



BHARAT HEAVY ELECTRICALS LIMITED
PROJECT ENGINEERING MANAGEMENT, NOIDA

Date-29-Oct-20

CORRIGENDUM- 05

PROJECT	:	(3X200 MW+3x500 MW) RAMAGUNDAM STAGE-I & II FGD
PACKAGE	:	GYPSUM DEWATERING SYSTEM
TENDER ENQUIRY NO	:	PE/PG/RGM/E-6515/2020 Dt. 05/09/2020
SUBJECT	:	REGARDING REPLY OF PRE BID QUERY

Type of Corrigendum			
Technical Corrigendum -	☒	Commercial Corrigendum -	☐

In reference to the above mentioned tender enquiry for **GYPSUM DEWATERING SYSTEM** package

Please find attached the reply of Pre-Bid query asked by bidders along with this Corrigendum no.5 ,

All the other terms and conditions of the tender enquiry remains same.

Yours faithfully,

For and on behalf of BHEL



NTPC RAMAGUNDAM-I & II
(3 X 200 MW + 3 X 500 MW)

PACKAGE: GYPSUM DEWATERING SYSTEM

SPECIFICATION No: PE-TS-467-571-A101

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PRE BID CLARIFICATIONS - 1



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S I	Clause	Page No.	Statement of the referred clause	Clarification Required by Bidder(s)	BHEL's Clarification
1	5.7.2	53 of 537	clarified water analysis	Provide the temperature of the clarified water.	Refer Table 4 page 34 of 537.
2	2.1.1.5	39 of 537	Bidder to consider the requirement of the vertical seal water sump pumps (2 nos., 1 working + 1 stand by) in his scope for pumping the water expended from the Vacuum pump(s) to the Cake Wash Tank(s). The system shall be complete with pumps, valves, instruments and accessories along with associated supports, fasteners, gaskets etc. with drive (IE3 motor). Also, bidder to include all connection bolts/nuts/washers for installation. Required instruments and any safety device shall be supplied.	Please provide the PID for vertical seal water sump arrangement or Bidder will consider minimum requirement.	P&ID of vertical seal pump with instrumentation requirement is already shown in "P & ID - Gypsum Dewatering System" page 418 of 537. Bidder to refer clause 2.0 of Sub section C4, page 218 of 537. Further, refer relevant clause in Sub section C4 for redundancy for instrumentation.
3	2.1.1.6	39 of 537	Vent fan including enclosure and its arrangement: Two (2) numbers	Bidder will consider Centrifugal type of vent fan. please confirm	Noted. Bidder to decide capacity and head of fan to meet system requirement in line with the tender specification.
4	2.1.1.6	39 of 537	Vent fan including enclosure and its arrangement: Two (2) numbers	Client to specify the MOC of Fume enclosure & ducting if any to be maintained.	Bidder to note that MOC of fan as well ducting shall be as per proven practice meeting the system requirement.
5	2.1.1.3	39 of 537	Vacuum belt filters complete with Accessories including discharge chute up to the gypsum conveyor skirt board.	Belt width & skirt board inside dimension to be provided to check the feasibility of proposed arrangement & profile of chute & angle.	Bidder to refer "Layout details of Gypsum Dewatering Building" page 412 & 413 of 537. The width of Gypsum conveyor belt is 800 mm and that of the skirt board is 533 mm. Revised "Layout details of Gypsum Dewatering Building" Rev 01 is also attached as Annexure-A to this pre-bid clarifications..
6	2.1.1.9	40 of 537	Scope of below-mentioned interconnected piping (slurry, air and water pipes) along with valves, rubber lining (wherever applicable), instruments, valves, supports, gaskets, fasteners and accessories which is non-integral to Gypsum dewatering system is limited to engineering only and supply shall be made by BHEL. Engineering includes layout & routing of pipes, preparation of isometric drawing and BOQ:	We understand all the drawings required for the engineering shall be provided by BHEL (Drawings for valves, pumps and other requirements). Please confirm.	All relevant input drawings shall be made available during detailed engineering of the package.



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7	2.1.5	43 of 537	Any other items required not covered above but required for the completeness of the system; it shall be included in the offer and shall be supplied by the Bidder/supplier. Bidder shall refer to the P&ID enclosed in Annexure-IV, Sub-Section-D of Section-I for the items under the bidder's scope. All the items indicated in the P&ID are minimal requirements.	Items shall be supplied as per Client P&ID to make the system operable. If any specific requirement, please define.	Tender Specification requirement is clear. However, any specific query / clarity required may be sought by the bidder.	
8	2.3	43 of 537	TERMINAL POINTS	TP point to be indicated in building GA for clarity. As mentioned in clause no. 2.3, point no.6 , TP distance at 5 meter from building boundary. Please identify the column & locate the same in GA drawing.	Coordinates shall be provided during detail engineering of the package.	
9	3.1	44 of 433	Codes & Standards	Design & Material shall be as per latest Indian Standard / Equivalent standards. Please confirm.	Latest edition of Codes and Standards mentioned at clause 3.1 and elsewhere in the tender Specification to be followed.	
10	4.3.4	46 of 537	The complete frame of the filter and all parts in contact with gypsum shall be made of corrosion resistant material or shall be provided with corrosion resistant liners of proven design.	since frames are not in contact with gypsum slurry hence shall be made of mild steel epoxy coated and parts which are in contact with slurry are mad of PP or MSRL. This is as per proven practice in similar application and same has considered.	Bidder is to follow the specification. The complete frame of the filter and all parts in contact with gypsum shall be made of corrosion resistant material or shall be provided with corrosion resistant liners of proven design. Accordingly, bidder may consider 'Corten / Weathering Steel' or 'SS 304' or any other suitable corrosion resistant material conforming to ASTM A606-4, A588, A847 etc. as applicable. The material so selected, should be meeting the strength requirement of the belt filter.	
				As clause 4.3.4 does not clearly specify the MOC requirement for the filter frame, and as per our proven design for our earlier HBF installations, our Filter MOC considered is as follows:		
				<table><tr><th>Description</th><th>Details</th></tr><tr><td>Filter Frame</td><td>A36 Steel or equal</td></tr><tr><td>Surface Preparation / Coating for Steel parts / items</td><td>SSPC-SP10 / (1) Coat of 4 Mils of Red Oxide Primer+ (1) Coat of 4 Mils Epoxy pant (RAL5003). Total paint thickness of (8) Mils DFT</td></tr></table>		Description
Description	Details					
Filter Frame	A36 Steel or equal					
Surface Preparation / Coating for Steel parts / items	SSPC-SP10 / (1) Coat of 4 Mils of Red Oxide Primer+ (1) Coat of 4 Mils Epoxy pant (RAL5003). Total paint thickness of (8) Mils DFT					



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				Hence, request you to kindly confirm whether we can quote considering the above mentioned MOC, or should we consider SS 304 for Filter considering the clause 4.3.4.	
11	4.3.10	47 of 537	The filtrate from gypsum slurry and from cake washing shall be taken to a separate vacuum receiver tank(s) as per the proven practice of the supplier. Each belt filter shall have an independent vacuum pump.	Filtrate from slurry and cake washing will be collected in the single receiver, this is the proven practice hence Separate receiver tank is not required (as per Client PID dwg no : 3-FW-000-01095 filtrate is collecting in single receiver).	The P & ID attached with tender specification has to be followed.
12	4.3.11	47 of 537	Gypsum cake from each belt filter shall be discharged through a hopper onto belt conveyor being provided by the Employer.	Bidder understand that hopper means discharge chute only, Gypsum cake from each belt filter shall be discharged through a chute arrangement instead of hopper onto belt conveyor indicated in GA drawing.	Bidder's understanding is correct. Further note that in "Layout details of Gypsum Dewatering Building" page 412 of 537 cut out for discharge chutes have already been indicated.
13	4.5.6	48 of 537	All pumps shall be fitted with suction and discharge pressure gauges.	Bidder will supply pressure gauge as per Client PID.	The P&ID provided with tender specification has to be followed. However, if the pressure gauge is required at the pump suction for reliable operation; the same shall be provided to meet system control requirement.
14	4.4	47 of 537	Vacuum System	Client to specify the Margin of Motor for installed power over the Absorbed kW required to select the motor power	Bidder to refer Clause 4.00.00 (b) page 186 of 537 of the Tender specification.
15	4.4	47 of 537	Vacuum System	Client to specify whether Bidder can Choose either among rpm 1000 or 1500 rpm speed motor for vacuum pump?	RPM of vacuum pump shall be as per system requirement & should be of proven design of the sub supplier approved during detailed engineering.
16	4.4.2	47 of 537	The vacuum pump shall be of low speed liquid ring type of proven design.	Client to specify the low speed range for selecting the vacuum pump	
17	4.4.5	47 of 537	The vacuum receiver and pump internals shall be suitably lined to protect against the corrosive environment.	Vacuum pump shall be without linings. Material of Construction of Vacuum Pump: MOC of vacuum pump shall be as below mentioned or better material as per SPECIFICATION No: PE-TS-467-571-A101 Page 3 of 5 1) Casting: ~ 2% Ni Cast Iron (GB 9439, HT 250)/ASTM A48, CLASS35 2) Shaft: Carbon Steel, En-8 or better 3) Impeller: Nodular Iron (ASTM A536,	Bidder to follow tender specification.



