantling of pipe & fittings which shall be finalised during detailed engineering..	We would like to clarify that mechanical grooved piping systems have not been provided by us for fire-fighting applications in India till date. In line with our standard practice, we provide flanged connections with break flanges for pipe-to-pipe joints to facilitate easy dismantling and maintenance. This practice is also followed in all the project executed by bidder.	Bid stipulations shall prevail. Shall be discussed during detail engineering.
180	Vol-II, Section - II, sub-sec 21	9 of 21	21.5	All embedded and exposed water pipes size 25mm and above shall be made of carbon steel of minimum schedule 40. Pipe size less than 25mm shall be of minimum schedule 80. Gravity drain pipes shall be of minimum schedule 20. The outdoor pipe line shall be preferably Ductile iron type conforming to latest IS/ ISO standard.	Kindly confirm, fire water pipes shall be as per BIS 3589 and BIS 1239.	Bid stipulations shall prevail.

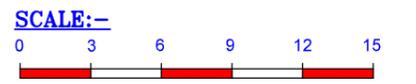


NOTES:-
 1. ALL DIMENSIONS AND ELEVATIONS ARE IN METERS.

LEGEND:-

1.		FIRST STAGE CONCRETING
2.		SECOND STAGE CONCRETING
3.		M-10 CONCRETE

FOR TENDER PURPOSE ONLY



SHEET 1 OF 2

CLIENT: **NORTH EASTERN ELECTRIC POWER CORPORATION LTD.**
 (MINI RATNA, CATEGORY-I, A GOVT. OF INDIA ENTERPRISE)

PROJECT: **HEO HEP (3x80MW) ARUNACHAL PRADESH, INDIA**

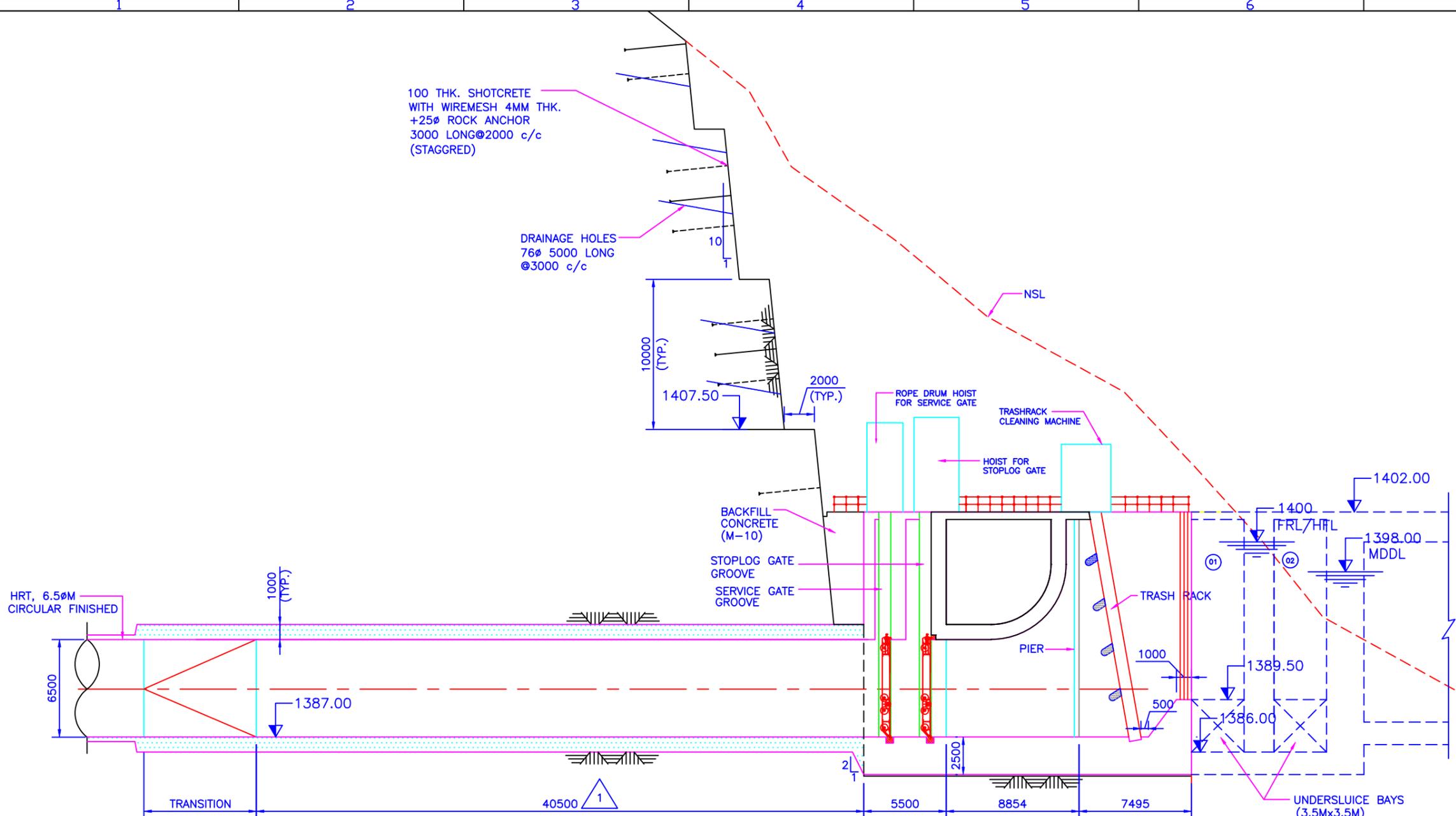
CONSULTANTS
WAPCOS
 (A GOVT. OF INDIA UNDERTAKING)

INTAKE STRUCTURE PLAN, SECTIONS & DETAILS

DRAWING NO : WAP/HEO/CD/TD/10

DATE : AUGUST, 2024 ORIGINAL PRINT SIZE : A3

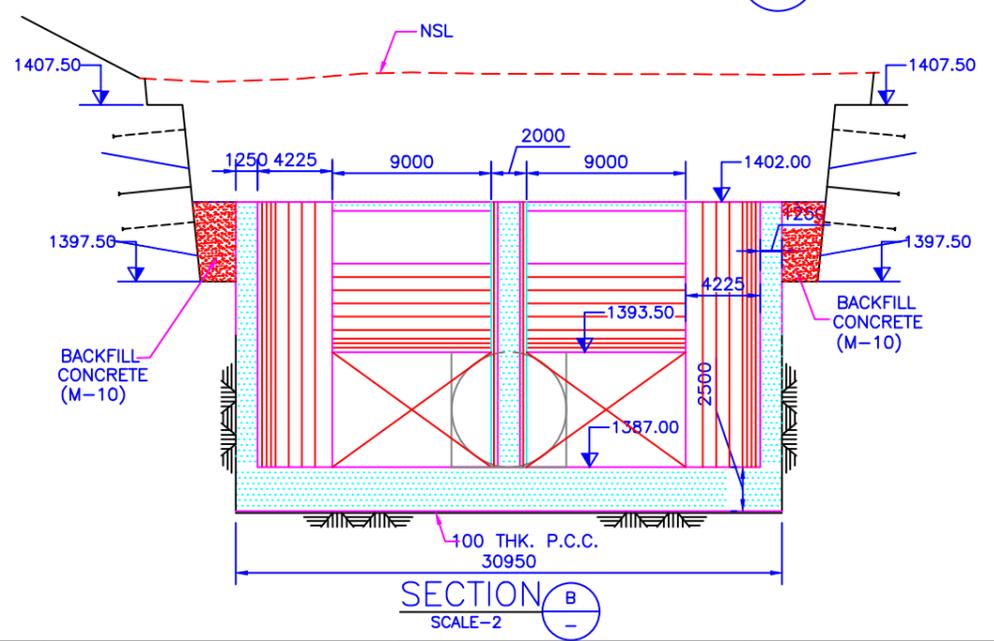
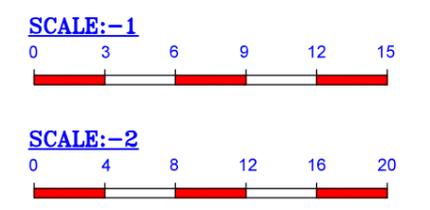
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LEGEND:-

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SHEET 2 OF 2

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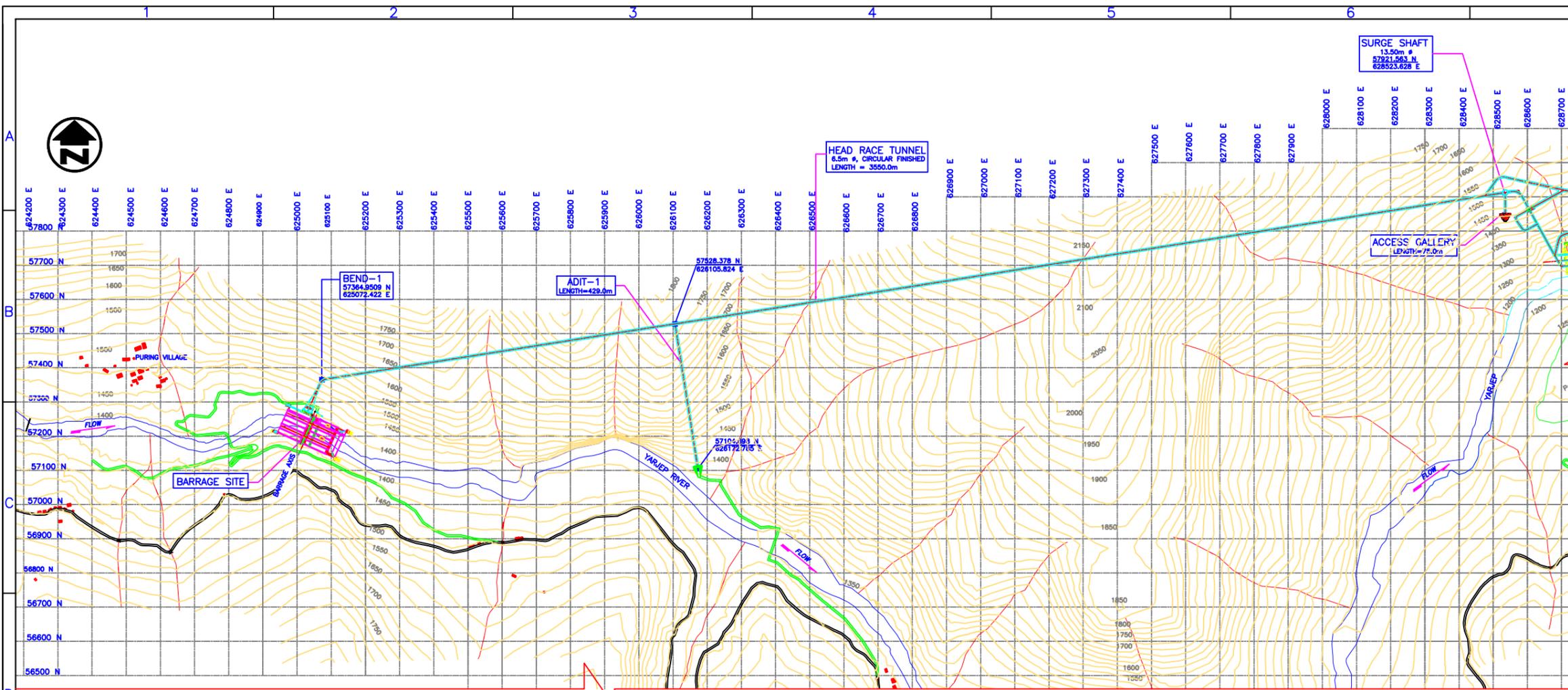
PROJECT: **HEO HEP (3x80MW) ARUNACHAL PRADESH, INDIA**

