2 X 250 MW NSPCL BHILAI TPP-FGD

CONSULTANT-NTPC LIMITED
(A Government of India Enterprises)

CIVIL, STRUCTURAL & ARCHITECTURAL WORKS

SPECIFICATION NO. PE-TS-468-600-C001

Bharat Heavy Electricals Limited
Project Engineering Management
PPEI Building, Power Sector,
Plot No. 25, Sector 16A,
Noida (U.P.)-201301

SECTION – C

TECHNICAL REQUIREMENTS SPECIFIC TO THE CONTRACT

NTPC Limited

(A Government of India Enterprise)

LOT-2 PROJECTS

PART - B

SUB-SECTION-IV-D
(CIVIL WORKS)

SECTION – VI

TECHNICAL SPECIFICATION
FOR

FLUE GAS DESULPHURISATION (FGD)
SYSTEM PACKAGE

BIDDING DOCUMENT NO.: CS-0011-109(2)-9

PART – B (DETAILED TECHNICAL SPECIFICATION)

SUB-SECTION-IV-D (CIVIL WORKS)

SUB-SECTION-IV-D

CIVIL WORKS

CLAUSE NO.	TECHNICAL REQUIREMENTS
1.00.00	**GENERAL**
1.01.00	This section of the bidding document deals mainly with the technical specification for the design and preparation of detailed drawings, getting the design and drawings approved by the Employer, fabrication, erection and construction of the necessary civil, structural and architectural works associated with the Flue Gas Desulphurization system package for Lot-2 Projects. The work shall have to be carried out both below and above ground level and shall be involving, basements, equipment foundations, slabs, beams, columns, footings, rafts, walls, steel frames, brick walls, stairs, trenches, pits, access roads, culverts, trestles, silos, sumps, Limestone storage hopper & shed, Crusher House, Transfer points, Conveyor Galleries, Tunnels, Gypsum storage shed, Chimney, Gypsum dewatering building, Ball Mill building, FGD control room building, Tank Foundations, absorber tower foundation, transformer foundation, MCC Building, finishes, complete architectural aspects, drainage, sanitation, water supply (from terminal points to various buildings/facilities) and all other civil, structural and architectural works associated with the complete FGD package.
1.02.00	The specifications are intended for the general description of the work, quality and workmanship. The specifications are not, however, intended to cover minutest details and the work shall be executed according to the relevant latest Indian Standard Codes / I. R. S. / I. R. C. specifications. Where provisions are not covered in Indian Standards, reference shall be made to ACI, AISC, ASCE, EN, CICIND and other international standards or to the best prevailing local Public Works Department practices or to the instructions of the Engineer. Some of the relevant I. S. Codes to be followed are mentioned in the Technical Specifications. The Contractor is expected to get clarified on any doubts about the specifications, etc. before bidding, in writing with the Employer in respect of interpretation of any portions of this document.
1.03.00	Bidder or his agencies engaged as detailer for fabrication drawings should have the experience of detailing for power plant structures or steel plant or Industrial structures like Petro/ Chemical/ Refinery/ Cement/FGD Plant/Coal Handling Plant/Ash Handling Plant etc. The designer responsible for preparation of scope drawings shall review and approve the fabrication drawings prepared by the detailer before releasing them for fabrication.
1.04.00	For projects Simhadri stage-II (2x500MW) and Vallur (3x500MW) special provisions specified in clause no 41.00.00 shall be applicable.
2.00.00	**CLAUSE DELETED**
3.00.00	**Work Description**
3.01.00	**Truck Hopper, Limestone Storage hopper and Underground Tunnel** Truck Hopper shall consist of underground portion, which shall be of R. C. C. with structural steel shed covered with permanently Colour coated profiled steel sheets.

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	Limestone storage hopper shall be of RCC with structural steel shed covered with permanently Colour coated profiled steel sheets. The structural arrangement to be adopted for the design and construction of Limestone Storage hopper shall essentially consist of R. C. C. frames spaced at approx. 3.0M centers with R. C. C. wall panels on the sides and R. C. C. raft at the bottom, fixed to the frames. Minimum thickness of R. C. C. raft at bottom shall be 600 mm. Minimum thickness of RCC side walls shall be 600 mm at bottom and 300 mm at top. The vertical and inclined portion of hopper shall be provided with 50 mm thick guniting (shotcreting). Details of shotcreting have been given elsewhere in this specification. Expansion joints shall be provided at a maximum distance of 40m. 600 mm wide water stop fabricated with 22G copper plate with bitumen board fillers and polysulphide sealing compound as specified elsewhere shall be used as expansion joint material. Floor shall be provided with cross slope not flatter than 1 in 50 towards side drains. Side drains shall be sloped towards sump where sump pumps as specified elsewhere, shall be provided. The slope of side drains shall not be flatter than 1 in 400. Side drains and sump shall have removable type steel grating cover. Water proofing / Damp proofing of under ground Truck hopper, Limestone Storage hopper, tunnels and underground (i. e. basement) portion of transfer houses shall be done by providing the following treatments: Chemical injection grouting for inner faces (details as specified elsewhere). Polymer modified cementitious coating on earth side face as per the following: (1) On the outer surface of walls, frames and roof slabs coming in contact with earth, polymer modified cementitious coating in two layers as specified and as per manufacturer's specifications shall be provided directly on the concrete surface. (2) 50 mm thick P. C. C. (1 : 2 : 4 with 10 mm nominal size stone aggregates) shall be provided under the raft i.e. over the lean concrete, followed by polymer modified cementitious coating in two layers (slurry mix application) as per manufacturer's specification. 50 mm thick P. C. C. (1 : 2 : 4) with 10 mm nominal size stone aggregates shall then be laid over the polymer modified cementitious coating before laying the raft. Truck hopper and its gratings shall be designed for movement of front end loader/ bulldozer over them. Bull dozer weight shall be considered as about 35T. The gratings shall be built of min. 200x28mm thick flats in main direction and min.100mm x 20mm thick in secondary direction. No painting/galvanization shall be provided in gratings. However, two coats of Red oxide Primer to be provided immediately after fabrication. Plinth protection along with drains shall be provided along the Hopper complex. However, 5m wide paving shall also be provided around machinery hatches and Truck hopper.

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	Earth pressure to be considered for design shall be due to earth pressure at rest (Ko) condition only. Earth pressure due to surcharge intensity of Uniformly Distributed Load (U. D. L) of intensity 2 T / Sq. M. shall be considered in the design. A minimum safety factor of 1.2 against uplift due to ground water shall be ensured during execution and after execution, considering dead weight of the structure to be 0.9 times only, ground water table to be taken at adjoining formation level and soil wedge angle of not more than 15 degrees. Also, FOS against uplift, to be taken as 1.0, considering the dead wt. of structure and soil resting on side projections if any in the vertical plane. Inclined wedge action of soil shall not be considered in this case. Wherever, slope of tunnel exceeds 10°, R. C. C. steps shall be provided for the entire width of each walkway.
3.01A.00	**Limestone Storage Silo** The supporting structure for silo shall be of structural steel.
3.02.00	**Overhead / Ground Conveyor Galleries and Trestles** Overhead conveyors shall be located in a suitably enclosed gallery of structural steel. The overhead gallery shall consist of two vertical latticed girders having rigid jointed portal frame at both ends. Cross beams at floor level supporting conveyor stringer beams shall be made of single rolled steel beam or single channel section (ISMB or ISMC) or plate girder. Horizontal bracings are to be provided at top & bottom plan of the gallery (latticed girders shall be braced together in plan at the top and bottom). Common end portal frame shall not be used for adjacent conveyor spans. Roof truss shall be provided at upper node points of latticed girders to form an enclosure. Contractor can also use tubular steel sections for roof truss only of conveyor galleries. The tubular steel section shall be of circular/rectangular/square shape. The circular steel tube shall conform to IS 1161 and rectangular/square steel sections shall conform to IS 4923. The steel structures using tubular sections shall be designed and fabricated as per IS 806 – “Code of Practice for use of steel tubes in general building construction.” and EN 1993-1-8:2005. The maximum span of overhead gallery shall be limited to 25 meters unless higher span is required due to site conditions, which shall be subject to approval of the Engineer. The gallery should as far as possible be erected as a box section keeping all the vertical and horizontal bracing tied in proper position. The gallery should be checked for all erection stresses that are likely to develop during handling and erection and if required, temporary strengthening of gallery members during erection shall be made. Seal plates under the conveyor galleries shall be provided in such a way that complete gallery bottom shall form a leak proof floor. The ground conveyors shall be located in suitably enclosed gallery of structural steel consisting of rigid portal frames spaced at regular intervals and suitably braced. Plinth protection along with drains shall be routed along the ground conveyors.

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	For double stream conveyor gallery, two side and one central walkway of width 800 mm and 1100 mm respectively shall be provided. The width of two side walkways for single stream conveyor gallery shall be 800 mm and 1100 mm respectively. Both sides of central and side walkways shall be provided with pipe handrails all along the conveyor gallery. Hand railing should not be supported on conveyor supporting stringers. The walkways shall be chequered plate construction with anti - skid arrangement. The anti - skid arrangement will consist of welding of 10 mm square steel bars at a maximum spacing of 500 mm along the length of the gallery. Where the slope of walkway is more than 10°, chequered plate steps with nosing and toe guard shall be provided. The floor of conveyor gallery all along the gallery length, shall be provided with minimum 12 gauge thick seal plates and other drainage arrangements as specified elsewhere Conveyor gallery shall have permanently colour coated steel sheet covers on roof and both sides. However in roof, a panel of minimum 1.5 m x 1.5 m area at about 6.0 m center shall be provided with translucent sheets of polycarbonate material for natural lighting. A continuous slit opening of 500 mm shall be provided on both sides just below the roof sheeting. Adequate provision of windows shall be kept on both sides of conveyor gallery as appended in Mechanical Section (Belt conveyor system). Windows shall be provided with wire mesh as specified elsewhere in this specification. Cross-over with chequered plate platform and ladder for crossing over the conveyors shall be provided at approximately every 100 M intervals of conveyor. Crossover shall preferably be located over four-legged rigid trestle location. For railway tracks passing below overhead conveyor gallery and along conveyors, the railway clearances both underground as well as over ground shall have to be adhered to for design, execution and erection of foundations, trestles, galleries etc., so that movement of locomotives and wagons is not hampered in any way during execution and afterwards. However at the location where the overhead conveyor gallery crosses road / rail line, minimum clearance of 8.5m above the road crest / rail top shall be provided. For calculation of material load on moving conveyor, a multiplication factor 1.6 shall be used to take care of inertia force, casual over burden and impact factor etc. Thus material load per unit length of each moving conveyor shall be $$1.6 \times \frac{\text{Rated capacity of conveyor system}}{\text{Conveyor Belt Speed}} \times F$$ Where, F = 1700/1400 for lime & 1250/900 for gypsum

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	It should be noted that for structural design, unit weight of lime shall be assumed as 1700 Kgs. / Cu. M. instead of 1400 Kgs. / Cu. M., unit weight of gypsum shall be assumed as 1250 Kgs. / Cu. M. instead of 900 Kgs. / Cu. M. considered for system sizing purpose. Conveyor Gallery structure shall be designed considering both conveyors operating simultaneously. Conveyor gallery and supporting trestles located between transfer houses / buildings shall be arranged in any one of the following ways. a) All gallery supporting trestles shall be four legged type only. One end of each gallery span shall be hinged to the supporting trestle and the other end shall be slide type. Slide type support shall be with P. T. F. E. bearings to allow both rotation & longitudinal movements. b) In between transfer houses / buildings, four legged trestles shall be placed at a maximum interval of 90 metres. The arrangement shall be such so as to ensure that force in the longitudinal direction (i. e. along the conveyor length) of conveyor gallery of length not more than 90 m is transferred to any four legged trestle. In the space between each successive four legged trestles, two legged trestles shall be provided at regular intervals. The end supports resting on the four-legged trestle can have either ends hinged or one hinge and the other on slide type depending on the arrangements. Slide type support shall be with P. T. F. E. bearings to allow both rotation & longitudinal movements. End of conveyor gallery which will be supported over transfer house, shall be so detailed that only vertical reaction is transferred from conveyor gallery and no horizontal force in longitudinal direction is transferred from conveyor gallery to transfer house structure and vice - versa. For trestles and trestle foundations for conveyor galleries located adjacent to existing structures, over ground and under ground facilities, location and details of these trestles and foundations shall have to be decided such that there is no interference both underground as well as over ground with existing structures and facilities. Trestle columns / ground conveyor portal column base shall be kept 300 mm higher than the existing ground level.
3.03.00	**Transfer Houses** The over ground portion of the transfer house shall be framed structure of structural steel work with permanently colour coated profiled steel sheet side cladding (from lowest working floor level till top) and R. C. C. floors comprising of RCC slab over profiled metal deck sheets (to be used as permanent shuttering) over structural beams. Shear anchor studs shall be provided through metal deck at regular interval on all top flange/flange plate of structural beams. However, the lower portion of side cladding, at ground, for a minimum height of 0.9 m above the finished floor level shall be one brick thick wall plastered on both side. In some areas like MCC floors etc., one brick thick wall cladding shall be provided. Brick wall cladding shall be supported on encased wall beams and suitably anchored to adjoining columns and beams. Vertical bracings shall be provided only on four sides along the periphery. Grade slab with 0.9m height one brick thick wall plastered on both side at periphery shall be provided for all transfer houses.

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	Adequate steel doors and windows for proper natural lighting and ventilation shall be provided. In addition to steel windows, panels of suitable size to suit the architectural treatment and made of translucent sheets of polycarbonate material shall also be provided on the side cladding for natural lighting. The roof of Transfer points shall be provided with pre-fabricated insulated metal sandwich panels. Composition of Insulated Metal Sandwich Panels shall be as described elsewhere in the Technical Specification. Adequate slope shall be provided for quick drainage of rain water.
3.04.00	**Crusher House** The crusher house shall be framed structure of structural steel work with permanently colour coated profiled steel sheet side cladding. However, panels of suitable size to suit the architectural treatment and made of translucent sheets of polycarbonate material shall also be provided on the side cladding for natural lighting. The lower portion of side cladding, at ground, for a height of minimum 0.9m above the finished floor level shall be of one brick thick wall plastered on both faces. Floors shall be of R. C. C. slab over profiled metal deck sheets (to be used as permanent shuttering) over structural beams. Shear anchor studs shall be provided through metal deck at regular interval on all top flange/flange plate of structural beams. Within this building cubicles are to be provided for resting room of operators and these shall be constructed with one brick thick brickwork having both sides plastered and roof slab. Adequate steel doors and windows for natural lighting and ventilation shall be provided. Vertical bracings shall be provided only on four sides along the periphery. The roof of Crusher house shall be provided with pre-fabricated insulated metal sandwich panels. Composition of Insulated Metal Sandwich Panels shall be as described elsewhere in the Technical Specification. Adequate slope shall be provided for quick drainage of rain water. Crushers shall be supported on R. C. C. deck, which in turn will rest on suitable vibration isolation system consisting of springs and dampers. This R. C. C. deck shall be isolated from the floor. However, the vibration isolation system consisting of springs and dampers may rest on main building framework. Detailed specification of vibration isolation system including the unbalanced force, frequency and amplitude criteria and other design requirements are appended elsewhere in this specification.
3.05.00	**Control building, M. C. C. Buildings** These shall be framed building with R. C. C. roof and floor. For steel framed building roof /floor shall comprise of RCC slab over profiled metal deck sheets (to be used as permanent shuttering only) over structural beams. Cladding shall be of brickwork/concrete block work with plastering on both sides. Roof shall be provided with roof water proofing treatment, as specified elsewhere in the Technical specification. Suitable arrangement shall be provided so as to prevent ingress of water into the cable trenches inside the building from cable entry locations.

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	All air - conditioned areas, shall be provided with false ceiling system (details specified elsewhere) with under deck insulation. Adequate aluminium doors and windows shall be provided for natural lighting, ventilation and view. All windows in air conditioned rooms shall have hermetically sealed double glazing.
3.06.00	**Pent House** These shall be of R. C. C. framed structures with columns, beams, slabs and foundations etc. Cladding shall be of brickwork with plastering on both sides. Roof shall be provided with roof water proofing treatment as specified elsewhere. Adequate nos. of steel doors and windows shall be provided for natural lighting and ventilation.
3.07.00	**Gypsum Storage Shed** The Gypsum storage shed shall be RCC framed structure with RCC/ Brick infill wall (upto Tripper floor) and structural steel shed with permanently colour coated profiled steel sheet roof and side cladding (above tripper floor). Roof shall be provided with troughed profile permanently colour coated sheet with slope of 1 in 5 for quick drainage of rain water. At grade level Heavy duty paving as detailed elsewhere in the specification shall be provided inside the shed.
3.08.00	**Toilets** Toilet with potable water line facilities shall be provided in each of the following locations: (a.) In all M. C. C./ Control buildings
3.09.00	**Staircases, Gratings, Handrails** All floors of transfer points/crusher houses and other facility buildings shall be accessible through staircase. All staircases of Transfer points and crusher house shall be of steel. Cage ladders (min. 450mm wide) shall be provided for access to roof of penthouses, single storey mcc rooms & mumty. All Stairs shall be minimum 1200 mm wide, maximum rise should not be more than 180 mm and minimum tread with 250 mm. Numbers and arrangement (including enclosures etc.) of stair cases shall be such as to meet the fire safety requirement as per guide lines of statutory regulatory bodies. For steel staircases, Stringers shall be of rolled steel channel (minimum ISMC 250) and tread shall be of steel gratings. Outside stairs to transfer points/crusher house shall be open type. However sheeting shall be provided at the top. Minimum 50 x 50 x 6 mm size angles with lugs shall be provided as edge protection for treads of stairs in underground TP's All gratings shall be electro forged types. Minimum thickness of the grating shall be 40 mm for indoor installation and 32 mm for outdoor installation. However, at entry or road crossing point's minimum thickness of grating shall be 40 mm The opening size shall not be more than 30mmx100mm. The minimum thickness of the main bearing bar shall be 6 mm or as per design requirement whichever is higher. All gratings shall be designed for minimum imposed load of 500Kgs. / Sq. M. If actual expected load is

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	more than the specified load, then actual load is to be considered. All gratings shall be hot dip galvanized at the rate of 610 g. per sq.m. after surface preparation by means of blast cleaning/ acid pickling. Minimum 1000 mm high hand railing shall be provided around all openings, projections / balconies, walkways, platforms, Stairs, etc. All handrails and ladder Pipes shall be 32 mm nominal bore MS Pipes (medium class) as per IS:1161. Handrails shall have top and middle rails at a height of 1000 mm and 500 mm and the vertical post spacing shall not exceed 1.50 M, with provision of kick Plates (100 mm high and 6 mm thick). All handrails and ladders shall be galvanised at the rate of 610 Gms / Sq. M as per IS:4736.
3.10.00	**Trenches** All trenches for cables or any other underground facility as detailed out elsewhere shall be of R. C. C. Cable trenches shall be provided with pre - cast R. C. C. covers / chequered plate cover. Cable trenches as well as pre - cast covers shall be provided with edge protection angles and lifting hooks. All embedments / block outs as required and specified elsewhere in these specifications shall be provided. Proper drainage arrangement shall be provided. Trench pre - cast cover weight shall not be more than 65 Kgs. Trench covers near entry or at road crossings shall be designed for 10 T wheel load at centre. Pre - cast covers shall be designed for central point load of 75 Kgs. R. C. C. cable trenches shall be filled with sand after erection of cables, up to top level and covered with pre - cast R. C. C. covers. For cable trenches outside buildings, top level shall be 200 mm above G. L and sand filling shall be overlaid with 50 thk. PCC. Minimum 50 x 50 x 6 mm size angles with lugs shall be provided as edge protection all around cut outs / openings in floor slabs, edges of drains supporting grating/precast RCC covers, edges of R. C. C. trenches supporting pre - cast covers, supported edges of pre - cast cover
3.11.00	**Cable gallery/trestles** Cable galleries/trestles shall be made of structural steel. The contractor can use either rolled sections or tubular steel sections. The tubular steel section shall be of circular/rectangular/square shape. The circular steel tube shall conform to IS:1161 and rectangular/square steel sections shall confirm to IS:4923. The steel structures using tubular sections shall be designed and fabricated as per IS:806 – "Code of Practice for use of steel tubes in general building construction." and **EN 1993-1-8:2005**.
3.12.00	**Transformer Foundation**
3.12.01	Foundations of transformers shall be designed for seismic and wind loads in addition to other applicable loads. Block foundations shall be provided for the main transformer block. The oil soak pit, if provided, shall be filled with gravel of size 40mm. The volume of the soak pit shall be sufficient to store complete oil of the transformer/reactor along with 10 minutes of fire water considering only 40% of the volume as available voids between gravel filling. However, in case a separate oil collection tank is provided for the transformer/reactor, oil soak pit of volume equivalent to one-third (1/3) the oil volume of transformer/reactor shall be provided around transformer/reactor. The oil collection

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	tank, in such cases, shall be designed for an effective capacity of complete oil of the transformer along with 10 minutes of fire water. The oil soak pit shall also be provided with a sump at the corner to allow drainage of water/oil from the soak pit. Arrangement for moving the transformer into place using rail cum road, jacking pads and pulling blocks including inserts, as required, shall be provided along with the transformer/ reactor foundations. RCC Firewall shall also be provided between the transformers wherever required. 300 mm thick PCC M20 encasement all around the Pylon supports inside soak pit for fire fighting system shall be provided up to top of gravel filling. Coarse aggregate filling inside the transformer oil soak pit shall be carried out only after construction/erection of Pylon supports and PCC encasement.
3.12.02	**Fencing** Fencing with toe wall and steel gates shall be provided around the transformers. Fencing shall comprise of PVC coated GI chain link fencing of minimum 8G (including PVC coating) of mesh size 75 mm and of height 2.4 m above the toe wall. The diameter of the steel wire for chain link fence (excluding PVC coating) shall not be less than 12G. Fence posts shall be of pre – cast R. C. C. of minimum M20 grade. All corner posts will have two stay posts and every tenth post will have transverse stay post. Suitable R. C. C. foundation for the post and stays shall be provided based on prevailing soil conditions. Gates shall be sturdy with locking provisions. Toe walls of brick masonry shall be provided between fence posts all along the run of the fence with suitable foundation. Toe wall shall be minimum 200 mm above the formation level with 50 mm thick P. C. C. coping (1: 1. 5: 3) and shall extend minimum 300 mm below the formation level. Toe wall shall be plastered on both sides and painted with two coats of cement paint of approved colour and shade. Toe wall shall be provided with weep holes at suitable spacing
3.13.00	**Booster Fan Foundation & Mill Foundation** Booster Fan and Mill foundations shall be RCC block foundation directly resting on virgin soil/ pile below Ground level. The vertical faces of this block foundation shall be isolated from adjacent footings by providing minimum 100mm thick polystyrene board of type-1 conforming to IS: 4671 with density 20 Kg/cum sandwiched between the vertical face of block foundation and 230 thick brick wall all round.
3.14.00	**CHIMNEY**
3.14.01	**Salient Features** Configuration and height of chimney(s) shall be as specified in mechanical portion of technical specification. Chimney shall be of reinforced concrete construction. There shall be one flue (liner) for each unit. The centre to centre distance between the proposed chimney(s) and the existing chimney(s) & NDCT in any direction shall not be less than 150 metres. The chimney shell (windshield) shall be constructed using slip form shuttering. Internal

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	platforms of steel structure shall be provided for enabling access to various elevations of the chimney and to provide support to the flue liners. Spacing of internal platforms shall not exceed 45.0 M. The platform beams shall be supported on concrete shell using suitable load bearing arrangement in the recesses provided for the purpose. The platform beams getting supported in the chimney shell shall have complete bearing support within the thickness of shell at that location and shall in no case be supported completely/partially on corbels/ brackets from the shell. "Through openings" in shell if provided to facilitate erection of platform beams shall be closed with cast-in-situ RCC closure wall on the external face of the shell. Necessary dowel bars shall be provided in the shell during construction for this purpose. Openings in the concrete shell for flue duct entry, access door & truck entry door at ground level, air ventilation etc shall be provided. Hand railing shall be provided all around internal staircase & around the ventilation voids in the internal platform using min. 32 mm nominal bore MS pipes of medium class conforming to IS:1161. Spacing of railing posts shall not be more than 1500 mm centre to centre with a minimum height of 1200 mm. The handrail shall have three rows of horizontal members between the railing posts including the top member. Kick plate of min. size 100x6 thick shall be provided in the hand railing. The flue duct outside the chimney shall be suitably connected to the flue liner inside the chimney through a transition duct. The transition duct shall be profiled into a circular shape to connect to the flue liner. The flue duct shall be so designed that no load is transferred on the chimney shell due to the duct. The interface between the flue liner and the transition ducting shall be provided with non-metallic expansion joint. The expansion joint in the flue liner shall comprise of non-metallic material suitable for wet stack operations, shall be acid resistant to withstand acidic flue gas condensates arising out of flue gas parameters & operating conditions as specified elsewhere in the specification and shall also prevent dust accumulation. The space between the expansion joint material and the liner shall be packed and sealed by providing a bolster made up of light weight compressible material suitable for wet stack operations and acid resistant to withstand acidic flue gas condensates arising out of flue gas parameters & operating conditions as specified elsewhere in the specification. The bolster shall be confined in texturized glass fabric having a final covering of stainless steel wire mesh. Chimney roof shall be of RCC slab over a grid of structural steel beams and provided with rainwater drainage system. An internal structural steel staircase supported from chimney shell with chequered plate floor panels and pipe handrails, shall be provided upto the platform just below roof platform and an internal cage ladder for a small height, over last staircase landing to access the chimney roof through a roof access hatch. The other components of the chimney include liner test ports (for continuous pollution monitoring), liner hatches, grade level slab of RCC with metallic hardener floor finish, acid resistant treatment on roof slab, a large electrically operated grill type roll-up door and personnel access metallic door at grade level, roof drain basin, rain water down comer pipe (150 mm diameter galvanized pipe), connection to plant drains, louvers with bird screens for ventilation and all other openings in the wind shield, all finishing works, electrical power distribution boards, lighting panels, power & control cabling and wiring systems, stair and platforms lighting, socket outlet, lightning protection and grounding system, aviation obstruction lighting with photoelectric controller etc, communication system, a rack and pinion elevator and other items, though not specifically mentioned but reasonably implied and necessary to complete the job in all respects.. Aviation Warning Lights (AWL) shall be mounted on door panel of required size (open

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	able from interior of chimney shell) fixed to openings in the chimney shell at locations and levels specified elsewhere. Suitable provision for approach to the AWL shall be provided at the platform level. AWL shall be located at about 1-1.5 metre above the top of platform to enable easy handling for maintenance. The size of roll-up door shall be determined based on minimum requirement for ventilation and transportation & erection of flue segments.
3.14.02	**Design Concept** Design and construction of various components and systems of the chimney shall be in accordance with relevant Indian Standard and where provisions are not covered in Indian Standard, reference shall be made to ACI, BS, CICIND and other international standards. In case of any conflict between this document and the Indian and International Standards, the stipulations of this document shall prevail. Imposed loading for design of all chimney components shall not be less than 5 kN/ Sq.m. An additional 25% of liner load shall be taken as impact loading for liner erection in addition to the liner load. The min. thickness of web for plate girders shall be kept as 12 mm. Seismic forces on the chimney system shall be determined based on site specific seismic information provided elsewhere in this document. Wind forces on the chimney system shall be determined based on site specific wind design criteria provided elsewhere in this document. The chimney and its components shall be designed to resist the most onerous forces resulting from all the possible combinations of the various loadings.
3.14.03	**Wind Shield** The wind shield shall be designed for vertical loading, cross wind loading, seismic loading, circumferential wind loading, thermal gradients etc. The analysis and design of wind shield shall be carried out as per IS 4998. The wind shield shall be analysed for cases with and without flue liner loads. Forces/stresses in the wind shield due to eccentricity effects of local loadings, insolation effects, rotation of chimney foundations, construction tolerances and moments of second order shall also be considered. Seismic response of the chimney shall be computed by the response spectrum method. At least, the first five modes of vibrations shall be used for this analysis. The cross wind analysis of the chimney shall be carried out irrespective of the value of the Scruton Number for the chimney and other empirical considerations which suggest structural immunity to cross wind oscillations. The effect of the openings/cut-outs in the chimney shell shall be duly considered in the design of the windshield. The minimum thickness of shell shall not be less than 500mm. The minimum vertical reinforcement shall be 0.3% of the concrete area. The maximum spacing of the reinforcement bars shall not be more than 250 mm on each face. The minimum circumferential reinforcement shall be 0.2% of the concrete area. The

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	maximum spacing of the reinforcement bars shall not be more than 200 mm on each face. The circumferential reinforcement in the top 3 meters of the windshield shall be twice that required from design forces. The clear cover to reinforcement shall be 50 mm. There shall be a continuous ring of concrete shell without any opening for a height of atleast 5m below the soffit of flue duct openings. There shall not be any reverse (outward) slope in the inside face of chimney shell. Where there is a change in slope/ profile of the shell, the circumferential reinforcement shall be increased to twice the requirement as per the design in a circumferential band extending atleast 3m above and below such slope/profile change level. The diameter of the reinforcing bar for the main vertical reinforcement of shell shall not be less than 25mm for a shell height upto the top level of flue duct opening. Shell thickness between any two 10m reference levels shall not vary more than 150mm. The minimum thickness of shell/closure wall at beam support recess/ opening locations shall be 100mm. Grade of concrete for chimney shell, and other super structure shall be minimum M 30. Only OPC cement shall be used for Chimney shell and other super structure. The final design shall be checked & verified by 'Wind Tunnel Test' conducted at a reputed institution. Dynamic interference effects due to additional chimney(s)/NDCTS's and other tall structures located upto distance of 20 times diameter at 2/3rd height of subject chimney, in the area or in the future expansion stage of the project, as envisaged by the owner at the time testing, shall be determined along with the other topographical features of the local area through model test.
3.14.04	**Flue Liners** The flue gas parameters & various operating conditions for selection of flue liner material, material specification for flue liner and the criteria of flue gas exit velocity for sizing the flue liner shall be as specified elsewhere in the specification. For flue liner with base metal as mild steel, the thickness of the base metal shall be determined from structural considerations. The thickness of any clad metal/coating/block lining etc. provided on the base metal shall not be considered for computing the structural strength of flue liner. The minimum thickness of the mild steel base metal shall, however, not be less than that specified elsewhere in the specification. Two manholes placed diametrically opposite shall also be provided in each flue at all internal platform levels. The supporting/restraining arrangements of the liners should be such that expansion of the liners longitudinally or circumferentially is not restrained.
3.14.05	**Internal Platforms** The platforms shall be designed for dead, imposed (live), erection work and other possible loadings and temperatures effects. These platforms shall provide support and lateral restraint to the steel liners and provide access for inspections and maintenance. Forces imposed on the floors due to lateral restraint of flues shall be enhanced aptly

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	for impact effects. These platforms shall also be designed suitably for the liner erection works. The platform shall be made up of chequered floor panels supported on grid of structural steel beams. All beams shall have bolted connections. The maximum permissible deflection in main steel girders supporting flue liner shall be span/1000.
3.14.06	**Internal Staircase** The staircase shall have a clear passage way width of not less than 800 mm and a clear headroom of not less than 2100 mm. The riser height shall not be more than 175 mm and tread width shall not be less than 225 mm.
3.14.07	**Foundation** The chimney foundation shall be designed as per limit state method as per IS 4998 for the most critical combination of forces and moments, resulting from all possible combinations of the various loadings from the chimney system during all stages of constructions. The effect of water table shall be considered and the foundation shall be checked for overturning for minimum and maximum vertical loads. There should be no uplift under any portion of the foundation/piles for any loading condition. Since chimney is a wind sensitive structure, no allowance shall be made in the load carrying capacity of the bearing strata / piles under any load case/combination with wind. The foundation diameter to depth ratio shall be maintained to around 10 and should preferably not exceed 12. The diameter of the reinforcing bar for the main radial and tangential reinforcement for the foundation shall not be less than 25mm. The spacing of radial steel at the outer edge of the foundation shall not be more than 250mm. Grade of concrete for foundation shall be minimum M 30.
3.14.08	**Thermal insulation (Applicable in case of Titanium / C-276 Flue Liner)** The insulation shall be semi rigid, resin bonded type, in the form of slabs and shall conform to IS: 8183. Blanket type insulation shall not be used. The density of insulation shall not be less than 64 kg/cu.m for resin bonded glass wool insulation and 100 kg/cu.m for resin bonded rock wool. The coefficient of thermal conductivity of insulation shall not be more than 0.52mW/cm/oC at a mean temperature of 100oC. The insulation thickness shall not be less than 100 mm, in any case, and shall be provided in two layers with the second layer of insulation covering the joints of the first layer. The insulation shall be wrapped on the outer-most surface with galvanized wire mesh using MS galvanised pins and speed washer.
3.14.09	**Chimney Painting** (i) All exposed steel surfaces (including exterior surface of mild steel flue liner in case the design does not envisage provision of thermal insulation on the exterior surface of flue liner) shall be painted as specified in corrosion protection clause of this specification. (ii) All steel parts embedded in concrete like bolts, nuts, washers, pipe sleeves and insert plate shall be galvanized as per IS:4736. The minimum weight for galvanizing shall be 610 g/sq.m and shall comply with relevant IS Codes.

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	(iii) The inside surface of chimney shell above roof, horizontal surface of shell at top, underside of concrete roof slab etc. shall be painted with epoxy phenolic coating system having total 220 microns DFT. a) All concrete surfaces shall be provided with two component transparent polyamide cured epoxy sealer coating (having solid by volume minimum 40% ±2%) of minimum 50 micron DFT to be applied over cleaned surface in multiple coats. Surface to be coated shall be absolutely dry, clean and dust free. b) Sealer coat shall be followed with the application of Intermediate coat of epoxy phenolic coating (solid by volume minimum 63%) of minimum 100 micron DFT. This coat shall be applied after an interval of minimum 24 hours (from the application of primer coat) by airless spray technique. c) Intermediate coat shall be followed with the application of finish coat of two-pack aliphatic Isocyanate cured acrylic finish paint (solid by volume minimum 55% ±2%) with Gloss retention (SSPC Paint Spec No 36, ASTM D 4587, D 2244, D 523) of Level 2 (after minimum 1000 hours exposure, Gloss loss less than 30 and colour change less than 2.0 ΔE) and minimum 70 micron DFT. This coat shall be applied after an interval of minimum 10 hours and within six (6) months (from the completion of Intermediate coat), Colour and shade of the coat shall be as approved by the Employer. (v) The entire external surface of chimney shell shall be painted with epoxy phenolic coating as specified in (iv) above in alternate bands of 'signal red' and 'bright white' colours.
3.14.11	**Rack and Pinion Elevator** A rack and pinion elevator, with a load carrying capacity of 400 kg (min) (passenger cum goods), cabin floor size of 1100 mm x 1000 mm (min.) and an operating speed of 40 m/min. (approx.), shall be provided for travel from the grade level to the top of the chimney. A landing platform shall be provided at all access/ platform levels. The elevator shall be of a proven and approved make. Enclosure shall be fabricated from tubular steel and expanded metal or wire mesh, 2.1 m high (Approx.). A Safety device comprising of an over speed governor in constant mesh with the rack by means of a flame hardened steel pinion shall be provided to protect the cab against over speed during the cab downward motion and the same shall actuate the brake mechanism and stop the down ward motion gradually. The lift shall be installed using anchor fasteners. The electrical requirement of the system shall conform to the main electrical specification. Drive motor shall be of S3 duty class with CDF of 25% and maximum number of 120 starts per hour in 55 degree Celsius ambient temperature. The motor shall be provided with internal 220V AC single phase space heaters or an alternate heating system. The elevator shall be supplied, installed, painted, tested, commissioned etc. complete with all mandatory spares (as specified in Part-F of this specification) and operation maintenance manual
3.15.00	**Limestone Grinding System building** This shall be framed building with R. C. C. roof and floor. For steel building roof /floors shall comprise of RCC slab over profiled metal deck sheets (to be used as permanent shuttering only over structural beams). Cladding shall be of single skin metal sheeting or brickwork/concrete block work with plastering on both sides. Roof shall be provided

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	with roof water proofing treatment, as specified elsewhere in the Technical specification.
3.16.00	**Gypsum Dewatering Building**
	This shall be framed building with R. C. C. roof and floor. For steel building roof /floors shall comprise of RCC slab over profiled metal deck sheets (to be used as permanent shuttering only over structural beams). Cladding shall be of single skin metal sheeting or brickwork/concrete block work with plastering on both sides. Roof shall be provided with roof water proofing treatment, as specified elsewhere in the Technical specification.
4.00.00	**Drainage & Water Supply Works**
4.01.00	Drainage System:
	The drainage arrangements shall be so planned so as to ensure quick disposal of drainage water without stagnation and / or overflow. It is envisaged to clean the facility buildings etc. with water periodically.
	Minimum 4 nos. down comers shall be provided in each building at corners.
	For Conveyors, each down comer shall lead the water / slurry to pit (of 2 Cu.M capacity) to allow settling of lime/gypsum. The water from the pit shall overflow into contractor's R.C.C drain, which will lead the discharge finally into owner's drain routed alongside the nearby road.
	For Ball Mill building, Gypsum dewatering building, FGD control room building, peripheral drains (Brick drains with steel gratings provided around the building) shall lead the water / slurry to a local pit (of 2 Cu. M. capacity) near each facility to allow settling. The water from the pit shall overflow into contractor's R.C.C drain, and finally into owner's drain routed alongside the nearby road.
	In case of Control rooms and M. C. C. buildings Pump houses, etc, water / slurry coming from down comers shall discharge into peripheral drains (Brick drains with steel gratings provided around the building) which will lead the water / slurry into contractor's R.C.C drain, which will lead the discharge finally into owner's drain routed alongside the nearby road.
	Contractor's scope shall also include construction of necessary culverts under the rail lines / roads as per railway / I. R. C. standards and approval of Railway culverts from concern Railway authorities.
4.02.00	**Internal and external water supply, drainage etc.**
	The scope for potable water supply includes all distribution systems, tanks, pipes, fittings etc. as required and as described here or elsewhere in the specifications.
	The scope for service water supply and dust control water supply shall be as described elsewhere in the specifications.

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	For water supply, medium class galvanized mild steel pipes conforming to IS: 1239 shall be used. All facility buildings shall be provided with open surface brick drains of minimum size of 300 mm width and 300 mm depth all around the periphery. All drains excepting the peripheral drains around facility building shall be of R. C. C. construction. Drains shall have removable steel grating cover and shall be provided with edge protection angles. For rain water down comer and those to be used for conveying water / slurry generated from cleaning of buildings floors, Galvanised MS pipes conforming to IS: 1239 (for 150 mm NB Medium grade pipes) with welded joints shall be used for MCC buildings, penthouse, control rooms, ball mill building, gypsum dewatering building, storage sheds. Galvanising shall be as per IS: 4736. The minimum mass of zinc coating shall not be less than 400 gms/sq.m. as per IS:6745. The zinc coating shall be smooth and shall be subjected to testing as per IS: 2633, for uniformity of coating. The zinc coating shall be free from all defects as per IS: 2629. All rain water down comers shall be provided with roof drain heads and complete with shoes bends, junctions, sockets, adapters, brackets and finished with anti-corrosive painting over a coat or primer. For design of building drainage system IS: 1742 shall be followed. For underground drain pipes, minimum class NP - 2 pipes conforming to IS: 458. At road crossings, concrete pipes of class NP 3 conforming to IS: 458 and at rail crossing R.C.C. box culvert to be provided.
5.00.00	**COLOUR COATED AND OTHER SHEETING WORK**
5.01.00	**Material** **a) Wall Cladding & Roofing Material** Troughed permanently colour coated sheet of approved shade and colour shall be **i)** either of steel with minimum 0.6mm bare metal thickness (i.e. excluding the thickness of galvanizing/aluminium-zinc coating and painting) of grade G250 as per AS1397 / grade SS255 as per ASTM A653M / grade S250GD as per EN 10326 with zinc coating to class Z275 / aluminium-zinc alloy coating to class AZ150 **ii)** or of minimum 0.5mm BMT (i.e. excluding the thickness of galvanizing/aluminium-zinc coating and painting) of grade G350 as per AS1397 / grade SS340 class 4 as per ASTM A792M / grade S350GD as per EN 10326 with zinc coating to class Z275 / aluminium-zinc alloy coating to class AZ150 **iii)** or of steel of minimum 0.4mm BMT (i.e. excluding the thickness of galvanizing/aluminium-zinc coating and painting) of grade G550 as per AS1397 / grade SS550 as per ASTM A792M / grade S550GD as per EN

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	10326 with zinc coating to class Z275 / aluminium-zinc alloy coating to class AZ150. Alternatively aluminium feed material of minimum bare metal thickness of 0.7 mm of aluminium alloy of Series 31000 and above as per IS 737 and IS 1254. **b) Metal Deck Roof Material** Troughed permanently colour coated metal decking sheets shall be **i)** either of steel with minimum 0.8mm bare metal thickness (i.e. excluding the thickness of galvanizing/aluminium-zinc coating and painting) of grade G250 as per AS1397 / grade SS255 as per ASTM A653M / grade S250GD as per EN 10326 with zinc coating to class Z275 **ii)** or of minimum 0.6mm BMT (i.e. excluding the thickness of galvanizing/aluminium-zinc coating and painting) of grade G350 as per AS1397 / grade SS340 class 4 as per ASTM A792M / grade S350GD as per EN 10326 with zinc coating to class Z275 **iii)** or of steel of minimum 0.6mm BMT (i.e. excluding the thickness of galvanizing/aluminium-zinc coating and painting) of grade G550 as per AS1397 / grade SS550 as per ASTM A792M / grade S550GD as per EN 10326 with zinc coating to class Z275. Alternatively aluminium feed material of minimum bare metal thickness of 0.9 mm of aluminium alloy of Series 31000 and above as per IS 737 and IS 1254 can also be used for metal decking. Thickness tolerance of (+/-) 0.04mm is permissible. However, all design calculations shall be carried out on the basis of lowest value of sheet thickness provided.
5.02.00	**Colour Coating** Steel shall be colour coated with total coating thickness of at least 40 microns (nominal) comprising of silicon modified polyester (SMP with silicon content of 30% to 50%) paint or Super Polyester paint, of minimum 20 microns (nominal) dry film thickness (DFT) on external face over primer coat of minimum 5 microns (nominal) and minimum 10 microns (nominal) SMP or super polyester paint over primer coat of minimum 5 microns (nominal) on internal face. SMP and Super polyester paint systems shall be of industrial finish of product type 4 of AS/NZ2728.
5.03.00	**Design Criteria** For wall cladding insulated / uninsulated sides and roof, permanently colour coated sheet of troughed profile shall be used. The nominal depth of trough shall be 30 mm. For profiled metal decking sheets (to be used for RCC floor slab or roof slab) the sectional modulus and moment of inertia of troughed profile per meter width shall be so as to limit the deflection of sheets to span/250 under total super imposed loading (DL +LL) comprising the self-weight of metal deck sheet, dead weight of green concrete and an additional construction load 100kg per sq.m for two span condition. The section modulus and moment of inertia of troughed profile shall be computed as per the provisions of IS 801 for satisfying the deflection and strength requirements. For metal deck sheets used for roofing (with or without RCC) and side cladding, the sectional modulus and moment of inertia of troughed profile per metre width shall be such that the deflection of sheets is limited to span/250 under design wind pressure

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	for two span condition. The sectional modulus and moment of inertia of troughed profile shall be computed as per the provisions of IS 801 for satisfying the deflection and strength requirements. No increase in allowable stress is permissible under wind load condition.
5.04.00	**Fasteners**
	Side cladding/roofing/decking sheets shall be fixed to the runner/purlins using self-drilling special coated fasteners confirming to corrosion resistant class 3 of AS3566 and tested for 1000 hours salt spray test. Spacing of Self-drilling fasteners in transverse direction (along runners/purlin) shall be equal to the pitch of trough or 250(+/-100) mm, whichever is lesser and in longitudinal direction at every runner/purlin location.
	Shear anchor studs shall also be provided through troughed permanently colour coated metal decking sheets metal deck, which are to be used as permanent shuttering, at regular interval on all top flange / flange plate of structural beams.
	The shear anchor studs for fixing metal deck sheet to floor structural beams shall conform to Type-B studs specified in AWS D1.1/D1.1M or equivalent as shear connector of 19mm diameter and 100mm length manufactured from cold drawn round steel bars conforming to the requirement of ASTM A 29, of grade designation 1010 through 1020, of standard quality with either semi-killed or killed, welded by Drawn Arc Stud Welding through metal deck sheet.
	The shear anchor studs for fixing metal deck sheet to roof structural purlins shall conform to Type-B studs specified in AWS D1.1/D1.1M or equivalent as shear connector of 16mm diameter and 65mm length manufactured from cold drawn round steel bars conforming to the requirement of ASTM A 29, of grade designation 1010 through 1020, of standard quality with either semi-killed or killed, welded by Drawn Arc Stud Welding through metal deck sheet.
	Alternatively, J/U type hooks shall be used in roofing which shall be provided in transverse direction (along runners/purlin) at a spacing equal to the pitch of trough or 250(+/-100) mm, whichever is lesser and in longitudinal direction at every runner/purlin location.
5.05.00	**Miscellaneous Details**
	To minimize the number of joints, the length of the sheet shall preferably be not less than 4.5m, cut pieces shall not be used, unless specifically approved by the Engineer. However, the actual length shall be such so as to suit the purlin / runner spacing.
	Lap between the sheets shall be at least 150mm in the longitudinal direction and at least one crest wide in the transverse direction which shall be properly anchored / fixed with fasteners.
	Z spacers if required shall be made of at least 2 mm thick galvanised steel sheet of grade 350 as per IS 277
	Sealant used for cladding shall be butyl based, two parts poly sulphide or equivalent approved, non stainless material and be flexible enough not to interface with fit of the sheets
.	Filler blocks as a trough filler shall be used to seal cavities formed between the profiled sheet and the support or flashing. The filler blocks shall be manufactured from black synthetic rubber or any other material approved by the Engineer.

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	All flashings, trim closures, caps etc. required for the metal cladding system shall be made out of plain sheets having same material and any weather/moisture sealants with appropriate material and coating specification as mentioned above for the outer face of the metal cladding. Overlap shall be min. 150 mm or as specified by manufacturer.
5.06.00	**Pre-Fabricated Insulated Metal Sandwich Panels** For structures where Pre-Fabricated Insulated Metal Sandwich Panels shall be used for Roofing, the sandwich panels shall comprise top sheet as troughed permanently colour coated sheet & bottom sheet as plain permanently colour coated with 50mm thick insulation sandwiched between the two sheets. Each sheet shall be **i)** either of steel with minimum 0.6mm bare metal thickness (i.e. excluding the thickness of galvanizing/aluminium-zinc coating and painting) of grade G250 as per AS1397 / grade SS255 as per ASTM A653M / grade S250GD as per EN 10326 with zinc coating to class Z275 / aluminium-zinc alloy coating to class AZ150 **ii)** or of minimum 0.5mm BMT (i.e. excluding the thickness of galvanizing/aluminium-zinc coating and painting) of grade G350 as per AS1397 / grade SS340 class 4 as per ASTM A792M / grade S350GD as per EN 10326 with zinc coating to class Z275 / aluminium-zinc alloy coating to class AZ150 **iii)** or of steel of minimum 0.4mm BMT (i.e. excluding the thickness of galvanizing/aluminium-zinc coating and painting) of grade G550 as per AS1397 / grade SS550 as per ASTM A792M / grade S550GD as per EN 10326 with zinc coating to class Z275 / aluminium-zinc alloy coating to class AZ150. Alternatively aluminium feed material of minimum bare metal thickness of 0.7 mm of aluminium alloy of Series 31000 and above as per IS 737 and IS 1254. Metal sheets (steel or aluminium) shall be colour coated with total coating thickness of at least 40 microns (nominal) dry film thickness (DFT) comprising of Silicon Modified Polyester (SMP with silicon content of 30% to 50%) paint or Polyester paint, of minimum 20 microns (nominal) SMP or polyester paint on one side (exposed face), over minimum 5 micron (nominal) primer coat and minimum 10 micron (nominal) SMP or Polyester paint over minimum 5 micron (nominal) primer coat on other side. SMP and Super Polyester paint shall conform to product type 4 of AS/NZS 2728. Troughed sheet shall be of approved profile, sectional properties, (suitable for the specified loading / deflection and purlins / runners spacing), colour and shade. Special coated fastener conforming to corrosion resistant Class 3 of AS3566 and tested for 1000 hours salt spray test shall be used for fixing Pre-Fabricated Insulated Metal Sandwich Panels with the structural members below. The contractor shall prepare working drawings of sheeting system including end and side laps, fixing details etc. before starting sheeting work at site.
5.07.00	**Polycarbonate Sheets** The polycarbonate sheet to be used for cladding and glazing purpose in conveyor galleries, Transfer points & pump houses shall have toughed profile to match with the metal cladding profile. Minimum 3.0mm thick fire retardant and UV resistant polycarbonate clean sheet of approved make shall be used. The polycarbonate sheet shall be installed along with the metal cladding so as to have a watertight lapping arrangement. Suitable detailing shall be made to cater for the thermal expansion. IS 14434 to be referred for other details

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6.00.00	**Roof Details**
6.01.00	Roof slab shall be minimum 150 mm thick and shall have minimum 10 dia HYSD reinforcement bars placed at 200 mm center both ways at top and bottom. For roof with metal deck the minimum thickness (150 mm) shall be above the top surface (crest) of the metal deck sheet.
6.02.00	900 mm high and minimum 100 mm thick R. C. C. parapet wall shall be provided over roofs of all buildings. Parapet wall shall have suitable coping. External face of parapet wall of the buildings provided with metal cladding shall also be finished with metal cladding of design and colour as per approved architectural drawings.
6.03.00	Junction of roof and parapet shall be provided with 150 x 150 mm size concrete fillet.
6.04.00	Drain level shall be provided with 45 x 45 cm size khurras having minimum thickness of 30 mm of M-15 concrete over PVC sheet of 1 m x 1m x 400 micron and finished with 12 mm 1 : 3 cement : sand plaster.
6.05.00	Roofs of all control rooms, M. C. C. rooms, penthouse etc., shall have roof water proofing treatment. Roof water proofing treatment shall be as follows: 1) Application of polymerised mastic over the RCC roof to achieve smooth surface as primer coat. 2) Application of high solid content liquid applied urethane based elastomeric water proofing membrane, over the primer coat, to give uniform joint less dry film thickness of minimum 1.5 mm (as per ASTM C 836 and C 898). 3) For efficient disposal of rain water, the run off gradient for the roof shall not be less than 1: 100. This gradient shall be provided by screed concrete M-15 (using 12.5 mm coarse aggregate) and / or cement mortar (1: 4) over the elastomeric water proofing membrane with 25mm thick cement mortar (1:4) topping. 4) Wearing course at top, shall consist of 25 mm thick P. C. C. (M-15) cast in panels of maximum 1.2 x 1.2 m size and reinforced with 0.56 mm diameter galvanized chicken wire mesh and sealing of joints using sealing compound / elastomeric water proofing membrane. Pathways for handling of materials and movement of personnel shall be provided with 22 mm thick chequered cement concrete tiles as per IS : 13801 for a width of 1000 mm in place of P. C. C.
6.06.00	For efficient disposal of rain water, the run off gradient for the roof shall not be less than 1:100. This gradient can be provided either in structure or subsequently by screed concrete M-15 (using 12.5 mm coarse aggregate) and/ or cement mortar (1:4). However, minimum 25 mm thick cement mortar (1:4) shall be provided on top to achieve smooth surface.
6.07.00	Medium class galvanised mild steel pipes conforming to IS: 1239/ IS: 3589 with welded joints shall be provided for rain water down comers to drain off rain water from the roof. These shall be suitably concealed with masonry work, to match with the exterior finish. The number and size of down comers shall be governed by IS: 1742 and IS: 2527. RCC roof shall be provided with 45 x 45 cm size Khurras having minimum thickness of 30 mm with M-15 concrete over PVC sheet of 1mx1mx400micron and finished with 12 mm thick cement sand plaster 1:3.
6.08.00	Access to RCC roof of Gypsum dewatering building, FGD Control room building, MCC building, Ball mill building shall be through RCC staircase, and roof access to all other buildings shall be through cage ladder as per requirement.

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6.09.00	Fillets at junction of roof and vertical walls shall be provided with cast - in - situ cement concrete (M-15) nominal mix followed by 12 mm thick 1:4 cement sand plaster.
6.10.00	The rainwater down comers shall be provided with suitable C.I. grating at inlet point.
7.00.00	**RCC Floors, Paving & Grade Slab details**
	The floor slabs shall be minimum 150 mm thick (above the top surface (crest) of the metal deck sheet) and shall have minimum 10 dia HYSD reinforcement bars placed at 200 mm center both ways at top and bottom. For floors with metal deck the minimum thickness (150 mm) shall be above the top surface (crest) of the metal deck sheet In case Bidder opts for steel super-structure with RCC floors/ roof, the bidder shall necessarily use Troughed permanently colour coated metal decking sheets having minimum thickness of 0.6mm as permanent shuttering. The detailed material property requirement of metal deck sheet is specified elsewhere in the specification. These profiled metal deck sheets shall be fixed to the structural steel beams/ purlins using headed shear anchor studs specified elsewhere in the specification. Chequered plates (used for floors, walkways etc.) shall be minimum 6 mm thick. Mild steel flats/angles of suitable size shall be welded to the bottom portion of chequered plates at a designed spacing to stiffen chequered plates suitably. Chequered plates shall be fixed by staggered welding of suitable size. Floors of trenches shall have integral finish to concrete base. Toe guard of size 100 x 6 mm shall be provided at various openings provided in floors e.g. around stair case openings, chute openings and other similar cutouts. For conveyor walkways, angle runner to act as toe guard shall be provided. R. C. C. floors (where no brick masonry walls are provided) shall be provided with handrails all along the periphery. RCC paving of minimum 150 mm thick with M25 grade concrete, over an under bed as specified herein shall be provided for areas mentioned below. RCC paving shall be designed as rigid reinforced concrete pavement for the crane/ vehicular/ equipment movement loads which the paving has to bear. The under bed for paving shall consist of preparation and consolidation of sub-grade to the required level, laying of stone soling of 200mm compacted thick for normal duty paving and 400mm compacted thick for heavy duty paving with 63 mm and down aggregate with interstices filled with selected moorum/ non-expansive soil followed by 75 mm thick 1:4:8 PCC (1 part cement, 4 parts sand and 8 parts stone aggregate) with 40 mm nominal size aggregate. For normal duty paving, reinforcement of the RCC paving shall consist of minimum 8mm dia bars @ 200 mm c / c in both directions at the centre of the slab. For heavy duty paving/ passage, reinforcement of the RCC paving shall consist of minimum 10mm dia bars @ 200 mm c / c in both directions at the centre of the slab. Paving areas shall be provided with the metallic hardener floor finish as specified elsewhere in the specification. Passages shall be provided inside the FGD area connecting to the outer periphery road to have access to the various facilities/buildings. These passage areas shall be provided with heavy duty paving for movement of heavy vehicles. The top surface of the passages shall be finished with 50 mm thick metallic hardener topping. Heavy duty

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	paving shall also be provided for the areas in the equipment lay down area, unloading & maintenance area with 50 mm thick metallic hardener topping. Lightly loaded areas such where no heavy traffic movement is envisaged shall be provided with Normal Duty paving. However, corridors below trestle where no traffic movement is envisaged and in the area over the buried fire water pipes shall be provided with interlocking concrete blocks of minimum M35 grade and minimum 80 mm thickness underlain by 20mm thick layer of sand followed by 200mm thick 63 mm and down aggregate with interstices filled with selected moorum/ non-expansive soil. All facility buildings shall be provided with 750 mm wide plinth protection all around. It consists of 50 mm thick P.C.C. M-20 grade with 12 mm maximum size aggregate over 200 mm thick stone soling using 40 mm nominal size rammed, consolidated and grouted with fine sand An area of minimum 7.5m width all around the tank foundations and other facility buildings shall be paved. This paving shall be beyond the extent of plinth protection. Further, heavy duty paving shall be provided for passages connecting the outer periphery road to have access to the various facilities/buildings. Any functional requirement of paving for FGD facility not specifically mentioned in this document is also in scope of bidder Plinth level of all buildings shall be kept at least 500 mm above the finished grade / formation level. Suitable open RCC drains shall be provided to dispose off storm water drain. Separate open RCC drains shall be provided to dispose off floor wash and plant effluents into RCC sump pits. Separate RCC sump pits shall be provided for different types of effluents. The paving shall be provided with slope of 1:500 to dispose the surface water/wash water to the nearest drain. All drains/pits shall be provided with Heavy duty electro forged GI grating cover. **GRADE SLAB OF BUILDINGS AT GROUND FLOOR** In buildings, the grade slab shall consist of 150mm thick RCC M25 grade base slab over an under bed as specified below. The under bed for ground floor slab shall consist of 75mm thick 1:4:8 PCC on stone soling of 200mm compacted thick with 63 mm and down aggregate with interstices filled with well graded selected sand/ moorum/ non-expansive soil on compacted and dressed sub - grade. Reinforcement for the slab shall consist of minimum 8mm dia. bars @ 200 mm c/c at top & bottom of the slab in both directions. However, at unloading & maintenance area, stone soiling of minimum 400mm thick and grade slab with minimum 10mm dia bars @ 200 mm c/c at top and bottom in both directions shall be provided. Further, top surface of grade slabs shall be finished with 50mm thick metallic hardener topping.
8.00.00	**Brickwork and allied masonry works** All brick walls shall be non - load bearing in-filled panel walls. All brickwork shall be designed as per Indian Standards and shall be plastered on both faces. All external walls shall be minimum one brick thick in 1: 6 cement: sand mortar. Brick walls shall be provided with 12 mm and 18 mm thick 1: 6 cement: sand plaster on smooth and rough face of the brick work respectively.

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	Only fly ash bricks shall be used in all construction. Bricks shall be table moulded/ machine made of uniform size, shape and sharp edges and shall have minimum compressive strength of 75kg/cm2. Burnt clay fly ash bricks and fly ash lime bricks shall conform to IS 13757 and IS 12894 respectively. Minimum fly ash content in fly ash based bricks shall be 25%. Brickwork cladding for various structures shall be so provided that there is a clear gap of 40 mm between inside face of external brick wall and outside face of column flange. Structural steel wall beams supporting brickwork shall be suitably encased with plaster or 1: 2: 4 concrete as the case may be. In case of box type steel beam, encasement shall be done with cement sand plaster in specified thickness and proportions over G. I. wire netting of 0.9 mm thickness. Parapets, chajjas, windows and door heads, architectural faces, fins etc. shall be provided with drip course in 1 : 4 cement sand mortar. 50 mm thick Damp proof course shall be provided at plinth level for all brick wall. All R. C. C. ceilings shall be rendered smooth and finished with whitewash unless otherwise specified. Ceiling of control rooms, M. C. C. rooms (except areas provided with false ceiling) shall be provided with 6 mm thick plaster.
9.00.00	**Earthing Mat** 40 mm Dia MS Rods as earthing mat, placed at a distance of 1.0M away and at depths between 0.60M and 1.00M shall be supplied and laid all around the periphery of buildings, structures, and outdoor equipment, as per the approved drawings. Risers of 40 mm Dia MS Rods and connecting to the above Earthing mat shall also be supplied and laid in position by the Contractor, as per the approved drawings. Risers shall be laid up to a height of 300 mm above the local Ground level, at each of the columns of the buildings on outside of the buildings, and minimum 2 (Two) numbers for structures and outdoor equipment. The contractor also supply and lay necessary number of 3.0 M deep vertical 40 mm Dia MS Rods Earthing electrodes and connecting them to the Earthing mat, as per the approved drawings and the supplying and laying of 40 mm Dia MS Rods for connecting the Contractor's earthing mat with the Employer's earthing mat separately at two locations.
10.00.00	**CLAUSE DELETED**
11.00.00	**CLAUSE DELETED**
12.00.00	**ROADS** All roads shall be of rigid pavements unless otherwise specified. The design of rigid pavement shall be carried out as per IRC: 58. The effects of design wheel load, maximum tyre inflation pressures, tyre contact area for the vehicle, traffic loads, environmental factors such as temperature changes in the pavement, other factors, like impact, load repetitions, etc., are to be taken. Detailed plate load tests to determine the modulus of sub grade reaction “K” shall be carried out as per the procedure outlined in IS: 1888. The design traffic load shall be a minimum value of 4 million standard axles. The road shall be designed for 30 years of life and considering a minimum traffic

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	growth rate of 1 per cent per annum. The concrete pavement for roads shall be minimum 250 mm thick slab. The road construction including its shoulders, base, sub base and concrete pavement shall be as per IRC standards. IRC: 58 shall be followed for the pavement design and IRC: 15 shall be followed for the construction of the concrete pavement. The road base shall be with minimum 150 mm thick dry lean concrete over granular sub base. Dry lean concrete shall be laid by a mechanical paver and compacted by vibratory rollers. Concrete pavement of the road shall be done with fully mechanized paver fitted with electronic sensors for construction techniques. Dry lean concrete shall be minimum M10 grade and concrete pavement slab shall be minimum M35 grade concrete. The finished top (crest) of all roads shall be 350 mm above the surrounding finished ground level. The sub grade under all roads and its shoulders shall be compacted to achieve 95 per cent or more of Standard Proctor's Density MDD using mechanical means. Cutting / extending / rerouting / remaking of existing roads including associated works to maintain continuity of road system / network shall also be carried out. All culverts and RCC bridges at crossings of all roads / rail tracks / facilities with drains / nallahs / channels / roads / rail tracks / pipes / other facilities, etc. are to be designed and constructed. Unless otherwise specified, all roads shall be double lane roads. Bidder shall provide permanent access to all facilities/structures from the nearby existing roads of the Owner. Roads shall be in concrete as per IRC standards, with minimum thickness of pavement (PQC) as 250mm (in M 35 grade) and DLC of 150 thick (in M 10 grade). Double lane road (width 12m having 7.5m wide pavement & 2.25m wide shoulders on both sides) shall be provided.
13.00.00	**CLAUSE DELETED**
14.00.00	**LIME & GYPSUM HANDLING AND ASSOCIATED BUILDINGS STORM WATER DRAINAGE SYSTEM** Storm water drain shall be designed taking into account the finished ground levels of the plant area, drainage pattern, intensity of rainfall, etc with a return period of 50 years. These values shall be based on rainfall intensity of 75mm/hr. All RCC drains shall be either RCC Cast-in-Situ or RCC Pre-cast drains. The minimum grade of concrete shall be M25 for RCC Cast-In-Situ drains and M30 for RCC Pre-cast drains. The maximum velocity for RCC open drains shall be limited to 1.8 metre per second. However, minimum velocity of 0.6 metre per second for self - cleansing shall be ensured. Bed slope not milder than 1 in 1000 shall be provided. Open RCC rectangular section, unless required otherwise due to functioned requirement, shall be provided for all drains. The thickness of side walls and bottom slab of RCC drains shall be minimum 150mm or as per design considerations

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	whichever is higher for drains upto depth of 1m from formation level. For depth of drain more than 1m from formation level, the thickness of side walls and bottom slab of RCC drains shall be minimum 200mm or as per design considerations whichever is higher. The drains shall be provided on both sides of roads .These shall be designed to drain the road surface as well as all the free and covered areas, etc. Box culverts shall be provided at all rail, road and other crossings. All drains inside the building shall have minimum 40 mm thick grating covers. In areas where heavy equipment loads would be coming, precast RCC covers shall be provided in place of steel grating. The invert levels of the in-plant and plant peripheral drains shall be kept such that water can be discharged by gravity to the main / trunk drains under all conditions. If required lifting facilities shall be provided for discharge in main / trunk drain by bidder.
15.00.00	**SEWERAGE SYSTEM** The connection of sewer pipe line for the associated buildings of FGD and Lime and gypsum handling area to nearest owner's sewage network is in bidder's scope. Cement concrete pipes of class NP-3 as per IS:458 shall be used below ground level for sewage disposal in all areas . However, for pressure pipes and under roads spun C.I. pipes conforming to IS:1536 of required class shall be used. RCC manholes with CI cover shall be provided at every 30m along the length, at connection points, and at every change of alignment, gradient or diameter of a sewer pipeline. This shall be as per IS:4111. Sewage pumping stations shall be provided as per IS:4111.
16.00.00	**LOADING**
16.01.00	For consideration of loads on structures IS : 875 - 'Code of practice for structural safety of buildings' shall be followed. In addition to the dead load, live load, equipment load (including impact / vibration). Temperature loads etc. various loading conditions arising due to operation and maintenance of equipment shall be considered in the design. The structure and equipment shall also be designed for seismic loads as per the **"Criteria for Earthquake Resistant Design of Structures and equipment"** and the **"Criteria for Wind Resistant Design of Structures and equipment"** specified in the **"Project Information section"** of technical specification. Wind and seismic forces shall not be considered to act simultaneously. The following minimum live loads shall be adopted for the design of various structures. If actual expected load is more than the specified load, then actual load is to be considered. a) Roofs — 150 Kgs. / Sq. M. for accessible roofs and 75 Kgs. / Sq. M. for non - accessible roofs. In addition to this dust load (Dead load) of 150 Kgs. / sq. m. on flat roofs & 75 Kgs. / sq. m. on inclined roofs shall also be considered.

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	b) R. C. C. floors	500 Kgs. / Sq. M.
	c) Stair and balconies	500 Kgs. / Sq. M.
	d) Toilet rooms	200 Kgs. / Sq. M.
	e) Chequered plate floors	400 Kgs. / Sq. M.
	f) Walkways (including walkways in conveyor galleries)	300 Kgs. / Sq. M.
	g) Conveyor galleries	In addition to the live loads, loads due to cable trays, fire fighting / service water pipes shall also be considered @ 125 Kgs. / m (minimum) on each of the longitudinal girder. Roof-truss members are to be checked for supporting fire fighting pipes/ Service water pipes.
	h) Road Culverts and its allied structures including R. C. C. pipe crossing & road crossing of trenches.	For class 'AA' loading and checked for class A loading as per IRC standard.
	i) Channels / trenches	In addition to earth pressure and water pressure, etc. additional earth pressure due to surcharge of 2T / Sq. M. shall also be considered for design.
	j) Covers for trenches / channels	Covers for channels & trenches, shall be designed for a live load of 0.4T Sq. M. and loading as mentioned under clause in trenches, whichever is critical.
	k) Sumps and tanks and other underground basement type structures	In addition to earth pressure with a surcharge of 2T / Sq. M. (or surcharge due to Railway loading whichever is critical for Railway load bearing structures etc.) and sub - soil water pressure etc. These are also to be designed for the following conditions : i) Water / liquid inside and no earth outside (applicable only to such structures which are liable to be filled up with water or any liquid). ii) Earth with surcharge outside and no water / liquid inside iii) For underground (basement) structures protection against buoyancy during execution and after execution shall be ensured without superimposed

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	L) Grating covers/ Precast RCC covers for drains, trench, sump pit in ground floor/paving area. — loadings with minimum factor of safety of 1.2 against buoyancy. 2500kgs. / sqm As per IRC standard (at road crossing for vehicular traffic.)
	If the erection load is higher than the specified live loads on any floor or part thereof, then the erection loads are to be considered for the design.
	Permissible increase in stresses of materials and bearing pressure of soil due to wind load or seismic load shall be as per relevant I. R. S. and I. S. code.
16.02.00	**Crane load**
	For crane loads, an impact factor of 25% and lateral crane surge of 10% (of lifted weight + trolley weight) shall be considered in the analysis of frame according to the provisions of IS:875. The longitudinal crane surge shall be 5% of the static wheel load. Longitudinal surge and lateral surge shall not be considered to act simultaneously.
16.03.00	**Temperature load**
	For temperature loading, the total temperature variation shall be considered as 2/3 of the average maximum annual variation in temperature. The average maximum annual variation in temperature for this purpose shall be taken as the difference between the mean of the daily minimum ambient temperature during the coldest month of the year and mean of daily maximum ambient temperature during the hottest month of the year. The structure shall be designed to withstand stresses due to 50% of the total temperature variation.
	Suitable expansion joints shall be provided in the longitudinal direction wherever necessary with provision of twin columns. The maximum distance of the expansion joint shall be as per the provisions of IS: 800 and IS: 456 for steel and concrete structures respectively.
17.00.00	**DESIGN CRITERIA**
17.01.00	The design of all R. C. C. structures shall be carried out as per 'code of practice for plain and reinforced concrete for general building construction', IS: 456.
17.02.00	Design of steel structures shall be done as per provisions of IS:800: 2007 (Limit state design) and other relevant IS standards.
17.03.00	Minimum size of the angle section to be used as structural members shall be 50 X 50 X 6. Minimum weld size shall be 6 mm. Connections shall be designed for 70 % of shear capacity of the member or the actual shear force, whichever is higher. The steel structures using tubular sections shall be designed and fabricated as per IS:806 – "Code of Practice for use of steel tubes in general building construction." and EN 1993-1-8:2005. Minimum grade of steel & thickness of Tubular/Hollow sections shall be Yst 240 Mpa & 4.0mm respectively

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17.04.00	The building shall conform to local bye - laws, rules and regulations for industrial buildings and also B. I. S. publications, SP 32 and 41.
17.06.00	Slotted holes shall not be assumed to act as expansion joint for relieving of stresses and suitable bearings shall be provided at the supports.
17.07.00	Stresses for all structures shall be checked for the higher of the forces obtained from gust factor method and the peak wind speed method.
17.08.00	Horizontal bracing system shall be provided at floor levels around the openings.
17.09.00	Shear force in steel columns shall be transferred to the pedestals / foundations exclusively either through foundation bolts or the shear key arrangement.
17.10.00	For design of liquid retaining structures, IS : 3370 (Part - I to IV) (latest) shall be followed. Face of the structure in contact with liquid shall be designed as un - cracked section. For design of R. C. C. pipes for culverts, latest editions of IS : 458, IS : 783 should be followed.
17.11.00	For design of all underground structures / foundations, ground water table shall be assumed at the formation level (i. e. the adjoining ground level). For all underground structures like tunnel, underground transfer point and underground hopper etc. crack width shall be limited to 0.2mm.
17.11A.00	The loads for all railway load bearing structures e. g. tunnel, culverts and underground transfer houses etc. and the analysis and the design of these structures shall be made strictly in accordance with the provisions of Indian Railway Bridge rules (latest edition), and Indian Railway Codes of practice (latest edition) with all amendments up to the date of opening of bids. The analysis, design and detailed drawing for tunnel, underground transfer houses, culverts etc. coming directly below the railway track shall be got approved by the contractor from the concerned railway authorities. All necessary payment for the above work shall be made by the bidder to the railway authority.
17.11B.00	Minimum clearance of 8.5m above the road crest / rail top shall be maintained at the location where the overhead conveyor gallery/cable gallery crosses road / rail line. The horizontal distance between Centre line of rail track and edge of any nearby building/structure shall not be less than 3.0m.
17.12.00	Design of masonry walls shall be made as per IS : 1905.
17.13.00	Civil task drawing indicating various equipment loading and supporting arrangement and floor loads to be submitted along with the design calculation.
17.14.00	Minimum 0.12% of reinforcement shall be provided on the top face of the foundation concrete on either direction and minimum percentage of reinforcement at bottom face of foundation shall be same as that stipulated for beam as per IS:456.
17.15.00	Foundations for all tanks shall be designed for as per IS: 803.
17.16.00	Footings shall be so proportioned to as to minimise the differential settlement.

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17.17.00	All gallery supporting trestles shall be so proportioned that the transverse deflection of gallery due to wind / seismic load should not exceed trestle height / 1000 as stipulated in IS: 11592. This deflection condition shall be strictly followed. Peak wind speed method shall be considered for checking the transverse deflection.
17.18.00	The crusher and transfer house structures shall be so designed that transverse deflection at places where conveyor galleries meet, should be equal to the respective transverse deflection of conveyor supporting trestles.
17.19.00	**Deflection criteria** The maximum Horizontal Deflection for various structures shall not exceed and be limited to the following:

Sl. No.	Description	Maximum value of
1.	For Trestles and transfer points (Transverse deflection at Conveyor gallery supporting level)	Height/1000 (For Wind load by Peak Wind Speed Method / Seismic Load)
2.	For other Buildings	Height/325

17.20.00

a) Permissible deflection (unless specified otherwise in this specification) for latticed framework and beams of floors other than drive floor shall be span/325.

b) The allowable deflection for beams directly supporting drive machinery shall be restricted to span/500 unless specified otherwise in this specification.

c) The deflection for manually operated cranes & monorail supporting beams shall not exceed span/500.

For electric overhead cranes :

1) upto 50 t capacity : span/750

2) over 50 t capacity : span/1000

d) The vertical deflection of metal deck sheet for roofing and side cladding shall be limited to span/250

e) The permissible vertical deflection for beams supporting drive machinery shall be restricted to span / 500 and for other beams it shall be within span / 325.

f) Permissible deflection for all purlins, cladding runners, roofing/cladding sheets and grating / chequered plates shall be span/250. However, the maximum vertical deflection of Grating/ Chequered plate shall be limited to 6 mm.

17.21.00

a) Dispersion of load in any direction through soil shall be as per IS: 8009 (relevant part).

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	b) Dispersion of load through concrete shall be considered at an angle of 45 degrees with horizontal from the edge of contact area.
17.22.00	a) The design and construction of RCC structures shall be carried out as per IS: 456. Working stress method shall be adopted for the design wherever specifically mentioned in this specification.
	b) For design and construction of steel-concrete composite members, IS: 11384 shall be followed.
	c) For reinforcement detailing, IS: 5525 and SP: 34 shall be followed.
	d) Two layers of reinforcement (on both inner and outer faces) shall be provided for RCC wall sections having thickness 150 mm or more.
17.23.00	a) All RCC liquid retaining/conveying shall be designed by working stress method as outlined in clause no. 4.5 of IS 3370 (Part-2) 2009 unless specified other wise.
	b) Water proofing treatment shall be provided for liquid retaining/ carrying structures and basement type structures (requiring dry working condition). Dense and durable concrete with water cement ratio not more than 0.45 shall be used. Plasticiser /super-plasticiser cum water proofing compound shall be added to the concrete. All the construction/expansion joints shall be provided with PVC water bar and/or chemical injection grouting as per IS:6494. As applicable internal/external surface of such structures shall be provided with acrylic based polymer modified cementitious composite coating system for critical structures. For liquid carrying/retaining structures, minimum two coats of such coating shall be applied. For external application wherever the surface is in contact with the earth, fine silica/quartz sand of 0.6 mm nominal size shall be added in the coating mix for better abrasion resistance and total nominal thickness of such coating shall be minimum 1.5 mm. For non critical structures minimum two coats of bitumen grade 85/25 as per IS:702, mixed with 1% of anti-stripping compound meeting the requirement of IS:6241, shall be applied. The total application of bitumen shall not be less than 1.7 kg/sq.m. Bidder shall submit a comprehensive scheme for water proofing treatment based on above or any other alternative scheme, internationally accepted for Employer's approval prior to commencement of work.
	c) All liquid retaining/carrying structures shall be tested for water tightness as per the provisions of IS: 3370 and IS: 6494 and in case of leakage, the same shall be rectified by chemical injection grouting through nozzles.
17.24.00	deleted.
17.25.00	Earth pressure for all underground structures shall be calculated using coefficient of earth pressure at rest or co-efficient of active earth pressure, whichever is applicable, depending upon the structural configuration. However, for the design of substructure of pump houses, earth pressure at rest shall be considered. Co-efficient of passive earth pressure shall be used only in design of shear keys for stability against sliding.
17.26.00	a) Following loading conditions shall be considered in addition to the loading from super structure for the design of substructure of pump house, channels, sumps, tanks, trenches and other underground structures containing liquid i) Water pressure from inside and no outside pressure, like earth pressure, ground water and surcharge pressure (applicable only to structures, which are liable to be filled up with water or any other liquid.)

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	ii) Earth pressure, surcharge pressure and ground water pressure from outside and no water pressure from inside. iii) Design shall also be checked against buoyancy due to the ground water during construction as well as after construction stages. Minimum factor of safety of 1.2 against buoyancy shall be ensured considering empty condition inside and ignoring the superimposed loadings. Provision of pressure relief valves/flap valves, etc., shall not be permitted to counter the buoyancy unless specified otherwise. iv) Base slab and piers of the pump houses shall also be designed for the condition of different combination of pump sumps being empty during maintenance stages with maximum ground water level. b) Intermediate dividing pier of pump sumps and partition wall (if applicable) in channel shall be designed considering water on one side only and other side being empty for maintenance. c) All pump houses and other substructures (wherever applicable) shall be checked for stability against sliding and overturning during construction as well as operating conditions for various combinations of loads.
17.27.00	**Design of Block Foundation** a) Block foundation resting on soil shall be analyzed using elastic half space theory. In case the foundation is supported over piles, Novak's approximation shall be used for determining the spring constant and damping ratio of pile groups. The mass of the RCC block shall be at least three times the mass of machine. Free vibration analysis of the foundation shall be carried out to evaluate the natural frequencies. The fundamental natural frequency shall be kept at least 20% away from the operating frequency (speed). Forced vibration analysis shall be carried out if the dynamic forces are made available by the machine supplier in which case the amplitude limits stipulated by the machine supplier and ISO 10816, whichever is lower, shall be satisfied. Reinforcement design shall be done by working stress method as per IS:456-2000 and IS:2974 (Part-IV). b) For the foundations supporting minor rotating equipment weighing less than one ton or if the mass of the rotating parts is less than one hundredth of the mass of the foundation, no dynamic analysis is necessary. However, if such minor equipment is to be supported on building structure, floors, etc., suitable vibration isolation shall be provided by means of springs, neoprene pads, etc., and such vibration isolation system shall be designed suitably.
17.28.00	Design drawings of steel structures shall include the connection, joint & fastener details for Main columns, Beams & Bracings.
17.29.00	Unless specified all sand filling shall be compacted to minimum 80% of the relative density and backfilled earth shall be compacted to minimum 90% of the Standard proctor density at OMC.
18.00.00	**Coating on RCC water retaining structures (other than drinking water)** Epoxy phenolic coating shall be applied on internal surfaces of the RCC water retaining structures, as per details specified below: All concrete surfaces shall be provided with two component transparent polyamide

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	cured epoxy sealer coating (having solid by volume minimum 40% ±2%) of minimum 50 micron DFT. Surface to be coated shall be absolutely dry, clean and dust free. Sealer coat shall be followed with the application of epoxy phenolic coating (solid by volume minimum 63%) of minimum 400 micron DFT. This coat shall be applied after an interval of minimum 24 hours (from the application of primer coat) by airless spray technique. **Coating on RCC water retaining structures (drinking water)** Internal surfaces of RCC water retaining structures shall be provided with minimum 400 micron Food grade epoxy coating complying to FDA Title 21, Part 175.300. Surface to be coated shall be absolutely dry, clean and dust free.
19.00.00	**Fabrication** All steel structures shall be fabricated in factory, transported and erected at site. All factory fabricated structures shall have bolted field connections. Silo with hopper & Chimney flue liners can either be fabricated at factory in segments, transported and welded at site before erection or fabricated at site. For Chimney flue liners, to prevent flue gas leakages, the applicable field joints shall necessarily be welded.
20.00.00	**Electrodes**
20.01.00	The electrodes used for welding shall be of suitable type and size depending upon specifications of the parent material, the method of welding, the position of welding and quality of welds desired. Only low hydrogen electrodes shall be used for welding of medium / high tensile steel and for mild steel plate thickness above 20 mm.
20.02.00	All low hydrogen electrodes shall be baked and stored before use as per manufacturer's recommendation. The electrodes shall be re-baked at 250°C - 300°C for one hour and later on cooled in the same oven to 100° C. It shall be transferred to a holding oven maintained at 60°C - 70°C. The electrodes shall be drawn from this oven for use.
20.03.00	Where coated electrodes are used they shall meet the requirements of IS: 814 and relevant ASME - Sec. II. Covering shall be heavy to withstand normal conditions of handling and storage.
20.04.00	Only those electrodes that give radiographic quality welds shall be used for welds, which are subjected to radiographic testing.
20.05.00	Where bare electrodes are used these shall correspond to specification of the parent material. The type of flux-wire combination for submerged arc welding shall conform to the requirements of F-60 class of AWSA-5-17-69 and IS: 3613. The electrodes shall be stored properly and the flux shall be baked before use in an oven in accordance with the manufacturer's requirements as stipulated.
20.06.00	The contractor shall take specific approval of the weld for the various electrodes proposed to be used on the works before any welding is started.
20.07.00	**Edge Preparation for Welding** Suitable edge as per weld joint detail shall be prepared either by machines or by automatic gas cutting. All edges cut by flame shall be ground before they are welded.
20.08.00	**Pre Heating and Post Heating**

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Mild steel and medium / high tensile steel plates thicker than 20mm, will require Pre-Heating of the parent plate prior to welding as mentioned in Table - 1 for mild steel and Table - 2 for medium / high tensile steel, however, higher pre heat temperature may be required as per approved welding procedure and it shall be followed. In welding materials of unequal thickness, the thicker part shall be taken for this purpose.