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				Gr.65-45-12) or better 4) Shaft Sleeve :(If applicable) Stainless Steel	
18	4.4.6	47 of 537	Each vacuum receiver tank(s) shall be provided with slide plate type pneumatic vacuum breaker. The plate shall be stainless steel with a min. thickness of 3 mm.	Since we are maintaining sufficient barometric height and it is enough to break the vacuum. Further Bidder shall provide vacuum breaker valve in Vacuum line to prevent excess vacuum generation if require.	Bidder to follow Tender specification.
19	4.5.8	48 of 537	Design pumps not to be damaged during reverse rotation at up to 150% of design RPM, at full discharge head in the event that a pump trips while the other operating pump remain on line.	Reverse rotation is not recommended. To have check valve, Immediately after discharge flange of pump.	The mentioned condition is for design. For routine operation, Check valve/ NRVs have to be considered as per requirement of system.
20	4.5.8	48 of 537	Pumps shall have stable head-capacity characteristics curve from run-off to shut-off. Shutoff head should be 115% of Best Efficiency Point (BEP).	We propose Shut-off head should be minimum 110 % instead of 115% of Best Efficiency Point (BEP). Please confirm.	Bidder to follow Tender specification.
21	4.5.15	48 of 537	The pumps shall have mechanical seals of cartridge type with self-lubrication sliding ring cartridges. The static part will be mounted on the seal plate with circumferential ring (O ring) or another flexible sealing ring. Built in seal design will not be accepted.	The pumps shall be supplied with mechanical seals of single cartridge type with self-lubrication arrangement. However, other clause i.e " The static part will be mounted on the seal plate with circumferential ring (O-ring) or another flexible sealing ring & built in seal design will not be accepted" is not applicable. Please confirm.	Bidder to follow Tender specification.
22	4.5.19	49 of 537	The material and thickness of the liners of slurry pumps shall ensure a minimum service life of 2 years before replacement. All the wear parts of the pump shall be guaranteed for a minimum wear life of not less than 14000 hours.	This clause is for slurry pumps only not for cake wash, Filter belt cloth wash and sump pump, slurry pumps are in client scope.	Filtrate extraction pumps to be installed at outlet of vacuum receiver tanks are slurry pumps which are in bidder's scope.
23	4.5.22	49 of 537	A common base plate shall be provided for pump assembly & Motor and the same shall be rigidly constructed, adequately braced and provided with finish pads for mounting pump.	Noted the requirement, but the same shall be confirmed later on receipt of firm vendor Inputs.	Bidder to follow Tender specification.
24	4.5.38	50 of 537	Equipments requiring monitoring during regular operation shall be approachable from the ground floor through staircase. Staircase with minimum width of 1200 mm shall be provided for approach to elevated structures at 5 m height from the nearest platform. Below this height, a vertical ladder with minimum clear width of 600 mm may also be	The Hydrocyclone platform and HBF platform are in Bidder scope, others platform and staircase is in client scope, please confirm.	Bidder to note that approach platform with access ladder for equipments in bidder's scope shall be provided by bidder. Regarding HBF, bidder to provide 2m (min) wide platform for each belt filter as



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			acceptable.		per Clause 4.3.12, Page 47 of 537 or it may provide a common platform of 3.3m (approx.) width. The "Layout details of Gypsum Dewatering Building" page 412 & 413 of 537 is for reference purpose. In case, common platform for HBF is provided as mentioned above, a movable platform along with access ladder shall be provided for approaching equipment/item on other side of HBF. A 1000 mm wide platform with suitable approach shall be provided by the bidder for each hydro cyclone as per Clause 4.5.36, Page 49 of 537.
25	4.5.34	49 of 537	Bidder to provide capacity of crane or hoist required for safe material handling and the details of heaviest component to be handled.	Details shall be provided during detail engineering. The handling facility for pumps in the layout shall be confirmed by Client to finalise the same.	Bidder's understanding is correct.
26	5.4	51 of 537	Hydro cyclone backpressure shall not exceed 20m H	Please clarify the requirement and Hydrocyclone feed inlet pressure will depends on the Hydrocyclone Vendor selection design to achieve the percent solids, Tonnage and PSD distribution.	Bidder to follow Tender specification.
27	8.03.04 and 10.0.d	55 of 537	3d Modeling	There is no 3d modeling of layout from Bidder side. Bidder shall provide the basic engineering of Equipment layout with load data for the scope of supply of equipment and platforms by Bidder. Rest all detail engineering of complete building by the client. The (Layout drawings) inputs to client shall be in AutoCAD format. Client to confirm the same.	Bidder to refer cl 10.0 (d) page 55 of 537 wherein 3D modelling has already been indicated under exclusion.
28		74 of 537	General Tech Spec- Part C-NTPC Spec.	This spec. is applicable for main contractor & not to BHEL's sub-contractors. Please confirm.	Relevant clauses as applicable for the package are to be followed.
29	7.02.00	84 of 537	Lifting devices i.e. hoists and chain pulley jacks ,etc. shall be provided by the	Not in Bidder scope. Client to confirm	Bidder to refer Clause 10.0 (c), page 55 of 537, wherein Cranes & Hoists for



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			contractor for handling of any equipment or any of its part having weight in excess of 500 Kgs during erection and maintenance activities.		Material handling have already been indicated under exclusion.
30	8.00.00	84 of 537	DOCUMENTS, DATA AND DRAWINGS TO BE FURNISHED BY CONTRACTOR	This clause shall be discussed during meeting (As mutually agreed).	Bidder to refer Note 1 of Annexure V, "Master drawing List with schedule of submission" page no 432 of 537.
31	8.03.01	84 of 537	BASIC ENGINEERING DOCUMENTATION & DETAILED ENGINEERING DOCUMENTS	This spec. is applicable for main contractor & not to BHEL's sub-contractors. Please confirm. Bidder will provide the basic engineering documents and Detailed Engineering documents will be (As per scope of supply) as per mutually agreement.	The referred clause is of 'General Technical Requirements' of End client. The points relevant to bidder has to be followed. Further, Bidder to refer Annexure V, sub section D, page 428 to 433 of 557 of technical specification for drawing document submission schedule.
32	11.00.00	101 of 537	Equipment Bases:- A cast iron or welded steel base plate shall be provided for all rotating equipment which is to be installed on a concrete base.	Base frames for all pumps and vacuum pumps shall be MS Fabricated epoxy painted. PI confirm. Also the Hold down/Anchor fasteners for foundations shall be MS Epoxy painted.PI confirm	Noted. Bidder to meet the system requirement.
33	7.15.00	189 OF 537	The size and number of cables (for HT motors) to be intimated to the successful Contactor during detailed engineering and the Contactor shall provide terminal box suitable for the same.	It will decided by manufacturer according to the frame size	During detail engineering bidder will inform the size and number of cables as per their equipment rating/s. BHEL shall select the cable size as available from the procured lot and inform the same. Bidder shall provide terminal box suitable for the same.
34	9	214 of 537	All transmitters shall be suitably grouped together and mounted inside (i) Local Instruments Enclosures (LIEs) in case of open areas of the plant and (ii) In Local Instrument Racks (LIRs) in case of covered areas.	LIE/LIR panel will be applicable only for PIT and TIT, Kindly clarify.	Bidder to follow Tender specification.
35	9	212 OF 537	LIE/LIR Panel	LIE/LIR panel will be applicable only for PIT and TIT, Kindly clarify	Bidder to follow Tender specification.
36	30	217 of 528	Local control panel and VFD panel, if any required for operation shall be in bidder scope.	as per PE-TS-467-571-A101 Technical specification pg. of 182 mentioned 11KV/3.3/415V Switch gears are in BHEL scope, Hence LCP panel and VFD panel will be in BHEL scope	Bidder's understanding wrt to Switchgears is correct. However, it does not include the VFD panel and same shall be in bidder's scope as per clause 30, Sub section C4, page 214 of 526, Specific Technical Requirements (C&I).



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37	3	218 of 537	MEASURING INSTRUMENTS (PRIMARY AND SECONDARY)	Instruments will be as per Client PID only, please confirm.	Bidder to refer clause 2.0 of Sub section C4, page 218 of 537.
38	5.02.00	258 OF 537	415 V/690 V LV VFD: The Variable frequency drive (VFD) system	Client scope, please confirm.	Refer reply at SI No. 36 above.
39	17.00.00	262 of 537	VFD PANEL REQUIREMENTS	as per PE-TS-467-571-A101 Technical specification pg. of 182 mentioned 11KV/3.3/415V Switch gears are in BHEL scope, Hence LCP panel and VFD panel will be in BHEL scope	Refer reply at SI No. 36 above.
40	19.00.00	263 of 537	HT SWITCHGEAR	as per PE-TS-467-571-A101 Technical specification pg. of 182 mentioned 11KV/3.3/415V Switch gears are in BHEL scope	Bidder's understanding is correct.
41	1.00.00	269 of 537	CONTROL DESK & PANELS	not in BIDDER scope of supply, please confirm	Bidder to refer clause 1, Sub section C4, page 212 of 526, Specific Technical Requirements (C&I), wherein it is indicated that GYPSUM DEWATERING SYSTEM (GDS) shall be operated from DCS (BHEL's scope).
42	1	271 of 537	LOCAL PANELS, This specification covers the Design, Manufacture, Inspection and Testing at the manufacturer's works, proper packing for transportation and delivery to site, supervision, erection, and commissioning at site of Local Panels required for control and monitoring of the Auxiliary Plant & Equipment.	Bidder will supply Junction boxes for the instruments, HBF can be controlled from client DDCMS.	Noted. However local control panel, if envisaged by bidder for their system operation, same shall be provided.
43	2.b	390 of 537	Mandatory spares list 2,b) Belt - 2 Sets	For spare belt - bidder shall supply wear belt or sealing belt	Bidder to note that a set shall mean complete replacement for one equipment. All type of belts shall be covered accordingly.
44		412 of 537	GA of GDWS	Please provide drawing in Acad version for FGD portion to workout the requirement & check the allocated space adequacy.	The "Layout details of Gypsum Dewatering Building" page 412 & 413 of 537 is for reference purpose. Same is to be finalized during detail engineering.
45		412 of 537	Elevation view of conveyor is not provided in layout	Client to provide the same	Extracts of elevation view of conveyor attached for reference as Annexure-B to this pre-bid clarifications.



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46	3	432 of 537	Only manual calculation with authentic supporting literature (e.g. extracts of hand Book/standard/codes) shall be acceptable. All design calculations and drawings shall be in SI system only.	The calculation done by reputed software, please confirm	Noted. However, all calculations shall be with authentic supporting literature (e.g. extracts of hand Book/standard/codes) shall be acceptable. All design calculations and drawings shall be in SI system only.
47	1.4	515 of 537	The vacuum box shall ensure tight sealing with the belt/cloth and shall be of proven design. MOC of Vacuum Box Should be preferably UHMW-PE	MOC of the Vacuum Box shall be Polypropylene (PP) material, which is the proven practice for the similar type of application.	Tender specification requirement is clear. However, bidder can propose any material equivalent or superior to UHMW- PE during detail engineering.
48	III-B	517 of 537	For sealing of inspection doors labyrinth type arrangement to be provided.	For sealing of inspection doors of chute rubber gaskets shall be provided instead of labyrinth as it is static / stationary equipment. Please confirm.	Bidder may propose better proven solution for finalization during detailed engineering.
49	III-C	518 of 537	Complete chute work in the region of flap gates shall be fabricated from 20 thk TISCRAAL or equivalent.	Please confirm the requirement of flap gate & its location in layout.	Flap gate is not applicable.
50	III-C	519 of 537	On e (1) no. chute blockage switch for each belt filter of proven type (subject to approval of the employer) shall be provided. Chute blockage switch shall trip the feeding conveyor in case of Chute blockage and protect the feeding conveyor equipment.	Since chute is around 2.4 m wide and 0.8 m width, chances of Cake blockage in the chute is less, as per the previous experience, it is not required for HBF Discharge chute. Hence supply is excluded from bidder scope.	Bidder to follow Tender specification.
51				Drip tray (civil work) design, Engineering and supply is in Client scope.	Confirmed. However, bidder to provide the input of the drip tray during detail engineering.
52		412 of 537	Conveyor location	Please mark Centre line of conveyor w.r.t. to belt filter in GA drawing. BHEL to provide the conveyor details to finalise the profile of chute at conveyor feeding area (Skirt board inside width, length & height.)	Conveyor location is already indicated in the drawing attached with specification. However further details shall be provided during detailed engineering.
53			As per Layout drawing, Bucket Elevator, Lime feeding system, compressed air system marked in vendors scope	These scope of engineering and Supply is Excluded from Bidder scope, please confirm	These systems are excluded from the Gypsum Dewatering package and they are already marked under respective system supplier's scope in the layout drawing.
54			Conveyor location	TIPL battery limit ends at bottom of discharge chute. Belt conveyor selection & conveyor profile & detailing by others.	Bidder's understanding is correct.