CONSULTANTS: **WAPCOS**
 (A GOVT. OF INDIA UNDERTAKING)

INTAKE STRUCTURE PLAN, SECTIONS & DETAILS

DRAWING NO : WAP/HEO/CD/TD/11

DATE : AUGUST, 2024 ORIGINAL PRINT SIZE : A3



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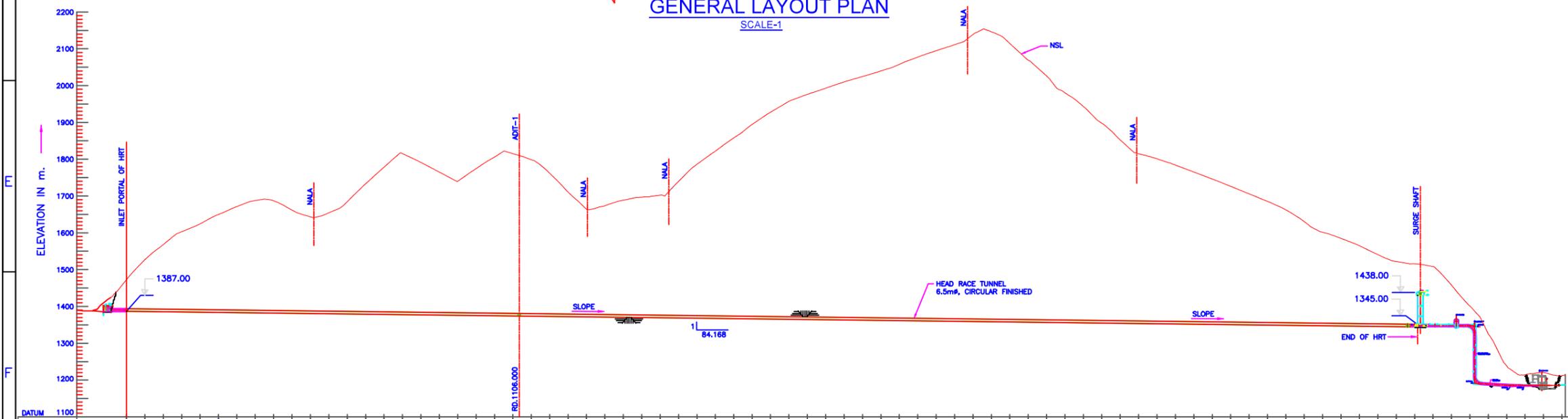
BEND GEOMETRY

BEND	DEFLECTION Δ	BEND RADIUS R (m)	BEND LENGTH Lc (m)	TANGENT LENGTH T (m)
BEND-1	56°43'35"	25.00	24.752	13.497

LEGEND:-

1.		1250	CONTOUR
2.		FLOW	RIVER
3.			EXISTING ROAD
4.			PROPOSED ROAD

GENERAL LAYOUT PLAN
SCALE-1

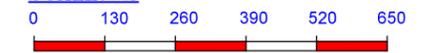


FOR TENDER PURPOSE ONLY

SCALE:-1



SCALE:-2



SHEET 1 OF 1

CHAINAGE	GROUND LEVEL	INVERT LEVEL
00.000	1472.674	1387.000
50.000	1526.790	1387.000
100.000	1588.074	1387.000
150.000	1602.950	1387.000
200.000	1624.265	1387.000
250.000	1649.777	1387.000
300.000	1671.333	1387.000
350.000	1687.686	1387.000
400.000	1687.036	1387.000
450.000	1661.718	1387.000
500.000	1643.298	1387.000
550.000	1654.334	1387.000
600.000	1684.546	1387.000
650.000	1733.281	1387.000
700.000	1778.459	1387.000
750.000	1815.038	1387.000
800.000	1791.128	1387.000
850.000	1785.000	1387.000
900.000	1774.503	1387.000
950.000	1740.000	1387.000
1000.000	1706.000	1387.000
1050.000	1815.023	1387.000
1100.000	1798.736	1387.000
1150.000	1781.664	1387.000
1200.000	1710.558	1387.000
1250.000	1683.906	1387.000
1300.000	1673.391	1387.000
1350.000	1688.685	1387.000
1400.000	1696.726	1387.000
1450.000	1702.226	1387.000
1500.000	1729.644	1387.000
1550.000	1786.025	1387.000
1600.000	1821.847	1387.000
1650.000	1857.942	1387.000
1700.000	1894.646	1387.000
1750.000	1927.804	1387.000
1800.000	1957.381	1387.000
1850.000	1976.279	1387.000
1900.000	1993.099	1387.000
1950.000	2010.062	1387.000
2000.000	2024.639	1387.000
2050.000	2039.927	1387.000
2100.000	2057.787	1387.000
2150.000	2077.534	1387.000
2200.000	2094.817	1387.000
2250.000	2111.309	1387.000
2300.000	2130.000	1387.000
2350.000	2148.284	1387.000
2400.000	2114.635	1387.000
2450.000	2098.412	1387.000
2500.000	2026.359	1387.000
2550.000	1980.667	1387.000
2600.000	1943.397	1387.000
2650.000	1897.981	1387.000
2700.000	1852.445	1387.000
2750.000	1814.680	1387.000
2800.000	1801.201	1387.000
2850.000	1783.943	1387.000
2900.000	1765.112	1387.000
2950.000	1746.083	1387.000
3000.000	1726.225	1387.000
3050.000	1705.940	1387.000
3100.000	1685.613	1387.000
3150.000	1662.395	1387.000
3200.000	1630.500	1387.000
3250.000	1601.459	1387.000
3300.000	1584.858	1387.000
3350.000	1564.484	1387.000
3400.000	1540.911	1387.000
3450.000	1522.130	1387.000
3500.000	1515.884	1387.000
3550.000	1508.322	1387.000
3600.000		1387.000
3650.000		1387.000
3700.000		1387.000
3750.000		1387.000
3800.000		1387.000
3850.000		1387.000
3900.000		1387.000

L-SECTION
SCALE-2

CLIENT: **NORTH EASTERN ELECTRIC POWER CORPORATION LTD.**
(MINI RATNA, CATEGORY-I, A GOVT. OF INDIA ENTERPRISE)

PROJECT: **HEO HEP (3x80MW) ARUNACHAL PRADESH, INDIA**

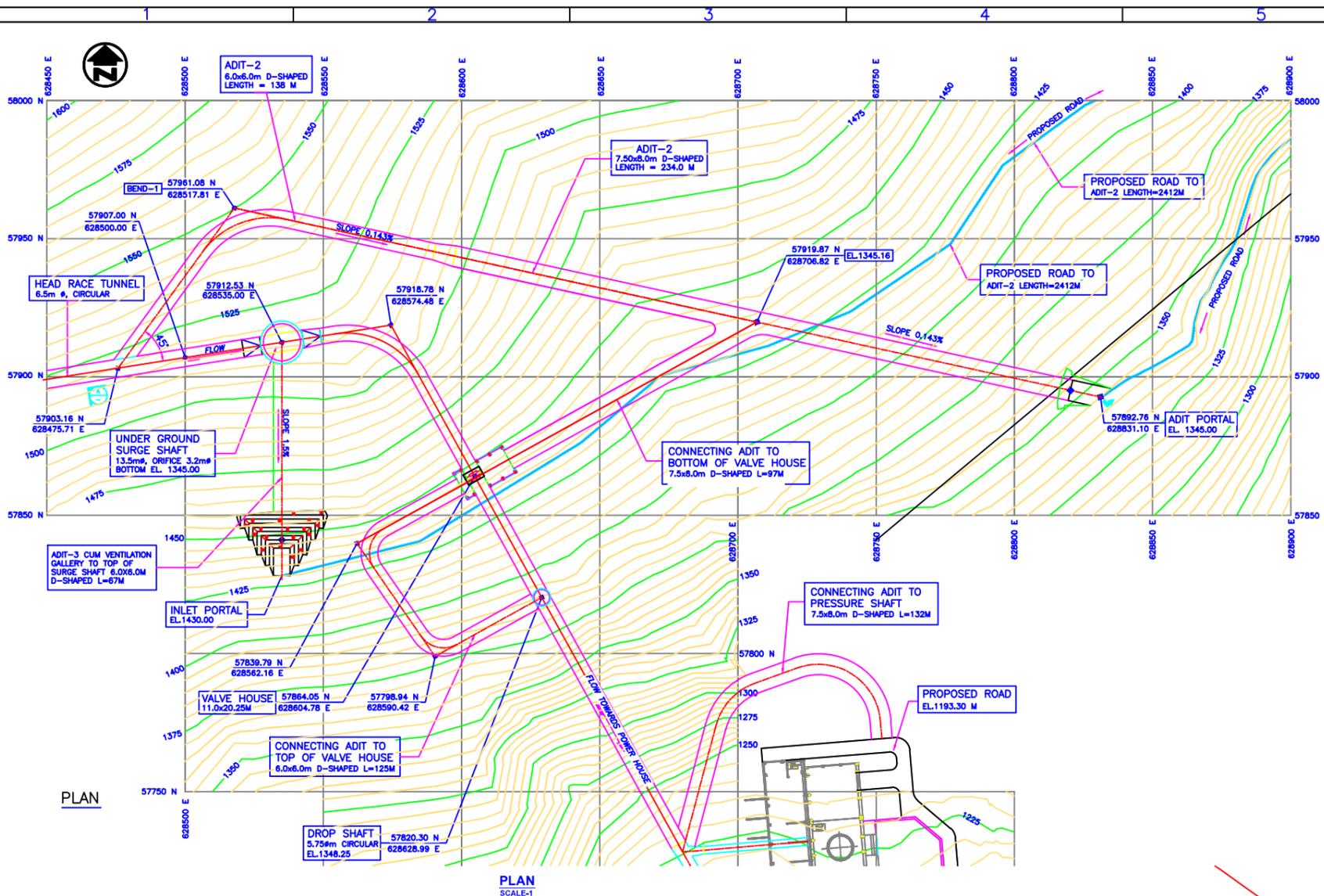
CONSULTANTS
 WAPCOS
(A GOVT. OF INDIA UNDERTAKING)