Base metal shall be preheated, not withstanding provisions of IS: 9595 to the temperature given in Table - 1 for mild steel and Table - 2 for medium / high tensile steel, prior to welding or tack welding. When base metal not otherwise required to be pre heated is at a temperature below 0°C it shall be pre heated to atleast 20°C., prior to tack welding or welding. Pre heating shall bring the surface of the base metal to the specified pre heat and this temperature shall be maintained as minimum inter-pass temperature welding is in progress.

TABLE - 1
MINIMUM PREHEAT AND INTERPASS TEMPERATURE FOR WELDING MILD STEEL

	Welding Using	
Thickness of thicker part at Point of welding	**Low hydrogen electrode or submerged arc welding**	**Other than low hydrogen electrode**
Upto and including 20mm	None	None
Over 20mm and up to and including 40mm	20°C	Not allowed
Over 40mm and up to and including 63mm	66°C	Not allowed
Over 63mm	110°C	Not allowed

Note: Type of electrode and the preheating requirements for welding shall be as per approved welding procedure.

TABLE - 2
MINIMUM PREHEAT AND INTERPASS TEMPERATURE FOR WELDING MEDIUM / HIGH TENSILE STEEL

	Welding Using	
Thickness of thicker part at Point of welding	**Low hydrogen electrode or**	**Other than low**

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	submerged arc welding	hydrogen electrode
Upto and including 20mm	None	Not Allowed
Over 20mm	120oC - 140°C	Not Allowed

Note : Type of electrode and the preheating requirements for welding of medium and high tensile steel shall be as per approved welding procedure.

20.09.00 Pre heating may be applied by external flame which is non-carbonizing like LPG, by electric resistance or electric induction process such that uniform heating of the surface extending up to a distance of four times the thickness of the plate on either side of the welded joint is obtained.

20.10.00 Thermo-chalk, thermo-couple or other approved methods shall be used for measuring the plate temperature.

20.11.00 All butt welds with plates thicker than 50mm and all site butt welds of main framing beam supporting the bunker shall require post weld heat treatment as per procedure given in AWS D-1.1. Post heating shall be done up to 600oC and rate of application shall be 200oC per hour.

20.12.00 The post heat temperature shall be maintained for 60 minutes per 2.5cm thickness. For maintaining slow and uniform cooling, asbestos pads shall be used for covering the heated areas.

21.00.00 Drainage and Sewage

The plant storm water drainage shall be designed taking into account the finished grade levels of the plant area, drainage pattern, intensity of rainfall, etc., The storm water drainage shall cater to storm water run off resulting from one hour rainfall intensity, with a return period of 50 years. The value of minimum rainfall intensity shall be taken as 75mm/hr. The maximum velocity for pipe drains and open drains shall be limited to 2.4m/sec and 1.8 m/sec. respectively. However, minimum velocity of 0.6m/sec. for self-cleansing shall be ensured. Bed slope not milder than 1 in 1000 shall be provided. The open drains shall be open rectangular drains of RCC unless required otherwise due to functional requirement. RC box culverts shall be provided at rail, road or other crossings.

Sewers shall be designed for a minimum self-cleansing velocity of 0.75m/sec and the maximum velocity shall not exceed 2.4m/sec.

22.00.00 Statutory Requirements

Bidder shall comply with all the applicable statutory rules pertaining to Factories Act, Fire Safety Rules at Tariff Advisory Committee. Water Act for pollution control, Explosives Act, etc.

Provisions of safety, health and welfare according to Factories Act shall be complied with. These shall include provision of continuous walkways along the crane - girder level on both sides of building, comfortable approach to EOT crane cabin, railing, fire escape, locker room for workmen, pantry, toilets, rest room etc.

Provisions for fire proof doors, number of staircases, fire separation wall, lath plastering/encasing the structural members (in fire prone areas), type of glazing etc. shall be made according to the recommendations of Tarrif Advisory Committee.

Statutory clearances and norms of State Pollution Control Board shall be followed.

Bidder shall obtain approval of Civil/Architectural drawings from concerned authorities before taking up the construction work.

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23.00.00	**INSPECTION, TESTING AND QUALITY CONTROL** Sampling and testing of major items of civil works viz. earthwork, concreting, structural steel work (including welding), piling, sheeting, etc. shall be carried out in accordance with the requirements of this specification. Wherever nothing is specified relevant Indian Standards shall be followed. In absence of Indian Standard equivalent International Standards may be used. The Bidder shall submit and finalise a detailed field Quality Assurance Programme before starting of the construction work according to the requirement of this specification. This shall include frequency of sampling and testing, nature/type of test, method of test, setting of a testing laboratory, arrangement of testing apparatus/equipment, deployment of qualified/experienced manpower, preparation of format for record, Field Quality Plan, etc. Tests shall be done in the field and/or at a laboratory approved by the Engineer. The Bidder shall furnish the test certificate from the manufacturer's of various materials to be used in the construction.
24.00.00	**CONCRETE** All R. C. C. works to the done under this specification, unless specified otherwise shall be design mix concrete. Minimum grade of concrete for various structures shall be as follows: a) M25 - For all underground / sub-structural/ super-structure R. C. C. work. b) M30- For Block Foundation c) M35- For spring supported RCC deck and rail load bearing structure (if applicable) Minimum 75 mm thick P.C.C M-7.5 shall be provided as mud mat below all foundations. For concreting of underground structures requiring water tightness, plasticizer cum water proofing admixture shall be added to the concrete mix. Both coarse and fine aggregates shall conform to IS: 383 for concrete, shotcreting etc. unless otherwise mentioned.
25.00.00	**Excavation, Backfilling, Disposal and Stacking of materials Details**
25.01.00	**Excavation in Soil** Excavation for foundation shall be to the bottom of lean concrete and as shown on drawing or as directed by the Engineer. The bottom of all excavations shall be trimmed to required levels and when excavation is carried below such levels by error, it shall be brought back to the specified level by filling with concrete of nominal mix 1 : 3 : 6 (cement: coarse sand: 40 mm down aggregates), as directed by the Engineer.

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	The Contractor shall ascertain for himself the nature of materials to be excavated and the difficulties, if any, likely to be encountered in executing this work. Cofferdams, sheet piling, shoring, bracing to maintain suitable slopes, draining etc. shall be provided and installed by the contractor, to the satisfaction of the Engineer. Surplus excavated materials shall be disposed off by the contractor at locations up to a lead of 5 kms from the plant boundary wall as directed by the engineer. The Contractor shall have to constantly pump out any water collected in excavated pits and other areas due to rain water, springs etc. and maintain dry working conditions at all times until the excavation, placement of reinforcement, shuttering, concreting, Backfilling is completed. The Contractor shall remove all slush/muck from the excavated areas to keep the work area dry. The Contractor, if required, shall employ sludge pumps, for this purpose. For other details, excavation clauses as given at “Foundation system and Geotechnical Data Chapter” given at “Project Information section” of technical specification, are to be referred.
25.02.00	**Excavation in Rock** For the work of excavation in rock, Contractor shall engage specialised agency having experience of excavation in rock involving wedging and blasting. The agency shall be subject to approval of Engineer and the Contractor shall furnish details of relevant experience in support while seeking approval for the agency. Blasting shall be resorted to only with the written permission of the Engineer. All the statutory laws, (Explosives Act etc.) rules, regulations, Indian Standards etc. pertaining to the acquisition, transport, storage, handling and use of explosives etc. shall be strictly followed. The contractor shall obtain Licenses from Competent Authorities for undertaking blasting work as well as for procuring, transporting to site and storing the explosives as per Explosives Act. The Contractor shall be responsible for the safe transport, use, custody and proper accounting of the explosive materials. Surplus excavated materials shall be disposed off by the contractor at locations up to a lead of 5 kms from the plant boundary wall as directed by the engineer. The Contractor shall have to constantly pump out any water collected in excavated pits and other areas due to rain water, springs etc. and maintain dry working conditions at all times until the excavation, placement of reinforcement, shuttering, concreting, backfilling is completed. For other details for excavation in rock, clauses as given at “Foundation system and Geotechnical Data Chapter” given at “Project Information section” of Technical specification, are to be referred.
25.03.00	**Backfilling, Disposal and Stacking of materials** Backfilled earth shall be compacted as per “Foundation system and Geotechnical Data Chapter” given at “Project Information section” of technical specification. However, the backfill under the rail lines and roads shall be compacted to minimum 95 % of the standard proctor density at OMC unless otherwise stated by rail Authorities. The contractor is required to excavate upto any depth as shown on the drawings or as directed by the Engineer. Lifting of excavated materials shall be done either by manual or mechanical or both means if called for by the Engineer.

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	The disposal / stacking areas for excavated materials shall be indicated by the Engineer. The carriage of excavated materials shall be done by the methods mentioned below: The excavated materials shall be carried beyond the initial lead of 50 m but upto 500 m by manual / animal labour or by mechanical means. If directed by the Engineer this material shall be used directly for filling purposes. For leads exceeding 500 m the Contractor shall transport the excavated materials by mechanical means only and as directed by the Engineer. The Contractor may be allowed to carry materials through Kuccha roads. Providing and maintaining of the Kuccha roads shall be the responsibility of the Contractor. The transported material shall be neatly stacked as directed by the Engineer. Some excavated materials required for filling purposes, may have to be carried upto a lead of 500 m and stacked as per instructions of the Engineer. Excavated materials carried beyond 500 m shall normally be for disposal purpose only. Double handling of materials shall be avoided as far as possible. However, depending on site condition excavated materials carried beyond a lead of 500 m may also be required to be brought back for filling purpose. Materials to be used for filling purpose shall be stone, sand or other inorganic materials and they shall be clean and free from shingle, salts, organic matter, large roots and excessive amount of sod, lumps, concrete or any other foreign substances which could harm or impair the strength of the substances in any manner. All clods shall be suitably broken to small pieces. When the material is mostly rock boulders, these shall be broken into pieces not larger than 150 mm size before backfilling and shall be backfilled in layers of 300mm interstices filled with sand. In case of broken rock boulders used for back filling, the top cover shall be with 1.0m thick soil. The layers of rock boulders, interstices filled with sand shall be compacted by plate vibrators. Sand used for filling shall be clean, medium grained and free from impurities. Fines less than 75 microns shall not be more than 20%. In any case, the materials to be used for filling purposes shall have the prior written approval of the Engineer. In case the materials have to be brought from pits / quarries, then it shall be the Contractor's responsibility for identification of such quarry areas, obtaining approval from their use from concerned authorities, excavation / quarrying loading and carriage of such material, unloading and filling at specified locations. The Contractor shall pay any fees, royalties etc. that may have to be pain for utilisation of borrow areas.
26.00.00	**GALVANISING** All burrs and irregular edges of the structural steel members to be galvanised shall be ground smooth before galvanising. Purity of Zinc to be used for galvanising shall be 99.5 % as per IS : 209 (latest edition). The weight of the zinc coating shall be at least 610 Gms. / m^2 unless noted otherwise.
27.00.00	**CHEMICAL INJECTION GROUTING**

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	Minimum, 12 mm dia (NB) threaded nozzle of suitable length, shall be provided over the surface and along the construction joint line in a grid pattern at a spacing not exceeding 1.5 m c / c before concreting operation. Adequate precaution shall be taken to keep the nozzles plugged at both ends to prevent them from getting closed by concrete. For fixing of any nozzle in set concrete suitable size hole shall be drilled, preferably by using repercussive hammer drill electrically operated, in grid pattern and grouting nozzle shall be fixed in these holes. After the nozzles are fully set, neat cement slurry admixed with water soluble non - shrink polymer / monomer based chemical shall be injected through the net - work of nozzles with low pressure grout pumps at a pressure of about 2.0 Kgs. / cm^2. Cement slurry shall be prepared by mixing cement with non-shrink polymer/monomer @ 500 gm/50 kg bag of cement and water, ensuring that Water: Cement ratio does not exceed 2 (by weight). Wetter the structure, lesser should be the water cement ratio. The property of the polymer/monomer should be such that when it is mixed with water @0.5% by weight of water, the viscosity of the resultant solution (water and polymer/monomer) should not be more than 1.2 centipoises. Plasticizing agent shall be added wherever required. The grouting shall be started at very low pressure and increased gradually to a required pressure. The grouting shall continue, till the hole refuses to take any further grout, even at an increased pressure. Applied pressure shall not be more than the designed strength of the concrete. After completion of grouting operation, the nozzles shall be sealed properly to the satisfaction of the Engineer.
28.00.00	**POLYMER MODIFIED CEMENTITIOUS COATING**
28.01.00	**Materials** Modified liquid polymer blend shall be a dispersion containing 100 % acrylic based polymer solids. Polymer shall be mixed in the ratio of 1 cement: 0.5 polymer (for minimum solid content of polymer 30%). Portland cement based dry powder. Clean, fine specially prepared quartz sand approximately 0.6 mm size.
28.02.00	**Mixing** The liquid polymer shall be stirred well and cement based powder shall then be added slowly to make a Slurry Mix. For preparation of Brush Topping Mix, quartz sand shall be added slowly and mixed well till a homogeneous mixture is obtained. The mix shall be used within half an hour of the preparation. Addition of quartz sand may not be necessary, in case dry power contains the same.
28.03.00	**Properties of Coating** It must adhere to wet surface. It should develop adequate bond strength, with the concrete surface, not less than 2 N / Sq. mm.

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	Co - efficient of permeability shall be about $5x10^{-10}$ Cm / Sec. Water absorption after continuous soaking shall not be more than 1 %. The materials shall be permeable under water vapour. The material shall be resistant to acids and alkalies present in the soil and underground water with normal pH value between 4 and 14. The co - efficient of thermal expansion of the material shall be close to that of concrete.
28.04.00	**Application** The concrete surface shall be cleaned and made free from grease, oils or loosely adhered particles. The surface shall be damp without any free water. For exterior underground part, application (b) pertaining to Brush topping Mix shall be followed. **(a) For Slurry Mix** A minimum of 2 coats shall be applied on the surface. The first coat being applied, when the surface is still damp and left to harden for 4 to 6 hours. After 4 to 6 hours of the application of second coat, it shall be finished by rubbing down with a soft dry sponge. The coverage shall not be less than 1 : 1 Kgs. / m^2 in the 2 coats. A lap of 75 mm shall be provided at the joints. The coating shall be air dried for 4 to 6 hours and, thereafter, cured for 7 days after the application of last coat. **(b) For Brush Topping Mix** This shall be applied in two coats. A primary coat of slurry mix can also be first applied on the surface as first coat. After the coating has dried up, a coat of Brush Topping Mix shall be applied over it with a push broom or any other similar brush. It shall be left in broom finished condition. The nominal thickness shall be 1.5 mm and minimum thickness shall be 1.0 mm. A lap of 75 mm shall be provided at the joints. It shall be ensured that no pinhole exists and rebrushing shall be done to cover the pinholes, if any. The Coating shall be air dried for 4 to 6 hours and thereafter cured for 7 days after the application of last coat. Rate of application of coating shall be established to achieve the required thickness.
29.00.00	**Architectural Concepts** Buildings shall be architecturally treated in such a way that it presents a pleasing composition of mass and void with suitable and functionally designed projections and recesses. The overall impact of the building shall be one of aesthetically unified architectural composition having a comprehensive scale, blending with the surroundings and taking full consideration of the climatic conditions and the building orientation. All the buildings shall be architecturally treated in such a way so as to be

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	in harmony with the surroundings. The over all composition may have straight or curvilinear profiles. Necessary projections, fins, parapets, chajjas etc. in addition to the minimum area specified elsewhere in this specification shall be provided as required. Nothing extra shall be payable for any changes required while getting the drawings / scheme approved and for executing the same. All structures, buildings and facilities shall be designed as per provisions of National Building Code 2016 and Local building by - laws as applicable including provisions of the Factories Act of the State concerned, with regard to requirement of free access, stairs, minimum head room, walkways, ventilation, toilets etc. and safety requirements like railings, fire escapes etc. Further all layouts and detailed drawings shall meet the relevant statutory requirements specified in recommendations of Petroleum act, Explosives act and Indian Electricity rules' as applicable.
29.01.00	**FINISHING SCHEDULE**
29.01.01	**Flooring** The nominal total thickness of floor finish shall be 50mm i.e. underbed & topping. The floor shall be laid on an already laid and matured concrete base. Flooring of tiles / stone shall be fixed with cement sand mortar 1:4, above PCC under bed (M 20 (with graded aggregate of nominal size 12.5mm) design mix) Flooring of Concrete hardener topping shall be provided above the PCC underbed (M 20 (with graded aggregate of nominal size 12.5mm) design mix).
29.01.02	Wherever specified Heavy duty ceramic tiles of size 300x300x7 mm thick (minimum) of reputed manufacturer of approved finish shade and colour to be used. Vitrified matt finish ceramic tiles wherever specified shall be 600x600 mm with minimum 9.5 mm thickness and of reputed manufacturer.
29.02.00	Floor finish & skirting: The nominal thickness of floor finish shall be 50 mm. Floors of toilets, pantries / kitchen shall be finished with Heavy duty (grade-5) dust pressed ceramic tiles 300mmx300mm x7 mm thick as per IS:15622, including pointing the joints with white cement mixed with matching pigment, of approved make, size & colour shade. (1) Floors of Office Room, Labs, Control Rooms, RIO Rooms and all other A/c Room shall be finished with Mirror polished Vitrified ceramic tiles (minimum 9.5 mm thk) with 3 mm groove joints as per approved pattern, pointed neatly with 3X4mm stainless epoxy grout SP- 100 of Laticrete or approved equivalent in approved colour to match colour of tile. (2) Suitable supporting arrangement shall be provided with M.S. angles / channels on cable trenches in MCC and Control rooms for mounting Control panels / MCC.

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	(3) In rest of the areas, IPS (Cement concrete flooring) with Concrete hardener topping shall be 12mm thick with ordinary grey cement using uniformly graded, properly treated iron particles shall be provided. (4) Floors and sides of under ground RCC structures like valve pits, trenches and tanks shall have simultaneous (integral) neat cement finish at the time of concreting. (5) The interconnecting walkway between various structures, buildings and facilities shall be finished with 22 mm chequered concrete tiles at top. 1000 mm wide walkway of 22mm thick chequered concrete tiles shall be provided on terrace for maintenance purpose, in all RCC /Metal deck roof buildings. (6) Skirting in general shall be 150mm high, Dado in toilet, kitchen & pantry shall be up to specified height (up to 2200 mm for toilets, up to 600 mm high above counter top in kitchen and pantry area). The dado height shall be measured from finished floor level. Skirting and Dado shall match with the floor finish. (7) Battery Room shall be provided with Acid resistant tile on horizontal and vertical surfaces, at all levels for all type of works, including One coat of bitumen primer followed by 12 mm thick bituminastic layer, 20 mm thick Acid Resistant tiles, 6 mm thick under-bed by potassium silicate mortar, 6 mm thick pointing of joints of tiles with acid/alkali resistant epoxy/furane mortar up to a depth of 20 mm and bituminastic end sealing. 1200 mm high dado on wall shall be with 12 mm thk Acid resistant tiles of the similar finish and the joints to be finished as per flooring tiles, with the rest of wall height and ceiling finished in chemical resistant paint (chlorinated rubber based). (8) Well polished 18 mm thick granite stone jointed with neat cement slurry mixed with pigment to match the shade of the stone including rubbing and cleaning, complete, to be provided in entrance area, entrance steps, Entrance area, staircases (tread, riser, landings, skirting).
29.03.00	Sunken RCC slab shall be provided in false flooring area and toilet, Kitchen and pantry, so as to keep the finished floor level of these areas same as that of the surrounding area.
29.04.00	Water proofing treatment to be provided on sunken portion of all vertical and horizontal surfaces of depressed portions of all toilets, W.C., kitchen, Pantry and the like consisting of : (i) Ist course of applying cement slurry @ 4.4 kg/sq.m mixed with water proofing compound conforming to IS 2645 in recommended proportions including rounding off junction of vertical and horizontal surface. (ii) IInd course of 20 mm cement plaster 1:3 (1 cement: 3 coarse sand) mixed with water proofing compound in recommended proportion including rounding off junction of vertical and horizontal surface. (iii) IIIrd course of applying blown or residual bitumen applied hot at 1.7 kg. per sq.m of area.

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	(iv) IVth course of 400 micron thick PVC sheet. (Overlaps at joints of PVC sheet should be 100 mm wide and pasted to each other with bitumen @ 1.7 kg/sq.m).
29.05.00	Acid / Alkali Resistant Treatment: Acid / alkali resistant lining treatment shall be provided in different areas as follows: Neutralization Pit: The walls shall be provided with one coat of bitumen primer, followed by 18 mm thick bitumastic layer, 115 mm thick A.R. bricks, 6 mm thick under bed of potassium silicate mortar, pointing the joints of bricks with acid / alkali resistant epoxy / furane mortar upto a depth of 20 mm and bitumastic end sealing. Suitable plasters shall be provided with A.R. bricks at regular intervals depending upon the height of lining, as per the specification. The floor of neutralization pit shall be provided with acid / alkali resistant lining treatment as given in the above para, except that the 115 mm thick A.R.tile layer shall be replaced by 75 mm thick A.R. tile layer and pilasters shall be omitted. The ceiling of neutralization pit shall be provided with one coat of epoxy primer followed by 2 coats of epoxy paint (150 micron). Acid / Alkali storage area / projections above the floor, pedestals projecting from the floor / saddles. : The floor shall be provided with one coat of bitumen primer followed by 12 mm thick bitumastic layer, 20 mm thick A.R. tiles, 6 mm thick under - bed by potassium silicate mortar, 6mm thick pointing of joints of tiles with acid / alkali resistant epoxy / furane mortar up to a depth of 20 mm and bitumastic end sealing. Dado of 12 mm thk Acid Resistant tiles up to 1.0M high shall also be provided if applicable in case of walls nearby. Alum/Lime Storage area and first floor of Chemical House : One coat of bitumen primer followed by 12mm thick bitumastic layer, 20 mm thick A.R. tiles, 6 mm thick underbed of potassium silicate mortar, 6mm thick pointing of joints of tiles with acid /alkali resistant epoxy /furane mortar up to a depth of 20 mm and bitumastic end sealing. Alum solution preparation tank: The wall shall be provided with one coat of bitumen primer followed by 12 mm thick bitumastic layer, 75 mm thick A.R. tiles, 6 mm thick underbed by potassium silicate mortar, pointing of joints of tiles with acid / alkali resistant epoxy / furane mortar upto a depth of 20 mm and bitumastic end sealing. The floor shall be provided with acid / alkali resistant lining treatment as given in the above para except that the 75 mm thick A.R. tile layer shall be replaced by 12 mm thick A.R. tile layer. Basket of Alum solution preparation tank: 5 mm thick epoxy lining over a coat of epoxy primer. Curved surfaces of saddles shall have minimum 12 MM thick bitumastic layer to support the vessel / tanks. Effluent Drains: Acid Resistant lining treatment indicated for the storage area shall be provided on the bed as well as walls of the drains with 38 MM AR tiles. The underside of the pre-cast slab cover shall be applied with one coat of epoxy primer and two coats of epoxy coating, total DFT 150 microns.

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	Lime tank: Two coats of bitumen paint conforming to IS: 9862, with total DFT 150 microns.
29.06.00	**Walls**
29.06.01	All walls shall be non-load bearing infilled panel walls. All external walls shall be minimum one brick thick masonry wall.
29.06.02	All external and internal walls shall be with minimum one brick masonry (230 or 250 mm) including toilet walls. Toilet partition low height walls shall be minimum half brick masonry.
29.06.03	For all air conditioned areas/ rooms, wherever metal cladding is envisaged as cladding material, additional brick masonry wall (230m thick) shall also be provided in addition to metal cladding for effective air conditioning. This brick wall shall be plastered & painted as specified elsewhere in the specification.
29.06.04	RCC transoms and mullions of size 115x115mm with suitable reinforcement shall be provided wherever necessary to reinforce the brickwork.
29.06.05	50 mm thick DPC in Cement concrete (M-20) with water proofing compound followed by two layers of bitumen coating 85/ 25 grade as per IS: 702 @ 1.7 kg/ sq.m. shall be provided at plinth level before starting the masonry work.
29.06.06	The bricks shall be laid with cement mortar (1:6) for one brick thick walls and (1:4) for half brick thick walls IS: 1905, IS: 2212 and SP -- 20 shall be followed for brick work design and construction.
29.07.00	**Plastering**
29.07.01	External (rough) surface of walls shall be plastered with 18 mm thick cement plaster, consisting first (base) layer of 12 mm thick plaster in cement sand mortar (1:6) and second (finishing) layer of 6 mm thick plaster in cement sand mortar (1:4). The internal (smooth) surface of walls shall have 12 mm thick plaster in cement sand mortar (1:6). All external / internal RCC surfaces including RCC parapet walls shall be provided with minimum 12mm thick plaster in cement sand mortar (1:4) except walls of underground structures like cable trenches / valve pits etc.
29.07.02	All exposed faces of R.C.C. walls of structures, buildings and facilities shall have minimum 12 mm thick cement sand plaster 1:6.
29.07.03	All RCC ceilings (except areas provided with false ceilings and cable vault ceiling) shall be provided with 6 mm thick cement sand plaster 1:4.
29.07.04	All plastering work shall conform to IS: 1661.
29.08.00	**Painting**
29.08.01	All painting on masonry or concrete surface shall preferably be applied by roller. If Applied by brush then same shall be finished off with roller.
29.08.02	All paints shall be of approved make including chemical resistant chlorinated rubber paint.
29.08.03	Minimum two finishing coats of paint shall be applied over a coat of primer.

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29.08.04	Deleted
29.09.00	**Internal Finish**
	All Air conditioned areas shall have 2mm of polymer based water resistant putty (wall putty) to given an even and smooth surface.
29.09.01	Acrylic emulsion paint shall be as per IS: 5411 (Part - 1). Acrylic distemper shall be as per IS: 428. Air - conditioned areas shall be applied with minimum 2 coats of acrylic emulsion paint. All other areas shall be applied with minimum 2 coats of Acrylic distemper.
29.09.02	Toilet, Pantry / Kitchen areas shall have dado with Designer ceramic tiles, 300x450mm upto 2.2 m height and shall match with floor finish. Above dado, Acrylic distemper shall be applied.
29.09.03	Areas coming in contact with chlorine fumes or acid / alkali shall have two coats of acid / alkali resistant chlorinated rubber paint over suitable primer on walls above dado & ceiling.
	The paint shall be of approved colour shade and make.
29.10.00	**External Wall Finish**
	Acrylic Smooth Exterior Paint with silicone additives (minimum two coats) over suitable primer as per manufacturer's specifications of approved colour, and shade for all types of plastered and / or exposed concrete surface, in all kinds of works, at all levels, including preparation of surface, preparation of working drawing, labour, material, equipment, handling, transportation, mixing, laying, applying finishing, testing, curing, making grooves, scaffolding, staging, etc., all complete, as per specifications, drawings and instructions of the Engineer-in-charge.
	Toe wall of chain link fencing shall be provided with two coats of Acrylic Smooth Exterior Paint with silicone additives.
	The finish shall be of approved colour shade and make.
29.11.00	**Ceiling Finish**
	Ceiling shall have min. two (2) coats of Acrylic distemper except AC areas & Battery room.
29.11.01	For painting on concrete, masonry and plastered & surface, IS: 2395 shall be followed. For painting on steel work and ferrous metals, IS: 1477 shall be followed.
29.11.02	Fire resistant transparent paint (confirming to IS: 162) shall be provided on all wood work, over French police or flat oil paint. French polish shall confirm to IS : 348. Flat oil paint shall confirm to IS: 1237.
29.12.00	**Doors, Windows, Ventilators, Louvers, Rolling Shutters & Glazing**
29.12.01	Adequate Doors, Windows, Louvers and Ventilators shall be provided for proper lighting and ventilation of all buildings. The area of windows shall be at least 10% of the floor area of the respective building. In addition to the above, wherever room height is more than 3.5 m, a band of ventilators of 600 mm height (minimum) shall be provided at the top.
29.12.02	Unless specified all doors, of air conditioned areas, entrance door of air lock lobby of all buildings shall have electro colour coated (anodised) aluminium frame work with glazing. Windows, ventilators & partitions of all buildings shall have electro colour coated (anodised) aluminium frame work with glazing. All doors of toilet, kitchen, pantry & store areas shall be of factory made pre - laminated solid core flush door

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	shutters, as per IS: 2202 (Part-I) with pressed steel door frame. Control room shall have Aluminium glazed door & partitions. All other doors (unless otherwise specified) shall be of steel.
29.12.03	All steel doors shall consist of double plate flush door shutters. The door shutter shall be 45 mm thick with two outer sheets of 18 G rigidly connected with continuous vertical 20 G stiffeners at the rate of 150 mm centre to centre. Side, top and bottom edges of shutters shall be reinforced by continuous pressed steel channel with minimum 18 G. The door shall be sound deadened by filling the inside void with mineral wool. Doors shall be complete with all hardware and fixtures like door closer, tower bolts, handles, stoppers, aldrops, etc.
29.12.04	Wherever functionally required, rolling shutters of suitable size approved by the Owner, with suitable operating arrangement manual/ electric shall be provided to facilitate smooth operations. Rolling shutters shall conform to IS: 6248.
29.12.05	All windows and ventilators at ground floor level shall be provided with suitable anodised aluminum grill.
29.12.06	Fire proof doors with panic devices shall be provided at all fire exit points as per the requirements. However minimum Fire rating shall be 2 hours. These doors shall be double cover plated type with mineral wool insulation. Vision Panel in minimum 11 mm thick inter layered fire resistant glass shall be provided in Fire Doors.
29.12.07	Hollow excluded Section of minimum 2 mm wall thickness as manufactured by INDAL, Jindal, Hindalco or equivalent shall be used for all Aluminium doors, windows, ventilators and Partitions.
29.12.08	The doors, Windows & ventilators frame shall be of suitable size & thickness for fixing the glazing. The Glazing thickness shall be minimum 6 mm thk clear toughened glass for all glazed doors, windows, ventilators & partitions. Windows in air conditioned areas shall be provided with 24mm thick hermetically sealed composite double glazing.
29.12.09	Doors and windows on external walls shall be provided with sunshade over the openings with width 600 mm more than the opening width. The projection from the finished face of the wall for sunshade shall generally be 450 mm over window openings, 750 mm over door openings and 900 over Rolling shutters, or as decided and approved by the Engineer.
29.12.10	Deleted
29.12.11	All glazing work shall conform to IS: 3548.
29.12.12	Windows in conveyor gallery shall be provided with welded wire fabric of 1.6mm thick wire as per IS: 4948 and 12mm x 30mm mesh size.
30.00.00	**WATER SUPPLY, DRAINAGE AND SANITATION**
30.01.00	Polyethylene water storage tank conforming to IS: 12701 shall be provided (for the use of toilet, pantry and kitchen) over the roof, with adequate capacity depending on the number of users and 8 hours requirement complete with all fittings including float valve, stop cock etc. The capacity of tank shall be calculated minimum 500 liters, per toilet, pantry and kitchen
30.02.00	CPVC pipes as per IS code 15778 shall be used for internal piping works for portable water supply.

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30.03.00 UPVC Pipes as per relevant IS code shall be shall be used for sanitary works above ground level.

30.04.00 The facilities provided in the toilet block shall depend on the number of users. However, minimum facilities to be provided shall be as stipulated below. IS: 1172 shall be followed for working out the basic requirements for water supply, drainage and sanitation. In addition, IS: 2064 and IS: 2065 shall be also be followed.

30.05.00 Each toilet block shall have the following minimum facilities. Unless specified all the fittings shall be of chromium plated brass (fancy type).

The toilet area shall have finished floor level at 15 mm below the finished floor level of surrounding area.

Following minimum fittings & fixtures together with associated plumbing works shall be provided as specified below.

Sl. No.	**Type of Fitting / Fixtures**	**Gents Toilet /Ladies Toilet**
i)	1 no wall mounted coloured glazed vitreous china European water closet with flush valve.	1 No./1 No.
ii)	Coloured glazed vitreous china flat back lipped urinals with photo voltaic controlled automatic flushing system including all requisite fittings and fixtures	1
Iii)	Wash Basin (oval shape) with photo voltaic control system and all requisite fittings and fixtures to be fixed on concrete platform finished with 18mm thick first grade polished granite stone	1 No./1 No.
iv)	Wall to wall mirror minimum 900 mm high (minimum 6mm thick float glass) including all fittings	1 No./1No.
v)	Stainless steel Towel Rail 600mm Long x 20 mm dia.	1 No. /1 No.
vi)	Stainless steel Liquid soap holder cum dispenser with requisite fittings.	1 No.
vii)	Overhead Drinking water storage tank (Minimum 500 Litres capacity)- High density polyethylene (cylindrical/vertical) molded seamless type.	1
viii)	Overhead Service water storage tank (Minimum 500 Litres capacity)- High density polyethylene (cylindrical/vertical) molded seamless type	1 No.

One No. drinking water connection with C.P. brass valve for fixing water cooler by Owner.

Required plumbing work from Owner's service water terminal point to the service water tank and from tank to the toilet accessories mentioned above.

Required plumbing work from Owner's potable water terminal point to the drinking water tank and from tank up to the water coolers.

Janitor room. Adequate space shall be provided.

Provision for installation of water cooler.

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30.06.00	All structures, buildings, facilities, liquid storage tanks shall be provided with peripheral surface drains of all around periphery and suitably connected to nearest Owner's drain. Overflow and drains from storage tanks shall be laid to and suitably connected to Owner's open surface drains.
30.07.00	The sewerage and waste water disposal system shall consist of providing all associated plumbing and underground pipe works together with all fittings and fixtures and inclusive of ancillary works such as connections, manholes and inspection chambers, including connection to Owner's nearest main sewer line or as directed by Engineer. If required, lifting facilities for connecting to the manhole of owner's sewer line shall be in bidder's scope.
30.08.00	Miscellaneous Architectural Items (a.) In all buildings suitable arrangement with provision of floor traps for draining the water collected from leakage, floor washing, fire fighting etc. shall be provided on all floors which shall be connected to rain water down comers. (b.) Wherever required minimum 1000 high hand railing with 32 NB M.S. pipes medium class as per IS : 1239 shall be provided, with toe & knee rail and toe guard plate, around all floor / roof openings, around periphery of Neutralisation Pit, projections of balconies, walkways, platforms, steel staircase etc. (c.) However for RCC staircases in structures, buildings and facilities, railings with 20 mm square MS bar balustrades with suitable anti corrosive paint of approved colour MS flats for knee & toe guard with 50mm Ø NB MS pipe hand rail at top shall be provided. (d.) All air conditioned areas / common corridors shall be provided with false ceiling constructed from 15 mm mineral Fibre Board in tile form of 600x600mm with supporting system as per manufacture guidelines. 50 mm thick mineral wool insulation (conforming to IS : 8183) shall be provided with as under deck insulation). Additional hangers and height adjustment clips shall be provided for return air grills, light fixtures, Air conditioning ducts etc. Minimum headroom below false ceiling shall be 3.0 m. (e.) Under - deck insulation shall be provided on the ceiling (underside of roof slab) and underside of floor slab of air - conditioned areas depending upon the functional / air - conditioning requirements. The under - deck insulation shall consist of 50 mm thick mineral wool insulation conforming to IS : 8183 backed with 0.05 mm thick aluminium foil & 24 G x 25 mm mesh wire netting and shall be fixed to ceiling with 24 G wire ties and suitable fixing arrangements. (f.) Parapets, chajjas, window / door heads, architectural facias, fins etc., shall be provided with drip course in cement mortar (1 : 3). (g.) 150mm thick fillets at junction of roof slab / chajja slab and parapet / vertical walls shall be provided with cast - in - situ cement concrete 1 : 2 : 4 nominal mix, followed by 12 mm thick cement sand plaster (1 : 4). (h.) Suitable provision shall be made for fixing of ceiling fans in office areas of different structures, buildings and facilities.
31.00.00	**CORROSION PROTECTION**

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31.01.00	GENERAL
(a)	All Steel structures shall be provided with painting as given in the specification. Further, painting system shall also meet the requirements of Corrosivity category C3 (durability High) as per ISO 12944. Painting system for steel surfaces embedded in Concrete is given separately. (b) All Painting shall be done as per technical specification. Painting scheme shall be submitted by the bidder for approval of employer. (c) All steel structures shall be designed by following basic design criteria in ISO 12944 Part 3. However, where it is not feasible to follow the design criteria given in ISO 12944 Part 3 where the steel surface are inaccessible for application of protective coating, corrosion allowance of 1.5 mm shall be kept in thickness(over the design thickness) of structural steel members. d) Painting scheme shall be resubmitted by the Bidder for approval of employer.
31.02.00	PAINTING OF STEEL SURFACES EMBEDDED IN CONCRETE: a) For the portion of Steel surfaces embedded in Concrete, the surface shall be prepared by Manual Cleaning and provided with Primer Coat of Chlorinated Rubber based Zinc Phosphate Primer of Minimum 50 Micron Dry Film Thickness (DFT). b) All threaded and other surfaces of foundation bolts and its materials, insulation pins, Anchor channels, sleeves, etc. shall be coated with temporary rust preventive fluid and during execution of civil works, the dried film of coating shall be removed using organic solvents.
31.03.00	PAINTING OF STEEL SURFACES (OTHER THAN THOSE EMBEDDED IN CONCRETE) a) All steel surfaces shall be provided with two component moisture curing zinc (ethyl) silicate primer coat (having minimum 80% of metallic Zinc content in dry film, solid by volume minimum 60% ±2%) of minimum 70 micron DFT to be applied over blast cleaned surface conforming to Sa 2 ½ finish of ISO 8501-1 with surface profile 40-60 Micron. The primer coat shall be applied in shop immediately after blast cleaning by airless spray technique. Zinc dust composition and properties shall be Type-II as per ASTM D520-00. b) Primer coat shall be followed with the application of Intermediate coat of two component polyamide cured epoxy with MIO Content (containing lamellar MIO minimum 30% on pigment, solid by volume minimum 80% ±2%) of minimum 100 micron DFT. This coat shall be applied in shop after an interval of minimum 24 hours (from the application of primer coat) by airless spray technique. c) Intermediate coat shall be followed with the application of finish coat of two-pack aliphatic Isocyanate cured acrylic finish paint (solid by volume minimum 55% ±2%) with Gloss retention (SSPC Paint Spec No 36, ASTM D 4587, D 2244, D 523) of Level 2 (after minimum 1000 hours exposure, Gloss loss less than 30 and colour change less than 2.0 ΔE) and minimum 70 micron DFT. This coat shall be applied shop after an interval of minimum 10 hours and within six (6) months (from the completion of Intermediate coat), Colour and shade of the coat shall be as approved by the Employer. Notes: 1. For Primer, high quality surface preparation is necessary and good amount of moisture is required for proper curing. Below 70 % relative humidity, curing time may go up to 7 days or more. In such a case additional water sprinkling may be ensured for completion of curing. Additionally Inorganic zinc silicate cannot be recoated; even with itself. Typically it should be used when coating bare steel surface for first time. 2. The most frequent problem associated when top coating Primer is bubbling/pin holing especially with non-weathered zinc silicate coatings. To a great extent, this bubbling of

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	finish paint can be eliminated by applying a mist coat of intermediate/topcoat as the first pass of the product, allow the bubbles to subside and then apply a full coat, as required. 3. In case top coating of zinc silicate with epoxy/polyurethane coatings, is expected to be delayed, it is advisable to use a suitable tie coat to avoid formation of white rust. However, if white rust forms then clean the surface with high pressure water, dry and apply the subsequent coats as required. 4. Touch up paintings on damaged areas: Surface preparation by manual tools, wire brush/ emery paper etc. Minimum 6 inches peripheral area, adjoining to damaged area to be covered. If metal surface is exposed, it is to be painted with Zinc rich epoxy (70 micron) or suitable primer with existing paint scheme. If primer is intact, intermediate & top coat to be done with specified DFT in scheme.
31.04.00	**COATING FOR MILD STEEL PARTS IN CONTACT WITH WATER.** a) All mild Steel parts coming in contact with water or water vapour shall be hot dip galvanised. The Minimum Coating of Zinc shall be 610 Gms / Sq. M. for galvanised Structures and shall comply with IS: 4759 and other relevant Codes. Galvanising shall be checked and tested in accordance with IS: 2629. b) The galvanising shall be followed by the application of an etching Primer and dipping in black bitumen in accordance with BS: 3416, unless otherwise specified.
31.05.00	**Gratings** All gratings shall be blast cleaned to Sa 2 ½ finish or cleaned by acid pickling as per ISO 8501-1 and shall be hot dip galvanized at the rate of 610 Gms / Sq. M.
31.06.00	**Hand Railings and Ladders** All Mild steel handrails and ladders shall be galvanised at the rate of 610 Gms / Sq. as per IS: 4736. However, Stainless steel handrails shall be provided as specified in General Architectural Specification clause 9.0.0.
31.07.00	**Sea Worthiness** All Steel Sections and fabricated Structures, which are required to be transported on sea, shall be provided with anti corrosive Paint before shipment to take care of sea worthiness.
31.08.00	**For Reinforced Concrete Work.** i) The protection for concrete sub-structure shall be provided based on aggressiveness of the soil, chemical analysis of soil/sub-soil water and presence of harmful chemicals/salts. ii) The protection to super structure shall depend on exposure condition and degree of atmospheric corrosion. This shall require use of dense and durable concrete, control of water cement ratio, increase in clear cover, use of special type of cement and reinforcement, etc., coating of concrete surface, etc., Bidder shall furnish the details of corrosion protection measures.
32.00.00	**Miscellaneous**
32.01.00	Ordinary form work shall be used in roofs and floor slabs in transfer houses, footings, pedestals, cable trenches, pits etc., Plywood form work shall be used for all over ground exposed work like columns, beams, floors and ceilings in control room and M. C. C. buildings.
32.02.00	Monorail girders and fixtures shall be provided for monorails at the locations as required and as described elsewhere in these specifications or drawings. Monorail

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	openings in the walls shall be provided with steel frame doors preferably sliding type or otherwise open able inside, access platforms and ladders.
32.03.00	Steel frame around openings in roof and on external walls for mounting of exhaust fans shall be provided.
32.04.00	Ready mix non - shrink cementitious grout of reputed manufacturer as approved by the Employer shall be used for grouting of block outs and foundation bolts, underpinning of base plates and machine bases. Crushing strength of grout shall be one grade higher than the foundation concrete. Minimum crushing strength shall be 30 N / mm^2 unless higher strength requirement is specified by the equipment supplier or the grout manufacturers.
32.05.00	The bottom of steel in case of cable / pipe galleries and trestles shall be generally 3m above the ground except for rail / road crossing where it shall be 8m above the rail top / road crest/ground. Further in bunker areas it shall be 8 m above the ground.
32.06.00	Polysulphide Sealing Compound shall be two-part polysulphide sealant and shall be from approved manufacturer, conforming to IS : 12118. Materials shall consist of polysulphide polymer and a curing agent. Gun grade material shall be used unless otherwise specified. The application of the sealant shall be strictly followed as per manufacturer's guidelines.
33.00.00	**SHOTCRETING**
33.01.00	**General Requirements**
33.01.01	Generally, shotcreting shall be done in accordance with IS : 9012.
33.01.02	Reinforcement for shotcreting shall be as detailed below, unless specified otherwise. Reinforcement in one direction consisting of 6 mm M. S. bars at 750 mm c / c shall be connected to the lugs for fastening of the wire fabric. This shall be used in case of 50 mm or above thick shotcreting.
33.01.03	Wire fabric conforming to IS : 1566 shall be used as reinforcement and shall consist of wire, 3 mm diameter, spaced 50 mm both ways and shall be electrically cross welded. Wire fabric shall be securely tied to 6 mm bars for 50 mm thickness. Adjacent sheet of wire fabric shall be lapped at least 100 mm and tied.
33.01.04	Clear cover to reinforcement mesh shall not be less than 15 mm.
33.01.05	Minimum thickness of shotcreting shall be 50 mm. for abrasion resistant work and 25 mm for ordinary surface protection work.
33.02.00	**Material** Generally, the materials shall be in accordance with aggregates specification given hereunder.

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33.02.01	Fine aggregate shall consist of natural sand or crushed stone from a known source and shall be strong, hard, coarse, sharp, chemically inert, clean and free from any coating. It shall be free from clay, coal or coal residue, organic or any other impurities that may impair the strength or durability of the concrete and shall conform to IS : 383.
33.02.02	Fine aggregate (Sand) shall be well graded and particles shall range in size within the following limits. The Engineer, may approved the use of any other grading as per requirement or as per IS : 9012.
33.02.03	The fineness modulus shall be preferably between 2.5 and 3.3. Any other value can be used, with prior approval of the Engineer.
33.03.00	**Application**
33.03.01	After the placement of reinforcement and / or welded mesh and not more than six hours prior to the application of shotcrete, the surface shall be thoroughly cleaned of all loose materials and dirt. The Contractor shall properly prepare the surfaces, reinforcement and / or welded mesh to receive the shotcrete. Cleaned surfaces shall be wetted not more than hour prior to shotcreting.
33.03.02	The mix as placed on surface shall be one part cement to three parts approved sand by mass. Cement and sand shall be dry mixed; not water shall be added after mixing and before using in the gun. The quantity of water when added shall be only that which is sufficient to hydrate the cement. For average atmospheric conditions, the water cement ratio for shotcrete in place shall be between 0.35 and 0.5 by mass. Suitable admixture shall be used wherever required.
33.03.03	A uniform pressure of not less than 3 Kg/cm^2 at the nozzle shall be maintained. Necessary adjustments shall be made to ensure this pressure, taking into account the length of hose and height of the place to be shotcreted, above location of the machine.
33.03.04	The application shall proceed in an upward direction. Beams, stiffeners and intermediate walls, if any, shall be wrapped with wire fabric and completely covered with shotcreting. All rebound shall be removed from the area of application as the work progresses and such rebound material shall not be reused.
33.03.05	As soon as the freshly shotcreted surface shows the first dry patches, a fine spray of water shall be applied to keep too moist. After the surface has hardened, it shall be kept continuously moist for minimum seven days. If there is extreme heat, especially when accompanied by hot winds, the shotcreted surface, immediately upon completion, shall be covered with burlap or similar covering, which must be kept continuously moist for 14 days after shotcreting. The temperature of the lining shall not be permitted to exceed 38^0C during placing of concrete.
34.00.00	**VIBRATION ISOLATION SYSTEM**
	These specifications are meant for the design, supply and erection of vibration isolation system for supporting crushers.
34.01.00	**Supporting Arrangement**
34.01.01	**For Crushers:**

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	The crushers shall be supported on vibration isolation system consisting of steel helical springs and viscous dampers. The supporting arrangement for each crusher shall consist of an R. C. C. deck supported on steel helical spring units and viscous damper units which in turn shall be supported on girders. The girders shall be an integral part of the crusher house building. The part of the structure consisting of the R. C. C. deck, springs and viscous dampers shall hitherto be referred to as “spring supported foundation”. The part of the structure, which is below the spring shall hitherto be called “supporting structure”.
34.01.02	The Contractor should do the Engineering / design, supply and erection of vibration isolation system consisting of steel helical spring units and viscous dampers supporting the top deck which in turn would support the crushers. The vibrations isolation system supplied shall be of a proven make. The Contractor or his sub - contractor who designs and supplies the system should have designed, supplied and installed such systems for not less than five machines of speeds and unbalance forces comparable to the machine proposed by the vendor. The vibration isolation systems installed by the contractor or his sub - contractor in such machines should have been working satisfactorily for at least five years.
34.02.00	**Scope of Work**
34.02.01	Scope of work shall include the following : (a.) Engineering (1.) Design of the vibration isolation system using steel helical springs and viscous dampers to support an R. C. C. top deck supporting the equipment. This includes the static and dynamic analysis of the vibration isolation system with the R. C. C. top deck and the equipment. (2.) Structural design of the R. C. C. top deck including preparation of General Arrangement drawings, detailed reinforcement drawings, bar - bending schedules etc. (3.) Calculation of loads on the structure supporting the springs and viscous dampers, their points of application and the stiffness requirements of the supporting structure. (4.) Drawings showing embedments and their locations and details on the R. C. C. top deck. (5.) Drawings showing blockouts, recesses etc. on the top deck. (6.) Design of the supporting structure, including preparation of detailed drawings and bill of materials. **(b.) Supply including packing and transportation to site**

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	(1.) Steel helical spring units and viscous dampers, including associated auxiliaries for installation of the spring units and dampers like steel shims, adhesive pads etc. (2.) Frame (s) for pre-stressing of spring elements. (3.) Suitable hydraulic jacks system including electric pumps, high pressure tubes etc. required for the installation, alignment etc. of the spring units, two extra hydraulic jacks, one hand operated pump and spares for the hydraulic jack system as required. **(c.) Erection and Commissioning** (1.) Complete erection and commissioning of the vibration isolation system including : (2.) Pre-stressing of spring elements, placing of spring elements in position, checking clearances on the shuttering of the R. C. C. top deck, construction of the supporting structure and the R. C. C. top deck, releasing to pre-stress in spring elements and making final adjustments and alignments after machine installation etc. (3.) The scope of work shall be deemed to include all activities which may not have been explicitly mentioned but are reasonably implied for the successful completion of the work for which these specifications are intended. (4.) This part of the specifications is for vibration isolation system. For the construction of the supporting structure for the crusher and the top deck, the relevant parts of the specification should be referred to. **(d.) Documentation** (1.) Submission of detailed design calculation, analysis (static and dynamic) and drawings for Employer's acceptance and approval. (2.) Furnishing methodology of providing shuttering and its removal as well as concreting of deck slab, installation of springs and dampers and the sequence of operation. (3.) Furnishing installation and maintenance manual indicating equipment, procedure etc., necessary for installation, maintenance of vibration isolation system. (4.) Furnishing a check list for confirming the readiness of the civil fronts for the installation of vibration isolation system and equipment required at each stage installation. (5.) Bill of materials of various elements such as springs, visco-dampers, with their rating, stiffness etc., included in supply.

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	(6.) Detailed specifications of the vibration isolation system and various items included in the supply and the standard (local or international) to which they conform. (7.) Proposed erection strategy of the entire system.
34.03.00	**Design Requirements for Crusher Foundation**
34.03.01	**Dynamic Analysis** Detailed dynamic analysis shall be done for the top deck together with springs and dampers and the natural frequencies and amplitudes of vibration shall be determined. A mathematical model of the top deck shall be formulated with three - dimensional beam / plate finite elements for the purpose of analysis with the spring idealised with vertical and horizontal stiffnesses. The mass of the machine together with that of the top deck shall be considered for the analysis. Natural frequencies upto at least 10 % above the operating speed shall be determined and these frequencies shall be checked against the design criteria. Forced response dynamic analysis shall be carried out for the operating condition unbalance forces using a sinusoidal forcing function. Unbalance forces as given by this specifications shall be used for his purpose. The amplitudes shall be checked against the design criteria. The dynamic forces from this analysis shall be used for structural design with a suitable fatigue factor.
34.03.02	**Isolation Efficiency** The vibration isolation system shall be designed for about 90 % isolation efficiency.
34.03.03	**De-coupling** A ratio of the least 10 (ten) shall be ensured between the stiffness of the supporting structure and the stiffness of the spring system in the vertical direction to achieve de-coupling between the two (the stiffness of the spring system being lower). This ensures that dynamic analysis of the supporting structure need not be carried out.
34.03.04	**Frequency Criteria** The frequency criterion has already been laid down implicitly by the isolation efficiency criteria and de-coupling required. The first bending mode frequency of the top deck shall be at least 20 % above the operating speed.
34.03.05	**Unbalance Forces for Crushers** Unbalance forces arising out of all the following cases shall be considered for checking the design and amplitudes.

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	(a.) Balance quality grade Q 40 as per VDI 2060 - 1966. (b.) One hammer broken condition. The missing hammer shall be assumed to be closest to the crusher non - drive end of the crusher. (c.) Three hammers broken condition. All the three hammers broken shall be assumed to be from the same suspension bar and located at the non - drive end of the crusher.
34.03.06	**Amplitude Criteria for Crushers** The calculated amplitudes (mean to peak values) shall not exceed following limits under the specified conditions. 1) Operating speed of 750 RPM (a.) 150 microns for an unbalance force arising out of balance quality grade Q 40 as per VDI 2060 - 1966. (b.) 300 microns in case of a one hammer broken condition. (c.) Amplitudes need not be checked for a three hammer broken condition. 2) Operating speed of 450 RPM (a.) 200 microns for an imbalance force arising out of balance quality grade Q-40 as per VDI -2060-1966. (b.) 400 microns in case of a one hammers broken condition. (c.) Amplitude need not be checked for a three hammer broken condition. For intermediate operating speed between 450 to 750 RPM the amplitude limits can be linearly interpolated. The amplitude limits mentioned above are in both vertical and horizontal directions. The amplitudes shall be calculated at critical points on the top surface of the R. C. C. deck. The amplitudes shall be checked for the most unfavorable superposition of modes in any direction. However, phase difference between the maximum amplitude occurring in different directions due to the rotating vetor may be considered while superimposing the modes.
34.03.07	**Unbalance force and Amplitude Criteria** The unbalance forces and amplitude criteria shall be as per the equipment manufacturer's recommendations or as per VDI 2060/ VDI 2056, whichever is more stringent.

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34.03.08	**Transient Resonance** Transient resonance, which may occur during the start - up or coasting down condition of the crusher, shall be checked, and the amplitudes in such a condition should not exceed one - and - half times those at operating speed for each design condition.
34.04.00	**Strength Criteria** The following criteria shall apply for the design of top deck : (a.) Dead loads, live loads, Seismic loads and dynamic loads shall be considered for the design. The most unfavorable combination shall considered for design. (b.) Seismic loads shall be assumed to act together with dynamic loads for a one millimeter eccentricity in the rotor. However, seismic loads and dynamic loads arising out of hammer breakage need not be considered together (c.) Fatigue shall be considered while designing for dynamic forces. A fatigue factor of 2.0 shall be used on all dynamic forces to arrive at the equivalent static force for the purpose of design. (d.) Working stress method shall be used for the design of R. C. C. deck. In survival condition, 10 % overstressing may be permitted. (e.) The R. C. C. top deck shall be at least of M35 grade of concrete as per IS : 456. (f.) Fatigue need not be considered for the three hammer broken condition. (g.) For calculating unbalance forces, the heaviest hammer (plain or toothed) shall be considered.
34.05.00	**Approval of Designs and Drawings** All design calculation, drawings and documents shall be in English. All design calculations and drawings shall be submitted to Employer for approval. However, approval of such designs and drawings shall not relieve the contractor of his responsibility regarding the adequacy of the foundation to carry the design forces.
34.06.00	**Standards** Latest revisions of the following Codes shall be used for the design of the crusher foundations. (a.) IS : 456 Code of Practice for Plain and Reinforced concrete. (b.) IS : 2974 (Part IV) Code of Practice for Design and Construction of Machine Foundations (Part IV) for rotary type machine of low frequency.

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	(c.) IS : 1893 (Criteria for Earthquake Resistant Design of Structures). (d.) DIN 4024 Machine Foundations : Flexible supporting structures for machines with rotating masses. (e.) DIN 2089 Helical Compression Springs out of round wire and rod; calculation and Design. (f.) DIN 2096 Helical Compression Springs out of round wire and rod; quality requirements for hot formed compression springs. (g.) VDI 2056 - Criteria for assessing mechanical vibrations of machines. (h.) VDI 2060 - Criteria for assessing the state of balance of rotating rigid bodies.not be permitted to exceed 38°C during placing and curing
35.00.00	**Packaging and Transportation.** All the equipment shall be suitably protected coated, covered or boxed and crated to prevent damage or deterioration during transit, handling and storage at site till the time of erection. While packing all the materials the limitations from the point of view of availability of railway wagon sizes in India should be taken into account. The contractor shall be responsible for any loss or damage during transportation, handling and storage due to improper packing.
36.00.00	**Plant Life** The plant shall be designed for a minimum operating life of 30 years under the conditions of operation. Assurance shall be given that plant components are adequate for this lifetime. If there are any exceptional items of the plant on which an assurance of meeting this clause cannot be given, life of such components and the difficulties associated with them shall be stated.
37.00.00	**PTFE (Poly Tetra Fluoroethylene) Bearing** The bearing shall be of reputed make and manufacturer as approved by the Engineer, for required vertical load and end displacement/rotation. PTFE bearing shall be sliding against highly polished stainless steel and the coefficient of friction between them shall be less than 0.06 at 55 kg/sq.cm. In order to prevent cold flow in PTFE surface it shall be rigidly bonded by a special high temperature resistance adhesive to the stainless steel substrata. The stainless steel surface that slides against the PTFE is mirror polished. The stainless steel shall be bonded to the top plate by special high strength adhesive. The thickness of stainless steel plate shall be between 1.0 mm to 1.5 mm.
38.00.00	**TESTS FOR MATERIAL / WORKMANSHIP**

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	All tests required for all materials, quality of workmanship or any other tests as desired by the Engineer shall be at contractor's cost.
39.00.00	**MATERIALS**
39.01.00	**For Civil, Structural and Architectural works**
	Employer will not supply any material. All materials including cement, reinforcement steel and structural steel, whatsoever required for execution and completion of the entire scope of work covered under this specification shall be arranged by the contractor at his own cost. All materials procured by the contractor shall meet the quality requirements specified in this specification. The contractor shall keep sufficient stock of cement and steel at site at any point of time when the work is in progress excluding what has been already incorporated in the works, so that any disruption / delay in availability of these materials during procurement will not affect the progress of work at site. The minimum quantity of such materials in stock at site shall not be less then the Requirement of one (1) month in case of Cement and Requirement of two (2) Consecutive months in case of Steel.
39.02.00	**Structural steel**
	Structural Steel (including embedded Steel) shall be straight, sound, free from twists, cracks, flaw, laminations and all other defects. Structural steel shall comprise of mild steel, medium strength steel and high tensile steel as specified below.
39.02.01	**Mild Steel**
	a) Rolled sections shall be of grade designation E250, Quality A/BR, Semi-killed/ killed conforming to IS 2062. All steel plates shall be of Grade designation E250, Quality BR (fully killed), conforming to IS 2062 and shall be tested for impact resistance at room temperature. Plates beyond 12mm thickness and up to 40mm thickness shall be normalized rolled. Plates beyond 40mm thickness shall be vacuum degassed & furnace normalised and shall also be 100% ultrasonically tested as per ASTM –A578 level B-S2. b) Pipes shall conform to IS 1161. c) Hollow (square and rectangular) steel sections shall be hot formed conforming to IS: 4923 and shall be of minimum Grade Yst 240. d) Chequered plate shall conform to IS 3502 and shall be minimum 6 mm thick excluding projection. Steel for chequered plate shall conform to grade E250A semi killed of IS: 2062 or equivalent grade conforming to ASTM & BS standards only.
39.02.02	**Medium and High Tensile Steel**
	Rolled Sections and plates shall be of grade designation E350 or higher, Quality B0 (Fully killed), conforming to IS 2062. Plates beyond 12mm thickness and up to 40mm thickness shall be normalized rolled. Plates beyond 40mm thickness shall be vacuum degassed & furnace normalised and shall also be 100% ultrasonically tested as per ASTM –A578 level B-S2.
39.03.00	**Cement**

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39.03.01	Fly ash based portland pozzolana cement conforming to IS:1489 (Part-1) shall be used for all areas other than for the critical structures identified below. Other properties shall be as per IS code.
39.03.02	Ordinary Portland Cement (OPC) shall necessarily be used for the following structures. a) Spring supported decks of limestone crusher b) RCC for Chimney shell. The grade of cement shall be Grade 43 for OPC conforming to IS:269.
39.03.03	In place of fly ash based portland pozzolana cement, OPC mixed with Fly Ash can be used. Batching plant shall have facility for mixing fly ash. Fly ash shall conform to IS:3812(Part I & Part II). Percentage of fly ash to be mixed in concrete shall be based on trial mix. Mix design shall be done with varying percentage of fly ash mix with cement.
39.04.00	**Reinforcement steel shall conform to:** a) Mild steel bars of grade I of IS: 432 Part – I or grade A of IS: 2062. b) High yield strength deformed TMT steel bars of grade Fe-500 having minimum elongation of 14.5 % or Fe-500D, and conforming to other requirements of IS 1786.
39.05.00	**Aggregates** **a) Coarse Aggregate** Coarse aggregate for concrete shall be crushed stones chemically inert, hard, strong, durable against weathering of limited porosity and free from deleterious materials. It shall be properly graded. It shall meet the requirements of IS: 383. **b) Fine Aggregate** Fine aggregate shall be hard, durable, clean and free from adherent coatings of organic matter and clay balls or pellets. Fine aggregate in concrete shall conform to IS : 383. For plaster, it shall conform to IS : 1542 and for masonry work to IS : 2116. **c)** Petrographic examination of aggregate shall be carried out by the contractor at National Council for Cement and Building Materials (NCB), Ballabgarh, or any other approved laboratory to ascertain the structure and rock type including presence of strained quartz and other reactive minerals. In case, the coarse aggregate sample is of composite nature, the proportions (by weight) of different rock types in the composite sample and petrographic evaluation of each rock should also be ascertained. While determining the rock type, special emphasis should be given on identification of known reactive rocks like chalcedony, opal etc. The procedure laid down in IS 2430 for sampling of aggregates may be followed. The laboratory shall determine potential reactivity of the aggregate, which may lead to reaction of silica in aggregate with the alkalis of cement and / or potential of some aggregates like limestone to cause residual expansion due to repeated temperature cycle. If the same is established, the contractor shall further carry out alkali aggregates reactivity test as per IS 2386 (Pt.VII) and / or repeated temperature cycle test to establish the suitability of the aggregates for the concrete work. The test results, with the final recommendations of the laboratory, as to a suitability of the aggregate, for use in the concrete work for various structures and suggested measures, in case of results

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	are not satisfactory, shall be submitted to the Engineer for his review, in a report form. In case in the report, it is established, that the aggregates contain reactive silica, which would react with alkalis of the cement, the contractor shall change the source of supply of the aggregate or use low alkali cement as per recommendation or take measures as recommended in the report as instructed by Engineer. In case aggregates indicate residual expansion, under repeated temperature cycle test (from 10° Celsius to 65° Celsius and for 60 temperature cycles) the material shall not be used for concreting of Lime stone crusher decks, Mills, Fans and other equipment foundations which are likely to be subjected to repeated temperature cycle. The contractor shall use aggregates free from residual expansion under repeated temperatures cycle test.
39.06.00	**NUTS AND BOLTS** M.S. Nuts and Bolts shall conform to IS:1363,IS:1364, IS:1367. High tensile fixing with bolts and nuts shall respectively be as per IS:3757 and IS:6623. Washers shall conform to IS:5369, IS:537o, IS:5372, IS:5374, IS:6610, IS:6649, as appropriate.
40.00.00	**CODES AND STANDARDS** All standards, specifications, acts and code of practice referred to herein shall be the latest editions including all applicable official amendments and revisions. Other Indian, foreign Codes and Standards not listed here but referred to elsewhere within this specification shall also be deemed to be part of this list. In case of conflict between this specification and those (IS standards, codes etc.) referred to herein, the former shall prevail. Some of the relevant Indian standards, Acts and Codes applicable to this section of the specification are listed below IS : 383 — Specification for coarse and fine aggregates from natural sources for Concrete. IS : 432 — Specification for mild steel and medium tensile steel bars and hard drawn steel wire for concrete reinforcement. IS : 456 — Code of practice for plain and reinforced concrete. IS : 458 — Specification for concrete pipes. IS : 516 — Method of test for strength of concrete.

CLAUSE NO.	TECHNICAL REQUIREMENTS
	IS : 800 — Code of practice for use of structural steel in general building construction.
	IS : 814 — Specification for covered electrodes for metal arc welding for weld steel.
	IS : 816 — Code of practice for use of metal arc welding for general construction.
	IS : 817 — Code of practice for training and testing of metal arc welders.
	IS : 875 (Pt. I to V) — Code of practice for design loads other than earthquake) for buildings and structures.
	IS : 1038 — Steel doors, windows and ventilators.
	IS : 1172 — Basic requirements for water supply, drainage and sanitation.
	IS : 1361 — Steel windows for industrial buildings.
	IS : 1786 — Specification for high strength deformed steel bars and wires for concrete reinforcement.
	IS : 1892 — Code of practice for subsurface investigation for foundation.
	IS : 1893 — Criteria for earthquake resistant design of structures.
	IS : 1904 — Code of practice for design and construction of foundations in soils; general requirements.
	IS : 1905 — Code of practice for structural safety of buildings - Masonry walls.
	IS : 1948 — Specification for aluminium doors, windows and ventilators.
	IS : 2062 — Steel for general structural purposes.
	IS : 2131 — Method of standard penetration test for soils.
	IS : 2212 — Code of practice for brickwork.
	IS : 2645 — Specification for Integral cement water proofing compounds.
	IS:2720 (Part-II, IV TO VIII, XIV, XXI, XXIII, XXIV, XXVII TO XXIX, XL) — Methods of test for soils - determination for water content etc code of practice for earth work on canals.
	IS : 2911 — Code of practice for design and construction of pile foundations.
	(Part-1/Sec.1) — Driven cast in situ concrete piles.

CLAUSE NO.	TECHNICAL REQUIREMENTS
	(Part-1/Sec.2) Bored cast-in-situ concrete piles. (Part-IV) Load test on piles. IS : 2974 (Part - I TO V) Code of practice for design and construction of machine foundations. IS : 3370 (Part I to IV) Code of practice for concrete structures for the storage of liquids. IS : 3658 Code of practice for liquid penetrant flaw detection. IS : 3664 Code of practice for ultra sonic testing by pulse echo method. IS : 4326 Code of practice for earthquake resistant design and construction of buildings. IS : 4990 Specification for plywood for concrete shuttering work. IS : 5624 Specification for foundation bolts. IS : 7215 Tolerances for fabrication steel structures. IS : 8112 Specification for 43 grade Ordinary Portland Cement. IS : 9103 Specification for admixtures for concrete. IS : 9595 Code of procedure of manual metal arc welding of mild steel. IS : 10262 Recommended guidelines for concrete mix design. IS : 13311 Method of non - destructive testing of concrete. IS : 13755 Dust pressed ceramic tiles with water absorption of 3%, E6% (Group B11a) ASTM 898 -89 Standard guide for use of high solid content, cold liquid-applied elastomeric water proofing membrane for use with separate wearing course. AS/NZS 2728 Pre finished / pre painted sheet metal product for interior / exterior building applications – Performance requirements. AS : 1365 Standards for steel manufacturing. AS : 1397 A steel sheet & strip – hot – dipped-zinc-coated or Aluminium-Zinc coated. AS : 3566 Self drilling screws for building and construction industry. IRC : 37 Guidelines for the design of flexible pavements. - Manual on sewerage and sewage treatment (Published by CPH & EEO) As updated.

CLAUSE NO.	TECHNICAL REQUIREMENTS

Indian Explosives Act. 1940 as updated.

41.00.00 SPECIAL PROVISIONS FOR SIMHADRI-II (2X500 MW) AND VALLUR (3X500MW) PROJECTS.

Item	Clause No.	General Provision (for all projects except Simhadri & Vallur)	Special Provisions for Simhadri & Vallur Projects
Corrosion Protection	31.01.00 (a)	…Corrosive Category C3…	…Corrosive Category C5…
	31.03.00 (b)	…Polyamide cured epoxy of minimum 100 micron DFT…	…Polyamide cured epoxy of minimum 180 micron DFT…
Colour coated and Other Sheeting works	5.01.00, 5.06.00	…Zinc coating to class Z275/ aluminium-zinc alloy coating to class AZ150…	…Zinc coating to class Z350/ aluminium-zinc alloy coating to class AZ200…
	5.01.00 (b)	…Zinc coating to class Z275…	…Zinc coating to class Z350…
Concrete (RCC)	24.00.00 a) 7.00.00 14.00.00 21.00.00	M25…	M30… (Refer notes below)
Concrete (PCC)	6.04.00 6.05.00 6.06.00 6.07.00 6.09.00	M-15…	M20…
Cement	39.03.01	… portland pozzolana cement conforming to IS:1489 (Part-1) shall be…	… portland pozzolana cement conforming to IS:1489 (Part-1) / Portland slag cement conforming to IS:455 shall be….
	39.03.03	In place of fly ash based portland pozzolana cement, II). Percentage… …fly ash mix with cement.	DELETED

CLAUSE NO.	TECHNICAL REQUIREMENTS

Reinforcement Steel	39.04.00 (b)	High yield strength deformed TMT steel bars of grade Fe 500	High yield strength deformed Corrosion resistant grade TMT steel bars of grade Fe 500

Note:

1. Provisions as mentioned under special requirements in Soil data & foundation system, of Project Information chapter (Part A of section VI of technical specifications), are also applicable for RCC works below ground.
2. The environmental exposure conditions corresponding to type “Severe” as per Table-3 of IS:456 shall be considered for all concrete. The minimum clear cover to main reinforcement shall be as below:

Sl No	Item	Top (mm)	Bottom (mm)	Side (mm)
1.	Foundations, Wall base slab, pedestals	60	60	60
2.	Plinth Beams	50	50	50
3.	Columns	60	--	60
4.	Floor/Roof/Tie/Lintel Beams	50	50	50
5	Floor / Roof slab and sun-shades / facia	35	35	35
6.	Trenches / Pits	40	60	60

For “Foundation System and Geotechnical Data” refer “Project Information section” of Technical specification.

Maharatna Company	**2 X 250 MW NSPCL BHILAI TPP-FGD** **SCOPE OF WORK**	SPECIFICATION NO. PE-TS-468-600-C001 VOLUME - II B SECTION - C REV.NO. 00 DATE 15-02-2020 SHEET 1 OF 1

SECTION - C

AMENDMENTS

AMENDMENT NO. 1 TO TECHNICAL SPECIFICATION (SECTION-VI)

S. NO.	SPECIFICATION REFERENCE				EXISTING	READ AS
	SEC/ PART	SUB-SEC.	PAGE NO.	CLAUSE NO.		
1.	VI/A	II-A1	TSTPS	GLP	Drawing No. 4330-999-POC-F-002 Rev. 5	Drawing No. 4330-999-POC-F-002 Rev. 6 is issued as per **Annexure-I.**
2.	VI/A	II-A1	TSTPS	Existing Plant Drawings	-	Additional Drawings of Existing Plant issued as per **Annexure-II**
3.	VI/A	II-A1	TSTPS	Project Information		Climatological Table issued as per **Annexure-III**
4.	VI/A	II-A2	Simhadri	GLP	Drawing No. 3530-999-POC-F-001 Rev. 5	Drawing No. 3530-999-POC-F-001 Rev. 6 is issued as per **Annexure-IV.**
5.	VI/A	II-A2	Simhadri	Project Information		Climatological Table issued as per **Annexure-V**
6.	VI/A	II-A2	Simhadri	Existing Plant Drawings	-	Additional Drawings of Existing Plant issued as per **Annexure-VI**
7.	VI/A	II-A3	Sipat	GLP	Drawing No. 9518/9545-999-POC-F-001 Rev. 13	Drawing No. 9518/9545-999-POC-F-001 Rev. 14 is issued as per **Annexure-VII**
8.	VI/A	II-A3	Sipat	Existing Plant Drawings	-	Additional Drawings of Existing Plant issued as per **Annexure-VIII**
9.	VI/A	II-A4	Vallur	Existing Plant Drawings	-	Additional Drawings of Existing Plant issued as per **Annexure-IX**
10.	VI/A	II-A5	Bhilai	GLP	Drawing No. B/TS/PLOT Rev. 1	Revised Drawing No. B/TS/PLOT Rev. 1 is issued as per **Annexure-X**
11.	VI/A	II-A7	Rourkela	GLP	Drawing No. PE-DG-427-100-M001 Rev. 9	Drawing No. PE-DG-427-100-M001 Rev. 10 is issued as per **Annexure-XI**

AMENDMENT NO. 1 TO TECHNICAL SPECIFICATION (SECTION-VI)

S. NO.	SPECIFICATION REFERENCE				EXISTING	READ AS
	SEC/ PART	SUB-SEC.	PAGE NO.	CLAUSE NO.		
12.	VI/A	VI	23 of 27	6.00.00	The performance tests shall be carried out in accordance with ASME PTC 40 (1991) code.	The performance tests shall be carried out in accordance with ASME PTC 40 (2017) code.
13.	VI/B	I-M1	7 of 52	3.03.01	The arrangement of the flue gas system shall allow complete isolation of the absorber from the gas side, with the unit in operation. **Guillotine gate type damper shall be provided by the Contractor before the suction of each Booster fan.**	The arrangement of the flue gas system shall allow complete isolation of the absorber from the gas side, with the unit in operation. **Guillotine gate type dampers shall be provided by the Contractor before the suction and discharge of each Booster fan.**
14.	VI/B	I-M1	24 of 52	6.05.10	New Clause Added	The design and manufacturing of wet ball mill shall follow the latest applicable Indian / International (ASME / EN / Japanese) Standards.
15.	VI/B	I-M1	27 of 52	7.04.11	New Clause Added	The design and manufacturing of vacuum belt filter shall follow the latest applicable Indian / International (ASME / EN / Japanese) Standards.
16.	VI/A	V	1-8 OF 21	1.00.00 2.00.00 3.00.00	Salient Design Data Guarantee Point	Pressure at Terminal Point before Booster Fan Suction shall be Zero (0) mmwc at Guarantee Point Condition for all the projects
17.	Section-VI, Part-B	M6	6 of 41	4.04.00	Dust Extraction System Type: Venturi Scrubber Type Location: • Belt Feeder after crusher • Feeder at crusher house • Limestone storage shed • Gypsum shed	Dust Extraction System Type: Dry Type Bag Filter Location: • Truck un-loading points • Junction Tower (limestone/gypsum discharge & receipt point) • Limestone crusher house (including belt feeder & vibrating feeder) • Lime stone / gypsum shed/silo
18.	Section-VI, Part-B	M6	28 of 41	1.07.00	Limestone feeding arrangement – Through vibrating screed feeder (However the crusher …….zero passage of limestone through screen)	Limestone feeding arrangement – Through vibrating feeder (However the crusher …….zero passage of limestone through screen)

AMENDMENT NO. 1 TO TECHNICAL SPECIFICATION (SECTION-VI)

S. NO.	SPECIFICATION REFERENCE				EXISTING	READ AS
	SEC/ PART	SUB-SEC.	PAGE NO.	CLAUSE NO.		
19.	Section-VI, Part-B	M6	3 of 41	3.02.00	……Gypsum from storage shed shall be loaded to user's trucks using front end loader/payloader.	……..Gypsum from storage shed shall be loaded to user's trucks using front end loader/payloader. The storage shed shall be enclosed type so that no dry gypsum could come out of shed.
20.	Section-VI, Part-B	M6	3 of 41	3.02.00	Alternatively, Gypsum can be stored in Eu-rosilos/equivalent (minimum 2 Nos. to be provided).	Alternatively, Gypsum can be stored in Eu-rosilos/equivalent (minimum 2 Nos. with 7 days storage each OR one No. with 7 days storage alongwith one bypass arrangement and storage shed for minimum 4 days for gypsum storage. The storage shed shall have facility to transfer gypsum to trucks by owner.
21.	Section-VI, Part-B	M6	3 of 41	3.02.00	……Silos shall have a drainage system at bottom. Silo shall permit to unload gypsum directly into trucks.	……Silos shall have a drainage system at bottom. Silo shall permit to unload gypsum directly into trucks. Further, conventional elevator (capacity of 8 persons) shall be provided for Silos to access the various operating/maintenance elevation/floors of silos & its top floors.
22.	Section-VI, Part-A	VI	22 of 27	5.00.00	-	xxxiv) Power consumption for lime stone unload-ing, conveying, crushing, storage & reclaiming sys-tem (Single Stream) except lighting, hoists, sam-pling unit, sump pumps, elevators, DE, ventilation, SW System, Potable water system. Duty factor for above system to be considered as 0.15. Accordingly, Pu for the same shall be duty factor x power consumption xxxv) Power consumption of Gypsum conveying system (Single Stream) except lighting, hoists, sampling unit, sump pumps, elevators, DE, Ventila-tion, SW System, Potable Water System.