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55	19.00.00	104 of 537	Colour coding	Vendor bought out equipments shall be as per vendor standards of colour coding and painting specs?.PI confirm	Details shall be finalized during detailed engineering.
56	2.a.5	516 of 537	The pumps shall be connected to its motors by flexible couplings. All couplings shall have suitable rigid steel coupling guards having closed ends and anchored to the base plate.	Bidder generally suggest V- Belt driven Vacuum Pumps, which has the option to vary the rpm by changing the pulley diameter if required. Client to confirm whether v-belt pump is ok?	Vacuum pump drive arrangement shall be selected by bidder to meet system requirement as per proven practice and shall be approved during detailed engineering.
57	1.0.II.a.7	516 of 537	Impeller Tip speed to be kept in range of 13-22 m/sec.	provide the tip speed of Vacuum Pumps need to maintain.	Tip speed of Vacuum pump shall be in range of 13-22 m/sec.
58				Cake wash, Cloth wash and Filtrate pumps shall be direct driven pumps through spacer coupling or V-Belt connection as per pump Vendor standard.-.Please confirm	Direct driven pumps through couplings to be provided.
59	a	518 of 537	The cake/cloth wash pumps shall be horizontal centrifugal type designed for continuous operation with semi-open or closed impeller. Casing, Gland and Stuffing Box shall be of 2.5 Ni Cast Iron to IS:210 Grade FG 260 or equivalent. Impeller, Wearing rings (as applicable) shall be of Stainless Steel -316 grade and Shaft & Shaft sleeves shall be of SS-410 grade.	Noted.PI specify the MOC for filtrate pumps. Else Bidder shall select the same and proceed as per process requirements.	Bidder may note the typical MOC of Filtrate Extraction Pumps as follows: a) Casing: 1. Ductile Iron (65-45-12, ASTM A536) with replaceable rubber liner- 14000 hours to be guaranteed. OR 2. Ductile Iron with Hi Chrome liner – 14000 hours to be guaranteed. OR 3.Hi Chrome (ASTM 532 Grade IIIA) - 24000 hours to be guaranteed. b) Impeller: Hi Chrome or superior material with 14000 hours guarantee. c) Solid Shaft: Duplex 2205 /EN8D /EN9 d) Shaft sleeve at mechanical seal: CD4MCU ASTM A 743/ Duplex 2205 e) Base Plate: Carbon steel with Epoxy Coating



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					Bidder shall provide MOC of proven design to be approved during detailed engineering as per system/process requirement. The material and thickness of the liners shall ensure a minimum service life of 2 years before replacement
60		518 of 537	Cake/Cloth Wash pump shall be 1500/3000 RPM.	PI specify the RPM for filtrate pumps if any preferred. Else Bidder shall select the same and proceed as per process requirements.	RPM of pump shall be as per system requirement & should be of proven design of the sub supplier approved during detailed engineering.
61	VI C	519 of 537	The slurry pumps shall be provided with motorized suction and discharge valves. In addition, flushing water lines with motorized valves shall be provided for each pump for automatic flushing of the pump after each shut down.	We understand as client per P&ID, instead of motorized pneumatic valves can be used. Please confirm.	Pneumatic valves are acceptable.
62				Piping software and version details to be provided	Bidder to note that CEASER is being used by BHEL for stress analysis. Bidder to share analysis compatible to same. Further details shall be shared during detail engineering.
63				Stress analysis /Critical line list to be provided	
64				Stress analysis software and version details	
65				Model review software and version details	BHEL is using SP3D/PDMS platform for 3D modeling. Bidder to share model compatible to same. Further details shall be shared during detailed engineering.
66				Interface details if any	Tender Specification requirement is clear. Further details shall be discussed during detailed engineering.
67			Area is in safe or hazardous zone	Kindly Confirm	Area is not classified in Hazardous zone.
68			Excluded 1. LCP & VFD Panel 2. Control Desk & Panels 3. Transformer 4. Furnitures 5. POwe cables, control cables and signal cable 6. LPBS	Please confirm the scope, listed as per TECH SPEC BRBCL GDWS PART 2 page number 41 of 150.	1) For LCP and VFD panel refer clarification at SI No. 36 above. 2) For control desk and panels refer clarification at SI No. 41 above. 3 & 4) Transformer and Furniture are excluded from bidder's scope. 5 & 6) Power cables, control cables and signal cable / LPBS- Bidder to refer " Electrical scope between



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69				Provide the Approved Vendor List	Refer Annexure-I, Sub Vendor List, Page 388 of 537 of tender specification.
70				Client to confirm the laydown/dropdown area anticipated for HBF components maintenance clearly in layout.	Tentative maintenance bay has already been marked in the "Layout details of Gypsum Dewatering Building" page 412 & 413 of 537. However, the same shall be finalized during detail engineering.
71			Particle Size Distribution	The Particle Size Distribution (PSD) provided by BHEL for Hydrocyclone feed is very fine resulting in very fine fraction particles feeding to HBF. This will impact on cake moisture and other process parameters.	Bidder to note the gypsum particle size distribution (PSD) to be used for designing Hydrocyclones and Vacuum Belt Filter shall be as per the PSD curve provided in the tender specification.
72			Particle Size Distribution	The percentage of fines at primary hydro cyclone feed are too high (50% <20 μ, 80% <30 μ). It is difficult to classify such high percentage of fines in hydro cyclone and may hinder the dewatering process in VBF. The maximum percentage of fines (<20 microns) shall be restricted to 15% in hydro cyclone feed. Please confirm.	All guarantees of Gypsum dewatering system performance shall be met by bidder as per the provided PSD only. The PSD curve provided in the technical specification is a standard curve and the Vacuum Belt Filter based on the same are running successfully.
73			Solid% in Gypsum Feed Slurry	The solids % in primary hydro cyclone slurry is comparatively dense (30%). Generally, it is in the range of 15-20%. Please confirm.	Bidder to follow specification.
74			Gypsum Purity	Chemical composition of solids in feed slurry at hydro cyclone inlet is not provided. The main concern is about the impurities (like inerts & fly ash) content in hydro cyclone feed since high impurities content (>10%) hinders the dewatering process in VBF. Hence, the impurities content shall be restricted to max. 10%. Please provide feed slurry solids chemical composition.	Bidder to refer clause 1.2.4 Sub section C1, page 38 of 537, wherein it is mentioned that the Gypsum purity is in BHEL's scope. However, the moisture content (<10%) and chloride content (<100 ppm) in the output gypsum cake is to be guaranteed by the bidder at rated capacity.



NTPC RAMAGUNDAM-I & II
(3 X 200 MW + 3 X 500 MW)