HEAD RACE TUNNEL LAYOUT PLAN & LONGITUDINAL SECTION

DRAWING NO : WAP/HEO/CD/TD/13

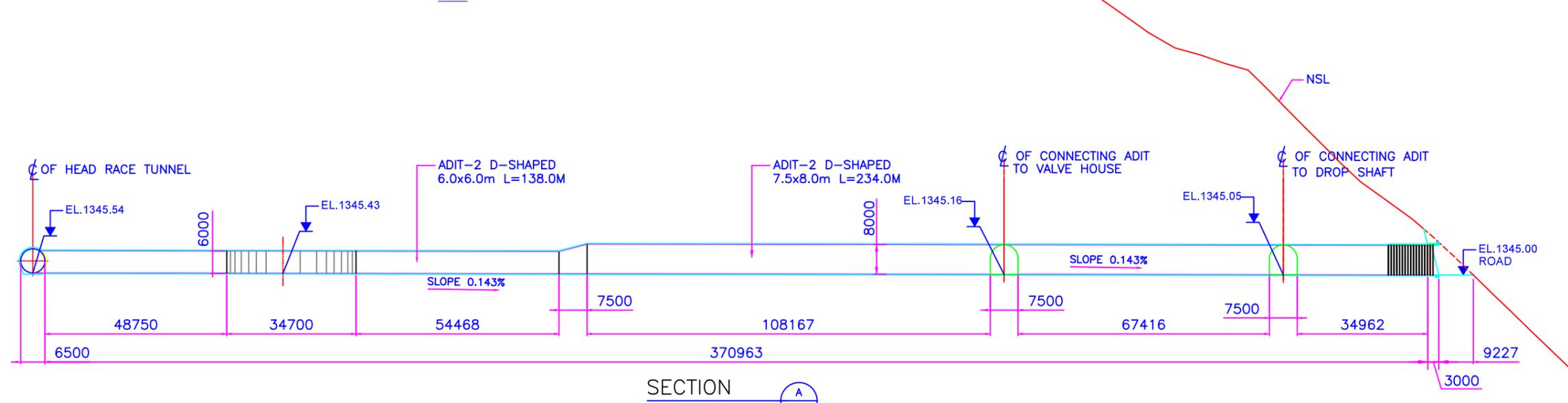
DATE : AUGUST, 2024

ORIGINAL PRINT SIZE : A3



PLAN

PLAN SCALE:1



SECTION SCALE:2

CLASSIFICATION OF ROCK FOR ADIT-2

S.NO.	CLASS OF ROCK	% OF TOTAL LENGTH	LENGTH
1.	II	33	45.54
2.	III	50	69.00
3.	IV	10	13.80
4.	V	7	9.66
TOTAL		100	138.00

CLASSIFICATION OF ROCK FOR ADIT-2

S.NO.	CLASS OF ROCK	% OF TOTAL LENGTH	LENGTH
1.	II	33	77.22
2.	III	50	117.00
3.	IV	10	23.40
4.	V	7	16.38
TOTAL		100	234.00

CLASSIFICATION OF ROCK FOR ADIT-3

S.NO.	CLASS OF ROCK	% OF TOTAL LENGTH	LENGTH
1.	II	33	22
2.	III	50	33
3.	IV	10	07
4.	V	7	5
TOTAL		100	67

CLASSIFICATION OF ROCK FOR CONNECTING ADIT TO BOTTOM OF VALVE HOUSE

S.NO.	CLASS OF ROCK	% OF TOTAL LENGTH	LENGTH
1.	II	33	41
2.	III	50	63
3.	IV	10	12
4.	V	7	09
TOTAL		100	125

CLASSIFICATION OF ROCK FOR CONNECTING ADIT TO TOP OF VALVE HOUSE

S.NO.	CLASS OF ROCK	% OF TOTAL LENGTH	LENGTH
1.	II	33	32
2.	III	50	48
3.	IV	10	10
4.	V	7	07
TOTAL		100	97

CLASSIFICATION OF ROCK FOR CONNECTING ADIT TO PRESSURE SHAFT

S.NO.	CLASS OF ROCK	% OF TOTAL LENGTH	LENGTH
1.	II	33	43.56
2.	III	50	66.00
3.	IV	10	13.20
4.	V	7	9.24
TOTAL		100	132.00

NOTES:-

- ALL DIMENSIONS ARE IN MILLIMETRES AND ELEVATIONS IN METRES. UNLESS OTHERWISE SPECIFIED.
- NO DIMENSION SHALL BE MEASURED FROM DRAWING. ONLY WRITTEN DIMENSIONS SHALL BE FOLLOWED.

LEGEND:-

1.		P.C.C. M-10
2.		CONTOURS
3.		PROPOSED ROAD
4.		RIVER

FOR TENDER PURPOSE ONLY

SCALE:-1



SCALE:-2



SHEET 1 OF 2

CLIENT: NORTH EASTERN ELECTRIC POWER CORPORATION LTD. (MINI RATNA, CATEGORY-I, A GOVT. OF INDIA ENTERPRISE)

PROJECT: HEO HEP (3x80MW) ARUNACHAL PRADESH, INDIA

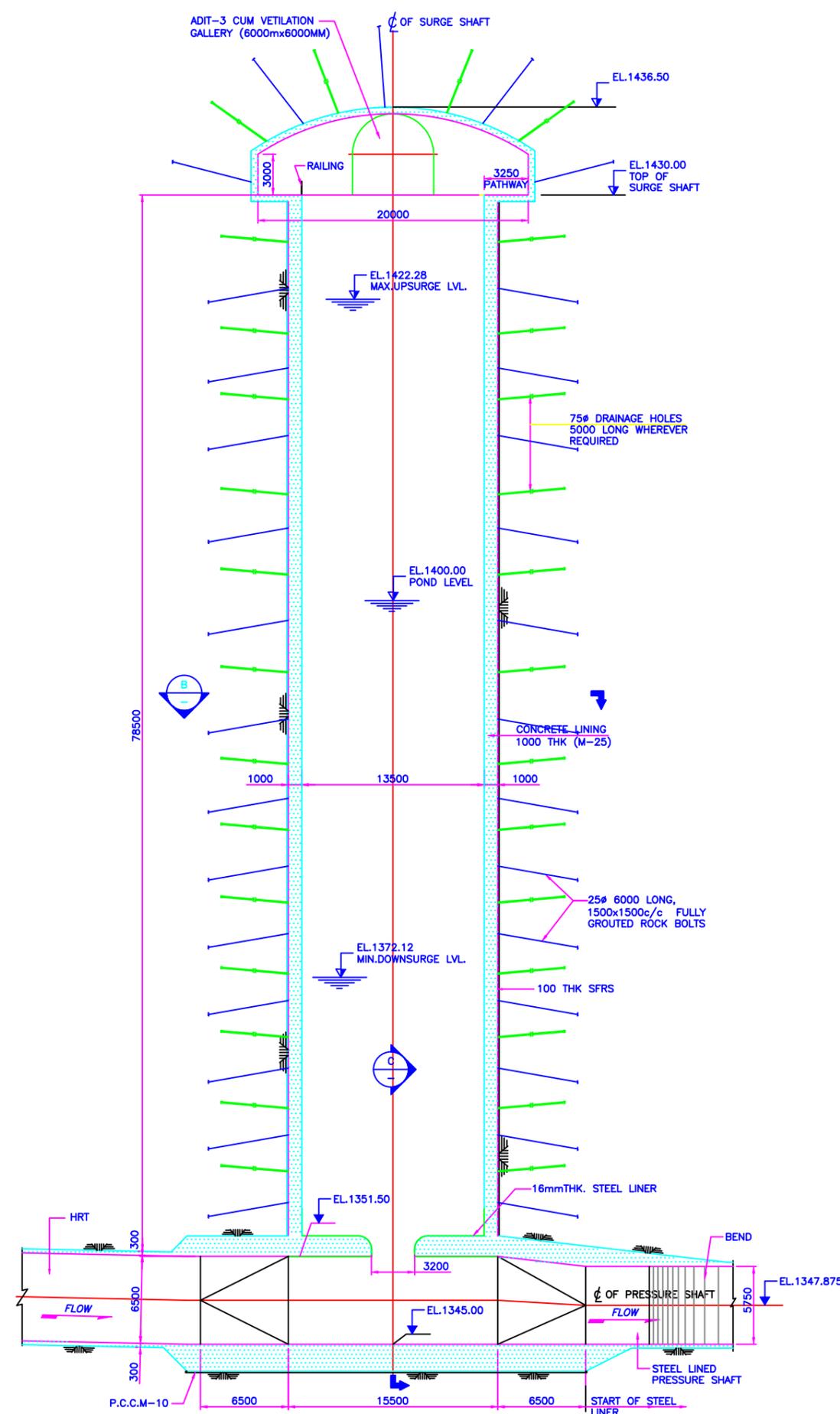
CONSULTANTS (A GOVT. OF INDIA UNDERTAKING)