AMENDMENT NO. 1 TO TECHNICAL SPECIFICATION (SECTION-VI)

S. NO.	SPECIFICATION REFERENCE				EXISTING	READ AS
	SEC/ PART	SUB-SEC.	PAGE NO.	CLAUSE NO.		
23.	Section-VI, Part-A	VII	54 of 82	O)	DUST SUPRESSION, SERVICE WATER, POTABLE WATER, COOLING WATER	SERVICE WATER, POTABLE WATER, COOLING WATER
24.	Section-VI, Part-A	VII	54 of 82	O)	Sl. No. h), i), j) & n)	Deleted
25.	VI/A	VI	19 OF 30	4.02.00(XVI)(a)	Each clarifier unit of PT-CW system shall be guaranteed for an effluent capacity of not less than 280 Cu.M/hr meeting the effluent quality as mentioned below.	Each clarifier unit of PT-CW system shall be guaranteed for an effluent capacity of not less than 460 Cu.M/hr meeting the effluent quality as mentioned below.
26.	VI/A	II-A4	33 OF 37	Table-4 Sea water Analysis	Sea water analysis	Sea water analysis. REFER **Annexure-XII**
27.	VI/A	III-A4	6 of 88	6.03.00(g)	Interconnection between the clarified water outlet channel and outlet channel Existing clarifier.	----------DELETED----------
28.	VI/A	III-A4	48 OF 88	3.A2.8-ULTRA-FILTERA-TION(UF) SYSTEM	Design permeate water quality--- Turbidity < 1.0 NTU, SDI < 2 for 100% of time.	Design permeate water quality--- Turbidity < 1.0 NTU, SDI < 3 for 100% of time.
29.	VI/A	III-A4	2 OF 88	4.01.00(d) (e) (f)	(d) 4 x 50% (3 working + 1 standby) capacity of plate type heat exchangers. (e)5 x 50% (3 Working + 2 standby) capacity FGD Auxiliary (Secondary) Cooling water pumps, along with drives. (f) 4 x 50% (3 Working + 1 standby) capacity FGD DM (Primary) cooling water pumps along with drives	(d) **4 x 33.33**% (3 working + 1 standby) capacity of plate type heat exchangers. (e) **5 x 33.33%** (3 Working + 2 standby) capacity FGD Auxiliary (Secondary) Cooling water pumps, along with drives. (f) **4 x 33.33%** (3 Working + 1 standby) capacity FGD DM (Primary) cooling water pumps along with drives

AMENDMENT NO. 1 TO TECHNICAL SPECIFICATION (SECTION-VI)

S. NO.	SPECIFICATION REFERENCE				EXISTING	READ AS
	SEC/ PART	SUB-SEC.	PAGE NO.	CLAUSE NO.		
30.	VI/A	III-A4	3 OF 88	6.01.00(d) (e) (f)	(d)7 x 50% (6 working + 1 standby) capacity of plate type heat exchangers. (e)8 x 50% (6 Working + 2 standby) capacity FGD Auxiliary (Secondary) Cooling water pumps, along with drives. (f)7 x 50% (6 Working + 1 standby) capacity FGD DM (Primary) cooling water pumps along with drives.	(d)**7 x 16.66**% (6 working + 1 standby) capacity of plate type heat exchangers. (e)**8 x 16.66**% (6 Working + 2 standby) capacity FGD Auxiliary (Secondary) Cooling water pumps, along with drives. (f)**7x16.66**% (6 Working + 1 standby) capacity FGD DM (Primary) cooling water pumps along with drives.
31.	VI/A	III-A4	7 OF 88	9.03.00(K) 9.04.009(c) (d)	(K) 6 x 50% (4 Working + 2 standby) capacity auxiliary cooling water pumps, its drives,---------- ----- -----& isolation valves at the discharge and discharge pipe line to PHE etc. (c) 5 x 50% (4 working + 1 standby) capacity of plate type heat exchangers. (d) 5 x 50% (4 Working + 1 standby) capacity FGD DM (Primary) cooling water pumps along with drives.	(K) **6 x 25% (**4 Working + 2 standby) capacity auxiliary cooling water pumps, its drives,----------& isolation valves at the discharge and discharge pipe line to PHE etc. (c) **5 x 25%** (4 working + 1 standby) capacity of plate type heat exchangers. (d) **5 x 25%** (4 Working + 1 standby) capacity FGD DM (Primary) cooling water pumps along with drives.
32.	VI/A	III-A4	28 OF 88	10.06.00 (25)	25) Required number of lifting bar, dial type load indicator, electrically operated mono rail hoists for handling chlorine tonners,	----------DELETED----------
33.	SEC-TION-VI/ Part-A	V	13 of 21	6.02.01a(ii)	a) FGD Control Room Building i) Air Cooled condensing units Air conditioners: 2X100% ii) AHU (with VVVFD): 2 X 100%	a) FGD Control Room Building i) Air Cooled condensing units Air conditioners: 2X100% ii) AHU : 2 X 100%

AMENDMENT NO. 1 TO TECHNICAL SPECIFICATION (SECTION-VI)

S. NO.	SPECIFICATION REFERENCE				EXISTING	READ AS
	SEC/ PART	SUB-SEC.	PAGE NO.	CLAUSE NO.		
34.	VI/A	V	13 of 21	6.02.01 (b)	100% standby shall be provided for area served by Cassette / Hi-wall Split/ Ductable split AC/ Package type air conditioners for all other control rooms covered in the scope of this package.	(N+1) standby configuration shall be provided for area served by Cassette / Hi-wall Split/ Ductable split AC/ Package type air conditioners for all other control rooms covered in the scope of this package. Here N stands for number of working ACs
35.	VI	Part E		SLD	0011-109(2)-POE-J-001/C Rev-B	0011-109(2)-POE-J-001/C Rev-C as Annexure-XIII
36.	VI	II-E6	10 of 23	4.04.04	Power and control cables shall be laid…Single core cable in trefoil formation shall be laid with a distance of four times the diameter of cable between trefoil center lines and clamped at every **two** metre. All multicore cables shall be laid in touching formation…..	Power and control cables shall be laid…Single core cable in trefoil formation shall be laid with a distance of four times the diameter of cable between trefoil center lines and clamped at every **one** metre. All multicore cables shall be laid in touching formation…..
37.	VI	II-E4	3 OF 6	3.01.00	a) 1.1 KV grade XLPE power cables shall have compacted aluminium conductor, XLPE insulated, PVC inner-sheathed (as applicable), armoured/ unarmoured, PVC outer-sheathed conforming to IS:7098. (Part-I). b) 1.1KV grade PVC power cables shall have aluminium conductor(compacted type for sizes above 10 sq.mm), PVC Insulated, PVC inner sheathed (as applicable) armoured/ unarmoured, PVC outer-sheathed conforming to IS:1554 (Part-I).	a) 1.1 KV grade XLPE power cables shall have compacted aluminium conductor, XLPE insulated, PVC inner-sheathed (as applicable), armoured, PVC outer-sheathed conforming to IS:7098. (Part-I). b) 1.1KV grade PVC power cables shall have aluminium conductor(compacted type for sizes above 10 sq.mm), PVC Insulated, PVC inner sheathed (as applicable) armoured, PVC outer-sheathed conforming to IS:1554 (Part-I).
38.	VI	II-E5	3 of 6	3.01.00	1.1 KV Grade Control Cables shall have stranded copper conductor and shall be multicore PVC insulated, PVC inner sheathed, armoured / unarmoured, FRLS PVC outer sheathed conforming to IS: 1554. (Part-I).	1.1 KV Grade Control Cables shall have stranded copper conductor and shall be multicore PVC insulated, PVC inner sheathed, armoured, FRLS PVC outer sheathed conforming to IS: 1554. (Part-I).
39.	VI	E20	11 of 19	5.05.01	Dummy panels…..during detailed engineering.	**Deleted**

AMENDMENT NO. 1 TO TECHNICAL SPECIFICATION (SECTION-VI)

S. NO.	SPECIFICATION REFERENCE				EXISTING	READ AS
	SEC/ PART	SUB-SEC.	PAGE NO.	CLAUSE NO.		
40.	VI	A	4 of 8	1.06.00(f)	ABT based energy….owner supplied energy meters.	ABT based energy meters and integration with existing metering system.
41.	SECTION – VI, PART-A	SUB-SECTION-III-C C&I SYSTEM	19 of 19	15.00.00	---	15.00.00 Requirement for FGD control room and RIO room FGD Control room and Remote I/O room (if applicable) shall be air conditioned and battery room shall be air ventilated. False ceiling shall be provided in Control room / RIO room. The following guidelines shall be followed for control system cabinet placement in Control room / Remote I/O room: i) Inter panel spacing-1200 mm ii) Clearance from back wall-1200 mm iii) Clearance from front wall-1200mm iv) Clearance from side wall-1000mm The above clearances are the minimum requirement and may increase with increase in door swing of cabinets. Cable trench to be provided for FGD CR & Remote I/O Room. In case CR/ RIO Room is located above ground floor, cable vault shall be provided. False floor to route cables is not permitted.
42.	SECTION – VI, PART-A	SUB-SECTION-III-C C&I SYSTEM	12 of 19	3.03.02	……Bidder shall connect analysers instruments of his scope and provide single point/port for connection with Employer's cloud server. Further connection to Employer's cloud server shall be in the scope of Employer……..	…….Bidder shall connect analysers instruments of his scope and provide single point/port in FGD Control room for connection with Employer's cloud server. Further connection to Employer's cloud server shall be in the scope of Employer……..

AMENDMENT NO. 1 TO TECHNICAL SPECIFICATION (SECTION-VI)

S. NO.	SPECIFICATION REFERENCE				EXISTING	READ AS
	SEC/ PART	SUB-SEC.	PAGE NO.	CLAUSE NO.		
43.	SECTION – VI, PART-B	SUB-SECTION-I-M6	14 of 76	4.9.6	Specification of the Vibration Monitoring System	Clause deleted
44.	Part-E (Tender Drawings), Section-VI	Scheme of FGD-Absorber System (DRG No: 0011-109(2)-POM-A-001. Rev. No: A.)	Sheet 1 of 3		In the referred tender drawing (Sheet 1 of 3), in FGD Bypass Damper's Seal Air System Flow Switch (FS), Temperature Switch (TS) and Temperature Transmitter (TT) is shown.	In the referred tender drawing (Sheet 1 of 3), in FGD Bypass Damper's Seal Air System Flow Switch (FS), Temperature Switch (TS) and Temperature Transmitter (TT) **stands deleted**. Only Pressure Transmitters (PT) are applicable at the discharge line of FGD Bypass Damper seal air system.
45.	VI/ PART-B	IV-D		39.05.00 (b)	**b) Fine Aggregate** Fine aggregate shall be hard, durable, clean and free from adherent coatings of organic matter and clay balls or pellets. Fine aggregate in concrete shall conform to IS : 383. For plaster, it shall conform to IS : 1542 and for masonry work to IS : 2116.	**Fine Aggregate** Fine aggregate shall consist of natural sand/ crushed sand and shall be hard, durable, clean and free from adherent coatings of organic matter and clay balls or pellets. Fine aggregate in concrete shall conform to IS: 383. For plaster, it shall conform to IS: 1542 and for masonry work to IS: 2116. However, in case of chimney shell construction, natural sand conforming to IS: 383 shall only be used.

AMENDMENT NO. 1 TO TECHNICAL SPECIFICATION (SECTION-VI)

S. NO.	SPECIFICATION REFERENCE				EXISTING	READ AS
	SEC/ PART	SUB-SEC.	PAGE NO.	CLAUSE NO.		
46.	VI/ PART-B	IV-D		31.06.00	**Hand Railings and Ladders** All Mild steel handrails and ladders shall be galvanised at the rate of 610 Gms / Sq. as per IS: 4736. However, Stainless steel handrails shall be provided as specified in General Architectural Specification clause 9.0.0.	**Hand Railings and Ladders** All Mild steel handrails and ladders shall be galvanised at the rate of 610 Gms / Sq. as per IS: 4736.
47.	VI/ PART-B	IV-D		31.01.00 d)	Painting scheme shall be resubmitted by the Bidder for approval of employer.	**Delete**
48.	VI/ PART-B	IV-D		7.00.00	The floor slabs shall be minimum 150 mm thick (above the top surface (crest) of the metal deck sheet) and shall have minimum 10 dia HYSD reinforcement bars placed at 200 mm center both ways at top and bottom. For floors with metal deck the minimum thickness (150 mm) shall be above the top surface (crest) of the metal deck sheet	The floor slabs shall be minimum 150 mm thick and shall have minimum 10 dia HYSD reinforcement bars placed at 200 mm center both ways at top and bottom.

AMENDMENT NO. 1 TO TECHNICAL SPECIFICATION (SECTION-VI)

S. NO.	SPECIFICATION REFERENCE				EXISTING	READ AS
	SEC/ PART	SUB-SEC.	PAGE NO.	CLAUSE NO.		
49.	VI/ PART-B	IV-D		7.00.00	In case Bidder opts for steel super-structure with RCC floors/ roof, the bidder shall necessarily use Troughed permanently colour coated metal decking sheets having minimum thickness of 0.6mm as permanent shuttering. The detailed material property requirement of metal deck sheet is specified elsewhere in the specification. These profiled metal deck sheets shall be fixed to the structural steel beams/ purlins using headed shear anchor studs specified elsewhere in the specification.	In case Bidder opts for steel super-structure with RCC floors/ roof, the bidder shall necessarily use Troughed permanently colour coated metal decking sheets having minimum thickness of 0.6mm as permanent shuttering. The detailed material property requirement of metal deck sheet is specified elsewhere in the specification. These profiled metal deck sheets shall be fixed to the structural steel beams/ purlins using headed shear anchor studs specified elsewhere in the specification. For floors with metal deck the minimum thickness (150 mm) shall be above the top surface (crest) of the metal deck sheet

AMENDMENT NO. 1 TO TECHNICAL SPECIFICATION (SECTION-VI)

S. NO.	SPECIFICATION REFERENCE				EXISTING	READ AS
	SEC/ PART	SUB-SEC.	PAGE NO.	CLAUSE NO.		
50.	VI/ PART-A	II-A1/A2/ A3/A4/ A5/A6/ A7	16 of 34/ 13 of 29/ 12 of 29/ 14 of 37 13 of 30/ 15 of 36/ 13 of 29/	7.02.03 xv)	High Strain Dynamic Load Test may be carried out for routine load testing of working piles. However, at least two numbers of static routine vertical load tests shall be carried out on pile on which high strain dynamic load test has already been carried out for establishing the correlation between the two tests. In case of discrepancy if any between dynamic and static vertical load tests, then additional static routine vertical load tests shall be conducted as decided by the Engineer and the results of static routine vertical load shall prevail. Number of routine vertical pile load tests as per clause 7.02.03 (ix) shall be total of static routine vertical load test and high strain dynamic load tests.	Routine pile load tests to be performed on 0.5% of the total number of piles provided for each diameter/allowable capacity. High Strain dynamic load test may be carried out for routine load testing of working piles. However, at least two numbers of static routine vertical load tests shall be carried out on pile on which high strain dynamic load test has already been carried out for establishing the correlation between the two tests. In case of discrepancy if any between dynamic and static vertical load tests, then additional static routine vertical load tests shall be conducted as decided by the Engineer and the results of static routine vertical load shall prevail. Number of routine vertical pile load tests as per clause 7.02.03 (ix) shall be total of static routine vertical load test and high strain dynamic load tests. In case agency wish to carry out only static routine vertical load test on 0.5% of total number of piles, he may adopt the same.
51.	VI/ PART-A	II-A1/A2/ A3/A4/ A5/A6/ A7	22 of 34/ 19 of 29/ 19 OF 29/ 24 of 37/ 20 of 30/ 25 of 36/ 21 of 29	Annexure	Bidder is required to carry out geotechnical investigation in this area. The allowable bearing pressure shall be adopted after approval of geotechnical investigation report by owner. However, the maximum allowable bearing pressure shall be as per the approved geotechnical report and shall be limited to the values as furnished in Table-2.	Bidder is required to carry out geotechnical investigation in this area. During detailed engineering, the Allowable Bearing Pressure shall be adopted after approval of geotechnical investigation report. However, the maximum allowable bearing pressure shall be lower of the two values i.e. as per approved geotechnical report and as per the values furnished in Table-2.
52.	VI/ PART-A	II-A3/A4/ A5/A6/ A7	-	Annexure-III	-	Amendment added with clause 7.00.00, II-A3/A4/A5/A6/A7, of Tech. Specification. Available additional data provided as per **Annexure-XIV.**

AMENDMENT NO. 1 TO TECHNICAL SPECIFICATION (SECTION-VI)

S. NO.	SPECIFICATION REFERENCE				EXISTING	READ AS
	SEC/ PART	SUB-SEC.	PAGE NO.	CLAUSE NO.		
53.	VI/ PART-A	II-A4	-	Annex-ure-IV	BH-93 co-ordinate	Please read co-ordinate of BH-93 as 1656N 813W

AMENDMENT NO. 1 TO TECHNICAL SPECIFICATION (SECTION-VI)

S. NO.	SPECIFICATION REFERENCE				EXISTING	READ AS
	SEC/ PART	SUB-SEC.	PAGE NO.	CLAUSE NO.		
54.	VI/ PART-A	II-A1/A2/ A3/A4/ A5/A6/ A7	12 of 34/ 9 of 29/ 9 of 29/ 11 of 37/ 10 of 30/ 11 of 36/ 10 of 29	7.02.01 e)	Before execution of work the bidder shall ensure that there is no obstruction to underground/over ground facilities like sewer lines, pipe lines etc. Any such damage and remedial/ rectification measures shall be at the contractors cost.	Before execution of work the bidder shall ensure that there is no obstruction to underground/over ground facilities like sewer lines, pipe lines etc. Any such damage and remedial/ rectification measures shall be at the contractors cost. **For underground facilities survey, Ground Penetration Radar (GPR) may be used.**

AMENDMENT NO. 1 TO TECHNICAL SPECIFICATION (SECTION-VI)

S. NO.	SPECIFICATION REFERENCE				EXISTING	READ AS
	SEC/ PART	SUB-SEC.	PAGE NO.	CLAUSE NO.		
55.	VI/ PART-A	II-A4	11 of 37	7.02.01 b	The roads, ground floor slabs, trenches, pipe pedestals, channels/drains and staircase foundation with foundation loading intensity less than 4 T / M2 may be supported on open / shallow foundations resting on virgin / controlled compacted filled up soil.	Minimum 500mm thick compacted moorum/Non-Expansive Soil shall be provided replacing existing ash/soil below the roads, trenches, pipe pedestals, channels/drains and staircase foundation with foundation loading intensity less than 4 T / M2 . For ground floor slab, where grade slab is the part of buildings, the ground improvement with stone column shall be carried out below the entire buildings/structures. Further, Ground improvement with stone column shall be carried out minimum d/2 distance beyond the footprint of buildings (minimum 2 rows beyond the building footprint), where d is the depth of improvement.
56.	VI/ PART-B	IV-D	3.14.09 Para 7	13 of 68	(v) The entire external surface of chimney shell shall be painted with epoxy phenolic coating as specified in (iv) above in alternate bands of 'signal red' and 'bright white' colours.	(iv) The entire external surface of chimney shell shall be painted with epoxy phenolic coating as specified in (iii) above in alternate bands of 'signal red' and 'bright white' colours.

AMENDMENT NO. 2 TO TECHNICAL SPECIFICATION (SECTION-VI)

S. NO.	SPECIFICATION REFERENCE				EXISTING	READ AS
	SEC/ PART	SUB-SEC.	PAGE NO.	CLAUSE NO.		
1.	VI/A	IV	2 of 3	1.08.00	FGD waste water including that of LHP/GHP shall be sent to ash slurry sump after lime neutralization.	FGD waste water and LHP/GHP waste water shall be sent to ash slurry sump. Lime neutralization of FGD waste water shall be done before sending it to ash slurry sump.
2.	VI/B	1M-1	4 of 52	1.09.00	**Noise level** The equivalent weighted average of sound level measured at a distance of 1.5 m above floor level in each elevation and one meter horizontally from the base of any equipments furnished and installed under these specifications, expressed in decibel to a reference of 0.0002 microbar, shall not exceed 85 dB(A). However for Ball Mills the noise levels as per following shall also be acceptable: a) Ball Mill: 90 dBA	**Noise level** The equivalent weighted average of sound level measured at a distance of 1.5 m above floor level in each elevation and one meter horizontally from the base of any equipments furnished and installed under these specifications, expressed in decibel to a reference of 0.0002 microbar, shall not exceed 85 dB(A). However for Ball Mill and Crusher, the noise levels as per following shall also be acceptable: a) Ball Mill: 90 dBA b) Crusher: 90 dBA

Maharatna Company	**2 X 250 MW NSPCL BHILAI TPP-FGD** **SCOPE OF WORK**	SPECIFICATION NO. PE-TS-468-600-C001 VOLUME - II B SECTION - C REV.NO. 00 DATE 15-02-2020 SHEET 1 OF 1

SECTION - C
CLARIFICATIONS

CLARIFICATION NO. 1 TO TECHNICAL SPECIFICATION (SECTION-VI)

SL. NO	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC'S CLARIFICATION
	SEC/ PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
1.	VI/A	III-C	13 of 19	3.06.01	Contractor shall depute Technical Experts of the OAM /OEM/OES/ (Original Analyser Manufacturer/Original Equipment Manufacturer/Original Equipment supplier) for each of the above system at Site, who will be fully qualified to perform the required duties, supervision of maintenance, repair etc. for a period of six month	We presume that the CEMS Equipment supplier is eligible for delivering the services of Comprehensive AMC (CAMC). Kindly confirm.	Specification requirement mentioned in clause 3.06.01 is clear. Bidder to comply with the specification requirement.
2.	VI/A	III-C	18 of 19	13.00.00	The minimum **quantity per unit of furniture** envisaged in FGD control room is as mentioned below:	As per the description given in the specification, there is only one FGD Control room common for all the Units. We presume the quantity of furniture indicated in this clause is common for all the Units. Kindly clarify and confirm.	Bidder's understanding is not correct. Bidder to supply minimum quantity of furniture as mentioned in the specification on **per generating unit basis**.
3.	General	General	General	General	Back up panel for FGD in FGD control room	We understand that no separate hardwired back up panels are to be considered in FGD control room. The entire operation in FGD control room shall be through DCS/HMI. Kindly clarify.	Bidder's understanding is correct.

CLARIFICATION NO. 1 TO TECHNICAL SPECIFICATION (SECTION-VI)

4.	VI/A	III-C	16 of 18	10.01.00	Hardwired Signal exchange: Hardwired signal exchange between BOP DDCMIS/ CHP DDCMIS (under Employer's scope) and FGD DDCMIS (under Contractor's scope) like by-pass damper status, inlet and outlet gates status, ID Fans status, ESPs status, Boiler Load Index (BLI), MFT etc. shall be provided on as required basis, for implementation of protections and interlocks. Contractor shall provide one Remote Input Output (RIO) per unit, placed in Central Equipment Room (CER) for the same. However, contractor to consider IOs and cables for minimum number of hardwired signal exchange per unit as follows DI – 130, DO – 130, AI – 50 and AO –50.	Kindly provide the Tentative route length distance between the following: (i) RIO Panel and employer DCS. (ii) RIO Panel and 24 V DC feeder (Customer provided) (iii) FGD RIO Panel & FGD Control room for all the projects. We further understand that modification and changes required at the Customer's DCS end/station LAN for FGD interface is not in the scope of the Bidder. Kindly confirm.	It is clarified that i) RIO panel and employer's DCS are placed at the same location i.e. Central Equipment Room (CER). Tentative route length between RIO panel (Placed in CER) and employer's DCS shall be 200 meters approximately for all projects. ii) Tentative route length between RIO panel (Placed in CER) and 24 V DC feeder (NTPC scope) shall be 200 meters approximately for all projects. iii) For route length between FGD RIO panel (placed in CER) and FGD control room, bidder to refer clause 9.03.00, PART-A, Sub Section III-C, wherein it is mentioned that "Bidder to visit site to estimate the distance between FGD control room and Employer's CCR/CER". Other FGD RIO panel location shall be finalized during detailed engineering Bidder's understanding is correct that modification and changes required at the Customer's DCS end/station LAN for FGD interface is not in the scope of the bidder.

CLARIFICATION NO. 1 TO TECHNICAL SPECIFICATION (SECTION-VI)

5.	VI/B	III-C1	2 of 4	3.04.00	Bidder shall be required to ensure supply of spare parts for lifetime of the plant. In case, the Bidder feels that certain equipment/component is likely to become obsolete, the Bidder shall clearly bring out the same in his Bid and indicate steps proposed to deal with such obsolescence.	C&I/ Electronics is a fast moving industry. Prediction of the spares availability for lifetime of the plant is not possible during tendering stage. In this regard, NTPC may please amend the referred clause as below: *"Bidder shall try to ensure availability of Spares. In case of phasing out of production of spares parts, a notice of 12 months in advance regarding the same shall be provided to Owner in order to order & stock bulk requirement of spares."*	With reference to clause 3.04.00, Part-B, Sub Section III-C1 of technical specification, it is clarified that lifetime of the plant is envisaged as 15 years for which bidder shall ensure supply of the spare parts. Bidder to comply with the specification.
6.	VI/B	III-C5	18 of 22	8.03.06	All the incoming / outgoing signals shall be grouped as per their origin / destination and will be terminated in the marshalling cabinets (or marshalling cum termination cabinet as the case may be).	Customer is requested to consider Cable termination at marshalling cabinet or any other equivalent methodology being followed by the manufacturer for several projects in the past. Kindly confirm.	Bidder's proposal is not acceptable. Bidder to comply with the specification requirement.

CLARIFICATION NO. 1 TO TECHNICAL SPECIFICATION (SECTION-VI)

7.	VI/A	III-C	10 of 19	3.03.00	CONTINUOUS EMISSION MONITORING SYSTEM (CEMS)	We understand that CEMS is already installed in the projects under Lot 2. NTPC may please review and clarify if ONE more set of CEMS is to be considered by bidder for the projects under LOT 2.	Bidder's understanding is not correct. Continuous Emission Monitoring System (CEMS) as specified under clause 3.03.00, Sub Section IIIC (C&I System), Section-VI, Part-A shall be in the scope of bidder.
8.	General	General	General	General	Flow Meters for high range flow	NTPC may please clarify if DP type of flow meters can be utilized for high flow ranges exceeding 12000 Nm3/Hr for Water/ slurry applications.	Bidder to note that Electromagnetic type flow meter shall be provided for these applications.

CLARIFICATION NO. 1 TO TECHNICAL SPECIFICATION (SECTION-VI)

SL. NO	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC'S CLARIFICATION
	SEC/ PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
9.	VI/A	III-C	2 of 19	1.02.01(F)	Twisted pair with round steel wired armour(SWA),Type A fieldbus cable complying to 61158(detailed specification as per PART-B),SS JBs with IP-66 and accessories for fieldbus based instruments and actuators shall be provided by the contractor under this package.	Sheet Steel JBs with IP65 protection is widely prevalent in use for Profibus. Kindly accept. Cabinet in place of JBs can be used in places where there is wide concentration of signals. NTPC is requested to accept and mention the material and IP clause applicable for Cabinet.	Specification requirements to be complied.
	VI/B	III-C5	2 of 3	1.05.00	SS Junction boxes specially designed for fieldbus application shall be provided on as required basis. These SS JBs shall house field mounted fieldbus components like distributers, tee, etc. These SS JBs shall have suitable cover and gasket and shall have protection class of IP-66 or better. SS Cable glands and blind plugs shall be provided by the Contractor.		

CLARIFICATION NO. 1 TO TECHNICAL SPECIFICATION (SECTION-VI)

10.	VI/A	III-B	2 of 6	1.05.00	VFD system	Kindly specify the VFD application requirement for LOT-2 FGD packages.	Bidder to refer Cl. 1.07.00, III-B, PartA; Cl. 5.01.00 A(iv), I-M1, PartB and Cl 15.00.00(j), I-M5, PartB for the same.
11.	General				Station LAN	We understand that only Interfacing with existing station LAN shall be in bidder's scope. Kindly confirm.	Bidder to refer clause 2.04.00, PART-A, Sub Sec IIIC wherein it is mentioned that contractor's scope shall include "A redundant station-wide LAN for connecting the unitized and common systems of FGD DDCMIS as well for connecting to Employer's Station LAN through firewall".

S. NO.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC'S CLARIFICATION
	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
MECHANICAL							
12	VI/B	I-M6	6 of 41	4.04.00	Dust extraction system Type Venturi scrubber type Location - Belt feeder after crusher -Feeder at crusher house - Limestone Storage Shed - Gypsum Shed	1. Kindly explain the working philosophy of DE system in Gypsum shed which will be open for conveyor and loader entry. 2. For Limestone silo, bag filter type DE system is to be considered.	(1) Bidder to provided DE system for Gypsum shed as per specification. Also refer amendment. (2) For Limestone silo, bag filter type DE system is acceptable.
13	**VI/A**	III-A5	**2 OF4**	2.01.15	Four (4) numbers of metal detectors (min. one no. on each conveyor feeding to crusher house and conveyor feeding to Limestone bunker at FGD plant).	In case of bucket elevator feeding to limestone bunker at FGD plant, MD shall not be applicable. In case of belt conveyor feeding to limestone bunker at FGD plant, MD shall be applicable.	Bidder's understanding is correct.
14	VI/A	III-A5	2 OF4	2.01.16	Four (4) numbers of electronic type belt scales (min. one no. on each conveyor feeding to crusher house and conveyor feeding to Limestone bunker at FGD plant) for continuous weighing,	In case of bucket elevator feeding to limestone bunker at FGD plant, BW shall not be applicable. In case of belt conveyor feeding to limestone bunker at FGD plant, BW shall be applicable.	In case bidder offers silo storage instead of shed storage then weigh belt feeder after crusher shall be provided for feeding the bucket elevator.
15	VI/B	I-M6	2 of 41	3.1.3.	It shall be possible to feed incoming limestone from any one conveyor to vibrating feeder & crusher of other stream.	Whether flap gate is to be provided or any other equipment is applicable. Please clarify.	Flap gate shall be provided to meet the specification requriement.
16	VI/B	V-QM2	4 of 9	1.08.00	Dust Control & Miscellaneous Systems (Dust Suppression & Dry Fog Dust Suppression System)	Dry Fog Dust Suppression System is not applicable. Please confirm.	Bidder's understanding is correct.
17	VI/C	GTR	40 OF 83	28.01.00	Training for Employers O&M Personnel	Whether training is required for LHP & GHP system	Bidder to comply with technical specification.
18	VI/C	GTR	38 OF 83	26.02.00	FGD System shall operate continuously at full load for a period not less than 72 hours.	LHP & GHP will operate intermittently based on feeding requirement	Bidder's understanding is correct.

S. NO.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC'S CLARIFICATION
	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
19	VI/A	III-A5	2 OF 4	2.01.13	Two (2) numbers conventional enclosure type passenger cum goods elevator having capacity of 10 persons (680kg) to serve various floors of lime stone crusher house & junction tower before mill bunker building (if applicable).	In absence of junction tower between crusher house & mill bunker and provision of limestone storage silo/shed between the same whether 2 no elevator is required to be provided or not.	Specification requirement is clear.
20	-	-	-	-	-	Debris chute is not mentioned in specification. Inform if it is to be considered with specification requirement.	Debris chute to be provided for all Transfer point and crusher house.
21	VI/B	I-M6	2 of 41 & 28 of 41	3.1.1 & limestone crusher datasheet	In limestone crusher house, limestone from each incoming Conveyor shall pass through one (1) number of (dedicated) Vibrating Feeder and one (1) number of (dedicated) crusher which shall crush limestone to (-) 20mm size or to suit limestone pulverizer and system. Through vibrating screen feeder (However the crusher shall be designed/sized considering zero passage of limestone through screen).	Two clauses are contradicting. Please clarify whether vibrating feeder or vibrating screening feeder or vibrating grizzly feeder to be considered before crusher in crusher house.	Vibrating feeder is requried. Refer amendment No.1
22	VI/B	I-M6	28 of 41	limestone crusher datasheet	Through vibrating screen feeder (However the crusher hall be designed/sized considering zero passage of limestone through screen).	Bidder request customer to provide seive analysis of limestone for sizing of vibrating screening feeder/ vibrating grizzly feeder.	Seive analysis of limestone is not available at this stage. Bidder to design the equipment as per the available data.
23	VI/B	I-M6	2 of 41	3.1.3.	A passenger cum goods elevator shall be provided in limestone crusher house.	Please specify type of elevator to be considered in limestone crusher house.	Conventional type elevator shall be provided.

S. NO.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC'S CLARIFICATION
	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
24	VI/B	I-M6	6 of 41	4.04.00	Dust extraction system Type Venturi scrubber type Location - Belt feeder after crusher -Feeder at crusher house - Limestone Storage Shed - Gypsum Shed	Bidder has considered dry type DE system in line with NTPC Lot-1A & Lot-1B FGD projects. (as per ammendments issued by NTPC for Lot-1A & 1B.) Please confirm.	Confirmed. Refer also amendment.
25	VI/A	III-A5	2 OF 4	2.01.14	two (2) number of suspended magnets, (one no. on each conveyor feeding to Limestone bunker (in case of covered storage shed)) on conveyors.	In case of bucket elevator feeding limestone to bunker at FGD plant, Bidder will not consider any suspended magnet (SM). Please confirm.	Bidder's understanding is correct.
26	VI/A	III-A5	2 OF 4	2.01.15	Four (4) numbers of metal detectors (min. one no. on each conveyor feed ing to crusher house and conveyor feeding to Limestone bunker at FGD plant).	Bidder will consider 02 numbers metal detectors before crusher house. But, in case of bucket elevator feeding limestone to bunker at FGD plant, Bidder will not consider any metal detectors before bunker feeding. Please confirm.	In case bidder offeres bucket elevetor for feeding to limestone bunker then metal detectors after crusher is not required.
27	VI/A	III-A5	2 OF 4	2.01.16	Four (4) numbers of electronic type belt scales (min. one no. on each conveyor feeding to crusher house and conveyor feeding to Limestone bunker at FGD plant) for continuous weighing,	Bidder will consider 02 numbers belt weigh scales before crusher house. But, in case of bucket elevator feeding limestone to bunker at FGD plant, Bidder will not consider any belt weigh scales before bunker feeding. Please confirm.	In case bidder offers silo storage instead of shed storage then weigh belt feeder after crusher shall be provided for feeding the bucket elevator.

S. NO.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC'S CLARIFICATION
	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
28					Simhadri-I%26II (4X500 MW) II-A2-1-General Layout Plan Sipat-I (3X660 MW) II-A3-1-General Layout Plan Bhilai (2X250 MW) II-A5-1-General Layout Plan Muzaffarpur II-A6-1-GLP Rourkela (1X250 MW) II-A7-1-General Layout Plan TSTPS-I%26II (6X500 MW) II-A1-1-General Layout Plan Vallur (3X500 MW) II-A4-1-General Layout Plan	Bidder request s customer to furnish autocad copy of GLP for FGD, LHP & GHP layout workout.	Bidder to develop the layout as per the pdf drawing of GLP as provided in the tender.
29	VI/A	VII	54 of 82	O)	DUST SUPRESSION, SERVICE WATER, POTABLE WATER, COOLING WATER	Bidder has not considered any dust supression system (dry fog dust suppression & plain water dust suppression) for limestone & gypsum handling system. Please confirm.	Dust extraction system is requried. Refer Amendment.
30	VI/A	VI	19 of 27	5.00.00	AUXILIARY POWER CONSUMPTION	Bidder requests customer to furnish the list of equipments to be considered for auxiliary power consumption cal. for limestone handling & gypsum handling system as the same is not given in spec.	Refer amendment.
31	VI/A	VI	19 of 27	5.00.00	AUXILIARY POWER CONSUMPTION	Bidder requests customer to furnish the duty factor to be considered for auxiliary power consumption cal. for limestone handling & gypsum handling system as the same is not given in spec.	Refer amendment.
32	VI/B	I-M6	2 of 41	3.0.0	SYSTEM DESCRIPTION FDR LIMESTONE & GYPSUM HANDLING SYSTEM	Bidder has not considered any trucks/payloaders/dozers for limestone & gypsum handling system. Please confirm.	Confirmed.

S. NO.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC'S CLARIFICATION
	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
CIVII & STRUCTURAL							
33	PART-B	SUB SEC-IV-D	63 OF 64	41.00.00	Special Provisions for Simhadri and Vallur	Please confirm whether cyclonic factor k4 is applicable for Simhadri and Vallur under Wind load calculations.	Cyclonic factor k4 shall be applicable as per the provisions of IS 875 Part-3 (2015)
34	PART-B	SUB SEC-IV-D	63 OF 64	41.00.00	General Provisions for all projects except Simhadri and Vallur	We understand that cyclonic factor k4 is NOT applicable for all projects under this category.	Cyclonic factor k4 shall be applicable as per the provisions of IS 875 Part-3 (2015)
35	PART-B	SUB SEC-IV-D	3 OF 64	3.01A.00	Limestone storage Silo	Please confirm whether Color coated Metal Side cladding is re-quired for Silo supporting structure or not?	Bidder to provide the same to meet any functional or technical requirement based on bidder's standard practice and experience.
36	PART-B	SUB SEC-IV-D	48 of 64	31.01.00, 31.03.00&41.00.00	All painting shall be provided with painting as given in the specification.Further painting system shall also meet the requirement of corrosivity category C3---- as per IS012944. & Painting of steel surface (other than those embedded in concrete)	We understand that bidder has to follow painting specification for steel structures as specified in clause no. 31.03.00 and same shall meets the requirements of Category requirement C3 of IS012944 . No additional requiremet to be meet.Kindly confirm. However for Simhadri and Vallur we need to folow the C5 norms kindly confirm as mentioned in clause no.41.00.00	BIDDER TO FOLLOW TECHNICAL SPECIFICATION

S. NO.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC'S CLARIFICATION
	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
37	Sec.VI, Part-A	II-A4	2 of 37	1.04.00	Plant water details ii) Sea water quality indicated in Table-4	The analysis is for Sea water quality. Whereas the source of water is CW blow down. Kindly provide us the CW blow down water analysis.	Necessary Amendement is being issued
38	Sec.VI, Part-A	III-A4 VI VI	48 of 88 17 of 27 18 of 27	7.08.00 3-A-2, 8) XVIII, B) XVIII, C)	Design permeate water quality: Turbidity <1NTU, SDI<2 for 100% of time In functional guarantee, SWRO feed water quality is SDI limited to 3 In functional guarantee, UF permeate water quality is SDI shall be limited to 3.	The clauses are contradictory. Kindly accept SDI<=3 similar to NTECL Vallur UF package	Necessary Amendement is being issued
39	Sec.VI, Part-A	III-A4	6 of 88 10 of 88	6.03.00 e) 6.07.00 II)	Two (2) numbers of reactor type clarifiers (both working) of RCC construction eacg if capacity as mentioned in ... Clarifiers 2) Number: 2 3) Design flow: 460cu.m/hr	We presume that the since both the clarifiers are working, each Clarifier capacity is 230cu.m/hr. Kindly confirm.	Bidder to comply the specification requirement .
40	Sec.VI, Part-A	III-A4	22 of 88 55 of 88 48 of 88	7.02.00 d) 7.08.00 4-G) 7.08.00 3-A-2	Two (2) numbers tube settlers/ lamella type clarifiers (both working).... 3) Design flow rate of each Clarifier: 125% of design flow of one filter feed pump (min. 1700cu.m/hr) 2)-b) UF permeate flow (net) Total design flow of all working high pressure feed pumps SWRO Unit) {not less than 1700cu.m/hr}	As per Clause 7.02.00 d), both the clarifiers are working. As per Clause 7.08.00 3 A-2, total UF permeate water requirement is minimum 1700cu.m/hr. However, as per Clause 7.08.00 4-G), each clarifier capacity is 1700cu.m/hr (125%). There is a huge difference between the actual clarified water requirement and the requirement in tender. Hence, kindly confirm whether the Clarifiers are both working (if so capacity of each clarifier) or it is only 1W+1S)	Bidder to comply the specification requirement .
41	Part-E	Drg. 0011-109(2)-POM-A-006	(Sht 5 of 7)		RO 2nd stage brine is sent to brine water storage tank.	RO 2nd stage brine TDS is in range of 2700ppm. This water can be recycled back to UF permeate tank instead of being sent to Brine water tank for disposal. Kindly confirm.	Bidder to comply the specification requirement .
42	Sec.VI, Part-A	III-A4	32 of 88	7.08.00 1-C-3) 7)	6) Maximum Pumps operating speed: 1500rpm	Kindly accept 3000rpm for RO Stage-2 HP pump which can have better efficiency.	Bidder to comply the specification requirement .
43	Vallur Sec.VI, Part-A	SUB-SECTION-III-A4	22 of 88		Terminal point for power supply to Drives in proposed RO plant (CW) in Vallur.	Kindly provide the power feeder details (number of feeders, location & rating (Volt & Amps) for the proposed plant. Kindly indicate the same in SLD. If the same is to be derived / utilised from existing LT MCC (with availabel spare feeders) Kindly provide the rating / Make/Model of LT MCC. In case of New MCC for the proposed plant, Do we need to place our MCC in existing control room or separate control building to be provided. Also we exclude the following from our supply 1) Illumination in existing MCC room 2) Ventilation in existing MCC room	Bidders request shall be considered by NTPC. Use of existing feeders, if found technically feasible by employer shall be included in ammendment to tender SLD.

S. NO.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC'S CLARIFICATION
	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
44	Vallur Sec.VI, Part-A	SUB-SECTION-III-A4	22 of 88		Control system	Kindly provide the details of control system for the proposed plant (PLC/DCS). If the same is to be incorporated in the exisitng control system, Kindly provide the details (make/ Model) of exisiting PLC/DCS. If new control system to be provided and the same to be located in existing control room, we exclude the following from our supply 1) Illumination in existing control room 2) Air conditioning in existing control room	Bidder to refer clause 2.02.01, Part-A, Sub Section IIIC wherein it is mentioned that FGD System comprising of binary and modulating controls of complete Flue gas desulphurization system, material handling systems and other systems being provided under the contract, shall be implemented in the DDCMIS. Accordingly, Absorbersystem/Limestone handling system/Gypsum handling system/Equipment cooling water system/Pre treatment water system/Desalination system and other systems being supplied under this package shall be operated, monitored and controlled form DDCMIS based control system being supplied under this package.
45	Vallur Sec.VI, Part-A	SUB-SECTION-III-A4	22 of 88		Instrument Air supply	For instrument Air & Service air Supply, we will take a tapping from existing Instrument air line. We are not considering separate compressor.	Referred query does not pertain to the referred specification clause and page no. Hence, the query is not clear.
46	Simhadri Sec.VI, Part-A	SUB-SECTION-III-A4	9 of 91		Terminal point for power supply to Drives in proposed RO plant (CW) in Vallur.	Kindly provide the power feeder details (number of feeders, location & rating (Volt & Amps) for the proposed plant. Kindly indicate the same in SLD. If the same is to be derived / utilised from existing LT MCC (with availabel spare feeders) Kindly provide the rating / Make/Model of LT MCC. In case of New MCC for the proposed plant, Do we need to place our MCC in existing control room or separate control building to be provided. Also we exclude the following from our supply 1) Illumination in existing MCC room 2) Ventilation in existing MCC room	Bidders request shall be considered by NTPC. Use of existing feeders, if found technically feasible by employer shall be included in ammendment to tender SLD.
47	Simhadri Sec.VI, Part-A	SUB-SECTION-III-A4	6 of 88		Control system	Kindly provide the details of control system for the proposed plant (PLC/DCS). If the same is to be incorporated in the exisitng control system, Kindly provide the details (make/ Model) of exisiting PLC/DCS. If new control system to be provided and the same to be located in existing control room, we exclude the following from our supply 1) Illumination in existing control room 2) Air conditioning in existing control room	Bidder to refer clause 2.02.01, Part-A, Sub Section IIIC wherein it is mentioned that FGD System comprising of binary and modulating controls of complete Flue gas desulphurization system, material handling systems and other systems being provided under the contract, shall be implemented in the DDCMIS. Accordingly, Absorbersystem/Limestone handling system/Gypsum handling system/Equipment cooling water system/Pre treatment water system/Desalination system and other systems being supplied under this package shall be operated, monitored and controlled form DDCMIS based control system being supplied under this package.

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48	Simhadri Sec.VI, Part-A	SUB-SECTION-III-A4	6 of 88		Instrument Air supply	For instrument Air & Service air Supply, we will take a tapping from existing Instrument air line. We are not considering separate compressor.	Referred query does not pertain to the referred specification clause and page no. Hence, the query is not clear.
49	SECTION-VI / Part-B	SUB-SECTION-I-M1 (FGD)	03 of 52	1.03.08	In case of a power failure all items of equipment (eg. Minimum one agitator in absorber and limestone slurry tank, Process water pump & lube oil system o Booster Fan & Ball Mill) which may cause irreversible damage to the FGD System shall be connected to the emergency power supply system to be provided by the contractor.	Clarification: Stoppage of Process water pumps will not cause any damage to the FGD System. It is not necessary to connect process water pumps to emergency power back up.	Specification requirement shall be considered by the bidder.
50	SECTION-VI / Part-B	SUB-SECTION-I-M1 (FGD)	14 of 52	1.03.08 5.01.00 Sl. no: iv	5.01.00 Sl. no: iv The slurry recirculation pumps shall have motor driven knife gate valve at pump suction and discharge side.	Deviation: Normally in case of recirculation pump area, in case of any pump stoppage the gate needs to quickly close without leakages in the slurry lines. In case of knife gate valves, there may be leakages after few operations due to wearing of components. In such applications, we propose to provide pneumatic operated butterfly valves that are widely provided in FGD plants.	Specification requirement shall be considered by the bidder.
51	SECTION-VI / Part-B	SUB-SECTION-I-M1 (FGD)	15 of 52	5.02.00	The contractor shall offer and demonstrate mixing arrangement such that n-1 number of agitators are sufficient to avoid the slurry settlement in the absorber tank in case of one agitator under breakdown (n-total no. of working agitators).	Deviation: As per our FGD design, under normal FGD operation, the jet Air Sparger (JAS) works to keep the slurry in suspension and no agita-tors are required to be in operation. The Agitators are required only during FGD stoppage to prevent the deposit settlement. For this purpose, we are offering two num-bers of Agitators. However, to meet tender requirement, one spare will be provided as a ware house spare.	Specification requirement shall be considered by the bidder.

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52	SECTION-VI / Part-B	SUB-SECTION-I-M1 (FGD)	17 of 52	5.06.02	The design of flue gas ducts and inlet and outlet hoods of the FGD as well as guide vanes and baffle plates shall ensure a homogeneous flue gas flow with respect to the distributions of: (i) temperature (ii) velocity (iii) dust content (iv) slurry injection and distribution. The above shall be proven by two phase Computa-tional Fluid Dynamics simulations (liquid and gas). The scope of modelling shall include flue gas path inside the absorber vessel including inlet and outlet duct. Homogeneity shall be ensured, if the devia-tion from average is less than +10%. Further, in the Absorber outlet hood no internals such as guide vanes and baffle plates shall be allowed.	Clarification: Customer's requirement "deviation from average: less than ±10%" is too strict and it is not required for the stable operation at the actual plants based on MHPS' experi-ences. The deviation from average is generally 15-20% and MHPS designed and delivered FGD plants based on the deviation from the av-erage for approx. ±15%. Bidder requested to change deviation from "±10%" to "±15-20%".	Specification requirement shall be considered by the bidder.
53	SECTION-VI, PART-B	SUB-SECTION-I-M1	23 of 52	6.05.01	Wet Ball Mill vi). Limestone bond index (kWh/sh.T) : 13 (min)	Clarification: Limestone bond index shall be as : 13 (max) (kWh/sh.T)	Specification requirement shall be considered by the bidder.
54	SECTION-VI / Part-B	SUB-SECTION-I-M1 (FGD)	33 of 52	12.02.00	All the pipes handling slurry shall be provided with replaceable rubber lining of proven quality. The contractor can provide slurry pipes of size lower than 300NB made up of FRP material (Silicon carbide coating on slurry exposed surface) if it has previous experience of providing the same. Outer surface of the pipes should be fire retardant.	Clarification: As per proven practice, all the pipes irre-spective of size (NB) handling slurry shall be provided with FRP material. FRP pipes are highly corrosive & abrasion resistant material and widely used for slurry applica-tion. FRP Pipes that are installed inside ab-sorber shall be provided with Silicon car-bide coating since these pipes are exposed to slurry fall during spraying. But for other areas, such silicon carbide coating is not required.	Specification requirement shall be considered by the bidder.
55	SECTION-VI / Part-B	SUB-SECTION-I-M1 (FGD)	26 of 52	7.04.01 Sl no: c	Vacuum Belt Filters: Gypsum purity : 90 % (minimum)	Clarification: Limestone purity of 89% as $CaCO_3$ is neces-sary to get 90% of Gypsum Purity. So Gyp-sum purity will be guaranteed based on 89 % of Limestone purity as $CaCO_3$.	Specification requirement shall be considered by the bidder.
56	SECTION-VI / Part-B	SUB-SECTION-I-M1 (FGD)	30 of 52	7.08.03	Agitation shall be provided to prevent settlement of slurry by side entry agitators with emergency flush start system. Sufficient number of agitators shall be provided in the tank by the contractor to prevent the solids from settling down.	As per proven FGD practice, the installa-tion height (shaft installation height) of the agitator will be located above the lime-stone/Gypsum accumulation level of the tank. Bidder will offer agitator without emer-gency flushing system Please confirm	Specification requirement shall be considered by the bidder.
57	SECTION-VI / Part-A	SUB-SECTION-V Salient De-sign Data	01 of 21	1.00.00	SIPAT-I 3X660MW: 5. Gas flow at the FGD Inlet when firing respective coal (Nm3/Sec) Design Point: 838 Nm3/Sec (1343 m3/sec) Guarantee Point: 740 Nm3/Sec (1143 m3/sec)	Gas flow provided in specification for SI-PAT 3X660MW is more than the gas flow of 800MW coal fired power plant capaci-ty.Pl Confirm.	Gas flow is considered based on worst coal firing with appropriate leakages. Sizing of FGD system shall be carried out as per the specified parameters.

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58	Part-E (Tender Drawings), Section-VI	-	Scheme of FGD-Absorber System (DRG No: 0011-109(2)-POM-A-001. Rev. No: A.)	Sheet 1 of 3 & Sheet 2 of 3	For Booster Fan Inlet Gate, Booster Fan Outlet Gate & FGD Bypass Damper's Seal Air System (in Sheet 1 & 2 of 3), Temperature Transmitter (TT) and Pressure Transmitter (PT) are shown in the drawing. For FGD Bypass Damper's Seal Air System (only in Sheet 1 of 3), Flow Switch (FS) & Temperature Switch (TS) is additionally shown.	Please note that all these FGD Gates & Dampers do not require any Seal Air Heaters (as per technical specification) for new wet stack arrangement. Temperature Transmitter (TT), Temperature Switch (TS) and Flow Switch (FS) are applicable only when Seal Air Heater is applicable (as in the case of FGD Outlet Gate & FGD Bypass Damper when the FGD treated Flue gas is entering the existing stack). However, for Booster Fan Inlet Gate, Booster Fan Outlet Gate & FGD Bypass Damper - for new wet stack arrangement, seal air heater is not applicable and hence, Temperature Transmitter (TT), Temperature Switch (TS) and Flow Switch (FS) are not applicable. Only Pressure Transmitter (PT) is applicable for these FGD Gates & Dampers.	Bidder's understanding is correct. Necessary Amendement is being issued

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ELECTRICAL							
59	PART B/ SECTION- VI	II-E1	3 of 8	2.02.00	All 11kV, 6.6kV and 3.3kV MV incomers from transformers or ties between switchgears shall be through bus ducts wherever switchgear rating is 1600Amp and above.	Because of layout constraint, connection between existing MV Switchgear & 11/6.6kV FGD Switchgear to be through MV Cables proposed. Please confirm.	Technical specifications are clear and Bidder to comply specification requirement.
60	PART B/ SECTION- VI	II-E4	4 of 6	2.14.04 & 3.01.00 (a)	2.14.00: All cables shall be armoured type. 3.01.00: 1.1 KV grade XLPE power cables shall have compacted aluminium conductor, XLPE insulated, PVC inner-sheathed (as applicable), armoured/ unarmoured, PVC outersheathed conforming to IS:7098. (Part-I).	These two clausses are in contradiction. All cables shall be unarmoured type. Cables shall be armoured type if laid in CHP area, directly buried and FGD Lime Stone and Gypsum Handling area. This is in lne with NTPC LOT-1A and 1B projects.	Bidder to follow clause no:- 2.14.00 of sub section-II/E4 of technical specification. Also Refer amendment for the same
61	PART B/ SECTION- VI	II-E4	4 of 6	4.00.00. (c)	The standard drum length of LT power cable with a maximum tolerance of +/- 5% may be decided by the bidder subject to condition that there shall not be any joint in cable, where application length of cable is up to & including 1000 meter for single core cable excluding 630 sq.mm size, and 750 meter for multicore cable & single core 630 sq.mm.	Standard length for LT cables shall be 500/ 750/1000m, to avoid wastage. Please confirm.	Technical specifications are clear and Bidder to comply with clause no:- 4.00.00.c of sub section-II/E4 of technical specifications
62	PART B/ SECTION- VI	II-E5	3 of 6	2.14.02 & 3.01.00	2.14.02: All cables shall be armoured type. 3.01.00: 1.1 KV Grade Control Cables shall have stranded copper conductor and shall be multicore PVC insulated, PVC inner sheathed, armoured / unarmoured, FRLS PVC outer sheathed conforming to IS: 1554. (Part-I).	All cables shall be unarmoured type. Cables shall be armoured type if laid in CHP area, directly buried and FGD Lime Stone and Gypsum Handling area. This is in lne with NTPC LOT-1A and 1B projects. Please confirm.	Bidder to follow clause no:- 2.14.02 of sub section-II/E5 of technical specification. Also Refer amendment for the same
63	PART B/ SECTION- VI	II-E6	07, 10 of 23	3.08.01 & 4.04.04	Trefoil clamps shall have adequate mechanical strength, when installed at 1 mtr intervals, & Single core cable in trefoil formation shall be laid with a distance of four times the diameter of cable between trefoil center lines and clamped at every two metre.	There is a contradiction in the specification. We are considering that the trefoils shall be clamped at every 2 meters. Please confirm.	Bidder to follow clause no:- 3.08.01 of sub section-II/E6 of technical specification. Also Refer amendment
64	PART B/ SECTION- VI	II-E6	13 OF 23	5.01.00	Earthing System: Earthing system network/earthmat shall be interconnected mesh of mild steel rods buried in ground in the plant.	Ring electrode type grounding system is envisaged using mild steel rod material for limiting the ground resistance below 1 ohms, which will be connected to main plant ground grid mesh at two points. Hence, ground grid mesh for FGD area not considered. Please confirm.	Technical specifications are clear and Bidder to comply with clause no:- 5.01.00 of sub section-II/E6 of technical specifications

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65	PART B-II/ SECTION- VI	II-E7	4 of 7	2.16.04	All Cables shall be armoured type.	All HT cables shall be unarmoured type. Cables shall be armoured type if laid in CHP area, directly buried and FGD Lime Stone and Gypsum Handling area. This is in lne with NTPC LOT-1A and 1B projects. Please confirm.	Technical specifications are clear and Bidder to comply with clause no:- 2.16.04 of sub section-II/E7 of technical specifications
66	PART B-II/ SECTION- VI	II-E7	5 OF 7	4.01.03	The standard drum length for HT power cables with a maximum tolerance of +/- 5%, may be decided by the bidder subject to condition that there shall not be any joint in cable, where application length of cable is up to & including 1000 meter for single core cable, and 750 meter for multicore cable.	Standard length for single core and 3 core cable HT power cable shall be 500/750m so as to avoid wastage. Please confirm.	Technical specifications are clear and Bidder to comply with clause no:- 4.01.03 of sub section-II/E7 of technical specifications
67	PART B/ SECTION- VI	II-E15	10 OF 18	4.04.00	Lighting Masts	Number of Lighting Masts is not specified in the specification. Please confirm the minimum number	The same shall be decided during detailed engineering
68	PART C/ SECTION- VI	--	75 OF 83	--	GENERAL TECHNICAL REQUIREMENTS-Public Address system	Requirement of Public Address system is not mentioned anywhere in the specification except in this clause (Applicable code and standards for Public Address System) hence Public Address System is excluded from bidder's scope of supply for FGD area. Please confirm.	Bidder understanding is correct.
HVAC							
69	**SECTION – VI, PART-A**	**SUB-SECTION-V**	**12 OF 21**	**6.02.01 a(ii)**	AHU (with VVVFD): 2 X 100%	VVVFD are required if there are multiple areas within the air conditioned area, and there is intermittent requirement of air conditioning in these areas. However, considering the size and layout of FGD control room there shall not be any intermittent requirement of air conditioning in FGD control room. In view of the above VVVFD have not been envisaged. Please confirm.	Bidder understanding is correct. Bidder to refer relevant amendment in this regard.
70	**SECTION – VI, PART-A**	**SUB-SECTION-V**	**13 OF 21**	**6.02.01 b**	100% standby shall be provided for area served by Cassette / Hi-wall Split/ Ductable split AC/ Package type air conditioners for all other control rooms covered in the scope of this package	As per the standard practice (N+1) configuration is provided for Cassette / Hi-wall Split/ Ductable split AC/ Package type air conditioners, where N is number of working unit, to avoid fouling with other equipment's, facilities within the air conditioned area. Please confirm.	Bidder understanding is correct . Bidder to refer relevant amendment in this regard.

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CRANE & HOISTS							
71	SEC VI, PART-B	I-M1	36 OF 52	14.09.00	Contractor shall provide motorized hoists and trolleys for all items requiring maintenance and weighing 500 kg or more. Items weighing more than 50 kg and required to be replaced for maintenance shall be provided with manual hoists/trolleys with runway beams/supporting structure etc.	Referred clauses are contradictory w.r.t selection of electric or manual hoist. We shall follow clause 9.09.00 of sub-section V/Section VI Part A for selection of electric or manual hoist. Kindly confirm. Further considering the layout constraints, it may not be feasible to provide hoists with trolleys for all equipment/component above 50 kg in the plant. We shall provide two nos. portable chain pulley (2T cap.) blocks to meet general handling re-quirements. Please confirm.	Bidder to comply specification requirement for the respective areas.
	SECTION – VI PART-C		5 OF 83	7.02.00	Lifting devices i.e. hoists and chain pulley jacks ,etc. shall be provided by the contractor for handling of any equipment or any of its part having weight in excess of 500 Kgs during erection and maintenance activities.		
	Section-VI, PART-B	I-M6	5 OF 41	4.03.03	Hoists- Drive (i) More than 2.0 tonne or more than 10.0 m lift or hoists coming out-side the buildings: Motor driven for both travel & lift. (ii) Other hoists including the hoists for handling take-up pulley and take-up weight: Manual for both travel & lift.		
72	SEC VI, PART-B	I-M1	36 OF 52	14.09.00	Access ladders with suitable platform shall also be provided for approach to all motorized hoists/trolleys mounted on their runway beams for the maintenance of hoists/trolleys.	Considering the layout & space constraints, it may not be feasible to provide all electric hoists with maintenance / repair platforms with handrails. Hence maintenance platform shall be provided depending upon feasibility.Please confirm.	NTPC clarified that the requirements stipulated in the specification shall be followed. Any layout specific issue shall be discussed and resolved during detailed engineering.
73	Section-VI, PART-A	Sub-Section-VII	-	-	MANDATORY SPARES:	No spares are mentioned for chain pulley blocks. Accordingly no mandatory spares shall be provided for chain pulley blocks. Please confirm.	NTPC clarified that scope as provided in the specification shall only be considered by the bidder.
74	SEC VI, PART-B	I-M5	151 OF 152	20.02.29	The control panel shall be wall mounted type and easily approachable from floor by a standing man.	The requirement is for ease of operation which is done by providing push button station at operable height. Control panels for electric hoists shall be hoist mounted. Wall mounted electric hoist will have festoon wire arrangement for power feeding which will form wire loop at one end of the travel resulting in lesser hook approach. Also, festoon wire arrangement will have roller type arrangement which requires frequent maintenance. In view of above, control panels will be hoist mounted with shrouded bus bar DSL for power feeding. This is in line with all other earlierexecuted projects by bidders for NTPC.Please confirm.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
75	SECTION – VI, PART-A	SUB-SECTION-VII	PAGE 29 OF 82	D-3) - 5)a	Electrical Items of Crane- Carbon brushes and brush holders for motors	For squirrel cage motors (preferred type for electric hoist) these items are not applicable.Please confirm.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
76	SEC VI, PART-B	SUB-SECTION-I-M5	143 OF 152	20.01.05	Creep speed to be achieved through pony motor and planetary gear box	Creep speed shall be achieved through variable voltage variable frequency drives. (pony motor and planetary gear box is old technology).Please confirm.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .

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77	SEC VI, PART-B	SUB-SECTION-I-M5	144 OF 152	20.01.10	The hoist motors shall be provided with DC electro-magnetic brakes as well as Electro Hydraulic Thrust brakes.Electro -Hydraulic Thrust brakes shall be provided for cross travel & long travel.	Please note that Electro -Hydraulic Thrust brakes are required to be supported on platform, which for single girder cranes is not feasible. Due to space constraint EHT cannot be provided. Hence, for all motions (i.e. hoisting,CT & LT) brakes provided shall be DC electro magnetic type since the same can be directly mounted on motor. Please confirm.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
78	SEC VI, PART-B	SUB-SECTION-I-M5	144 OF 152	20.01.12	A platform shall extend to full length of the crane bridge on both sides of the bridge girder.	End platform is provided for maintenance of cranes. The crane girder is single girder type and provision for full length platform cannot be provided. Accordingly all other accessories mentioned elsewhere over crane bridge platform are also not applicable. Please confirm.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
79	SEC VI, PART-B	SUB-SECTION-I-M5	144 OF 152	20.01.14	The main hook shall be of Ramshorn type conforming to IS: 5749	Ramshorn hook as per IS 5749 is available for capacity 40T and above. For capacity less than 40T, Point hooks with Shank as per IS 15560 shall be used.Please confirm.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
80	SEC VI, PART-B	SUB-SECTION-I-M5	145 OF 152	20.01.15	Hoist motor shall be slip ring	For crane and hoists squirel cage inducation motors (preferred type for electric hoist) shall be used. Please confirm.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
	SECTION – VI PART-B	SUB SECTION-II-E2	2 of 9	3.01.00 (c)	Crane duty motors shall be slip ring/ squirrel cage Induction motor as per the requirement.		
81	SEC VI, PART-B	SUB-SECTION-I-M5	146 OF 152	20.01.18	DSL shall generally be on opposite side of the operator's cabin	Operator cabin is not applicable for single girder crane.Please confirm.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
82	SEC VI, PART-B	SUB-SECTION-I-M5	146 OF 152	20.01.21	The vertical deflection of crane girder shall not exceed 1/800 of the span	As per IS 807 the vertical deflection of the crane shall be 1/750 of the span of the crane (if the span of the cranes is more than 12m), and 1/600 of the span (if the span of the crane is less than 12m).Please confirm.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
83	SEC VI, PART-B	SUB-SECTION-I-M5			General-	For SG EOT Crane, square bar shall be provided as rolled section (as per IS: 3443) for low capacity cranes are not available with manufacturers i.e. SAIL, JINDAL	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
84	SEC VI, PART-B	SUB-SECTION-I-M5	148 OF 152	20.02.03	The complete hoists assembly, wire rope, hook etc. shall be ISI stamped approved	BOI shall be sourced from approved Makes/ BIS approved suppliers.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
85	SEC VI, PART-B	SUB-SECTION-I-M5	149 OF 152	20.02.15	Lifting bar of adequate design ...	Lifting bar design shall be provided and supplied by the respective equipment manufacturer that has to be lifted.Please confirm.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
86	SEC VI, PART-B	SUB-SECTION-I-M5	150 OF 152	20.02.25	The contractor shall terminate two feeders of 415 V AC electrical power supply near one end of the monorail beam at ground level	One no incoming supply to each electric hoist shall be provided by a suitably located feeder, to be decided dur-ing detail engineering. Two feeders are not required.Please confirm.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
87	SEC VI, PART-B	SUB-SECTION-I-M5			General-	Power supply for electric hoists shall be from DSL arrangement.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .

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MSE-POWER CYCLE							
88	VI / A	V salient design data	197 of 324	3.00.00 A	Salient data S no 5 flue gas flow of (288 Nm3/sec) 446 m3/Sec at FGD inlet at guaranteed TMCR 250 MW condition	Please check and confirm the flue gas flow to FGD at TMCR condition. The flue gas flow at TMCR condition is on higher side and may have affect on flue gas velocity, system sizing and SLD (stack liquid discharge) in the exisitng chimney.	Gas flow is considered based on worst coal firing with appropriate leakages. Sizing of FGD system shall be carried out as per the specified parameters.
89	VI / A	V salient design data	197 of 324	3.00.00 A	Salient data S no 5 flue gas flow of 525 m3/Sec at FGD inlet at design VWO condition	Please check and confirm the flue gas flow to FGD at VWO condition. The flow is on higher side (is more than the BMCR flow of boiler) may have affect on flue gas velocity, system sizing and SLD in the exisitng chimney.	Gas flow is considered based on worst coal firing with appropriate leakages. Sizing of FGD system shall be carried out as per the specified parameters.
90	VI / A	III A 1	49 of 324	22.01.00	For Rourkela (1x250 MW) project, booster fan shall be provided only if the existing ID fan is not sufficient to take care of the pressure losses in the FGD system	We understand that Booster fan must be provided to ensure atleast +30 mmwc at chimney inlet to attain positive draft at the chimney duct entry during the FGD operation. Please confirm.	Requirement of booster fan shall be arrived based on the given sizing criteria with at least +40 mmwc at chimney inlet.

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91	Section – VI, PART -A	Sub-Section III-A1	Page 7 of 9	14.00.00	The contractor scope shall also include the provision of FGD Trestle for routing of air & water lines, slurry lines, steam line, waste water, etc. required for the complete process operations.	It is understood that pipe racks need to be constructed in new area for FGD requirement. However, existing pipe racks shall be used for routing pipes related to FGD system wherever need to do so arises.	Bidder to comply with the specification requirement.
CIVIL							
92	A/VI	III-D	1 OF 3	1.05.00	Site levelling shall be done by owner as per the levels specified in GLP in tender document. However, site clearance and minor grading as required is in bidder's scope. For TSTPS there is area marked for FGD which is having slope (i.e. there is grade difference within area). Suitable modification in slope as per bidder's requirement with necessary slope protection measures shall be done by bidder.	Bidder understands that the FGL of the proposed FGD area is RL (+) 218.5 m. Please confirm.	Various finished ground level (FGLs) are there for different blocks as indicated in the GLP.
93	VI/A	III-D	1 OF 3	1.05.00	Site levelling shall be done by owner as per the levels specified in GLP in tender document. However, site clearance and minor grading as required is in bidder's scope. For TSTPS there is area marked for FGD which is having slope (i.e. there is grade difference within area). Suitable modification in slope as per bidder's requirement with necessary slope protection measures shall be done by bidder.	Since leveling and grading of proposed FGD area is in the scope of owner, bidder understands following works are in the scope of the owner: 1. Dismantling of any existing temporay/permanent structures and clearing debris. 2. Slope protection 3.Diversion of any existing facilities/structures, nalla, etc. 4.Stacked materials/equipments etc. if any, located at proposed FGD area shall be cleared by owner. Please confirm.	Blocks marked in the GLP shall be made available as per technical specification.
94	VI/B	IV-D	6 OF 64	3.05.00	**Control building, M. C. C. Buildings** These shall be framed building with R. C. C. roof and floor. For steel framed building roof /floor shall comprise of RCC slab over profiled metal deck sheets (to be used as permanent shuttering only) over structural beams.	For the suject clauses, kindly mention clearly wheather the frame is of Structral steel or RCC. Please clarify. Further, bidder understands that for RCC framed buildings, roof/floor shall be without profile metal deck sheets, using normal removable shuttering. Please confirm.	Type of Building structure (RCC/ Steel), if not specified in the technical Specification shall be decided by the bidder considering the functional requirement, schedule of construction and site constraints (if any).Further, for RCC framed building's roof/floor choice of shuttering shall be decided by the bidder considering the functional requirement, schedule of construction and site constraints (if any)
	VI/B	IV-D	14 OF 64	3.15.00	**Limestone Grinding System Building** This shall be framed building with R. C. C. roof and floor. For steel framed building roof /floor shall comprise of RCC slab over profiled metal deck sheets (to be used as permanent shuttering only) over structural beams.		
	VI/B	IV-D	15 OF 64	3.16.00	**Gypsum Dewatering Building** This shall be framed building with R. C. C. roof and floor. For steel framed building roof /floor shall comprise of RCC slab over profiled metal deck sheets (to be used as permanent shuttering only) over structural beams.		
95	VI/B	IV-D	15 OF 64	4.01.00	The water from the pit shall overflow into contractor's R.C.C drain, which will lead the discharge finally into owner's drain routed alongside the nearby road.	Please provide the co-ordinates and section (geometry and invert level) of owner's existing drains, where the storm water discharge from proposed FGD area shall be connected.	The details shall be provided at detailed engg. stage.

S. NO.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC'S CLARIFICATION
	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
96	VI/B	IV-D	21 OF 64	7.00.00	The floor slabs shall be minimum 150 mm thick (above the top surface (crest) of the metal deck sheet) and shall have minimum 10 dia HYSD reinforcement bars placed at 200 mm center both ways at top and bottom. For floors with metal deck the minimum thickness (150 mm) shall be above the top surface (crest) of the metal deck sheet	Bidder understands that the referred clause is applicable for steel super structured buildings. Please confirm.	Minimum thickness of RCC Floor shall be 150mm for all building types.
97	VI/B	IV-D	25 OF 64	15.00.00	The connection of sewer pipe line for the associated buildings of FGD and Lime and gypsum handling area to nearest owner's sewage network is in bidder's scope.	Please provide the co-ordinates and invert level of owner's existing sewage network, where the sewer pipe line from the proposed FGD area shall be connected.	The details if available shall be provided at detailed engg. stage.
98	VI/B	IV-D	34 OF 64	22.00.00	Bidder shall obtain approval of Civil/Architectural drawings from concerned authorities before taking up the construction work.	Bidder shall obtain approval of Civil / Architectural drawings from customer/customer's consultant before taking up the construction work. Please confirm.	BIDDER TO FOLLOW TECHNICAL SPECIFICATION
99	VI/B	IV-D	46 OF 64	30.05.00	Required plumbing work from Owner's service water terminal point to the service water tank and from tank to the toilet accessories mentioned above.	Please provide the co-ordinates of owner's service water terminal point.	It shall be furnished during detail engineering.
100	VI/B	IV-D	46 OF 64	30.05.00	Required plumbing work from Owner's potable water terminal point to the drinking water tank and from tank up to the water coolers.	Please provide the co-ordinates of owner's potable water terminal point.	Please refer Clause 1.07.00 of Sub-Section-IV of Part-A of technical specifications for location of terminal point of potable water. Exact co-ordinate shall be provided during detail engineering.
101	VI/B	IV-D	49 OF 64	31.06.00	However, Stainless steel handrails shall be provided as specified in General Architectural Specification clause 9.0.0.	The clause no 9.00.00 is applicable for Earthing mat. Please clarify.	BIDDER TO REFER AMMENDMENT
102	A/VI	II-A7	13 OF 29	7.02.03 xv)	High Strain Dynamic Load Test may be carried out for routine load testing of working piles. However, at least two numbers of static routine vertical load tests shall be carried out on pile on which high strain dynamic load test has already been carried out for establishing the correlation between the two tests. In case of discrepancy if any between dynamic and static vertical load tests, then additional static routine vertical load tests shall be conducted as decided by the Engineer and the results of static routine vertical load shall prevail. Number of routine vertical pile load tests as per clause 7.02.03 (ix) shall be total of static routine vertical load test and high strain dynamic load tests.	High strain dynamic load test is not required as static routine load test are being carried out in the piles. Please confirm.	Routine pile load tests to be performed on 0.5% of the total number of piles provided for each diameter/allowable capacity. High Strain dynamic load test may be carried out for routine load testing of working piles. However, at least two numbers of static routine vertical load tests shall be carried out on pile on which high strain dynamic load test has already been carried out for establishing the correlation between the two tests. In case of discrepancy if any between dynamic and static vertical load tests, then additional static routine vertical load tests shall be conducted as decided by the Engineer and the results of static routine vertical load shall prevail. Number of routine vertical pile load tests as per clause 7.02.03 (ix) shall be total of static routine vertical load test and high strain dynamic load tests. In case agency wish to carry out only static routine vertical load test on 0.5% of total number of piles, he may adopt the same.
103	A/VI	II-A7	11 OF 29	7.02.03 i)	Two stage flushing of pile bore shall be ensured by airlift technique duly approved by the employer.	Flushing of pile bore shall be done as per IS 2911 Part-1 Section-2. Please confirm.	Bidder to comply the Technical Specification
104	A/VI	II-A7	17 OF 29	7.07.02.05	Recommendations on foundation system and the net allowable bearing pressure and pile capacity shall be based on the conservative values of Geotechnical investigation data.	Recommendations on foundation system and the net allowable bearing pressure and pile capacity shall be based on the average values of Geotechnical Investigation data. Please confirm.	Bidder to comply the Technical Specification
105	A/VI	II-A7	21 OF 29	ANNEXURE-III b	the maximum allowable bearing pressure shall be as per the approved geotechnical report and shall be limited to the values as furnished in Table-2.	The maximum allowable bearing pressure shall be as per the approved geotechnical report during detailed engineering. Please confirm.	Bidder is required to carry out geotechnical investigation in this area. During detailed engineering, the Allowable Bearing Pressure shall be adopted after approval of geotechnical investigation report. However, the maximum allowable bearing pressure shall be lower of the two values i.e. as per approved geotechnical report and as per the values furnished in Table-2.

S. NO.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC'S CLARIFICATION
	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
106	A/VI	II-A10	21 OF 29	Annexure-III	Soil data and foundation system	Only Bore logs are furnished. Please furnish the following data in addition to bore logs: 1. Electrical Resistivity Test Results. 2. Laboratory test results 3. Chemical analysis of ground water and sub soil	refer ammendment

S. NO.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC'S CLARIFICATION
	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
Compressed Air System							
107	SECTION-VI / PART-B	I-M3 COMPRESSED AIR SYSTEM	1 OF 6	2.02.00	Design and Construction – **For Compressor**	MOC of all components within compressor skid shall be as per OEM standard. The MOC and design of all components outside the skid shall be as per technical specification/NIT. This is being followed in all the projects executed by BIDDER for NTPC and other customers. Pl. accept.	Technical specification is in order . Bidder to comply with Technical specification requirement. However any superior MOC shall also be acceptableas per Manufacturing Standard and Proven Design.
108	SECTION-VI / PART-B	I-M3 COMPRESSED AIR SYSTEM	2 OF 6	4.00.00	Intercooler, Aftercooler & Oil coolers (For Screw)		
109	SECTION-VI / PART-B	I-M3 COMPRESSED AIR SYSTEM	5 OF 6	9.02.01	Each compressor shall be in the control panel to operate either in Base duty (Auto Load-Unload) or Standby duty (Auto On-Off) mode in case of Screw and unload/modulate/energy optimization (Auto Dual Mode) in **case of centrifugal**	Bidder understands that Centrifugal type air compressors are not applicable for such smaller capacity machines. However, bidder request NTPC to furnish the option for reciprocating compressors, being smaller capacity compressors. Please accept.	Bidder understanding is correct that centrifugal type Air Compressor is not applicable. Tye of compressor shall be oil free screw type a sper clause 3.00.00 of Sub section IIIA -2 , section VI.
110	SECTION-VI / PART-B	I-M3 COMPRESSED AIR SYSTEM	5 OF 6	9.01.06	The following indications shall be made available in the control panels for repeating the same in **main plant control system** / panels.	Bidder understands that the required indications shall be made in FGD control room and not in main plant control room. Please confirm.	Bidder's understanding is correct
111	SECTION-VI / PART-A	III-A2 AIR CONDITIONING, VENTILATION SYSTEM & COMPRESSED AIR SYSTEM	3 OF 4	3.00.00(a)	Two numbers (1 W + 1S) oil free, rotary screw type air compressors for Instrument air & service air application for.....	1.) Bidder understands that the common compressor is to be provided for Instrument air & Service application. Pl. confirm. 2.) NTPC to confirm whether the common piping network to be provided for Instrument air and Service air application for plant use or a separate network of Instrument air & Service air to be provided. Pl. confirm.	Bidder's understanding is correct. Bidder to refer Tender drawing of Compressed air system. 00-11-109(2)-POM-A-007
112	SECTION-VI / PART-A	VI FUNCTIONAL GUARANTEES & LIQUIDITY DAMAGES	24 OF 30	xxiii	Total power consumption at motor input terminal at rated duty of air compressor.....	Bidder request NTPC to specify the duty factor for considering the auxiliary power consumption for Compressed air system. As the continuous consumption of compressed air will be much lesser than the rated compressor capacity specified by NTPC. In such case, the compressor will go under unload conditions for a considerable time and thus lower power requirements.	Duty point shall be 1.0 . Bidder to comply with specification requirement.
Chimney							
113	VI PART A	V salient design data	201 of 326	4.01.02	Single-flue chimney shall be provided. The flue gas emission point above the plant grade level shall be minimum 150 meters.	Stack height shall be arrived based on the MOEF & CC Notification dated 28.06.2018. Please accept.	The flue gas emission point above the plant grade level shall be as per the salient design data for the respective projects as indicated in the specification.
	VI PART A	V salient design data	48 of 326	24.00.01	Wet stack of 150 meter height shall be provided with a stack condensate collection system to avoid the carryover of		
Cranes & Hoist							
114	SEC VI, PART-B	I-M1	36 OF 52	14.09.00	Contractor shall provide motorized hoists and trolleys for all items requiring maintenance and weighing 500 kg or more. Items weighing more than 50 kg and required to be replaced for maintenance shall be provided with manual hoists/trolleys with runway beams/supporting structure etc.	Referred clauses are contradictory w.r.t selection of electric or manual hoist. We shall follow clause 9.09.00 of sub-section V/Section VI Part A for selection of electric or manual hoist. Kindly confirm. Further considering the layout constraints, it may not be feasible to provide hoists with trolleys for all equipment/component above 50 kg in the plant. We shall provide two nos. portable chain pulley (2T cap.) blocks to meet general handling requirements.	Bidder to comply specification requirement for the respective areas.