PACKAGE: GYPSUM DEWATERING SYSTEM

SPECIFICATION No: PE-TS-467-571-A101

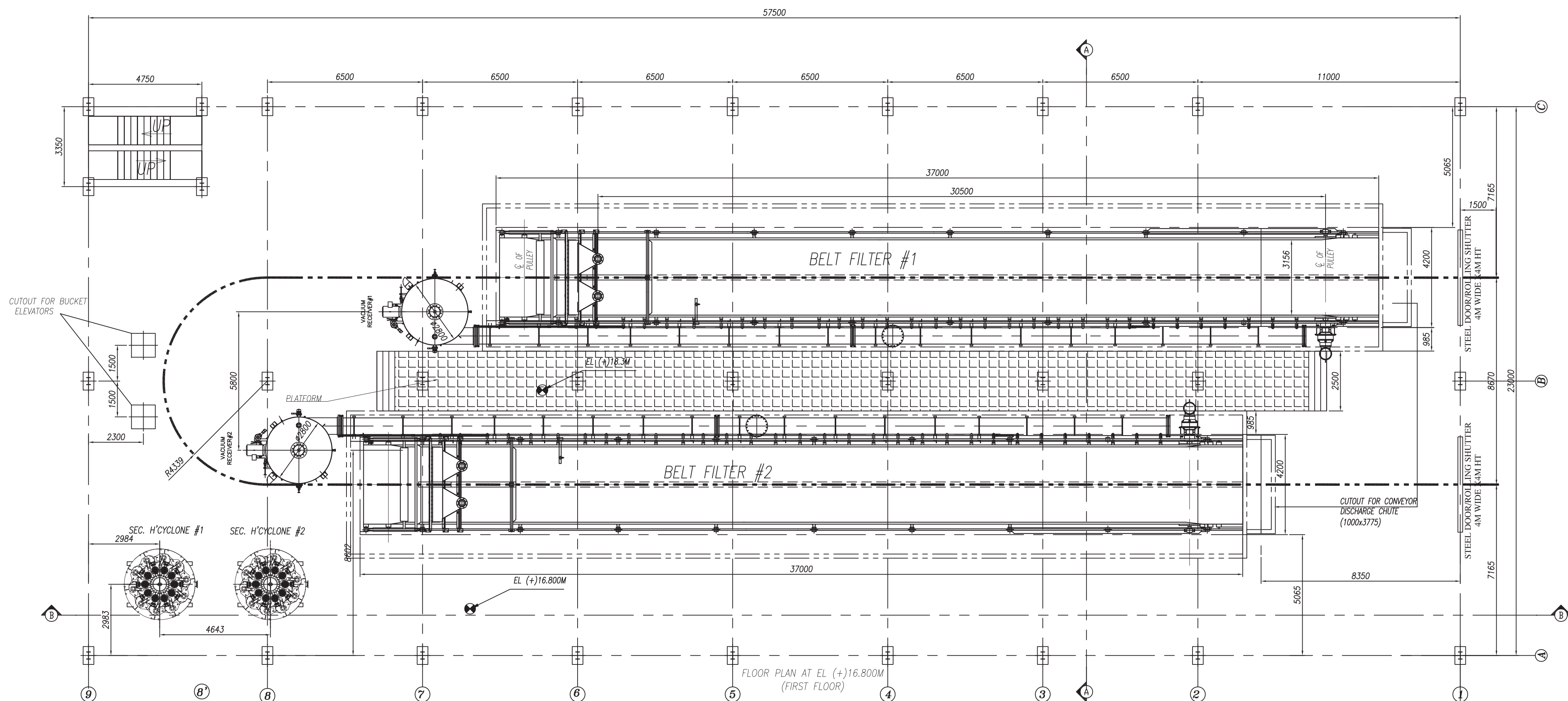
SECTION-III

ANNEXURE 3

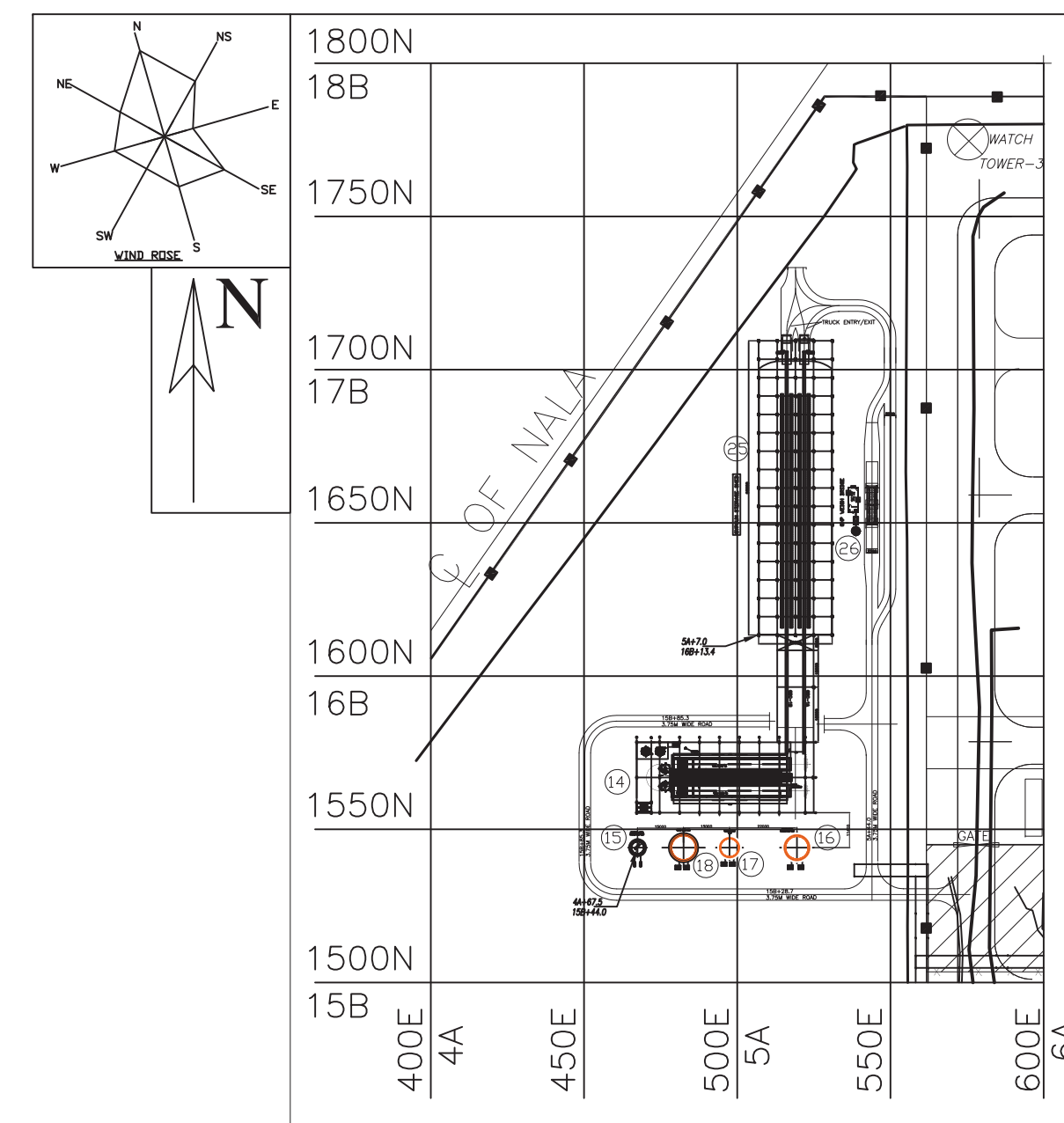
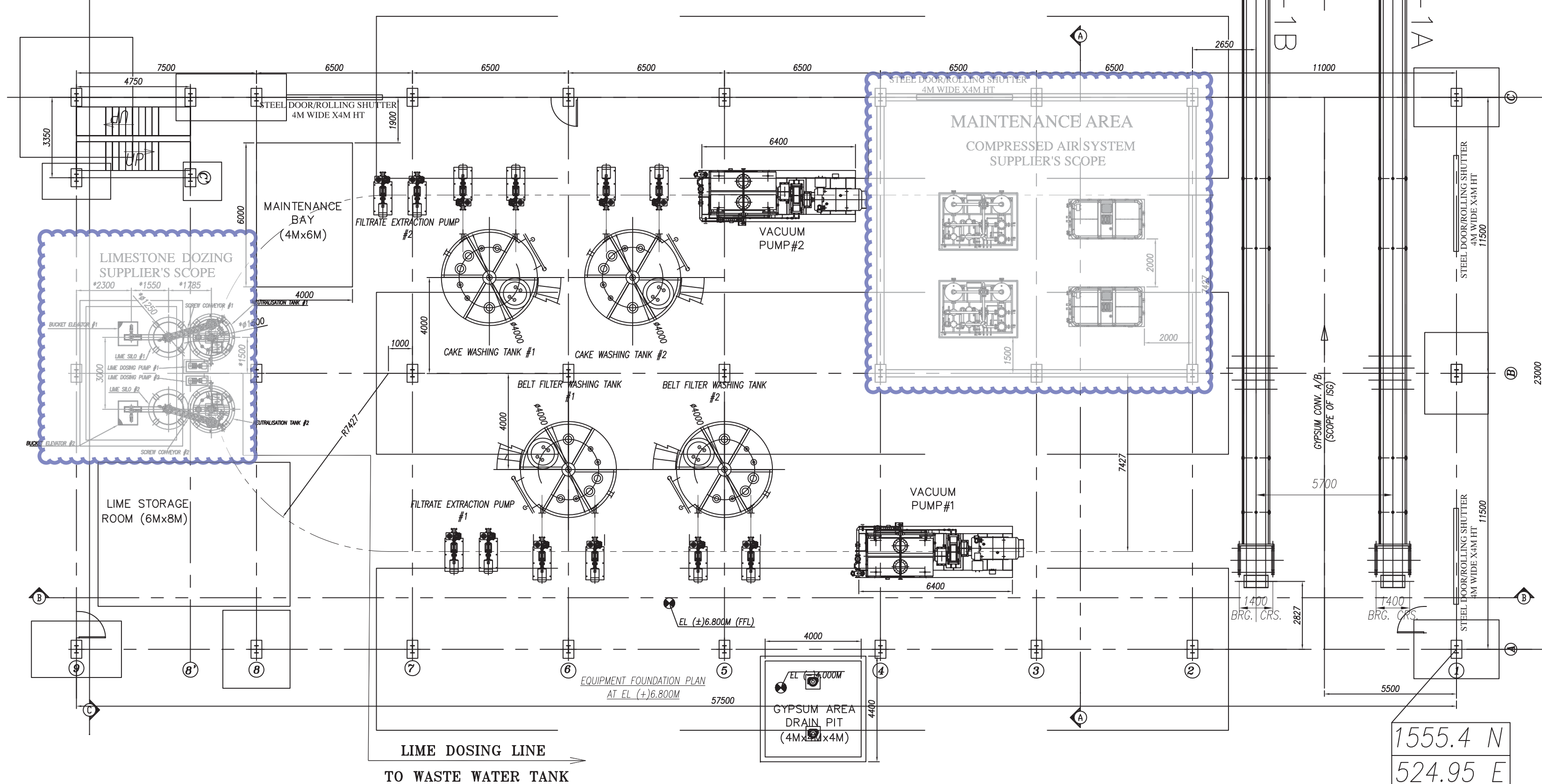
DATE 23-10-2020

					Feed slurry solids composition will be shared during detail engineering.
75					P&IDs for Bidder's scope of Engineering as per Clause 2.1.1.9 (ii) (d), (e) & (f) are enclosed as Annexure-C to this pre-bid clarifications.

DRAWING NO. PE-DG-467-521-A101



*** MARKED DIMENSIONS OF LIME DOSING/FEEDING SYSTEM SHOWN IN THE DRAWING ARE FOR GUIDANCE PURPOSE ONLY AND SHALL BE FINALISED DURING DETAIL ENGG. BY VENDOR.