ADIT-2 PLAN L-SECTION

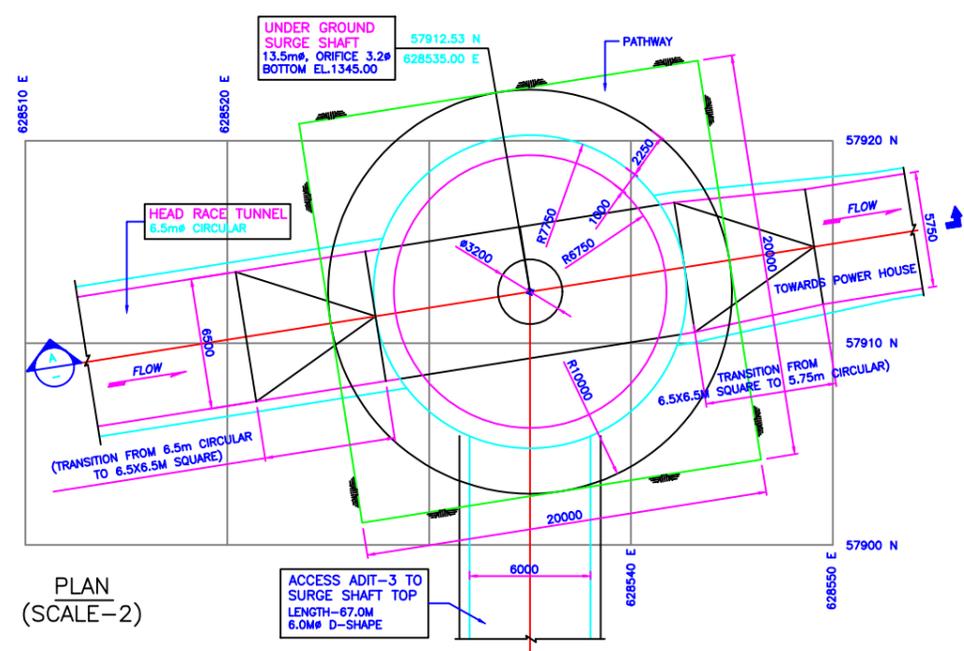
DRAWING NO : WAP/HEO/CD/TD/18

DATE : AUGUST, 2024

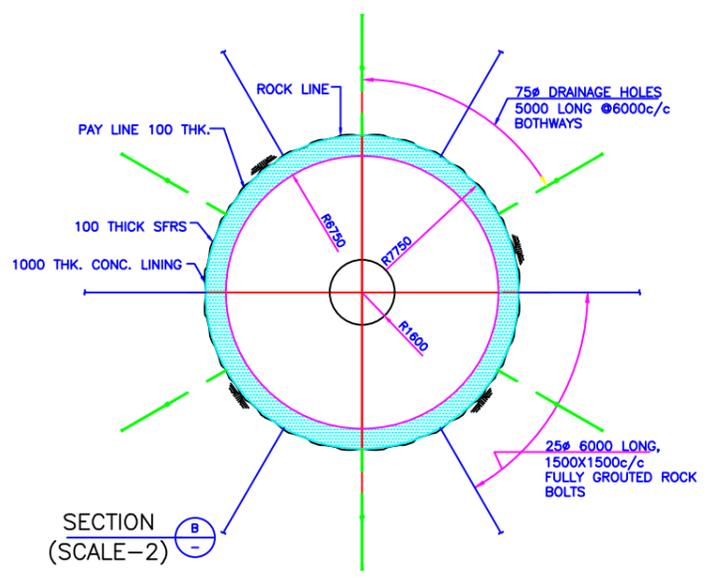
ORIGINAL PRINT SIZE : A3



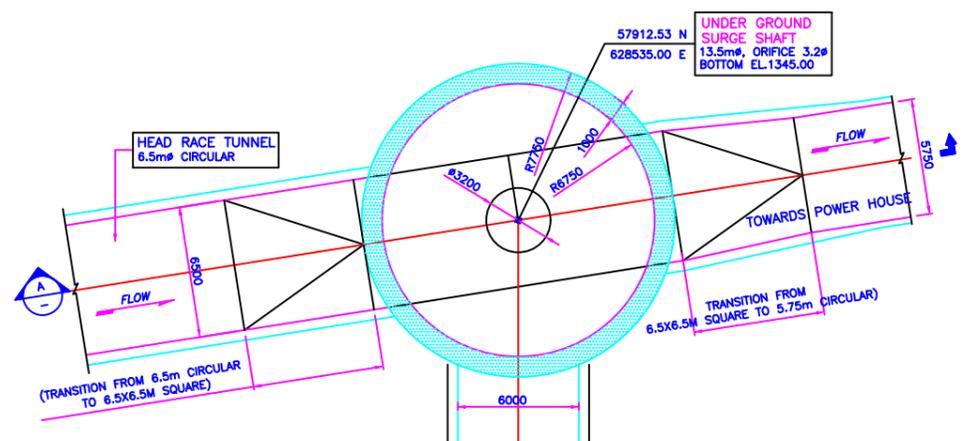
SECTION A-A (SCALE-1)



PLAN (SCALE-2)



SECTION B-B (SCALE-2)



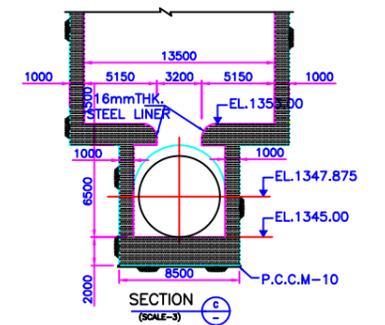
SECTIONAL PLAN OF SURGE SHAFT AT EL.1430.00 (SCALE-2)

NOTES:-

1. ALL DIMENSIONS ARE IN MILLIMETRES AND ELEVATIONS IN METRES. UNLESS OTHERWISE SPECIFIED.
2. NO DIMENSION SHALL BE MEASURED FROM DRAWING. ONLY WRITTEN DIMENSIONS SHALL BE FOLLOWED.
3. PROPER BLASTING TECHNIQUE SHALL BE ADOPTED SO AS TO GET PROPER EXCAVATED SECTION AS SHOWN IN THE DRAWING.
4. SHEAR ZONES AND UNSTABLE WEDGE BLOCK, IF PRESENT, WILL REQUIRE SPECIAL TREATMENTS.
5. THE ROCK BOLTS OF THE CROWN, SIDE WALL SHALL BE PROJECTED 300MM BEYOND THE ROCK SURFACE TO SUPPORT THE LINING. THE LENGTH OF THREADED PORTION SHALL BE 350mm.
6. THE LENGTH, SPACING OF ROCK BOLTS & DRAINAGE ARRANGEMENT INDICATED THIS DRAWING MAY BE CHANGED/MODIFIED DURING CONSTRUCTION STAGE AS PER GEOLOGY

LEGEND:-

1.		P.C.C. M-10
2.		CONCRETE M-25



SECTION C-C (SCALE-3)

CLASSIFICATION OF ROCK FOR SURGE SHAFT

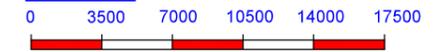
S.NO.	CLASS OF ROCK	% OF TOTAL HEIGHT	SURGE SHAFT HEIGHT
1.	II	33	28
2.	III	50	43
3.	IV	10	08
4.	V	7	6
TOTAL		100	85

FOR TENDER PURPOSE ONLY

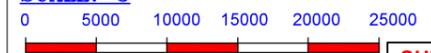
SCALE:-1



SCALE:-2



SCALE:-3



SHEET 1 OF 2

CLIENT: NORTH EASTERN ELECTRIC POWER CORPORATION LTD. (MINI RATNA, CATEGORY-I, A GOVT. OF INDIA ENTERPRISE)

PROJECT: HEO HEP (3x80MW) ARUNACHAL PRADESH, INDIA

CONSULTANTS: WAPCOS (A GOVT. OF INDIA UNDERTAKING)

SURGE SHAFT PLAN & SECTIONS

DRAWING NO : WAP/HEO/CD/TD/22

DATE : AUGUST, 2024 ORIGINAL PRINT SIZE : A3

NOTES:-

1. ALL DIMENSIONS ARE IN MILLIMETRES AND LEVELS ARE IN METRES.
2. NO DIMENSION SHALL BE MEASURED FROM THIS DRAWING ONLY WRITTEN DIMENSIONS SHALL BE FOLLOWED.
3. CONCRETE FOR ALL RCC WORKS SHALL BE OF GRADE M-25 CONFORMING TO IS:456-2000 UNLESS OTHERWISE SPECIFIED.
4. ALL REINFORCEMENT INCLUDING ROCK BOLT SHALL BE HIGH YIELD STRENGTH DEFORMED BARS GRADE Fe-500 CONFORMING TO IS:1786-2000.
5. FOR DETAILS OF SUPPORT SYSTEM REFER SEPARATE DRAWING.

LEGEND:-

1.		CONCRETE M-15
2.		CONCRETE M-25

FOR TENDER PURPOSE ONLY

SCALE:-1

0 2000 4000 6000 8000 10000

SCALE:-2

0 1800 3600 5400 7200 9000

SHEET 1 OF 1

CLIENT: **NORTH EASTERN ELECTRIC POWER CORPORATION LTD.**
(MINI RATNA, CATEGORY-I, A GOVT. OF INDIA ENTERPRISE)