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	SECTION – VI PART-C		5 OF 83	7.02.00	Lifting devices i.e. hoists and chain pulley jacks ,etc. shall be provided by the contractor for handling of any equipment or any of its part having weight in excess of 500 Kgs during erection and maintenance activities.	Please confirm.	
	Section-VI, PART-B	I-M6	5 OF 41	4.03.03	Hoists- Drive (i) More than 2.0 tonne or more than 10.0 m lift or hoists coming out-side the buildings: Motor driven for both travel & lift. (ii) Other hoists including the hoists for handling take-up pulley and take-up weight: Manual for both travel & lift.		
115	SEC VI, PART-B	I-M1	36 OF 52	14.09.00	Access ladders with suitable platform shall also be provided for approach to all motorized hoists/trolleys mounted on their runway beams for the maintenance of hoists/trolleys.	Considering the layout & space constraints, it may not be feasible to provide all electric hoists with maintenance / repair platforms with handrails. Hence maintenance platform shall be provided depending upon feasibility. Please accept.	NTPC clarified that the requirements stipulated in the specification shall be followed. Any layout specific issue shall be discussed and resolved during detailed engineering.
116	Section-VI, PART-A	Sub-Section-VII	-	-	MANDATORY SPARES:	No spares are mentioned for chain pulley blocks. Accordingly, mandatory spares shall be provided for chain pulley blocks. Please confirm.	NTPC clarified that scope as provided in the specification shall only be considered by the bidder.
117	SEC VI, PART-B	I-M5	151 OF 152	20.02.29	The control panel shall be wall mounted type and easily approachable from floor by a standing man.	The requirement is for ease of operation which is done by providing push button station at operable height. Control panels for electric hoists shall be hoist mounted. Wall mounted electric hoist will have festoon wire arrangement for power feeding which will form wire loop at one end of the travel resulting in lesser hook approach. Also, festoon wire arrangement will have roller type arrangement which requires frequent maintenance. In view of above, control panels will be hoist mounted with shrouded bus bar DSL for power feeding. This is in line with all other earlier bidder executed projects for NTPC. please accept.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
118	SECTION – VI, PART-A	SUB-SECTION-VII	PAGE 29 OF 82	D-3) - 5)a	Electrical Items of Crane- Carbon brushes and brush holders for motors	For squirrel cage motors (preferred type for electric hoist) these items are not applicable. please confirm.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
119	SEC VI, PART-B	SUB-SECTION-I-M5	143 OF 152	20.01.05	Creep speed to be achieved through pony motor and planetary gear box	Creep speed shall be achieved through variable voltage variable frequency drives. (pony motor and planetary gear box is old technology) please accept.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
120	SEC VI, PART-B	SUB-SECTION-I-M5	144 OF 152	20.01.10	The hoist motors shall be provided with DC electro-magnetic brakes as well as Electro Hydraulic Thrust brakes. Electro -Hydraulic Thrust brakes shall be provided for cross travel & long travel.	Please note that Electro -Hydraulic Thrust brakes are required to be supported on platform, which for single girder cranes is not feasible. Due to space constraint EHT cannot be provided. Hence, for all motions (i.e. hoisting, CT & LT) brakes provided shall be DC electromagnetic type since the same can be directly mounted on motor. please accept.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
121	SEC VI, PART-B	SUB-SECTION-I-M5	144 OF 152	20.01.12	A platform shall extend to full length of the crane bridge on both sides of the bridge girder.	End platform is provided for maintenance of cranes. The crane girder is single girder type and provision for full length platform cannot be provided. Accordingly, all other accessories mentioned elsewhere over crane bridge platform are also not applicable. please accept.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .

S. NO.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC'S CLARIFICATION
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122	SEC VI, PART-B	SUB-SECTION-I-M5	144 OF 152	20.01.14	The main hook shall be of Ramshorn type conforming to IS: 5749	Ramshorn hook as per IS 5749 is available for capacity 40T and above. For capacity less than 40T, Point hooks with Shank as per IS 15560 shall be used. please accept.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
123	SEC VI, PART-B	SUB-SECTION-I-M5	145 OF 152	20.01.15	Hoist motor shall be slip ring	For crane and hoists squirel cage induction motors (preferred type for electric hoist) shall be used. please accept.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
	SECTION – VI PART-B	SUB SECTION-II-E2	2 of 9	3.01.00 (c)	Crane duty motors shall be slip ring/ squirrel cage Induction motor as per the requirement.		
124	SEC VI, PART-B	SUB-SECTION-I-M5	146 OF 152	20.01.18	DSL shall generally be on opposite side of the operator's cabin	Operator cabin is not applicable for single girder crane. please accept.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
125	SEC VI, PART-B	SUB-SECTION-I-M5	146 OF 152	20.01.21	The vertical deflection of crane girder shall not exceed 1/800 of the span	As per IS 807 the vertical deflection of the crane shall be 1/750 of the span of the crane (if the span of the cranes is more than 12m), and 1/600 of the span (if the span of the crane is less than 12m). please accept.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
126	SEC VI, PART-B	SUB-SECTION-I-M5			General-	For SG EOT Crane, square bar shall be provided as rolled section (as per IS: 3443) for low capacity cranes are not available with manufacturers i.e. SAIL, JINDAL please accept.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
127	SEC VI, PART-B	SUB-SECTION-I-M5	148 OF 152	20.02.03	The complete hoists assembly, wire rope, hook etc. shall be ISI stamped approved	BOI shall be sourced from approved Makes/ BIS approved suppliers. please accept.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
128	SEC VI, PART-B	SUB-SECTION-I-M5	149 OF 152	20.02.15	Lifting bar of adequate design ...	Lifting bar design shall be provided and supplied by the respective equipment manufacturer that has to be lifted. please accept.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
129	SEC VI, PART-B	SUB-SECTION-I-M5	150 OF 152	20.02.25	The contractor shall terminate two feeders of 415 V AC electrical power supply near one end of the monorail beam at ground level	One no incoming supply to each electric hoist shall be provided by a suitably located feeder, to be decided during detail engineering. Hence, Two feeders are not required please accept.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
130	SEC VI, PART-B	SUB-SECTION-I-M5			General-	Power supply for electric hoists shall be from DSL arrangement. please accept.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
HVAC							
131	**SECTION – VI, PART-A**	**SUB-SECTION-V**	**12 OF 21**	**6.02.01 a(ii)**	AHU (with VVVFD): 2 X 100%	VVVFD are required if there are multiple areas within the air conditioned area, and there is intermittent requirement of air conditioning in these areas. However, considering the size and layout of FGD control room there shall not be any intermittent requirement of air conditioning in FGD control room. In view of the above VVVFD have not been envisaged. Please confirm.	Bidder understanding is correct . Bidder to refer relevant amendment in this regard.

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	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
132	**SECTION – VI, PART-A**	**SUB-SECTION-V**	**13 OF 21**	**6.02.01 b**	100% standby shall be provided for area served by Cassette / Hi-wall Split/ Ductable split AC/ Package type air conditioners for all other control rooms covered in the scope of this package	As per the standard practice (N+1) configuration is provided for Cassette / Hi-wall Split/ Ductable split AC/ Package type air conditioners, where N is number of working unit, to avoid fouling with other equipment's, facilities within the air conditioned area. NTPC is requested to accept the same.	Bidder understanding is correct . Bidder to refer relevant amendment in this regard.
ELEC							
133	PART B/ SECTION- VI	II-E1	3 of 8	2.02.00	All 11kV, 6.6kV and 3.3kV MV incomers from transformers or ties between switchgears shall be through bus ducts wherever switchgear rating is 1600Amp and above.	Because of layout constraint, we recommend connection between existing MV Switchgear & 11/6.6/ 3.3kV FGD Switchgear to be through MV Cable. Please confirm	Technical specifications are clear and Bidder to comply specification requirement.
134	PART B/ SECTION- VI	II-E4	4 of 6	2.14.04 & 3.01.00 (a)	2.14.00: All cables shall be armoured type. 3.01.00: 1.1 KV grade XLPE power cables shall have compacted aluminium conductor, XLPE insulated, PVC inner-sheathed (as applicable), armoured/ unarmoured, PVC outersheathed conforming to IS:7098. (Part-I).	These two clausses are in contradiction. All cables shall be unarmoured type. Cables shall be armoured type if laid in CHP area, directly buried and FGD Lime Stone and Gypsum Handling area. This is in lne with NTPC LOT-1A and 1B projects. Please confirm	Bidder to follow clause no:- 2.14.00 of sub section-II/E4 of technical specification. Also Refer amendment for the same
135	PART B/ SECTION- VI	II-E4	4 of 6	4.00.00. (c)	The standard drum length of LT power cable with a maximum tolerance of +/- 5% may be decided by the bidder subject to condition that there shall not be any joint in cable, where application length of cable is up to & including 1000 meter for single core cable excluding 630 sq.mm size, and 750 meter for multicore cable & single core 630 sq.mm.	Standard length for LT cables shall be 500/ 750/1000m, to avoid wastage. Please confirm	Technical specifications are clear and Bidder to comply with clause no:- 4.00.00.c of sub section-II/E4 of technical specifications
136	PART B/ SECTION- VI	II-E5	3 of 6	2.14.02 & 3.01.00	2.14.02: All cables shall be armoured type. 3.01.00: 1.1 KV Grade Control Cables shall have stranded copper conductor and shall be multicore PVC insulated, PVC inner sheathed, armoured / unarmoured, FRLS PVC outer sheathed conforming to IS: 1554. (Part-I).	All cables shall be unarmoured type. Cables shall be armoured type if laid in CHP area, directly buried and FGD Lime Stone and Gypsum Handling area. This is in lne with NTPC LOT-1A and 1B projects. Please confirm.	Bidder to follow clause no:- 2.14.02 of sub section-II/E5 of technical specification. Also Refer amendment for the same
137	PART B/ SECTION- VI	II-E6	07, 10 of 23	3.08.01 & 4.04.04	Trefoil clamps shall have adequate mechanical strength, when installed at 1 mtr intervals, & Single core cable in trefoil formation shall be laid with a distance of four times the diameter of cable between trefoil center lines and clamped at every two metre.	There is a contradiction in the specification. We are considering that the trefoils shall be clamped at every 2 meters. Please confirm.	Bidder to follow clause no:- 3.08.01 of sub section-II/E6 of technical specification. Also Refer amendment
138	PART B/ SECTION- VI	II-E6	13 OF 23	5.01.00	Earthing System: Earthing system network/earthmat shall be interconnected mesh of mild steel rods buried in ground in the plant.	Ring electrode type grounding system is envisaged using mild steel rod material for limiting the ground resistance below 1 ohms, which will be connected to main plant ground grid mesh at two points. Hence, ground grid mesh for FGD area not considered. Please confirm.	Technical specifications are clear and Bidder to comply with clause no:- 5.01.00 of sub section-II/E6 of technical specifications
139	PART B-II/ SECTION- VI	II-E7	4 of 7	2.16.04	All Cables shall be armoured type.	All HT cables shall be unarmoured type. Cables shall be armoured type if laid in CHP area, directly buried and FGD Lime Stone and Gypsum Handling area. This is in lne with NTPC LOT-1A and 1B projects. Please confirm	Technical specifications are clear and Bidder to comply with clause no:- 2.16.04 of sub section-II/E7 of technical specifications

S. NO.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC'S CLARIFICATION
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140	PART B-II/ SECTION- VI	II-E7	5 OF 7	4.01.03	The standard drum length for HT power cables with a maximum tolerance of +/- 5%, may be decided by the bidder subject to condition that there shall not be any joint in cable, where application length of cable is up to & including 1000 meter for single core cable, and 750 meter for multicore cable.	Standard length for single core and 3 core cable HT power cable shall be 500/750m so as to avoid wastage. Please confirm.	Technical specifications are clear and Bidder to comply with clause no:- 4.01.03 of sub section-II/E7 of technical specifications
141	PART B/ SECTION- VI	II-E15	10 OF 18	4.04.00	Lighting Masts	Number of Lighting Masts is not specified in the specification. Please confirm the minimum number	The same shall be decided during detailed engineering
142	PART C/ SECTION- VI	--	75 OF 83	--	GENERAL TECHNICAL REQUIREMENTS-Public Address system	Requirement of Public Address system is not mentioned anywhere in the specification except in this clause (Applicable code and standards for Public Address System) hence Public Address System is excluded from bidder's scope of supply for FGD area. Please confirm.	Bidder's understanding is correct.
CIVIL							
143	VI/A	III-D	1 OF 3	1.05.00	Site levelling shall be done by owner as per the levels specified in GLP in tender document. However, site clearance and minor grading as required is in bidder's scope. For TSTPS there is area marked for FGD which is having slope (i.e. there is grade difference within area). Suitable modification in slope as per bidder's requirement with necessary slope protection measures shall be done by bidder.	Bidder understands that the FGL of the proposed FGD area is RL (+) 294.00 m. Please confirm. Also during detailed engineering (if necessary) only micro grading up to a maximum depth of 0.30m below FGL will be done by bidder. Please confirm.	Various finished ground level (FGLs) are there for different blocks as indicated in the GLP.
144	VI/A	III-D	1 OF 3	1.05.00	Site levelling shall be done by owner as per the levels specified in GLP in tender document. However, site clearance and minor grading as required is in bidder's scope. For TSTPS there is area marked for FGD which is having slope (i.e. there is grade difference within area). Suitable modification in slope as per bidder's requirement with necessary slope protection measures shall be done by bidder.	Since leveling and grading of proposed FGD area is in the scope of owner, bidder understands following works are in the scope of the owner: 1. Dismantling of any existing temporary/permanent structures and clearing debris. 2. Slope protection 3.Diversion of any existing facilities/structures, nalla, etc. 4.Stacked materials/equipments etc. if any, located at proposed FGD area shall be cleared by owner. Please confirm.	Blocks marked in the GLP shall be made available as per technical specification.
	VI/B	IV-D	6 OF 64	3.05.00	**Control building, M. C. C. Buildings** These shall be framed building with R. C. C. roof and floor. For steel framed building roof /floor shall comprise of RCC slab over profiled metal deck sheets (to be used as permanent shuttering only) over structural beams.		Type of Building structure (RCC/ Steel), if not specified in the technical

S. NO.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC'S CLARIFICATION
	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
145	VI/B	IV-D	14 OF 64	3.15.00	**Limestone Grinding System Building** This shall be framed building with R. C. C. roof and floor. For steel framed building roof /floor shall comprise of RCC slab over profiled metal deck sheets (to be used as permanent shuttering only) over structural beams.	For the suject clauses, kindly mention whether the frame is of Structural steel or RCC. Please clarify. Further, bidder understands that for RCC framed buildings, roof/floor shall be without profile metal deck sheets, using normal removable shuttering. Please confirm.	Specification shall be decided by the bidder considering the functional requirement, schedule of construction and site constraints (if any).Further, for RCC framed building's roof/floor choice of shuttering shall be decided by the bidder considering the functional requirement, schedule of construction and site constraints (if any)
	VI/B	IV-D	15 OF 64	3.16.00	**Gypsum Dewatering Building** This shall be framed building with R. C. C. roof and floor. For steel framed building roof /floor shall comprise of RCC slab over profiled metal deck sheets (to be used as permanent shuttering only) over structural beams.		
146	VI/B	IV-D	15 OF 64	4.01.00	The water from the pit shall overflow into contractor's R.C.C drain, which will lead the discharge finally into owner's drain routed alongside the nearby road.	Please provide the co-ordinates and section (geometry and invert level) of owner's existing drains, where the storm water discharge from proposed FGD area shall be connected.	The details if available shall be provided at detailed engg. stage.
147	VI/B	IV-D	21 OF 64	7.00.00	The floor slabs shall be minimum 150 mm thick (above the top surface (crest) of the metal deck sheet) and shall have minimum 10 dia HYSD reinforcement bars placed at 200 mm center both ways at top and bottom. For floors with metal deck the minimum thickness (150 mm) shall be above the top surface (crest) of the metal deck sheet	Bidder understands that the referred clause is applicable for steel super structured buildings. Please confirm.	Minimum thickness of RCC Floor shall be 150mm for all buiilding types.
148	VI/B	IV-D	25 OF 64	15.00.00	The connection of sewer pipe line for the associated buildings of FGD and Lime and gypsum handling area to nearest owner's sewage network is in bidder's scope.	Please provide the co-ordinates and invert level of owner's existing sewage network, where the sewer pipe line from the proposed FGD area shall be connected.	The details if available shall be provided at detailed engg. stage.
149	VI/B	IV-D	34 OF 64	22.00.00	Bidder shall obtain approval of Civil/Architectural drawings from concerned authorities before taking up the construction work.	Bidder shall obtain approval of Civil / Architectural drawings from customer/customer's consultant before taking up the construction work. Please confirm.	BIDDER TO FOLLOW TECHNICAL SPECIFICATION
150	VI/B	IV-D	46 OF 64	30.05.00	Required plumbing work from Owner's service water terminal point to the service water tank and from tank to the toilet accessories mentioned above.	Please provide the co-ordinates of owner's service water terminal point.	It shall be furnished during detail engineering.
151	VI/B	IV-D	46 OF 64	30.05.00	Required plumbing work from Owner's potable water terminal point to the drinking water tank and from tank up to the water coolers.	Please provide the co-ordinates of owner's potable water terminal point.	Please refer Clause 1.07.00 of Sub-Section-IV of Part-A of technical specifications for location of terminal point of potable water. Exact co-ordinate shall be provided during detail engineering.
152	VI/B	IV-D	49 OF 64	31.06.00	However, Stainless steel handrails shall be provided as specified in General Architectural Specification clause 9.0.0.	The clause no 9.00.00 is applicable for Earthing mat. Please clarify.	BIDDER TO refer ammendment

S. NO.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC'S CLARIFICATION
	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
153	VI/A	II-A5	11 OF 30	7.02.03 i)	Two stage flushing of pile bore shall be ensured by airlift technique duly approved by the employer.	Flushing of pile bore shall be done as per IS 2911 Part-1 Section-2. Please confirm.	Bidder to comply the Technical Specification
154	VI/A	II-A5	13 OF 30	7.02.03 xv)	High Strain Dynamic Load Test may be carried out for routine load testing of working piles. However, at least two numbers of static routine vertical load tests shall be carried out on pile on which high strain dynamic load test has already been carried out for establishing the correlation between the two tests. In case of discrepancy if any between dynamic and static vertical load tests, then additional static routine vertical load tests shall be conducted as decided by the Engineer and the results of static routine vertical load shall prevail. Number of routine vertical pile load tests as per clause 7.02.03 (ix) shall be total of static routine vertical load test and high strain dynamic load tests.	High strain dynamic load test is not required as static routine load test are being carried out in the piles. Please confirm.	Routine pile load tests to be performed on 0.5% of the total number of piles provided for each diameter/allowable capacity. High Strain dynamic load test may be carried out for routine load testing of working piles. However, at least two numbers of static routine vertical load tests shall be carried out on pile on which high strain dynamic load test has already been carried out for establishing the correlation between the two tests. In case of discrepancy if any between dynamic and static vertical load tests, then additional static routine vertical load tests shall be conducted as decided by the Engineer and the results of static routine vertical load shall prevail. Number of routine vertical pile load tests as per clause 7.02.03 (ix) shall be total of static routine vertical load test and high strain dynamic load tests. In case agency wish to carry out only static routine vertical load test on 0.5% of total number of piles, he may adopt the same.
155	VI/A	II-A5	16 OF 30	7.07.02.05	Recommendations on foundation system and the net allowable bearing pressure and pile capacity shall be based on the conservative values of Geotechnical investigation data.	Recommendations on foundation system and the net allowable bearing pressure and pile capacity shall be based on the average values of Geotechnical Investigation data. Please confirm.	Bidder to comply the Technical Specification
156	VI/A	II-A5	20 OF 30	ANNEXURE-III b	The maximum allowable bearing pressure shall be as per the approved geotechnical report and shall be limited to the values as furnished in Table-2.	The maximum allowable bearing pressure shall be as per the approved geotechnical report during detailed engineering. Please confirm.	Bidder is required to carry out geotechnical investigation in this area. During detailed engineering, the Allowable Bearing Pressure shall be adopted after approval of geotechnical investigation report. However, the maximum allowable bearing pressure shall be lower of the two values i.e. as per approved geotechnical report and as per the values furnished in Table-2.
157	VI/A	II-A5	20 OF 30	Annexure-III	Soil data and foundation system	Only Bore logs are furnished. Please furnish the following data in addition to bore logs: 1. Electrical Resistivity Test Results. 2. Laboratory test results 3. Chemical analysis of ground water and sub soil	refer ammendment
158	VI/A	II-A5	22 TO 24 OF 30	Annexure-IV	Co-ordinates of Bore Holes are given in X and Y.	Bidders understand that the Y represents to East direction and X represents the Noth direction. Please confirm. Also BH-31 is approx 400m away from FGD area and BH-33 is given two times, please furnish the Bore holes of FGD area.	Bidders understanding regarding co-ordinate system is correct. Further, Available Borelog have already furnished in the tender document.
159	VI/B	IV-D	9 OF 64	3.14.00	Chimney	Bidder understands that the subject Chimney will not be operated under bypass mode. Please confirm.	Please refer tender drawings in this regard.

S. NO.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC'S CLARIFICATION
	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
160	VI/B	IV-D	14 OF 64	3.14.09 (V)	The entire external surface of chimney shell shall be painted with epoxy phenolic coating as specified in **(iv)** above in alternate bands of 'signal red' and 'bright white' colours.	Bidder understands that the entire external surface of chimney shell shall be painted with epoxy phenolic coating as specified in **(iii)** above in alternate bands of 'signal red' and 'bright white' colours. Please confirm.	BIDDER UNDERSTANDING IS CORRECT
161	VI/A	V	Page 9 of 21	4.01.04	Alternatively, Contractor can also provide chimney of 8 mm thick (minimum) mild steel with Borosilicate Glass Block Lining of minimum 38 mm thickness,.....	Please provide the detailed specification for Borosilicate Glass Block lining system, including material specification for borosilicate blocks, adhesive, erection procedure etc.	Borosilicate glass block lining shall be provided which should have been in successful operation for similar application in at least two (2) units, located at different locations, for a period not less than two (2) years as on the date of Techno-Commercial bid opening as per the requirement of this clause.
162	VI/A	V	Page 9 of 21	4.01.04	Transition duct inside the chimney and chimney flue liner shall be painted with corrosion resistant paint for Borosilicate Lining and insulated for Titanium/C276 cladding irrespective of surface temperature.	Bidder understands that: 1. If liner material is Titanium/C276 cladding, then there will insulation on outside surface of the liners and consequently there will be **no** corrosion protection paint on external surface of liners. 2. If liner material is Borosilicate lining system, then there will **no** insulation outside the liner and consequently there will be corrosion protection paint on external surface of liners. Please confirm.	Bidders understanding is correct.
163	VI/A	V	Page 9 of 21	4.01.05	The top flue liner above the roof slab shall be made of solid C276 (ASTM B575, UNS N10276) / Titanium (Grade 2 as per ASME SB265) of minimum 10 mm thickness.	1. Inside surface of chimney liner above roof shall be either clad steel (Titanium or C276) or borosilicate lining system as per specification. 2. External surface of chimney flue liner above chimney roof shall be wrapped with 2 mm thick Titanium / C-276 sheet over insulation, for all the cases. Please Confirm.	NTPC clarified that he top flue liner above the roof slab shall be made of solid C276 / Titanium (Grade 2 as per ASME SB265) of minimum 10 mm thickness in all the cases. Also, external surface of chimney flue liner projecting over the chimney roof shall be wrapped with 2 mm thick Titanium / C-276 sheet over insulation, for all the cases.
164	VI/A	V	Page 9 of 21	4.01.06	External surface of chimney flue liner projecting over the chimney roof shall be wrapped with 2mm thick Titanium/C-276 sheet over insulation.		
165	VI/A	V	Page 9 of 21	4.01.05	The minimum length of flue liner projecting over the chimney roof shall be atleast equal to diameter of flue liner.	The maximum length projecting above the chimney roof shall be 6m as per standard practice. Please confirm.	NTPC clarified that the minimum length of flue liner projecting over the chimney roof shall be atleast equal to diameter of flue liner as per requirement.
166	VI/A	III-A1	Page 9 of 9	24.00.00	Wet stack condensate collection system	Please provide the detailed material specification for condensate collection system.	NTPC clarified that the specified requirement shall be considered by the bidder.
167	VI/A	III-A1	Page 9 of 9	24.00.02	Drain piping shall be of suitable material from corrosion point of view.	Please provide the detailed material specification for condensate drain pipe.	NTPC clarified that the specified requirement shall be considred by the bidder.
168	VI/A	III-A1	Page 9 of 9	24.00.04	The design of the stack condensate collection system shall be provided by the bidder in its bid.	The design of the stack condensate collection system shall be provided during detailed engineering. Please confirm.	Specification requirement shall be considered by the bidder.
LAYOUT							

S. NO.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC'S CLARIFICATION
	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
169	Section – VI, PART -A	Sub-Section III-A1	Page 7 of 9	14.00.00	The contractor scope shall also include the provision of FGD Trestle for routing of air & water lines, slurry lines, steam line, waste water, etc. required for the complete process operations.	It is understood that pipe racks need to be constructed in new area for FGD requirement. However, existing pipe racks shall be used for routing pipes related to FGD system wherever need to do so arises. Kindly confirm.	Specification requirement shall be considered by the bidder.

S. NO.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC'S CLARIFICATION
	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
CRANES & HOISTS							
170	SEC VI, PART-B	I-M1	36 OF 52	14.09.00	Contractor shall provide motorized hoists and trolleys for all items requiring maintenance and weighing 500 kg or more. Items weighing more than 50 kg and required to be replaced for maintenance shall be provided with manual hoists/trolleys with runway beams/supporting structure etc.	Referred clauses are contradictory w.r.t selection of electric or manual hoist. We shall follow clause 9.09.00 of sub-section V/Section VI Part A for selection of electric or manual hoist. Kindly confirm. Further considering the layout constraints, it may not be feasible to provide hoists with trolleys for all equipment/component above 50 kg in the plant. We shall provide two nos. portable chain pulley (2T cap.) blocks to meet general handling re-quirements. Please confirm	Bidder to comply specification requirement for the respective areas.
	SECTION – VI PART-C			7.02.00	Lifting devices i.e. hoists and chain pulley jacks ,etc. shall be provided by the contractor for handling of any equipment or any of its part having weight in excess of 500 Kgs during erection and maintenance activities.		
	Section-VI, PART-B	I-M6	5 OF 41	4.03.03	Hoists- Drive (i) More than 2.0 tonne or more than 10.0 m lift or hoists coming out-side the buildings: Motor driven for both travel & lift. (ii) Other hoists including the hoists for handling take-up pulley and take-up weight: Manual for both travel & lift.		
171	SEC VI, PART-B	I-M1	36 OF 52	14.09.00	Access ladders with suitable platform shall also be provided for approach to all motorized hoists/trolleys mounted on their runway beams for the maintenance of hoists/trolleys.	Considering the layout & space constraints, it may not be feasible to provide all electric hoists with maintenance / repair platforms with handrails. Hence maintenance platform shall be provided depending upon feasibility. Please confirm	NTPC clarified that the requirements stipulated in the specification shall be followed. Any layout specific issue shall be discussed and resolved during detailed engineering.
172	Section-VI, PART-A	Sub-Section-VII	-	-	MANDATORY SPARES:	No spares are mentioned for chain pulley blocks. Accordingly no mandatory spares shall be provided for chain pulley blocks. Please confirm.	NTPC clarified that scope as provided in the specification shall only be considered by the bidder.

S. NO.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC'S CLARIFICATION
	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
173	SEC VI, PART-B	I-M5	151 OF 152	20.02.29	The control panel shall be wall mounted type and easily approachable from floor by a standing man.	The requirement is for ease of operation which is done by providing push button station at operable height. Control panels for electric hoists shall be hoist mounted. Wall mounted electric hoist will have festoon wire arrangement for power feeding which will form wire loop at one end of the travel resulting in lesser hook approach. Also, festoon wire arrangement will have roller type arrangement which requires frequent maintenance. In view of above, control panels will be hoist mounted with shrouded bus bar DSL for power feeding. This is in line with all other earlier Bidder's executed projects for NTPC. Please confirm.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
174	SECTION – VI, PART-A	SUB-SECTION-VII	PAGE 29 OF 82	D-3) - 5)a	Electrical Items of Crane- Carbon brushes and brush holders for motors	For squirrel cage motors (preferred type for electric hoist) these items are not applicable. Please confirm.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
175	SEC VI, PART-B	SUB-SECTION-I-M5	143 OF 152	20.01.05	Creep speed to be achieved through pony motor and planetary gear box	Creep speed shall be achieved through variable voltage variable frequency drives. (pony motor and planetary gear box is old technology). Please confirm.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
176	SEC VI, PART-B	SUB-SECTION-I-M5	144 OF 152	20.01.10	The hoist motors shall be provided with DC electro-magnetic brakes as well as Electro Hydraulic Thrust brakes.Electro -Hydraulic Thrust brakes shall be provided for cross travel & long travel.	Please note that Electro -Hydraulic Thrust brakes are required to be supported on platform, which for single girder cranes is not feasible. Due to space constraint EHT cannot be provided. Hence, for all motions (i.e. hoisting,CT & LT) brakes provided shall be DC electro magnetic type since the same can be directly mounted on motor. Please accept.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .

S. NO.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC'S CLARIFICATION
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177	SEC VI, PART-B	SUB-SECTION-I-M5	144 OF 152	20.01.12	A platform shall extend to full length of the crane bridge on both sides of the bridge girder.	End platform is provided for maintenance of cranes. The crane girder is single girder type and provision for full length platform cannot be provided. Accordingly all other accessories mentioned elsewhere over crane bridge platform are also not applicable. Please accept.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
178	SEC VI, PART-B	SUB-SECTION-I-M5	144 OF 152	20.01.14	The main hook shall be of Ramshorn type conforming to IS: 5749	Ramshorn hook as per IS 5749 is available for capacity 40T and above. For capacity less than 40T, Point hooks with Shank as per IS 15560 shall be used. Please confirm.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
179	SEC VI, PART-B	SUB-SECTION-I-M5	145 OF 152	20.01.15	Hoist motor shall be slip ring	For crane and hoists squirel cage inducation motors (preferred type for electric hoist) shall be used. Please confirm.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
	SECTION – VI PART-B	SUB SECTION-II-E2	2 of 9	3.01.00 (c)	Crane duty motors shall be slip ring/ squirrel cage Induction motor as per the requirement.		
180	SEC VI, PART-B	SUB-SECTION-I-M5	146 OF 152	20.01.18	DSL shall generally be on opposite side of the operator's cabin	Operator cabin is not applicable for single girder crane. Please confirm.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
181	SEC VI, PART-B	SUB-SECTION-I-M5	146 OF 152	20.01.21	The vertical deflection of crane girder shall not exceed 1/800 of the span	As per IS 807 the vertical deflection of the crane shall be 1/750 of the span of the crane (if the span of the cranes is more than 12m), and 1/600 of the span (if the span of the crane is less than 12m). Please confirm.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
182	SEC VI, PART-B	SUB-SECTION-I-M5			General-	For SG EOT Crane, square bar shall be provided as rolled section (as per IS: 3443) for low capacity cranes are not available with manufacturers i.e. SAIL, JINDAL	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
183	SEC VI, PART-B	SUB-SECTION-I-M5	148 OF 152	20.02.03	The complete hoists assembly, wire rope, hook etc. shall be ISI stamped approved	BOI shall be sourced from approved Makes/ BIS approved suppliers. Please confirm.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
184	SEC VI, PART-B	SUB-SECTION-I-M5	149 OF 152	20.02.15	Lifting bar of adequate design ...	Lifting bar design shall be provided and supplied by the respective equipment manufacturer that has to be lifted. Please confirm.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
185	SEC VI, PART-B	SUB-SECTION-I-M5	150 OF 152	20.02.25	The contractor shall terminate two feeders of 415 V AC electrical power supply near one end of the monorail beam at ground level	One no incoming supply to each electric hoist shall be provided by a suitably located feeder, to be decided during detail engineering. Two feeders are not required. Please confirm.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .

S. NO.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC'S CLARIFICATION
	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
186	SEC VI, PART-B	SUB-SECTION-I-M5			General-	Power supply for electric hoists shall be from DSL arrangement. Please confirm.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
HVAC							
187	SECTION – VI, PART-A	SUB-SECTION-V	13 OF 21	6.02.01 a(ii)	AHU (with VVVFD): 2 X 100%	VVVFD are required if there are multiple areas within the air conditioned area, and there is intermittent requirement of air conditioning in these areas. However, considering the size and layout of FGD control room there shall not be any intermittent requirement of air conditioning in FGD control room. In view of the above VVVFD have not been envisaged. Please confirm.	Bidder understanding is correct . Bidder to refer relevant amendment in this regard.
188	SECTION – VI, PART-A	SUB-SECTION-V	13 OF 21	6.02.01 b	100% standby shall be provided for area served by Cassette / Hi-wall Split/ Ductable split AC/ Package type air conditioners for all other control rooms covered in the scope of this package	As per the standard practice (N+1) configuration is provided for Cassette / Hi-wall Split/ Ductable split AC/ Package type air conditioners, where N is number of working unit, to avoid fouling with other equipment's, facilities within the air conditioned area. NTPC is requested to accept the same.	Bidder understanding is correct . Bidder to refer relevant amendment in this regard.
POWER CYCLE							
189	TECHNICAL SPECIFICATION , SECTION – VI, PART-A	SUB-SECTION-IV	1 of 3	1.02.00	One tapping each from the two Flue Gas Duct going towards the existing Chimney (in case of single flue chimney). No load of duct shall be transmitted on the Employers facilities.	As per the clause-1.02.00 it appears that there is option for offering double flue chimney. However, as per the clause-4.01.02, only single flue chimney is to be offered. Please clarify if there is option to offer double flue chimney, in that case, the height of the chimney same may also be intimated.	The flue gas emission point above the plant grade level shall be as per the salient design data for the respective projects as indicated in the specification.
190	TECHNICAL SPECIFICATION SECTION – VI, PART-A	SUB-SECTION-V	PAGE 8 OF 25	4.01.02	Single-flue chimney shall be provided. The flue gas emission point above the plant grade level shall be minimum 150 meters.		

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	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
PIPING LAYOUT							
191	Section – VI, PART -A	Sub-Section III-A1	Page 7 of 9	14.00.00	The contractor scope shall also include the provision of FGD Trestle for routing of air & water lines, slurry lines, steam line, waste water, etc. required for the complete process operations.	Bidder understood that Pipe Racks has to be constructed only in new area for FGD requirement wherever existing Pipe Rack is not available. However, existing pipe rack will be used for routing pipes related to FGD system wherever need to do so arises. Kindly confirm	Bidder to comply with the specification requirement.
CIVIL							
192	VI/B	IV-D	9 OF 64	3.14.00	Chimney	Bidder understands that the subject Chimney will not be operated under bypass mode. Please confirm.	Please refer tender drawings in this regard.
193	VI/B	IV-D	9 OF 64	3.14.00	Chimney	Please provide the material specification for condensate collection system and condensate drain pipe.	NTPC clarified that the specified requirement shall be considred by the bidder.
194	VI/B	IV-D	14 OF 64	3.14.09 (V)	The entire external surface of chimney shell shall be painted with epoxy phenolic coating as specified in (iv) above in alternate bands of 'signal red' and 'bright white' colors.	Bidder understands that the entire external surface of chimney shell shall be painted with epoxy phenolic coating as specified in (iii) above in al-ternate bands of 'signal red' and 'bright white' colors. Please confirm.	Bidder's understanding is correct, amendment shall be issued.
195	VI/A	V	9 of 21	4.01.04	Alternatively, Contractor can also provide chimney of 8 mm thick (minimum) mild steel with Borosilicate Glass Block Lining of minimum 38 mm thickness,.....	Please provide the detailed specification for Borosilicate Glass Block lining system, including material specification for borosilicate blocks, adhesive, erection procedure etc.	Borosilicate glass block lining shall be provided which should have been in successful operation for similar application in at least two (2) units, located at different locations, for a period not less than two (2) years as on the date of Techno-Commercial bid opening as per the requirement of this clause.

S. NO.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC'S CLARIFICATION
	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
196	VI/A	V	9 of 21	4.01.04	Transition duct inside the chimney and chimney flue liner shall be painted with corrosion resistant paint for Borosilicate Lining and insulated for Titanium/C276 cladding irrespective of surface temperature.	Bidder understands that: 1. If liner material is Titanium/C276 cladding, then there will insulation on outside surface of the liners and consequently there will be no corrosion protection paint on external surface of liners. 2. If liner material is Borosilicate lining system, then there will no insulation outside the liner and consequently there will be corrosion protection paint on external surface of liners. Please confirm.	Bidders understanding is correct.
197	VI/A	V	9 of 21	4.01.05	The top flue liner above the roof slab shall be made of solid C276 (ASTM B575, UNS N10276) / Titanium (Grade 2 as per ASME SB265) of minimum 10 mm thickness.	1. Inside surface of chimney liner above roof shall be either clad steel (Titanium or C276) or borosilicate lining system as per specification. 2. External surface of chimney flue liner above chimney roof shall be wrapped with 2 mm thick Titanium / C-276 sheet over insulation, for all the cases. Please Confirm.	NTPC clarified that he top flue liner above the roof slab shall be made of solid C276 / Titanium (Grade 2 as per ASME SB265) of minimum 10 mm thickness in all the cases. Also, external surface of chimney flue liner projecting over the chimney roof shall be wrapped with 2 mm thick Titanium / C-276 sheet over insulation, for all the cases.
198	VI/A	V	9 of 21	4.01.06	External surface of chimney flue liner projecting over the chimney roof shall be wrapped with 2mm thick Titanium/C-276 sheet over insulation.		
199	VI/A	V	9 of 21	4.01.05	The minimum length of flue liner projecting over the chimney roof shall be at least equal to diameter of flue liner.	The maximum length projecting above the chimney roof shall be 6m as per standard practice. Please confirm.	NTPC clarified that the minimum length of flue liner projecting over the chimney roof shall be atleast equal to diameter of flue liner as per requirement.
200	VI/A	III-A1	9 of 9	24.00.00	Wet stack condensate collection system	Please provide the detailed material specification for condensate collection system.	NTPC clarified that the specified requirement shall be considered by the bidder.

S. NO.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC'S CLARIFICATION
	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
201	VI/A	III-A1	9 of 9	24.00.02	Drain piping shall be of suitable material from corrosion point of view.	Please provide the detailed material specification for condensate drain pipe.	NTPC clarified that the specified requirement shall be considered by the bidder.
202	VI/A	III-A1	9 of 9	24.00.04	The design of the stack condensate collection system shall be provided by the bidder in its bid.	The design of the stack condensate collection system shall be provided during detailed engineering. Please confirm.	Specification requirement shall be considered by the bidder.
203	VI/A	V	9 OF 21	4.01.01	A "wet Chimney" shall be installed downstream of Wet Flue Gas Desulfurization (FGD) system by the Contractor...	The location of new Wet Chimney shall be near to Existing Chimney in the space provided clearing foundation interface. The design of Wet Chimney shall be done considering interface factor of existing chimney as determined by wind tunnel study. However, no design check or validation shall be done for existing chimney/structures/buildings. Kindly confirm.	As per technical specification Minimum 150m center to center distance is to be maintaned between existing chimney's & NDCT's and new Wet FGD Chimney, bidder to comply with the provision of technical specification.
204	VI/B	IV-D	21 OF 64	7.00.00	In case Bidder opts for steel superstructure with RCC floors/ roof, the bidder shall necessarily use Troughed permanently colour coated metal decking sheets having minimum thickness of 0.6mm as permanent shuttering...	In case Bidder opts for steel superstructure with RCC floors/roof, kindly specify the cladding system to be adopted (Brick Cladding / Metal Sheet Cladding).	Type of Building cladding, if not specified in the technical Specification shall be decided by the bidder considering the functional requirement, schedule of
205	A/VI	III-D	1 OF 3	1.05.00	Site levelling shall be done by owner as per the levels specified in GLP in tender document. However, site clearance and minor grading as required is in bidder's scope.	Bidder understands that the FGL of the proposed FGD area is RL (+) 85.00 m. Please confirm.	Various finished ground level (FGLs) are there for different blocks as indicated in the GLP.
206	A/VI	III-D	1 OF 3	1.05.00	Site levelling shall be done by owner as per the levels specified in GLP in tender document. However, site clearance and minor grading as required is in bidder's scope. For TSTPS there is area marked for FGD which is having slope (i.e. there is grade difference within area). Suitable modification in slope as per bidder's requirement with necessary slope protection measures shall be done by bidder.	As site levelling shall be done by owner as per the levels specified in GLP in tender document for the proposed FGD areas, therefore any suitable modification in slope along with necessary slope protection measures shall be done by owner. Only site clearance and minor grading as required is in bidder's scope. Kindly confirm.	Blocks marked in the GLP shall be made available as per technical specification.

S. NO.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC'S CLARIFICATION
	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
207	A/VI	II-A1	16 OF 34	7.02.03 xv)	High Strain Dynamic Load Test may be carried out for routine load testing of working piles...	High strain dynamic load test is not required as static routine load test are being carried out in the piles. Please confirm.	Routine pile load tests to be performed on 0.5% of the total number of piles provided for each diameter/allowable capacity. High Strain dynamic load test may be carried out for routine load testing of working piles. However, at least two numbers of static routine vertical load tests shall be carried out on pile on which high strain dynamic load test has already been carried out for establishing the correlation between the two tests. In case of discrepancy if any between dynamic and static vertical load tests, then additional static routine vertical load tests shall be conducted as decided by the Engineer and the results of static routine vertical load shall prevail. Number of routine vertical pile load tests as per clause 7.02.03 (ix) shall be total of static routine vertical load test and high strain dynamic load tests. In case agency wish to carry out only static routine vertical load test on 0.5% of total number of piles, he may adopt the same.
208	A/VI	II-A1	13 OF 34	7.02.03 i)	Two stage flushing of pile bore shall be ensured by airlift technique duly approved by the employer.	Flushing of pile bore shall be done as per IS 2911 Part-1 Section-2. Please confirm.	Bidder to comply the Technical Specification
209	A/VI	II-A1	20 OF 34	7.07.02.05	Recommendations on foundation system and the net allowable bearing pressure and pile capacity shall be based on the conservative values of Geotechnical investigation data.	Recommendations on foundation system and the net allowable bearing pressure and pile capacity shall be based on the average values of Geotechnical Investigation data. Please confirm.	Bidder to comply the Technical Specification
210	A/VI	II-A1	22 OF 34	ANNEXURE-I b)	The maximum allowable bearing pressure shall be as per the approved geotechnical report and shall be limited to the values as furnished in Table-2.	The maximum allowable bearing pressure shall be as per the approved geotechnical report during detailed engineering. Please confirm.	Bidder is required to carry out geotechnical investigation in this area. During detailed engineering, the Allowable Bearing Pressure shall be adopted after approval of geotechnical investigation report. However, the maximum allowable bearing pressure shall be lower of the two values i.e. as per approved geotechnical report and as per the values furnished in Table-2.
211	A/VI	II-A1	-	Annexure-II	Soil data and foundation system	Bore logs furnished are located far away from proposed FGD areas. Please furnish the soil data in and around proposed FGD areas. Please furnish the following data in addition to bore logs: 1.Electrical Resistivity Test Results. 2.Laboratory test results 3.Chemical analysis of ground water and sub soil	Available data has already been furnished
COMPRESSED AIR SYSTEM							

S. NO.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC'S CLARIFICATION
	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
212	SECTION-VI / PART-B	I-M3 COMPRESSED AIR SYSTEM	1 OF 6	2.02.00	Design and Construction – **For Compressor**	MOC of all components within compressor skid shall be as per OEM standard. The MOC and design of all components outside the skid shall be as per technical specification/NIT. This is being followed in all the projects executed by the Bidder for NTPC and other customers. Pl. accept.	Technical specification is in order . Bidder to comply with Technical specification requirement. However any superior MOC shall also be acceptableas per Manufacturing Standard and Proven Design.
213	SECTION-VI / PART-B	I-M3 COMPRESSED AIR SYSTEM	2 OF 6	4.00.00	Intercooler, Aftercooler & Oil coolers (For Screw)		
214	SECTION-VI / PART-B	I-M3 COMPRESSED AIR SYSTEM	5 OF 6	9.02.01	Each compressor shall be in the control panel to operate either in Base duty (Auto Load-Unload) or Standby duty (Auto On-Off) mode in case of Screw and unload/modulate/energy optimization (Auto Dual Mode) in **case of centrifugal**	Bidder understands that Centrifugal type air compressors are not applicable for such smaller capacity machines. However, bidder request NTPC to furnish the option for reciprocating compressors, being smaller capacity compressors. NTPC to confirm.	Bidder understanding is correct that centrifugal type Air Compressor is not applicable. Tye of compressor shall be oil free screw type a sper clause 3.00.00 of Sub section IIIA -2 , section VI.
215	SECTION-VI / PART-B	I-M3 COMPRESSED AIR SYSTEM	5 OF 6	9.01.06	The following indications shall be made available in the control panels for repeating the same in **main plant control system** / panels.	Bidder understands that the required indications shall be made in FGD control room and not in main plant control room. NTPC to confirm.	Bidder's understanding is correct
216	SECTION-VI / PART-A	III-A2 AIR CONDITIONING, VENTILATION SYSTEM & COMPRESSED AIR SYSTEM	3 OF 4	3.00.00(a)	Two numbers (1 W + 1S) oil free, rotary screw type air compressors for Instrument air & service air application for.....	1.) Bidder understands that the common compressor is to be provided for Instrument air & Service application. Pl. confirm. 2.) NTPC to confirm whether the common piping network to be provided for Instrument air and Service air application for plant use or a separate network of Instrument air & Service air to be provided. Pl. confirm.	Bidder's understanding is correct. Bidder to refer Tender drawing of Compressed air system. 00-11-109(2)-POM-A-007
217	SECTION-VI / PART-A	VI FUNCTIONAL GUARANTEES & LIQUIDITY DAMAGES	24 OF 30	xxiii	Total power consumption at motor input terminal at rated duty of air compressor.....	Bidder request NTPC to specify the duty factor for considering the auxiliary power consumption for Compressed air system. As the continuous consumption of compressed air will be much lesser than the rated compressor capacity specified by NTPC. In such case, the compressor will go under unload conditions for a considerable time and thus lower power requirements. We request you to specify duty point for air compressors.	Duty point shall be 1.0 . Bidder to comply with specification requirement.

S. NO.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC'S CLARIFICATION
	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
ELECTRICAL							
218	PART A/ SECTION- VI	IIIB	5 OF 8	1.10.00.2	Cabling: Contractor scope shall include laying of cable from employer board as shown in Electrical Single Line Diagram Drg No. 0011-109-POE-J-001/REV. B on the employers nearest trestle in the FGD area as shown in GLP draiwng of repective plant subject to availability of space and suitability. In case of non-availability of space in employer's trestle, contractor shall make necessary arrangements for cable tray erection & cable laying.	1. We require space for cable in existing cable trays for incoming cables for 11KV FGD SWGR (6 feeders) in existing cable trestle from Swyd control room to FGD area . Kindly provide the space in cable trays for accommodating mentioned cable . 2. Where-ever there is no space in already running customer's trays, additional trays shall be provided by the bidder in the exist-ing cable trestle. Kindly confirm if there is space for approx. 6 number cable trays(600mm wide) in the existing cable trestle from Swyd control room area to FGD area. 3. Runway conductor available in customer's trestle will be utilized for earthing purpose and bidder shall not lay runway conductor in areas where customer's runway conductor is already available. Only tapping from customer's run way conductor to cable trays supplied by bidder shall be in bidder's scope. 4. Pl furnish the exisitng trestle layout along with section view of trestle and occupancy of cable trays for TALCHER.	(1, 2 and 4.)bidder may visit the project in order to get itself acquainted with existing electrical of plant. 3. Bidder can utilize employers run away conductor wherever available.
219	PART B/ SECTION- VI	II-E3	8 OF 9		-	It is assumed that connection shall be through 33kV HT cable.	Bidders understanding is correct
220	PART B/ SECTION- VI	-			-	Pl furnish the protection panel specification.	Please refer Sub Sec-II-E20, Part B for the same

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	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
221	SEC VI, PART-B	I-M1	36 OF 52	14.09.00	Contractor shall provide motorized hoists and trolleys for all items requiring maintenance and weighing 500 kg or more. Items weighing more than 50 kg and required to be replaced for maintenance shall be provided with manual hoists/trolleys with runway beams/supporting structure etc.	Referred clauses are contradictory w.r.t selection of electric or manual hoist. We shall follow clause 9.09.00 of sub-section V/Section VI Part A for selection of electric or manual hoist. Kindly confirm. Further considering the layout constraints, it may not be feasible to provide hoists with trolleys for all equipment/component above 50 kg in the plant. We shall provide two nos. portable chain pulley (2T cap.) blocks to meet general handling re-quirements.	Bidder to comply specification requirement for the respective areas.
	SECTION – VI PART-C		5 OF 83	7.02.00	Lifting devices i.e. hoists and chain pulley jacks ,etc. shall be provided by the contractor for handling of any equipment or any of its part having weight in excess of 500 Kgs during erection and maintenance activities.		
	Section-VI, PART-B	I-M6	5 OF 41	4.03.03	Hoists- Drive (i) More than 2.0 tonne or more than 10.0 m lift or hoists coming out-side the buildings: Motor driven for both travel & lift. (ii) Other hoists including the hoists for handling take-up pulley and take-up weight: Manual for both travel & lift.		
222	SEC VI, PART-B	I-M1	36 OF 52	14.09.00	Access ladders with suitable platform shall also be provided for approach to all motorized hoists/trolleys mounted on their runway beams for the maintenance of hoists/trolleys.	Considering the layout & space constraints, it may not be feasible to provide all electric hoists with maintenance / repair platforms with handrails. Hence maintenance platform shall be provided depending upon feasibility.	NTPC clarified that the requirements stipulated in the specification shall be followed. Any layout specific issue shall be discussed and resolved during detailed engineering.
223	Section-VI, PART-A	Sub-Section-VII	-	-	MANDATORY SPARES:	No spares are mentioned for chain pulley blocks. Accordingly no mandatory spares shall be provided for chain pulley blocks. Please confirm.	NTPC clarified that scope as provided in the specification shall only be considered by the bidder.
224	SEC VI, PART-B	I-M5	151 OF 152	20.02.29	The control panel shall be wall mounted type and easily approachable from floor by a standing man.	The requirement is for ease of operation which is done by providing push button station at operable height. Control panels for electric hoists shall be hoist mounted. Wall mounted electric hoist will have festoon wire arrangement for power feeding which will form wire loop at one end of the travel resulting in lesser hook approach. Also, festoon wire arrangement will have roller type arrangement which requires frequent maintenance. In view of above, control panels will be hoist mounted with shrouded bus bar DSL for power feeding. This is in line with all other earlier Bidder's executed projects for NTPC.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
225	SECTION – VI, PART-A	SUB-SECTION-VII	PAGE 29 OF 82	D-3) - 5)a	Electrical Items of Crane- Carbon brushes and brush holders for motors	For squirrel cage motors (preferred type for electric hoist) these items are not applicable.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .

S. NO.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC'S CLARIFICATION
	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
226	SEC VI, PART-B	SUB-SECTION-I-M5	143 OF 152	20.01.05	Creep speed to be achieved through pony motor and planetary gear box	Creep speed shall be achieved through variable voltage variable frequency drives. (pony motor and planetary gear box is old technology)	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
227	SEC VI, PART-B	SUB-SECTION-I-M5	144 OF 152	20.01.10	The hoist motors shall be provided with DC electro-magnetic brakes as well as Electro Hydraulic Thrust brakes.Electro -Hydraulic Thrust brakes shall be provided for cross travel & long travel.	Please note that Electro -Hydraulic Thrust brakes are required to be supported on platform, which for single girder cranes is not feasible. Due to space constraint EHT cannot be provided. Hence, for all motions (i.e. hoisting,CT & LT) brakes provided shall be DC electro magnetic type since the same can be directly mounted on motor.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
228	SEC VI, PART-B	SUB-SECTION-I-M5	144 OF 152	20.01.12	A platform shall extend to full length of the crane bridge on both sides of the bridge girder.	End platform is provided for maintenance of cranes. The crane girder is single girder type and provision for full length platform cannot be provided. Accordingly all other accessories mentioned elsewhere over crane bridge platform are also not applicable.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
229	SEC VI, PART-B	SUB-SECTION-I-M5	144 OF 152	20.01.14	The main hook shall be of Ramshorn type conforming to IS: 5749	Ramshorn hook as per IS 5749 is available for capacity 40T and above. For capacity less than 40T, Point hooks with Shank as per IS 15560 shall be used.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
230	SEC VI, PART-B	SUB-SECTION-I-M5	145 OF 152	20.01.15	Hoist motor shall be slip ring	For crane and hoists squirel cage inducation motors (preferred type for electric hoist) shall be used.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
	SECTION – VI PART-B	SUB SECTION-II-E2	2 of 9	3.01.00 (c)	Crane duty motors shall be slip ring/ squirrel cage Induction motor as per the requirement.		
231	SEC VI, PART-B	SUB-SECTION-I-M5	146 OF 152	20.01.18	DSL shall generally be on opposite side of the operator's cabin	Operator cabin is not applicable for single girder crane	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .

S. NO.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC'S CLARIFICATION
	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
232	SEC VI, PART-B	SUB-SECTION-I-M5	146 OF 152	20.01.21	The vertical deflection of crane girder shall not exceed 1/800 of the span	As per IS 807 the vertical deflection of the crane shall be 1/750 of the span of the crane (if the span of the cranes is more than 12m), and 1/600 of the span (if the span of the crane is less than 12m).	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
233	SEC VI, PART-B	SUB-SECTION-I-M5			General-	For SG EOT Crane, square bar shall be provided as rolled section (as per IS: 3443) for low capacity cranes are not available with manufacturers i.e. SAIL, JINDAL	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
234	SEC VI, PART-B	SUB-SECTION-I-M5	148 OF 152	20.02.03	The complete hoists assembly, wire rope, hook etc. shall be ISI stamped approved	BOI shall be sourced from approved Makes/ BIS approved suppliers.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
235	SEC VI, PART-B	SUB-SECTION-I-M5	149 OF 152	20.02.15	Lifting bar of adequate design ...	Lifting bar design shall be provided and supplied by the respective equipment manufacturer that has to be lifted.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
236	SEC VI, PART-B	SUB-SECTION-I-M5	150 OF 152	20.02.25	The contractor shall terminate two feeders of 415 V AC electrical power supply near one end of the monorail beam at ground level	One no incoming supply to each electric hoist shall be provided by a suitably located feeder, to be decided dur-ing detail engineering. Two feeders are not required	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
237	SEC VI, PART-B	SUB-SECTION-I-M5			General-	Power supply for electric hoists shall be from DSL arrangement.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
HVAC System							
238	SECTION – VI, PART-A	SUB-SECTION-V	13 OF 21	6.02.01 a(ii)	AHU (with VVVFD): 2 X 100%	VVVFD are required if there are multiple areas within the air conditioned area, and there is intermittent requirement of air conditioning in these areas. However, considering the size and layout of FGD control room there shall not be any intermittent requirement of air conditioning in FGD control room. In view of the above VVVFD have not been envisaged. Please confirm.	Bidder understanding is correct. Bidder to refer relevant amendment in this regard.
239	SECTION – VI, PART-A	SUB-SECTION-V	13 OF 21	6.02.01 b	100% standby shall be provided for area served by Cassette / Hi-wall Split/ Ductable split AC/ Package type air conditioners for all other control rooms covered in the scope of this package	As per the standard practice (N+1) configuration is provided for Cassette / Hi-wall Split/ Ductable split AC/ Package type air conditioners, where N is number of working unit, to avoid fouling with other equipment's, facilities within the air conditioned area. NTPC is requested to accept the same.	Bidder understanding is correct. Bidder to refer relevant amendment in this regard.
CAS(Compressed Air System)							

S. NO.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC'S CLARIFICATION
	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
240	SECTION-VI / PART-B	I-M3 COMPRESSED AIR SYSTEM	1 OF 6	2.02.00	Design and Construction – **For Compressor**	MOC of all components within compressor skid shall be as per OEM standard. The MOC and design of all components outside the skid shall be as per technical specification/NIT. This is being followed in all the projects executed by the Bidder for NTPC and other customers. PI. accept.	Technical specification is in order . Bidder to comply with Technical specification requirement. However any superior MOC shall also be acceptableas per Manufacturing Standard and Proven Design.
241	SECTION-VI / PART-B	I-M3 COMPRESSED AIR SYSTEM	2 OF 6	4.00.00	Intercooler, Aftercooler & Oil coolers (For Screw)		
242	SECTION-VI / PART-B	I-M3 COMPRESSED AIR SYSTEM	5 OF 6	9.02.01	Each compressor shall be in the control panel to operate either in Base duty (Auto Load-Unload) or Standby duty (Auto On-Off) mode in case of Screw and unload/modulate/energy optimization (Auto Dual Mode) in **case of centrifugal**	Bidder understands that Centrifugal type air compressors are not applicable for such smaller capacity machines. However, bidder request NTPC to furnish the option for reciprocating compressors, being smaller capacity compressors. NTPC to confirm.	Bidder understanding is correct that centrifugal type Air Compressor is not applicable. Tye of compressor shall be oil free screw type a sper clause 3.00.00 of Sub section IIIA -2 , section VI.
243	SECTION-VI / PART-B	I-M3 COMPRESSED AIR SYSTEM	5 OF 6	9.01.06	The following indications shall be made available in the control panels for repeating the same in **main plant control system** / panels.	Bidder understands that the required indications shall be made in FGD control room and not in main plant control room. NTPC to confirm.	Bidder's understanding is correct
244	SECTION-VI / PART-A	III-A2 AIR CONDITIONING, VENTILATION SYSTEM & COMPRESSED AIR SYSTEM	3 OF 4	3.00.00(a)	Two numbers (1 W + 1S) oil free, rotary screw type air compressors for Instrument air & service air application for.....	1.) Bidder understands that the common compressor is to be provided for Instrument air & Service application. PI. confirm. 2.) NTPC to confirm whether the common piping network to be provided for Instrument air and Service air application for plant use or a separate network of Instrument air & Service air to be provided. PI. confirm.	Bidder's understanding is correct. Bidder to refer Tender drawing of Compressed air system. 00-11-109(2)-POM-A-007
245	SECTION-VI / PART-A	VI FUNCTIONAL GUARANTEES & LIQUIDITY DAMAGES	Total power consumption at motor input terminal	xxiii	Total power consumption at motor input terminal at rated duty of air compressor.....	Bidder request NTPC to specify the duty factor for considering the auxiliary power consumption for Compressed air system. As the continuous consumption of compressed air will be much lesser than the rated compressor capacity specified by NTPC. In such case, the compressor will go under unload conditions for a considerable time and thus lower power requirements. We request you to specify duty point for air compressors.	Duty point shall be 1.0 . Bidder to comply with specification requirement.
MSE(Water System)							
	VI/A	III-A4	6 of 88	6.03.00, Cl. (h)	One (1) number clarified water storage tank/distribution chamber of RCC constrction of capacity/sizes as mentioned in the data sheet with required isolation valves		

S. NO.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC'S CLARIFICATION
	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
246	VI/B	I-M5	11 of 152	8.02.0201	a) Water from aerator shall flow by gravity upto the clarified water storage tank and Filtered Water sump under various flow rates upto maximum flow. c) Water from aerator shall flow by gravity upto the clarified water storage tank and Filtered Water sump under various flow rates upto maximum flow	We understand that there shall be one common clarified water storage tank of capacity 150 Cum which is common for stage-I & Stage-II FGD tender (2x500 MW + 2X500 MW). Further we understand that no filter water sump shall be applicable as the same is not indicated in tender drgs also. Purpose, capacity, MOC of the filtered water sump, if to be considered, may pl. be informed.	Bidder's understanding is correct.There is a common clarified water storage tank for Simhadri Stage-I(2X500MW) and Stage-II(2X500MW).No filtered water sump is envisaged. Necessary Amendment is being issued
	VI/A	III-A4	11 of 88	6.07.00, III (3)	Size of clarified water storage tank/Distribution chamber shall be 150 Cum. Number of storage tank shall be One.		
247	VI/A	III-A4	7 of 88	6.04.00	The Bidder shall provide common Equipment Cooling water system for all the units with closed circuit cooling.....	We understand that ACW/ECW system is common for all units (i.e for Stage-I + stage-II, total 4X500 MW). Please confirm. If our uderstanding is in order, pump configuration Considering common system for all units (i.e. 100 %), is : 1.) 6 x 25% (4 Working + 2 standby) capacity auxiliary cooling water pumps. 2.) 5 x 25% (4 working + 1 standby) capacity of plate type heat exchangers. 3.) 5 x 25% (4 Working + 1 standby) capacity FGD DM (Primary) cooling water pumps. Pl. Confirm.	Bidders understanding is correct.Necessary Amendment is being issued.
	VI/E	Tender drg: P&ID for ECW system for FGD	-	Tender drg no: 011-109(2)-POM-A-005 (SHT 2 OF 2)	In project title "Simhadari STPP, Stage-II (2X500 MW) is indicated, Stage-I is not indicated. Total DMCW pumps/PHEs are indicated as "total number of units+1 common standby		
	VI/A	III-A4	7 of 88	6.03.00, Cl. k)	6 x 50% (4 Working + 2 standby) capacity auxiliary cooling water pumps, its drives, associated suction pipes from clarified water distribution chamber/tank, isolation valves, pump(s) discharge pipes(CS), non-return valves & isolation valves at the discharge and discharge pipe line to PHE etc.		
	VI/A	III-A4	7 of 88	6.04.00, Cl. c), d)	(c) 5 x 50% (4 working + 1 standby) capacity of plate type heat exchangers. (d) 5 x 50% (4 Working + 1 standby) capacity FGD DM (Primary) cooling water pumps along with drives		
248	VI/E	Tender drg: P&ID for Pre-Treatment Plant (Sheet-1) for Simhadri STPP	-	Tender drg no: 011-109(2)-POM-A-005 (SHT 1 OF 2)	Symbol indicated in raw water pumps/ACW pumps recirculation line.	We understand that the Item symbol indicated in the Raw water pumps/ACW pumps recirculation line just before MO valve is orifice plate (the same is not mentioned in the legend). Pl. Confirm.	Specification is quite clear.Bidder to comply the specification requirement.
249	VI/A,	Terminal points & Exclusion	2 of 3	1.04.00	Process Water:- For process water -----(Simhadri STPP & VallurTPP)	Terminal point of Simhadri Tender(tap off & discharge) may please be specified.	Specification is quite clear.Bidder to take the tap of from the suction header and after treatment the same will be used in the FGD system
MPL							
250	Section – VI, PART -A	Sub-Section III-A1	Page 7 of 9	14.00.00	The contractor scope shall also include the provision of FGD Trestle for routing of air & water lines, slurry lines, steam line, waste water, etc. required for the complete process operations.	Bidder understood that Pipe Racks has to be constructed only in new area for FGD require-ment wherever existing Pipe Rack is not available. However, existing pipe rack will be used for routing pipes related to FGD system wherever need to do so arises. Kindly confirm.	Specification requirement shall be considered by the bidder.
Civil							

S. NO.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC'S CLARIFICATION
	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
251	VI/B	IV-D	9 OF 64	3.14.00	Chimney	Bidder understands that the subject Chimney will not be operated under bypass mode. Please confirm	Please refer tender drawings in this regard.
252	VI/B	IV-D	9 OF 64	3.14.00	Chimney	Please provide the material specification for con-densate collection system and condensate drain pipe.	Specification requirement shall be considered by the bidder.
253	VI/B	IV-D	14 OF 64	3.14.09 (V)	The entire external surface of chimney shell shall be painted with epoxy phenolic coating as specified in (iv) above in alternate bands of 'signal red' and 'bright white' colors.	Bidder understands that the entire external sur-face of chimney shell shall be painted with epoxy phenolic coating as specified in (iii) above in al-ternate bands of 'signal red' and 'bright white' colors. Please confirm.	Bidder's understanding is correct, amendment shall be issued.
254	VI/A	V	9 of 21	4.01.04	Alternatively, Contractor can also provide chimney of 8 mm thick (minimum) mild steel with Borosilicate Glass Block Lining of mini-mum 38 mm thickness,.....	Please provide the detailed specification for Bo-rosilicate Glass Block lining system, including ma-terial specification for borosilicate blocks, adhe-sive, erection procedure etc.	Borosilicate glass block lining shall be provided which should have been in successful operation for similar application in at least two (2) units, located at different locations, for a period not less than two (2) years as on the date of Techno-Commercial bid opening as per the requirement of this clause.
255	VI/A	V	9 of 21	4.01.04	Transition duct inside the chimney and chim-ney flue liner shall be painted with corrosion resistant paint for Borosilicate Lining and insu-lated for Titanium/C276 cladding irrespective of surface temperature.	Bidder understands that: 1. If liner material is Titanium/C276 cladding, then there will insulation on outside surface of the liners and consequently there will be no corro-sion protection paint on external surface of lin-ers. 2. If liner material is Borosilicate lining system, then there will no insulation outside the liner and consequently there will be corrosion protection paint on external surface of liners. Please confirm.	Bidders understanding is correct.
256	VI/A	V	9 of 21	4.01.05	The top flue liner above the roof slab shall be made of solid C276 (ASTM B575, UNS N10276) / Titanium (Grade 2 as per ASME SB265) of minimum 10 mm thickness.	1. Inside surface of chimney liner above roof shall be either clad steel (Titanium or C276) or borosilicate lining system as per specification. 2. External surface of chimney flue liner above chimney roof shall be wrapped with 2 mm thick Titanium / C-276 sheet over insulation, for all the cases. Please Confirm.	NTPC clarified that the top flue liner above the roof slab shall be made of solid C276 / Titanium (Grade 2 as per ASME SB265) of minimum 10 mm thickness in all the cases. Also, external surface of chimney flue liner projecting over the chimney roof shall be wrapped with 2 mm thick Titanium / C-276 sheet over insulation, for all the cases.

S. NO.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC'S CLARIFICATION
	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
	VI/A	V	9 of 21	4.01.06	External surface of chimney flue liner project-ing over the chimney roof shall be wrapped with 2mm thick Titanium/C-276 sheet over insulation.		
257	VI/A	V	9 of 21	4.01.05	The minimum length of flue liner projecting over the chimney roof shall be at least equal to diameter of flue liner.	The maximum length projecting above the chim-ney roof shall be 6m as per standard practice. Please confirm.	NTPC clarified that the minimum length of flue liner projecting over the chimney roof shall be atleast equal to diameter of flue liner as per requirement.
258	VI/A	III-A1	9 of 9	24.00.00	Wet stack condensate collection system	Please provide the detailed material specification for condensate collection system.	NTPC clarified that the specified requirement shall be considered by the bidder.
259	VI/A	III-A1	9 of 9	24.00.02	Drain piping shall be of suitable material from corrosion point of view.	Please provide the detailed material specification for condensate drain pipe.	NTPC clarified that the specified requirement shall be considered by the bidder.
260	VI/A	III-A1	9 of 9	24.00.04	The design of the stack condensate collection system shall be provided by the bidder in its bid.	The design of the stack condensate collection system shall be provided during detailed engi-neering. Please confirm	Specification requirement shall be considered by the bidder.
261	VI/A	V	9 OF 21	4.01.01	A "wet Chimney" shall be installed down-stream of Wet Flue Gas Desulfurization (FGD) system by the Contractor...	The location of new Wet Chimney shall be near to Existing Chimney in the space provided clearing foundation interface. The design of Wet Chimney shall be done considering interface factor of ex-isting chimney as determined by wind tunnel study. However, no design check or validation shall be done for existing chim-ney/structures/buildings. Kindly confirm.	As per technical specification Minimum 150m center to center distance is to be maintaned between existing chimney's & NDCT's and new Wet FGD Chimney, bidder to comply with the provision of technical specification.
262	VI/B	IV-D	21 OF 64	7.00.00	In case Bidder opts for steel super-structure with RCC floors/ roof, the bidder shall neces-sarily use Troughed permanently colour coat-ed metal decking sheets having minimum thickness of 0.6mm as permanent shuttering...	In case Bidder opts for steel super-structure with RCC floors/roof, kindly specify the cladding sys-tem to be adopted (Brick Cladding / Metal Sheet Cladding).	Type of cladding system if not specified in the technical Specification shall be decided by the bidder considering the functional requirement, schedule of construction and site constraints (if any).

S. NO.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC'S CLARIFICATION
	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
263	A/VI	III-D	1 OF 3	1.05.00	Site levelling shall be done by owner as per the levels specified in GLP in tender docu-ment. However, site clearance and minor grading as required is in bidder's scope.	As per GLP, FGL of the proposed FGD areas are varying from RL (+) 6.50 M to RL (+) 8.50 M. Kind-ly confirm the FGLs of proposed FGD areas clearly for Stage-I and Stage-II.	Various finished ground level (FGLs) are there for different blocks as indicated in the GLP.
264	A/VI	II-A2	13 OF 29	7.02.03 xv)	High Strain Dynamic Load Test may be carried out for routine load testing of working piles...	High strain dynamic load test is not required as static routine load test are being carried out in the piles. Please confirm.	Routine pile load tests to be performed on 0.5% of the total number of piles provided for each diameter/allowable capacity. High Strain dynamic load test may be carried out for routine load testing of working piles. However, at least two numbers of static routine vertical load tests shall be carried out on pile on which high strain dynamic load test has already been carried out for establishing the correlation between the two tests. In case of discrepancy if any between dynamic and static vertical load tests, then additional static routine vertical load tests shall be conducted as decided by the Engineer and the results of static routine vertical load shall prevail. Number of routine vertical pile load tests as per clause 7.02.03 (ix) shall be total of static routine vertical load test and high strain dynamic load tests. In case agency wish to carry out only static routine vertical load test on 0.5% of total number of piles, he may adopt the same.
265	A/VI	II-A2	11 OF 29	7.02.03 i)	Two stage flushing of pile bore shall be en-sured by airlift technique duly approved by the employer.	Flushing of pile bore shall be done as per IS 2911 Part-1 Section-2. Please confirm.	Bidder to comply the Technical Specification
266	A/VI	II-A2	17 OF 29	7.07.02.05	Recommendations on foundation system and the net allowable bearing pressure and pile capacity shall be based on the conservative values of Geotechnical investigation data.	Recommendations on foundation system and the net allowable bearing pressure and pile capacity shall be based on the average values of Geotech-nical Investigation data. Please confirm.	Bidder to comply the Technical Specification
267	A/VI	II-A2	19 OF 29	ANNEXURE-I b)	The maximum allowable bearing pressure shall be as per the approved geotechnical report and shall be limited to the values as furnished in Table-2.	The maximum allowable bearing pressure shall be as per the approved geotechnical report during detailed engineering. Please confirm.	Bidder is required to carry out geotechnical investigation in this area. During detailed engineering, the Allowable Bearing Pressure shall be adopted after approval of geotechnical investigation report. However, the maximum allowable bearing pressure shall be lower of the two values i.e. as per approved geotechnical report and as per the values furnished in Table-2.

S. NO.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC'S CLARIFICATION
	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
					Electrical		
268	PART A/ SECTION- VI	III-B	5 OF 8	1.10.00.2	Cabling: Contractor scope shall include laying of cable from employer board as shown in Electrical Single Line Diagram Drg No. 0011-109(2)-POE-J-001 on the employers nearest trestle in the FGD area as shown in GLP drawing of subject plan subject to availability of space and suitability. In case of non-availability of space in employer's trestle, contractor shall make necessary arrangements for cable tray erection & cable laying.	1. We require space for cable in existing cable trays for incoming cables for 11KV FGD SWGR and 11 KV FGD Motors in existing cable trestle from main plant to FGD area . Kindly provide the space in cable trays for accommodating mentioned cables . 2. Please furnish drawings for Pipe & cable trestle along A and C Row. Please also furnish drawings for connectivity of cables from MV switchgear vault to Main plant cable trestle (trestle running along Mills). The same are not available and are required for establishing connectivity from main plant to FGD area. 3. Wherever there is no space in already running customer's trays, additional trays shall be provided by the bidder in the existing cable trestle. Kindly confirm that all trestles in main plant can bear additional loads of 2 no. 600 Wide cable trays for routing of cables for FGD. Total 6 no. cable trays from main plant to FGD area are required to be routed. 4. As per GLP space for new trestle may not be available hence contarctor will lay cables by means of existng trestle or trenches or ductbanks or slits whatever possible during detail engineering. For cable laying necessary modification in existing cable trestle may also be done by contractor. Bidder is not considering any new structure for cable trestle in their pricing. please confirm. 5. Runway conductor available in customer's trestle will be utilized for earthing purpose and bidder shall not lay runway conductor in areas where customer's runway conductor is already available. Only tapping from customer's run way conductor to cable trays supplied by bidder shall be in bidder's scope.	(1, 2 ,3 and 4.)bidder may visit the project in order to get itself acquainted with existing electrical of plant. 5. Bidder can utilize employers run away conductor wherever available.
269	PART B/ SECTION- VI	II-E15	5 OF 18	4.04.00	Lighting Masts	Number of Lighting Masts is not specified in the specification. Please confirm the minimum number	The same shall be decided during detailed engineering
270	PART C/ SECTION- VI	--	75 OF 83	--	GENERAL TECHNICAL REQUIREMENTS-Public Address system	Requirement of Public Address system is not mentioned anywhere in the specification except in this clause (Applicable code and standards for Public Address System) hence Public Address System is excluded from bidder's scope of supply for FGD area. Please confirm.	Bidder's understanding is correct.
271	PART B/ SECTION- VI	II-E7	4 OF 7	2.16.01	Cable selection & sizing : HT cable shall be sized based on the following considerations: a) Rated current of the equipment	For Incoming cable to 11kV Tie Switchgear in FGD area, sizing of cable shall be done as per actual loading of the switchboard. Please confirm.	Technical specifications are clear. Bidder to comply with the clause no:-2.16.01 of sub section-II/E7 of technical specifications
272	PART B/ SECTION- VI	II-E6	13 OF 23	5.01.00	Earthing System: Earthing system network/earthmat shall be interconnected mesh of mild steel rods buried in ground in the plant.	Ring electrode type grounding system is envisaged using mild steel rod material for limiting the ground resistance below 1 ohms, which will be connected to main plant ground grid mesh at two points. Hence, ground grid mesh for FGD area not considered. Please confirm.	Technical specifications are clear. Bidder to comply with the clause no:-5.01.00 of sub section-II/E6 of technical specifications
273	PART B/ SECTION- VI	II-E4	4 of 6	3.01.00	1.1 KV grade XLPE power cables shall have compacted aluminium conductor, XLPE insulated, PVC inner-sheathed (as applicable), armoured/ unarmoured, PVC outersheathed conforming to IS:7098. (Part-I).	All cables shall be unarmoured type. Cables shall be armoured type if laid in CHP area, directly buried and FGD Lime Stone and Gypsum Handling area. This is in lne with NTPC LOT-1A and 1B projects.	Bidder to follow clause no:- 2.14.00 of sub section-II/E4 of technical specification. Refer amendment
274	PART B/ SECTION- VI	II-E5	3 of 6	3.01.01	1.1 KV grade control cables shall have stranded copper conductor and shall be multicore PVC insulated, PVC inner sheathed, armoured / unarmoured, FRLS PVC outer sheathed conforming to IS: 1554. (Part-I).	All cables shall be unarmoured type. Cables shall be armoured type if laid in CHP area, directly buried and FGD Lime Stone and Gypsum Handling area. This is in lne with NTPC LOT-1A and 1B projects.	Bidder to follow clause no:- 2.14.02 of sub section-II/E5 of technical specification. Refer amendment

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275	PART B-II/ SECTION- VI	II-E7	2 of 7	2.05.00	All the cables, other than single core unarmoured cables, shall have distinct extruded PVC inner sheath of black colour as per IS: 5831.	All HT cables shall be unarmoured type. Cables shall be armoured type if laid in CHP area, directly buried and FGD Lime Stone and Gypsum Handling area. This is in lne with NTPC LOT-1A and 1B projects.	Technical specifications are clear and Bidder to comply with clause no:- 2.16.04 of sub section-II/E7 of technical specifications
276	PART B/ SECTION- VI	II-E6	10 of 23	4.04.04	Single core cable in trefoil formation shall be laid with a distance of four times the diameter of cable between trefoil center lines and clamped at every two metre.	Single core cables in trefoil formation shall be laid with a distance of 2 times the diameter of cables between trefoil centre lines as per standard practice. Please confirm.	Bidder to follow clause no:- 3.08.01 of sub section-II/E6 of technical specification. Also Refer amendment
277	PART B/ SECTION- VI	II-E6	10 of 23	4.04.04	Single core cable in trefoil formation shall be laid with a distance of four times the diameter of cable between trefoil center lines and clamped at every two metre.	Cable shall be clamped at every two meter or one meter as per clause 3.08.01. Please confirm?	Bidder to follow clause no:- 3.08.01 of sub section-II/E6 of technical specification. Also Refer amendment
278	PART B-ii/	ELECT-1	94 OF 118	0000-211-POE-A-030	Vertical support: For 1 to 6 tier of 600mm tray -C2 channel	C1 channel shall be used upto 3 tier of 600mm tray	technical specifications are clear and Bidder to comply with sub section-ELECT-1 of technical specifications
279	PART B/ SECTION- VI	II E-06	3 of 23	3.1.04	Cable troughs shall be required for branching out few cables from main cable route.	The following sentence may be considered instead of the sentence on the left column mentioned in the specification i.e. "Wherever few cables are branching out from main trunk route troughs/ Local Buried Pipe / Slit / Branch Trays shall be used. Please confirm. (The above is in line with other clauses speci-fication since the specification also informs to use Slits, branch trays.)	technical specifications are clear and Bidder to comply with clause no:-3.1.04 of sub section-II/E6 of technical specifications
280	PART B/ SECTION- VI	II E-06	7 of 23	3.09.01	The cable clamps/ties required to clamp multicore cables shall be of SS-316 material, 12mm wide, polyster coated ladder lock type.	Self-locking, Nylon ties shall be used for clamping of multicore cables	technical specifications are clear and Bidder to comply with clause no:-3.09.01 of sub section-II/E6 of technical specifications
281	PART B/ SECTION- VI	II E-06	10 of 23	4.4.09	Wherever few cables are branching out from main trunk route troughs shall be used.	The following sentence may be considered instead of the sentence on the left column mentioned in the specification i.e. "Wherever few cables are branching out from main trunk route troughs/ Local Buried Pipe / Slit / Branch Trays shall be used. Please confirm. (The above is in line with other clauses speci-fication since the specification also informs to use Slits, branch trays.)	technical specifications are clear and Bidder to comply with clause no:-4.4.09 of sub section-II/E6 of technical specifications

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282	PART B/ SECTION- VI	II E-06	11 of 23	4.4.14(3)	Power and control cables for AC drives and corresponding emergency AC or DC drives shall be laid in segregated routes. Cable routes for one set of auxiliaries of same unit shall be segregated from the other set.	It shall be complied to the extent feasible for essential drives only	technical specifications are clear and Bidder to comply with clause no:-4.4.14(3) of sub section-II/E6 of technical specifications
283	PART B/ SECTION- VI	II E-06	2 of 23	2.01.05	The cable vault……maintenance of cables.	600mm wide and 2.1m high movement pas-sage shall be provided for walk ways in cable vaults / cable spreader room for easy maintenance of cables.	technical specifications are clear and Bidder to comply with clause no:-2.01.05 of sub section-II/E6 of technical specifications
284	PART B/ SECTION- VI	II E-06	4 of 23	3.02.02(f)	Cantilever arms of 320mm, 620mm and 750mm ...with tray in position	Since only 600mm, 300mm and 150mm are to be installed as per technical specification, Cantilever arms of 300mm for 150mm wide tray, 450mm for 300mm wide tray and 750mm for 600mm wide cable tray shall be provided. The same is in line with other NTPC projects executed by the Bidder.	technical specifications are clear and Bidder to comply with clause no:-3.02.02(f) of sub section-II/E6 of technical specifications
285	PART B/ SECTION- VI	II E-06	5 of 23	3.02.05(a)	All overhead cable routes.....on one route.	Please note that clause number 1.08.00 (point 2) mentioned above is contradicting to clause number 3.02.05 (a) . We understand that cables from main plant to FGD area shall be accommodated in space available in existing trays. For further requirement , trays shall be erected in existing cable trestle (customer scope) . Please note that no separate cable trestle for cables from main plant to FGD area is envisaged.	Bidder understanding is not correct
286	PART B-II/ SECTION- VI	II E-15	4 of 18	3.01.00	The illumination of various indoor and outdoor areas in the main plant & offsite area shall be provided as described here.	Illumination of only FGD area in scope are being considered	Bidder understanding is correct
287	PART B-II/ SECTION- VI	II E-15	9 of 18	14	In the hazardous areas like Hydrogen generation .....lighting shall be flameproof	Illumination of only FGD area in scope are being considered	Bidder understanding is correct
288	PART B-II/ SECTION- VI	II E-15	11 of 18	4.07.00	Occupancy based Passive Infra-red sensors	Please mention areas where sensors are to be used. As there is no office area, conference rooms etc. in FDG scope so these sensors are not being considered	The same shall be finalized during detailed engg in line with GRIHA requirement

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289	PART B-II/ SECTION- VI	II E-15	15, 16, 17, 18	Annexure-A,B	Location	Illumination of only FGD area in scope are being considered	Bidder understanding is correct
290	PART B-II/ SECTION- VI	II E-14	1 of 9	2.01.00	Type A fire sealing system ..... in CER & CCR.	Since CER & CCR is not in scope of FGD area, so Type A fire sealing system is not being considered. Only Type B fire sealing system shall be provided	Bidder understanding is correct
291	PART A/ SECTION- VI	III A4	6 of 88	6.03.00	1 X 100% Raw Water Pump of.....Isolation valves for Control Valves.	As we understand the location of Raw Water Pump is approximately 3kms from FGD Control Room, various LT feeders (415V AC/240V AC) - both Motor and Supply feeders, Single Phase feeders for Lighting etc., shall be provided by Customer during contract engineering.	The same shall be finalized during detailed engg based on availability of nearby supply feeders
292	II E-14		1 of 9	2.01.00	Type A fire sealing system ..... in CER & CCR.	Since CER & CCR is not in scope of FGD area, so Type A fire sealing system is not being considered. Only Type B fire sealing system shall be provided	Bidder understanding is correct
293	III A4		9 of 91	9.03.00	1 X 100% Raw Water Pump of.....Isolation valves for Control Valves.	As we understand the location of Raw Water Pump is approximately 3kms from FGD Control Room, various LT feeders (415V AC/240V AC) - both Motor and Supply feeders, Single Phase feeders for Lighting etc., shall be provided by Customer during contract engineering.	The same shall be finalized during detailed engg based on availability of nearby supply feeders

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					CRANES & HOISTS		
294	SEC VI, PART-B	I-M1	36 OF 52	14.09.00	Contractor shall provide motorized hoists and trolleys for all items requiring maintenance and weighing 500 kg or more. Items weighing more than 50 kg and required to be replaced for maintenance shall be provided with manual hoists/trolleys with runway beams/supporting structure etc.	Referred clauses are contradictory w.r.t selection of electric or manual hoist. We shall follow clause 9.09.00 of sub-section V/Section VI Part A for selection of electric or manual hoist. Kindly confirm. Further considering the layout constraints, it may not be feasible to provide hoists with trolleys for all equipment/component above 50 kg in the plant. We shall provide two nos. portable chain pulley (2T cap.) blocks to meet general handling re-quirements.	Bidder to comply specification requirement for the respective areas.
	SECTION – VI PART-C		5 OF 83	7.02.00	Lifting devices i.e. hoists and chain pulley jacks ,etc. shall be provided by the contractor for handling of any equipment or any of its part having weight in excess of 500 Kgs during erection and maintenance activities.		
	Section-VI, PART-B	I-M6	5 OF 41	4.03.03	Hoists- Drive (i) More than 2.0 tonne or more than 10.0 m lift or hoists coming out-side the buildings: Motor driven for both travel & lift. (ii) Other hoists including the hoists for handling take-up pulley and take-up weight: Manual for both travel & lift.		
295	SEC VI, PART-B	I-M1	36 OF 52	14.09.00	Access ladders with suitable platform shall also be provided for approach to all motorized hoists/trolleys mounted on their runway beams for the maintenance of hoists/trolleys.	Considering the layout & space constraints, it may not be feasible to provide all electric hoists with maintenance / repair platforms with handrails. Hence maintenance platform shall be provided depending upon feasibility.	NTPC clarified that the requirements stipulated in the specification shall be followed. Any layout specific issue shall be discussed and resolved during detailed engineering.
296	Section-VI, PART-A	Sub-Section-VII	-	-	MANDATORY SPARES:	No spares are mentioned for chain pulley blocks. Accordingly no mandatory spares shall be provided for chain pulley blocks. Please confirm.	NTPC clarified that scope as provided in the specification shall only be considered by the bidder.
297	SEC VI, PART-B	I-M5	151 OF 152	20.02.29	The control panel shall be wall mounted type and easily approachable from floor by a standing man.	The requirement is for ease of operation which is done by providing push button station at operable height. Control panels for electric hoists shall be hoist mounted. Wall mounted electric hoist will have festoon wire arrangement for power feeding which will form wire loop at one end of the travel resulting in lesser hook approach. Also, festoon wire arrangement will have roller type arrangement which requires frequent maintenance. In view of above, control panels will be hoist mounted with shrouded bus bar DSL for power feeding. This is in line with all other earlier Bidder's executed projects for NTPC.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
298	SECTION – VI, PART-A	SUB-SECTION-VII	PAGE 29 OF 82	D-3) - 5)a	Electrical Items of Crane- Carbon brushes and brush holders for motors	For squirrel cage motors (preferred type for electric hoist) these items are not applicable.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
299	SEC VI, PART-B	SUB-SECTION-I-M5	143 OF 152	20.01.05	Creep speed to be achieved through pony motor and planetary gear box	Creep speed shall be achieved through variable voltage variable frequency drives. (pony motor and planetary gear box is old technology)	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
300	SEC VI, PART-B	SUB-SECTION-I-M5	144 OF 152	20.01.10	The hoist motors shall be provided with DC electro-magnetic brakes as well as Electro Hydraulic Thrust brakes.Electro -Hydraulic Thrust brakes shall be provided for cross travel & long travel.	Please note that Electro -Hydraulic Thrust brakes are required to be supported on platform, which for single girder cranes is not feasible. Due to space constraint EHT cannot be provided. Hence, for all motions (i.e. hoisting,CT & LT) brakes provided shall be DC electro magnetic type since the same can be directly mounted on motor.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .

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	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
301	SEC VI, PART-B	SUB-SECTION-I-M5	144 OF 152	20.01.12	A platform shall extend to full length of the crane bridge on both sides of the bridge girder.	End platform is provided for maintenance of cranes. The crane girder is single girder type and provision for full length platform cannot be provided. Accordingly all other accessories mentioned elsewhere over crane bridge platform are also not applicable.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
302	SEC VI, PART-B	SUB-SECTION-I-M5	144 OF 152	20.01.14	The main hook shall be of Ramshorn type conforming to IS: 5749	Ramshorn hook as per IS 5749 is available for capacity 40T and above. For capacity less than 40T, Point hooks with Shank as per IS 15560 shall be used.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
303	SEC VI, PART-B	SUB-SECTION-I-M5	145 OF 152	20.01.15	Hoist motor shall be slip ring	For crane and hoists squirel cage inducation motors (preferred type for electric hoist) shall be used.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
	SECTION – VI PART-B	SUB SECTION-II-E2	2 of 9	3.01.00 (c)	Crane duty motors shall be slip ring/ squirrel cage Induction motor as per the requirement.		
304	SEC VI, PART-B	SUB-SECTION-I-M5	146 OF 152	20.01.18	DSL shall generally be on opposite side of the operator's cabin	Operator cabin is not applicable for single girder crane	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
305	SEC VI, PART-B	SUB-SECTION-I-M5	146 OF 152	20.01.21	The vertical deflection of crane girder shall not exceed 1/800 of the span	As per IS 807 the vertical deflection of the crane shall be 1/750 of the span of the crane (if the span of the cranes is more than 12m), and 1/600 of the span (if the span of the crane is less than 12m).	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
306	SEC VI, PART-B	SUB-SECTION-I-M5			General-	For SG EOT Crane, square bar shall be provided as rolled section (as per IS: 3443) for low capacity cranes are not available with manufacturers i.e. SAIL, JINDAL	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
307	SEC VI, PART-B	SUB-SECTION-I-M5	148 OF 152	20.02.03	The complete hoists assembly, wire rope, hook etc. shall be ISI stamped approved	BOI shall be sourced from approved Makes/ BIS approved suppliers.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
308	SEC VI, PART-B	SUB-SECTION-I-M5	149 OF 152	20.02.15	Lifting bar of adequate design ...	Lifting bar design shall be provided and supplied by the respective equipment manufacturer that has to be lifted.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
309	SEC VI, PART-B	SUB-SECTION-I-M5	150 OF 152	20.02.25	The contractor shall terminate two feeders of 415 V AC electrical power supply near one end of the monorail beam at ground level	One no incoming supply to each electric hoist shall be provided by a suitably located feeder, to be decided dur-ing detail engineering. Two feeders are not required	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
310	SEC VI, PART-B	SUB-SECTION-I-M5			General-	Power supply for electric hoists shall be from DSL arrangement.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
COMPRESSED AIR SYSTEM							
311	SECTION-VI / PART-B	I-M3 COMPRESSED AIR SYSTEM	1 OF 6	2.02.00	Design and Construction – **For Compressor**	MOC of all components within compressor skid shall be as per OEM standard. The MOC and design of all components outside the skid shall be as per technical specification/NIT. This is being followed in all the projects executed by the Bidder for NTPC and other customers. Pl. accept.	Technical specification is in order . Bidder to comply with Technical specification requirement. However any superior MOC shall also be acceptableas per Manufacturing Standard and Proven Design.
312	SECTION-VI / PART-B	I-M3 COMPRESSED AIR SYSTEM	2 OF 6	4.00.00	Intercooler, Aftercooler & Oil coolers (For Screw)		
313	SECTION-VI / PART-B	I-M3 COMPRESSED AIR SYSTEM	5 OF 6	9.02.01	Each compressor shall be in the control panel to operate either in Base duty (Auto Load-Unload) or Standby duty (Auto On-Off) mode in case of Screw and unload/modulate/energy optimization (Auto Dual Mode) in **case of centrifugal**	Bidder understands that Centrifugal type air compressors are not applicable for such smaller capacity machines. However, bidder request NTPC to furnish the option for reciprocating compressors, being smaller capacity compressors. NTPC to confirm.	Bidder understanding is correct that centrifugal type Air Compressor is not applicable. Tye of compressor shall be oil free screw type a sper clause 3.00.00 of Sub section IIIA -2 , section VI.

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314	SECTION-VI / PART-B	I-M3 COMPRESSED AIR SYSTEM	5 OF 6	9.01.06	The following indications shall be made available in the control panels for repeating the same in **main plant control system** / panels.	Bidder understands that the required indications shall be made in FGD control room and not in main plant control room. NTPC to confirm.	Bidder's understanding is correct
315	SECTION-VI / PART-A	III-A2 AIR CONDITIONING, VENTILATION SYSTEM & COMPRESSED AIR SYSTEM	3 OF 4	3.00.00(a)	Two numbers (1 W + 1S) oil free, rotary screw type air compressors for Instrument air & service air application for.....	1.) Bidder understands that the common compressor is to be provided for Instrument air & Service application. Pl. confirm. 2.) NTPC to confirm whether the common piping network to be provided for Instrument air and Service air application for plant use or a separate network of Instrument air & Service air to be provided. Pl. confirm.	Bidder's understanding is correct. Bidder to refer Tender drawing of Compressed air system. 00-11-109(2)-POM-A-007
316	SECTION-VI / PART-A	VI FUNCTIONAL GUARANTEES & LIQUIDITY DAMAGES	24 OF 30	xxiii	Total power consumption at motor input terminal at rated duty of air compressor.....	Bidder request NTPC to specify the duty factor for considering the auxiliary power consumption for Compressed air system. As the continuous consumption of compressed air will be much lesser than the rated compressor capacity specified by NTPC. In such case, the compressor will go under unload conditions for a considerable time and thus lower power requirements. We request you to specify duty point for air compressors.	Duty point shall be 1.0 . Bidder to comply with specification requirement.
HVAC							
317	SECTION – VI, PART-A	SUB-SECTION-V	12 OF 21	6.02.01 a(ii)	AHU (with VVVFD): 2 X 100%	VVVFD are required if there are multiple areas within the air conditioned area, and there is intermittent requirement of air conditioning in these areas. However, considering the size and layout of FGD control room there shall not be any intermittent requirement of air conditioning in FGD control room. In view of the above VVVFD have not been envisaged. Please confirm.	Bidder understanding is correct . Bidder to refer relevant amendment in this regard.
318	SECTION – VI, PART-A	SUB-SECTION-V	13 OF 21	6.02.01 b	100% standby shall be provided for area served by Cassette / Hi-wall Split/ Ductable split AC/ Package type air conditioners for all other control rooms covered in the scope of this package	As per the standard practice (N+1) configuration is provided for Cassette / Hi-wall Split/ Ductable split AC/ Package type air conditioners, where N is number of working unit, to avoid fouling with other equipment's, facilities within the air conditioned area. NTPC is requested to accept the same.	Bidder understanding is correct . Bidder to refer relevant amendment in this regard.

S. NO.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC'S CLARIFICATION
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LAYOUT							
319	Section – VI, PART -A	Sub-Section III-A1	Page 7 of 9	14.00.00	The contractor scope shall also include the provision of FGD Trestle for routing of air & water lines, slurry lines, steam line, waste water, etc. required for the complete process operations.	It is understood that pipe racks need to be constructed in new area for FGD requirement. However, existing pipe racks shall be used for routing pipes related to FGD system wherever need to do so arises.	Bidder to comply with specification requirements.
CIVIL							
320	A/VI	III-D	1 OF 3	1.05.00	Site levelling shall be done by owner as per the levels specified in GLP in tender document. However, site clearance and minor grading as required is in bidder's scope. For TSTPS there is area marked for FGD which is having slope (i.e. there is grade difference within area). Suitable modification in slope as per bidder's requirement with necessary slope protection measures shall be done by bidder.	Bidder understands that the FGL of the proposed FGD area is RL (+) 4.10 m. Please confirm.	Various finished ground level (FGLs) are there for different blocks as indicated in the GLP.
321	VI/A	III-D	1 OF 3	1.05.00	Site levelling shall be done by owner as per the levels specified in GLP in tender document. However, site clearance and minor grading as required is in bidder's scope. For TSTPS there is area marked for FGD which is having slope (i.e. there is grade difference within area). Suitable modification in slope as per bidder's requirement with necessary slope protection measures shall be done by bidder.	Since leveling and grading of proposed FGD area is in the scope of owner, bidder understands following works are in the scope of the owner: 1. Dismantling of any existing temporay/permanent structures and clearing debris. 2. Slope protection 3.Diversion of any existing facilities/structures, nalla, etc. 4.Stacked materials/equipments etc. if any, located at proposed FGD area shall be cleared by owner. Please confirm.	Blocks marked in the GLP shall be made available as per technical specification.
322	VI/B	IV-D	6 OF 64	3.05.00	**Control building, M. C. C. Buildings** These shall be framed building with R. C. C. roof and floor. For steel framed building roof /floor shall comprise of RCC slab over profiled metal deck sheets (to be used as permanent shuttering only) over structural beams.	For the suject clauses, kindly mention clearly wheather the frame is of Structral steel or RCC. Please clarify. Further, bidder understands that for RCC framed buildings, roof/floor shall be without profile metal deck sheets, using normal removable shuttering. Please confirm.	Type of Building structure (RCC/ Steel), if not specified in the technical Specification shall be decided by the bidder considering the functional requirement, schedule of construction and site constraints (if any).Further, for RCC framed building's roof/floor choice of shuttering shall be decided by the bidder considering the functional requirement, schedule of construction and site constraints (if any)
	VI/B	IV-D	14 OF 64	3.15.00	**Limestone Grinding System Building** This shall be framed building with R. C. C. roof and floor. For steel framed building roof /floor shall comprise of RCC slab over profiled metal deck sheets (to be used as permanent shuttering only) over structural beams.		
	VI/B	IV-D	15 OF 64	3.16.00	**Gypsum Dewatering Building** This shall be framed building with R. C. C. roof and floor. For steel framed building roof /floor shall comprise of RCC slab over profiled metal deck sheets (to be used as permanent shuttering only) over structural beams.		
323	VI/B	IV-D	15 OF 64	4.01.00	The water from the pit shall overflow into contractor's R.C.C drain, which will lead the discharge finally into owner's drain routed alongside the nearby road.	Please provide the co-ordinates and section (geometry and invert level) of owner's existing drains, where the storm water discharge from proposed FGD area shall be connected.	The details if available shall be provided at detailed engg. stage.

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324	VI/B	IV-D	21 OF 64	7.00.00	The floor slabs shall be minimum 150 mm thick (above the top surface (crest) of the metal deck sheet) and shall have minimum 10 dia HYSD reinforcement bars placed at 200 mm center both ways at top and bottom. For floors with metal deck the minimum thickness (150 mm) shall be above the top surface (crest) of the metal deck sheet	Bidder understands that the referred clause is applicable for steel super structured buildings. Please confirm.	Minimum thickness of RCC Floor shall be 150mm for all buiilding types.
325	VI/B	IV-D	25 OF 64	15.00.00	The connection of sewer pipe line for the associated buildings of FGD and Lime and gypsum handling area to nearest owner's sewage network is in bidder's scope.	Please provide the co-ordinates and invert level of owner's existing sewage network, where the sewer pipe line from the proposed FGD area shall be connected.	The details if available shall be provided at detailed engg. stage.
326	VI/B	IV-D	34 OF 64	22.00.00	Bidder shall obtain approval of Civil/Architectural drawings from concerned authorities before taking up the construction work.	Bidder shall obtain approval of Civil / Architectural drawings from customer/customer's consultant before taking up the construction work. Please confirm.	BIIDER TO COMPLY WITH TECHNICAL SPECIFICATION
327	VI/B	IV-D	46 OF 64	30.05.00	Required plumbing work from Owner's service water terminal point to the service water tank and from tank to the toilet accessories mentioned above.	Please provide the co-ordinates of owner's service water terminal point.	It shall be furnished during detail engineering.
328	VI/B	IV-D	46 OF 64	30.05.00	Required plumbing work from Owner's potable water terminal point to the drinking water tank and from tank up to the water coolers.	Please provide the co-ordinates of owner's potable water terminal point.	Please refer Clause 1.07.00 of Sub-Section-IV of Part-A of technical specifications for location of terminal point of potable water. Exact co-ordinate shall be provided during detail engineering.
329	VI/B	IV-D	49 OF 64	31.06.00	However, Stainless steel handrails shall be provided as specified in General Architectural Specification clause 9.0.0.	The clause no 9.00.00 is applicable for Earthing mat. Please clarify.	BIDDER TO REFER AMMENDMENT
330	A/VI	II-A4	14 OF 37	7.02.03 xv)	High Strain Dynamic Load Test may be carried out for routine load testing of working piles. However, at least two numbers of static routine vertical load tests shall be carried out on pile on which high strain dynamic load test has already been carried out for establishing the correlation between the two tests. In case of discrepancy if any between dynamic and static vertical load tests, then additional static routine vertical load tests shall be conducted as decided by the Engineer and the results of static routine vertical load shall prevail. Number of routine vertical pile load tests as per clause 7.02.03 (ix) shall be total of static routine vertical load test and high strain dynamic load tests.	High strain dynamic load test is not required as static routine load test are being carried out in the piles. Please confirm.	Routine pile load tests to be performed on 0.5% of the total number of piles provided for each diameter/allowable capacity. High Strain dynamic load test may be carried out for routine load testing of working piles. However, at least two numbers of static routine vertical load tests shall be carried out on pile on which high strain dynamic load test has already been carried out for establishing the correlation between the two tests. In case of discrepancy if any between dynamic and static vertical load tests, then additional static routine vertical load tests shall be conducted as decided by the Engineer and the results of static routine vertical load shall prevail. Number of routine vertical pile load tests as per clause 7.02.03 (ix) shall be total of static routine vertical load test and high strain dynamic load tests. In case agency wish to carry out only static routine vertical load test on 0.5% of total number of piles, he may adopt the same.

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331	A/VI	II-A4	15 of 37	7.02.04 i)	In case of rammed stone column methodology, the bidder shall submit the construction methodology giving information regarding type of equipment, weight of rammer, height of fall, compaction criteria, stages of casing withdrawal etc. Use of bentonite slurry for formation of stone columns shall not be permitted. A casing pipe shall be provided by the bidder upto to full depth of stone column.	The casing pipe shall be temporary i.e. the casing pipe will be removed after installation of each stone column. Please confirm.	Casing pipe shall be temporary only. However, this shall be withdrawn in stages.
332	A/VI	II-A4	12 OF 37	7.02.03 i)	Two stage flushing of pile bore shall be ensured by airlift technique duly approved by the employer.	Flushing of pile bore shall be done as per IS 2911 Part-1 Section-2. Please confirm.	Bidder to comply the Technical Specification
333	A/VI	II-A4	19 OF 37	7.07.02.05	Recommendations on foundation system and the net allowable bearing pressure and pile capacity shall be based on the conservative values of Geotechnical investigation data.	Recommendations on foundation system and the net allowable bearing pressure and pile capacity shall be based on the average values of Geotechnical Investigation data. Please confirm.	Bidder to comply the Technical Specification
334	A/VI	II-A4	24 OF 37	ANNEXURE-III b	The maximum allowable bearing pressure shall be as per the approved geotechnical report and shall be limited to the values as furnished in Table-2.	The maximum allowable bearing pressure shall be as per the approved geotechnical report during detailed engineering. Please confirm.	Bidder is required to carry out geotechnical investigation in this area. During detailed engineering, the Allowable Bearing Pressure shall be adopted after approval of geotechnical investigation report. However, the maximum allowable bearing pressure shall be lower of the two values i.e. as per approved geotechnical report and as per the values furnished in Table-2.
335	A/VI	II-A4	25 of 37	Annexure-III, d)	The diameter of pile, minimum length and maximum allowable capacity of piles shall be as given below:	The Safe Load Capacity furnished in the table is without grund improvement. Please confirm. Also the allowable capacity and length of pile during detailed engineering shall be as per approved geotechnical investigation report. Please confirm.	The pile load capacity furnished in the table is without ground improvement. Minimum length of pile shall be higher of the two values i.e. as per approved geotechnical report and Technical Specification Further, Allowable capacity shall be as per Technical Specification only.
336	A/VI	II-A4	24 OF 37	Annexure-III	Soil data and foundation system	Only Bore logs are furnished. Please furnish the following data in addition to bore logs: 1. Electrical Resistivity Test Results. 2. Laboratory test results 3. Chemical analysis of ground water and sub soil	refer ammendment
337	A/VI	II-A4	-	Annexure-IV	BH-93	Please provide the co-ordinates of BH-93.	Please read co-ordinate of BH-93 as 1656N 813W
338	VI/B	IV-D	9 OF 64	3.14.00	Chimney	Bidder understands that the subject Chimney will not be operated under bypass mode. Please confirm.	Please refer tender drawings in this regard.
339	VI/B	IV-D	9 OF 64	3.14.00	Chimney	Please provide the material specification for condensate collection system and condensate drain pipe.	Specification requirement shall be considered by the bidder.
340	VI/B	IV-D	14 OF 64	3.14.09 (V)	The entire external surface of chimney shell shall be painted with epoxy phenolic coating as specified in **(iv)** above in alternate bands of 'signal red' and 'bright white' colours.	Bidder understands that the entire external surface of chimney shell shall be painted with epoxy phenolic coating as specified in **(iii)** above in alternate bands of 'signal red' and 'bright white' colours. Please confirm.	Bidder's understanding is correct, amendment shall be issued.

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341	VI/A	V	Page 9 of 21	4.01.04	Alternatively, Contractor can also provide chimney of 8 mm thick (minimum) mild steel with Borosilicate Glass Block Lining of minimum 38 mm thickness,.....	Please provide the detailed specification for Borosilicate Glass Block lining system, including material specification for borosilicate blocks, adhesive, erection procdure etc.	Borosilicate glass block lining shall be provided which should have been in successful operation for similar application in at least two (2) units, located at different locations, for a period not less than two (2) years as on the date of Techno-Commercial bid opening as per the requirement of this clause.
342	VI/A	V	Page 9 of 21	4.01.04	Transition duct inside the chimney and chimney flue liner shall be painted with corrosion resistant paint for Borosilicate Lining and insulated for Titanium/C276 cladding irrespective of surface temperature.	Bidder understands that: 1. If liner material is Titanium/C276 cladding, then there will insulation on outside surface of the liners and consequently there will be **no** corossion protection paint on external surface of liners. 2. If liner material is Borosilicate lining system, then there will **no** insulation outside the liner and consequently there will be corossion protection paint on external surface of liners. Please confirm.	Bidders understanding is correct.

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343	VI/A	V	Page 9 of 21	4.01.05	The top flue liner above the roof slab shall be made of solid C276 (ASTM B575, UNS N10276) / Titanium (Grade 2 as per ASME SB265) of minimum 10 mm thickness.	1. Inside surface of chimney liner above roof shall be either clad steel (Titanium or C276) or borosilicate lining system as per specification. 2. External surface of chimney flue liner above chimney roof shall be wrapped with 2 mm thick Titanium / C-276 sheet over insulation, for all the cases. Please Confirm.	NTPC clarified that the top flue liner above the roof slab shall be made of solid C276 / Titanium (Grade 2 as per ASME SB265) of minimum 10 mm thickness in all the cases. Also, external surface of chimney flue liner projecting over the chimney roof shall be wrapped with 2 mm thick Titanium / C-276 sheet over insulation, for all the cases.
344	VI/A	V	Page 9 of 21	4.01.06	External surface of chimney flue liner projecting over the chimney roof shall be wrapped with 2mm thick Titanium/C-276 sheet over insulation.		
345	VI/A	V	Page 9 of 21	4.01.05	The minimum length of flue liner projecting over the chimney roof shall be atleast equal to diameter of flue liner.	The maximum length projecting above the chimney roof shall be 6m as per standard practice. Please confirm.	NTPC clarified that the minimum length of flue liner projecting over the chimney roof shall be atleast equal to diameter of flue liner as per requirement.
346	VI/A	III-A1	Page 9 of 9	24.00.00	Wet stack condensate collection system	Please provide the detailed material specification for condensate collection system.	NTPC clarified that the specified requirement shall be considered by the bidder.
347	VI/A	III-A1	Page 9 of 9	24.00.02	Drain piping shall be of suitable material from corrosion point of view.	Please provide the detailed material specification for condensate drain pipe.	NTPC clarified that the specified requirement shall be considered by the bidder.
348	VI/A	III-A1	Page 9 of 9	24.00.04	The design of the stack condensate collection system shall be provided by the bidder in its bid.	The design of the stack condensate collection system shall be provided during detailed engineering. Please confirm.	Specification requirement shall be considered by the bidder.
349	A/VI	II-A4	15 OF 37	7.02.04 (iv)	Ground improvement ..... The ground improvement shall be carried out below the entire buildings/structure rather than restricting it to just below foundations.	The ground improvement shall be done below foundations only. The ground improvement below, road, drain, trenches, pits, grade slab is not required as the same will be rested on compacted controlled fill. Please confirm.	Minimum 500mm thick compacted moorum/Non-Expansive Soil shall be provided replacing existing ash/soil below the roads, trenches, pipe pedestals, channels/drains and staircase foundation with foundation loading intensity less than 4 T / M2 . However, where grade slab is the part of buidings, the ground improvement shall be carried out below the entire buildings/structures. Further, Ground improvement with stone column shall be carried out minimum d/2 distance beyond the footprint of buildings(minimum 2 rows beyond the building footprint), where d is the depth of improvement.

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					ELECTRICAL		
350	PART A/ SEC-TION- VI	IIIB	3 OF 6	1.10.00(2)	Cabling: Contractor scope shall include laying of cable from employer.....FGD area in the contractor's scope.	1. We require space for cable in existing cable trays for incoming cables for 11KV FGD SWGR and 11 KV FGD Motors in existing cable trestle from main plant to FGD area . Kindly provide the space in cable trays for accommodating mentioned cables . 2. Please furnish drawings for Pipe & cable trestle along A and C Row. Please also furnish drawings for connectivity of cables from MV switchgear vault to Main plant cable trestle (trestle running along Mills). The same are not available and are required for establishing connectivity from main plant to FGD area. 3. Wherever there is no space in already running customer's trays, additional trays shall be provided by the bidder in the existing cable trestle. Kindly confirm that all trestles in main plant can bear additional loads of 2 no. 600 Wide cable trays for routing of cables for FGD. Total 6 no. cable trays from main plant to FGD area are required to be routed. Please confirm. 4. As per GLP space for new trestle may not be available hence contarctor will lay cables by means of existng trestle or trenches or ductbanks or slits whatever possible during detail engineering. For cable laying necessary modification in existing cable trestle may also be done by contractor. Bidder is not considering any new structure for cable trestle . please confirm. 5. Runway conductor available in customer's trestle will be utilized for earthing purpose and bidder shall not lay runway conductor in areas where customer's runway conductor is already available. Only tapping from customer's run way conductor to cable trays supplied by bidder shall be in bidder's scope. Please confirm.	(1, 2 ,3 and 4.)bidder may visit the project in order to get itself acquainted with existing electrical of plant. 5. Bidder can utilize employers run away conductor wherever available.
351	PART B/ SECTION- VI	II-E15	5 OF 18	4.00.00	Lighting Masts	Number of Lighting Masts is not specified in the specification. Please confirm the minimum number.	The same shall be decided during detailed engineering

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352	PART C/ SECTION- VI	--	75 OF 83	--	Public Address system	Requirement of Public Address system is not mentioned anywhere in the specification except in this clause (Applicable code and standards for Public Address System) hence Public Address System is excluded from bidder's scope of supply for FGD area. Please confirm.	Bidder's understanding is correct.
353	PART B/ SECTION- VI	II-E7	4 OF 7	2.16.01	Cable selection & sizing : HT cable shall be sized based on the following considerations: a) Rated current of the equipment	For Incoming cable to 11kV Tie Switchgear in FGD area, sizing of cable shall be done as per actual loading of the switchboard. Please confirm.	Technical specifications are clear. Bidder to comply with the clause no:-2.16.01 of sub section-II/E7 of technical specifications
354	PART B/ SECTION- VI	II-E6	13 OF 23	5.01.00	Earthing System: Earthing system network/earthmat shall be interconnected mesh of mild steel rods buried in ground in the plant.	Ring electrode type grounding system is envisaged using mild steel rod material for limiting the ground resistance below 1 ohms, which will be connected to main plant ground grid mesh at two points. Hence, ground grid mesh for FGD area not considered. Please confirm.	Technical specifications are clear. Bidder to comply with the clause no:-5.01.00 of sub section-II/E6 of technical specifications
355	PART B/ SECTION- VI	II-E4	4 of 6	3.01.00	1.1 KV grade XLPE power cables shall have compacted aluminium conductor, XLPE insulated, PVC inner-sheathed (as applicable), armoured/ unarmoured, PVC outersheathed conforming to IS:7098. (Part-I).	All cables shall be unarmoured type. Cables shall be armoured type if laid in CHP area, directly buried and FGD Lime Stone and Gypsum Handling area. This is in lne with NTPC LOT-1A and 1B FGD projects. Please confirm.	Bidder to follow clause no:- 2.14.00 of sub section-II/E4 of technical specification. Also Refer amendment for the same
356	PART B/ SECTION- VI	II-E5	3 of 6	3.01.01	1.1 KV grade control cables shall have stranded copper conductor and shall be multicore PVC insulated, PVC inner sheathed, armoured / unarmoured, FRLS PVC outer sheathed conforming to IS: 1554. (Part-I).	All cables shall be unarmoured type. Cables shall be armoured type if laid in CHP area, directly buried and FGD Lime Stone and Gypsum Handling area. This is in lne with NTPC LOT-1A and 1B FGD projects. Please confirm.	Bidder to follow clause no:- 2.14.02 of sub section-II/E5 of technical specification. Also Refer amendment for the same
357	PART B-II/ SECTION- VI	II-E7	2 of 7	2.05.00	All the cables, other than single core unarmoured cables, shall have distinct extruded PVC inner sheath of black colour as per IS: 5831.	All HT cables shall be unarmoured type. Cables shall be armoured type if laid in CHP area, directly buried and FGD Lime Stone and Gypsum Handling area. This is in lne with NTPC LOT-1A and 1B FGD projects. Please confirm	Technical specifications are clear and Bidder to comply with clause no:- 2.16.04 of sub section-II/E7 of technical specifications
358	PART B/ SECTION- VI	II-E6	10 of 23	4.04.04	Single core cable in trefoil formation shall be laid with a distance of four times the diameter of cable between trefoil center lines and clamped at every two metre.	Single core cables in trefoil formation shall be laid with a distance of 2 times the diameter of cables between trefoil centre lines as per standard practice. Please confirm.	Bidder to follow clause no:- 3.08.01 of sub section-II/E6 of technical specification. Also Refer amendment
359	PART B/ SECTION- VI	II-E6	10 of 23	4.04.04	Single core cable in trefoil formation shall be laid with a distance of four times the diameter of cable between trefoil center lines and clamped at every two metre.	Cable shall be clamped at every two meter or one meter as per clause 3.08.01. Please confirm?	Bidder to follow clause no:- 3.08.01 of sub section-II/E6 of technical specification. Also Refer amendment
360	PART B-ii/	ELECT-1	94 OF 118	0000-211-POE-A-030	Vertical support: For 1 to 6 tier of 600mm tray -C2 channel	C1 channel shall be used upto 3 tier of 600mm tray	technical specifications are clear and Bidder to comply with sub section-ELECT-1 of technical specifications
361	PART B/ SECTION- VI	II E-06	3 of 23	3.1.04	Cable troughs shall be required for branching out few cables from main cable route.	The following sentence may be considered instead of the sentence on the left column mentioned in the specification i.e. "Wherever few cables are branching out from main trunk route troughs/ Local Buried Pipe / Slit / Branch Trays shall be used. Please confirm. (The above is in line with other clauses speci-fication since the specification also informs to use Slits, branch trays.)	technical specifications are clear and Bidder to comply with clause no:-3.1.04 of sub section-II/E6 of technical specifications
362	PART B/ SECTION- VI	II E-06	7 of 23	3.09.01	The cable clamps/ties required to clamp multicore cables shall be of SS-316 material, 12mm wide, polyster coated ladder lock type.	Self-locking, Nylon ties shall be used for clamping of multicore cables	technical specifications are clear and Bidder to comply with clause no:-3.09.01 of sub section-II/E6 of technical specifications

S. NO.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC'S CLARIFICATION
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363	PART B/ SECTION- VI	II E-06	10 of 23	4.4.09	Wherever few cables are branching out from main trunk route troughs shall be used.	The following sentence may be considered instead of the sentence on the left column mentioned in the specification i.e. "Wherever few cables are branching out from main trunk route troughs/ Local Buried Pipe / Slit / Branch Trays shall be used. Please confirm. (The above is in line with other clauses speci-fication since the specification also informs to use Slits, branch trays.)	technical specifications are clear and Bidder to comply with clause no:-4.4.09 of sub section-II/E6 of technical specifications
364	PART B/ SECTION- VI	II E-06	11 of 23	4.4.14(3)	Power and control cables for AC drives and corresponding emergency AC or DC drives shall be laid in segregated routes. Cable routes for one set of auxiliaries of same unit shall be segregated from the other set.	It shall be complied to the extent feasible for essential drives only. Please confirm.	technical specifications are clear and Bidder to comply with clause no:-4.4.14(3) of sub section-II/E6 of technical specifications
365	PART B/ SECTION- VI	II E-06	2 of 23	2.01.05	The cable vault……maintenance of cables.	600mm wide and 2.1m high movement passage shall be provided for walk ways in cable vaults / cable spreader room for easy maintenance of cables. Please confirm	technical specifications are clear and Bidder to comply with clause no:-2.01.05 of sub section-II/E6 of technical specifications
366	PART B/ SECTION- VI	II E-06	4 of 23	3.02.02(f)	Cantilever arms of 320mm, 620mm and 750mm ...with tray in position	Since only 600mm, 300mm and 150mm are to be installed as per technical specification, Cantilever arms of 300mm for 150mm wide tray, 450mm for 300mm wide tray and 750mm for 600mm wide cable tray shall be provided. The same is in line with other NTPC projects executed by the Bidder. Please confirm	technical specifications are clear and Bidder to comply with clause no:-3.02.02(f) of sub section-II/E6 of technical specifications
367	PART B/ SECTION- VI	II E-06	5 of 23	3.02.05(a)	All overhead cable routes.....on one route.	We understand that cables from main plant to FGD area shall be accommodated in space available in existing trays . For further requirement , trays shall be erected in existing cable trestle (customer scope) . Please note that no separate cable trestle for cables from main plant to FGD area is envisaged. Please confirm	Bidder understanding is not correct
368	PART B-II/ SECTION- VI	II E-07	5 of 7	4.01.03	The standard length of HT Cable shall be 1000m for all single core……750m for 3 core cable.	Standard length for single core and 3 core cable HT power cable shall be 500/750m so as to avoid wastage. Please accept	technical specifications are clear and Bidder to comply with clause no:-4.01.02) of sub section-II/E7 of technical specifications
369	PART B-II/ SECTION- VI	II E-15	4 of 18	3.01.00	The illumination of various indoor and outdoor areas in the main plant & offsite area shall be provided as described here.	Illumination of only FGD area in scope are being considered.	Bidders understanding is correct
370	PART B-II/ SECTION- VI	II E-15	9 of 18	14	In the hazardous areas like Hydrogen generation .....lighting shall be flameproof	Illumination of only FGD area in scope are being considered.	Bidders understanding is correct
371	PART B-II/ SECTION- VI	II E-15	11 of 18	4.07.00	Occupancy based Passive Infra-red sensors	Please mention areas where sensors are to be used. As there is no office area, conference rooms etc. in FDG scope so these sensors are not being considered.	The same shall be finalized during detailed engg in line with GRIHA requirement
372	PART B-II/ SECTION- VI	II E-15	15, 16, 17, 18	Annexure-A,B	Location	Illumination of only FGD area in scope are being considered.	Bidders understanding is correct
373	PART B-II/ SECTION- VI	II E-14	1 of 9	2.01.00	Type A fire sealing system ..... in CER & CCR.	Since CER & CCR is not in scope of FGD area, so Type A fire sealing system is not being considered. Only Type B fire sealing system shall be provided. Please confirm.	Bidders understanding is correct

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	SEC/ PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
CIVIL							
374	VI/B	IV-D	9 OF 64	3.14.00	Chimney	Bidder understands that the subject Chimney will not be operated under bypass mode. Please confirm.	Please refer tender drawings in this regard.
375	VI/B	IV-D	9 OF 64	3.14.00	Chimney	Please provide the material specification for condensate collection system and condensate drain pipe.	Specification requirement shall be considered by the bidder.
376	VI/B	IV-D	14 OF 64	3.14.09 (V)	The entire external surface of chimney shell shall be painted with epoxy phenolic coating as specified in (iv) above in alternate bands of 'signal red' and 'bright white' colors.	Bidder understands that the entire external surface of chimney shell shall be painted with epoxy phenolic coating as specified in (iii) above in alternate bands of 'signal red' and 'bright white' colors. Please confirm.	Bidder's understanding is correct, amendment shall be issued.
377	VI/A	V	9 of 21	4.01.04	Alternatively, Contractor can also provide chimney of 8 mm thick (minimum) mild steel with Borosilicate Glass Block Lining of minimum 38 mm thickness,.....	Please provide the detailed specification for Borosilicate Glass Block lining system, including material specification for borosilicate blocks, adhesive, erection procedure etc.	Borosilicate glass block lining shall be provided which should have been in successful operation for similar application in at least two (2) units, located at different locations, for a period not less than two (2) years as on the date of Techno-Commercial bid opening as per the requirement of this clause.

SL. NO	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC'S CLARIFICATION
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378	VI/A	V	9 of 21	4.01.04	Transition duct inside the chimney and chimney flue liner shall be painted with corrosion resistant paint for Borosilicate Lining and insulated for Titanium/C276 cladding irrespective of surface temperature.	Bidder understands that: 1. If liner material is Titanium/C276 cladding, then there will insulation on outside surface of the liners and consequently there will be no corrosion protection paint on external surface of liners. 2. If liner material is Borosilicate lining system, then there will no insulation outside the liner and consequently there will be corrosion protection paint on external surface of liners. Please confirm.	Bidders understanding is correct.
379	VI/A	V	9 of 21	4.01.05	The top flue liner above the roof slab shall be made of solid C276 (ASTM B575, UNS N10276) / Titanium (Grade 2 as per ASME SB265) of minimum 10 mm thickness.	1. Inside surface of chimney liner above roof shall be either clad steel (Titanium or C276) or borosilicate lining system as per specification. 2. External surface of chimney flue liner above chimney roof shall be wrapped with 2 mm thick Titanium / C-276 sheet over insulation, for all the cases. Please Confirm.	NTPC clarified that the top flue liner above the roof slab shall be made of solid C276 / Titanium (Grade 2 as per ASME SB265) of minimum 10 mm thickness in all the cases. Also, external surface of chimney flue liner projecting over the chimney roof shall be wrapped with 2 mm thick Titanium / C-276 sheet over insulation, for all the cases.
380	VI/A	V	9 of 21	4.01.06	External surface of chimney flue liner projecting over the chimney roof shall be wrapped with 2mm thick Titanium/C-276 sheet over insulation.		
381	VI/A	V	9 of 21	4.01.05	The minimum length of flue liner projecting over the chimney roof shall be at least equal to diameter of flue liner.	The maximum length projecting above the chimney roof shall be 6m as per standard practice. Please confirm.	NTPC clarified that the minimum length of flue liner projecting over the chimney roof shall be atleast equal to diameter of flue liner as per requirement.
382	VI/A	III-A1	9 of 9	24.00.00	Wet stack condensate collection system	Please provide the detailed material specification for condensate collection system.	NTPC clarified that the specified requirement shall be considered by the bidder.
383	VI/A	III-A1	9 of 9	24.00.02	Drain piping shall be of suitable material from corrosion point of view.	Please provide the detailed material specification for condensate drain pipe.	NTPC clarified that the specified requirement shall be considered by the bidder.

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384	VI/A	III-A1	9 of 9	24.00.04	The design of the stack condensate collection system shall be provided by the bidder in its bid.	The design of the stack condensate collection system shall be provided during detailed engineering. Please confirm.	Specification requirement shall be considered by the bidder.
385	VI/A	V	9 OF 21	4.01.01	A "wet Chimney" shall be installed downstream of Wet Flue Gas Desulfurization (FGD) system by the Contractor...	The location of new Wet Chimney shall be near to Existing Chimney in the space provided clearing foundation interface. The design of Wet Chimney shall be done considering interface factor of existing chimney as determined by wind tunnel study. However, no design check or validation shall be done for existing chimney/structures/buildings. Kindly confirm.	As per technical specification Minimum 150m center to center distance is to be maintaned between existing chimney's & NDCT's and new Wet FGD Chimney, bidder to comply with the provision of technical specification.
386	VI/B	IV-D	21 OF 64	7.00.00	In case Bidder opts for steel super-structure with RCC floors/ roof, the bidder shall necessarily use Troughed permanently colour coated metal decking sheets having minimum thickness of 0.6mm as permanent shuttering...	In case Bidder opts for steel super-structure with RCC floors/roof, kindly specify the cladding system to be adopted (Brick Cladding / Metal Sheet Cladding).	Type of Building CLADDING SYSTEM, if not specified in the technical Specification shall be decided by the bidder considering the functional requirement, schedule of construction and site constraints (if any).
387	A/VI	III-D	1 OF 3	1.05.00	Site levelling shall be done by owner as per the levels specified in GLP in tender document. However, site clearance and minor grading as required is in bidder's scope.	Bidder understands that the FGL of the proposed FGD area is RL (+) 56.00 m. Please confirm.	Various finished ground level (FGLs) are there for different blocks as indicated in the GLP.
388	A/VI	II-A6	15 OF 36	7.02.03 xv)	High Strain Dynamic Load Test may be carried out for routine load testing of working piles...	High strain dynamic load test is not required as static routine load test are being carried out in the piles. Please confirm.	Routine pile load tests to be performed on 0.5% of the total number of piles provided for each diameter/allowable capacity. High Strain dynamic load test may be carried out for routine load testing of working piles. However, at least two numbers of static
389	A/VI	II-A6	13 OF 36	7.02.03 i)	Two stage flushing of pile bore shall be ensured by airlift technique duly approved by the employer.	Flushing of pile bore shall be done as per IS 2911 Part-1 Section-2. Please confirm.	Bidder to comply the Technical Specification
390	A/VI	II-A6	19 OF 36	7.07.02.05	Recommendations on foundation system and the net allowable bearing pressure and pile capacity shall be based on the conservative values of Geotechnical investigation data.	Recommendations on foundation system and the net allowable bearing pressure and pile capacity shall be based on the average values of Geotechnical Investigation data. Please confirm.	Bidder to comply the Technical Specification
391	A/VI	II-A6	25 OF 36	ANNEXURE-III b)	The maximum allowable bearing pressure shall be as per the approved geotechnical report and shall be limited to the values as furnished in Table-2.	The maximum allowable bearing pressure shall be as per the approved geotechnical report during detailed engineering. Please confirm.	Bidder is required to carry out geotechnical investigation in this area. During detailed engineering, the Allowable Bearing Pressure shall be adopted after approval of geotechnical investigation report. However, the maximum allowable bearing pressure shall be lower of the two values i.e. as per approved geotechnical report and as per the values furnished in Table-2.

SL. NO	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC'S CLARIFICATION
	SEC/ PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
392	A/VI	II-A6	-	Annexure-IV	Soil data and foundation system	Only Bore logs are furnished. Please furnish the following data in addition to bore logs: 1.Electrical Resistivity Test Results. 2.Laboratory test results 3.Chemical analysis of ground water and sub soil	Bidder may refer ammendment for available data
393	A/VI	II-A6	-	Annexure-IV	Soil data and foundation system	Bore logs near Chimney area of Stage-II have been furnished which are applicable to FGD area near Chimney only. Please furnish the soil data for FGD areas marked in GLP other than Chimney area.	Available data has already been furnished
ELECTRICAL							
394	PART A/ SECTION- VI	IIIB	5 of 8	1.10.00(2)	Cabling: Contractor scope shall include laying of cable from employer board as shown in Electrical Single Line Diagram Drg No. 0011-109-POE-J-001/REV. B on the employers nearest trestle in the FGD area as shown in GLP draiwng of repective plant subject to availability of space and suitability. In case of non-availability of space in employer's trestle, contractor shall make necessary arrangements for cable tray erection & cable laying.	1. We require space for cable in existing cable trays for incoming cables for 6.6KV FGD SWGR (2 feeders) in existing cable trestle from main plant to FGD area . Kindly provide the space in cable trays for accommodating mentioned cable . 2. Where-ever there is no space in already running customer's trays, additional trays shall be provided by the bidder in the exist-ing cable trestle. Kindly confirm if there is space for approx. 4 number cable trays(600mm wide) in the existing cable trestle from main plant area to FGD area. 3. Runway conductor available in customer's trestle will be utilized for earthing purpose and bidder shall not lay runway conductor in areas where customer's runway conductor is already available. Only tapping from customer's run way conductor to cable trays supplied by bidder shall be in bidder's scope.	(1,and 2)bidder may visit the project in order to get itself acquainted with existing electrical of plant. 3. Bidder can utilize employers run away conductor wherever available.
HVAC							
395	SECTION – VI, PART-A	SUB-SECTION-V	13 OF 21	6.02.01 a(ii)	AHU (with VVVFD): 2 X 100%	VVVFD are required if there are multiple areas within the air conditioned area, and there is intermittent requirement of air conditioning in these areas. However, considering the size and layout of FGD control room there shall not be any intermittent requirement of air conditioning in FGD control room. In view of the above VVVFD have not been envisaged. Please confirm.	Bidder understanding is correct . Bidder to refer relevant amendment in this regard.

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396	SECTION – VI, PART-A	SUB-SECTION-V	13 OF 21	6.02.01 b	100% standby shall be provided for area served by Cassette / Hi-wall Split/ Ductable split AC/ Package type air conditioners for all other control rooms covered in the scope of this package	As per the standard practice (N+1) configuration is provided for Cassette / Hi-wall Split/ Ductable split AC/ Package type air conditioners, where N is number of working unit, to avoid fouling with other equipment's, facilities within the air conditioned area. We request employer to accept the same.	Bidder understanding is correct . Bidder to refer relevant amendment in this regard.
MPL							
397	Section - VI, Part - A	Sub-Section III-Al	Page 7 of 9	14.00.00	The contractor scope shall also include the provision of FGD Trestle for routing of air & water lines, slurry lines, steam line, waste water, etc. required for the complete process operations.	Bidder understood that Pipe Racks has to be constructed only in new area for FGD require-ment wherever existing Pipe Rack is not available. However, existing pipe rack will be used for routing pipes related to FGD system wherever need to do so arises. Kindly confirm.	Bidder to comply the Technical Specification

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					CIVIL		
398	A/VI	III-D	1 OF 3	1.05.00	Site levelling shall be done by owner as per the levels specified in GLP in tender document. However, site clearance and minor grading as required is in bidder's scope. For TSTPS there is area marked for FGD which is having slope (i.e. there is grade difference within area). Suitable modification in slope as per bidder's requirement with necessary slope protection measures shall be done by bidder.	Bidder understands that the FGL of the proposed FGD area is RL (+) 282.00 m. Please confirm.	Various finished ground level (FGLs) are there for different blocks as indicated in the GLP.
399	VI/A	III-D	1 OF 3	1.05.00	Site levelling shall be done by owner as per the levels specified in GLP in tender document. However, site clearance and minor grading as required is in bidder's scope. For TSTPS there is area marked for FGD which is having slope (i.e. there is grade difference within area). Suitable modification in slope as per bidder's requirement with necessary slope protection measures shall be done by bidder.	Since leveling and grading of proposed FGD area is in the scope of owner, bidder understands following works are in the scope of the owner: 1. Dismantling of any existing temporay/permanent structures and clearing debris. 2. Slope protection 3.Diversion of any existing facilities/structures, nalla, etc. 4.Stacked materials/equipments etc. if any, located at proposed FGD area shall be cleared by owner. Please confirm.	Blocks marked in the GLP shall be made available as per technical specification.
400	VI/B	IV-D	6 OF 64	3.05.00	**Control building, M. C. C. Buildings** These shall be framed building with R. C. C. roof and floor. For steel framed building roof /floor shall comprise of RCC slab over profiled metal deck sheets (to be used as permanent shuttering only) over structural beams.	For the suject clauses, kindly mention clearly whether the frame is of Structral steel or RCC. Please clarify. Further, bidder understands that for RCC framed buildings, roof/floor shall be without profile metal deck sheets, using normal removable shuttering. Please confirm.	Type of Building structure (RCC/ Steel), if not specified in the technical Specification shall be decided by the bidder considering the functional requirement, schedule of construction and site constraints (if any).Further, for RCC framed building's roof/floor choice of shuttering shall be decided by the bidder considering the functional requirement, schedule of construction and site constraints (if any)
	VI/B	IV-D	14 OF 64	3.15.00	**Limestone Grinding System Building** This shall be framed building with R. C. C. roof and floor. For steel framed building roof /floor shall comprise of RCC slab over profiled metal deck sheets (to be used as permanent shuttering only) over structural beams.		
	VI/B	IV-D	15 OF 64	3.16.00	**Gypsum Dewatering Building** This shall be framed building with R. C. C. roof and floor. For steel framed building roof /floor shall comprise of RCC slab over profiled metal deck sheets (to be used as permanent shuttering only) over structural beams.		
401	VI/B	IV-D	15 OF 64	4.01.00	The water from the pit shall overflow into contractor's R.C.C drain, which will lead the discharge finally into owner's drain routed alongside the nearby road.	Please provide the co-ordinates and section (geometry and invert level) of owner's existing drains, where the storm water discharge from proposed FGD area shall be connected.	The details if available shall be provided at detailed engg. stage.
402	VI/B	IV-D	21 OF 64	7.00.00	The floor slabs shall be minimum 150 mm thick (above the top surface (crest) of the metal deck sheet) and shall have minimum 10 dia HYSD reinforcement bars placed at 200 mm center both ways at top and bottom. For floors with metal deck the minimum thickness (150 mm) shall be above the top surface (crest) of the metal deck sheet	Bidder understands that the referred clause is applicable for steel super structured buildings. Please confirm.	Minimum thickness of RCC Floor shall be 150mm for all buiilding types.
403	VI/B	IV-D	25 OF 64	15.00.00	The connection of sewer pipe line for the associated buildings of FGD and Lime and gypsum handling area to nearest owner's sewage network is in bidder's scope.	Please provide the co-ordinates and invert level of owner's existing sewage network, where the sewer pipe line from the proposed FGD area shall be connected.	The details if available shall be provided at detailed engg. stage.
404	VI/B	IV-D	34 OF 64	22.00.00	Bidder shall obtain approval of Civil/Architectural drawings from concerned authorities before taking up the construction work.	Bidder shall obtain approval of Civil / Architectural drawings from customer/customer's consultant before taking up the construction work. Please confirm.	BIDDER TO COMPLY WITH TECHNICAL SPECIFICATION
405	VI/B	IV-D	46 OF 64	30.05.00	Required plumbing work from Owner's service water terminal point to the service water tank and from tank to the toilet accessories mentioned above.	Please provide the co-ordinates of owner's service water terminal point.	It shall be furnished during detail engineering.
406	VI/B	IV-D	46 OF 64	30.05.00	Required plumbing work from Owner's potable water terminal point to the drinking water tank and from tank up to the water coolers.	Please provide the co-ordinates of owner's potable water terminal point.	Please refer Clause 1.07.00 of Sub-Section-IV of Part-A of technical specifications for location of terminal point of potable water. Exact co-ordinate shall be provided during detail engineering.

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407	VI/B	IV-D	49 OF 64	31.06.00	However, Stainless steel handrails shall be provided as specified in General Architectural Specification clause 9.0.0.	The clause no 9.00.00 is applicable for Earthing mat. Please clarify.	BIDDERTO REFER AMMENDMENT
408	A/VI	II-A3	12 OF 29	7.02.03 xv)	High Strain Dynamic Load Test may be carried out for routine load testing of working piles. However, at least two numbers of static routine vertical load tests shall be carried out on pile on which high strain dynamic load test has already been carried out for establishing the correlation between the two tests. In case of discrepancy if any between dynamic and static vertical load tests, then additional static routine vertical load tests shall be conducted as decided by the Engineer and the results of static routine vertical load shall prevail. Number of routine vertical pile load tests as per clause 7.02.03 (ix) shall be total of static routine vertical load test and high strain dynamic load tests.	High strain dynamic load test is not required as static routine load test are being carried out in the piles. Please confirm.	Routine pile load tests to be performed on 0.5% of the total number of piles provided for each diameter/allowable capacity. High Strain dynamic load test may be carried out for routine load testing of working piles. However, at least two numbers of static routine vertical load tests shall be carried out on pile on which high strain dynamic load test has already been carried out for establishing the correlation between the two tests. In case of discrepancy if any between dynamic and static vertical load tests, then additional static routine vertical load tests shall be conducted as decided by the Engineer and the results of static routine vertical load shall prevail. Number of routine vertical pile load tests as per clause 7.02.03 (ix) shall be total of static routine vertical load test and high strain dynamic
409	A/VI	II-A3	10 OF 29	7.02.03 i)	Two stage flushing of pile bore shall be ensured by airlift technique duly approved by the employer.	Flushing of pile bore shall be done as per IS 2911 Part-1 Section-2. Please confirm.	Bidder to comply the Technical Specification
410	A/VI	II-A3	15 OF 29	7.07.02.05	Recommendations on foundation system and the net allowable bearing pressure and pile capacity shall be based on the conservative values of Geotechnical investigation data.	Recommendations on foundation system and the net allowable bearing pressure and pile capacity shall be based on the average values of Geotechnical Investigation data. Please confirm.	Bidder to comply the Technical Specification
411	A/VI	II-A3	19 OF 29	ANNEXURE-II b	The maximum allowable bearing pressure shall be as per the approved geotechnical report and shall be limited to the values as furnished in Table-2.	The maximum allowable bearing pressure shall be as per the approved geotechnical report during detailed engineering. Please confirm.	Bidder is required to carry out geotechnical investigation in this area. During detailed engineering, the Allowable Bearing Pressure shall be adopted after approval of geotechnical investigation report. However, the maximum allowable bearing pressure shall be lower of the two values i.e. as per approved geotechnical report and as per the values furnished in Table-2.
412	A/VI	II-A3	19 OF 29	Annexure-II	Soil data and foundation system	Only Bore logs are furnished. Please furnish the following data in addition to bore logs: 1. Electrical Resistivity Test Results. 2. Laboratory test results 3. Chemical analysis of ground water and sub soil	refer ammendment
413	VI/B	IV-D	9 OF 64	3.14.00	Chimney	Bidder understands that the subject Chimney will not be operated under bypass mode. Please confirm.	Please refer tender drawings in this regard.
414	VI/B	IV-D	9 OF 64	3.14.00	Chimney	Please provide the material specification for condensate collection system and condensate drain pipe.	
415	VI/B	IV-D	14 OF 64	3.14.09 (V)	The entire external surface of chimney shell shall be painted with epoxy phenolic coating as specified in **(iv)** above in alternate bands of 'signal red' and 'bright white' colours.	Bidder understands that the entire external surface of chimney shell shall be painted with epoxy phenolic coating as specified in **(iii)** above in alternate bands of 'signal red' and 'bright white' colours. Please confirm.	Bidder's understanding is correct, amendemnet shall be issued.
416	VI/A	V	Page 9 of 21	4.01.04	Alternatively, Contractor can also provide chimney of 8 mm thick (minimum) mild steel with Borosilicate Glass Block Lining of minimum 38 mm thickness,……..	Please provide the detailed specification for Borosilicate Glass Block lining system, including material specification for borosilicate blocks, adhesive, erection procdure etc.	Borosilicate glass block lining shall be provided which should have been in successful operation for similar application in at least two (2) units, located at different locations, for a period not less than two (2) years as on the date of Techno-Commercial bid opening as per the requirement of this clause.

S. NO.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC'S CLARIFICATION
	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
417	VI/A	V	Page 9 of 21	4.01.04	Transition duct inside the chimney and chimney flue liner shall be painted with corrosion resistant paint for Borosilicate Lining and insulated for Titanium/C276 cladding irrespective of surface temperature.	Bidder understands that: 1. If liner material is Titanium/C276 cladding, then there will insulation on outside surface of the liners and consequently there will be **no** corossion protection paint on external surface of liners. 2. If liner material is Borosilicate lining system, then there will **no** insulation outside the liner and consequently there will be corossion protection paint on external surface of liners. Please confirm.	Bidders understanding is correct.
418	VI/A	V	Page 9 of 21	4.01.05	The top flue liner above the roof slab shall be made of solid C276 (ASTM B575, UNS N10276) / Titanium (Grade 2 as per ASME SB265) of minimum 10 mm thickness.	1. Inside surface of chimney liner above roof shall be either clad steel (Titanium or C276) or borosilicate lining system as per specification. 2. External surface of chimney flue liner above chimney roof shall be wrapped with 2 mm thick Titanium / C-276 sheet over insulation, for all the cases. Please Confirm.	NTPC clarified that the top flue liner above the roof slab shall be made of solid C276 / Titanium (Grade 2 as per ASME SB265) of minimum 10 mm thickness in all the cases. Also, external surface of chimney flue liner projecting over the chimney roof shall be wrapped with 2 mm thick Titanium / C-276 sheet over insulation, for all the cases.
419	VI/A	V	Page 9 of 21	4.01.06	External surface of chimney flue liner projecting over the chimney roof shall be wrapped with 2mm thick Titanium/C-276 sheet over insulation.		
420	VI/A	V	Page 9 of 21	4.01.05	The minimum length of flue liner projecting over the chimney roof shall be atleast equal to diameter of flue liner.	The maximum length projecting above the chimney roof shall be 6m as per standard practice. Please confirm.	NTPC clarified that the minimum length of flue liner projecting over the chimney roof shall be atleast equal to diameter of flue liner as per requirement.
421	VI/A	III-A1	Page 9 of 9	24.00.00	Wet stack condensate collection system	Please provide the detailed material specification for condensate collection system.	NTPC clarified that the specified requirement shall be considered by the bidder.
422	VI/A	III-A1	Page 9 of 9	24.00.02	Drain piping shall be of suitable material from corrosion point of view.	Please provide the detailed material specification for condensate drain pipe.	NTPC clarified that the specified requirement shall be considered by the bidder.
423	VI/A	III-A1	Page 9 of 9	24.00.04	The design of the stack condensate collection system shall be provided by the bidder in its bid.	The design of the stack condensate collection system shall be provided during detailed engineering. Please confirm.	Specification requirement shall be considered by the bidder.
CAS							

S. NO.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC'S CLARIFICATION
	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
424	SECTION-VI / PART-B	I-M3 COMPRESSED AIR SYSTEM	1 OF 6	2.02.00	Design and Construction – **For Compressor**	MOC of all components within compressor skid shall be as per OEM standard. The MOC and design of all components outside the skid shall be as per technical specification/NIT. This is being followed in all the projects executed by Bidder for NTPC and other customers. Pl. accept.	Technical specification is in order . Bidder to comply with Technical specification requirement. However any superior MOC shall also be acceptableas per Manufacturing Standard and Proven Design.
425	SECTION-VI / PART-B	I-M3 COMPRESSED AIR SYSTEM	2 OF 6	4.00.00	Intercooler, Aftercooler & Oil coolers (For Screw)		
426	SECTION-VI / PART-B	I-M3 COMPRESSED AIR SYSTEM	5 OF 6	9.02.01	Each compressor shall be in the control panel to operate either in Base duty (Auto Load-Unload) or Standby duty (Auto On-Off) mode in case of Screw and unload/modulate/energy optimization (Auto Dual Mode) in **case of centrifugal**	Bidder understands that Centrifugal type air compressors are not applicable for such smaller capacity machines. However, bidder request NTPC to furnish the option for reciprocating compressors, being smaller capacity compressors. NTPC to confirm.	Bidder understanding is correct that centrifugal type Air Compressor is not applicable. Tye of compressor shall be oil free screw type a sper clause 3.00.00 of Sub section IIIA -2 , section VI.
427	SECTION-VI / PART-B	I-M3 COMPRESSED AIR SYSTEM	5 OF 6	9.01.06	The following indications shall be made available in the control panels for repeating the same in **main plant control system** / panels.	Bidder understands that the required indications shall be made in FGD control room and not in main plant control room. NTPC to confirm.	Bidder's understanding is correct
428	SECTION-VI / PART-A	III-A2 AIR CONDITIONING, VENTILATION SYSTEM & COMPRESSED AIR SYSTEM	3 OF 4	3.00.00(a)	Two numbers (1 W + 1S) oil free, rotary screw type air compressors for Instrument air & service air application for.....	1.) Bidder understands that the common compressor is to be provided for Instrument air & Service application. Pl. confirm. 2.) NTPC to confirm whether the common piping network to be provided for Instrument air and Service air application for plant use or a separate network of Instrument air & Service air to be provided. Pl. confirm.	Bidder's understanding is correct. Bidder to refer Tender drawing of Compressed air system. 00-11-109(2)-POM-A-007
429	SECTION-VI / PART-A	VI FUNCTIONAL GUARANTEES & LIQUIDITY DAMAGES	24 OF 30	xxiii	Total power consumption at motor input terminal at rated duty of air compressor.....	Bidder request NTPC to specify the duty factor for considering the auxiliary power consumption for Compressed air system. As the continuous consumption of compressed air will be much lesser than the rated compressor capacity specified by NTPC. In such case, the compressor will go under unload conditions for a considerable time and thus lower power requirements. We request you to specify duty point for air compressors.	Duty point shall be 1.0. Bidder to comply with specification requirement.
CRANE EH & CPB							
430	SEC VI, PART-B	I-M1	36 OF 52	14.09.00	Contractor shall provide motorized hoists and trolleys for all items requiring maintenance and weighing 500 kg or more. Items weighing more than 50 kg and required to be replaced for maintenance shall be provided with manual hoists/trolleys with runway beams/supporting structure etc.	Referred clauses are contradictory w.r.t selection of electric or manual hoist. We shall follow clause 9.09.00 of sub-section V/Section VI Part A for selection of electric or manual hoist. Kindly confirm. Further considering the layout constraints, it may not be feasible to provide hoists with trolleys for all equipment/component above 50 kg in the plant. We shall provide two nos. portable chain pulley (2T cap.) blocks to meet general handling re-quirements.	Bidder to comply specification requirement for the respective areas.
	SECTION – VI PART-C		5 OF 83	7.02.00	Lifting devices i.e. hoists and chain pulley jacks ,etc. shall be provided by the contractor for handling of any equipment or any of its part having weight in excess of 500 Kgs during erection and maintenance activities.		
	Section-VI, PART-B	I-M6	5 OF 41	4.03.03	Hoists- Drive (i) More than 2.0 tonne or more than 10.0 m lift or hoists coming out-side the buildings: Motor driven for both travel & lift. (ii) Other hoists including the hoists for handling take-up pulley and take-up weight: Manual for both travel & lift.		

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	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
431	SEC VI, PART-B	I-M1	36 OF 52	14.09.00	Access ladders with suitable platform shall also be provided for approach to all motorized hoists/trolleys mounted on their runway beams for the maintenance of hoists/trolleys.	Considering the layout & space constraints, it may not be feasible to provide all electric hoists with maintenance / repair platforms with handrails. Hence maintenance platform shall be provided depending upon feasibility.	NTPC clarified that the requirements stipulated in the specification shall be followed. Any layout specific issue shall be discussed and resolved during detailed engineering.
432	Section-VI, PART-A	Sub-Section-VII	-	-	MANDATORY SPARES:	No spares are mentioned for chain pulley blocks. Accordingly no mandatory spares shall be provided for chain pulley blocks. Please confirm.	NTPC clarified that scope as provided in the specification shall only be considered by the bidder.
433	SEC VI, PART-B	I-M5	151 OF 152	20.02.29	The control panel shall be wall mounted type and easily approachable from floor by a standing man.	The requirement is for ease of operation which is done by providing push button station at operable height. Control panels for electric hoists shall be hoist mounted. Wall mounted electric hoist will have festoon wire arrangement for power feeding which will form wire loop at one end of the travel resulting in lesser hook approach. Also, festoon wire arrangement will have roller type arrangement which requires frequent maintenance. In view of above, control panels will be hoist mounted with shrouded bus bar DSL for power feeding. This is in line with all other earlier Bidder executed projects for NTPC.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
434	SECTION – VI, PART-A	SUB-SECTION-VII	PAGE 29 OF 82	D-3) - 5)a	Electrical Items of Crane- Carbon brushes and brush holders for motors	For squirrel cage motors (preferred type for electric hoist) these items are not applicable.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
435	SEC VI, PART-B	SUB-SECTION-I-M5	143 OF 152	20.01.05	Creep speed to be achieved through pony motor and planetary gear box	Creep speed shall be achieved through variable voltage variable frequency drives. (pony motor and planetary gear box is old technology)	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
436	SEC VI, PART-B	SUB-SECTION-I-M5	144 OF 152	20.01.10	The hoist motors shall be provided with DC electro-magnetic brakes as well as Electro Hydraulic Thrust brakes.Electro -Hydraulic Thrust brakes shall be provided for cross travel & long travel.	Please note that Electro -Hydraulic Thrust brakes are required to be supported on platform, which for single girder cranes is not feasible. Due to space constraint EHT cannot be provided. Hence, for all motions (i.e. hoisting,CT & LT) brakes provided shall be DC electro magnetic type since the same can be directly mounted on motor.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
437	SEC VI, PART-B	SUB-SECTION-I-M5	144 OF 152	20.01.12	A platform shall extend to full length of the crane bridge on both sides of the bridge girder.	End platform is provided for maintenance of cranes. The crane girder is single girder type and provision for full length platform cannot be provided. Accordingly all other accessories mentioned elsewhere over crane bridge platform are also not applicable.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
438	SEC VI, PART-B	SUB-SECTION-I-M5	144 OF 152	20.01.14	The main hook shall be of Ramshorn type conforming to IS: 5749	Ramshorn hook as per IS 5749 is available for capacity 40T and above. For capacity less than 40T, Point hooks with Shank as per IS 15560 shall be used.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
439	SEC VI, PART-B	SUB-SECTION-I-M5	145 OF 152	20.01.15	Hoist motor shall be slip ring	For crane and hoists squirel cage inducation motors (preferred type for electric hoist) shall be used.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
	SECTION – VI PART-B	SUB SECTION-II-E2	2 of 9	3.01.00 (c)	Crane duty motors shall be slip ring/ squirrel cage Induction motor as per the requirement.		
440	SEC VI, PART-B	SUB-SECTION-I-M5	146 OF 152	20.01.18	DSL shall generally be on opposite side of the operator's cabin	Operator cabin is not applicable for single girder crane	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .

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441	SEC VI, PART-B	SUB-SECTION-I-M5	146 OF 152	20.01.21	The vertical deflection of crane girder shall not exceed 1/800 of the span	As per IS 807 the vertical deflection of the crane shall be 1/750 of the span of the crane (if the span of the cranes is more than 12m), and 1/600 of the span (if the span of the crane is less than 12m).	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
442	SEC VI, PART-B	SUB-SECTION-I-M5			General-	For SG EOT Crane, square bar shall be provided ,as rolled section (as per IS: 3443) for low capacity cranes are not available with manufacturers i.e. SAIL, JINDAL	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
443	SEC VI, PART-B	SUB-SECTION-I-M5	148 OF 152	20.02.03	The complete hoists assembly, wire rope, hook etc. shall be ISI stamped approved	BOI shall be sourced from approved Makes/ BIS approved suppliers.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
444	SEC VI, PART-B	SUB-SECTION-I-M5	149 OF 152	20.02.15	Lifting bar of adequate design ...	Lifting bar design shall be provided and supplied by the respective equipment manufacturer that has to be lifted.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
445	SEC VI, PART-B	SUB-SECTION-I-M5	150 OF 152	20.02.25	The contractor shall terminate two feeders of 415 V AC electrical power supply near one end of the monorail beam at ground level	One no incoming supply to each electric hoist shall be provided by a suitably located feeder, to be decided dur-ing detail engineering. Two feeders are not required	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
446	SEC VI, PART-B	SUB-SECTION-I-M5			General-	Power supply for electric hoists shall be from DSL arrangement.	Technical specification requirement is clear. However, Hoists/EOT cranes etc of proven design conforming to IS3938/IS3177/IS2266 and proven practice is also acceptable .
HVAC							
447	SECTION – VI, PART-A	SUB-SECTION-V	12 OF 21	6.02.01 a(ii)	AHU (with VVVFD): 2 X 100%	VVVFD are required if there are multiple areas within the air conditioned area, and there is intermittent requirement of air conditioning in these areas. However, considering the size and layout of FGD control room there shall not be any intermittent requirement of air conditioning in FGD control room. In view of the above VVVFD have not been envisaged. Please confirm.	Bidder understanding is correct . Bidder to refer relevant amendment in this regard.
448	SECTION – VI, PART-A	SUB-SECTION-V	13 OF 21	6.02.01 b	100% standby shall be provided for area served by Cassette / Hi-wall Split/ Ductable split AC/ Package type air conditioners for all other control rooms covered in the scope of this package	As per the standard practice (N+1) configuration is provided for Cassette / Hi-wall Split/ Ductable split AC/ Package type air conditioners, where N is number of working unit, to avoid fouling with other equipment's, facilities within the air conditioned area. NTPC is requested to accept the same.	Bidder understanding is correct . Bidder to refer relevant amendment in this regard.
MSE-WS							
449	VI/A	III-A4	2 of 88	2.01.00 (d)	4 x 50% (3 working + 1 standby) capacity of plate type heat exchangers.	Bidder understands that with 3W+1S PHE, the configuration shall be 4X33.33%. Please confirm.	Necessary amendement is being issued
450	VI/A	III-A4	2 of 88	2.01.00 (e)	5 x 50% (3 Working + 2 standby) capacity FGD Auxiliary (Secondary) Cooling water pumps, along with drives.	Bidder understands that with 3W+2S pumps, the configuration shall be 5X33.33%. Please confirm.	Necessary amendement is being issued
451	VI/A	III-A4	2 of 88	2.01.00 (f)	4 x 50% (3 Working + 1 standby) capacity FGD DM (Primary) cooling water pumps along with drives.	Bidder understands that with 3W+1S pumps, the configuration shall be 4X33.33%. Please confirm.	Necessary amendement is being issued
LAYOUT							
452	Section – VI, PART -A	Sub-Section III-A1	Page 7 of 9	14.00.00	The contractor scope shall also include the provision of FGD Trestle for routing of air & water lines, slurry lines, steam line, waste water, etc. required for the complete process operations.	It is understood that pipe racks need to be constructed in new area for FGD requirement. However, existing pipe racks shall be used for routing pipes related to FGD system wherever need to do so arises.	Bidder to comply with the specification requirements.
ELECTRICAL							
453	PART B/ SECTION-VI	II-E1	3 of 7	2.02.00	ALL MV INCOMERS FROM TRANSFORMERS & TIES BETWEEN SWITCHGEARS SHALL BE THROUGH BUS-DUCTS.	Because of layout constraint, we recommend connection between existing MV Switchgear & 11/6.6kV FGD Switchgear to be through MV Cable.	Technical specifications are clear and Bidder to comply specification requirement.
454	PART B/ SECTION-VI	II-E4	4 of 6	2.14.00 & 3.01.00	2.14.00: All cables shall be armoured type. 3.01.00: 1.1 KV grade XLPE power cables shall have compacted aluminium conductor, XLPE insulated, PVC inner-sheathed (as applicable), armoured/ unarmoured, PVC outersheathed conforming to IS:7098. (Part-I).	These two clausses are in contradiction. All cables shall be unarmoured type. Cables shall be armoured type if laid in CHP area, directly buried and FGD Lime Stone and Gypsum Handling area. This is in Ine with NTPC LOT-1A and 1B projects.	Bidder to follow clause no:- 2.14.00 of sub section-II/E4 of technical specification. Also Refer amendment for the same

S. NO.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC'S CLARIFICATION
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455	PART B/ SECTION-VI	II-E4	4 of 6	4.00.00. (c)	The standard drum length of LT power cable with a maximum tolerance of +/- 5% may be decided by the bidder subject to condition that there shall not be any joint in cable, where application length of cable is up to & including 1000 meter for single core cable excluding 630 sq.mm size, and 750 meter for multicore cable & single core 630 sq.mm.	Standard length for LT cables shall be 500/ 750/1000m, to avoid wastage.	Technical specifications are clear and Bidder to comply with clause no:- 4.00.00.c of sub section-II/E4 of technical specifications
456	PART B/ SECTION-VI	II-E5	4 of 6	2.14.02 & 3.01.00	2.14.02: All cables shall be armoured type. 3.01.00: 1.1 KV Grade Control Cables shall have stranded copper conductor and shall be multicore PVC insulated, PVC inner sheathed, armoured / unarmoured, FRLS PVC outer sheathed conforming to IS: 1554. (Part-I).	All cables shall be unarmoured type. Cables shall be armoured type if laid in CHP area, directly buried and FGD Lime Stone and Gypsum Handling area. This is in lne with NTPC LOT-1A and 1B projects.	Bidder to follow clause no:- 2.14.02 of sub section-II/E5 of technical specification. Also Refer amendment for the same
457	PART B/ SECTION-VI	II-E6	10 of 23	3.08.01 & 4.04.04	Trefoil clamps shall have adequate mechanical strength, when installed at 1 mtr intervals, & Single core cable in trefoil formation shall be laid with a distance of four times the diameter of cable between trefoil center lines and clamped at every two metre.	There is a contradiction in the specification. We are considering that the trefoils shall be clamped at every 2 meters. Please confirm.	Bidder to follow clause no:- 3.08.01 of sub section-II/E6 of technical specification. Also Refer amendment
458	PART B/ SECTION-VI	II-E6	13 OF 23	5.01.00	Earthing System: Earthing system network/earthmat shall be interconnected mesh of mild steel rods buried in ground in the plant.	Ring electrode type grounding system is envisaged using mild steel rod material for limiting the ground resistance below 1 ohms, which will be connected to main plant ground grid mesh at two points. Hence, ground grid mesh for FGD area not considered. Please confirm.	Technical specifications are clear and Bidder to comply with clause no:- 5.01.00 of sub section-II/E6 of technical specifications
459	PART B-II/ SECTION-VI	II-E7	4 of 7	2.16.04	All Cables shall be armoured type.	All HT cables shall be unarmoured type. Cables shall be armoured type if laid in CHP area, directly buried and FGD Lime Stone and Gypsum Handling area. This is in lne with NTPC LOT-1A and 1B projects.	Technical specifications are clear and Bidder to comply with clause no:- 2.16.04 of sub section-II/E7 of technical specifications
460	PART B-II/ SECTION-VI	II-E7	5 OF 7	4.01.03	The standard length of HT Cable shall be 1000m for all single core.....750m for 3 core cable.	Standard length for single core and 3 core cable HT power cable shall be 500/750m so as to avoid wastage.	Technical specifications are clear and Bidder to comply with clause no:- 4.01.03 of sub section-II/E7 of technical specifications
461	PART B/ SECTION-VI	II-E15	10 OF 18	4.04.00	Lighting Masts	Number of Lighting Masts is not specified in the specification. Please confirm the minimum number	The same shall be decided during detailed engineering
462	PART B/ SECTION-VI	II-E16	01 OF 13	1.00.00 & 9.00.00	Battery Health Monitoring System & DC Health Monitoring system	As per clause 1.00.00 DC health monitoring system shall be offered integral with each battery set for main plant and switchyard battery. We understand that Battery & DC health monitoring system is excluded from bidder's scope of supply for 220V DC Battery for FGD area. Please Confirm.	Confirmed. The referred clauses are not part of the specification
463	PART C/ SECTION-VI	--	74 OF 83	--	GENERAL TECHNICAL REQUIREMENTS-Public Address system	Requirement of Public Address system is not mentioned anywhere in the specification except in this clause (Applicable code and standards for Public Address System) hence Public Address System is excluded from bidder's scope of supply for FGD area. Please confirm.	Bidder's understanding is correct.