KEY PLAN

LEGEND:-	
FGL	- FINISHED GROUND LEVEL
FFL	- FINISHED FLOOR LEVEL
T.O.P.F	- TOP OF PLATFORM
T.O.C	- TOP OF CONCRETE
OPENG	- OPENING
MR	- MONORAIL
THK	- THICK
TYP	- TYPICAL
GDWB	- GYPSUM DEWATERING BUILDING
VBF	- VACUUM BELT FILTER

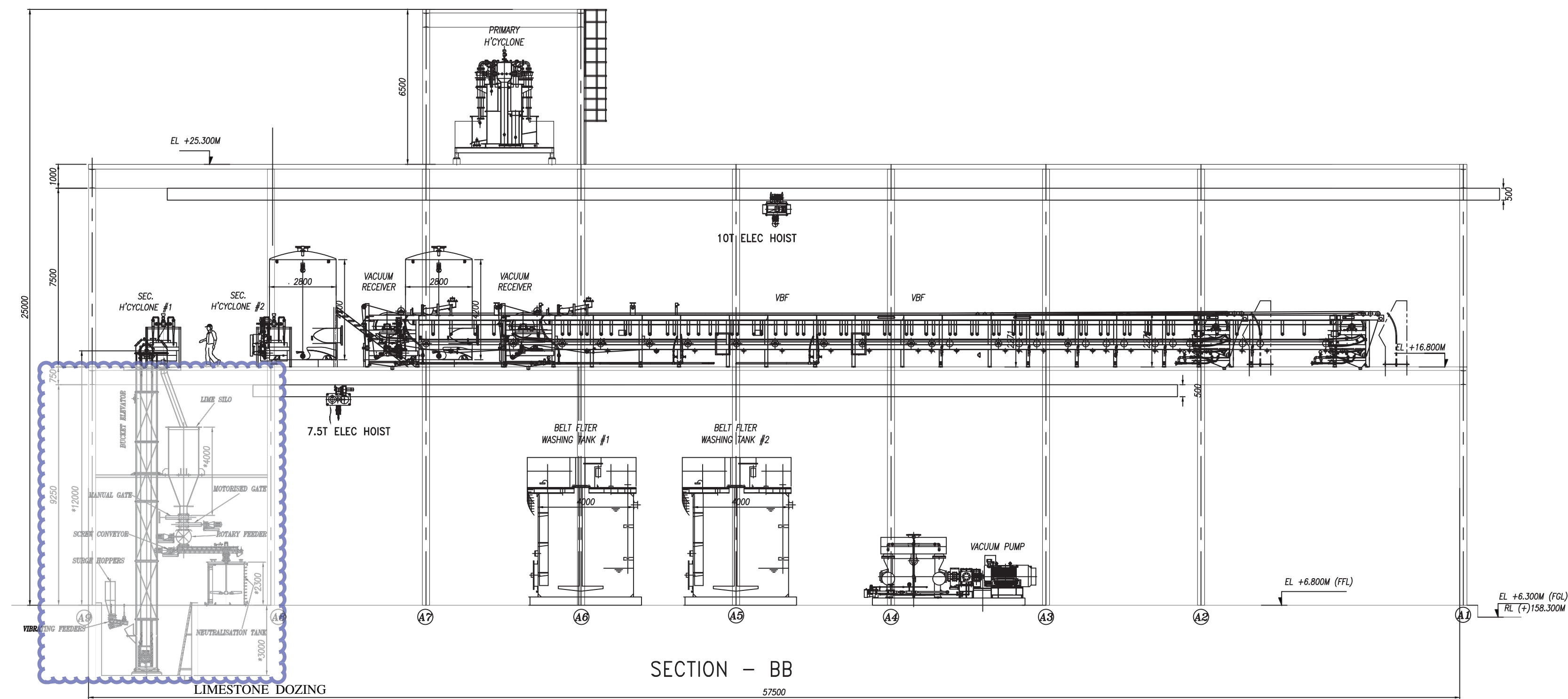
NOTES:

- ALL DIMENSIONS ARE IN MILLIMETRES AND ELEVATIONS IN METRES.
- EL (+)0.00M OF MAIN PLANT AREA CORRESPONDS TO RL (+)152.00M
- FGL EL (+) 6.300M CORRESPONDS TO RL (+)158.30M IN GBC1A AND GBC1B AREA
- THE EQUIPMENT MACHINERY SIZES SHOWING IN THE DRAWING IS INDICATIVE ONLY AND WILL BE CONFIRMED AFTER VENDOR DATA. THE MAXIMUM ANTICIPATED SIZE AND LOADING IS PROVIDED IN THE DRAWING.
- FLOOR OPENINGS, PIPE CROSSINGS SHALL BE CONFIRMED DURING DETAIL ENGINEERING.
- FLOOR ELEVATION TO BE CONSIDERED AS PRELIMINARY. FINAL LEVEL WILL BE FIXED AFTER EQUIPMENT FINALIZATION.
- DETAILS OF STAIRCASE, SUITABLE DOORS, WINDOWS, VENTILATORS SHALL BE CONSIDERED BY CIVIL DESIGNER FOR GYPSUM DEWATERING BUILDING.

REF. DWGS

- 0-FW-000-01375 : PLANT LAYOUT OF FGD SYSTEM

NTPC DRG NO:			
CUSTOMER: NTPC LIMITED.			
PROJECT: RAMAGUNDAM SUPER THERMAL POWER PLANT STAGE - I (3x200MW) & STAGE-II (3x500MW)			
	DEPT	NAME	SIGN
	DRN	PC/SA	28.05.20
	CHD	VH	28.05.20
	APPD	PK	28.05.20
UNIT: BOILER AUXILIARIES PLANT, RANIPET-632 406.			
TITLE: LAYOUT DETAILS OF GYPSUM DEWATERING BUILDING			SCALE : NTS
DRAWING NO. PE-DG-467-571-A101			REV. 00
SHEET 1 OF 2			

DRAWING NO.
PE-DG-467-571-A101

LEGEND:-

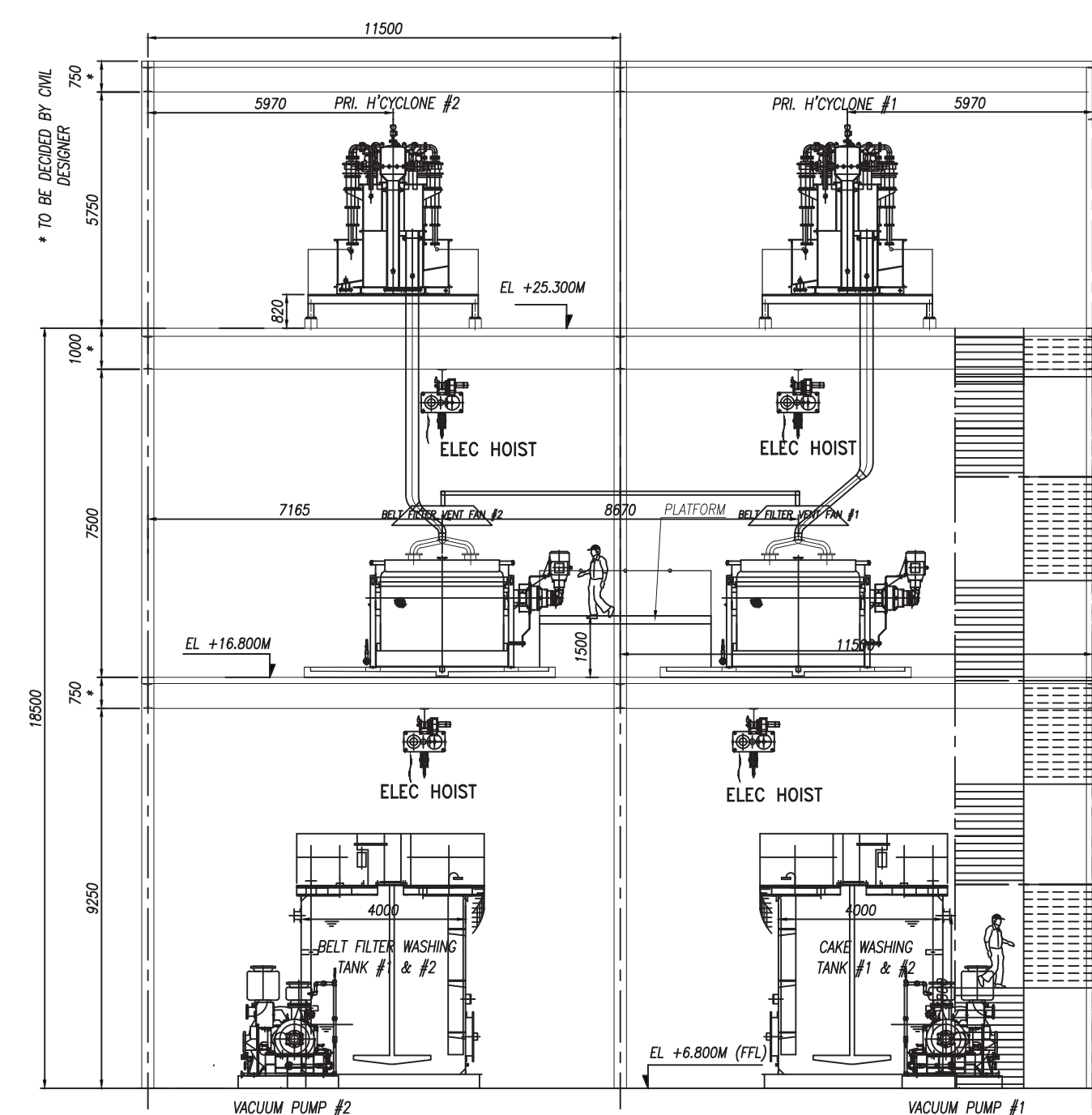
- FGL - FINISHED GROUND LEVEL
- FPL - FINISHED FLOOR LEVEL
- T.O.P - TOP OF PLATFORM
- T.O.C - TOP OF CONCRETE
- SPRING - SPRING
- HR - MONORAIL
- TRK - TRACK
- TYP - TYPICAL
- EDWB - GYPSUM DEWATERING BUILDING
- VBF - VACUUM BELT FILTER

NOTES:

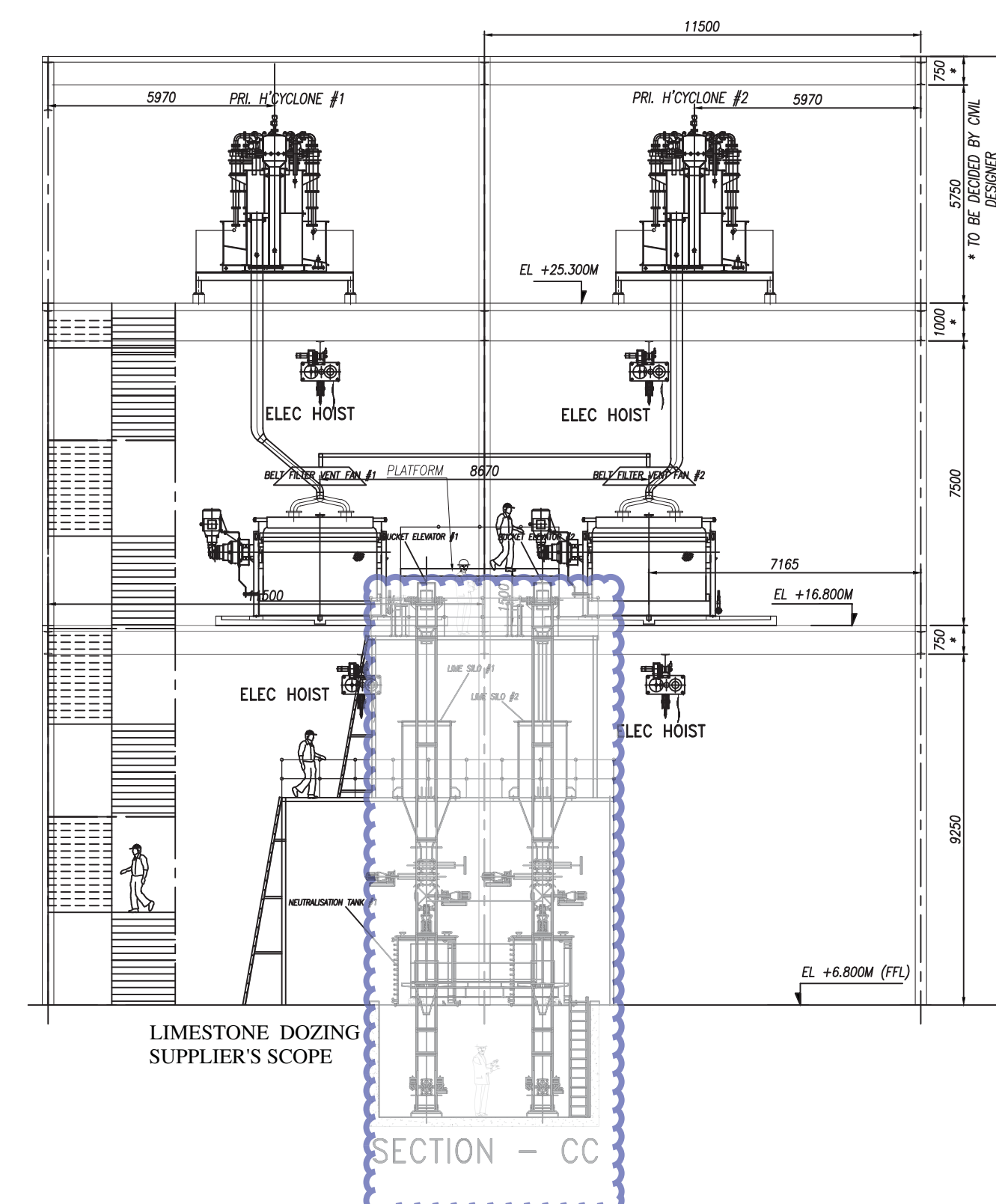
- ALL DIMENSIONS ARE IN MILLIMETRES AND ELEVATIONS IN METRES.
- EL (+)0.00M OF MAIN PLANT AREA CORRESPONDS TO RL (+)152.00M
- FGL EL (+) 6.300M CORRESPONDS TO RL (+)158.30M IN GBC1A AND GBC1B AREA
- THE EQUIPMENT MACHINERY SIZES SHOWING IN THE DRAWING IS INDICATIVE ONLY AND WILL BE CONFIRMED AFTER VENDOR DATA. THE MAXIMUM ANTICIPATED SIZE AND LOADING IS PROVIDED IN THE DRAWING.
- FLOOR OPENINGS, PIPE CROSSINGS SHALL BE CONFIRMED DURING DETAIL ENGINEERING.
- FLOOR ELEVATION TO BE CONSIDERED AS PRELIMINARY. FINAL LEVEL WILL BE FIXED AFTER EQUIPMENT FINALIZATION.
- DETAILS OF STAIRCASE, SUITABLE DOORS, WINDOWS, VENTILATORS SHALL BE CONSIDERED BY CIVIL DESIGNER FOR GYPSUM DEWATERING BUILDING.

REF. DWGS

- 0-FW-000-01375 : PLANT LAYOUT OF FGD SYSTEM



SECTION - AA



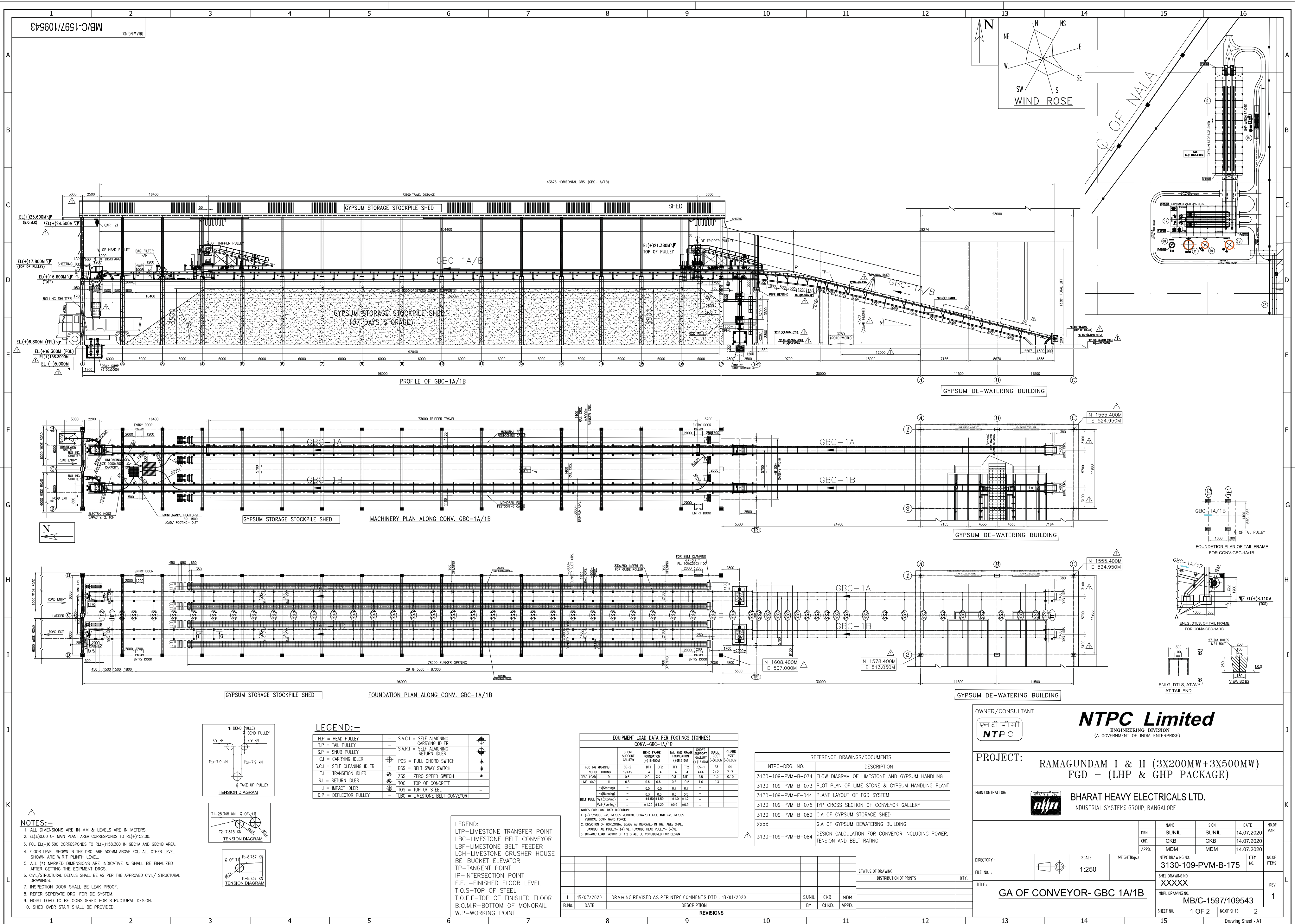
SECTION - CC

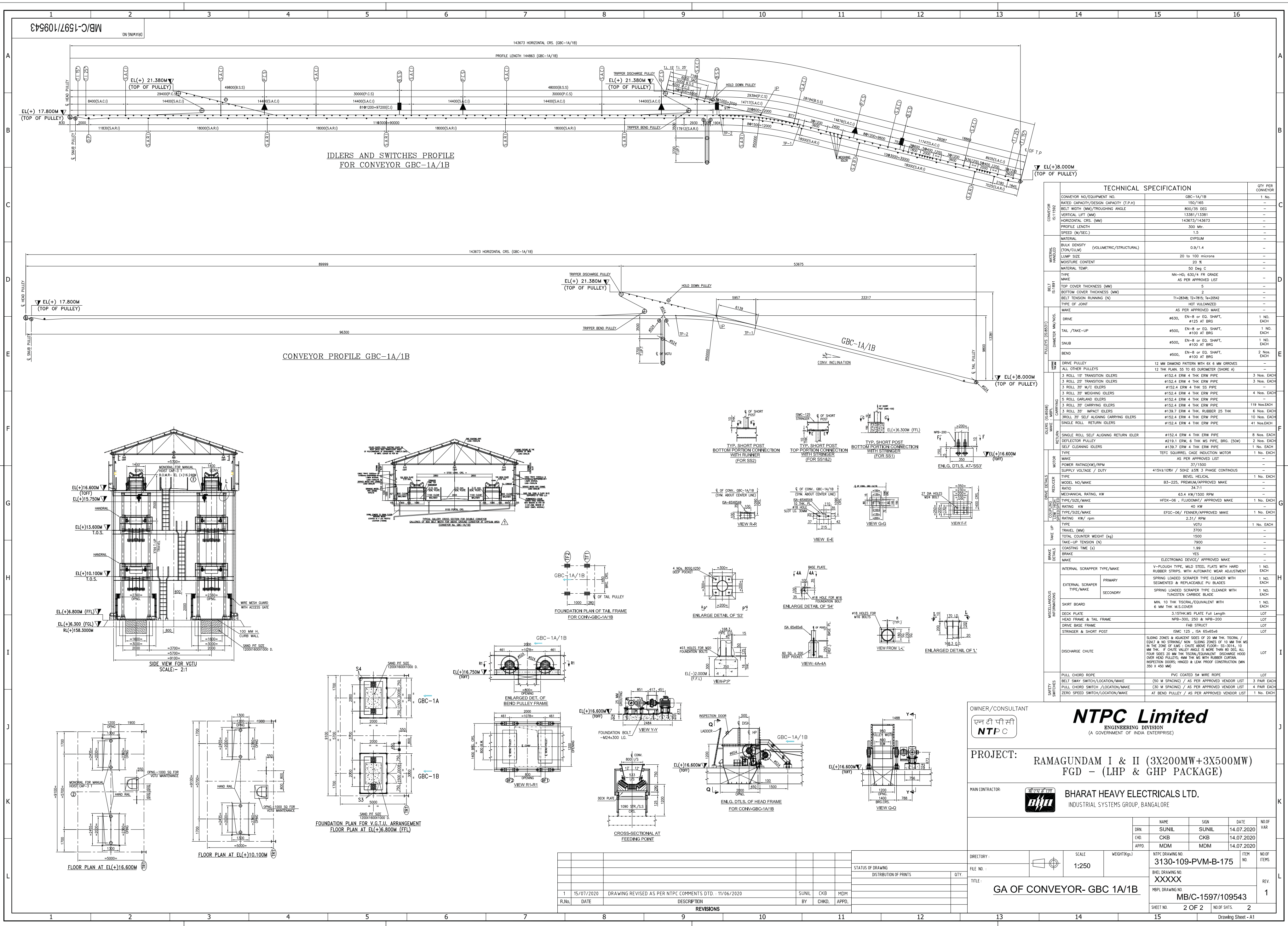
*** MARKED DIMENSIONS OF LIME DOSING/FEEDING SYSTEM SHOWN IN THE DRAWING ARE FOR GUIDANCE PURPOSE ONLY AND SHALL BE FINALISED DURING DETAIL ENGG. BY VENDOR.