PROJECT: **HEO HEP (3x80MW) ARUNACHAL PRADESH, INDIA**

CONSULTANTS

WAPCOS

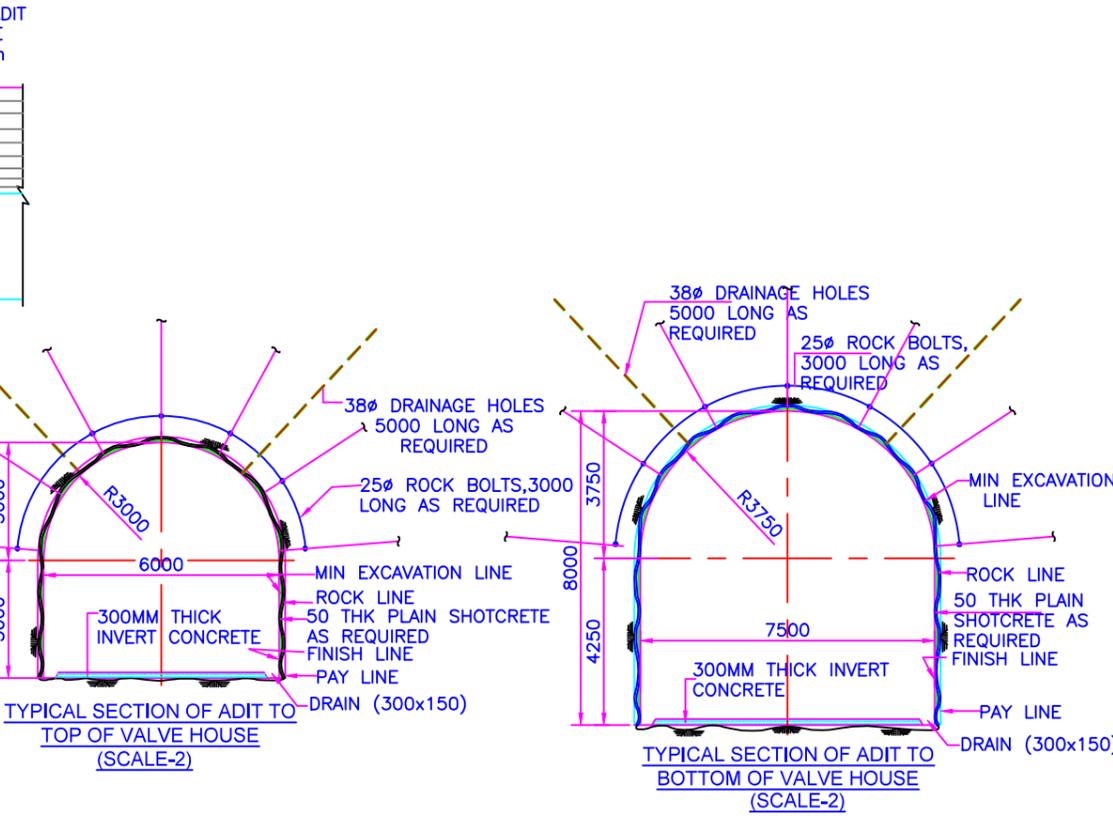
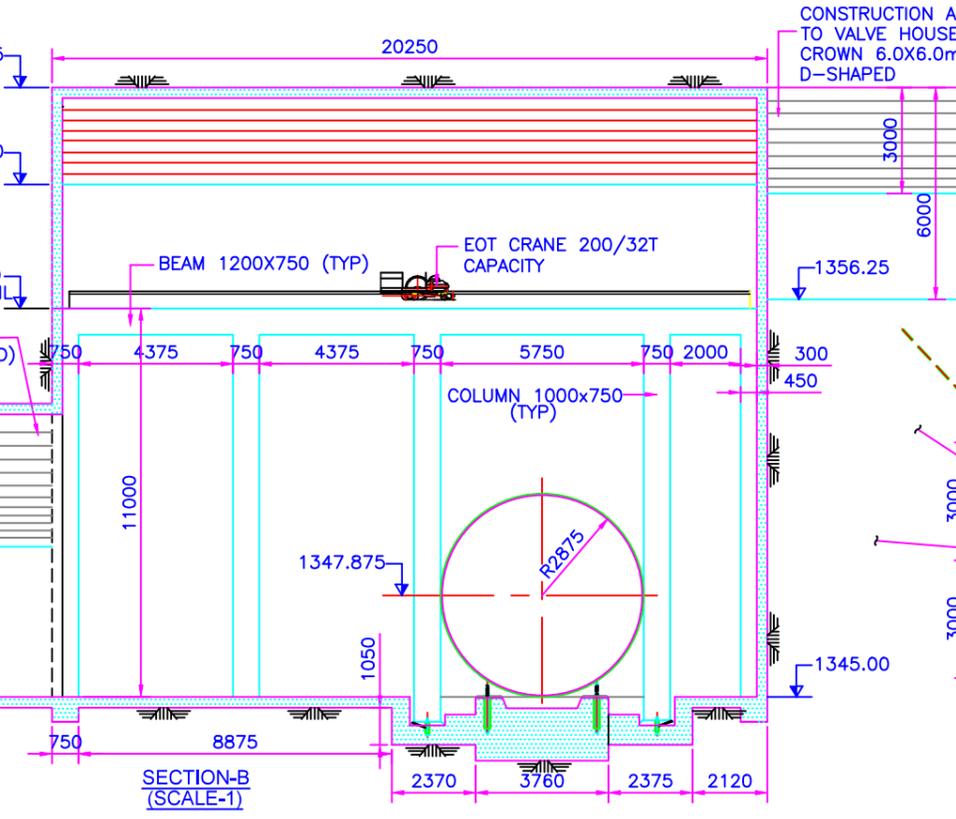
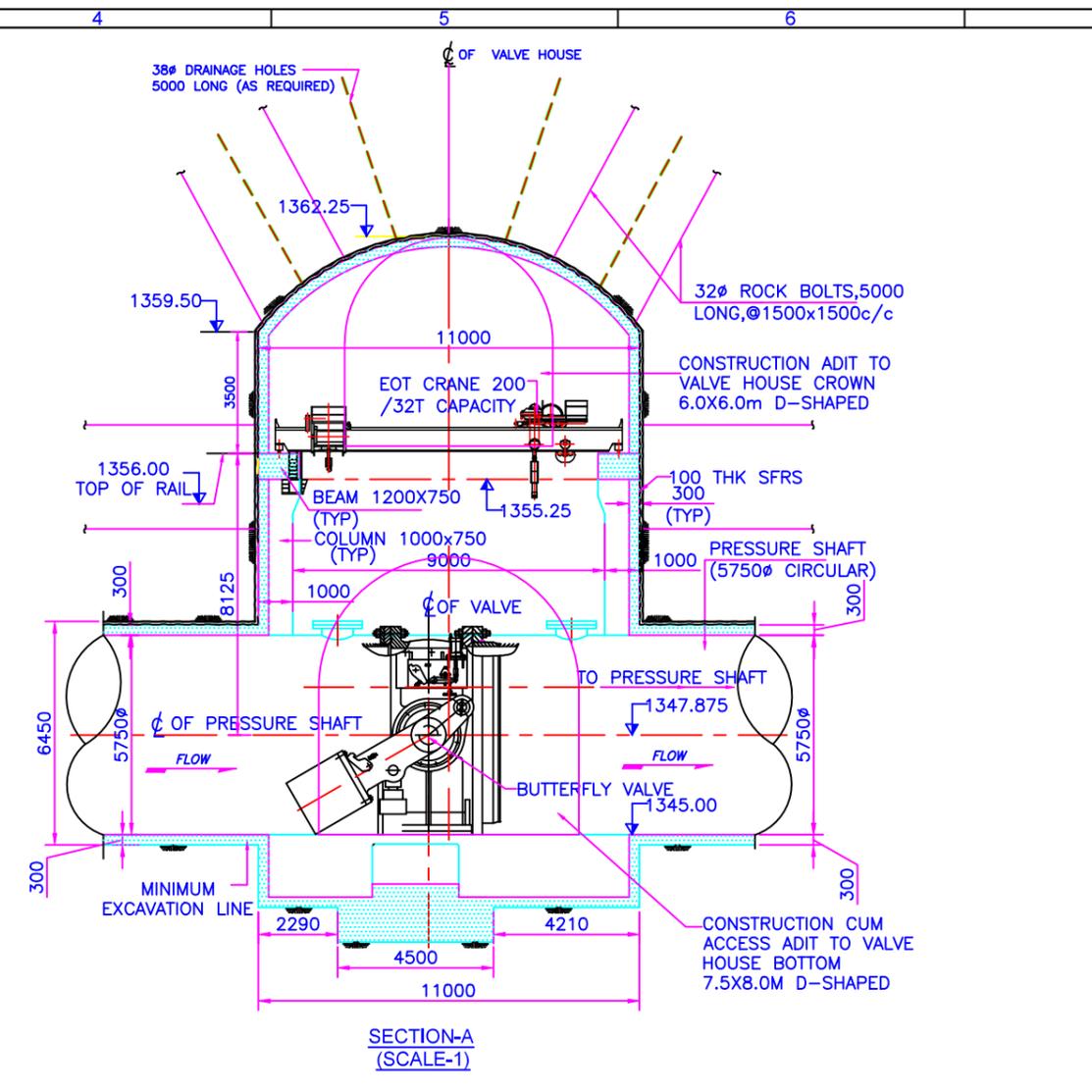
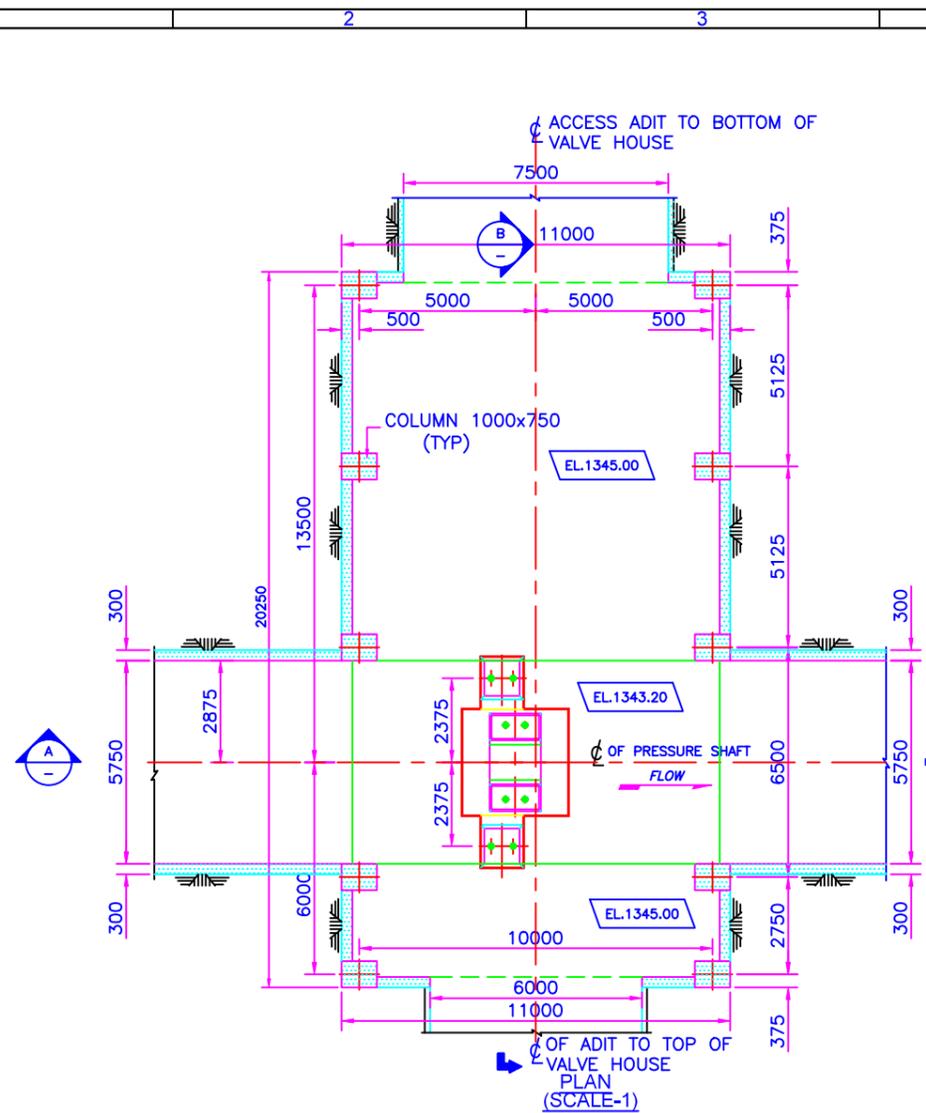
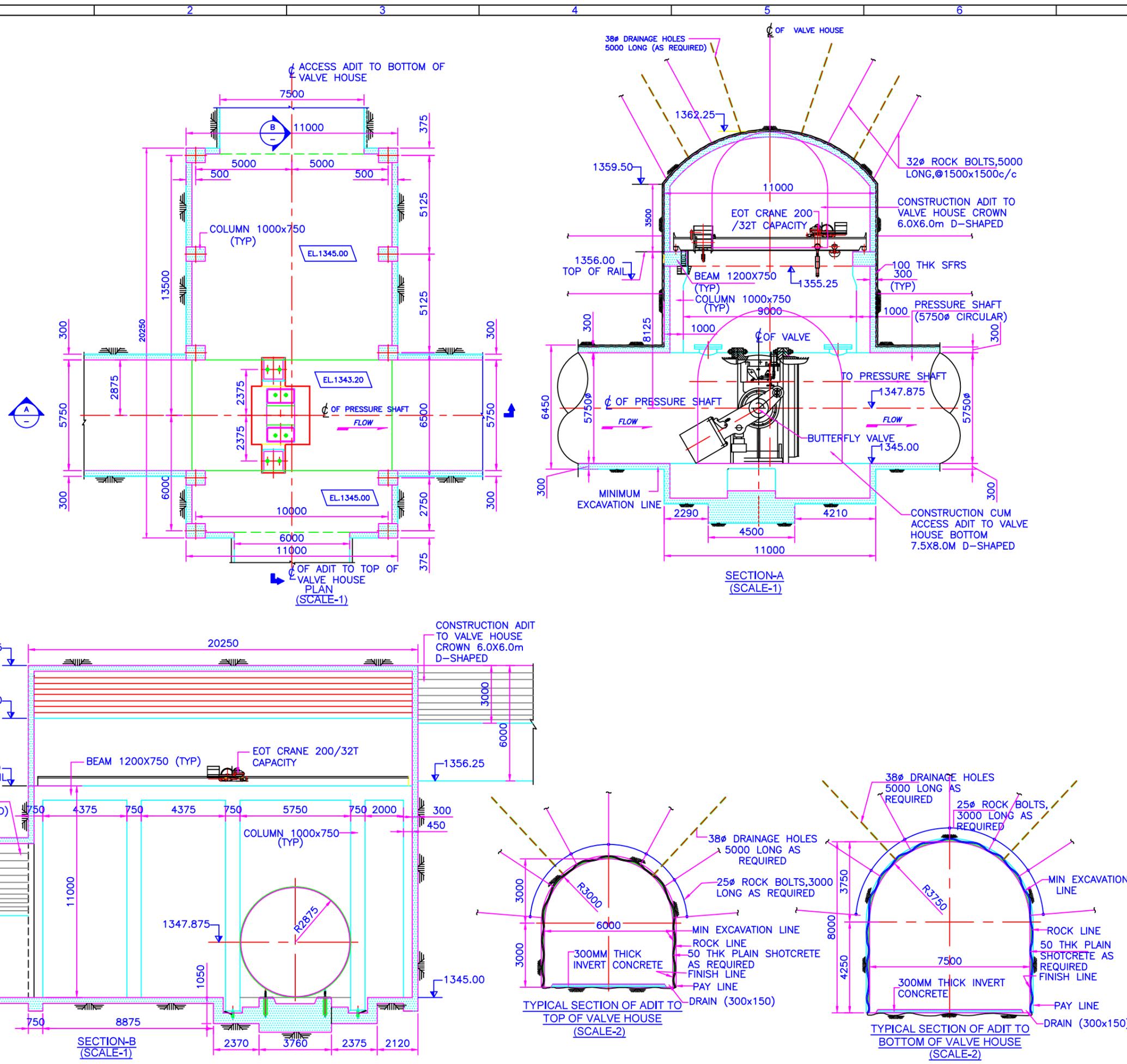
(A GOVT. OF INDIA UNDERTAKING)