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464	SECTION – VI, PART-B TECHNICAL SPECIFICATION BID DOC. NO. CS-0011-109(2)-2	SUB-SECTION II-E-20 CONTROL AND PROTECTION	10	5.04.00	Integration of Bus bar Protection with existing scheme	1) Kindly confirm that the existing BUS BAR Protection Numerical Relay shall have facility/provision to include additional 2no FGD bays. 2) Furnish the GA & Schematics of existing BUS BAR Protection panels.	Confirmed however bidder is requested to visit the site and collect the required details.
465	SECTION – VI, PART-B TECHNICAL SPECIFICATION BID DOC. NO. CS-0011-109(2)-2	SUB-SECTION II-E-20 CONTROL AND PROTECTION	10	5.04.01	Islanding Scheme	1) Trip relay for additional two no FGD bay shall be provided in FGD protection panel. No separate panel is envisaged. Kindly confirm. 2) Furnish the GA & Schematics of existing islanding panel.	Confirmed however bidder is requested to visit the site and collect the required details.
466	SECTION – VI, PART-B TECHNICAL SPECIFICATION BID DOC. NO. CS-0011-109(2)-2	SUB-SECTION II-E-20 CONTROL AND PROTECTION	10	5.05.00	Integration of Energy Meter with existing	We understand that standalone energy meters are envisaged. No interfacing of upcoming meters with existing meter is required. Kindly clarify.	Integration with existing ABT energy metering system is in the scope of the bidder. May refer to part-A, subsection-IIIB Clause no1.06.00(f) of the technical specification.
467	SECTION – VI, PART-B TECHNICAL SPECIFICATION BID DOC. NO. CS-0011-109(2)-2	SUB-SECTION II-E-20 CONTROL AND PROTECTION	10	5.05.00	Dummy panels shall be supplied for mounting of owner's supplied energy meters.	Kindly confirm whether dummy panel is required for additional 2 no. transformer(FGD) bay.	Dummy panels are not required for FGD bays. Same shall be amended in the Technical specification.
468	SECTION – VI, PART-B TECHNICAL SPECIFICATION BID DOC. NO. CS-0011-109(2)-2	SUB-SECTION II-E-20 CONTROL AND PROTECTION	Protection SLD for 220/34.5KV FGD TIE Transformer			50LBB1, 50LBB2 Protection is shown in Proetction SLD.Kindly confirm whether separate LBB potection is required or shall be use as a part of built in existing 220KV Bus Bar Protection relay.	Separate LBB Protection is required.
469	SECTION – VI, PART-B TECHNICAL SPECIFICATION BID DOC. NO. CS-0011-109(2)-2	SUB-SECTION II-E-20 CONTROL AND PROTECTION		3.00.00,4.00.00,5.00.00		Kindly furnish the existing SAS drawings like System Architecture, Netwroking panel drawing. Details of Gateways, Modems, Ethernet switches, Time synchroniser for each of the following projects 1) SIMHADRI 2) TALCHER 3) SIPAT 4) MUZAFFARPUR 5) VALLUR 6) BHILAI 7) ROURKELA. The details are required in order to enable us to qoute against the enquiry.	220kV Bay addition is applicable for Talcher Project only. SAS is not envisaged in existing system at Talcher.
470	SECTION – VI, PART-E	ELEC. SINGLE LINE DIAGRAM	61 TO 66	0011-109(2)-POE-J-001/A-F	Necessary Augmentation & Modification in existing switchgear shall be in bidder's scope.	Please confirm the OEM for existing HT switchgear for the projects covered under this tender. 1) Talcher I & II 2) Simhadri I & II 3) Sipat 4) Vallur 5) Bhilai 6) Rourkela 7) Muzaffarpur	Bidder is requested to visit the site and collect the required details.
	SECTION – VI, PART-B	SUB SECTION-II-E9 HT SWITCHGEAR	--	--			

S. No.	Reference				NTPC Specification Requirement	Bidder's Query	NTPC's Clarification
	Sec/ Part	Sub-Section	Page No	Cl. No			
471	SVI (Part C)		22 of 83	13.01.00	All the first fills of consumables and one years topping requirement of consumables such as greases, oil, lubricants, servo fluids / control fluids, gases and essential chemicals etc. which will be required to put the equipment covered under the scope of specifications, into successful commissioning / initial operation and to establish completion of facilities shall be supplied by the Contractor	NTPC to clarify if the spares & topping consumables, on receipt at site will immediately be taken over and stored in their stores or the materials need to kept in our stores & handed over separately at the end of project.	NTPC clarified that the spares and topping consumables supplied as per the requirement of the specifications shall be taken over immediately.
472	SIII (BDS)		20 of 28	10.1	Mandatory spares are to be supplied along with respective main equipment.		

S. NO.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC'S CLARIFICATION
	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
MSE-Water system							
473	III-A4	5 of 88	5.01.00, Cl. (a)	5.01.00, Cl. (a)	(a) One cold water header tapped from CW Blowdown from the existing blow down header available near FGD area.	Please note provisions for FGD cooling water & Process water are already envisaged. Further CW Blowdown is fully utilized in CHP & AHP of Main plant so tapping for process water from CW blowdown cannot be envisaged as mentioned in cl. no. 5.01.00 (a) of technical specification. In view of above, we undersatand that additonal cooling water & process water along with various equipment specified in cl. no. 5.01.00 & tender P&ID for FGD system is not required. Please confirm.	Bidder 's query is not clear. Bidder to comply the specification requirement.
474	VI/A	III-A4	5 of 88	5.01.00, Cl. (b)	(b) Hot secondary water pipe (ACW) from the PHE's, discharging into the FGO system as process water. Provision for recirculation of hot secondary water line to CW blow down header shall also be provided.		
475	VI/A	III-A4	5 of 88	5.01.00, Cl. (c)	(c) 2x100% capacity self-cleaning strainers on the secondary side.		
476	VI/A	III-A4	5 of 88	5.01.00, Cl. (d)	(d) 2 x100% (1 working + 1 standby) capacity of plate type heat exchangers.		
477	VI/A	III-A4	5 of 88	5.01.00, Cl. (e)	(e) 3 x 100% (1 Working + 2 standby) capacity FGD Auxiliary (Secondary) Cooling water pumps, along with drives.		
478	VI/A	III-A4	5 of 88	5.01.00, Cl. (f)	(f) 2 x 100% (1 Working + 1 standby) capacity FGD DM (Primary) cool ing water pumps along with drives..		
479	VI/A	III-A4	5 of 88	5.01.00, Cl. (g)	(g) One Overhead DM water tank (ECW O/H tank).		
480	VI/A	III-A4	5 of 88	5.01.00, Cl. (h)	(h) Alkali (Sodium Hydroxide) preparation tank, agitator and motor, piping, valves etc.		
481	VI/A	III-A4	5 of 88	5.01.00, Cl. (i)	(i) Piping for initial makeup to ECW tank from existing OM water transfer pump, piping for emergency makeup to ECW tank from condensate transfer pump, other piping, fittings, supports, valves.....		
482	VI/E	Tender drg: P&ID for ECW system for FGD	-	Tender drg no: 011-109(2)-POM-A-004	Pumps, PHE, SCS, DM oerhead tank, piping,valves etc.		

Sl. No.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC'S CLARIFICATION
	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
483	PART - E TENDER DRAWINGS	SECTION – VI	63 of 66	0011-109(2)-POE-J-001/C, Rev-B	Electrical single line diagram for FGD Package TALCHER STPP - I & II	Please kindly provide the following drawings for Existing 220kV AIS Switchyard of TALCHER STPP - I & II :- i) 220kV Switchyard Layout. ii) 220kV Switchyard Section. iii) 220kV Switchyard Earthmat Layout. iv) 220kV Switchyard Illumination Layout. v) 220kV Switchyard Erection Key Diagram. vi) 220kV Switchyard GA Drawing. vii) 220kV Switchyard Hydrant / Fire-fighting Layout. viii) Contour map of the switchyard area ix) Structure loading diagram for switchyard.	These drawing if required shall be provoided during detailed enginnering subject to availability of the same to the succesful Bidder. Further, Bidder is also requested to visit the site and collect all the required details.
484	-	-	-	TSTPS- Dwg No - 4330-999-POC-F-002, Rev-5	General Layout Plan	Please kindly demarcate existing 220kV AIS Switchyard in subject TSTPS GLP since same is not visible in GLP.	Refer amendment in GLP
485	PART - E TENDER DRAWINGS	SECTION – VI	63 of 66	0011-109(2)-POE-J-001/C, Rev-B	Electrical single line diagram for FGD Package TALCHER STPP - I & II	Subject SLD mentions "33kV Tie Switchgear in Switchyard Area (2000A)" - please confirm where this switchgear is to be located - in existing switchyard control room building (sufficient space available ?) or by extension of existing switchyard control room building or in separate new standalone room.	33kV tie switchgear shall be housed in separate new standalone building.
486	-	-	-	TSTPS- Dwg No - 4330-999-POC-F-002, Rev-5	General Layout Plan	i) Please kindly provide plan (floorwise) & elevation of existing TSTPS switchyard control building for estimation purpose please. ii) Also please confirm number of stories of existing switchyard control building.	These drawing if required shall be provoided during detailed enginnering subject to availability of the same to the succesful Bidder. Further, Bidder is also requested to visit the site and collect all the required details.

Sl. No.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC'S CLARIFICATION
	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
487	SECTION – VI, PART-A	III-B	2 OF 8	1.05.01	Scope of work shall also include modification as required at TSTPS Stage-I&II Switchyard control room.	i) Please kindly elaborate on scope of "modification as required" to be carried out at TSTPS Stage-I&II Switchyard control room for clarity please. ii) Please confirm whether any extension / dismantling is required to be carried out at TSTPS Stage-I&II Switchyard control room or if there is sufficient space to accomodate all ACDB,DCDB,Control & Relay panels and 33kV Switchgear in existing switchyard control building.	i) Modification in existing siwtchyard control room builidng shall be required to accommodate the system supplied by the Bidder for the Switchyard scope. Bidder to assess the same through site visit. ii) Bidder is also requested to visit the site and collect all the required details.
488	SECTION – VI, PART-A	III-B	3 OF 8	1.06.00 d)	d) Extending AC/DC supply from owner's existing ACDB/DCDB in switchyard area.	i) Please confirm location of existing ACDB & DCDB. ii) Please confirm if existing ACDB & DCDB have sufficient number of spare feeders in order to cater to 2 nos. 220kV AIS Switchyard extension bays in scope. iii) If not , please provide SLD of new ACDB to be provided and please confirm its power source. iv) If not , please provide SLD of new DCDB to be provided and please confirm rating of new battery to be provided (if any) for 2 nos. 220kV AIS Switchyard extension bays in scope. v) We understand that any new switchyard Auxiliary transformer is not required to be provided for subject scope of 2 nos. 220kV bay extension.Please confirm.	i) Existing ACDB and DCDB for switchyard are located in switchyard control room building. ii) Confirmed. Owner shall provide DC and AC feeders for two number 220kV bays. iii) NA iv) NA iv) Confirmed

Sl. No.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC'S CLARIFICATION
	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
489	SECTION – VI, PART-A	III-B	2 OF 8	1.05.02	Cable trenches	i) Please confirm whether cable trenches are existing in 220kV AIS switchyard and no new cable trench is required to be provided since 2 nos. 220kV AIS Bay extension appear to be located in between existing bays of 220kV AIS Switchyard as per SLD. ii) Please conirm that existing main trench to control room have sufficient space to accommodate cables for these two new bays.	Bidder to asses the adequacy of the space in exiting cable trench through site visit, incase of any additional cable trench/tray is required for the laying of the cables for the Switchyard scope , same shall be in the scope of the Bidder.
490	SECTION – VI, PART-B	SUB SECTION II-E-19 SWITCHYARD ELECTRICAL	2 OF 44	1.01.08	For 220kV Switchyard, the existing Busbar is of quad/twin moose.	i) We understand that "existing busbar" in subject clause refers to 220kV existing switchyard Main Bus-I & II and Transfer bus. Please confirm. ii) We understand that only 2 nos. 220kV Jack Bus & droppers/jumpers to main/transfer bus is to be constructed - please confirm. iii) Please confirm type & runs (twin/quad) present in existing jack bus/bays.	i) Confirmed ii) & iii) This shall be as per the developed layout during detailed enginnering
491	SECTION – VI, PART-B	SUB SECTION II-E-19 SWITCHYARD ELECTRICAL	2 OF 44	1.01.11	The various minimum heights of the switchyard shall be same as followed in existing switchyard.	Please kindly provide Existing 220kV Tower & Beam & equipment structure & foundation drawings of Existing 220kV AIS Switchyard of TALCHER STPP - I & II for estimation purpose please.	Bidder to collect these information through site visit., if required for estimation purpose.
492	SECTION – VI, PART-A	III-B	2 OF 8	1.05.00	SWITCHYARD	We understand that scope of switchyard extension is only appicable for Talcher STPS only and not for any other power plant in subject FGD Lot-II tender. Please confirm.	Bidder understanding is correct.
493	-	-	-	TSTPS- Dwg No - 4330-999-POC-F-002, Rev-5	General Layout Plan	Please kindly demarcate/indicate in GLP the location of 2 nos. 100MVA, 220/34.5kV FGD Tie Transformers - #1 & #2 in existing 220kV AIS switchyard since same is not visible in GLP.	Refer amendment in GLP
494	SECTION – VI, PART-B	SUB SECTION II-E-19 SWITCHYARD ELECTRICAL	2 OF 44	1.01.11	The various minimum heights of the switchyard shall be same as followed in existing switchyard.	Please kindly provide Existing 220kV Tower & Beam & equipment structure & foundation drawings of Existing 220kV AIS Switchyard of TALCHER STPP - I & II for estimation purpose please.	Bidder to collect these information through site visit., if required for estimation purpose.

Sl. No.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC'S CLARIFICATION
	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
495	SECTION – VI, PART-B	SUB SECTION-II-E9 HT SWITCHGEAR	9 OF 38	4.2.00	"33kV Tie Switchgear in Switchyard Area (2000A)" - Circuit Breaker	i) Please confirm if Bidder make 33kV Switchgear having SF6 Circuit Breaker (33kV GIS) can be alternatively provided for "33kV Tie Switchgear in Switchyard Area (2000A)". Brochure of same is enclosed for kind perusal (product already successfully supplied/under supply to several utilities including NTPC). Acceptance confirmation kinldy required from NTPC in this regard. ii) If acceptable, please kindly provide suitable technical specification / amendments (& Mandatory spares list) for the same.	33KV Vaccum Circuit Breaker/ Panel to be provided as per spec requirement. Hence, Bidder to comply the technical specification in this regard.
496	PART - E TENDER DRAWINGS	SECTION – VI	63 of 66	0011-109(2)-POE-J-001/C, Rev-B	Electrical single line diagram for FGD Package TALCHER STPP - I & II	i) We understand that number of feeders of "33kV Tie Switchgear in Switchyard Area (2000A)" indicated in subject SLD is final and no extra feeders are required. Please confirm. ii) Please kindly provide outgoing/incoming feeder ratings of "33kV Tie Switchgear in Switchyard Area " since same not available in subject SLD.	Refer ammended tender SLD for feeder details.
497	PART - E TENDER DRAWINGS	SECTION – VI	63 of 66	0011-109(2)-POE-J-001/C, Rev-B	Electrical single line diagram for FGD Package TALCHER STPP - I & II	i) Please kindly provide size & no. of runs of 33kV cables to be provided for incoming feeders from FGD Tie transformer to 33kV Tie Switchgear and further from 33kV Tie Switchgear to 33/11.5kV FGD HT Transformer #1-#6. ii) Please kindly confirm how to lay a) 33kV cables from FGD Tie transformer to 33kV Tie Switchgear b) from 33kV Tie Switchgear to 33/11.5kV FGD HT Transformer #1-#6 - in new cable trenches or in existing cable trenches. If existing cable trenches are to be utilised, please provide route layout drawings , lengths & sections of the same.	i) Sizing shall be carried out by bidder based on design criteria specified in tender documents. ii) Bidder is requested to visit the site and collect all the required details.
498	PART - E TENDER DRAWINGS	SECTION – VI	63 of 66	0011-109(2)-POE-J-001/C, Rev-B	Electrical single line diagram for FGD Package TALCHER STPP - I & II	It is observed that earth switches of Isolators & CT of Bus Coupler (bay #9), Spare Bays (bay#12 & bay#13) & Auto Transformer #2 bay are coloured red & legend of SLD indicates red marked scope as " Bidder's Scope". We understand that these are not in bidder's scope & tender scope is limited only to 2 nos. 220kV Bay extension (jack bus). Please confirm.	refer ammended tender SLD

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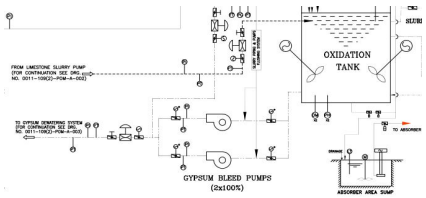
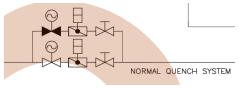
499	PART - E TENDER DRAWINGS	SECTION – VI	63 of 66	0011-109(2)-POE-J-001/C, Rev-B	Electrical single line diagram for FGD Package TALCHER STPP - I & II	Please kindly indicate all 220kV CT & CVT in 220kV extension bays in subject SLD for estimation purpose.	refer ammended tender SLD
500	SECTION – VI, PART-A	III-B	2 OF 8	1.05.02 II.	Material for earthing of all switchyard equipment and Gravel filling.	i) Please confirm depth of gravel filling to be provided for 2 nos. 220kV AIS Switchyard extension bays in scope. ii) We understand that any gates, fence, drains , internal switchyard service roads etc. are not required to be provided for 2 nos. 220kV AIS Switchyard extension bays in scope. Please confirm.	i) Gravel Filling shall be of two layer of 150mm (75mm layer of 20mm dia and 75mm layer of 40mm dia) ii) Bidder understanding is correct.
501	SECTION – VI, PART-A	IV TERMINAL POINTS & EXCLUSIONS	3 OF 3	1.13.01	Electrical Terminal points of Contractor's electrical scope, applicable for all systems/ subsystems described in relevant clauses for SCOPE is given below: ..... ii) Employer 220kV Bus at Switchyard (For TSTPS only)	We understand that subject clause refers to 220kV Main-1, 2 and Transfer Bus of 220kV existing AIS sub-station. Please confirm.	Bidder understanding is correct.
502	SECTION – VI, PART-A	III-B	2 OF 8	1.05.00	CONTROL & PROTECTION OF EHV SYSTEM FOR NEW BAYS	i) Please confirm that existing Bus bar protection system have sufficient capabilty for extention of two bays. ii) Please specify the details/make/scheme of existing 220kV switchyard CRP/SAS system.	1) Confirmed. 2) Bidder is requested to visit the site and collect the required details.
503	SECTION – VI, PART-A	III-B	2 OF 8	1.05.02 II.	Material for earthing of all switchyard equipment and Gravel filling.	Please clarify whether Main underground earthmat is already existing for two new bays or not. Please also specify grid spacing of underground earthmat in existing 220kV Switchyard.	Earthing connection to the equipment is to be extended through existing underground earth mat . Spacing of the underground earthmat is to be ascertained during enginnering by the succesful bidder through site assesment.
504	SECTION – VI, PART-A	III-B	2 OF 8	1.05.00	Study	Please confirm if insulation coordination study of LA for 220kV Switchyard is required to be conducted. Please confirm.	INSULATION CO-ORDINATION STUDY IS NOT REQUIRED HOWEVER LA AS INDICATED IN THE SLD ARE TO BE PROVIDED BY THE BIDDER.
505	SECTION – VI, PART-A	III-B	2 OF 8	1.05.00	Switchyard Civil Works	Please confirm whether any cutting or filling work and vegetation removal work is to be executed or not in 2 nos. 220kV bay extension area. We understand it is already at FGL only. Please confirm.	Minor grading as per technical specification is in Bidder's scope.
506	SECTION – VI, PART-B	SUB SECTION II-E-19 SWITCHYARD ELECTRICAL	5 OF 44	2.00.00	Switchyard 220kV Circuit Breaker	We understand that any CSD is not required to be provided in 220kV Circuit Breakers for subject 2 nos. 220kV AIS Bay extension.	Bidder to refer the Tendre SLD for the Same.

Sl. No.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC'S CLARIFICATION
	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
507	SECTION – VI, PART-A	III-B	2 OF 8	1.05.00	Illumination/HVAC/Fire-fighting	i) Please confirm whether additional illumination is to be provided in existing switchyard control room building. If required, please provide type/qty of fixtures to be provided. ii) Please confirm that any air-conditioning/ventilation/ fire-fighting is not required to be provided in existing switchyard control room building. iii) Please confirm whether hydrant or any other fire-protection system exists in 220kV switchyard bay extension area. If not, then please confirm type of fire-protection system to be provided and source of water in case of hydrant system to be provided.	I) & II) Air conditioning/Illumination/ fire fighting is already avaiable in the existing Switchyard control room building . However if any requirement arises due to modification under present scope , same shall be in the Bidder's scope. iii) Hydrant system in the existing Switchyard is available however same is to be extended up to the bays under the present scope by the Bidder.

S. NO.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC Clarification
	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
508	Section IV	GCC	New Definition		Common Facilty for multiunit project for the purpose of Completion of Facility	For the purpose of Completion of Facility please define the the components which are part of Common Facility and need to be completion with Unit-1.	All components of common facilities need to completed with Unit-1 for the purpose of Completion of Facility.

S. NO.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC Clarification
	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
509	VI/B	SUB-SECTION-I-M1 (FGD)	29 of 52	7.07.06	The Waste water Tank shall be complete with Agitator, level transmitters etc. The waste water collection tank shall be of Steel construction with rubber lining	Bidder shall envisage 3 mm thick Flake glass (Vinyle ester based) lining for Waste Water tank as per Clause no. 10.01.00 of TECHNICAL SPECIFICATION SECTION-VI BID DOC. NO.:CS-0011-109(2)-9 PART B SUB-SECTION-I-M1 (FGD): "Wastewater tank, Filtrate tank, Secondary hydro cyclone feed tank: Vinyl Ester based flake glass lining of minimum 3 mm thickness"	NTPC clarified that requirement of the specification shall be considered by the bidder.
510	VI/A	SUB-SECTION-III-A1 FGD	6 of 9	7.08.00	All the storage tanks shall be lined with replaceable chlorobutyl/bromobutyl rubber lining of minimum 4 mm thickness or with vinyl ester based flake glass lining of minimum 3 mm thickness from inside.	Bidder shall envisage water tank linings as per Specification Clause no. 13.03.07 of TECHNICAL SPECIFICATION SECTION-VI BID DOC. NO.:CS-0011-109(2)-9 PART B SUB-SECTION-I-M1 (FGD).	NTPC clarified that requirement of the specification shall be considered by the bidder.
511	VI/B	SUB-SECTION-I-M1 (FGD)	30 of 52	7.08.06	Suction screens shall be installed to protect the pump.	Suction screens are not applicable for auxiliary absorbent pump. Bidder shall provide Suction screens only inside the Absorber vessel to protect the Slurry recirculation pumps as per specification clause no. 5.06.23 of TECHNICAL SPECIFICATION SECTION-VI BID DOC. NO.:CS-0011-109(2)-9 PART B SUB-SECTION-I-M1 (FGD).	NTPC clarified that requirement of the specification shall be considered by the bidder.
512	VI/B VI/A	SUB-SECTION-I-M1 FGD SUB-SECTION-III-A1 FGD	7.07.07 & 7.07.10 2.06.00	29 of 52 2 of 9	The complete waste water neutralization…..automated and controlled from the control room. - Adequate storage and feeding system…..contractor scope - Bucket conveyors shall be provided by the contractor to feed lime to each of the lime storage silos from ground level... - Automated lime feeding & dosing system for Neutralization….	Employer is requested to furnish the following: 1) A detailed scheme for automated waste water neutralization system along with automated lime feeding and dosing system since same has not been shown in the Tender Drawing no. 0011-109(2)-POM-A-003, Rev-A, Scheme of Gypsum Dewatering System. 2) Please let us know the bulk density of Hydrated lime and weather this lime (supplied by Employer) will be in the form of bags or transported through trucks. 3) As Employer is arranging the Hydrated lime unto lime storage building this point needs to be incorporated in the Terminal Point Chapter (Section-VI, Part-A, Sub-section IV, Terminal Points & Exclusions). 4) Bidder understands that the lime will be manually feed to the Bucket elevator from the lime storage room.	NTPC clarified that lime shall not be hydrated. It shall be supplied in the form of bags by the employer.
513	VI/B	SUB-SECTION-I-M1 (FGD)	8.07.00	31 of 52	For Absorber Recirculation service a Silicon Carbide impeller and SiC lining for casing can also be accepted if manufacturer has supplied a similar pump for a previous installation for similar service.	Bidder also proposes the Absorber recirculation pump impeller with Hi-chrome/ Duplex Stainless steel material and SiC lining for casing as per manufacturer's proven practice in similar applications.	NTPC clarified that the requirement specified in the specification to be considered by the bidder.
514	VI/A	SUB-SECTION-VII MANDATORY SPARES	1.07.00	7 of 82	Gear box: 1 no. for each type and size of pump	Same may not be applicable for pumps which are V-belt driven, hence bidder shall not envisage any spares for these items for V-belt driven pumps.	NTPC clarified that applicability of the spares shall be established during detailed engineering.
515	VI/C	PART- C GENERAL TECHNICAL REQUIREMENTS	30.00.00	41 of 83	The equivalent "A" weighted sound pressure level measured at a height of 1.5 m above floor level in elevation and at a distance of one (1) meter horizontally from the nearest surface of any equipment/ machine, furnished and installed under these specifications, expressed in decibels to a reference of 0.0002 microbar, shall not exceed 85 dBA. However for Ball Mills the noise levels as per following shall also be acceptable: a) Ball Mill: < 90 dBA	Bidder shall follow the same noise level limit for Limestone Crushers as mentioned below: a) Ball Mill: < 90 dBA **b) Crusher: < 90 dBA** Employer is requested to confirm on Bidders understanding.	Bidder to comply technical specification.
516	VI/B	SUB-SECTION-I-M7 (LOW PRESSURE PIPING)	2.02.09	3 OF 16	Inspection holes shall be provided at suitable locations for pipes 800 Nb and above as required for periodic observations and inspection purposes.	Bidder has overground pipes in RC pump suction & discharge having size higher then 800 NB and there inspection holes are not being provided. So Bidder understands that this clause may be applicable for underground pipes only. Employer to confirm on Bidders understanding.	Bidder's understanding is correct.
517	VI/B	SUB-SECTION-I-M7 (LOW PRESSURE PIPING)	2.02.11	4 OF 16	For large size pipes/ducts, at high point and bends/change of direction of flow, air release valves shall be provided as dictated by the system requirement and operation philosophy & tripping conditions of pumping system. Sizing criteria for air release valves shall be generally on the basis of valve size to pipe diameter ratio of 1 :8. Requirement shall be decided as per relevant code.	Bidder understands that this clause is not applicable for Recycle Pump suction & discharge line. Employer to confirm on Bidders understanding.	Bidder's understanding is correct.
518	VI/A		1.25.00 (O)	54 of 82	Mandatory spares for Limestone & Gypsum handling system- Dust suppression system,..	As Dust suppression system is not applicable in Limestone & Gypsum handling system, this clause is not applicable	Refer amendment in this regard.

S. NO.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC Clarification
	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
519	VI/A	SUB-SECTION-III A1 FGD	5.04.00	5 of 9	The filtrate water from belt filter dewatering and wash water from washing system and the underflow from the secondary hydro-cyclone shall be taken to a common filtrate water tank. 2x100% pump shall be provided to supply wash water (for cake washing as well as belt cloth washing) to the belt filters.	-Filtrate water is not suitable for cake washing and belt cloth washing. Clarified water shall be provided for cake washing as per clause no. 7.04.07 mentioned in Technical Specification Section-VI Part B Sub section I M1 FGD & Pre NIT response to Clarification 3 (sr. no. 5) -Bidder proposes to use process water from process water pump (2x100%) for belt cloth washing, as filtrate may contain solids. Hence, separate pump (2x100%) for belt cloth washing is not envisaged.	Bidder is requested to refer Note 2 in the Gypsum Dewatering System Tender Drawing in this regard.
520	VI/B	SUB-SECTION-I M1 FGD	7.04.07	27 of 52	For cake washing only clarified water shall be used.		
521	VI/A	SUB-SECTION-VII - MANDATOR SPARES	1.17.00	10 of 82	Horizontal Centrifugal Pumps: Casing liners- 1 set of each type	Casing liner is not applicable for Water pumps. Hence bidder shall not envisage any mandatory spares for casing liners.	NTPC clarified that applicability of the spares shall be established during detailed engineering.
522	VI/B	SUB-SECTION-I M5	20.01.01	143 of 152	Electric Overhead Traveling (EOT) crane shall take care of erection/ maintenance requirement of pumps / blowers / machines and their associated auxiliaries for which these are being installed.	Bidder shall envisage Electric & Manual hoist as per clause 14.09.00, subsection I-M1, Vol. VI/B. Hence, EOT crane is not required & this is inline with Lot 1A/1B tenders.	Bidder to note that the refered Cl is applicable for Vallut TPP only and where EOT crane is envisaged.Bidder to comply the specification requirement.
523	VI/A	SUB-SECTION-VII - MANDATOR SPARES	1.09.00	65 of 82	Lime Feeders	Bidder understands Lime feeder means Limestone Weigh Feeder. Employer to confirm the same.	Bidder's understanding is correct. Bidder to comply with the specification requirement.
524	VI/E	0011-109(2)-POM-A-001	1 of 3 2 of 3 3 of 3			Bidder proposes Ceramic ball control valve in place of pinch control valve in slurry line (i.e. at Gypsum Bleed to absorber, Gypsum Bleed to primary HC, Reagent slurry to Absorber inlet as shown in tender drawing no. 0011-109(2)-POM-A-001 TECHNICAL SPECIFICATION SECTION – VI, PART-E) as per bidder's proven practice. Bidder does not have any references of pinch control valves being used in mentioned service which is not at all a good design alternative A mentioned in below reasons: • The rubber of the pinch valve is likely subject to a fast abrasion during the operation as a consequence of the high velocity in the contacted section and the rubber further reduces the area of passage. To be noted that such experience is relevant to an on/off service as well, while the control valve is permanently subject to the passage of fluid which is even worse for the material. • The actuation of a pinch valve exposes the rubber of the valve to a continuous movement that can further limit the lifetime of this component during the long term operation. Further, Ceramic ball control vale is superior to Pinch control valve. Hence employer is requested to accept bidder's proposal to use Ceramic ball control valve in this regard.	NTPC clarified that requirement of the specification shall be considered by the bidder.
525	VI/A	III-A5 (Limestone & Gypsum Handling system)	2 of 4	2.01.11	Pressurized Ventilation system for all Switchgear rooms, MCC rooms complete with all mechanical, electrical, accessories, civil and structural works.	Common switch-gear rooms & MCC rooms have been considered along with other FGD facilities. Hence, separate switchgear room and MCC room have not been considered for lime-stone/gypsum handling system. Employer to confirm bidder's understanding.	Final no. of switchgear and MCC rooms shall be decided during detailed engg. based on actual layout of FGD /lime-stone/ gypsum systems.
526	VI/A	III-A5 (Limestone & Gypsum Handling system)	4 of 4	3.07.00	Complete ventilation system for gypsum storage shed.	As this gypsum shed is one side complete open, hence ventilation system is not required.	Bidder to comply technical specification.
527	VI/A	III-A5 (Limestone & Gypsum Handling system)	2 of 4	2.01.15	Four (4} numbers of metal detectors (min. one no. on each conveyor feeding to crusher house and conveyor feeding to Limestone bunker at FGD plant)	Metal detector is not required between crusher house & Limestone day silo. Hence, 2 nos. metal detector will be provided before crusher house only, as limestone is stored at silo instead of limestone shed. Employer to confirm bidder's understanding.	Confirm, In case bidder proposed silo storage instead of shed storage then Metal detector after crusher is not required.
528	VI/A	III-A5 (Limestone & Gypsum Handling system)	2 of 4	2.01.16	Four (4) numbers of electronic type belt scales (min. one no. on each conveyor feeding to crusher house and conveyor feeding to Limestone bunker at FGD plant) for continuous weighing,	Belt scale is not required at limestone day silo as we are providing vibratory feeder which can be pre-set/regulated for limestone measurement. Hence, 2 nos. belt scale will be provided. Employer to confirm bidder's understanding.	In case bidder proposed silo storage instead of shed storage then weigh belt feeder after crusher shall be provided for feeding the bucket elevator.

S. NO.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC Clarification
	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
529	VI/E	DRAWING : 0011-109(2)-POM-A-001, Scheme of Absorber	1 OF 3 2 OF 3 3 OF 3		1. TENDER PFD indicated gate valve and butterfly valve for water application at Process water to normal quench valve island. 2. TENDER PFD indicated gate valve and butterfly valve for water application at Process water to Emergency Water Tank valve island. 	Bidder wish to clarify that gate valve shall be provided for water application to maintain consistency all over the Tender PFD. Employer to confirm on Bidders understanding.	NTPC clarified that requirement of the specification shall be considered by the bidder.
530	VI/E	DRAWING : 0011-109(2)-POM-A-001, Scheme of Absorber	1 OF 3 2 OF 3 3 OF 3		TENDER PFD indicated two gate valves (closed condition) in series at process water line to Absorber for water supply into Absorber.	Bidder wish to clarify that these valves shall be replaced with pneumatically operated glove control valve to regulate level of Absorber. Employer to confirm on Bidders understanding.	NTPC clarified that requirement of the specification shall be considered by the bidder.
531	VI/E	DRAWING : 0011-109(2)-POM-A-002, Scheme of FGD Milling System			TENDER PFD indicated two set of valve island (one set consist of one motorized gate valve+ one pneumatic butterfly valve + one manual gate valve) at water line to Limestone Slurry Storage Tank.	Bidder wish to clarify that desired slurry density is achieved in Ball mill system and reagent slurry with desired density is stored in Limestone Slurry Storage Tank. Limestone Slurry Storage Tank is use for slurry storage purpose only. Hence, water line (with valve island) to Limestone Slurry Storage Tank is not envisaged. Employer to confirm on Bidders understanding.	NTPC clarified that requirement of the specification shall be considered by the bidder.
532	VI/E	DRAWING : 0011-109(2)-POM-A-001, Scheme of Absorber and DRAWING : 0011-109(2)-POM-A-003, Scheme of Gypsum Dewatering System			1. TENDER PFD indicated valve island (MOV+On/Off Valve+Manual Valve, all butterfly valve) in filtrate line to Absorber from Filtrate water pump. 2. TENDER PFD indicated valve island (one MOV+one On/Off Valve+Manual Valve, all butterfly valve) in filtrate line to Absorber from Filtrate water discharge pump.	Two valve island (MOV+On/Off Valve+Manual Valve, all butterfly valve) in series indicated in filtrate water line at filtrate water pump common discharge. Bidder wish to clarify that one set of valve island (MOV+On/Off Valve+Manual Valve, all butterfly valve) is sufficient for filtrate water flow to absorber from filtrate water pump common discharge. Employer to confirm on Bidders understanding.	NTPC clarified that requirement of the specification shall be considered by the bidder.
533	VI/E	DRAWING : 0011-109(2)-POM-A-003, Scheme of Gypsum Dewatering System			TENDER PFD indicated pneumatically operated butterfly valve at Cake wash water pump suction and discharge for water application.	Bidder wish to clarify that gate valve shall be provided for water application to maintain consistency all over the Tender PFD. Employer to confirm on Bidders understanding.	NTPC clarified that requirement of the specification shall be considered by the bidder.
534	VI/E	DRAWING : 0011-109(2)-POM-A-003, Scheme of Gypsum Dewatering System			TENDER PFD indicated pneumatically operated butterfly valve at Cake wash water pump suction and discharge for water application.	Bidder wish to clarify that manual gate valve shall be provided at cake wash water pump suction for water application to maintain consistency all over the TENDER PFD. Employer to confirm on Bidders understanding.	NTPC clarified that requirement of the specification shall be considered by the bidder.
535	VI/E	DRAWING : 0011-109(2)-POM-A-001, Scheme of Absorber	1 OF 3 2 OF 3 3 OF 3		Scheme shows FI (Flow Indicator) and FT (Flow Transmitter) are installed in Booster Fan common discharge flue gas duct.	We understands that Flow Indicator (FI) is a digital display of electronic Flow Transmitter (FT). No separate Flow Indicator (FI) shall be envisaged in addition of Flow Transmitter (FT). Employer to confirm on Bidders understanding.	Bidder's understanding is correct.
536	VI/E	DRAWING : 0011-109(2)-POM-A-001, Scheme of Absorber	1 OF 3 2 OF 3 3 OF 3		Schemes shows DPT with DPI across ME in Absorber.	We understands that DP Indicator (DPI) is a digital display of electronic DP Transmitter (DPT). No separate DP Indicator (DPI) shall be envisaged in addition of DP Transmitter (DPT). Employer to confirm on Bidders understanding.	Bidder's understanding is correct.
537	VI/E	DRAWING : 0011-109(2)-POM-A-001, Scheme of Absorber	1 OF 3 2 OF 3 3 OF 3		Schemes shows FT in slurry recirculation pump common discharge line.	Slurry recirculation pump discharge line size is approximately 1200 to 1400 mm. Pressure measurement at same line shall be provided instead of flow measurement. Employer to confirm on Bidders understanding.	Bidder's proposal is not acceptable. Bidder to comply with the sepcification requirement.
538	VI/E	DRAWING : 0011-109(2)-POM-A-001, Scheme of Absorber	1 OF 3 2 OF 3 3 OF 3		NOTES 5: All instruments shall be provided with isolation valves.	Bidder wish to clarify that the following cases instrument isolation valve not envisaged. 1. Ultrasonic Level Transmitter 2. Guided wave Radar Level Transmitter 3. In-line mounted instruments like Rotameter/Density Meter/Magnetic flow meter etc. 4. Any non-contact type process measurement like ultrasonic principle type measurement 5. RTD and T/C 6. Annubar type flow measurement. Employer to confirm on Bidders understanding.	Noted. However same shall be discussed and decided during detailed engineering.
539	VI/E	DRAWING : 0011-109(2)-POM-A-001, Scheme of Absorber	1 OF 3 2 OF 3 3 OF 3		NOTES 10 : All slurry tanks shall be provided with field indicators for local level indication and other tanks shall be provided with level gauges for local level indication.	Bidder wish to clarify that local level gauges shall be provided for water tanks. Ultrasonic level transmitter with digital display shall be provided for slurry tank for local level indication. Hence, separate locate level gauge for slurry tank is not envisaged. Employer to confirm on Bidders understanding.	Bidder's proposal is not acceptable. Bidder to comply with the sepcification requirement.
540	VI/A	III-C (C&I SYSTEM)	16 OF 19	7.00.00	Bidder shall provide power supply distribution panels/cabinets/boxes for sub distribution of DC/Main UPS/Utility feeders on as required basis. The power supply distribution box shall include **change over circuitry**, switch fuse units, MCBs, terminal blocks etc. suitable for application.	Bidder understand that "change over circuitry" shall be applicable for Main UPS only. Non-UPS power shall be evenly distributed from three phase supply bus bar. 24V DC Charger shall have redundant panel. Hence, we are not envisaged "change over circuitry" in field mounted power distribution box.	Bidder's understanding is not correct. Bidder to provide "changeover circuitry" in power supply distribution panels/cabinets/boxes for sub distribution of DC/Main UPS/Utility feeders on as required basis.
541	VI/A	III-C (C&I SYSTEM)	2 OF 19	1.02.00	In this package fieldbus based controls and conventional controls (hardwired 4-20mA/DI/DO) both are envisaged.	Bidder understanding is that 1. Fieldbus (FF/Profibus) based field instrument and electrical motorized actuator shall be connected to DCS control system with fieldbus protocol. 2. Solenoid Operated Valve, Online Analyzers, CEMS, VMS and SWGR shall be connected to DCS control system with hardwired (4-20mA /DI /DO). Employer to confirm on Bidders understanding.	Bidders understanding is correct. As per specification all field transmitters (PT/DPT/TT) and motorized actuators shall be fieldbus (FF/Profibus) based and specification requirements are to be complied.

S. NO.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC Clarification
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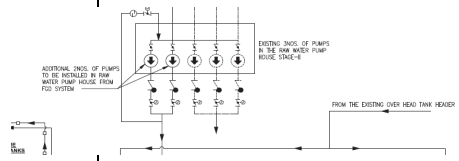
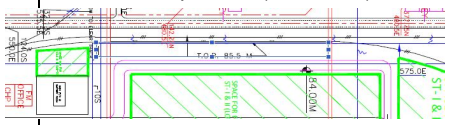
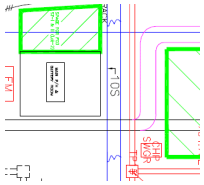
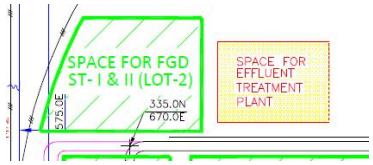
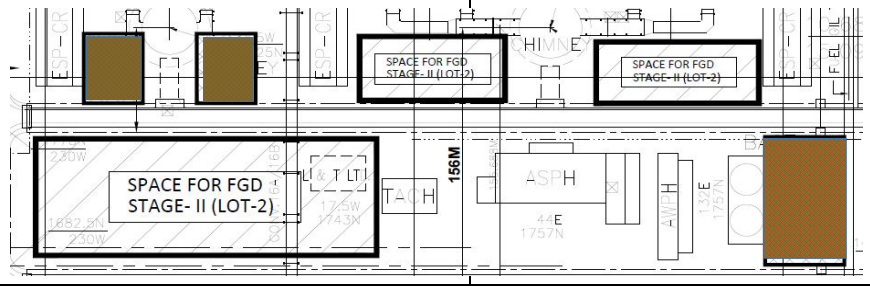
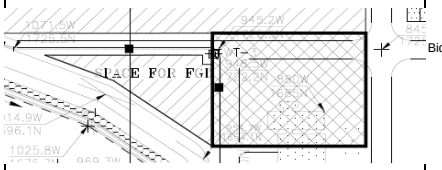
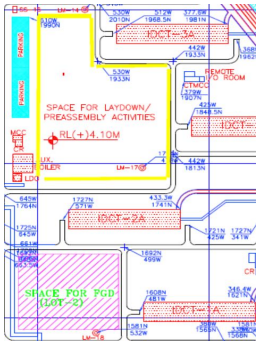
542	VI/A	III-C (C&I SYSTEM)	2 OF 19	1.02.01	Fieldbus based control system for fieldbus based actuators and fieldbus based instruments (PT/DPT/TT) shall be provided for all applications. In case non fieldbus based actuator or transmitters are required for few applications then the same shall be discussed and finalized during detailed engineering.	Bidder understand that all field transmitters (PT/DPT/TT) and motorized actuators shall be fieldbus (FF/Profibus-PA) based instruments. CEMS, Analyzer, Solenoid Operated Valves, others transmitter, SWGR and VMS shall be hardwired based equipments. Employer to confirm on Bidders understanding.	Bidders understanding is correct. As per specification all field transmitters (PT/DPT/TT) and motorized actuators shall be fieldbus (FF/Profibus) based and specification requirements are to be complied.
543	VI/A	III-C (C&I SYSTEM)	9 OF 19	3.01.01 (b)	All Instruments which are Integral to equipment like pumps, motors etc. /skid mounted instruments and are not indicated in enclosed drawings (as applicable)…	Bidder understand that all skid mounted instruments supplied by mechanical package supplier (like Booster Fan, Ball Mill, Vacuum Belt Filter, Recycle Pump and Oxidation Blower etc. shall be hardwired (4-20mA/DI/DO). Employer to confirm on Bidders understanding.	As per the refered clause 3.01.01 b), for skid mounted instruments "Specification / type of instruments shall be as per standard and proven practice of equipment supplier". Bidder to comply with the specification requirement.
544	VI/A	III-C (C&I SYSTEM)	15 OF 19	5.01.00 (b)	All power supply distribution cables required for directly connecting two equipment / systems devices in contractor's scope shall be provided by the contractor. All these cables shall be FRLS & as per IS-1554 Part – I latest edition.	Bidder understand that power cable from UPS-ACDB/CHARGER-DCDB/NON-UPS ACDB to field power distribution board shall be sized 3CX2.5sq.mm(copper conductor) and from power distribution board to field instruments shall be sized 3CX1.5 sq.mm (Cu conductor). Instruments power cable shall be sized 3Cx1.5 sqmm (Cu conductor) as minimum. Employer to confirm on Bidder's understanding.	Noted. However, sizing of power supply distribution cable shall be decided during detailed engineering complying with the referred specification clause 5.01.00 b).
545	Section-VI, Part-A	Sub-Section-III-B Electrical System/Equipment	2 of 8	1.05.01	Scope of Work shall also include modification as required at TSTPS Stage-I&II Switchyard Control Room	Bidder request to employer to provide the existing TSTPS Stage-I&II Switchyard Control Room details drawing. Bidder understood that modification shall be limited to inside the control room building (like modification of trenches, panel opening, busduct opening if any only. however any extension of existing control room building is not envisaged.	Bidder may visit site to assess the modification requirements. Further Bidder to note that the 33KV switchgear shall be placed in a separate new building to be constructed in switchyard area by Bidder.
546	Section-VI, Part-A	Sub-Section-III-B Electrical System/Equipment	2 of 8	1.05.01	Further the scope shall also include the cabling, lighting, lightning protection,…….	Bidder understood that proposed Transformers bays under protected through existing Direct stock lightning protection(DSLP) by Lighting mast(LM) & shield wire. Bidder understand that all necessary lighting fixtures shall be mounted on existing Tower /LM only. Hence bidder is not envisaged any addition Tower/LM.	Bidder has to furnish the DSLP calculation and establish that transformer bay along with transformer is protected from direct stroke, incase of unprotected zone, Bidder has to provoide suitable provision as per the specification requiremenrt. Further Bidder has to ensure required illumination level in the bay under Bidder's Scope.If possible at site existing structures for Lighting purpose may be utilised by the Bidder for mounting of additional Lighting fixtures as required.
547	Section-VI, Part-A	Sub-Section-III-B Electrical System/Equipment	2 of 8	1.05.02	220kV Equipment: Circuit Breaker, Isolator, Current transformer, Surge arresters, Bus Post Insulators etc.	Bidder understand that voltage Transformer (PTs) for transformer bays are not required.	Bidder to refer the Tender SLD for the same.
548	Section-VI, Part-A	Sub-Section-III-B Electrical System/Equipment	3 of 8	1.05.02	Armoured Power and control cables, cabling…..	Bidder understand that indicated power cables are excluding 33kV HT cables and bidder can use 33kV HT cables are unarmoured type.	All cables shall be armoured type as per specification requirement
549	Section-VI, Part-A	Sub-Section-III-B Electrical System/Equipment	3 of 8	1.06.00	b) Control, Relay protection panels, Relay test kit, Relay Engineering network comprising of one OWS(operator work station), one EWS(Engineering work station), one A4 color Printer, one TSE(Time Synchronization Equipment) and networking accessories as per specification.	Bidder request to employer to furnish the following details: 1. Detail list of Relay test kit. 2. Details of existing Relay Engineering network.	Bidder is requested to kindly visit the site, get acquainted with the existing schematics and procure relevant data.
550	Section-VI, Part-A	Sub-Section-III-B Electrical System/Equipment	3 of 8	1.06.00	c) Integration with exising RTU/SDH, existing Bus bar protection system….	Bidder request to employer to provide the existing RTU/SDH and Busbar protection details.	Bidder is requested to visit the site and collect the required details.
551	Section-VI, Part-A	Sub-Section-III-B Electrical System/Equipment	4 of 8	1.06.00	f) ABT based energy meters, integration with existing metering system and…..	Bidder understood employer will provide necessary PTs connection from existing system.	Bidder's understanding is correct
552	NTPC, Talcher Kaniha (6 x 500 MW) GLP 4330-999-POC-F-002 Rev-05	TSTPS GLP			20kV TSTPS Stage-I&II Switchyard Location	Bidder request to employer to provide the Latest layout (TSTPS GLP) with 220kV TSTPS Stage-I&II Switchyard (in present GLP we found only 400kV Switchyard)	Refer Amended GLP.
553	SLD ((0011-109(2)-POE-J-001/C Rev B	Talcher SLD			100 MVA, 220/34.5kV, FGD TIE Transformer & 2000A 33kV TIE Switchgear	Bidder understood that 220/34.5kV, FGD TIE Transformers & 33kV TIE Switchgears rating are indicative only. Actual rating shall be based on actual requirements/calculations.	Ratings indicated are the minimum ratings. Bidder to perform sizing/calculations and supply the higher of the calculated and minimum rating specified.
554	VI/A	SUB-SECTION-III-A1 SCOPE OF SUPPLY & GYPSUM DEWATERING SYSTEM	5 of 9	5.05.00	The gypsum slurry from each absorber shall be fed to a common primary hydrocyclone tank…….	The primary hydrocyclone feed tank may or may not be required depending on the layout and so the primary hydrocyclone tank is not envisaged for all the projects. The primary hydrocyclone feed tank is not required for Project with one Boiler unit.	NTPC clarified that requirement of the specification shall be considered by the bidder.
555	VI/B	SUB-SECTION-I-M1 TECHNICAL REQUIREMENTS	19 OF 52	5.06.07	The absorbtion tank shall be provided with an overflow line complete with sealing pot……	Seal loop shall be provided as per Bidder's proven practice	NTPC clarified that requirement of the specification shall be considered by the bidder. Any technology specific issues shall be discussed during detailed engineering.
556	VI/A	SUB SECTION – VI, FUNCTIONAL GUARANTEES & LIQUIDATED DAMAGES	23 of 27	6.00.00	The performance tests shall be carried out in accordance with ASME PTC 40 (1991) code.	The performance tests shall be carried out in accordance with ASME PTC 40 code latest edition 2017.	Bidder's understanding is correct. Amendment shall be issued.
557	VI	SUB SECTION - II-A5, PROJECT INFORMATION				Bidder request employer to provide Climatological data for following projects: 1. Simhadri 2. TSTPS	Refer amendment in this regard.

S. NO.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC Clarification
	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
558	VI	SUB SECTION - II-A5, PROJECT INFORMATION (TSTPS)	30 OF 34 & 31 OF 34	TABLE 4	TABLE 4 IS REFERRED FOR BOTH CW BLOWDOWN WATER ANALYSIS & CLARIFIED WATER ANALYSIS.	TABLE 4 IS REFERRED (TSTPS Project information) FOR BOTH CW BLOWDOWN WATER ANALYSIS & CLARIFIED WATER ANALYSIS. UNDER CW BLOWDOWN WATER ANALYSIS TWO DIFFERENT VALUES ARE GIVEN FOR SULFATE 124.95 & 276 mg/l. CONFIRM THE SULFATE VALUE TO BE CONSIDERED.	Sulphate content of 124.95 shall be considered.
559	VI/B	IV-D (Civil Works)	9 of 64	3.13.00	Booster Fan foundations shall RCC block foundation directly resting on virgin soil/pile below Ground level. The vertical faces of this block foundation shall be isolated from adjacent footings by providing minimum 100mm thick polystyrene board of type-1 conforming to IS: 4671 with density 20 Kg/cum sandwiched between the vertical face of block foundation and 230 thick brick wall all round.	Bidder propose to use frame type RCC foundation for Booster Fans to optimize the concrete quantity if the founding level in virgin soil is more than 3.0 m below FGL at site. All other specifications shall be followed as mentioned in this clause as they are.	Bidder to follow technical specifications
560	VI/B	IV-D (Civil Works)	32 of 64	19.00.00	All steel structures shall be fabricated in factory, transported and erected at site. All factory fabricated structures shall have bolted field connections.	Bidder requests to allow large diameter tanks, absorbers, ducts to be fabricated at factory in segments, transported and welded at site before erection or fabricated at site.	Bidder to follow technical specifications
561	VI/B	IV-D (Civil Works)	58 of 64	39.02.02	Medium and High Tensile Steel - Rolled Sections and plates shall be of grade designation E350 or higher, Quality B0 (Fully killed), conforming to IS 2062. Plates beyond 12mm thickness and up to 40mm thickness shall be normalized rolled. Plates beyond 40mm thickness shall be vacuum degassed & furnace normalized and shall also be 100% ultrasonically tested as per ASTM –A578 level B-S2.	Bidder proposes to allow usage of E350 or higher grade of steel of quality BR (Fully killed) conforming to IS: 2062 for its nominal usage in structural steel applications.	Bidder to follow technical specifications
562	VI/A	SUB-SECTION-IV TERMINAL POINTS & EXCLUSIONS	PAGE 2 OF 3	1.04.00	Process Water For process water requirement, Contractor shall take a tap off suitably from the existing blow down header available near FGD area except for coastal projects (Simhadri STPP & Vallur TPP).	Bidder request customer to specify available pressure in blow down header/TP .	Pressure available at terminal point will be furnished during detail engg.
563	VI/A	SUB-SECTION-IV TERMINAL POINTS & EXCLUSIONS	PAGE 2 OF 3	1.05.00	Sea water PT & Desalination plant applicable for Vallur TPP: i) Contractor shall take a tap off suitably from the existing CW blow down header (To CMB) available near the proposed Sea water PT & Desalination plant (as indicated in GLP). ii) Contractor shall terminate the discharge of backwash, cleaning & chemical waste and PT plant sludge into the existing CW blow down header (To CMB) available at 200 meter downstream of intake point to sea water PT & Desalination plant	Bidder request customer to provide material of construction used in existing CW blow down header conveying sea water. Bidder request customer to specify available pressure at TP locations. Bidder request employer to provide the CWBD pipe routing drawing so that bidder can take tapping at suitable location for PT&SWRO plant inline with Terminal point chapter.	Material of Construction of CWBD in the mentioned project is Internally Epoxy Lined MS Pipe. Exact Routing and Available Pressure at Terminal Point will be furnished during detail engg.
564	VI/A	SUB-SECTION-IV TERMINAL POINTS & EXCLUSIONS	PAGE 2 OF 3	1.08.00	Waste Water FGD waste water including that of LHP/GHP shall be sent to ash slurry sump after lime neutralization.	Bidder do not envisage any waste water in LHP/ GHP area, which require Lime neutralization. Hence, lime neutralization will be done only for FGD waste water. Employer is requested to confirm on Bidder's understanding.	It shall be discussed and resolved during detail engineering
565	VI/B	SUB-SECTION-I-M5 EQUIPMENT COOLING WATER SYSTEM	PAGE 19 OF 151	12.03.01.07	13. Service Lime slurry/Solution/Suspensions Recommended material Galvanized Steel	Bidder understands for limestone slurry application rubber lined carbon steel material is recommended instead of Galvanized Steel.	Bidder to comply the specification requirement.
566	VI/B	SUB-SECTION-I-M5 EQUIPMENT COOLING WATER SYSTEM	PAGE 20 OF 151	12.03.01.07	16. Chlorinated Water MSRL/CPVC above ground & HDPE pipe for below ground	Bidder wishes customer to confirm whether option for use of GRP pipes for chlorinated water is available or not for both above ground & under ground.	Bidder to comply the specification requirement.
567	VI/B	SUB-SECTION-I-M5 EQUIPMENT COOLING WATER SYSTEM	PAGE 21 OF 152	12.03.03.01	Pipes 50 NB and smaller shall have socket welded joints for chlorine line	Bidder understands this clause is applicable for only metallic pipes. For jointing non - metallic pipes procedure to be followed as mentioned in non metallic pipe specification.	Bidder's understanding is correct.
568	VI/B	SUB-SECTION-I-M6 LIMESTONE & GYPSUM HANDLING SYSTEM	Page 6 of 41	4.05.00	Service Water Service water connections are to be provided in conveyor galleries & tunnels at 50 meter interval and one (1) no. on each floor of Transfer Points, toilets and minimum two(2) nos. on each floor of crusher house.	Bidder understands Process water is only used as service water in LHS & GHS. Bidder wishes customer to specify source of Service water used in LHS & GHS if water used is different from Process water.	Refer Terminal Points of Exclusion of Part-A, Section-VI
569	VI/E	DRAWING : 0011-109(2)-POM-A-002 (SHT 1 of2), Scheme of PT plant for Simhadri				Bidder request Employer to provide the location of tapping point from existing Over head tank header for water being used for flushing	Exact location will be finalized during detail Engineering .
570	VI/B	IV-D (Civil Works)	9 of 64	3.14.01	The center to center distance between the proposed chimney(s) and the existing chimney(s) & NDCT in any direction shall not be less than 150 meters.	Considering the space available for FGD system for Bhilai (2x 250 MW) project, Bidder request to give approval for 140 m Centre to Centre distance between proposed & existing Chimney.	Bidder to comply technical specification.
571	VI/A	III (scope of supply & services)	5 of 6	1.11.00	Bidder shall utilize the area identified for FGD purpose. The area identified for FGD purpose in GLP shall be levelled and **free from obstructions like sheds, trees etc. and will be in owner's scope**. However, site clearance like removal of bushes, vegetation etc. is in bidder's scope.	Tree cutting may also be required during routing of flue gas duct Duct (From tapping point to absorber inlet), pipe/ cable trestles etc.. Bidder understand that the same shall also be in Employer scope along with FGD area.	Bidder's understanding is correct.

S. NO.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC Clarification
	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
572	NTPC, Talcher Kaniha (6 x 500 MW) GLP 4330-999-POC-F-002 Rev-05					Bidder request Employer to provide the following drawings (which is not available in drawing): 1. Stage I (Unit 1, 2) ID system elevation & plan drawing	Additional available drawings are being furnished as an Amendment. Further required drawings shall be provided during detail engineering subject to availability of the same. Bidder is requested to visit site for getting the required information in case of non-availablity of the drawings.
573	NTPC, Talcher Kaniha (6 x 500 MW) GLP 4330-999-POC-F-002 Rev-05					Based on site visit, bidder request Employer to provide additional space for FGD, between railway track & road (as marked below):  	Bidder to refer ammended GLP
574	NTPC, Talcher Kaniha (6 x 500 MW) GLP 4330-999-POC-F-002 Rev-05					During site visit, it was observed that there are some drain trenches available inside the FGD area , which is not marked in GLP. Bidder request Employer to provide existing drain trench layout of power plant showing drain trench routing in the area provided for FGD system.	Bidder to refer ammended GLP
575	NTPC, Talcher Kaniha (6 x 500 MW) GLP 4330-999-POC-F-002 Rev-05					During site visit, it was observed that road near main P/H & battery room is incorrectly marked in GLP. Bidder request Employer to provide the updated layout.  	Bidder to refer ammended GLP
576	NTPC, Talcher Kaniha (6 x 500 MW) GLP 4330-999-POC-F-002 Rev-05					During site visit, bidder has found that space marked for FGD facilities near Effluent treatment plant is much lesser than that shown in the GLP. Bidder request Employer to provide the markup for actual space available (dimensions) along with drain trench routing.  	Bidder to refer ammended GLP
577	NTPC, Sipat (3 x 660 MW) GLP 9518-999-POC-F-001 Rev-13					As per revised GLP, space provided by Employer for all three units FGD system is not sufficient. Based on site visit, bidder request Employer to check & provide additional space for FGD near existing BAST (2 nos. instead of 4 nos. marked in GLP) , as marked below & ID fan area of Unit 3  	Bidder to refer ammended GLP

S. NO.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC Clarification
	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
578	VI/A	SUB-SECTION-III-D CIVIL WORKS	Page 2 of 3	2.00.00	CONSTRUCTION FACILITIES 4.Providing all arrangements for the supply of construction water induding borewells, water tankers etc.	Based on feedback of site visit, we got the feedback that arranging construction water is cahllanging to meet the tender schedule as the complete project is on piling and have approx 30m piling for major equipments and buildings. In view of such a huge civil work and tender schedule, Bidder requests employer to provide the construction water for Vallur project either free of cost or chargeable basis with in plant premises.	BIDDER TO COMPLY WITH TECHNICAL SPECIFICATION
579	NTECL Vallur (3 x 500 MW) GLP NTECL Vallur GLP Drg No. 0260-999-POC-F-001 Rev-05					At present Space provided behind the U#2 &3 (Between 1600N - 1800 N and 800W-1200W) is within 150m radius of existing stacks. We request Employer to provide additional area as shown in below extract of GLP so that 150m radius criteria for existing and new wet stack can be fullfilled.  	Bidder to refer ammended GLP
580	NTECL Vallur (3 x 500 MW) GLP Drg No. 0260-999-POC-F-001 Rev-05					Bidder envisaged that as per layout planned for FGD facilities,the foundation for duct support may rest on the existing Chimney Foundation and accordingly employer is requested to allow Bidder for it.	Duct support foundation shall not be kept on chimney foundation
581	NTECL Vallur (3 x 500 MW) GLP Drg No. 0260-999-POC-F-001 Rev-05					Bidder envisaged that as there is no space available for providing the support structure to bypass damper which needs to be installed in existing ID fan outlet duct to Chimney. So load of bypass damper will be transferred on existing structure only and employer is requested to allow Bidder for it.	It shall be discussed and resolved during detail engineering.
582	NTECL Vallur (3 x 500 MW) GLP Drg No. 0260-999-POC-F-001 Rev-05					Bidder requests employer to interchange the "SPACE FOR LAYDOWN PREASSEMBLY ACTIVITIES" WITH SPACE FOR FGD provided in between IDCT-1A and IDCT-2A  	Bidder to accommodate the FGD facilities as shown in GLP
583	Simhadri 4 x 500 MW) GLP 3530-999-POC-F-001 Rev-05					Bidder request Employer to provide the following drawings (Which is not available in tender): 1. Stage I (Unit 1, 2) ID system elevation & plan drawing	Additional available drawings are being furnished as an Amendment. Further required drawings shall be provided during detail engineering subject to availability of the same. Bidder is requested to visit site for getting the required information in case of non-availablity of the drawings.
584	Vol. I to V	Section III BDS	20 of 28	10.1	Note: 1)Projects where FGDs are to be installed at more than 2 units, Execution shall be taken up in parallel in blocks of 2 units, hence executing agency shall work in parallel in each block of max 2 units and accordingly the schedule shall be applicable for each block of max 2 units separately. 2) The schedule given above is for 1st Unit of each block of max 2 units and Common facilities (U#1, U#3 & U#5 -as applicable). The activities specific to subsequent Unit of each block of max 2 units (U#2, U#4 & U#6-as applicable) shall be phased at an interval of 3 months, except for engineering activities which shall be completed along with 1st Unit.	Bidder request NTPC to consider any three units out of six for 32 Month completion and balance three in another 35 Months (Not necessarily in a unit sequence) Bidder also request Employer to furnish the shutdown period requirement for Damper erection in bypass duct.	NTPC clarified that the stipulations of the bidding documents shall be followed by the bidder.
585	**CIVIL POINTS**						
586	SECTION – VI, PART-A	SUB-SECTION-II-A1 Civil Works	7.02.01--e)	12 of 34	Before execution of work the bidder shall ensure that there is no obstruction to underground/over ground facilities like sewer lines, pipe lines etc. Any such damage and remedial/ rectification measures shall be at the contractors cost.	Bidder understands that overground obstruction such as existing pipes, cable racks, overground electrical lines etc shall be visualized during site visit. However to understand routing of existing underground facilities like sewer lines, pipelines etc, Bidder request owner to share construction drawings of existing	Available draing shall be provided during detail engineering. Bidder shall also ensure that there is no damage to existing facilities and nearby foundations. For underground facilities survey, Ground Penetration Radar (GPR) may be used.
587	SECTION – VI, PART-A	SUB-SECTION-II-A2 Civil Works	7.02.01--e)	9 of 29			
588	SECTION – VI, PART-A	SUB-SECTION-II-A3 Civil Works	7.02.01--e)	9 of 29			

S. NO.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC Clarification
	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
589	SECTION – VI, PART-A	SUB-SECTION-II-A4 Civil Works	7.02.01--e)	11 of 37		amenities so that bidder shall plan their amenities designated for FGD accordingly.	
590	SECTION – VI, PART-B	SUB-SECTION-IV-D Civil Works	4.01.00	16 of 64	Drainage System	Bidder clarifies that Employers existing drain invert level shall be necessary to plan the RCC drain(in the scope of Bidder) on which water from the pit in FGD area shall be diverted. So Bidder request Employer furnish the above information.	The details if available shall be provided at detailed engg. stage.
591	SECTION – VI, PART-B	SUB-SECTION-IV-D Civil Works	4.01.00	16 of 64	Contractor's scope shall also include construction of necessary culverts under the rail lines / roads as per railway / I. R. C. standards and approval of Railway culverts from concern Railway authorities.	Bidder understands that scope of design and construction of necessary culverts under the rail lines / roads as per railway / I. R. C. standards shall be in the scope of Bidder. However approval from concerned Railway Authorities shall be in the scope of Owner.	Bidder to follow technical specifications
592		SUB-SECTION-II-A2 Project Information (Simhadri-I & II 4X500 MW)			General	During Site Visit it has been observed that there is one acid sump in flue gas tapping point bay near Chimney Area Unit-1.It is understood that the tank shall be dismantled during handover before start of FGD works.	Bidder to refer Clause 1.11.00 of Sub-section-III, Part-A in this regard.
593		SUB-SECTION-II-A4 Project Information (Vallur TPP-3X500 MW)			General	During Site Visit, it has been observed that there is no space available for placement of Duct Support Foundations near Chimney area because of existing structures for Unit-1 and because of extension of Chimney Raft till edge of the road for Unit-3. Hence Bidder request either placement of Duct support Foundation on the existing raft for Unit-1 or on the existing roads for both Unit-1 & 3.	The duct foundation shall not be kept over chimney foundation.
594		SUB-SECTION-II-A4 Project Information (Vallur TPP-3X500 MW)			General	From the site visit, it is presumed that there is around 3 m of Ash filling, hence Owner to clarify whether roads, ground floor slabs, trenches, pipe pedestals, channels/drains and staircase foundation can be supported on open/shallow foundation resting on virgin soil.	BIDDER TO REFER AMMENDMENT
595	General				Underground substructures, sewer pipes, water pipes, cables etc around the FGD	Bidder request Owner to please provide the drawings for underground pipes, cables, amenities , utilities etc around the FGD area .	Additional available drawings are being furnished as an Amendment. Further required drawings shall be provided during detail engineering subject to availability of the same. Bidder is requested to visit site for getting the required information in case of non-availability of the drawings.
596					Sand aggregate for Construction	In case of non-availability of river sand, Bidder understands that mechanical sand/crushed sand may be allowed for concrete work.	BIDDER TO REFER AMMENDMENT
597					Topographical Survey drawing	Bidder request topographical survey drawing in AutoCAD format of all proposed FGD site..	Owner provides pdf file document/drawing s only.
598	SECTION – VI, PART-B	SUB-SECTION-IV-D Civil Works	22.00.00	34 of 64	Bidder shall obtain approval of Civil/Architectural drawings from concerned authorities before taking up the construction work.	Bidder understands that the scope of FGD Works is limited to taking approval from Owner for Construction. Scope of obtaining approval of Civil/Architectural drawings from concerned authorities is in owner scope.	Bidder to follow technical specifications
599		General			Chemical parameters of Ground Water	Bidder request Owner to please furnish the Chemical properties of Ground Water found in the Soil Report.	refer ammendment for available data
600	SECTION – VI, PART-A	SUB-SECTION-III-D Civil Works	2.00.00	2 of 3	Providing all arrangements for the supply of construction water including borewells, water tankers.	Bidder request owner to please provide Construction water at one point (either free or chargeable) so as to address the quality of Construction Water which may be objectionable or not adhering to quality if arranged from outside from water tankers.	Bidder to follow technical specifications
601	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-III-D CIVIL WORKS	2 of 3	2.00.00 CONSTRUCTION FACILITIES, SI No 10	Providing all necessary fire-fighting devices/equipment/ fire tender etc. required during the project execution stage. He shall maintain all such equipment/ devices in proper working conditions throughout the period of work.	Bidder shall provide all fire fighting devices / Equipment during the entire Project Execution period for its scope of work. However Bidder requested Employer to provide the Fire Tender of the existing Plant during emergency if required	BIDDERR TO COMPLY WITH TECHNICAL SPECIFICATION
602	TECHNICAL SPECIFICATION SECTION – VI	PART-D ERECTION CONDITIONS OF CONTRACT	11 of 53	27.02.00 Water	Contractor shall make all arrangements himself for the supply of construction water as well as potable water for labour and other personnel at the worksite/colony. However, drawl of construction/potable water from bore-well shall be permitted if found suitable. Any statutory clearance required shall be obtained by the contractor. Assistance, if required shall be provided by the owner	Bidder request Employer to furnish the following inputs / clarifications: a) Bidder request Employer to provide construction water at free of cost b) Bidder understands that Employer shall provide limestone, lime, water, compressed air etc. for Testing and commissioning at free of cost.	Bidder shall arrange its own water as per technical specification. Limestone and lime shall be supplied by the owner. Use of compressed air for testing and commissioning is not clear as per bidder's query. Same shall be discussed during detail engineering.
603	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-III-D CIVIL WORKS	2 of 3	2.00.02 CONSTRUCTION FACILITIES	However space required for bidder's office, storage, pre assembly and fabrication areas shall be provided by owner free of charge within the plant premises	Bidder envisaged that all steel structures including Chimney flue liner , Absorber & Steel Tanks shell/Silo fabrication shall be fabricated at site within Plant boundary designated Laydown area or near to the proposed FGD Area . Bidder request Owner to provide sufficient levelled & graded land / space for development of site fabrication facility. All field connections shall be welded or bolted connections.	For steel structures factory fabrication is envisaged as per clause no 19.00.00 of TECHNICAL SPECIFICATION SECTION – VI PART-B SUB-SECTION-IV-D CIVIL WORKS. Further, any space requirement shall be discussed after award.
604	TECHNICAL SPECIFICATION SECTION-VI, PART-A	SUB-SECTION-III-D CIVIL WORKS	1 of 3 2 of 3	1.05.00 2.00.02	Site levelling shall be done by Owner as per the levels specified in GLP in tender document. However space required for bidder's office, storage, pre assembly and fabrication areas shall be provided by owner free of charge within the plant premises.	Bidder understand that Site levelling for area provided for Site office pre-assembly, storage, fabrication etc. will be done by employer. Bidder requests employer to confirm the same.	Site levelling shall be done by Owner as per the levels specified in GLP for blocks marked for FGD in tender document. Only site clearance and minor grading is in bidder's scope.

S. NO.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC Clarification
	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
605	SLD ((0011-109(2)-POE-J-001/C Rev B	SLD	SLD	SLD	FGD HT TRFs (33/11.5kV), 11kV TIE Switchgear in FGD area, FGD Aux TRF (11/3.45kV) and 3.3kV Switchgear.	Bidder wish to consider one common (for all 6 units) 11kV TIE Switchgear in FGD area with 3 Incomers and 2 Bus Couplers and 3 Nos. FGD HT TRFs (33/11.5kV) each transformer to cater to load on its own bus plus load on adjacent bus section. Similarly, 3 Nos FGD Aux TRF (11/3.45kV) each transformer to cater to load on its own bus plus load on adjacent bus section and one no. common 3.3kV Switchgear shall be considered.	Refer ammendment in SLD
606	SLD ((0011-109(2)-POE-J-001/C Rev B	SLD	SLD	SLD	**Note : 7 :** Bidder shall provide 3 Nos. DC system of adequate capacity for meting DC loads in FGD area	As Bidder has planned to consider all SWGRs in one common Electrical biulding, so Bidder will consider 1 Set of DC system with adequate rating insteade of 3 Sets of DC system (which is technically not required)	Refer ammendment in SLD
607	SLD ((0011-109(2)-POE-J-001/C Rev B	SLD	SLD	SLD	**Note : 8 :** Three no. of DG set for entire FGD plant shall be provided.....	Bidder wish to clarify that, the no. of DG set may be decided by Bidder based on the requirement of emergency power of the FGD system. So Bidder request employer to give this flexibility.	Refer ammendment in SLD
608	SECTION – VI, PART-B	II-E2 MOTORS	4 of 9	7.04.00	Motor rated above 1000 KW shall have insulated bearing/housing to prevent flow of shaft current	Bidder shall provide NDE side end shield insulation to prevent the flow of shaft current.	Bidders offering is in line with the specification requirement
609	SECTION – VI, PART-B	II-E2 MOTORS	4 of 9	7.09.00	11 KV motors shall be offered with Separable Insulated Connector (SIC) as per IEEE 386. The offered SIC terminations shall be provided with protective cover and trifurcating sleeves. SIC termination kit shall be suitable for fault level of 25 KA for 0.17 seconds.	Bidder shall provide phase segregated type terminal box (PSTB) with a fault level of 43kA for 0.25sec.	Bidder to comply specification requirement under Cl 7.09.00, II-E2
610	SECTION - VI/A	III (scope of supply & services)	5 of 6	1.11.00	Bidder shall utilize the area identified for FGD purpose. The area identified for FGD purpose in GLP shall be levelled and **free from obstructions like sheds, trees etc. and will be in owner's scope**. However, site clearance like removal of bushes, vegetation etc. is in bidder's scope.	Tree cutting may also be required in the laydown /storage / preassembley area, so Bidder understand that the same shall also be in Employer scope along with FGD area.	Bidder's understanding is correct.
611	SECTION – VI, PART-A	III -A1 FGD	2 of 9	2.04.00	Provision shall be made for faciliting operation of unit with FGD bypass through existing stack. All modifications required including providing bypass damperis included in the scope of Contractor.	Bidder wish to clarify following points: - Installation of bypass damper in the existing ducting is very difficult in some of the plants based on thir site visit. - In some of the site there is no space for erection of bypass dampers. - In some plants the bypass damper support & the FGD inlet duct support (at tapping points) will come on the raft of the Stack. Bidder request employer to furnish their suggesation on the above points related to bypass damper & tapping point ducting.	NTPC clarified that requirement of the specifications shall be considered by the bidder.
612	SECTION – VI, PART-A	III -A5	2 of 4	2.01.12	Exhaust fans to be provided in all battery rooms and all toilets.	Bidder wish to clarify that there is no saperate battery room for Limestone & Gypsum handling system, however all necessary vantilation system shall be provided in the MCC room common for FGD and LHS system.	Exhaust fans for battery room (if applicable) to be provided. However, Electrical to check the requirement of battery room.
613	VI/B	VI-D - Civil Works	32 of 64	19.00.00	Silo with hopper & Chimney flue liners can either be fabricated in segments, transported and welded at site before erection or Fabricated at site.	Bidder understand that Tanks & Absorber can also be fabricated at site. Employer is requested to confirm on Bidders understanding.	Bidder to comply the specification requirement
614	SECTION-VI, PART-A & Simhadri 4 x 500 MW) GLP 3530-999-POC-F-001 Rev-05	III -A4	6 of 88	6.03.00	WATER PRE-TREATMENT PLANT	Bidder requests employer to provide the power supply from existing Switchgear available in RAWPH for bidder supplied Raw water pumps. Bidder will laid down cable from employer switchgear to Raw water pumps	Bidders request shall be considered by NTPC. Use of existing feeders, if found technically feasible by employer shall be included in ammendment to tender SLD.
615	VI/A	SUB-SECTION- III A4 (Equipment cooling water system)	6 of 88	6.03.00 (a)	2 X100 % Raw water pump of 550 m3/hr capacity to be installed at Raw (sweet water) water pump house of Simhadri STPP St-II (2X500MW)	As per Clause No. 6.07.00 (II), the cascade aerator, stilling chamber, inlet channels, clarifier etc shall be designed for 460 m3/hr+ 3% sludge. As per clause no. 6.03.00(a), Raw water pump to be designed for 550 m3/hr capacity. Process water requirement for 4 x 500 MW units at Simhadri is around 550 m3/hr. Accordingly, aerator, stilling chamber & clarifier need to be designed for	Bidder to comply the specification requirement
616	VI/A	SUB-SECTION- III A4 (Equipment cooling water system)	10 of 88	6.07.00 (II)	Clarifiers: Number: 2 Design flow : 460 m3/hr		
617	IV/A	I	19 of 21	4.07.03	Bidder/ bidder's sub vendor shall source the Ultra Filtration system including membrane upstream to Sea Water Reverse Osmosis (SWRO) plant from such suppliers who has supplied in a single SWRO plant one (1) number of UF system as offered of capacity not less than	Please clarify if suppliers with experience in SWRO without UF can be considered if they have supplied UF system for any similar applications meeting capacity and water quality.	Specification is quite clear. Bidder to comply the specification requirement

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	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
618	Sec-VI, Part - A	Sub Sec - III-A1	4 of 9	4.01.04	2x100% electric driven, single stage, integrally geared, single or dual vane centrifugal type / positive displacement (Helical lobe) type with VFD drive, oxidation blowers complete with integral gearbox, lube oil system, instrumentation and accessories. The blower will be used for supplying a variable volume of air to the absorber reaction tank.	Please note that multistage centrifugal air compressors and root lobe type air blowers also suitable for this type of applications. We request you to please accept the above type also in addition to the types mentioned in the referred clause.	This is not a clarification. NTPC requested the bidder to consider its requirement.
619	Part-A	Sub Sec: III-A1	6 of 9	7.01.00	Two (2) Process water Storage tanks (each tank catering to the requirements of all the units).....	We propose one (1) process water storage tank for each unit catering 15 minutes storage of one (1) unit process water requirement. Please confirm.	This is not a clarification. NTPC requested the bidder to consider its requirement.
620	Sec-VI, Part - A	Sub Sec - III-A1	6 of 9	7.01.01	2x100% Process Water Pumps for each unit connected to each of the Process water Storage tanks (for example total 8 nos. of pumps for 4x500 MW) along with all necessary piping, valves, control & instrumentation. Each pump catering to process water requirement of one unit.	Since various plants having various number of units, hence we propose separate tank and pumps for each unit, i.e. for each unit One (1) process water storage tank of 15 Minutes storage capacity along with Two (2) Nos Process water pump and Two (2) Nos Mist Eliminator wash water pumps located near absorber area instead of Two (2) common storage tank for all the units. In that case we have an possibility of interchangeability of pumps and spares . Kindly confirm.	This is not a clarification. NTPC requested the bidder to consider its requirement.
	Sec-VI, Part - A	Sub Sec - III-A1	6 of 9	7.02.00	2x100% Mist Eliminator Wash Water Pump for each unit connected to each of the Process water Storage tanks (for example total 8 nos. of pumps for 4x500 MW) along with all necessary piping, valves, control & instrumentation. Each pump catering to mist washing requirement of one unit.		
621	Part-A	Sub Sec: V	1 of 21 3 of 21 5 of 21 7 of 21	1.00 2.00 3.00 4.00	Inlet NOx level	Please furnish the inlet NOx level in mg/NM^3 at 6% O_2 dry.	FGD system shall be designed using the data given in the salient design data.
622	Part-A	Sub Sec: V	1 of 21 3 of 21 5 of 21 7 of 21	1.00 2.00 3.00 4.00	Inlet SO_2 (mg/Nm^3 Wet)	We presume that the values indicated against this clause are at actual O2. Please confirm.	FGD system shall be designed using the data given in the salient design data at given O2.
623	Part-A	Sub Sec: V	1 of 21	1.00	Inlet SO_2 (mg/Nm^3 Wet)	Please note that as per the SO_2 (%v/v wet) against guarantee condition, the SO_2 works out to 2344 mg/NM^3 instead of 2330 indicated. Please check and clarify which value to be considered for FGD system design.	FGD system shall be designed using the data given in the salient design data.