NTPC DRG NO:				
CUSTOMER: NTPC LIMITED.				
PROJECT: RAMAGUNDAM SUPER THERMAL POWER PLANT				
STAGE - I (3x200MW) & STAGE-II (3x500MW)				
DEPT	DRN	NAME	SIGN	DATE
BHARAT HEAVY ELECTRICALS LIMITED,	PC/SA			28.05.20
UNIT: BOILER AUXILIARIES PLANT,	M	CHD	VH	28.05.20
RANPET-632 406.	APPD	PK		28.05.20
TITLE:				SCALE : NTS
ELEVATION DETAILS OF GYPSUM DEWATERING BUILDING				
DRAWING NO.		SHEET 2 OF 2		REV. 00
PE-DG-467-571-A101				

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Size A0





TECHNICAL SPECIFICATION		QTY PER CONVEYOR
CONVEYOR NO./EQUIPMENT NO.	GBC-1A/1B	1 No.
RATED CAPACITY/DESIGN CAPACITY (T.P.H)	150/165	-
BELT WIDTH (MM)/THROUGHING ANGLE	800/35 DEG	-
VERTICAL LIFT (MM)	13381/13381	-
HORIZONTAL CRS. (MM)	143673/143673	-
PROFILE LENGTH	300 Mtr.	-
SPEED (M/SEC.)	1.5	-
MATERIAL	GYP-SUM	-
BULK DENSITY (TON/CU.M)	(VOLUMETRIC/STRUCTURAL)	0.9/1.4
LUMP SIZE	20 to 100 microns	-
MOISTURE CONTENT	20 %	-
MATERIAL TEMP.	50 Deg C	-
TYPE MAKE	NN-HD; 630/4 FR GRADE AS PER APPROVED LIST	-
TOP COVER THICKNESS (MM)	5	-
BOTTOM COVER THICKNESS (MM)	2	-
BELT TENSION RUNNING (N)	T1=28346, T2=7815, T3=20542	-
TYPE OF JOINT	HOT VULCANIZED	-
MAKE	AS PER APPROVED MAKE	-
DRIVE	#630, EN-8 or EQ. SHAFT, #125 AT BRG	1 NO. EACH
TAI /TAKE-UP	#500, EN-8 or EQ. SHAFT, #100 AT BRG	1 NO. EACH
SNUB	#500, EN-8 or EQ. SHAFT, #100 AT BRG	1 NO. EACH
BEND	#500, EN-8 or EQ. SHAFT, #100 AT BRG	2 Nos. EACH
DRIVE PULLEY	12 MM DIAMOND PATTERN WITH 6 X 6 MM GROOVES	-
ALL OTHER PULLEYS	12 THK PLAN. 55 TO 65 DIAMETER (SHORE A)	-
3 ROLL 15' TRANSITION IDLERS	#152.4 ERW 4 THK ERW PIPE	3 Nos. EACH
3 ROLL 35' TRANSITION IDLERS	#152.4 ERW 4 THK ERW PIPE	3 Nos. EACH
3 ROLL 35' W/C IDLERS	#152.4 ERW 4 THK SS PIPE	4 Nos. EACH
3 ROLL 35' WEIGHING IDLERS	#152.4 ERW 4 THK ERW PIPE	4 Nos. EACH
3 ROLL GARLAND IDLERS	#152.4 ERW 4 THK ERW PIPE	119 Nos. EACH
3 ROLL 35' CARRYING IDLERS	#152.4 ERW 4 THK ERW PIPE	6 Nos. EACH
3 ROLL 35' IMPACT IDLERS	#139.7 ERW 4 THK RUBBER 25 THK	10 Nos. EACH
3 ROLL 35' SELF ALIGNING CARRYING IDLERS	#152.4 ERW 4 THK ERW PIPE	41 Nos. EACH
SINGLE ROLL RETURN IDLERS	#152.4 ERW 4 THK ERW PIPE	8 Nos. EACH
DEFLECTOR PULLEY	#219.1 ERW 4 THK MS PIPE, BRG. (50W)	2 Nos. EACH
SELF CLEANING IDLERS	#139.7 ERW 4 THK ERW PIPE	1 No. EACH
TYPE MAKE	TEFC SQUIRREL CAGE INDUCTION MOTOR	1 No. EACH
POWER RATING (KW)/RPM	AS PER APPROVED LIST	-
SUPPLY VOLTAGE / DUTY	415Vx100V / 50HZ x5R 3 PHASE CONTINUOUS	-
TYPE	BEVEL HELICAL	1 No. EACH
MODEL NO/MAKE	B3-225, PREMIUM/APPROVED MAKE	-
RATIO	34.7:1	-
MECHANICAL RATING, KW	63.4 KW/1500 RPM	-
TYPE/MAKE	HFDX-06, FLUIDOMAT/ APPROVED MAKE	1 No. EACH
RATING KW	40 KW	-
TYPE/MAKE	EPG-06/ PENNER/APPROVED MAKE	1 No. EACH
RATING KW / rpm	2.3/17 RPM	-
TYPE	VGU	1 No. EACH
TRAVEL (MM)	3700	-
TOTAL COUNTER WEIGHT (kg)	1500	-
TAKE-UP TENSION (N)	7900	-
COASTING TIME (s)	1.99	-
TYPE	YES	-
MAKE	ELECTROMAG DEVICE/ APPROVED MAKE	-
INTERNAL SCRAPER TYPE/MAKE	V-PLUGH TYPE, MILD STEEL FLATS WITH HARD RUBBER STRIPS, WITH AUTOMATIC WEAR ADJUSTMENT	1 NO. EACH
EXTERNAL SCRAPER TYPE/MAKE	SPRING LOADED SCRAPER TYPE CLEANER WITH SEGMENTED & REPLACEABLE PU BLADES	1 NO. EACH
TYPE/MAKE	SPRING LOADED SCRAPER TYPE CLEANER WITH TONGSTON CARBIDE BLADE	1 NO. EACH
SKIRT BOARD	MIN. 10 THK TSSRAL/EQUIVALENT WITH 6 MM THK M.S.COVER	1 NO. EACH
DECK PLATE	3.15THK.MS PLATE Full Length	LOT
HEAD FRAME & TAIL FRAME	NPB-300, 250 & NPB-200	LOT
DRIVE BASE FRAME	FAB STRUCT	LOT
STRINGER & SHORT POST	ISM C 125, ISA 65x65x6	LOT
DISCHARGE CHUTE	SLIDING ZONES & ADJACENT SIDES OF 20 MM THK TSSRAL / ENLT & NO STRONG/ NON- SLIDING ZONES OF 10 MM THK MS IN THE ZONE OF LAG; WHITE ABOVE FLOOR- SS-20x14, 10 MM THK. IF CHUTE VALLEY ANGLE IS MORE THAN 80 DEG. ALL FOUR SIDES 20 MM THK TSSRAL/EQUIVALENT DISCHARGE HOOD OVER HOOD PULLEYS, 4MM THK MS WITH RUBBER CURTAIN INSPECTION DOORS, HINGED & LAG PROOF CONSTRUCTION (MIN. 350 X 450 MM)	LOT
PULL CHORD ROPE	PVC COATED 5W WIRE ROPE	LOT
BELT SWAY SWITCH/LOCATION/MAKE	(50 M SPACING) / AS PER APPROVED VENDOR LIST	3 PAIR EACH
BELT CHORD SWITCH /LOCATION/MAKE	(30 M SPACING) / AS PER APPROVED VENDOR LIST	4 PAIR EACH
ZERO SPEED SWITCH/LOCATION/MAKE	AT BEND PULLEY / AS PER APPROVED VENDOR LIST	1 No. EACH

OWNER/CONSULTANT

एन टी पी सी
NTPC

PROJECT:

RAMAGUNDAM I & II (3X200MW+3X500MW)
FGD - (LHP & GHP PACKAGE)

MAIN CONTRACTOR:

BHARAT HEAVY ELECTRICALS LTD.
INDUSTRIAL SYSTEMS GROUP, BANGALORE

DIRECTORY:

FILE NO:

TITLE:
GA OF CONVEYOR- GBC 1A/1B

SCALE

1:250

WEIGHT(kgs.)

NTPC DRAWING NO.
3130-109-PVM-B-175

BHEL DRAWING NO.
XXXXXX

MBPL DRAWING NO.
MB/C-1597/109543

DRN

SUNIL

SIGN

SUNIL

DATE

14.07.2020

NO OF

VAR

CHD

CKB

CKB

14.07.2020

4 PAIR EACH

APPD

MDM

MDM

14.07.2020

1 NO. EACH

STATUS OF DRAWING

DISTRIBUTION OF PRINTS

QTY.

REVISIONS

1 15/07/2020 DRAWING REVISED AS PER NTPC COMMENTS DTD : 11/06/2020

SUNIL

CKB

MDM

BY

CHKD.

APPD.

SHEET NO.

2 OF 2

NO OF SHTS.