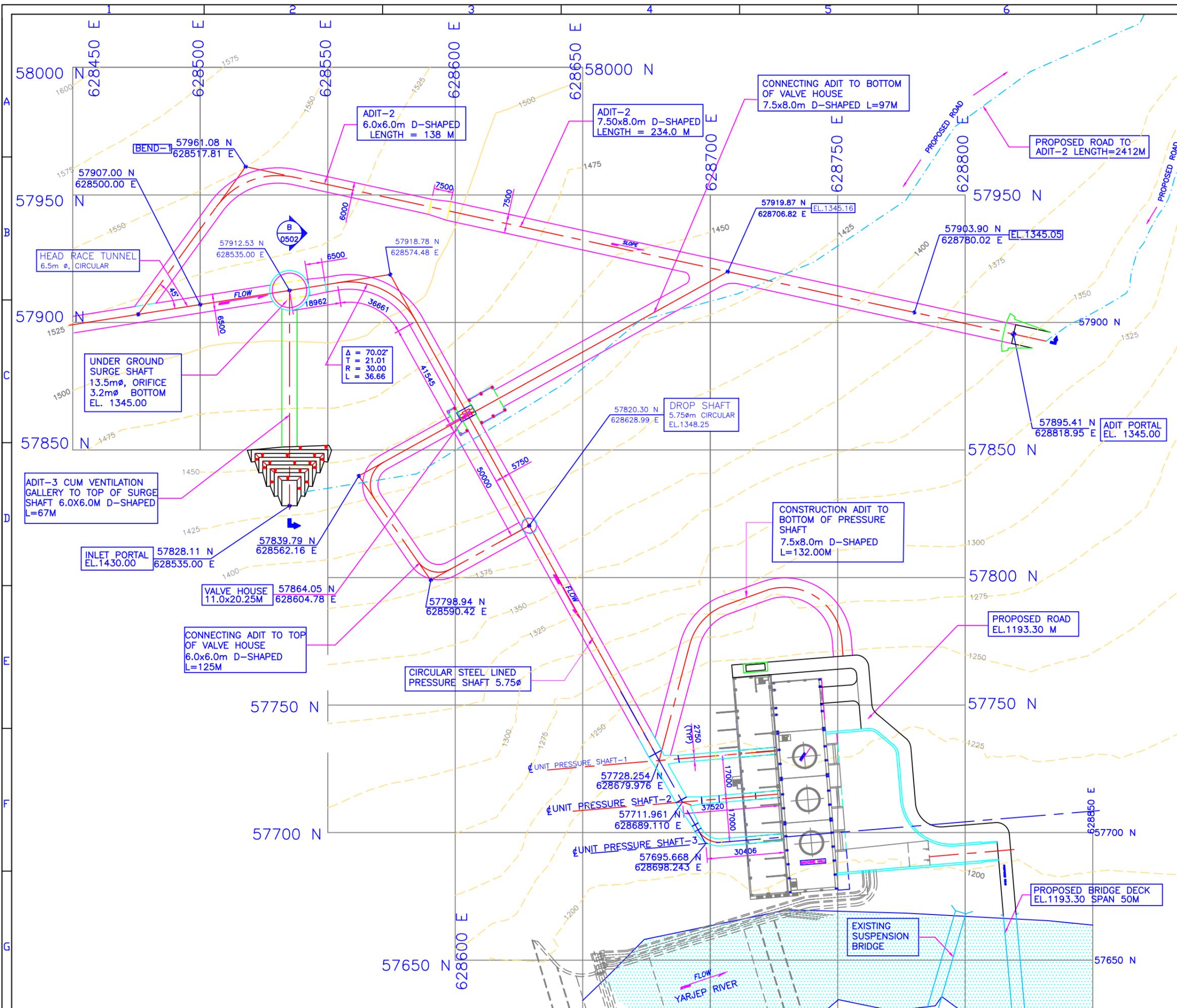
VALVE HOUSE PLAN AND SECTIONS

DRAWING NO : WAP/HEO/CD/TD/23

DATE : AUGUST, 2024

ORIGINAL PRINT SIZE : A3

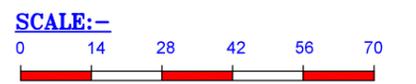




NOTES:-

1. ALL DIMENSIONS ARE IN MILLIMETRES AND ELEVATIONS IN METRES. UNLESS OTHERWISE SPECIFIED.
2. NO DIMENSION SHALL BE MEASURED FROM DRAWING. ONLY WRITTEN DIMENSIONS SHALL BE FOLLOWED.

FOR TENDER PURPOSE ONLY



SHEET 1 OF 1

CLIENT: **NORTH EASTERN ELECTRIC POWER CORPORATION LTD.**
(MINI RATNA, CATEGORY-I, A GOVT. OF INDIA ENTERPRISE)

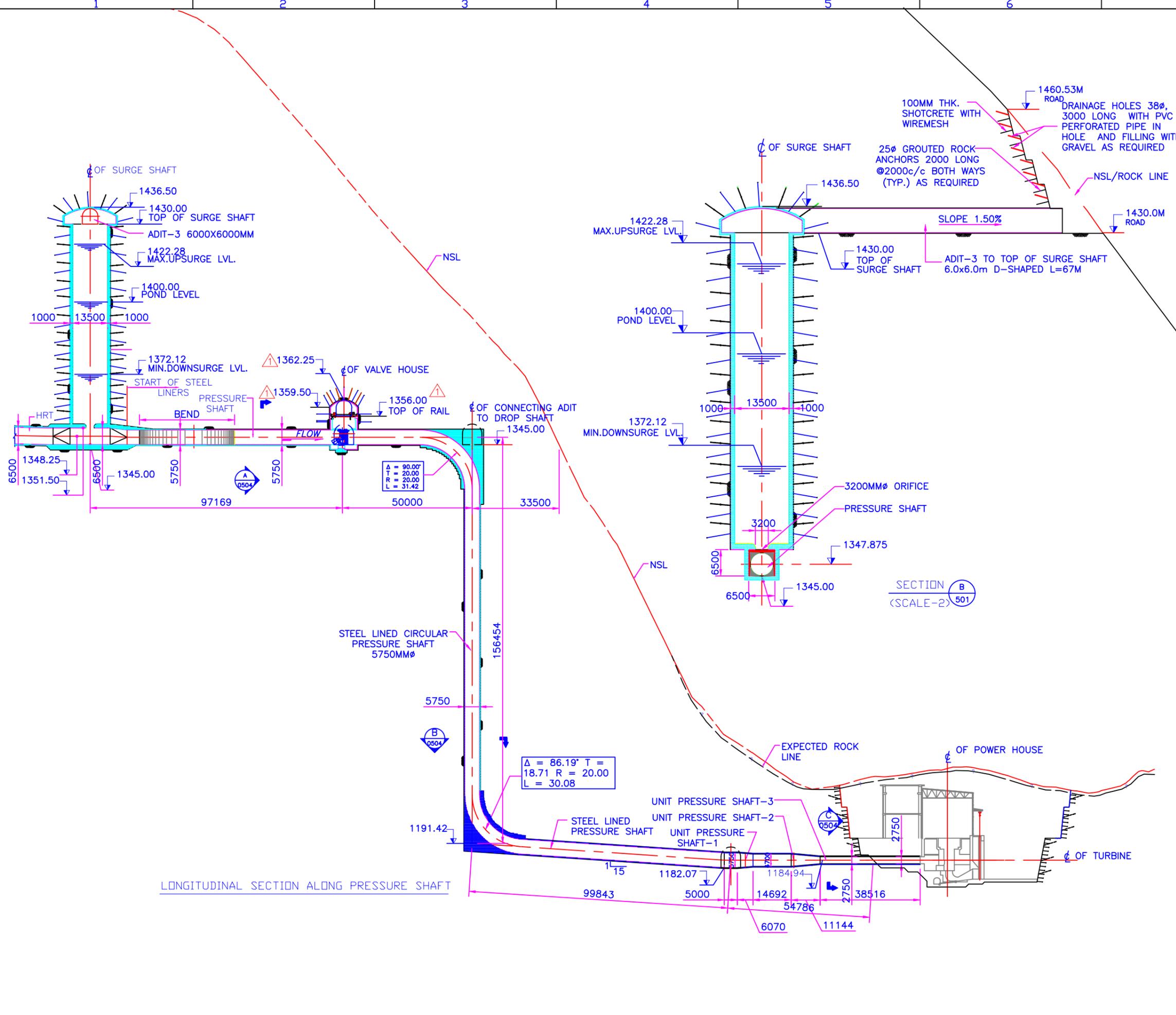
PROJECT: **HEO HEP (3x80MW) ARUNACHAL PRADESH, INDIA**

CONSULTANTS: **WAPCOS**
(A GOVT. OF INDIA UNDERTAKING)

PRESSURE SHAFT PLAN

DRAWING NO : WAP/HEO/CD/TD/26
 DATE : AUGUST, 2024 ORIGINAL PRINT SIZE : A3

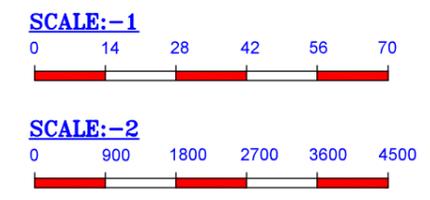
NOTES:-
 1. ALL DIMENSIONS ARE IN MILLIMETRES AND ELEVATIONS IN METRES, UNLESS OTHERWISE SPECIFIED.