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	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
624	Part-A	Sub Sec: V	3 of 21	1.00	Inlet SO_2 (mg/Nm^3 Wet)	Please note that as per the SO_2 (%v/v wet) against guarantee and design condition, the SO_2 works out to 2087 and 2001 mg/NM^3 respectively instead of 2079 and 2010 indicated. Please check and clarify which value to be considered for FGD system design.	FGD system shall be designed using the data given in the salient design data.
625	Part-A	Sub Sec: V	5 of 21	1.00	Inlet SO_2 (mg/Nm^3 Wet)	Please note that as per the SO_2 (%v/v wet) against guarantee condition, the SO_2 works out to 2058 mg/NM^3 instead of 2070 indicated. Please check and clarify which value to be considered for FGD system design.	FGD system shall be designed using the data given in the salient design data.
626	Part-A	Sub Sec: V	7 of 21	1.00	Inlet SO_2 (mg/Nm^3 Wet)	Please note that as per the SO_2 (%v/v wet) against designe condition, the SO_2 works out to 1201 mg/NM^3 instead of 1215 indicated. Please check and clarify which value to be considered for FGD system design.	FGD system shall be designed using the data given in the salient design data.
627	Part-A	Sub Sec: V	1 of 21 3 of 21 5 of 21 7 of 21	1.00 2.00 3.00 4.00	Dust (mg/Nm^3)	We presume that the values indicated against this clause are wet and at actual O_2. Please confirm.	FGD system shall be designed using the data given in the salient design data at given O2.
628	Part-A	Sub Sec: V	1 of 21 3 of 21 5 of 21 7 of 21	1.00 2.00 3.00 4.00	SO_3 (PPM)	We presume that the values indicated against this clause are wet and at actual O_2. Please confirm.	FGD system shall be designed using the data given in the salient design data at given O2.
629	Part-A	Sub Sec: V	2 of 21 4 of 21 6 of 21 8 of 21	1.00 2.00 3.00 4.00	HCL (PPM wet)	We presume that the values indicated against this clause are at actual O_2. Please confirm.	FGD system shall be designed using the data given in the salient design data at given O2.
630	Part-A	Sub Sec: V	2 of 21 4 of 21 6 of 21 8 of 21	1.00 2.00 3.00 4.00	HF(PPM wet)	We presume that the values indicated against this clause are at actual O2. Please confirm.	FGD system shall be designed using the data given in the salient design data at given O2.
631	Part-A	Sub Sec: V	2 of 21 4 of 21 6 of 21 8 of 21	1.00	Unit Auxiliary Power Consumption (KW) for complete scope of work for the project (max.)	The unit auxiliary power consumption -values indicated per unit are too optmistic. Please check and revise the values.	NTPC clarified that requirement of the specification shall be considered by the bidder.

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	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
632	Part-A	Sub Sec: V	3 of 25	2.00	Gas flow at FGD inlet when firing respective coal in guarantee and design condition - 861 m^3/ Sec and 996 m^3/sec	Please note that the same value of gas flow has been indicated for various projects. Site elevations of every project is different and accordingly the actual flue gas flow for each project will be different from each other. Further, considering the site elevations and pressure - 0 mmWC at terminal point the actual flue gas flow rates shall be workedout for FGD system design. Please confirm whether our understanding is correct or not.	FGD system shall be designed using the data given in the salient design data at given O2.
633	Part-A	Sub Sec: V	5 of 21	3.00	Gas flow at FGD inlet when firing respective coal in guarantee and design condition - 446 m^3/ Sec and 525 m^3/sec	Please note that the same value of gas flow has been indicated for both Bhilai and Rourkela projects. Site elevations of these project is different and accordingly the actual flue gas flow for each project will be different from each other. Further, considering the site elevations and pressure - 0 mmWC at termial point the actual flue gas flow rates shall be workedout for FGD system design. Please confirm whether our understanding is correct or not.	FGD system shall be designed using the data given in the salient design data at given O2.
634	Part-A	Sub Sec: V	9 of 25	4.01.05	The top flue liner above the roof slab shall be made of solid C276 / Titanium (Grade 2 as per ASME SB265) of minimum 10 mm thickness. The minimum length of flue liner projecting over the chimney roof shall be atleast equal to diameter of flue liner	Please note that in Clause No. 4.01.06 it is specified that "External surface of chimney flue liner projecting over the chimney roof shall be wrapped with 2 mm thick Titanium / C-276 sheet over insulation." but in the reffered clause it is specified that the top flue liner above the roof slab shall besolid C276 / Titanium (Grade 2 as per ASME SB265) of minimum 10 mm thickness. Please clarify the discrepancy and confirm the actual requirement.	Both the stipulations of the specification shall be followed.
635	Part-A	Sub Sec: V	13 of 25	6.03.00	3. All ventilation systems shall operate on 100% fresh air. All mechanically ventilated areas shall be positively ventilated by means of supply air fans fitted with filters and exhaust fans for ventilation of heat generating areas combination of supply air fans with exhaust air fans shall be provided. MCC / switchgear and cable gallery areas shall be provided with gravity operated back draft dampers in association with supply air fans in order to maintain positive pressure. Battery rooms and other fumes/odour generating areas shall be negatively ventilated by means of exhaust air fans / roof exhausters and intake louvers.	Referring to S. No. 1 of the same clause, which describes that evaporative cooling type ventilation system for MCC / Switchgear Rooms and Battery Rooms. Please clarify which areas to be provided with mechanical ventilation system with combination of supply and exhaust air fans and the areas to be provided with evaporative cooling type ventilation system.	Specification requirement is amply clear. Accordingly, Evaporative type ventilation system shall be provided for non-AC area of FGD Control room building which consists of MCC room , cable gallery, battery room etc. . All other area as per clause 2.00.00 (c) of sub sec III-A2, shall have mechanical Ventilation system as specified in technical specification.

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636	Sec-VI, Part - A	Sub Sec - VI	21 of 27	5.00.00	v) Limestone Gravimetric feeder, Wet ball mill and their integral Auxiliaries divided by the numberof units in the project	Please note that Gravimetric Feeder, Wet Ball Mill and their intergal auxiliaries are designed for 110% of limestone required at design point condition. Auxiliary Power shall be demonstrated for guaranteed point condition which is much below the design condition of equipment. Since, the equipment can not be operated at guaranteed point condition, we propose to adopt suitable duty factor (guaranteed point requirement/equipment rating) for computing the aux power consumption. Please confirm.	Bidder to comply requirements of the specifications.
637	Sec-VI, Part - A	Sub Sec - VI	21 of 27	5.00.00	vii) Vacuum Belt Filter, Vacuum Pump and its integral auxiliaries divided by the number of units in the project	Please note that Vacuum Belt Filter and their intergal auxiliaries are designed for 110% of gyspum slurry generated at design point condition. Auxiliary Power shall be demonstrated for guaranteed point condition which is much below the design condition of equipment. Since, the equipment can not be operated at guaranteed point condition, we propose to adopt suitable duty factor (guaranteed point requirement/equipment rating) for computing the aux power consumption. Please confirm.	Bidder to comply requirements of the specifications.
638	Sec-VI, Part - A	Sub Sec - VI	21 of 27	5.00.00	xi) Mist Eliminator Wash Water pump(s)	Please note that the Mist Eliminator Water Pumps operate intermittently and not continuously operated. Hence, we propose to adopt suitable duty factor (No. of hours running in a day/24) for computation the aux. power consumption. Please confirm.	Bidder to comply requirements of the specifications.
639	Sec-VI, Part - A	Sub Sec - VI	26 of 30	7.00.00	FGD will be regarded as a FGD in operation, when by-pass damper is closed and total flow of flue gas from boiler goes via FGD, and SO2 content is as below in cleaned flue gas for the range of specified coals & loads:	This clause is applicable for FGD availability and not for design purpose. Please confirm.	NTPC clarified that the referred clause is for availability guarantee of FGD system.
640	Sec-VI, Part - A	Sub Sec - VII	5 of 82 to 82 of 82		Nos. /Sets for each project	Since the quanity of mandatory spares is specified common for all the projects. Different plants having various units i.e. One (1) unit, Two (2) units, Three (3) units and Four (4) units also. Hence Please confirm the quanity of mandatory spares quanity specified in the reference section.	NTPC clarified that the quantity of spares as specified in Clause 1.01.00 of subsection-VII of Part-A shall be supplied.
641	Sec-VI, Part - B	Sub Sec - I - M1	5 of 52	2.00.00	All welding which shall be in the contact with process fluids shall be executed under the supervision of the designer/ manufacturer.	It may please be noted that liner material manufacturers do not undertake the responsibility of supervision of application/ execution. We can follow manufacturers guide lines for application. Please confirm.	Bidder to comply requirements of the specifications.
642	Sec-VI, Part - B	Sub Sec - I - M1	6 of 52	3.02.05	Bidder to note that application of lining material in the ducts shall be carried out under the supervision of designer/ manufacturer.	Please note that liner material manufacturers do not undertake the responsibility of supervision of application/ execution. We can follow manufacturers guide lines for application. Please confirm.	Bidder to comply requirements of the specifications.

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643	Sec-VI, Part - B	Sub Sec - I - M1	8 of 52	4.01.00	Pressure drop for FGD & De-NOx systems in existing ID fan in Rourkela (1x250 MW) project has already been considered and Booster fan (along with associated gates) for this project shall be provided if the required pressure drop exceeds the specified value in following clauses. Further for Rourkela (1x250 MW) project, pressure loss of 40 mmwc through chimney and 100 mm wcl (including margin) shall be considered in both booster fan design criteria as mentioned below to take care of pressure loss due to future installation of De-NOx system. In Muzaffarpur-II (2X195 MW) project, 100 mm wcl (including margin) shall be considered in both booster fan design criteria as mentioned below to take care of pressure loss due to future installation of De-NOx system.	As per the referred clause, pressure drop of 100 MMWC (including margin) across the DE Nox system shall be only be considered for Muzaffarpur (2x195 MW) and Rourkela (1x250 MW) projects and need not be considered for other projects. Please confirm. Further, please indicate the margin component included in 100 MMWC.	NTPC clarified that the specified pressure drop for DeNOx system shall only be considered for Muzaffarpur (2x195 MW) and Rourkela (1x250 MW) projects and need not be considered for other projects. Further, margin over flow and pressure shall be as per clause 4.01.02 (iii) & (iv) respectively for booster fan sizing.
644	Sec-VI, Part - B	Sub Sec - I - M1	9 of 52	4.01.01 (V)	Pressure drop considered for FGD & De-NOx systems in existing ID fan in Rourkela (1x250 MW) - 456 mmwc	Please clarify whether the pressure drop mentioned in the referred clause include margin. If YES, please indicate the margin component.	NTPC clarified that booster fan shall be provided in Rourkela project, only if the required pressure drop as per the specified criteria in the FGD system, exceeds this specified pressure drop considered in the existing ID fan.
645	Sec-VI, Part - B	Sub Sec - I - M1	10 of 52	4.01.01 (V)	Pressure drop considered for FGD & De-NOx systems in existing ID fan in Rourkela (1x250 MW) - 550 mmwc	Please clarify whether the pressure drop mentioned in the referred clause includes margin as per Clause No. 4.01.02 (iv). If YES, please indicate the margin component.	NTPC clarified that booster fan shall be provided in Rourkela project, only if the required pressure drop as per the specified criteria in the FGD system, exceeds this specified pressure drop considered in the existing ID fan.
646	Sec-VI, Part - B	Sub Sec - I - M1	9 of 52	4.01.01 (3) (iii)	Pressure at Terminal Point before Booster Fan suction - 0 mmwc	At Clasue No 4.01.02 (3) (vi), Page No 10 of 52, the pressure at Booster Fan suction has been indicated as 0 mmwc. Please clarify the descrepency and confirm which values to be considered for Booster Fan design.	NTPC clarified that requirement of the specification shall be considered by the bidder.

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647	Sec-VI, Part - B	Sub Sec - I - M1	15 of 52	5.01.00 (A) (V)	Minimum 10% spare nozzles shall be provided at each level.	Please note that in open spray tower type system all the nozzles installed in the spray bank shall be in operation, 10% of spare nozzles for each spray level shall not be isolated providing isolation valves in side the absorber for the open spray tower type system. In case 10% nozzles isolated inside the absorber, the flue gas passes through absorber with out cleaning and SO2 levels in clean gas increases and desired SO2 removal efficiencies can not be achieved. Hence, kindly note that this clause is not applicable for open spray tower type absorbers.	Bidder to comply requirements of the specifications.
648	Sec-VI, Part - B	Sub Sec - I - M1	16 of 52	5.03.03	Oxidation nozzles / spargers shall have a minimum redundancy of 10% or as per the contractor's proven practice whichever is maximum.	Please note that we are supplying lance type oxidation air system (one (1) lance for each agitator) 10% margin on oxidation air nozzle is not applicable for our design. Hence please confirm that the margin for oxidation nozzles will be applicable as per bidder design standard.	Bidder to comply requirements of the specifications.
649	Sec-VI, Part - B	Sub Sec - I - M1	20 of 52	5.06.17	The spray headers (if provided) and air supply headers shall be made of FRP or Carbon Steel with rubber lining (minimum 10 mm natural rubber lining), corrosions and erosion resistant in the inner and outer side (Silicon Carbide coating on metal/FRP surface exposed to slurry).	Please note that FRP spray headers and alloy steel air supply pipes in Absorber do not require any protective linings on inner/outer surfaces. Please confirm that the same will be as per Contractor or its Collaborator design requirement.	Bidder to comply requirements of the specifications.
650	Sec-VI, Part - B	Sub Sec - I - M1	26 of 52	6.05.04	The primary hydro-cyclone shall be made up of polyurethane or urethane materials.	Please confirm that in addition to the Polyurethane or urethane material Rubber lined Hydrocyclones are also accpetable.	Bidder to comply requirements of the specifications.
651	Sec-VI, Part - B	Sub Sec - I - M1	28 of 52	7.06.03	A 10% margin shall be provided in each of the pump.	Please comfirm that 10% margin shall be provided on flow for Filtrate water pump only. No margin is required on Belt/cloth wash water pump.	Bidder to comply requirements of the specifications.
652	Sec-VI, Part - B	Sub Sec - I - M1	28 of 52	7.07.04	The Secondary hydro-cyclone shall be made up of polyurethane or urethane materials.	Please confirm that in addition to the Polyurethane or urethane material Rubber lined Hydrocyclones are also accpetable.	Bidder to comply requirements of the specifications.
653	Sec-VI, Part - B	Sub Sec - I - M1	28 of 52	7.07.05	In case bidder opts to provide additionally Lamella separator before the waste water tank and after the secondary hydro cyclone for removing impurities from the system, the solids concentration in waste water up to max 10% can be acceptable	In the reference clause the solid concnetration in the waste water is limited up to 10%. Please note that to maintain the solid concentration in waste water the quantity of waste water shall be discharged more from the FGD system, in that case the process water requirement for the FGD system will be increased. Since the process water quantity available for FGD system is also limited in the Cl. No. 7.07.00 of Section - VI, Part - A, Sub Section - I-M5, page 10 of 151. We request you kindly review the requirement.	Bidder to comply requirements of the specifications.
654	Sec-VI, Part - B	Sub Sec - I - M1	29 of 52	7.07.06	The material of Casing and impeller shall be rubber lined Cast Iron (IS:210 Gr FG260). Shaft and Shaft Sleeves shall be Stainless Steel-410.	Please confirm that in addition to the MOC specified in the reference clause, Hi-Chrome construction waste water pump is also acceptable.	Bidder to comply requirements of the specifications.

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655	Sec-VI, Part - B	Sub Sec - I - M1	30 of 52	8.04.00	The process water lines shall be provided with pneumatic/ motorized valves as per the proven practice of the Bidder.	In the flow diagram Dwg No. 0011-109(2)-POM-A-003, Rev.A motor operated valve are indicated in the process water line. Hence please confirm that bidder can provide either Pneumatic operated or motor operated valve in all the process water, Mist Eliminaotr, Clarified water (Gypsum cake wash) lines.	Bidder to comply requirements of the specifications.
656	Part-B	Sub Sec:1-M1-FGD	30 of 52	8.04.00	All the slurry pumps be provided with motorized suction and discharge valves.	Please confirm that as per the notes mentioned in Flow Diagram Dwg No. 0011-109(2)-POM-A-001, A002 and A003, bidder can provide either pneumatic operated or Motor operated valves on suction and discharge lines of slurry duty pumps (except Recirculation pump) . Plesae confirm.	Wherever pneumatic valve as per bidder proven practice can be provided, are clearly shown in the tender drawings.
657	Part-B	Sub Sec:1-M1-FGD	31 of 52	8.05.00	In case of pump with rubber lined casing, the casing should be radially split to allow easy removal of impeller.	In addition to the proposed pump, we intended to propose SS 2205 (CD4MnCuN) casing with back pullout/ end suction type in addition to radial split. Please confirm.	Bidder to comply requirements of the specifications.
658	Part-B	Sub Sec:1-M1-FGD	31 of 52	8.06.00	The Bidder can also offer an hi chrome alloy line pump if the Bidder has previous experience of the same for similar applications.	We propose slurry recirculation pumps with HI Chrome impeller and SS 2205 (CD4MnCuN) casing in addition to the materials specified in the referred clauses 8.06.00 and 8.07.00. Please confirm.	Bidder to comply requirements of the specifications.
659	Part-B	Sub Sec:1-M1-FGD	31 of 52	8.09.00	The design of the shaft shall ensure that the operating speed is at least 20% above the critical speed of the shaft	Please note that the critical speed of the pump shall be atleast 20% above the operating speed. Please confirm.	Bidder to comply requirements of the specifications.
660	Part-B	Sub Sec:1-M1-FGD	34 of 52	13.01.00	Two (2) Process water Storage tanks (each tank catering to the requirements of all the units operating at Design Point) along with two numbers of 2x100 % Booster water pumps, if required	Please note that in LOT-2 Projects, one project having single units, two projects with 2 units, one project with 3 units and one project with 4 units and another project with 6 units. If only two(2) process water tanks are to be provided, then the process water pumps and mist eliminator water pumps for all units shall be located near process water tanks which requires lot of space to install all the pumps. Due to the space constriants, we propose one process water tank for each unit with storage capacity of 15 minutes maximum processs water requirement of one unit. 2x100% capacity Booster Pumps of adequate capacity are common for the project supplies the process water to these unitised process water tank. Please confirm.	Bidder to comply requirements of the specifications.
661	Part-B	Sub Sec:1-M1-FGD	37 of 52	14.17.00	Inter-connecting pipes/cables between various facilities of FGD plant shall be routed on the steel trestles to be provided by the Contractor. The clear head room for the same shall be minimum 8 M.	For pipe/ cable racks, the clear head room of minimum 8 M will be provided at road/ rail crossings and at other areas, the head room will be maintained minimum 2.5 meter above the grade level. Please confirm.	Bidder to comply requirements of the specifications.
662	Part-B	Sub Sec:1-M5	34 of 151	12.05.00	Raw Water Pump for Simhadri STPP-II (2X500MW)	Please furnish existing Raw Water Pump House GA and Sump/ Tank details.	Details will be furnished during detail engineering.

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663	Part-B	Sub Sec:1-M6	2 of 41	3.1.3	In limestone crusher house, limestone coming from each incoming Conveyor shall pass through one (1) or two (2) numbers of (dedicated) Vibrating screening Feeders and one (1) or two (2) numbers of (dedicated) crushers respectively which shall crush limestone to (-) 20mm size or to suit limestone pulverizer and system.	As per Clause No. 6.05.01 (III) at Page No 23 of 52, the input limestone size for wet ball mill is mentioned as 1" (i.e 25.4 mm) which is actually (-) 20 mm as per referred clause. We propose to consider the input size (-) 20 mm from the limestone crusher outlet for wet ball mill. Please confirm.	Bidder to comply requirements of the specifications.
664	Project Information for Talcher Project	Table - 4	31 of 34		Process Water/ CW Blowdown Water Analysis	In the referred Table, two different values - 125.95 mg/l and 276 mg/l are indicated for sulphates. Please clarify the discrepancy and confirm the actual value to be considered for process design.	Sulphate value of 124.95 mg/l shall be considered.
665	Sipat (3x660 MW)				General Layout Plan	We request you to kindly furnish the following GA drawings with Plan and Elevation. - Conveyor 16A/16B - TAC House - Ash water pump house - BAST (BA Settling and Surge Tank) - ESP Control room - Main Plant Equipment layout	Available drawing shall be provided during detail engineering
666	Rourkela (1x250 MW)				General Layout Plan	Please clarify whether bidder can use the exisitng pipe racks for routing of Process water, clarified water and DMC water from the terminal point to the FGD system area.	Bidder to refer clause 14.00.00 of Sub-section III-A1 of Part-A of technical specifications in this regard.
667	Bhilai (2x250 MW)				General Layout Plan	We request you to kindly furnish the following GA drawings with Plan and Elevation. - Pipe racks near chimney area to Ash Silo. - Ash Water Pump House - MCC & Control room near Ash water pump house	Required drawings shall be provided during detail engineering subject to availability of the same. Bidder is requested to visit site for getting the required information in case of non-availability of the drawings.
668	Bhilai (2x250 MW)				General Layout Plan	The space earmarked in the layout is not adequate. Please confirm that bidder can use additional area available in the layout.	Please refer latest GLP being issued as an amendment.
669	Bhilai (2x250 MW)				General Layout Plan	Please clarify whether bidder can use the exisitng pipe racks for routing of Process water, clarified water and DMCW water from the terminal point to the FGD system area.	Bidder to refer clause 14.00.00 of Sub-section III-A1 of Part-A of technical specifications in this regard.
670	TSTPS (4x500 MW) + 2x500 MW				General Layout Plan	Please furnish the following Stage - II (Unit # 3, 4, 5 & 6) GA drawings - ESP Control room - Various ash handling builidng constructed in exisitng chimney area - Conveyor joinning at TP -15 & 16 - Conveyor between TP - 23 & 24	Additional available drawings are being furnished as an Amendment. Further required drawings shall be provided during detail engineering subject to availability of the same. Bidder is requested to visit site for getting the required information in case of non-availability of the drawings.

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671	TSTPS (4x500 MW) + 2x500 MW				General Layout Plan	Please furnish the following Stage - I (Unit # 1 & 2) GA drawings - ESP Control room - Various ash handling builidng constructed in exisitng chimney area	Additional available drawings are being furnished as an Amendment. Further required drawings shall be provided during detail engineering subject to availability of the same. Bidder is requested to visit site for getting the required information in case of non-availability of the drawings.
672	TSTPS (4x500 MW) + 2x500 MW				General Layout Plan	Main plant equipment drawing for Stage - I and Stage - II	Additional available drawings are being furnished as an Amendment. Further required drawings shall be provided during detail engineering subject to availability of the same. Bidder is requested to visit site for getting the required information in case of non-availability of the drawings.
673	Simhadri TPS (2x500 MW+2x500 MW)				General Layout Plan	Please clarify the terminal point for process water and clarified water of FGD system for Stage - I units.	Bidder to refer the Tender Drg.No. 0011-109(2)-POM-A-005 (Sht 1of 2) in conjunction with the Technical Specifications Section VI, Part-A Sub Section III A-4 " Equipment Cooling Water System" accordingly.
674	Simhadri TPS (2x500 MW+2x500 MW)				General Layout Plan	Please furnsih the GA drawing of all the existing building constructed near existing Chimney area and pipe racks near chimney	Additional available drawings are being furnished as an Amendment. Further required drawings shall be provided during detail engineering subject to availability of the same. Bidder is requested to visit site for getting the required information in case of non-availability of the drawings.
675	Simhadri TPS (2x500 MW+2x500 MW)				General Layout Plan	Please furnish the main equipment plan drawing for Stage - I	Additional available drawings are being furnished as an Amendment. Further required drawings shall be provided during detail engineering subject to availability of the same. Bidder is requested to visit site for getting the required information in case of non-availability of the drawings.
676	Simhadri TPS (2x500 MW+2x500 MW)				General Layout Plan	Please furnish the ID System elevation and plan drawing for Stage - I	Additional available drawings are being furnished as an Amendment. Further required drawings shall be provided during detail engineering subject to availability of the same. Bidder is requested to visit site for getting the required information in case of non-availability of the drawings.
677	Simhadri TPS (2x500 MW+2x500 MW)				General Layout Plan	Please furnish the conveyor GA drawing between TP - 20 & 21 routed between Stage - I and Stage - II. Also please furnish the Conveyor GA drawing of TP -19	Additional available drawings are being furnished as an Amendment. Further required drawings shall be provided during detail engineering subject to availability of the same. Bidder is requested to visit site for getting the required information in case of non-availability of the drawings.

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678	Vallur (3x500 MW)				General Layout Plan	Please furnisht the conveyor GA drawing between the TP - 5 & TP - 6. Also please furnish the GA Drawing for ESP Control room, Pipe and Cable trestule near ESP and existing chimney.	Additional available drawings are being furnished as an Amendment. Further required drawings shall be provided during detail engineering subject to availability of the same. Bidder is requested to visit site for getting the required information in case of non-availability of the drawings.
679					General	We understand that the NTPC replies to Pre NIT Queries shall also be part of the Tender Documents. Please confirm.	NTPC clarified that replies to Pre NIT Queries shall not be part of the Tender Documents.

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	FGD SYSTEMS						
680	VI/B	I-M1	7 of 52	3.03.01	Guillotine gate type damper shall be provided by the Contractor before the suction of each Booster fan.	Since the specified clauses are contradictory NTPC to clarify the requirement of Guillotine Damper at the outlet of Booster fan.	Motorized Guillotine type gates with 2x100% seal air fans shall also be provided at suction & discharge of each Booster Fan as per clause 22.02.00 Subsection III A1 Part A of technical specification.
	VI/E	Scheme of FGD Absorber System 0011-109(2)-POM-A-001			**Scheme of FGD Absorber System** Guillotine Damper at Inlet and Outlet of Booster fans		
681	VI/B	I-M1	8 of 52	4.01.00	In Muzaffarpur-II (2X195 MW) project, 100 mm wcl (including margin) shall be considered in both booster fan design criteria as mentioned below to take care of pressure loss due to future installation of De-NOx system.	100 mm wcl (including margin) to take care of pressure loss due to future installation of De-NOx system is considered only for Muzaffurpurm for remaining 6 projects the same was not considered. NTPC to confirm.	NTPC clarified that the specified pressure drop for DeNOx system shall only be considered for Muzaffarpur (2x195 MW) and Rourkela (1x250 MW) projects and need not be considered for other projects.
682	VI/B	I-M1	14 of 52	5.00.00	**ABSORBER** The unit shall be provided with an independent/dedicated absorber.	Considering the capacity of the FGD units common FGD is proposed for the following projects. a. NSPCL BHILAI EXPANSION POWER PROJECT (2x250 MW) b. KBUNL MUZAFFARPUR TPS, STAGE-II (2x195 MW) NTPC to confirm.	NTPC clarified that requirement of the specification shall be considered by the bidder.
683	VI/B	I-M1	28 of 52	7.06.02	**FILTRATE SYSTEM** 2x100% horizontal centrifugal pumps shall be provided for wash water requirements of belt filter. Alternatively, wash water pump may take suction from the vacuums receiver tanks.	The Quality of filtrate water especially chlorides will be much higher when compared to Cooling Tower Blow down(i.e Process water) hence bidder requests NTPC to allow the usage of Process water for belt cloth washing of Vacuum Belt filter as against filtrate water as specified in the referred clauses.	Bidder is requested to refer Note 2 in the Gypsum Dewatering System Tender Drawing in this regard.
684	VI/B	I-M2	1 of 27	3.01.00(iI)	(ii) Mechanical Ventilation (using Roof extractors/ Supply and/or Exhaust fans) shall be provided for various other areas/buildings in the scope of bidder as under: a) Grinding system building b) Gypsum dewatering building c) Recirculation pump & Oxidation blower/compressor building.	Since Recirculation pump & oxidation Blower/ Compresor building is located inside a shed, mechanical ventilation is not considered for shed as per clause no 2.00.00 specified here.	Bidder to note that if shed is in open , then no mechnical ventilation is required as per specification. However, if shed/ facility is under enclosure then mechnical ventilation shall be provided as per refered clause.
685	VI/A	III-A2	2 of 4	2.00.00 ©	Note 3: If open shed is envisaged for any facility, then in that case no mechanical ventilation is required.		
	LAYOUT						
686	VI/A	II-A1-1	TALCHER STPS GLP-DRG NO- 4330-999-POC-F-0002/REV-5		Space marked for FGD in front of Unit-1&2	Out of the space marked for FGD , the space marked of Dimensions 34m x 63 m in front of Unit-1&2 is not adequate to place the FGD system and placing the FGD system at other allocated spaces will call for higher inlet duct length and therby high power and high operating cost. Request NTPC to provide addditional space in front of Unit-1&2.	Bidder to refer revised GLP.
687	VI/A	II-A3-1	SIPAT STPP GLP-DRG NO- 9518-999-POC-F-001/REV-13		Conveyor-16A/16B running across the space marked for FGD	NTPC is requested to provide the detailed drawings of Conveyor 16A/16B to access the feasibilty of locating equipments in the space marked for FGD.	Available drawing shall be provided during detail engineering
688	VI/A	II-A4-1	NTECL PP GLP-DRG NO- 0260-999-POC-F-001/REV-5		HT Tower cable running in between Coordinates 1102.6 W,1737.7 N and 1071.5 W,1725.5 N	NTPC is requested to provide the following a. Elevation of HT cables across the referred coordinates b. Safe Distance to be maintained from the cables for the proposed auxiliaries	a. Bidder is requested to visit the site and collect the required elevation details. b. Safe Distance from the cables to be maintained as per the relevant Standards/ statutory requirements.

S. NO.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC'S CLARIFICATION
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689	VI/A	II-A7-1	ROURKELA PP-II EXP GLP-DRG NO- PE-DG-427-100-M001		Space marked for FGD	Due to Limitation of space and capacity of the unit bidder proposes the following modification in the tender Limestone and Gypsum Handling Systems. 1. The Storage volume of both 7 day silo and one day silo works out to be 790 m3 Considering the capacity of the Lime stone stoarge silo, Bidder proposes 7 day silo can be at top of ball mill ,Also it serves as both 7 day storage and day storage silo.hence bidder proposes one common Limestone silo for 8 days upstream of Ball mill. In addition Bidder proposed underground crusher with a bucket elevator upstream of the above mentioned silo.,thereby avoiding lengthy conveyors and space. 2. The Gypsum Storage volume for 7 days works out to be only 1820 m3 hence bidder proposes Gypsum storage in inverted cone pyramid shape just below the vacuum belt filter which eliminates the need for travelling tripper & reduces significant space for yard occupation.	1. For Lime Stone & Gypsum Storage: Bidder's proposal for lime stone and gypusm storage is acceptable. 2. Bidder's proposal for underground crusher with bucket elevator is acceptable, however, bidder to take care of all civil, structures, archetural, mechanical & electrical requirement to meet the specification requirement at no extra cost to NTPC after award.
	ELECTRICAL						
690	VI / A	III-B	2 of 8	1.05.00	Modification required at TSTPS stage I & II switchyard control room.	NTPC to clarify / provide the list of modification in existing switchyard control room.	Bidder to assess the same through site visit. These modification shall be to accommodate the system offered by the Bidder.
691	VI / A	III-B	3 of 8	1.06.00	Control and protection of new 220KV bays and 22/34.5KV transformers	We understand that the protection relay panel shall be located in existing switchyard control room. Kindly confirm. Also NTPC to provide the existing switchyard room layout for new panel installation purpose.	Bidder's understanding is correct however bidder is requested to visit the site and obtain further details.
692	VI / A	III-B	3 of 8	1.06.00	Integration with existing RTU / SDH	Please provide the drawing for existing switchyard control schematic scheme.	Bidder is requested to visit the site and collect the required details.
693	VI / B	II-E1	1 of 8	1.06.00	The voltage level for motors shall be as follows:	For VFD application motors, we have considered the voltage rating as below - Motors below 160KW: 415 V 6 Pulse - Motors 160KW and above and upto 400KW : 690V 12 Pulse - Motors above 400KW to 700KW : 690V 12 Pulse - Motors above 700KW : 3.3KV 18 Pulse	bidder to comply with requirements of technical specification regarding design of VFD.
694	VI / B	II-E1	3 of 8	2.01.00	All transformers except 220kV class and 132kV class FDG Tie transformers are classified as Auxiliary transformers	As per project SLD, 132KV transformer is not applicable for us.	Confirmed
695	VI / B	II-E4	3 of 6	2.14.01	The voltage drop in the cables, during motor starting condition, shall be limited to 10% and during full load running condition, shallbe limited to 3% of rated voltage	We understand that the running voltage drop shall be calculated from PCC to MCC shall be 3% and MCC to motos shall be 3%. Kindly confirm.	Confirmed. However combined voltage variation at various voltage levels shall not be be more than 6% (for MV systems) and 10% (for LV systems).
696	VI / B	II-E10	1 of 57	1.01.01	For Main Plant (TG & SG areas) and Service Building, each Lighting DB shall have 1X100% transformer. For all other areas, each Lighting DB shall have 2X100% transformers	Lighting shall be provided equipments / package under FGD bidder scope only. Lighting for other area / cllient building are not considered.	Bidder understanding is correct
697	VI / B	II-E15	17 of 18	Annexure - B	Lighting system for TG Building Boilers Compressor area ESP Room Switchyard Area Chemical House Etc		
698	0011-109(2)-POE-J-001/A - Rev.B		Single Line diagram		Electrical Single line diagram for FGD package Simadhari Stage I & II	We understand that the tender SLD (Drg No. 0011-109(2)-POE-J-001 /A - Rev.B) is applicable common for Simahadri stage I and II (4 x 500MW). Kindly confirm.	Bidder to refer note 15 in tender SLD. SLD shows indicative supply arrangement of one stage only.
699	0011-109(2)-POE-J-001 / A/B/C/D/E/F		Single Line diagram		FGD Swrvice switchgear I with 3 nos of 11/0.433KV transformers (2working + 1 standby)	For each 1 unit or 2 unit or 3 unit configuration, we have considered the transformer for FGD package as bleow - FGD service switchgear I with 3 nos. of transformers is considered common for all absorbor LV auxiliaries power supply purose. - FGD service switchgear II with 2 nos. of transformers is considered Lime stone and Gypsum LV auxiliaries power supply purose. - FGD service switchgear III with 2 nos. of transformers is considered Cooling water, compressor, AC, Ventilation & Miscellaneous loads LV auxiliaries power supply purose.	Number of feeders / switchgeatrs shown in SLD is typical. Final feeding arrangement at various load centers shall be decided during detailed engineering based on actual loads coming in various areas.

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	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
700	0011-109(2)-POE-J-001/C - Rev.B		Single Line diagram		22KV Switchyrd	As per tender part A, section III B, cl. No. 1.05.00, page no. 2 of 8, we have considered 2 nos. of 220KV transformer bays shall be extended in existing 220KV outdoor AIS in our scope. Any Modification / new CT or earth switch fixing of existing switchyard are not considered in our scope.	Confirmed
701	4330-999-POC-F-002 / Rev.05		General Layout Plan		22KV Switchyrd & new 33KV switchgear location	As per plany layout, no space available in existing switchyard area for new extension bay and 33KV switchgear building installation purpose. NTPC to indicate the area for the same in the plant tender layout.	Refer ammendment.
	CIVIL						
702	VI/A		26 to 32 of 41		Talcher Kaniha, 4x500 MW. Soil data Bore log details furnished without 'N' values.	Kindly provide detail soil invetigation report available near by areas.	Available data has already been furnished
	LHS						
703	VI/B	III-A5	2 of 4	2.01.13	Two nos. conventional type passenger cum goods elevator in lime stone crusher house and transfer tower before mill bunker.	We are considering Rack & Pinion type passenger cum goods elevators in lime stone crusher house and transfer tower before mill bunker. Please Confirm.	Bidder to comply with specification requirement.
704	VI/B	I-M6	3 of 41	3.2.0	Gypsum from storage shed shall be loaded to user's truck using front end loader / Payloader.	We understand that 1 No. front end loader / Payloader is not in Bidders scope. Please confirm.	Confirmed.
	CONTROL & INSTRUMENTATION						
705	VI/B	IIII-C2	23 of 40	11.00.00	Analyzers shall be placed inside Air conditioned CONTAINERISED ROOM (PORTABLE CABIN) or Air conditioned analyzer room provided by the contactor. For detailed specification of CONTAINERISED ROOM (PORTABLE CABIN), Contractor to refer Sub section IIIC-11, Part-B, Section-VI of technical specification.	Analyzers to be placed inside Air conditioned Panel placed inside Chimney shell.	Bidder's proposal is not acceptable. Bidder to comply with the specification requirement.
706	VI/B	IIII-C8	3 of 4	3.01.00	INTERFACES: For ON-OFF and INCHING type actuators interface with the control system shall be through hardwired signal only.	Interface philosophy to be clarified for interface with control system thru hardwired signal or fieldbus network?	Please Refer Clause 12.00.00, Sub Section IIIC, Part-A, Section-VI, as per that Clause 3.00.00(Hardwired actuators) is not applicable for this project.
	VI/B	IIII-C8	3 of 4	4.01.00	INTERFACES: For ON-OFF and INCHING type actuators interface with the control system shall be through fieldbus network.		

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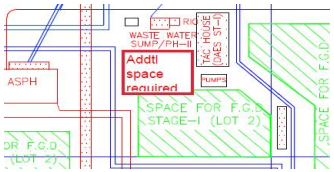
	LAYOUT						
707	VI/A	II-A1-1	TALCHER STPS GLP-DRG NO- 4330-999-POC-F-0002/REV-5		Space marked for FGD in between Unit-3 & 4 and Crushed Coal Stock pile	NTPC is requested to provide the detailed drawings of Conveyor between TP-23 and TP-24 to access the feasibilty of locating equipments in the space marked for FGD.	Additional available drawings are being furnished as an Amendment. Further required drawings shall be provided during detail engineering subject to availability of the same. Bidder is requested to visit site for getting the required information in case of non-availability of the drawings.
708	VI/A	II-A2-1	SIMHADRI TPP GLP-DRG NO- 3530-999-POC-F-0001/REV-5		Space marked for FGD in between Unit-2 and NDCT-3	NTPC is requested to provide additional space in between space marked for FGD and Waste Water sump /ph-II as below.  	Bidder to accommodate the FGD facilities as per revised GLP.
709	VI/A	II-A3-1	SIPAT STPP GLP-DRG NO- 9518-999-POC-F-001/REV-13		 	Whether the railway track specified in the space for FGD as below is operational or reduntant. 	Bidder can accommodate the FGD facilities in the space provided in the GLP.
710	VI/A	II-A4-1	NTECL PP GLP-DRG NO- 0260-999-POC-F-001/REV-5		Space for FGD available 	Bidder proposes Twin flue for FGD units for Boiler no-1&2 near by the space marked for FGD at Coordinates 948.5 W and 722.2 N and the distance between Existing Chimney and New Wet stack works around 140m, also beyond that space the plant boundary ends and there is no space for any further extension possible beyond that point. Hence Bidder requests NTPC to relax this clause of 150m for this plant to 140m.	Bidder to comply with the specification requirement.
	VI/B	IV-D	9 of 64	3.14.01	The centre to centre distance between the proposed chimney(s) and the existing chimney(s) & NDCT in any direction shall not be less than 150 metres.		

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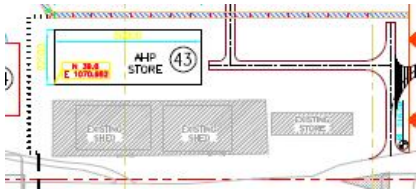
711	VI/B	II-A5-1	NSPCL-2X250 MW EPP-3 BHILLAI GLP-DRG NO- B/TS/PLOT		Space marked for FGD	Due to Limitation of space and capacity of the unit bidder proposes the following modification in the tender Limestone and Gypsum Handling Systems. 1. The Storage volume of both 7 day silo and one day silo works out to be 1280 m3 Considering the capacity of the Lime stone stoarge silo, Bidder proposes 7 day silo can be at top of ball mill ,Also it serves as both 7 day storage and day storage silo.hence bidder proposes one common Limestone silo for 7 days upstream of Ball mill. In addition Bidder proposed underground crusher with a bucket elevator upstream of the above mentioned silo.,thereby avoiding lengthy conveyors and space. 2. The Gypsum Storage volume for 7 days works out to be only 3400 m3 hence bidder proposes Gypsum storage in inverted cone pyramid shape just below the vacuum belt filter which eliminates the need for travelling tripper & reduces significant space for yard occupation.	1. For Lime Stone & Gypsum Storage: Bidder's proposal for lime stone and gypusm storage is acceptable. 2. Bidder's proposal for underground crusher with bucket elevator is acceptable, however, bidder to take care of all civil, structures, archetural, mechanical & electrical requirement to meet the specification requirement at no extra cost to NTPC after award.
712	VI/A	II-A7-1	ROURKELA PP-II EXP GLP-DRG NO- PE-DG-427-100-M001		Space marked for FGD	The space marked for FGD is inaequate to place the facilities required as per tender, hence bidder requests NTPC to provide the space as below (Existing Shed and Existing Store near by AHP Store-43) for FGD system so that the facilities can be accomodated. 	Bidder to refer revised GLP furnished as amendment.

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	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
713	V	SCC	6 of 27	14.1	Royalty	(i) Please confirm whether any surplus excavated material/ rock/ sand/earth within plant boundary may be utilized by the Contractor for the purpose of construction activities, free of cost (with prior consent of Employer) Any royalty payable on the same shall be reimbursed by the Employer to the Contractor. (ii) We understand that in case, it is necessary to dispose the excessive excavated material outside the plant premises, then all clearance(s)/ permissions shall be arranged by Employer and all the applicable Charges including royalty, transportation etc. shall be borne by Employer. Please confirm.	(i) Any excavated material such as rock / sand/earth may be utilised subject to meeting the technical requirements of relevant purpose for which it is intended to be used. Further the bidder shall pay any fees, royalties etc. that have to be paid for utilisation of same. (ii) Bidder to refer clause no 25.00.00 of technical specification section -VI, Part -B sub section-IV-D Civil works regarding disposal of surplus excavated material. Further bidder is required to arrange the area outside plant boundary where backfilling material can be disposed off at his own cost. All necessary permission , applicable charges royalty etc for the same shall be borne by the bidder.

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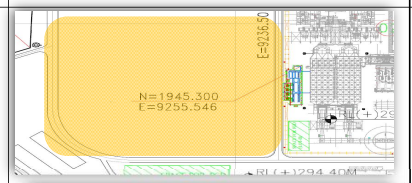
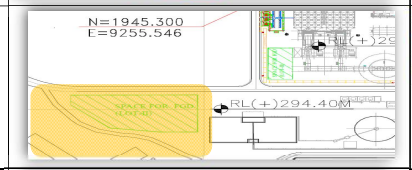
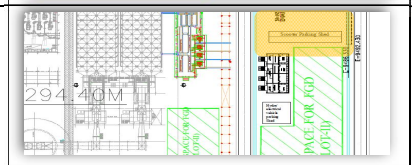
714	Bhilai (2X250 MW) II-A5-6-Pipe Cable Trestle Layout	-	-	-	Observation during site visit	As per the Drg. No. PE-DG-239-100-002 REV.1 sheet 4 of 4 - Pipe cable trestle layout section PR-13 & PR-14 - pile/cable trestle top is (+)9.55 M & (+)12.95 M., where as, during site visit the pipe /cable trestle are found to be routed at elevation of (+)2.2m (TOS) over which pipes of 400 nb(max) are routed (refer reference drg. no. PE-DG-239-100-002 REV.1 -sheet 2 of 4)). Bidder presumes and considers to route the FGD duct clearing the existing the pipe routing as per the site conditions and as per drg no. PE-DG-239-100-002 REV.1 -sheet 2 of 4) . Please check and confirm.	Bidder to route the FGD duct clearing the existing pipe routing as per the site conditions. Any further layout constraint shall be discussed during detail engineering.
715	Bhilai (2X250 MW): Bhilai (2X250 MW) II-A5-1-General Layout Plan.pdf	GENERAL LAYOUT PLAN DRG. NO. B/TS/PLOT, SHT 1 of 1, Rev. 0				Space provided by NTPC is not sufficient to accommodate all the FGD facilities. During site visit bidder has noticed that free space available with in the c o-ordinates between E 9000 & E 9200 and N 2000 & N 1800. Bidder requsts NTPC to provide above additional space for Limestone handling conveyor, Crusher, Bulk & Day Silos, Mill building and slurry preparaion of FGD System and equipment. Please confirm.	Please refer latest GLP for latest area/ blocks marked for FGD purpose being issued as an amendment.
716	Bhilai (2X250 MW): Bhilai (2X250 MW) II-A5-1-General Layout Plan.pdf	GENERAL LAYOUT PLAN DRG. NO. B/TS/PLOT, SHT 1 of 1, Rev. 0				Space provided by NTPC is not sufficient to accommodate all the FGD facilities. During site visit bidder has noticed that free space available with in the c o-ordinates between E 9000 & E 9200 and N 1800 & N 1600 . Bidder requests NTPC to re-routing of road and provide additional space beside Waste water Holding Tank as indicated.	Please refer latest GLP for latest area/ blocks marked for FGD purpose being issued as an amendment.
717	Bhilai (2X250 MW): Bhilai (2X250 MW) II-A5-1-General Layout Plan.pdf	GENERAL LAYOUT PLAN DRG. NO. B/TS/PLOT, SHT 1 of 1, Rev. 0				Bidder requests NTPC to Shift existing Scooter parking Shed to some other place and provide space beside BMD Maintenance bay/stores for FGD System. Bidder request NTPC to provide space between the co-ordinates E 9400 & E 9600 and N 2000 & N 1800.	Please refer latest GLP for latest area/ blocks marked for FGD purpose being issued as an amendment.
718	Rourkela PP-II (1X250 MW): Rourkela (1X250 MW) II-A7-1-General Layout Plan.pdf	PLOT PLAN DRG. NO. PE-DG-427-100-M001, SHT 1 of 1, Rev. 09				Space provided by NTPC is not sufficient to accommodate all the FGD facilities. Bidder requests NTPC to provide additional space of 140m x60 m required for Limestone handling conveyor, Crusher, Bulk & Day Silos, Mill building and slurry preparaion of FGD System.	Please refer latest GLP for latest area/ blocks marked for FGD purpose being issued as an amendment.
719	Sipat-I (3X660 MW) II-A6-1-General Layout Plan					NTPC to provide following drawings, which are not received along with the tender document. 1. Existing coal conveyor 16A/B 2. Existing coal conveyor 5A/B 3. Equipment Layout Plan The above drawing were asked in earlier clarification on draft tender, which are extremely essential for planning of FGD facilities.	Available drawing shall be provided during detail engineering
720	Sipat-I (3X660 MW) II-A6-1-General Layout Plan					NTPC to note that in the provided FGD space, existing railway track is passing. hence, entire space can not be utilised for FGD facilities. Bidder requests NTPC to provide additional space of Approx. 150m length x 70m wide as marked in the below snap to accomodate all the facilities. 	Please refer latest GLP for latest area/ blocks marked for FGD purpose being issued as an amendment.
721	Simhadri-II (2X500 MW) II-A5-1-General Layout Plan					Bidder requests owner to provide following drawings 1. Stage-I, ID system elevation and plan drawing 2. Stage-I, Equipment Layout Plan of stage-I facilities 3. Stage-I, Pipe Cable Trestle Layout with foundation details 4. Existing coal conveyor 18A/B, 19A/B & 20A/B (i.e. Conveyors between TP-18, TP-19, TP-20 & TP-21) 5. Existing coal conveyor 6A/B (i.e. Conveyor between TP-4 & TP-5) 6. AHP key plan of Stage-II AHP facilities to check interference with existing AHP facilities. The above drawing were asked in earlier clarification on draft tender, which are extremely esential for planning of FGD facilities.	Requested drawigs "Equipment Layout plan and Pipe cable trestle" is not available with us.

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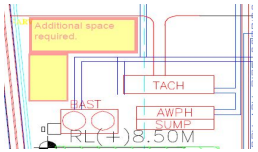
	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
722	Simhadri-II (2X500 MW) II-A5 1-General Layout Plan					To accommodate the FGD facilities within the available space, Bidder requests NTPC to provide yellow marked space as indicated in below snap near stage-II AHP area.  	Please refer latest GLP for latest area/ blocks marked for FGD purpose being issued as an amendment.
723	Simhadri-II (2X500 MW) II-A5 1-General Layout Plan					NTPC to note that stage-I existing facilities like existing duct, pipe racks, ID fans, duct from ESP to ID fans, existing workshop building etc are not shown in the GLP received along with tender. NTPC is requested to provided the updated GLP to plan FGD layout at our end.	Please refer latest GLP for latest area/ blocks marked for FGD purpose being issued as an amendment.
724	NTECL Vallur (3X500 MW) - Vallur GLP					NTPC to provide Coal conveyor drawings between TP5 & TP6 for planning of FGD facilities.	Available drawing shall be provided during detail engineering
725	NTPC Talcher Kaniha (6X500 MW) - Talcher GLP					As per GLP, Bidder noticed there are Conveyor, FO Tanks, Rail tracks and PIPE CUM CABLE RACK across FGD Space allocated area. Bidder requests NTPC to provide detail elevation drawings of the same. 1. Stage-I, ID system elevation and plan drawing 2. Stage-I, Equipment Layout Plan 3. Stage-I, Pipe Cable Trestle Layout with foundation details 4. Stage-II, Equipment layout plan 5. Stage-II, Pipe Cable Trestle Layout with foundation details 6. Conveyor drawings between TP3 & TP4, TP15 & TP16 and TP23 & TP24. 7. PIPE CUM CABLE RACK across FGD Space allocated area. 8. AHP key plan of Stage-I, Stage-II and stage-III AHP facilities. 9. Stage-II & stage-III ESP swithgear room GA drawing along with foundation details drawing. The above drawing were asked in earlier clarification on draft tender, which are extremely esential for planning of FGD facilities.	Requested drawigs "Equipment Layout Plan & Pipe Cable Trestle Layout" is not available with us.
726	NTPC Talcher Kaniha (6X500 MW) - Talcher GLP					NTPC to note that stage-I existing facilities like existing duct, pipe racks, ID fans, duct from ESP to ID fans, ESP swithgear building, other AHP faclites etc are not shown in the GLP received along with tender. NTPC is requested to provided the updated GLP to plan FGD layout at our end.	Bidder is requested to visit site for getting the required information not available in the drawing. Any further layout constraint shall be discussed during detail engineering.
727	NTPC Talcher Kaniha (6X500 MW) - Talcher GLP					NTPC to note that provided space for FGD is not sufficient to accommodate all 6 units absorber along with chimney. Hence, to accommodate all the absorber within the allocated space bidder request NTPC to shift the existing road by 15m towards the railway track. please refer below snap for further clarification.	Bidder to refer ammended GLP

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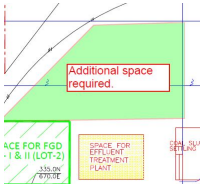
728	NTPC Talcher Kaniha (6X500 MW) - Talcher GLP					To accommodate the FGD facilities within the available space, Bidder requests NTPC to provide following additional space (Grid E 600-900, N 300- 600)  	Bidder to refer ammended GLP
729	For LOT-2 Layouts	General		GLP for Lot-2 tender for all projects.		Bidder has considered the space as allocated in the general layout plan drawing and based on the site visit.This is done to accomodate various equipments / system of FGD as per tender specificaiton. Bidder requests NTPC to provide the space as identified,which is clear without any obstruction at the time of award of contract. Please confirm.	Bidder to refer clause 1.11.00 of Sub-section-III Part-A of technical specification in this regard.
730	For LOT-2 Layouts	--	--	GLP for Lot-2 tender for all projects.		As seen from the GLP of various projects the space earmarked for FGD system is inadequate. To accommodate FGD system, some facilities like roads are to be relocated. Bidder request owner to take a note of the same and make necessary arrangment for such re-locations.	Bidder to refer clause 1.11.00 of Sub-section-III Part-A of technical specification in this regard.
731	SECTION-VI, PART-A SUB-SECTION-III-A1 (FGD)	14.00.00	07 of 09		The contractor scope shall also include the provision of FGD trestle for routing of air & water lines, slurry lines, steam line, waste water, etc. .. required for the complete process operations.	Due to space constraint in the Layout , Bidder has considered existing Owner's pipe racks for routing pipes / cables (tapping from terminal points) related to FGD system. In other areas with in FGD, new trestle as required. Please confirm.	NTPC requirement shall be complied with.
732	For LOT-2 Layouts	-	-	-	-	Bidder has considered that the GLP provided by NTPC are final and the sizes and orientations of the buildings/structures indicated in the same are 'not to exceed'. Bidder shall plan FGD system facilities and duct layouts accordingly. Any modification required in duct layout due to variation in building/structure size shall be compensated by Owner.	Bidder is requested to visit site for getting the required information. Bidder to refer clause 1.11.00 of Sub-section-III Part-A of technical specification in this regard.
733	Section- VI, Part-B Bid Doc. No. CS-0011-109(2)-9	Sub-Section I-M6 - Limestone & Gypsum Handling system	6 of 41	.4.04.00	Dust Extraction system - Venturi Scrubber Type	For limestone handling system, it is generally recommended to provide dry type DE system and the same is followed in NTPC - LOT-1A &1B tenders. Please confirm.	Confirmed. Refer admendment No.-1
734	Section- VI, Part-A Bid Doc. No. CS-0011-109(2)-9	Sub-Section III-A5- Limestone & Gypsum Handling system	3 of 4	3.04.00	Complete dust extraction system ...	As gypsum generated is with moisture of 10% (max.), there shall not be any dry dust. Dust extraction system will work only for the dry material. Hence we do not recommended to provide any kind of dust extraction system for gypsum handling system. Please confirm.	Bidder to comply with specificaiton requirement.
735	Section- VI, Part-B Bid Doc. No. CS-0011-109(2)-9	Sub-Section I-M6 - Limestone & Gypsum Handling system	28 if 41	1.7.0	Datasheet of Limestone crusher - Limestone feeding arrangement - through **vibrating screen feeder** arrangement.	As the two clauses are contradictory, Bidder presumes that vibrating feeder to be considered. NTPC to please check and confirm.	Vibrating feeder to be provided as per Clause No. 3.1.3. Refer amendment no.-1 for Datasheet of Limestone crusher.
	Section- VI, Part-B Bid Doc. No. CS-0011-109(2)-9	Sub-Section I-M6 - Limestone & Gypsum Handling system	2 of 41	3.1.3	In limestone crusher house, limestone from each incoming conveyor shall pass through (1) no. of dedicated **vibrating feeder**....		
736	-	-	-	-	Sieve analysis & Material CharacteristicS / Physical properties for the limestone as received input	Please furnish us feed sieve analysis, material characteristics / Physical properties and typical distribution of limestone (unloaded through trucks) for selection of the limestone crusher.	Bidder to consider suitable sieve analysis for ROM limestone available for this application. For material charachteristics/Physical properties consider relevant section.
737	Section-VI, Part-B Bid Doc. No. CS-0011-109(2)-9	Sub-Section I-M1 - Limestone & Gypsum Handling system	25 of 46	7.04.09	Gypsum cake from each belt filter shall be discharged **through a hopper** onto belt conveyor being provided by the contractor.	Gypsum cake from the vacuum belt filter shall be directly fed to the dedicated belt conveyor through the chute. Hence, Hopper arrangement is not required. NTPC to confirm.	Bidder to comply requirements of the specifications.
738	SECTION – VI, PART-B	SUB-SECTION-I-M1 (FGD)	4.01.02	10 OF 52	(ix) Pressure drop considered for FGD & De-NOx systems in existing ID fan in: 550 mmWC	Please clarify whether this pressure drop is with margin or without margin..	NTPC clarified that booster fan shall be provided in Rourkela project, only if the required pressure drop (including margin) as per the specified criteria in the FGD system, exceeds this specified pressure drop considered in the existing ID fan.
739	SECTION – VI, PART-B	SUB-SECTION-I-M1 (FGD)	5.01.00 B	15 OF 52	However, 3 x 50% Gas Cooling Pumps instead of Slurry Recirculation shall be provided.	Please modify the clause as "3 x 50% or 2x100% Gas Cooling Pumps instead of Slurry Recirculation shall be provided." The best option shall be selected by the bidder.	Bidder to comply requirements of the specifications.
740	SECTION – VI, PART-B	SUB-SECTION-I-M1 (FGD)	5.03.02	16 OF 52	Absorber Oxidation Systems: Head: For Bubbling Type process.....or minimum 3500 mmwc whichever is higher.	Bidder request NTPC to modify the clause as, "Absorber Oxidation Systems: Head: For Bubbling Type process.....or minimum 3000 mmwc whichever is higher."	Bidder to comply requirements of the specifications.

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	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
741	SECTION – VI, PART-B	SUB-SECTION-I-M1 (FGD)	5.06.23	21 OF 52	The Screens shall be made of made of Alloy 59 /C276 or abrasion resistant FRP/Polypropylene (in case Contractor/Collaborator has proven experience).	Bidder request NTPC to modify the clause as, "The Screens shall be made of made of Alloy 59 /C276 or SS 316L or abrasion resistant FRP/Polypropylene (in case Contractor/Collaborator has proven experience)."	Bidder to comply requirements of the specifications.
742	SECTION – VI, PART-B	SUB-SECTION-I-M1 (FGD)	5.02.00	15 OF 52	Absorber includes side entry agitators, the contractor shall offer and demonstrate mixing arrangement such that n-1 number of agitators are sufficient to avoid the slurry settlement in the absorber tank in case of one agitator under breakdown (ntotal no. of working agitators). In case vertical agitators in Absorber are offered, one complete mechanical assembly of agitator shall be supplied as warehouse spare for each Absorber.	Bidder request NTPC to modify the clause as, "In case vertical agitators in Absorber are offered, one complete mechanical assembly of agitator shall be supplied as warehouse spare for each Absorber or shall offer and demonstrate mixing arrangement such that n-1 number of agitators are sufficient to avoid the slurry settlement in the absorber tank in case of one agitator under breakdown (n, total no. of working agitators >3)."	Bidder to comply requirements of the specifications.
743	SECTION-VI, PART-A	SUB-SECTION-III-A4	6.03.00	6 of 88	g) Interconnection between the clarified water outlet channel and outlet channel Existing clarifier.	Kindly provide the location at which FGD clarifier outlet is to be connected to existing clarifier outlet.	Necessary Amendement is being issued.
744	SECTION-VI, PART-A	SUB-SECTION-III-A4	6.03.00	6 of 88	i) Necessary piping, valves, control and instrumentation etc arrangement for Tap off from the existing chlorine dosing system of St-I/St-II.	(i) Kindly furnish terminal point location, terminal point parameters like flow, pressure, temperature,pipe size, dosage rate, etc of existing chlorine dosing sytem. (ii) Since chlorination is not in Bidder's scope, Bidder understands that no approval from statutory body like CCOE is in Bidder's scope. Please confirm Bidder's understanding.	Exact Details will be finalized during detail engineering.
745	SECTION-VI, PART-A	SUB-SECTION-III-A4	6.05.00	7 of 88	a) Preparation and dosing system equipments shall be installed in the existing chemical house of the stage-II.	Please provide the tentative routing of dosing lines from existing chemical house to FGD PT plant.	Exact Details will be finalized during detail engineering.
746	SECTION-VI, PART-A	SUB-SECTION-III-A4	(VII) – Horizontal Centrifugal Pump	14 of 88	Raw water Pump: Raw (sweet water) water pump house of St-II (2X500MW)	Please furnish tentative routing for raw water supply line to FGD PT plant which Bidder can follow/utilise.	Routing will be finalized during detail engineering.
747	SECTION-VI, PART-A	SUB-SECTION-III-A4	b) Chemical House	21 of 88	1) The chemical tank which is proposed to be used for preparation and supply of chemicals at any instant shall be selectable through control system.	Generally for PT plant, all chemical tanks outlet valves are manual valves and the same is also shown in NTPC's tender P&IDs. Hence, please eloborate this requirement.	Bidder to comply requirements of the specifications.
748	SECTION-VI, PART-A	SUB-SECTION-III-A4	7.06.00	28 of 88	23)Chlorination (if required) shall be suitably taped off from the existing CW chlorination system located nearby CW pump house alongwith necessary piping, valve, control & instrumentation etc.	Kindly furnish the location, tentative routing and terminal point parameters like flow, pressure, temperature,pipe size, dosage rate, etc of existing chlorine dosing sytem.	Exact Details will be finalized during detail engineering.
749	SECTION-VI, PART-A	SUB-SECTION-III-A4	7.06.00	28 of 88	25) Required number of lifting bar, dial type load indicator, electrically operated mono rail hoists for handling chlorine tonners	Please note that chlorination system is not in Bidder's scope. Hence, handling for chlorine tonners shall not be in Bidder's scope. Please confirm.	Necessary Amendement is being issued.
750	SECTION-VI, PART-A	SUB-SECTION-IV TERNINAL POINTS & EXCLUSIONS	1.05.00	2 of 3	Sea water PT & Desalination plant applicable for Vallur TPP: i) Contractor shall take a tap off suitably from the existing CW blow down header (To CMB) available near the proposed Sea water PT & Desalination plant (as indicated in GLP). ii) Contractor shall terminate the discharge of backwash, cleaning & chemical waste and PT plant sludge into the existing CW blow down header (To CMB) available at 200 meter downstream of intake point to sea water PT & desalination plant.	i) Please furnish the flow, pressure, temperature available at terminal point and its location. ii) Please furnish the terminal point pressure at which Bidder shall terminate the discharge and its location.	Exact details will be furnished during detail Engineering.
751	SECTION-VI, PART-A	SUB-SECTION-V	1.00.00	1 0f 21	SALIENT DESIGN DATA	Please provide the value of NOx in flue gas composition	FGD system shall be designed using the data given in the salient design data.
		SUB-SECTION-V	2.00.00	3 0f 21	SALIENT DESIGN DATA	Please provide the value of NOx in flue gas composition	FGD system shall be designed using the data given in the salient design data.
		SUB-SECTION-V	3.00.00 A	5 0f 21	SALIENT DESIGN DATA	Please provide the value of NOx in flue gas composition	FGD system shall be designed using the data given in the salient design data.
		SUB-SECTION-V	3.00.00 B	7 0f 21	SALIENT DESIGN DATA	Please provide the value of NOx in flue gas composition	FGD system shall be designed using the data given in the salient design data.
752	**VI - A**	**II - A5**	**22 of 30**	**Annexure IV**	**--**	**FGD facilities for Bhilai Package:** Bidder requests NTPC to share borehole details for locations adjacent to identified FGD space.	Available data has already been furnished
753	**VI - A**	**II - A3**	**21 of 29**	**Annexure III**	**--**	**FGD facilities for Sipat Package:** Bidder requests NTPC to share borehole details for locations adjacent to identified FGD space.	Available data has already been furnished
	SECTION – VI /PART-E	0011-109(2)-P0E-J-001/B		Note no. 10	**Sipat-I & Vallur:** Two numbers 11kV motors per unit shall be fed from existing spare feeders in station boards as indicated in tech. spec. Necessary augmentation and modification required in switch gear panels for this purpose shall be in scope of bidder.		Same shall be furnished to successful Bidder during detailed Engineering. However, Bidder may visit Site for details and assessment

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754	SECTION – VI /PART-E	0011-109(2)-P0E-J-001/F		Note no. 10	**Rourkela:**Two numbers spare panels in owners station switchgears shall be suitably modified to DE type for feeding of 6.6 kv FGD tie switchgears.	Request Employer to share the drawings- GA and SLD of existing Switchgear. Same is required for estimating the cost of augmentation and modification of these feeders.	of existing equipment.
	SECTION – VI /PART-E	0011-109(2)-P0E-J-001/E		Note no. 10	**Bhilai:** Two numbers 6.6 kv motors per unit shall be fed from existing spare feeders in unit boards as indicated in SLD. Necessary augmentation and modification required in switch gear panels for this purpose shall be in scope of bidder.		
755	SECTION – VI /PART-E	0011-109(2)-P0E-J-001/C			**Talcher STPP-I &II :** 11 KV FGD Switchgear Scheme 3.3 KV FGD Switchgear Scheme	Bidder proposes to have single 11 KV tie Switchgear and 3.3 KV tie Switchgear for all the four units in line with other LOT-2 projects. Please concur.	refer ammendment to tender SLD
756	SECTION – VI /PART-E	0011-109(2)-P0E-J-001/C		Note no. 8	**Talcher STPP I & II:** Three numbers DG set for entire FGD plant shall be provided by the bidder for meeting the emergency load envisaged.	Bidder proposes to have only single DG for entire FGD system as a whole in line with other LOT2 projects. This DG shall feed the emergency MCC(common for entire Plant).Please concur	refer ammendment to tender SLD
757	SECTION – VI /PART-E	0011-109(2)-P0E-J-001/E		Note no. 7	**Talcher STPP I & II:**Bidder shall provide 03 nos. DC system of adequate capacity for meeting DC loads in FGD area.	Bidder proposes to have only 01 nos 220 V DC system for entire FGD system as a whole. Please concur	refer ammendment to tender SLD
758	SECTION – VI, PART-B	SUB SECTION II-E-19	38 of 44	8.07.05 c)	For Step and Touch potential the following parameters shall be considered i) Current distribution factor – 1(One) ii) Duration of fault current - 0.5 sec iii) Human body weight - 50kg	Bidder understands that separate touch & step potential calculation is not required for FGD package. However necessary supporting calculations shall be submitted for maintaining the ground grid resistance less than 1 ohm. Please confirm.	Bidders understanding is Correct
759	SECTION – VI /PART-A	SUB-SECTION-IV	2 OF 3	1.04.00	**Process Water** For process water requirement, Contractor shall take a tap off suitably from the existing blow down header available near FGD area except for coastal projects(Simhadri STPP & Vallur TPP).	Employer to note that in general,process water tap off point are quite away from space provided for FGD. Hence, Bidder requests Employer that whereever applicable, process water booster pump (in FGD scope) can be fed from near by client switchgear in case the tap off point is far away from FGD area. Employer to concur.	The same shall be finalized during detailed engg. Based on availability of nearby switchgear.
760	SECTION – VI /PART-B	SUB-SECTION-II-E21	13 of 17	5.07.01	Lightning protection system shall conform to IS:2309. It shall comprise vertical air termination, horizontal air termination, down conductor, test links, earth connections and earth electrodes.	Please note that IS 2309 has been withdrawn. Bidder understands that IEC-62305 shall be used for lightining protection system design in absence of IS. Employer to confirm.	Confirmed
761	Section-VI, Part-B	SUBSECTION-II-E15 LIGHTING	7 of 18	4.00.00 ; 10 (a)	Lighting panels shall have min. IP55 degree of protection.	Bidder understands that outdoor lighting panels shall have IP55 degree of protection. However, IP54 shall be provided for indoor lighting panels. Owner is requested to confirm.	Techncial specifications are clear. Bidder to comply with clause no 4.00.00.10(a) of Sub section II-E15 of technical specifications
762	Section-VI, Part-B	SUBSECTION-II-E15 LIGHTING	8 of 18	4.00.00 ; 10 (i)	LP-1 3No. 415V, 32 A, TP MCB (31/2Cx70sq.mm cable) LP-2 3No. 415V, 32 A, TP MCB (31/2Cx35sq.mm cable) LP-D1 1No. 220V,32 A, DP Isolator (2Cx35sq.mm cable)	Bidder understands Cable size requirement mentioned in lighting panel section is indicative only. Bidder shall select required size of cables as per sizing criteria. Please confirm.	Techncial specifications are clear. Bidder to comply with clause no 4.00.00.10(i) of Sub section II-E15 of technical specifications
763	Section-VI, Part-B	SUBSECTION-II-E15 LIGHTING	11 of 18	4.07.00	**Occupancy based Passive Infra-red sensors** The sensors shall be recess mounted, programmable type suitable for lighting load of 6A with variable off delay settings.	Please note that as per general industrial practice,Bidder will consider occupancy based passive Infra-red sensors in area like Office, Conference room & Control Room. Owner is requested to confirm.	The same shall be finalized during detailed engg in line with GRIHA requirement
764	SECTION – VI /PART-B	SUB-SECTION-II-E6	5 of 23	3.02.05 (a)	FOR COAL HANDLING PLANT/FGD PLANT AREA THE FOLLOWING SHALL ALSO BE APPLICABLE:- All overhead cable routes shall be along the route of the conveyor gallery on separate supporting structures and cable shall be laid in vertical trays. .....Directly buried cable, if essential shall not have concentration of more than 4 cables on one route	Please note that for Talcher STPP, there shall be cables coming from Switchyard area to FGD area. Employer is requested to suggest cable route and raceway for the same.	Bidder may visit the project in order to get itself acquainted with existing electrical of plant
765	SECTION – VI /PART-A	SUB-SECTION-I	16 OF 21	4.03.00	**PROVENNESS CRITERIA FOR ELECTRICAL EQUIPMENTS** **4.03.07 SWITCHYARD 220KV EQUIPMENT** **220kV Circuit Breakers being offered should be from Manufacturer who has manufactured and supplied atleast five(5) nos. of three phase circuit breakers suitable for Air Insulated Substation/ Switchyard of 220 kV or above class which should have been in successful operation for at least two(2) years.**	As per this clause of proveness criteria, bidder understands that for extension of 220kV bay in Talcher, it is not necessary to have switchyard equipment of same make as that of exisiting switchyard equipment make. Please confirm.	Bidders understanding is Correct
766	SECTION- VI, PART-A	SUB-SECTION-IV	3 OF 3	1.13.01	Terminal points of Contractor's electrical scope, applicable for all systems/subsystems described in relevant clauses for SCOPE is given below: i) Employer's HT switchgear ii) Employer 220kV Bus at Switchyard (For TSTPS only)	For TSTPS,Bidder proposes that if there is spare availability(of adequate capacity) in the existing station/Unit switchgear then modification/extension of transformer bay in existing switchyard may not be required.Request employer to please check and confirm the same.	Power supply for FGD system in TSTPS shall be derived from 220kV switchyard as per tender SLD.

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	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
767	TSTPS-I&II (6X500 MW) II-A1-1-General Layout Plan				400KV SWITCHYARD	Please note that referred two drawings are contradictory. General layout indicates 400KV switchyard and SLD indicates 220kV. Please clarify.	Owner's existing 220kV switchyard is located in Stage-I Switchyard area. Bidder may visit Site for
768	SECTION – VI /PART-E	0011-109(2)-P0E-J-001/C			230KV SWITCHYARD		
769	SECTION – VI /PART-E	0011-109(2)-P0E-J-001/C			220/34.5kV	Please note that there shall be no FGD loads that needs 33kV voltage supply. Hence, Bidder propose to have 220/11kV transformer that shall further feed 11kV switchgear. Instead of having 33kV voltage intermediate switchgear in between. Please concur.	Bidder to provide supply arrangement as indicated in tender SLD.
770	TSTPS-I&II (6X500 MW) II-A1-1-General Layout Plan					General layout of Talcher does not indicate any space allocated for extension of switchyard for FGD, and further placement of 220/34.5kV transformer and 33kV switchgear. Request employer to indicate the same.	Two(2) nos. additional 220kV bays, transformers and 33kV switchgear building shall be placed in switchyard area. Also refer Ammendment to tender GLP
771	VI/A	IIIC	3 of 19	1.02.01 (F)	Twisted pair with round steel wired armour (SWA), Type A fieldbus cable complying to 61158 (detailed Specification as per PART-B), ... for fieldbus based instruments and actuators shall be provided by the contractor under this package	Bidder understands that Fieldbus Trunk cable shall be Single pair as per IEC-61158 Type-A specification. Accordingly, Instrumentation cables other than Fieldbus cables, shall be minimum 4 pair type for connection between field/JB and DDCMIS. Kindly confirm / clarify.	The requirements of fieldbus cables and instrumentation cables are different. The fieldbus cables are to provided as per referred clause 1.02.01 (F). Regarding instrumentaion cables (F type/ G type), bidder's understanding is correct.
	VI/B	III-C5	18 of 22	8.03.08 (b)	Minimum 4 pair Instrumentation Cables shall be used for connection between field/JB and DDCMIS marshalling cabinet ...		
772	VI/A	IIIC	4 of 19	2.02.01 (b)	Common system process blocks: i. Gypsum De watering Handling common system block. ii. Lime stone preparation and handling common system block. iii. Other associated common system including RO based Desalination system, Water treatment system (as applicable)	Bidder understands that a common process block can be considered including all common systems like Gypsum Dewatering / handling, Limestone preparation / handling, water treatment system etc. Kindly confirm / clarify.	Bidder's understanding is not correct. It is clarified that as per referred clause, three Common system process blocks are envisaged as mentioned below: i. Gypsum De watering Handling common system block. ii. Lime stone preparation and handling common system block. iii. Other associated common system including RO based Desalination system, Water treatment system (as applicable)
773	VI/A	IIIC	5 of 19	2.04.02	Cabling from ACDB to FGD OWS (located in CCR) shall be in bidder's scope of supply.	Kindly inform the cable route length to be considered for the same.	Tentative cable route length between ACDB to FGD OWS (located in CCR) shall be 200 meters approximately.
774	VI/A	IIIC	7 of 19	2.10.00 (b)	Marshalling cabinets separate from system cabinets for terminating inputs from field, MCC/SWGR etc., for further wiring to control system and for terminating outputs from control system to MCC/SWGR etc.	Bidder understands that either separate marshalling cabinet or system cabinet with partition for marshalling, can be considered as per OEM's standard & proven practice. Kindly confirm / clarify.	Bidder's understanding is correct. However, bidder to comply with the specification requirement mentioned in the refered clause 2.10.00.
	VI/A	IIIC	7 of 19	2.10.00 (e)	In case DDCMIS supplier can provide system cabinet with suitable partition to create separate marshalling area on the rear side of the system cabinet, ensuring that dust ingression does not take place in system area, the same can also be accepted subject to Employer's approval during detailed engineering stage.		
775	VI/A	IIIC	12 of 19	3.03.01, Notes: 9	Analyzers mentioned in S.No. 1 to 7 of the above list of flue gas analyzers for CEMS are not applicable for NSPCL Rourkela (1x250MW) project.	Bidder understands that for NSPCL Rourkela (1X250MW) project, all CEMS related supply and services are excluded from Bidder's scope. Kindly confirm / clarify.	Bidder's understanding is correct.
776	VI/A	IIIC	12 of 19	3.03.02	Bidder shall connect analysers instruments of his scope and provide single point/port for connection with Employer's cloud server. Further connection to Employer's cloud server shall be in the scope of Employer.	Bidder understands that Bidder's Terminal point for the same shall be at a single point/port near Bidder's CEMS. Kindly confirm / clarify.	Refer Amendment in this regard.
777	VI/A	IIIC	16 of 19	10.00.00	Interfacing with Employer's DDCMIS	Bidder understands that necessary hardware / software modifications as required at Employer's System end, to interface with Bidder's system, shall be in Employer's scope. Kindly confirm / clarify.	Bidder's understanding is correct.
	VI/A	IIIC	5 of 19	2.04.02	A redundant station-wide LAN for ... connecting to Employer's Station LAN through firewall. This shall include all cables and accessories required for connecting Contractor's system upto the Employer's systems such as Station LAN, etc.		
	VI/A	Appendix-I to Part- A	2 of 2	Note:3	Redundant Master Clock are located in CER. Interconnecting cables shall be on as required basis.		