2

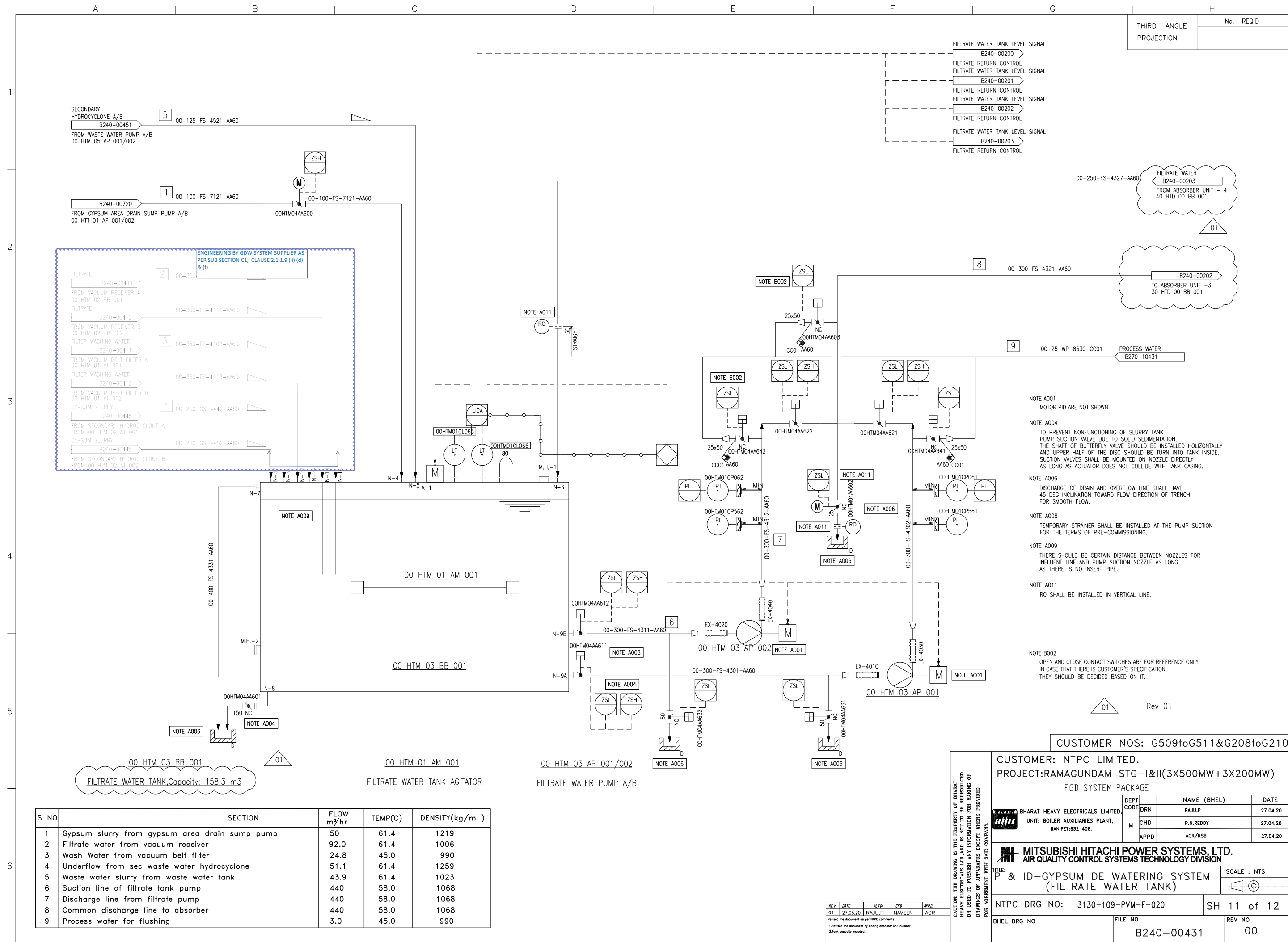
Drawing Sheet - A1

THIRD ANGLE
PROJECTION

No. REQ'D

A3

DRAWING No.



S NO	SECTION	FLOW m ³ /hr	TEMP(°C)	DENSITY(kg/m ³)
1	Gypsum slurry from gypsum area drain sump pump	50	61.4	1219
2	Filtrate water from vacuum receiver	92.0	61.4	1006
3	Wash Water from vacuum belt filter	24.8	45.0	990
4	Underflow from sec waste water hydrocyclone	51.1	61.4	1259
5	Waste water slurry from waste water tank	43.9	61.4	1023
6	Suction line of filtrate tank pump	440	58.0	1068
7	Discharge line from filtrate pump	440	58.0	1068
8	Common discharge line to absorber	440	58.0	1068
9	Process water for flushing	3.0	45.0	990

CUSTOMER NOS: G509toG511&G208toG210

CUSTOMER: NTPC LIMITED.
PROJECT:RAMAGUNDAM STG-I&II(3X500MW+3X200MW)
FGD SYSTEM PACKAGE

DEPT	NAME (BHEL)	DATE
DRN	RAJU.P	27.04.20
CHD	P.N.REDDY	27.04.20
APPD	ACR/RSB	27.04.20

MITSUBISHI HITACHI POWER SYSTEMS, LTD.
AIR QUALITY CONTROL SYSTEMS TECHNOLOGY DIVISION

TITLE:
P & ID-GYPSUM DE WATERING SYSTEM
(FILTRATE WATER TANK)

SCALE : NTS

NTPC DRG NO: 3130-109-PVM-F-020 SH 11 of 12

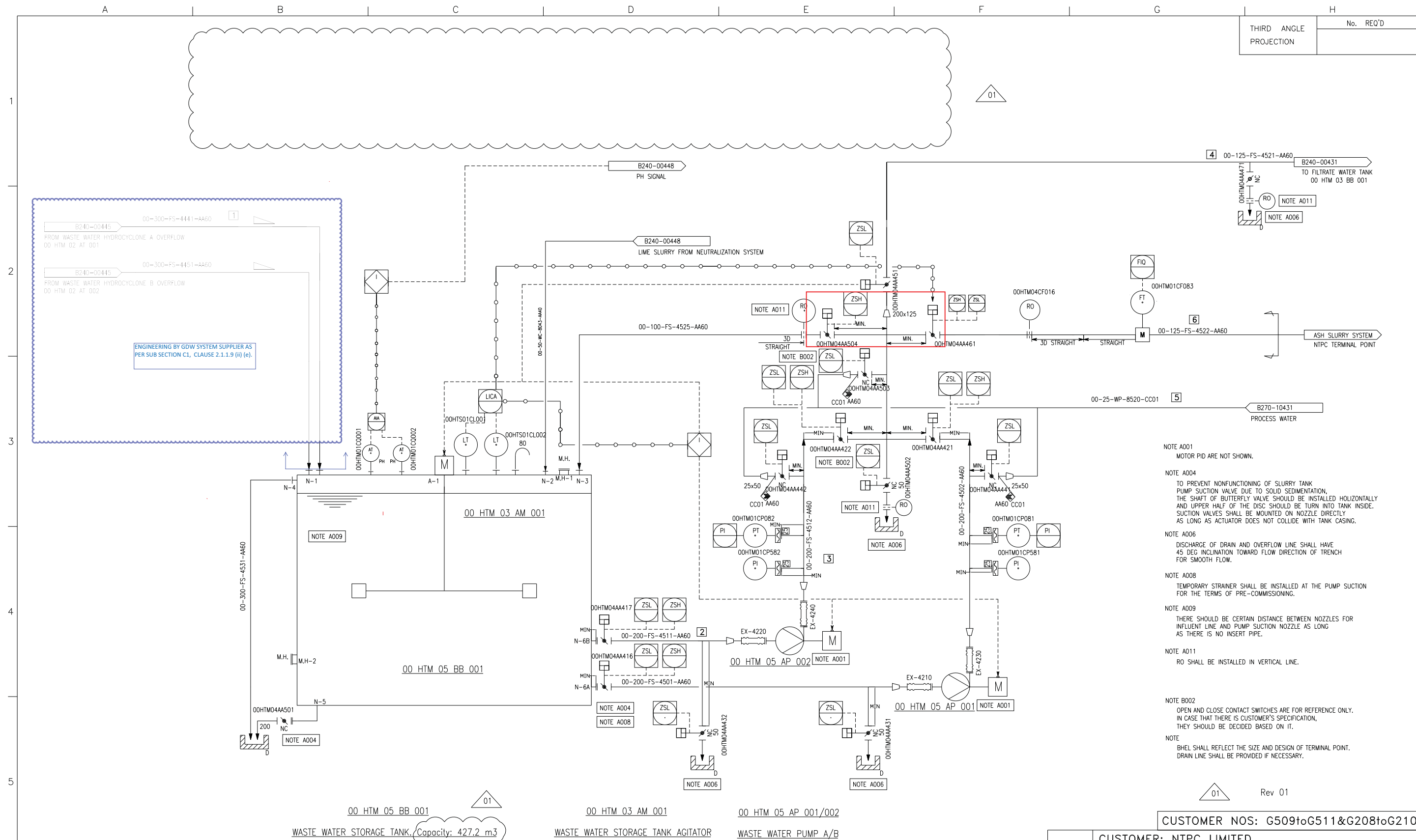
BHEL DRG NO: B240-00431 REV NO: 00

THIRD ANGLE
PROJECTION

No. REQ'D

A3

DRAWING No.



CUSTOMER NOS: G509toG511&G208toG210

CUSTOMER: NTPC LIMITED.
PROJECT: RAMAGUNDAM STG-I&II(3X500MW+3X200MW)
FGD SYSTEM PACKAGE

DEPT	NAME (BHEL)	DATE
DRN	RAJU.P	27.04.20
CHD	P.N.REDDY	27.04.20
APPD	ACR/RSB	27.04.20

MITSUBISHI HITACHI POWER SYSTEMS, LTD.
AIR QUALITY CONTROL SYSTEMS TECHNOLOGY DIVISION

TITLE: P & ID-GYPSUM DEWATERING SYSTEM (WASTE WATER TANK)
SCALE: NTS

NTPC DRG NO: 3130-109-PVM-F-020 SH 12 of 12

BHEL DRG NO: 2740-00451 FILE NO: 2740-00451 REV NO: 00

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REV.	DATE	ALT.	CHK	APPD
01	27.05.20	RAJU.P	NAVEEN	ACR

1. Revised the document by removing the neutralization system and submitted the same in other MTL.
2. Tank capacity included.

S NO	SECTION	FLOW m ³ /hr	TEMP (°C)	DENSITY kg/m ³
1	Gyp slurry from sec hydro cyclone over flow	85.0	61.4	1023
2	Gyp slurry to WW pump Suction	126	61.4	1023
3	Gyp slurry from WW pump discharge	126	61.4	1023
4	Gyp slurry to filtrate water tank	43.90	61.4	1023
5	Process water line for flushing	3	45	990
6	Gyp slurry to NTPC terminal point	41.20	61.4	1023

0 1 2 3 4 5 6 7 8 9 10