CLASSIFICATION OF ROCK FOR PRESSURE SHAFT

S.NO.	CLASS OF ROCK	% OF TOTAL LENGTH	LENGTH
1.	II	33	124
2.	III	50	188
3.	IV	10	38
4.	V	7	26
TOTAL		100	376

FOR TENDER PURPOSE ONLY



SECTION **B**
 (SCALE-2) 501

SHEET 1 OF 1

CLIENT: **NORTH EASTERN ELECTRIC POWER CORPORATION LTD.**
 (MINI RATNA, CATEGORY-I, A GOVT. OF INDIA ENTERPRISE)

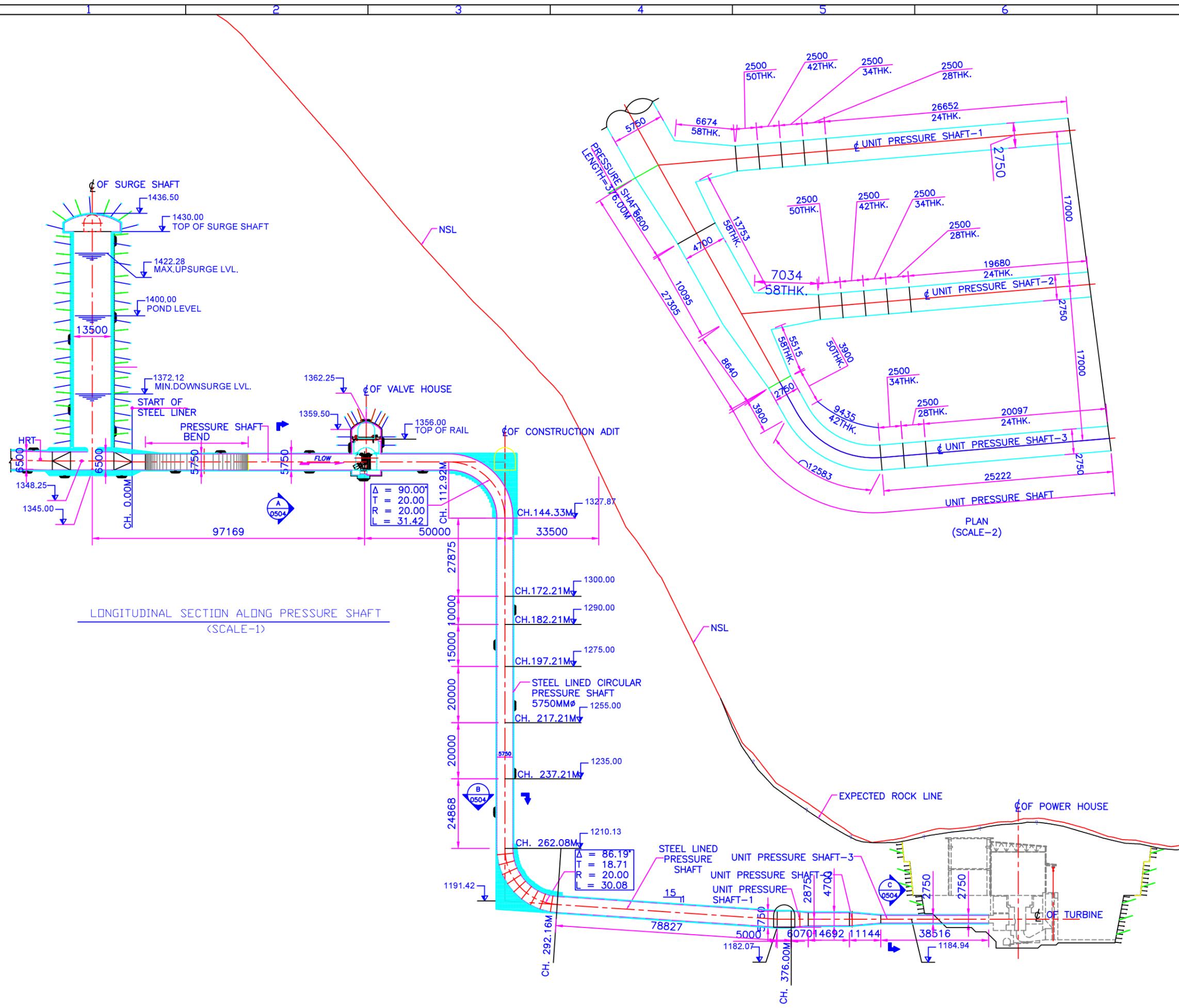
PROJECT: **HEO HEP (3x80MW) ARUNACHAL PRADESH, INDIA**

CONSULTANTS: **WAPCOS**
 (A GOVT. OF INDIA UNDERTAKING)

PRESSURE SHAFT AND ADIT-3 LONGITUDINAL SECTION

DRAWING NO : WAP/HEO/CD/TD/27

DATE : AUGUST, 2024 ORIGINAL PRINT SIZE : A3

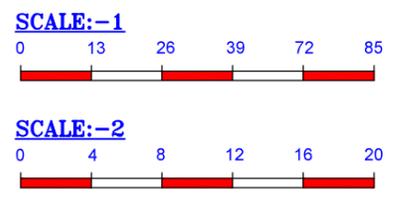


- NOTES:-**
1. ALL DIMENSIONS ARE IN MILLIMETRES AND ELEVATIONS IN METRES. UNLESS OTHERWISE SPECIFIED.
 2. NO DIMENSION SHALL BE MEASURED FROM DRAWING. ONLY WRITTEN DIMENSIONS SHALL BE FOLLOWED
 3. FOR SURGE SHAFT AND VALVE CHAMBER DETAILS REFER SEPARATE DRAWINGS.
 4. GRADE OF STEEL PLATE SHALL CONFORM TO SUMITEN 610 GRADE F

CLASSIFICATION OF ROCK FOR PRESSURE SHAFT

S.NO.	CLASS OF ROCK	% OF TOTAL LENGTH	LENGTH
1.	II	33	124
2.	III	50	188
3.	IV	10	38
4.	V	7	26
TOTAL		100	376

FOR TENDER PURPOSE ONLY



SHEET 1 OF 1

CLIENT: **NORTH EASTERN ELECTRIC POWER CORPORATION LTD.**
(MINI RATNA, CATEGORY-I, A GOVT. OF INDIA ENTERPRISE)

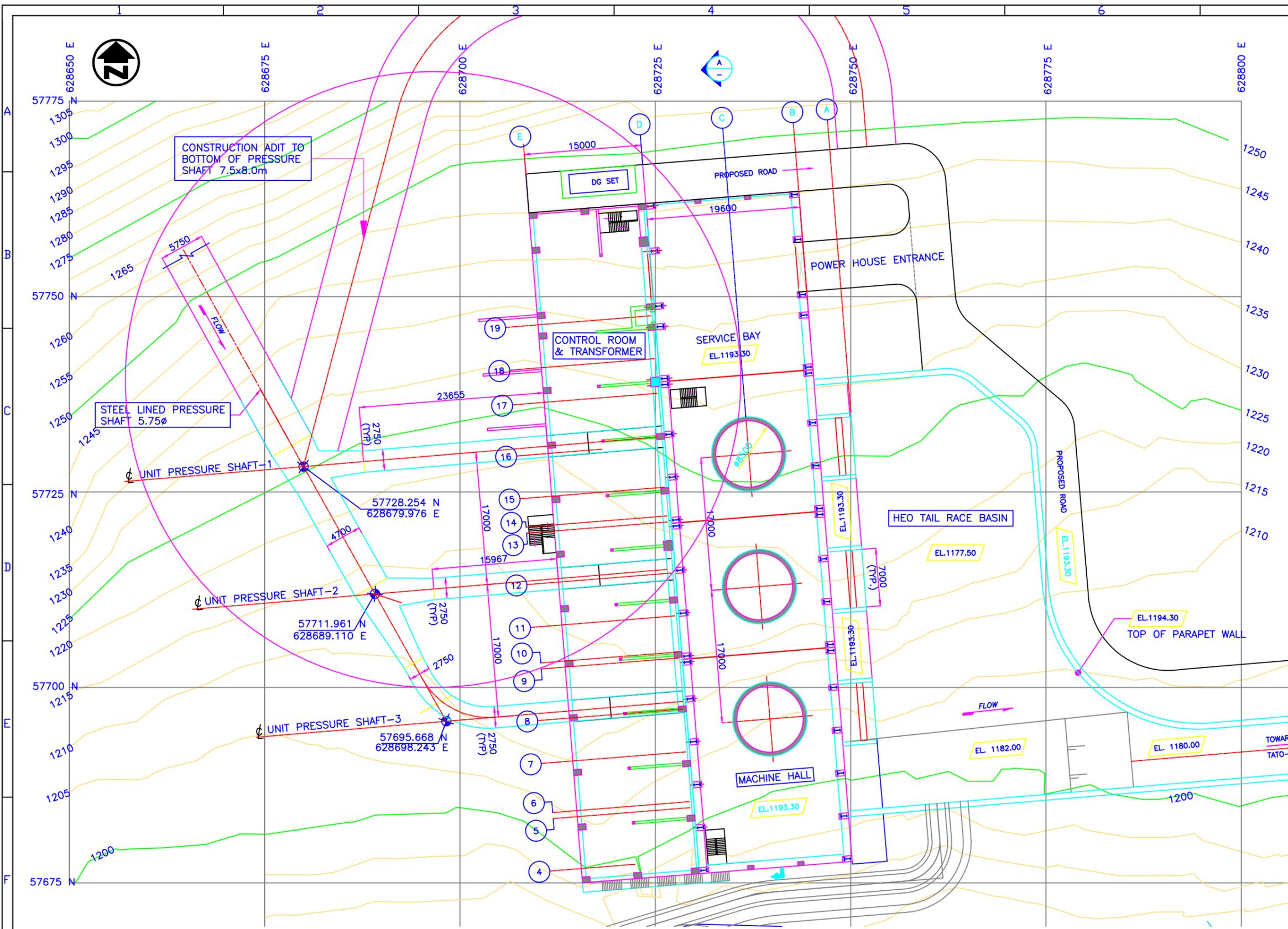
PROJECT: **HEO HEP (3x80MW) ARUNACHAL PRADESH, INDIA**

CONSULTANTS: **WAPCOS**
(A GOVT. OF INDIA UNDERTAKING)

PRESSURE SHAFT STEEL LINER DETAILS

DRAWING NO : WAP/HEO/CD/TD/28

DATE : AUGUST, 2024 ORIGINAL PRINT SIZE : A3



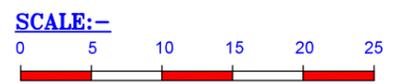
GENERAL LAYOUT PLAN

- NOTES:-**
1. ALL DIMENSIONS ARE IN MILLIMETRES AND ELEVATIONS IN METRES. UNLESS OTHERWISE SPECIFIED.
 2. NO DIMENSION SHALL BE MEASURED FROM DRAWING. ONLY WRITTEN DIMENSIONS SHALL BE FOLLOWED.
 3. THE LENGTH AND SPACING OF ROCK BOLTS ARRANGEMENT INDICATED IN THIS DRAWING MAY BE CHANGED/MODIFIED DURING CONSTRUCTION STAGE AS PER GEOLOGY
 4. GRADE OF STEEL PLATE SHALL CONFORM TO ASTM 537 CLASS-II

LEGEND:-

1.		CONCRETE M-15
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FOR TENDER PURPOSE ONLY



SHEET 1 OF 1

CLIENT: **NORTH EASTERN ELECTRIC POWER CORPORATION LTD.**
(MINI RATNA, CATEGORY-I, A GOVT. OF INDIA ENTERPRISE)

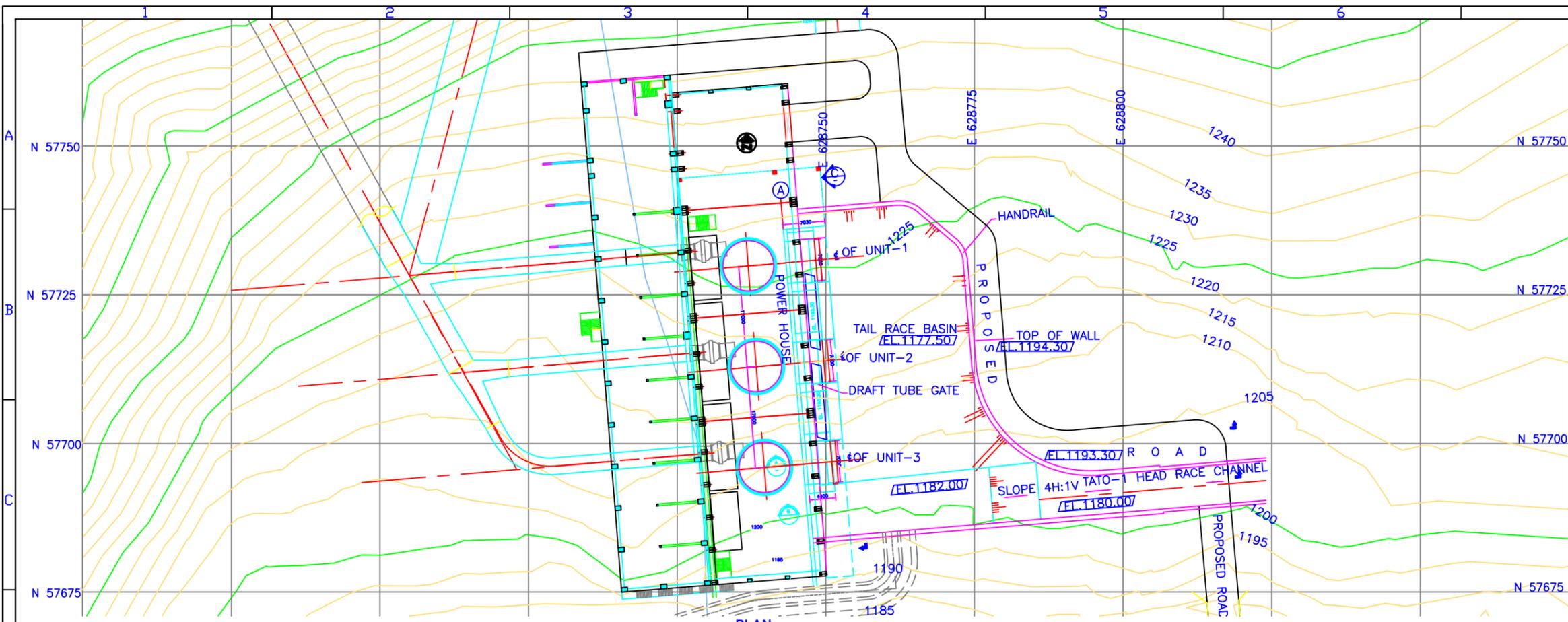
PROJECT: **HEO HEP (3x80MW) ARUNACHAL PRADESH, INDIA**

CONSULTANTS: **WAPCOS**
(A GOVT. OF INDIA UNDERTAKING)

POWER HOUSE GENERAL LAYOUT PLAN

DRAWING NO : WAP/HEO/CD/TD/30

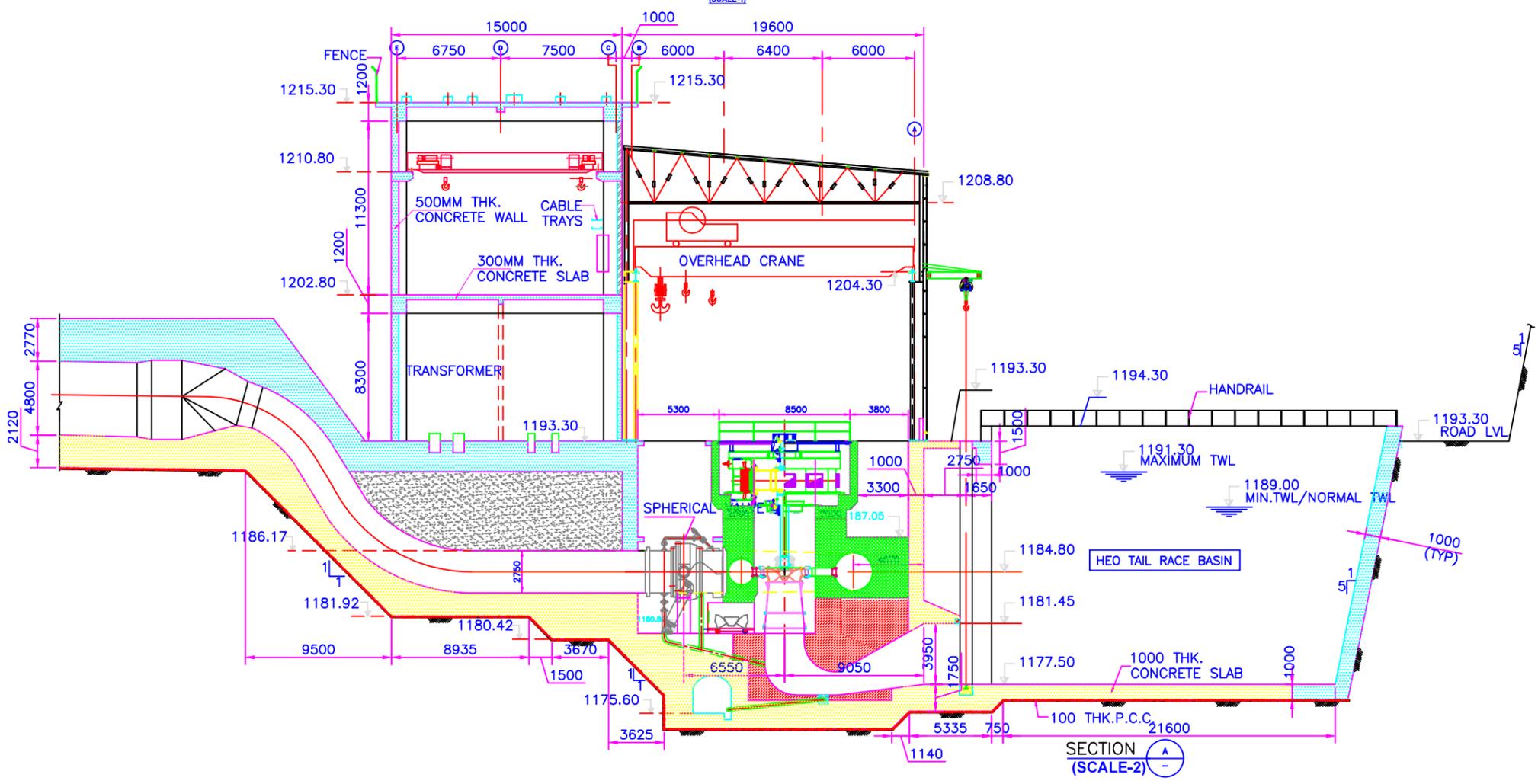
DATE : AUGUST, 2024 ORIGINAL PRINT SIZE : A3



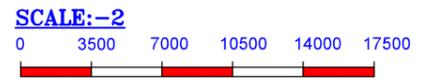
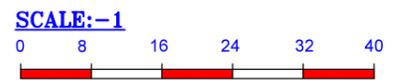
NOTES:-
 1. ALL DIMENSIONS ARE IN MILLIMETRES AND ELEVATIONS IN METRES, UNLESS OTHERWISE SPECIFIED.

LEGEND:-

1.		CONCRETE M-20 1st STAGE
2.		BRICK WALL



FOR TENDER PURPOSE ONLY



SHEET 1 OF 2

CLIENT: **NORTH EASTERN ELECTRIC POWER CORPORATION LTD.**
 (MINI RATNA, CATEGORY-I, A GOVT. OF INDIA ENTERPRISE)

PROJECT: **HEO HEP (3x80MW) ARUNACHAL PRADESH, INDIA**

CONSULTANTS
WAPCOS
 (A GOVT. OF INDIA UNDERTAKING)

POWER HOUSE TAIL RACE BASIN PLAN & SECTIONAL DETAILS

DRAWING NO : WAP/HEO/CD/TD/39

DATE : AUGUST, 2024 ORIGINAL PRINT SIZE : A3