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778	VI/A	IIIC	16 of 19	10.01.00	Hardwired signal exchange between BOP DDCMIS/ **CHP DDCMIS** (under Employer's scope) and FGD DDCMIS	Bidder understands that with respect to Limestone unloading through road, Limestone Handling system shall be independent of Coal Handling System. Accordingly, no interface of FGD DDCMIS is envisaged with CHP DDCMIS. Kindly confirm / clarify.	Bidder's understanding is correct in view of limestone transportation through road.
	VI/A	III-A5	1 of 4	2.01.01	Limestone will be received to power plant through road by trucks...		
779	VI/A	IIIC	16 of 19	10.01.00	Cabling from DCDB to RIO panel (located in CER) shall be in bidder's scope of supply.	Kindly inform the cable route length to be considered for the same.	Tentative cable route length between DCDB to RIO panel (located in CER) shall be 200 meters approximately.
780	VI/B	III-C5	2 of 22	1.06.04	In order to achieve above, following shall be redundant with automatic change-over (including the associated software), as a minimum: ... Output modules ...	Bidder understands that Output redundancy shall be considered as specified in Volume-VIA, Sub-Section-IIIC Cl.No.2.15.00. Kindly confirm / clarify.	Bidder's understanding is correct and accordingly output redundancy shall be considered for 10% of all type of drives.
	VI/A	IIIC	9 of 19	2.15.00	Output redundancy is applicable for 10% of drives including MOVs, Pneumatic On/Off / Control valves, Electrical breakers etc. distributed in various functional groups. Exact application shall be finalized during detailed engineering.		
781	VI/B	I-M6	28/29 of 41	4.0.0	Specification of the Vibration Monitoring System	Bidder understands that Vibration Monitoring system specification for complete FGD system (including Crushers), shall be as specified in Volume-VIB Sub-section III-C2. Accordingly, VMS specification in Sub-section I-M6 Cl.No.4.0.0 shall be superseded. Kindly confirm / clarify.	Bidder's understanding is correct. Refer amendment in this regard.
	VI/B	III-C2	32 of 40	12.00.00	Vibration Monitoring System		
782	VI/B	I-M6	31 of 41	6.3.01	Limestone & Gypsum Handling Plant Main Control Room ...	Bidder understands that no separate Control room is envisaged for Limestone/ Gypsum Handling, and the same shall instead be read as 'FGD Control Room'. Kindly confirm / clarify.	Bidder's understanding is correct.
783	VI/B	I-M6	36 of 41	6.06.02	Status indications in Large Video Screen Following individual status indications shall be provided in LVS with individual ON/OFF/TRIP indications on CRT.	Bidder understands that no LVS is envisaged for the FGD system as per Appendix-I to Part- A, Section-VI. Kindly confirm / clarify.	Bidder's understanding is correct.
	VI/A	IIIC	3 of 19	2.01.00	The contract quantity of hardware and peripherals of HMIPIS, programming station etc. shall be as per Appendix-I to Part- A, Section-VI of Technical specification read in conjunction with detailed technical specification.		
784	VI/B	I-M6	36 of 41	6.07.00	DDCMIS/Control desk shall be provided with adequate number of facia type annunciation windows operating through DDCMIS for the following audio-visual fault annunciation purposes.	Bidder understands that all annunciations are envisaged through OWS, and no hardwired facia type annunciation is envisaged for the same. Kindly confirm / clarify.	Bidder's understanding is correct.
	VI/B	III-C5	14 of 22	5.02.01	The OWS annunciation will replicate in software the salient features of conventional hardware annunciations facia (for permanent viewing i.e., not operator changeable) while presenting more flexibility.		
785	VI/B	I-M6	36 of 41	6.06.02 (m)	... Further Mimic lamps for HT and LT SLDs shall be provided on the control desk.	Bidder understands that no mimic lamp related arrangement on Control Desk is envisaged dedicatedly for Handling system SLDs, inline with NIT VI-A Sub-Section-IIIC. Kindly confirm / clarify.	Bidder's understanding is correct

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786	SECTION-VI, PART-A	SUB-SECTION-III-A4	6.03.00	6 of 88	Two of reactor clarifier (both working) of RCC construction each of capacity as mentioned in datasheet.	Please note that there is discrepancy in the capacity of clarifier between the mentioned clauses. i) As per cl.7.07.00 total water available is 530 m3/hr. As per datasheet cl. 6.07.00, design flow of each clarifier is 460 m3/hr whereas as per guarantee clause 4.02.00,capacity of each clarifier shall not be less than 280 m3/hr. Kindly clarify.	Necessary Ammendement is being issued.
	SECTION-VI, PART-A	SUB-SECTION-III-A4	6.07.00	10 of 88	II) Clarifiers Design Flow- 460 m3/hr.		
	SECTION-VI, PART-A	SUB-SECTION-VI	4.02.00	16 of 27	(xvii) Clarification Plant (Applicable for Simhadri) a) Each clarifier unit of PT-CW system shall be guaranteed for an effluent capacity of not less than 280 cum/hr meeting the effluent quality as mentioned below.		
	SECTION – VI, PART-B	SUB-SECTION-I-M5	7.07.00	10 of 152	Total water (ACW/Process water + (plus) Gypsum washing water for Simhadri STPP- I & II (2x500 MW) & (2x500MW) 530 m3/hr		

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787	Part A / Sec IV	III-A4	6 of 88	6.03.00. e)	Two (2) numbers of reactor type clarifiers (Both working) of RCC Construction each of capacity as mentioned in the data sheets including associated equipment and drives.	Bidder understands that 2 x 50% capacity clarifiers with shall be provided. Further Bidder understands that the design flowrate of each Clarifier shall be 230m3/hr (with total design flow of 460 m3/hr).	As mentioned in the Cl No 9.07.00 (II) , Sub-section-A4, Page 9 of 88 , Design flow of clarifier shall be 460 m3/hr. Bidder to comply the specification requirement.
	Part A / Sec IV	III-A4	10 of 88	6.07.00. II)	Clarifier 3) Design Flow -460 m 3 /hr		
788	Part A / Sec IV	III-A4	6 of 88	6.03.00. g)	Interconnection between the clarified water outlet channel and outlet channel Existing clarifier.	Bidder would like to clarify that interconnection between clarified water outlet channel and outlet channel of exsiting clarifier would not be provided.	Bidder to comply the specification requirement.
789	Part A / Sec IV	III-A4	6 of 88	6.04.00. b)	Hot secondary water pipe (ACW) from the PHE's, discharging into the FGD system as process water. Provision for recirculation of hot secondary water line to ACW tank shall also be provided.	Bidder would like to clarify that separate ACW tank is not provided. Furthermore, provision for recirculation of hot secondary water line to clarified water storage tank is not envisaged as per process requirements and would not be considered. Please confirm.	Bidder to note that Clarified Water storage tank /Distribution Chamber and ACW tank are same.
790	Part A / Sec IV	III-A4	6 of 88	6.05.00. b)	Lime preparation & dosing system consisting of required number of RCC lime slaking tanks, RCC lime solution preparation tanks, agitators, lime slurry transfer pumps, lime solution dosing pumps complete with all necessary piping, fittings, feed piping, water supply piping, overflow and drain piping, sampling connections etc as mentioned data sheets enclosed in Annexure-1 of this sub-section.	Bidder would like to clarify that based on the capacity of the tank calculated either RCC or metallic (suitable compatible material) tanks would be provided. Please confirm.	Bidder to comply the specification requirement.
	Part A / Sec IV	III-A4	6 of 88	6.05.00. c)	Alum Solution preparation & dosing system consisting of required number of RCC Alum solution preparation tanks, agitators, alum solution dosing pumps complete with all necessary piping, fittings, feed piping, water supply piping, overflow and drain piping, sampling connections etc as mentioned data sheets enclosed in Annexure-1 of this sub-section.		
791	Part A / Sec IV	III-A4	22 of 88	7.02.00. a)	CW blow down water pipe tapped at the nearest point from CW blow down header to CMB to a stilling chamber, one set of Control Valve, its bypass valve and Isolation Valves for Control Valves.	Bidder understands that the CW system in the existing plant is once through system and hence the Seawater quality provided will be conisdered as design input for PT & Desalination Plant, without considering Cycles of concentration (COC) on water quality.	CW system in the existing plant is running at 1.5 COC, hence the design sea water quality shall be calculated accordingly. Necessary amendement is being issued.
	Part A / Sec IV	II-A4	33 of 37	PROJECT INFORMATION (VALLUR TPP 3X500 MW)	TABLE-4 SEA WATER ANALYSIS		
792	Part A / Sec IV	III-A4	24 of 88	7.03.00. iii)	Complete Chemical cleaning and Flushing system comprising the necessary tanks and pumps for SWRO trains/streams.	Bidder would like to propose One (1) no. common Chemical cleaning system for both SWRO and BWRO Units depending on Manufacturers recommendation, instead of separate chemical cleaning system for SWRO and BWRO Units. Please confirm.	Bidder to comply the specification requirement.
793	Part A / Sec IV	III-A4	25 of 88	7.04.00. d)	Complete system for chemical cleaning and Flushing system comprising the necessary tanks and pumps for RO trains/streams.		
794	Part A / Sec IV	III-A4	25 of 88	7.04.00. g)	Reject water piping from 2 nd stage RO trains to the Brine water storage tank.	Bidder would like to propose that BWRO reject water may be recirculated back to the Filtered water storage tank (downstream of Dual Media Filters). Please note that BWRO reject water quality is much better than the SWRO inlet water quality.	Bidder to comply the specification requirement.
795	Part A / Sec IV	III-A4	26 of 88	7.06.00. 3)	Two numbers of Coagulant preparation tanks & its accessories	Bidder would like to clarify that there are no chemical dilution required for chemicals such as coagulant (FeCl3), anti-scalant, HCl and NaOH, before dosing. Hence, Bidder proposes to provide required Bulk storage tanks and one (1) no. dosing tank (for each chemical) of one day capacity required. Please confirm.	Bidder to comply the specification requirement.
796	Part A / Sec IV	III-A4	26 of 88	7.06.00. 7)	Two numbers of Anti-scalant preparation tanks & its accessories		
797	Part A / Sec IV	III-A4	27 of 88	7.06.00. 13) & 14)	Three numbers of Acid (HCl) preparation tanks & its accessories Two numbers of Acid (HCl) measuring tanks & its accessories		
798	Part A / Sec IV	III-A4	27 of 88	7.06.00. 19) & 20)	One number of Alkali preparation tank & its accessories Two numbers of Alkali measuring tanks for pH control of RO System & its accessories		

S. NO.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC'S CLARIFICATION
	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
799	Part A / Sec IV	III-A4	27 of 88	7.06.00	16) Two numbers of Sodium Hydroxide (Alkali) unloading pumps, its drives, required suction & discharge piping, valves, fittings etc. 17) Two numbers of Sodium Hydroxide (Alkali) transfer cum re-circulation pumps, its drives, required suction & discharge piping, valves, fittings etc.	Bidder would like propose 2 x 100% Sodium Hydroxide (Alkali) unloading cum transfer pumps which can unload the chemical from the chemical tanker to bulk storage tanks and also can transfer chemicals from bulk storage tank to day tank. Please confirm.	Bidder to comply the specification requirement.
800	Part E/ Sec VI	-	1 of 2	0011-109(2)-POM-A-005	P&ID for Pre-Treatment Plant (Sheet-1) for Simhadri STPP	Bidder understands that Owner will provide a service water connection from the exsiting overhead tank header for dilution of chemicals and flushing purposes. Please confirm.	Bidder to take necessary tapoff from the nearest available overhead tank header.
801	Part E/ Sec VI	-	1 of 2	0011-109(2)-POM-A-005	P&ID for Pre-Treatment Plant (Sheet-1) for Simhadri STPP	Owner has indicated "Filter backwash pump discharge" line connected to the "stilling chanmber". However, please note that there are no Media filters proposed / required for this project as per specification. Please clarify.	Bidder ' s understanding is correct. Filter Back wash pump disscharge in the P & ID is not required and same my be considered as deleted.
802	Technical Specification- Section VI, PART -A BID DOC NO CS-0011-109(2)-9	II-A5 PJ INFORMATION,(BHILAI - 2 X 250 MW) II-A6 PJ INFORMATION,(MUZAFIRPUR -II 2 X 195 MW) II-A7 PJ INFORMATION,(ROURKELA 1 X 250MW) II-A2 PJ INFORMATION,(SIMHADRI -4 X 500MW) II-A4 PJ INFORMATION,(VALLUR TPP 3X500MW)	BHILAI - 2 X 250 MW --> Page 21 OF 30 MUZAFIRPUR -II 2 X 195 MW--> Page 25 of 36 ROURKELA - 1 X 250MW---> Page 21 of 29 SIMHADRI -4 X 500MW---> Page 19 of 29 VALLUR TPP 3X500MW --> Page 24 of 37	ANNEX -III	Soil data and foundation system Employer has carried out geotech investigation in the vicinity of proposed area. Logs of available bore holes for bidder's solely information in the vicinity of the proposed area are enclosed with this annex	Requesting NTPC to provide the layout indicating location of Bore Holes provided with respect to the proposed space for F.G.D Plant	Borehole co-ordinate marked in the borelog. Bidder may refer the same
803	Technical Specification- Section VI, PART -A BID DOC NO CS-0011-109(2)-9	II-A3 PJ INFORMATION,(SIPAT - 3 X660MW)	Page 19 of 29	ANNEX -II	Soil data and foundation system Employer has carried out geotech investigation in the vicinity of proposed area. Logs of available bore holes for bidder's solely information in the vicinity of the proposed area are enclosed with this annex	Requesting NTPC to provide the layout indicating location of Bore Holes provided with respect to the proposed space for F.G.D Plant	Borehole co-ordinate marked in the borelog. Bidder may refer the same
804	Technical Specification- Section VI, PART -A BID DOC NO CS-0011-109(2)-9	II-A1 PJ INFORMATION,(TSTPP - 6 X500MW)	Page 22 of 34	ANNEX -I	Soil data and foundation system Employer has carried out geotech investigation in the vicinity of proposed area. Logs of available bore holes for bidder's solely information in the vicinity of the proposed area are enclosed with this annex	Requesting NTPC to provide the layout indicating location of Bore Holes provided with respect to the proposed space for F.G.D Plant	Borehole co-ordinate marked in the borelog. Bidder may refer the same
805	Technical Specification- Section VI, PART -B BID DOC NO CS-0011-109(2)-9	IV - D CIVIL WORKS	Page 9 of 64	3.14.01 CHIMNEY	The Center to center distance between the proposed chimneys and the existing chimneys and NDCT's in any direction shall not be less than 150 m	Request to confirm whether the center to center distance between the two new chimneys needs to be a minimum of 150 m or is it only applicable for the center to center distance between new chimneys and existing chimneys.	The center to center distance of minimum 150m shall be kept between exsting and new chimney. The distance between existing chimney's shall be as per design.
806	Technical Specification- Section VI, PART -B BID DOC NO CS-0011-109(2)-9	IV - D CIVIL WORKS	Page 13 of 64	3.14.08	Thermal insulation (application in case of titanium , C 276 Flue liner)	Bidder understands that thermal insulation is not required in case of 38 mm thick Borosilicate lining inside flue can	Bidders understanding is correct.
807	Technical Specification- Section VI, PART -B BID DOC NO CS-0011-109(2)-9	IV - D CIVIL WORKS	Page 34 of 64	22.00.00	Statutory requirements Bidder shall obtain approval of Civil/Architectural drawings from Concerned authority before taking up construction	Bidder understand that Civil/Architectural drawings for the project needs approval from "NTPC " only and does not need require approval from other external agencies.	Bidder to comply with technical specification
808	VI /A	III-B	3 of 8	1.05.03 / 1.06.00.(c)	It is in the interest of the bidder to acquaint himself with existing schematics and present scope before submission of offer.	1. Existing schematics of control and protection panel of switchyard. 2. Availiablity/Ratings of spare module in exisitng ACDB / DCDB of exsiitng switchyard 3. Existing switchyard control room details. 4.Existing switchyard plan and section layout. 5. Make of Existing Switchyard Equipments.	Bidder is requested to visit the site and collect the required details.
809	VI / B	II-E16	12 of 12	-	Block diagram of DC health monitoring system (drg. No. 0000-209-POE-A-002)	Bidder understand this is not aplicable to 220V DC system of FGD package/FGD plant area, since DC health monitoring system is not covered in writeup portion of E16. Owner to check and confirm	Bidders understanding is correct.

S. NO.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC'S CLARIFICATION
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810	VI / E	-	61 to 66	-	Electrical Single Line Diagram for FGD Package (Drg.no.0011-109 (2)-P0E-J-001/A-F Rev A)	Owner to furnish the following details: 1. Existing Station boards details (SLD, Make) for Bidder's reference.	Relevant details shall be provided during detailed engineering.
811	VI /A	III-B	5 of 8	1.10.00 (2)	Contractor scope shall include laying of cable from employer board as shown in Electrical Single Line Diagram Drg No. 0011-109 (2)-POE-J-001/Rev.B on the employers nearest trestle in the FGD area as shown in GLP drawing of respective plant subject to availability of space and suitability.		Query is incomplete and not clear
812	VI /A	IV	3 OF 3	1.13.01	Employer's HT switchgear		Query is incomplete and not clear
813	VI / B	II-E6	22 of 23	9.00.00.b.1	Separate Switchgear Rooms shall be provided for each unit. For TG building, all HT boards shall be provided in HT switchgear room at only one floor and all L T boardsshall be provided in L T switchgear room at only one floor	Bidder understands that this clause is not applicable for FGD Package. Please confirm. Switchgear rooms to be decicded by bidder. Bidder will decide based on FGD layout	Bidders understanding is correct.
814	VI / A	III-B	2 of 8	1.05.02.I	Surge arrester	Location of surge arrester not clear in Tender SLD (Talcher STPS). One no. of surge arrester will be provided on 220kV side of FGD tie transformer	Bidders understanding is correct . Refer ammended tender SLD.
815	VI / A	III-B	3 OF 8	1.05.02.II	Material for earthing of all switchyard equipment	Below and above ground earthing of switchyard equipment which are in Bidder scope of supply and two connections will be provided / terminated to existing switchyard earth grid. NTPC to confirm.	Bidders understanding is correct.
816	VI / A	III-B	3 OF 8	1.05.02.II	Lighting and its accessories	Power supply for lighting of new 220kV dia (if required) shall be fed from existing MLDB in swicthyard control room. Request NTPC to confirm.	Bidders understanding is correct.
817	-	-	-	-	GLP - Talcher	1. Request NTPC to identify space for two nos. of 220 / 34.5kV, 100 MVA (TYP) transformer near to switchyard area. 2. General Layout shows 400kV switchyard, whereas Specification/ Tender says 220 kV Switchyard. Please confim the location of 220 kV Switchyard on layout. 3. Please provide overall cable tray layout to identfy the routing of 33 kV Cable.	Refer ammendment to tender GLP
818	VI / B	II-E19	3 of 44	1.01.25	Two nos. of suitable separate power suppy from LT switchgear shall be provided to each AC kiosk.	Two nos. of power supply for AC kiosk **(if applicable)** shall be derived from existing LT switchgear located in switchyard control room. Request NTPC to confirm.	Bidders understanding is correct.
819	VI / B	II-E19	33 of 44	Annexure I	Bay Kiosk	Control and protection panel are located in existing switchyard control room as per clause 1.06.00 part A, sub section IIIB. Hence, no separate Bay Kiosk is envisaged. NTPC to confrim the space availability at Existing Switchyard control Room to accomodate new switchyard panels.	Bidder's understanding is correct however bidder is requested to visit site for obtaining further details.

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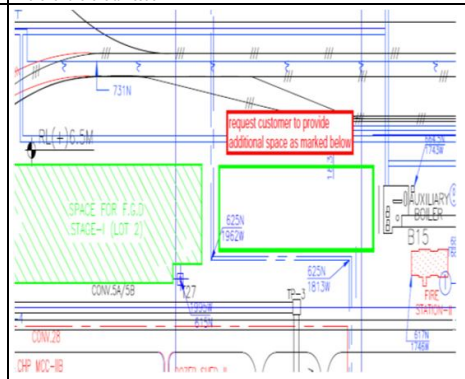
820	VI / B	II-E19	37 of 44	8.07.00	Cabling	**A.** Existing cable trays/ trench in switchyard control room shall be utilized for the following: 1. power from ACDB / DCDB to control and protection of new 220kV dia. 2. control cables 3. whereever possible, Existing cable tray shall be utilized from switchyard control room to switchyard. **B.** New cable trench and trays / conduit with support accessories will be provided by bidder in new 220kV dia of switchyard. Request NTPC to confirm.	Bidder understanding is correct. However it may be noted that incase space available in the existing tray/trench is not sufficient than seprate arrangement for the cables in the bidder's scope shall also be in the scope of the Bidder.
821	IV/ A	-	3 of 3	1.13.01	Electrical Terminal Points ii) Employer 220kV Bus at Switchyard (For TSPS only)	Bidder presume bus extension is not required at TSPS 220KV Switchyard (Talcher STPS). NTPC to confirm the same	Bidders understanding is correct.
822	VI / B	II-E19	37 of 44	8.07.00	1.05.00	NTPC to confirm 220kV side voltage variation for TSPS (TALCHER).	Voltage variation for 220kV shall be from 198kV to 245kV as per Statutory regulations.
823	A5-1	-	-	-	General Layout Plan dwg for Bhilai 2 x 250 MW	Request NTPC to provide : Additional space required for 1. Limestone handling, 2.Integrated Ball mill & Gypsum dewatering building and 3.gypsum storage shed facilities.	Refer ammendment to tender GLP
824	A7-1	-	-	-	General Layout Plan dwg for Rourkela 1 x 250 MW	Request NTPC to provide : Additional space required for 1. Limestone handling, 2.Integrated Ball mill & Gypsum dewatering building and 3.gypsum storage shed facilities.	Refer ammendment to tender GLP
825	A1-1	-	-	-	General Layout Plan dwg for TSTPS 6 x 500 MW	Request NTPC to provide : Additional space required for 1. Booster fans 2. Space for Switchyard	Refer ammendment to tender GLP

S. NO.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC Clarification
	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
1					Site Fabrication	We request NTPC to kindly clarify that Absorber vessel can be fabricated at Site for Lot-2 Projects. Also kindly clarify whether material cost for Absorber (Clad Plates) to be considered in which Schedule. Also request NTPC to clarify under which Schedule material cost for Chimney Flue Liners will have to be considered.	**Absorber:** Absorber vessel can be fabricated at site. Clad Plates for Absorbers shall be considered under supply portion and Material cost for the same is to be quoted in supply portion, whereas, only site fabrication and erection cost of Absorber shall be quoted under Installation. **Chimney Liner:** In case bidder offers chimney flue liner cladding of C276/Titanium, it has to be fabricated in factory in segments, transported and welded at Site. In such case, Clad Plates for chimney liners shall be considered under supply portion and Material cost for the same is to be quoted in supply potion, whereas, only site fabrication and erection cost of chimney liner shall be quoted under Installation portion. However, in case the bidder offers chimney lining material as MS with Boro-silicate, the same can be fabricated at site. In such case, erection including material cost of Chimney liner (MS portion) shall be quoted under Installation portion. Cost of Boro-silicate portion shall be quoted in supply portion.
2					Vallur TPP (3x500 MW)	As per the latest amendment the PT and Sea Water RO plant needs to be designed for 1.5 Cycles of concentration which implies input TDS level of 63,000 ppm with a guarantee of membranes varying from 3 to 5 years without any replacement. We need a revision in the design parameters so that we can offer suitable equipment.	Revision in the design parameters/arrangement is not required as Two (2) stage RO is sufficient to meet the requirement.
3					Talcher STPP (2x500 MW + 4x500 MW)	AS per the amended GLP of Talcher there are lot of existing drains available within the space allocated for FGD system, hence we request NTPC to clarify the scope of re-routing of above drains.	NTPC clarified that re-routing of existing drains within the space allocated for FGD system is in NTPC scope.
4						Outlet duct and bypass damper support over chimney raft is to allowed wherever there is an issue.	NTPC clarified that such layout related issues shall be discussed and suitably resolved during detailed engineering.
5	VI/A	II-A2	Simhadri	GLP Drawing No. 3530-999-POC-F-001 Rev. 6	Space allocated for FGD portion in Simhadri	 Request customer to allocate the highlighted portion in FGD Simhadri also. This bloack was initially allocated by NTPC & also same has been shown during site visit. Due to deletion of this block we are not able to locate LHP system.	NTPC clarified that the space allocated in the revised GLP shall be considered by the bidder.

S. NO.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC Clarification
	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
1	VI/B	SUB-SECTION-I-M1 (FGD)	29 of 52	7.07.06	The Waste water Tank shall be complete with Agitator, level transmitters etc. The waste water collection tank shall be of Steel construction with rubber lining	Bidder shall envisage 3 mm thick Flake glass (Vinyle ester based) lining for Waste Water tank as per Clause no. 10.01.00 of TECHNICAL SPECIFICATION SECTION-VI BID DOC. NO.:CS-0011-109(2)-9 PART B SUB-SECTION-I-M1 (FGD): Wastewater tank, Filtrate tank, Secondary hydro cyclone feed tank: Vinyl Ester based flake glass lining of minimum 3 mm thickness. Clause No. 7.07.06 & 10.01.00 are contradictory to each other regarding lining material of wast water tank. So, bidder has considered lining material as per cl. no. 10.01.00... This is in line with clarification / reply / amendment received from NTPC for Lot 1A / Lot 1B tender.	Bidder's understanding is correct.The waste water collection tank shall be of Steel construction with Vinyl Ester based flake glass lining of minimum 3 mm thickness.
2	VI/A	SUB-SECTION-III-A1 FGD	6 of 9	7.08.00	All the storage tanks shall be lined with replaceable chlorobutyl/bromobutyl rubber lining of minimum 4 mm thickness or with vinyl ester based flake glass lining of minimum 3 mm thickness from inside.	Bidder shall envisage water tank linings as per Specification Clause no. 13.03.07 of TECHNICAL SPECIFICATION SECTION-VI BID DOC. NO.:CS-0011-109(2)-9 PART B SUB-SECTION-I-M1 (FGD). CL. No. 13.03.07 provides the option of Epoxy lining, in addition to Rubber/ Flake glass lining mentioned in cl.no. 7.08.00.. So, bidder will consider Rubber/ Flake glass/ Epoxy lining. Employer to confirm bidder's consideration.	NTPC clarified that the requirement of Aux. Absorber Tank as per Clause 7.08.00 and Process Water Tank as per Clause 13.03.07 are to be taken care as per specification requirement.
3	VI/B	SUB-SECTION-I-M1 (FGD)	30 of 52	7.08.06	Suction screens shall be installed to protect the pump.	Suction screens are not applicable for auxiliary absorbent pump. Bidder shall provide Suction screens only inside the Absorber vessel to protect the Slurry recirculation pumps as per specification clause no. 5.06.23 of TECHNICAL SPECIFICATION SECTION-VI BID DOC. NO.:CS-0011-109(2)-9 PART B SUB-SECTION-I-M1 (FGD).	NTPC clarified that requirement of the specification shall be considered by the bidder.
4	VI/B VI/A	SUB-SECTION-I-M1 FGD SUB-SECTION-III-A1 FGD	7.07.07 & 7.07.10 2.06.00	29 of 52 2 of 9	The complete waste water neutralization.....automated and controlled from the control room. - Adequate storage and feeding system.....contractor scope - Bucket conveyors shall be provided by the contractor to feed lime to each of the lime storage silos from ground level... - Automated lime feeding & dosing system for Neutralization....	Employer is requested to furnish the following: 1) A detailed scheme for automated waste water neutralization system along with automated lime feeding and dosing system since same has not been shown in the Tender Drawing no. 0011-109(2)-POM-A-003, Rev-A, Scheme of Gypsum Dewatering System. 2) Please let us know the bulk density of Hydrated lime and weather this lime (supplied by Employer) will be in the form of bags or transported through trucks. 3) As Employer is arranging the Hydrated lime unto lime storage building this point needs to be incorporated in the Terminal Point Chapter (Section-VI, Part-A, Sub-section IV, Terminal Points & Exclusions). 4) Bidder understands that the lime will be manually feed to the Bucket elevator from the lime storage room. Bidder understands that the lime bags shall be unloaded manually to the bucket elevator inlet. Employer to confirm bidder's understanding.	NTPC clarified that lime bags after unloading into a container shall be fed automatically into the bucket conveyors.
5	VI/B	SUB-SECTION-I-M1 (FGD)	8.07.00	31 of 52	For Absorber Recirculation service a Silicon Carbide impeller and SiC lining for casing can also be accepted if manufacturer has supplied a similar pump for a previous installation for similar service.	Bidder also proposes the Absorber recirculation pump impeller with Hi-chrome/ Duplex Stainless steel material and SiC lining for casing as per manufacturer's proven practice in similar applications.	NTPC clarified that Hi-chrome impeller is also acceptable as per specification requirement.
6	VI/B	SUB-SECTION-I M5	20.01.01	143 of 152	Electric Overhead Traveling (EOT) crane shall take care of erection/ maintenance requirement of pumps / blowers / machines and their associated auxiliaries for which these are being installed.	Bidder shall envisage Electric & Manual hoist as per clause 14.09.00, subsection I-M1, Vol. VI/B. Hence, EOT crane is not required & this is inline with Lot 1A/1B tenders. Bidder understands that EOT crane is applicable only for Sea water RO plant for Vallur TPP. However, EOT crane is not applicable for PT plant & ECW system.	Bidder's understanding is correct. Bidder to refer Cl No-7.03.00 (ix) and 7.05.00(k) RO (2ND STAGE) SYSTEM, Sub-section-III A4, Part-A, Section-VI. Please refer Cl No -7.05.00(h),Sub-section-III A4, Part-A, Section-VI for ECW system of Vallur TPP.

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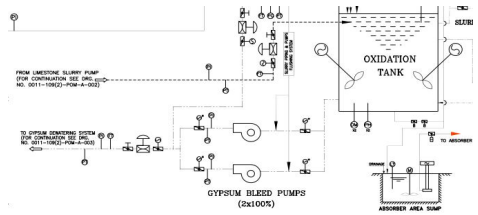
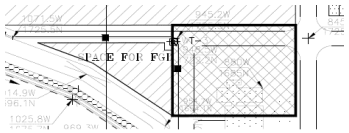
	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
7	VI/E	0011-109(2)-POM-A-001	1 of 3 2 of 3 3 of 3			Bidder proposes Ceramic ball control valve in place of pinch control valve in slurry line (i.e. at Gypsum Bleed to absorber, Gypsum Bleed to primary HC, Reagent slurry to Absorber inlet as shown in tender drawing no. 0011-109(2)-POM-A-001 TECHNICAL SPECIFICATION SECTION – VI, PART-E) as per bidder's proven practice. Bidder does not have any references of pinch control valves being used in mentioned service which is not at all a good design alternative A mentioned in below reasons: • The rubber of the pinch valve is likely subject to a fast abrasion during the operation as a consequence of the high velocity in the contacted section and the rubber further reduces the area of passage. To be noted that such experience is relevant to an on/off service as well, while the control valve is permanently subject to the passage of fluid which is even worse for the material. • The actuation of a pinch valve exposes the rubber of the valve to a continuous movement that can further limit the lifetime of this component during the long term operation. Further, Ceramic ball control vale is superior to Pinch control valve. Hence employer is requested to accept bidder's proposal to use Ceramic ball control valve in this regard.	NTPC clarified that requirement of the specification shall be considered by the bidder.
8	VI/A	III-A5 (Limestone & Gypsum Handling system)	4 of 4	3.07.00	Complete ventilation system for gypsum storage shed.	As this gypsum shed is one side complete open, hence ventilation system is not required.	NTPC clarified that requirement of the specification shall be considered by the bidder.
9	VI/A	SUB-SECTION-IV TERMINAL POINTS & EXCLUSIONS	PAGE 2 OF 3	1.04.00	Process Water For process water requirement, Contractor shall take a tap off suitably from the existing blow down header available near FGD area except for coastal projects (Simhadri STPP & Vallur TPP).	Bidder request customer to specify available pressure in blow down header/TP .	As already clarified, pressure available at terminal point will be furnished during detailed engineering.
10	VI/A	SUB-SECTION-IV TERMINAL POINTS & EXCLUSIONS	PAGE 2 OF 3	1.05.00	Sea water PT & Desalination plant applicable for Vallur TPP: i) Contractor shall take a tap off suitably from the existing CW blow down header (To CMB) available near the proposed Sea water PT & Desalination plant (as indicated in GLP). ii) Contractor shall terminate the discharge of backwash, cleaning & chemical waste and PT plant sludge into the existing CW blow down header (To CMB) available at 200 meter downstream of intake point to sea water PT & Desalination plant	Bidder request customer to provide material of construction used in existing CW blow down header conveying sea water. Bidder request customer to specify available pressure at TP locations. Bidder request employer to provide the CWBD pipe routing drawing so that bidder can take tapping at suitable location for PT&SWRO plant inline with Terminal point chapter.	As already clarified, Material of Construction of CWBD in the mentioned project is Internally Epoxy Lined MS Pipe. Exact Routing and available Pressure at Terminal Point will be furnished during detailed engineering.
11	VI/B	SUB-SECTION-I-M5 EQUIPMENT COOLING WATER SYSTEM	PAGE 19 OF 151	12.03.01.07	13. Service Lime slurry/Solution/Suspensions Recommended material Galvanized Steel	Bidder understands for limestone slurry application rubber lined carbon steel material is recommended instead of Galvanized Steel. Galvanised steel is not recommended for slurry line pipes, hence bidder has considered ubber lined carbon steel pipe , in line with lot 1A/1B tender.	NTPC clarified that requirement of the specification shall be considered by the bidder.
12	VI/A	NTECL Vallur (3 x 500 MW) GLP NTECL Vallur GLP Drg No. 0260-999-POC-F-001 Rev-05				At present Space provided behind the U#2 &3 (Between 1600N - 1800 N and 800W-1200W) is within 150m radius of existing stacks. We request Employer to provide additional area as shown in below extract of GLP so that 150m radius criteria for existing and new wet stack can be fullfilled.Bidder has not received ammended GLP for Vallur. Employer is requested to upload the same.	NTPC clarified that GLP for Vallur is not amended and requirement of the specification shall be considered by the bidder.
13	VI/A	NTECL Vallur (3 x 500 MW) GLP Drg No. 0260-999-POC-F-001 Rev-05				Bidder envisaged that as per layout planned for FGD facilities,the foundation for duct support may rest on the existing Chimney Foundation and accordingly employer is requested to allow Bidder for it.	NTPC clarified that such layout related issues shall be discussed and suitably resolved during detailed engineering.
14	VI/A	III-A1	2 of 9	2.04.00	Provision shall be made for faciliting operation of unit with FGD bypass through existing stack. All modifications required including providing bypass damperis included in the scope of Contractor.	Bidder wish to clarify following points: - Installation of bypass damper in the existing ducting is very difficult in some of the plants based on thir site visit. - In some of the site there is no space for erection of bypass dampers. - In some plants the bypass damper support & the FGD inlet duct support (at tapping points) will come on the raft of the Stack. Bidder request employer to furnish their suggesation on the above points related to bypass damper & tapping point ducting.	NTPC clarified that such layout related issues shall be discussed and suitably resolved during detailed engineering.

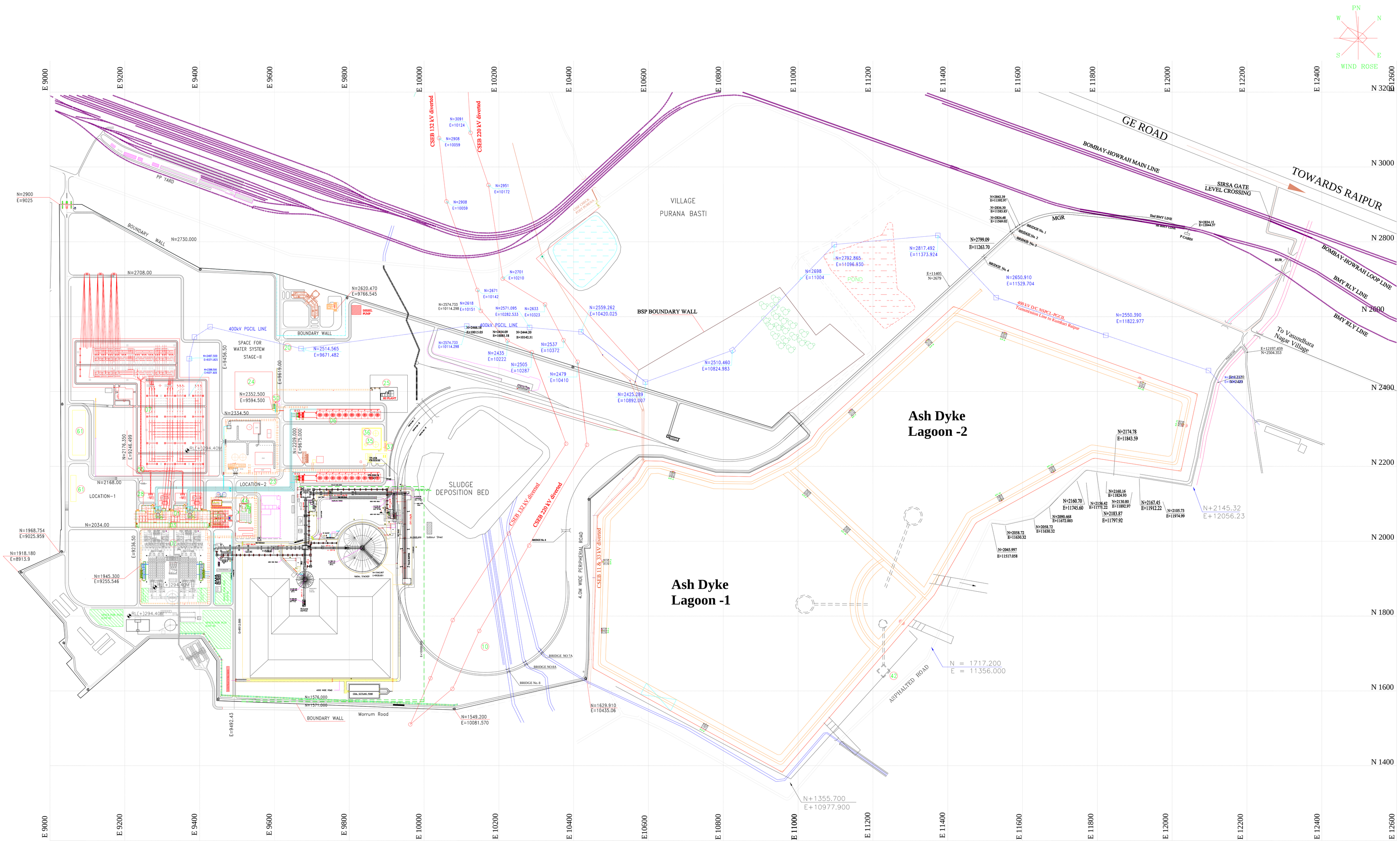
S. NO.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC Clarification
	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
15	VI/A	V	Page 9 of 21	4.01.05 4.01.06	The top flue liner above the roof slab shall be made of solid C276 (ASTM B575, UNS N10276) / Titanium (Grade 2 as per ASME SB265) of minimum 10 mm thickness. External surface of chimney flue liner projecting over the chimney roof shall be wrapped with 2mm thick Titanium/C-276 sheet over insulation.	1. Inside surface of chimney liner above roof shall be either clad steel (Titanium or C276) or borosilicate lining system as per specification. 2. External surface of chimney flue liner above chimney roof shall be wrapped with 2 mm thick Titanium / C-276 sheet over insulation, for all the cases. Please Confirm.	Following shall be considered for the respective clauses: 4.01.05 For Titanium/C-276 lining, the top flue liner above the roof slab shall be made of solid C276 (ASTM B575, UNS N10276) / Titanium (Grade 2 as per ASME SB265) of minimum 10 mm thickness. For Borosilicate lining, the top flue liner above the roof slab shall be made of C276 (ASTM B575, UNS N10276) / Titanium (Grade 2 as per ASME SB265) of minimum 8 mm thickness with Borosilicate Glass Block Lining of minimum 38 mm thickness. The minimum length of flue liner projecting over the chimney roof shall be atleast equal to diameter of flue liner. 4.01.06 For Titanium/C-276 lining, external surface of chimney flue liner projecting over the chimney roof shall be wrapped with 2 mm thick Titanium / C-276 sheet over insulation. For Borosilicate lining, top portion of the flue can shall be wrapped with 8 mm thick U capping of Titanium / C-276 sheet to avoid any damage in between flue can and borosilicate lining.
16	II-A4 PROJECT INFORMATION	Table 4- Note	34 OF 37	AMENDMENT NO. 1 TO TECHNICAL SPECIFICATION (SECTION-VI), Sr. No. 26 Annexure-XII Vallur - Sea Water Analysis	**Annexure-XII Vallur - Sea Water Analysis** **Note:** The C.W system is expected to operate at about 1.5 Cycles of concentration.	COC of 1.5 implies TDS of around 63000ppm.Due to biological /organic impurities present in cooling tower blowdown water, extensive pretreatment is required and still there will be considerable fouling in RO membranes. Also, increase in temperature of CW water will reduce the life and performance of RO membrane substantially. Change of source from cooling tower blowdown to direct sea water will help in optimum designi of the system. Request employer to look into above mentioned issues and ammend the specification suitably.	NTPC clarified that requirement of the specification shall be considered by the bidder.
17				AMENDMENT NO. 1 TO TECHNICAL SPECIFICATION (SECTION-VI), Sr. No. 4 Annexure IV: Simhadri 4 x 500 MW) GLP 3530-999-POC-F-001 Rev-**06**	Space near Fire station-II was allocated for FGD in Rev. 5 layout. In latest layout, this space is removed & additional space near FOPH-2 is allocated for FGD.	Considering layout optimisation, Bidder request NTPC to provide the earlier allocated space..	NTPC clarified that requirement of the specification shall be considered by the bidder.
18				AMENDMENT NO. 1 TO TECHNICAL SPECIFICATION (SECTION-VI), Sr. No. 35 Annexure XIII: Talcher SLD ((0011-109(2)-POE-J-001/C Rev C	11 kV TIE Switchgear in FGD area (Unit#1 & 2) and 11 kV TIE Switchgear in FGD area (Unit#3, 4, 5 & 6)	Bidder wish to distribute the FGD and common system load in 11kV TIE Switchgear 1 & 2 in FGD area based on layout feasibilities. Employer to confirm.	Loads related to stage-I entirely shall be fed from 11kV tie switchgear of unit 1 and 2. Loads related to stage-II shall be fed from 11kV tie switchgear of unit 3,4,5, and 6. Scheme has been clearly indicated in tender SLD. For loads that are common for stage-I and II FGD systems, bidder may choose to feed these loads from any 11kV tie switchgear based on layout feasibilities.

S. NO.	SPECIFICATION REFERENCE				SPECIFICATION REQUIREMENT	BIDDER'S QUERY	NTPC Clarification
	SEC/PART	SUB SEC.	PAGE NO.	CLAUSE NO.			
19	SECTION – VI, PART-A	SUB-SECTION-I INTENT OF SPECIFICATION	2.3 2.5(ii)	12 OF 19 13 of 19	For Chimney, Bidder or its agency should have in the past built at least one (1) reinforced concrete chimney of minimum 100m height For Chimney, Bidder or its design agency (ies) should have carried out design & detailed engineering of at least one reinforced concrete chimney with steel flues, of minimum 100m height.	Bidder requests employer to amend the QR criteria for Chimney design agency as mentioned below; (similar to QR criteria for chimney civil works.) (1) For Chimney, Bidder or its design agency (ies) should have carried out design & detailed engineering of at least one reinforced concrete chimney with Steel/Brick Flue, of minimum 100m height. OR (2) Bidder's inhouse Engineer' team , based on their experience and approval from NTPC	NTPC clarified that requirement of the specification shall be considered by the bidder.
20	Section-VI, Part-A	Sub-Section-III-B Electrical System/Equipment	3 of 8	1.06.00	Extending AC/DC Supply from owner's existing ACDB/DCDB in switchyard area	Bidder request to employer to provide the AC/DC Supply for the followings in Switchyard area: 1. 33KV TIE Switchgear 2. 11kV TIE Switchgear (for Owner's Use) 3. Illumination of Electrical Building in Switchyard area.	AC and DC supply shall be provided BY OWNER for switchyard EHV bay equipments and its control and protection systems ONLY. Bidder shall make its own arrangement for AC and DC Auxilliary supply required for 33kV/11kV switchgear/electrical room and illumination of buildings which are under bidders scope from FGD Aux. supply system.
21	VI/A	VII	13-15 of 82	1.19.00 1.20.00 1.21.00	Mandatory Spares :- Pre-Treatment Plant Cum ECW System for Simhadri STPP-II(2X500 MW))	Bidder is unable to locate Mandatory Spares of ECW system in Cl. 1.20.00 for Simhadri Proposal whereas spares of ECW are mentioned for all other proposal against Cl. 1.19.00 & 1.21.00. Customer may please review applicability of ECW(Equipment Cooling Water System) spares for Simhadri Proposal.	NTPC clarified that requirement of the specification shall be considered by the bidder.
22	VI/B	I-M1	19 of 52	5.06.11	The complete absorber vessel (absorber oxidation tank, absorber tower & absorber outlet duct upto absorber outlet flange) shall be made of clad sheet of C276 / Alloy 59 (minimum 2 mm thickness) by explosion bonding or hot rolling, having minimum 7 mm thick carbon steel as base material.	Kindly amend the clause and accept Plug Welding of C276 sheet with Carbon Steel plates of required thickness. The same will be economical and shall be deliverable in time.	NTPC clarified that requirement of the specification shall be considered by the bidder.

	2 X 250 MW NSPCL BHILAI TPP-FGD **SCOPE OF WORK**	SPECIFICATION NO. PE-TS-468-600-C001 VOLUME - II B SECTION - C REV.NO. 00 DATE 15-02-2020 SHEET 1 OF 1

SECTION - C

GENERAL LAYOUT PLAN



FACILITY LEGEND

ID	FACILITY	ID	FACILITY	ID	FACILITY	ID	FACILITY
1	TURBINE BUILDING	18	WORKSHOP/WAREHOUSE	35*	LIGHT FUEL OIL STORAGE TANK	52	SPACE FOR CTI TRANSFORMERS (POTENTIAL) (NOT SHOWN)
2	STEAM GENERATOR	19	MAIN GUARDHOUSE	36	HEAVY FUEL OIL STORAGE TANK (2)	53	INTERFACE WITH ELECTRICAL MANHOLE BETWEEN CONTRACT 71.1000 & CONTRACT 70.3000 PROVIDED BY CONTRACT 71.1000
3	CENTRAL CONTROL ROOM (INCLUDED IN STG BUILDING)	20*	MAIN PLANT ACCESS ROAD	37	FUEL OIL UNLOADING PUMP SKID (2)		
4	AQCS AREA	21	FIRE WATER PUMP HOUSE AND SWITCH GEAR BUILDING	38	FUEL OIL FORWARDING PUMP SKID (2)	54*	CONTRACT 70.3000 AREA OF WORK
5	WATER TREATMENT AREA – SUNSHADE	22	SERVICE/FIRE WATER TANK (2)	39*	DELETED	55	INTERFACE WITH ELECTRICAL MANHOLE BETWEEN CONTRACT 71.1000 & CONTRACT 70.7000 PROVIDED BY CONTRACT 71.1000 (NOT SHOWN)
6	COOLING TOWER	23	CIRCULATING WATER PIPES	40*	COAL TRANSFER BUILDING		
7 *	SWITCH YARD	24	RAW WATER STORAGE TANK	41	FIRE STATION	56	CONTRACT 70.7000 AREA OF WORK
8 *	DELETED	25	HYDROGEN GENERATION BUILDING	42	AWRS PUMP HOUSE	57	WATCH TOWERS
9 *	COAL STORAGE – 7 DAYS COAL STORAGE	26	DEMINERALIZED WATER STORAGE TANK (2)	43	CENTRAL EFFLUENT MONITORING BASIN	58*	DELEDTED
10*	RAIL ROAD LOOP (CONTRACT 70.0250 AREA OF WORK)	27	CIRCULATING WATER CHEMICAL FEED AREA – SUNSHADE	44	CANTEEN	59*	IN-MOTION TRACK SCALE (NOT SHOWN)
11*	EMERGENCY COAL STOCKOUT RECLAIM	28	DIESEL GENERATOR BUILDING	45	DECANTED ASH WATER PUMP STRUCTURE	60	TRUCK SCALE
12	ASH DISPOSAL AREA (CONTRACT 70.4000 AREA OF WORK)	29	WATER TREATMENT ELECTRICAL BUILDING	46	PUBLIC USE ASH SILOS (3)	61	SITE OFFICE
13*	RESERVE COAL STORAGE AREA – 53 DAYS COAL STORAGE	30*	SWITCHYARD CONTROL BUILDING (CONTRACT 70.6000) (NOT SHOWN)	47	NEUTRALIZATION TANK	62	AIR COMPRESSOR BUILDING
14	ADMINISTRATION BUILDING	31	COOLING TOWER ELECTRICAL BUILDING	48*	COAL FACILITIES SETTLEMENT POND	63	CONDENSATE STORAGE TANK(2)
15	SERVICE BUILDING	32*	DELETED	49	RAW WATER CLARIFIER		
16	SPACE FOR ADDITIONAL AQCS EQUIPMENT (FUTURE)	33*	BOTTOM CAR DUMPER BUILDING	50	RAW WATER PUMP HOUSE		
17	SOUTH ENTRY GUARDHOUSE	34	DIESEL LOCOMOTIVE SHED (NOT SHOWN)	51	SETTLING POND		

NOTE:

1. EXISTING PIPE/CABLE TRESTLES PASSING THROUGH THE PROPOSED FGD AREA SHALL BE RETAINED, AND FGD LAYOUT SHALL BE PREPARED ACCORDINGLY. BIDDER TO TAKE NECESSARY PRECAUTION AND SHALL BE RESPONSIBLE FOR ANY DAMAGE TO EXISTING FAULITIES/PIPE/CABLE TRESTLES ETC.

LEGEND:

1. SPACE FOR FGD PACKAGE (FOR LOT-2) . . . . . .

NTPC SAIL POWER COMPANY PVT. LIMITED

2x250 MW EXPANSION POWER PLANT-3 BHILAI

TECHNICAL SERVICES DEPARTMENT

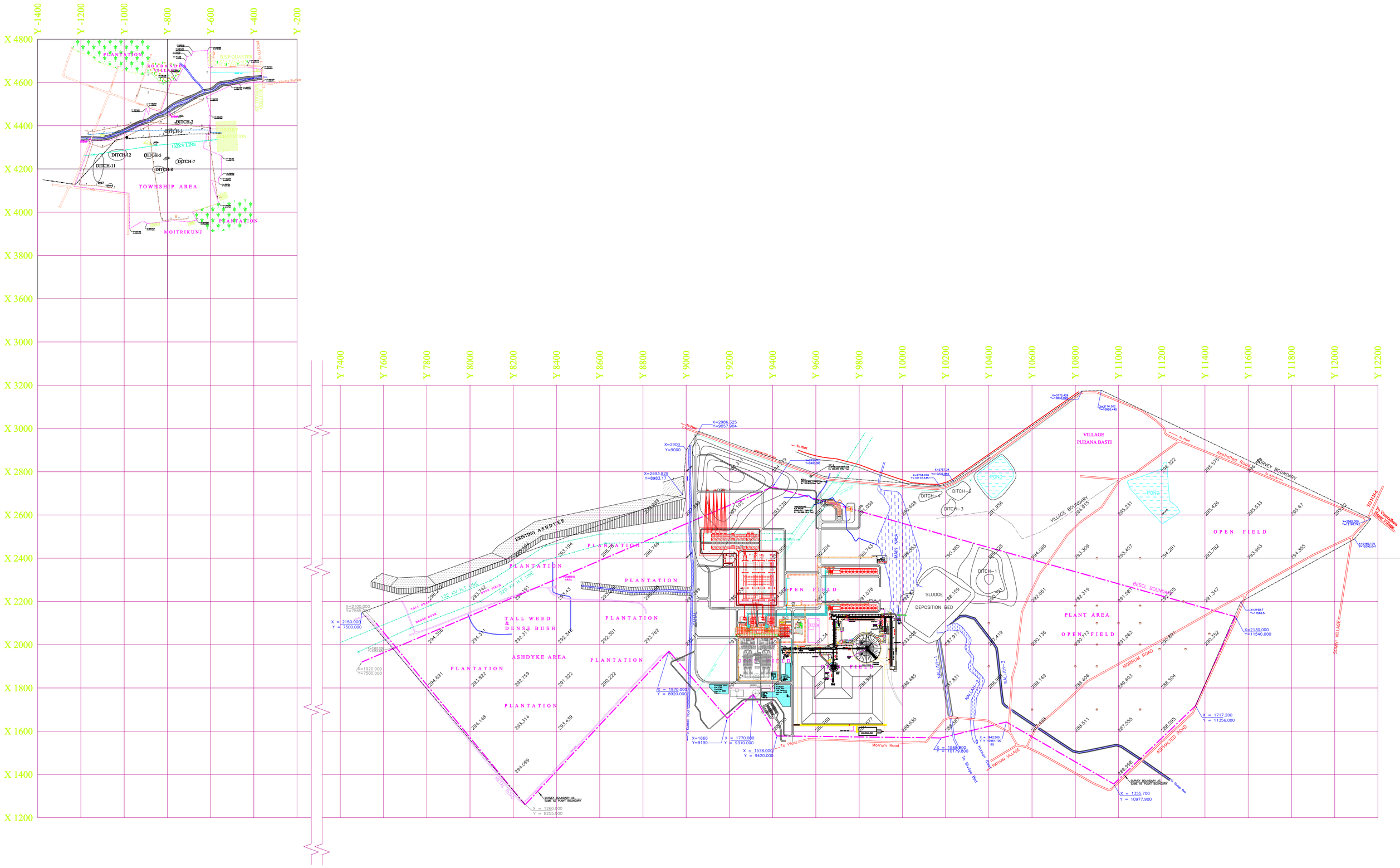
GENERAL LAYOUT PLAN

SIGN	DRG. NO. B/TS/PLOT	REV	SIZE
DATE: 23/08/18	SHEET 1 OF 1	0	A3

3884S/2020/PS-PEM-CIV

	2 X 250 MW NSPCL BHILAI TPP-FGD **SCOPE OF WORK**	SPECIFICATION NO. PE-TS-468-600-C001 VOLUME - II B SECTION - C REV.NO. 00 DATE 15-02-2020 SHEET 1 OF 1

SECTION - C
TOPOGRAPHY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Y -400
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X 4600
X 4400
X 4200
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X 3600
X 3000
X 3200
X 3000
X 2800
X 2600
X 2400
X 2200
X 2000
X 1800
X 1600
X 1400
X 1200
PLANTATION
B.S.P QUARTER
DITCH-2
DITCH-3
132KV LINE
DITCH-12
DITCH-5
DITCH-7
DITCH-11
DITCH-8
TOWNSHIP AREA
MOITRIKUNJ
Y 7400
Y 7600
Y 7800
Y 8000
Y 8200
Y 8400
Y 8600
Y 8800
Y 9000
Y 9200
Y 9400
Y 9600
Y 9800
Y 10000
Y 10200
Y 10400
Y 10600
Y 10800
Y 11000
Y 11200
Y 11400
Y 11600
Y 11800
Y 12000
Y 12200
EXISTING ASHDYKE
PLANTATION
TALL WEED & DENSE BUSH
ASHDYKE AREA
OPEN FIELD
SLUDGE DEPOSITION BED
VILLAGE PURANA BASTI
VILLAGE BOUNDARY
POND
DITCH-1
DITCH-2
DITCH-3
DITCH-4
PLANT AREA
SURVEY BOUNDARY
Asphalted Road
BESCL BOUNDARY
MORRUM ROAD
ASPHALTED ROAD
SONNI VILLAGE
PATHAN VILLAGE
To Plant
To Sludge Bed
To Kumari Road
X=2986.325
Y=9057.904
X=2900
Y=9000
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Y=8983.17
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Y=7500.000
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Y=7500.000
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TO N.H.-6
To Vindhyachal Thermal Power Station

	2 X 250 MW NSPCL BHILAI TPP-FGD **SCOPE OF WORK**	SPECIFICATION NO. PE-TS-468-600-C001 VOLUME - II B SECTION - C REV.NO. 00 DATE 15-02-2020 SHEET 1 OF 1

SECTION - C

CONTOUR DRAWINGS

X 1200
X 1400
X 1600
X 1800
X 2000
X 2200
X 2400
X 2600
X 2800
X 3000
X 3200
Y 7400
Y 7600
Y 7800
Y 8000
Y 8200
Y 8400
Y 8600
Y 8800
Y 9000
Y 9200
Y 9400
Y 9600
Y 9800
Y 10000
Y 10200
Y 10400
Y 10600
Y 10800
Y 11000
Y 11200
Y 11400
Y 11600
Y 11800
Y 12000
Y 12200
Y 12400
PLANTATION
TALL GRASS
DENSE BUSH
OPEN FIELD
EXISTING ASHDYKE
SURVEY BOUNDARY AS SAME AS PLANT BOUNDARY
CANAL
To Kumari Nadi
MAIN NALA
DITCH-1
DITCH-2
DITCH-3
DITCH-4
DITCH-5
SLUDGE DEPOSITION BED
POND
VILLAGE BOUNDARY
VILLAGE PURANA BASTI
HOUSE
SURVEY BOUNDARY
SOMNI VILLAGE
TO N.H-6
To Pond
TRACK HOPPER
ASPHALTED ROAD

SECTION - C

MAIN EQUIPMENT PLANT LAYOUT

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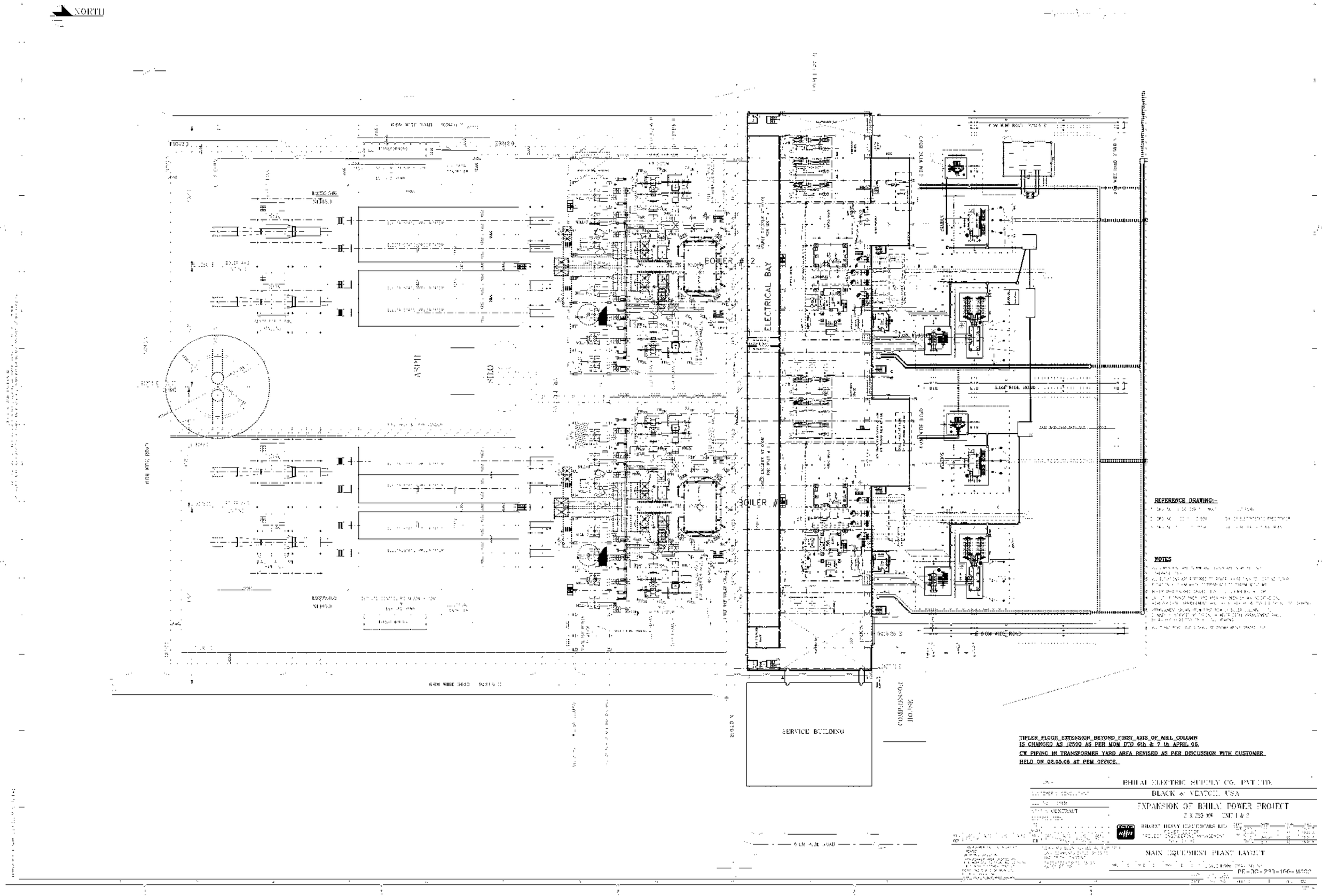

	2 X 250 MW NSPCL BHILAI TPP-FGD **SCOPE OF WORK**	SPECIFICATION NO. PE-TS-468-600-C001 VOLUME - II B SECTION - C REV.NO. 00 DATE 15-02-2020 SHEET 1 OF 1

SECTION - C

ID SYSTEM-ELEVATION AND PLAN

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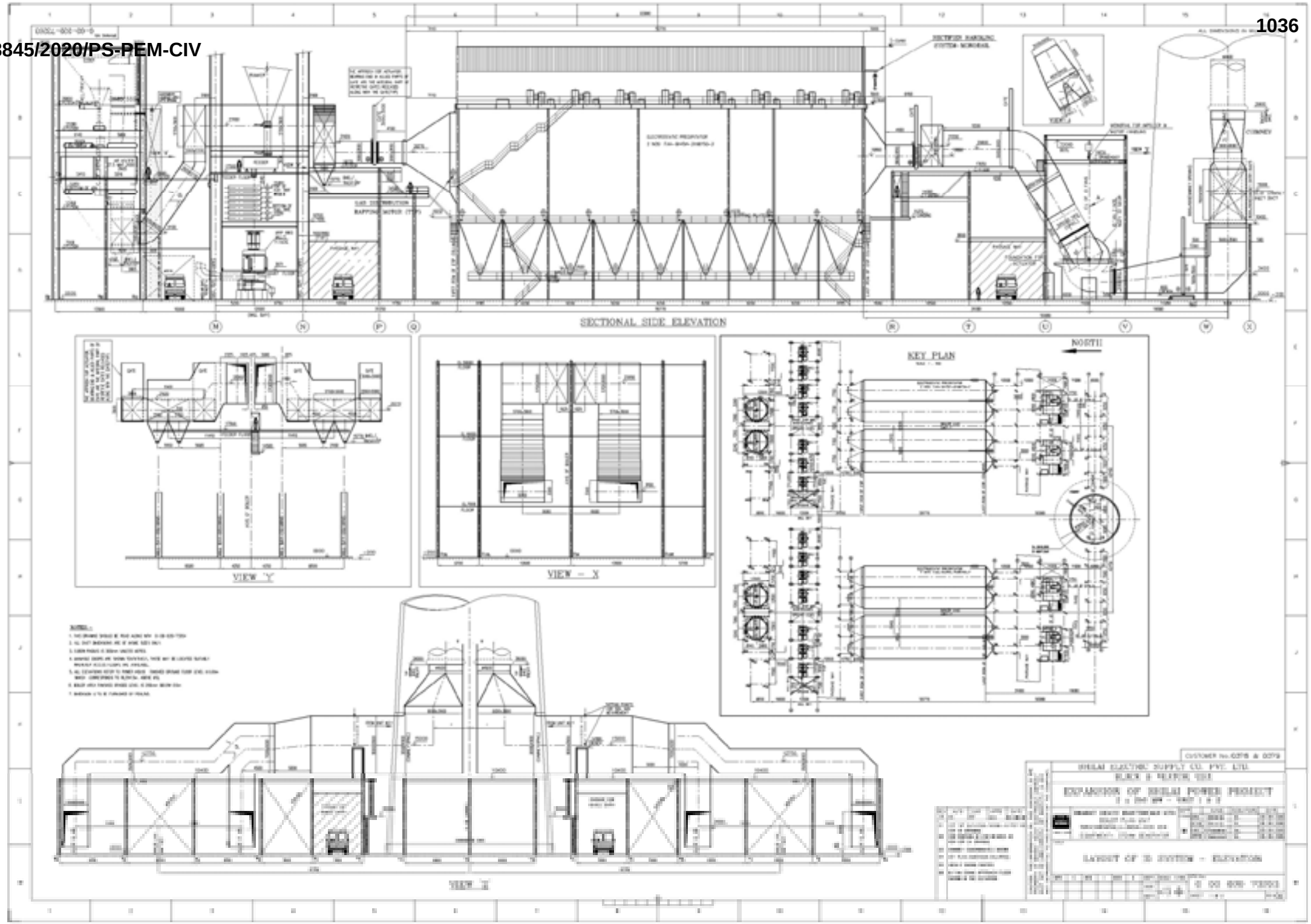

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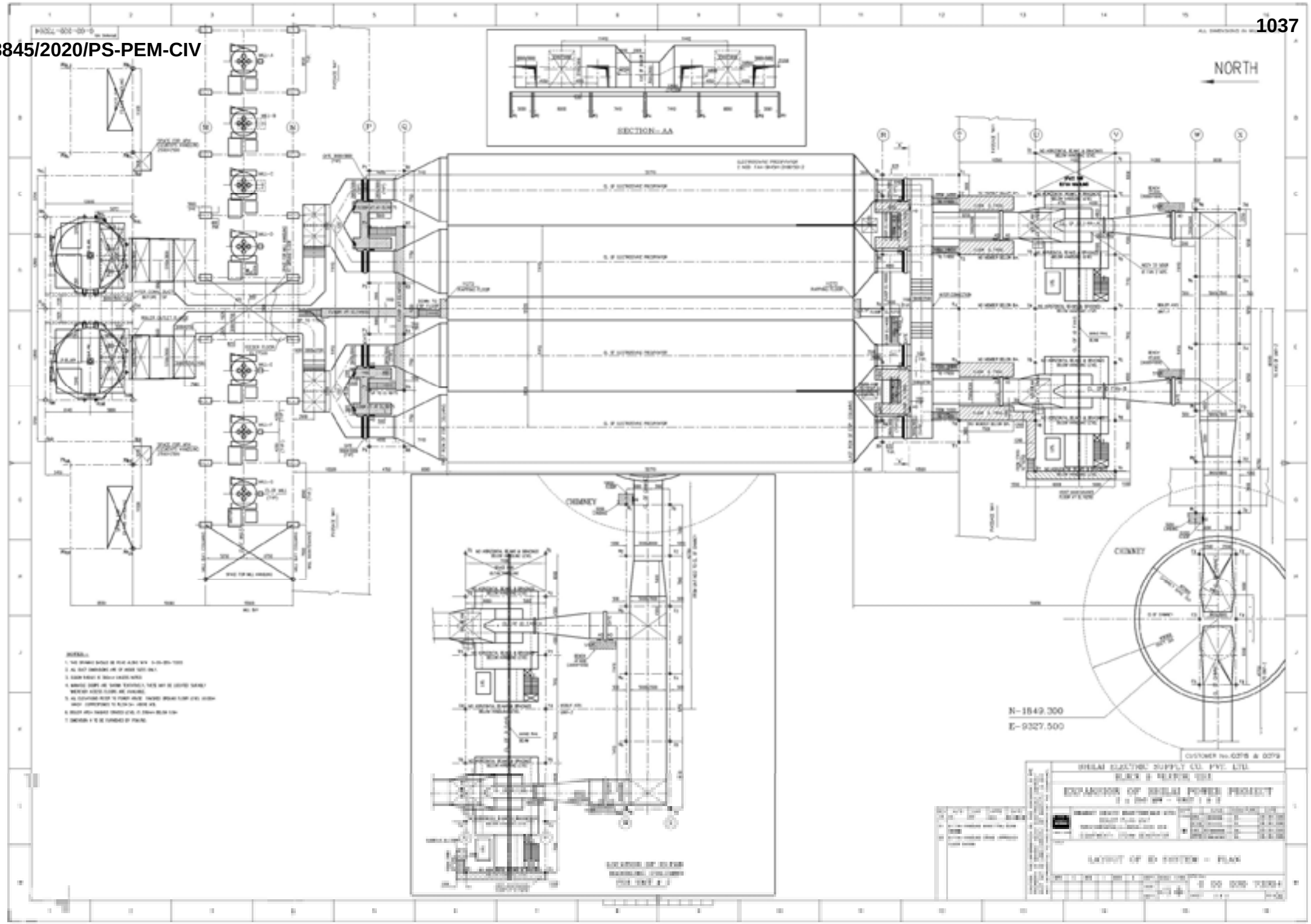

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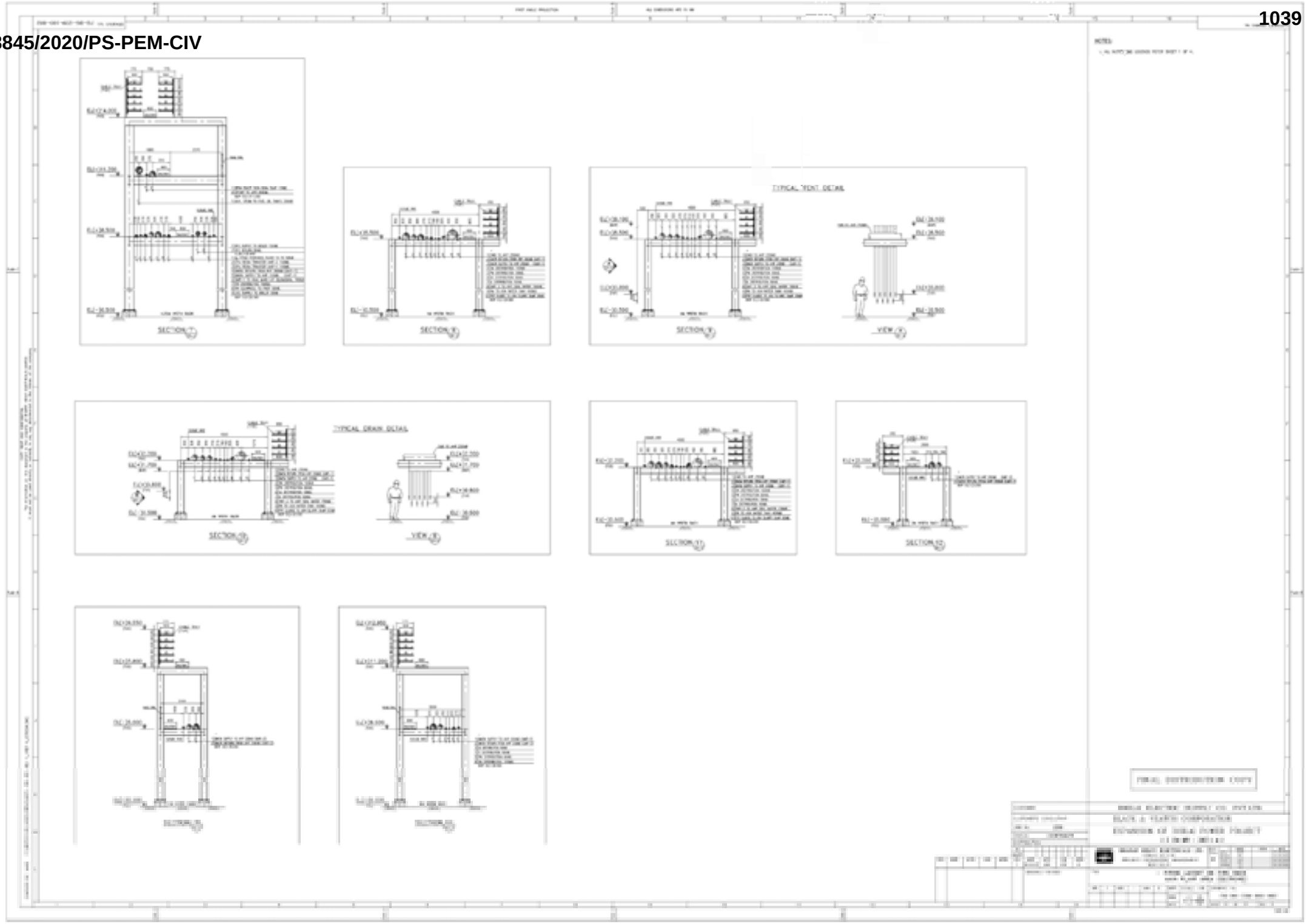
	2 X 250 MW NSPCL BHILAI TPP-FGD **SCOPE OF WORK**	SPECIFICATION NO. PE-TS-468-600-C001 VOLUME - II B SECTION - C REV.NO. 00 DATE 15-02-2020 SHEET 1 OF 1

SECTION - C

PIPE CABLE TRESTLE LAYOUT

38845/2020/PS-PEM-CIV



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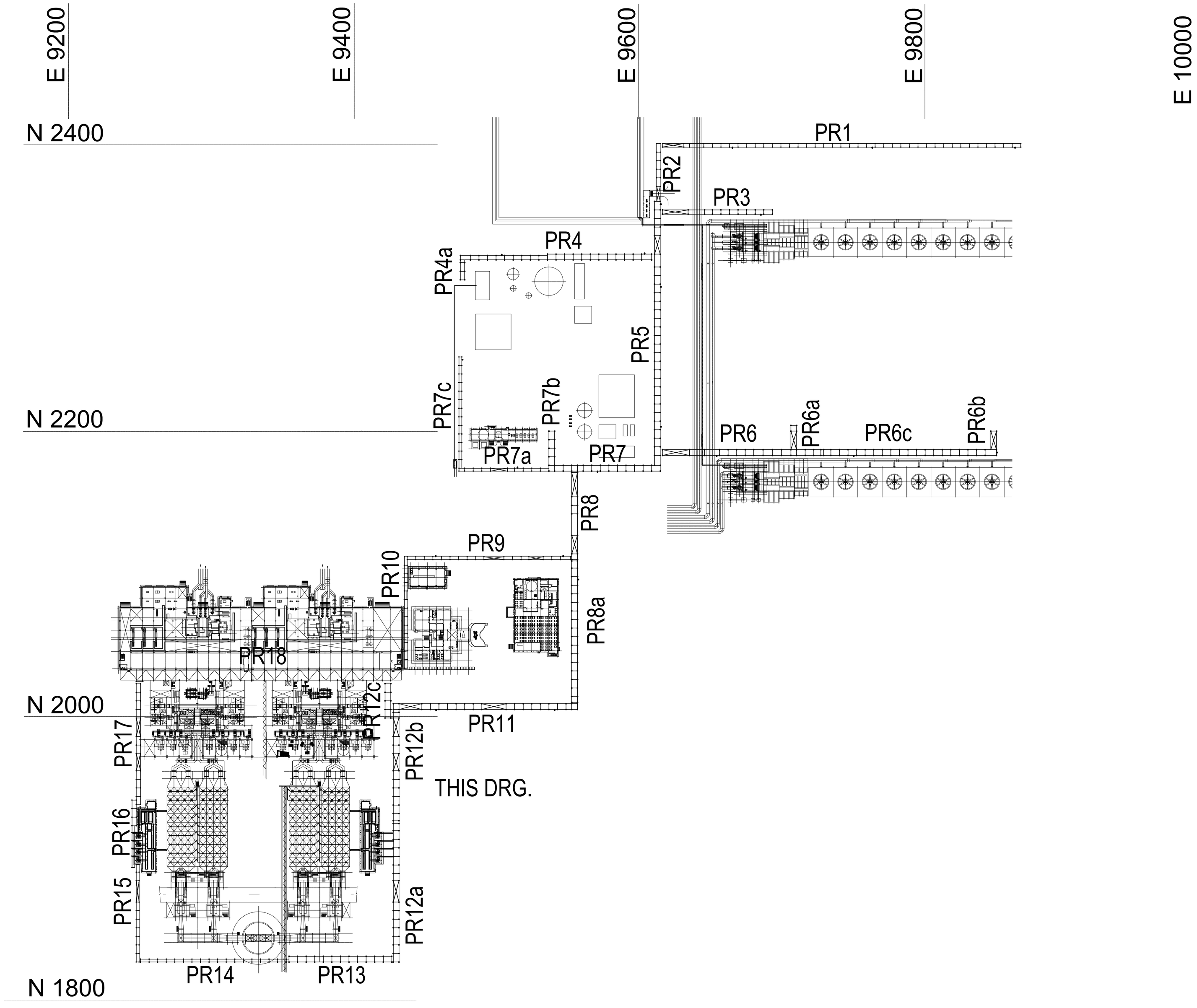

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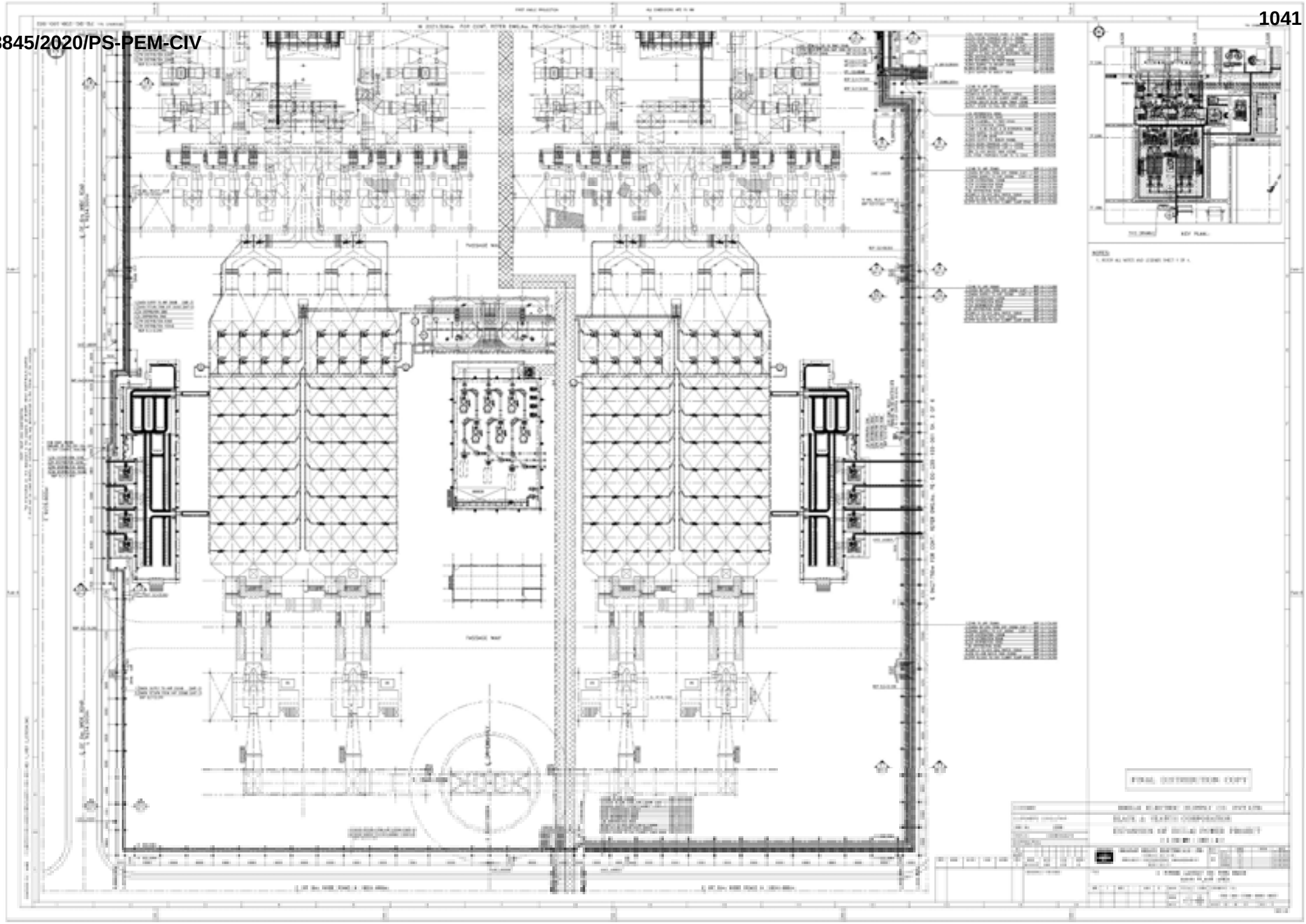

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	2 X 250 MW NSPCL BHILAI TPP-FGD **SCOPE OF WORK**	SPECIFICATION NO. PE-TS-468-600-C001 VOLUME - II B SECTION - C REV.NO. 00 DATE 15-02-2020 SHEET 1 OF 1

SECTION - C

PIPE CABLE TRESTLE FOUNDATION

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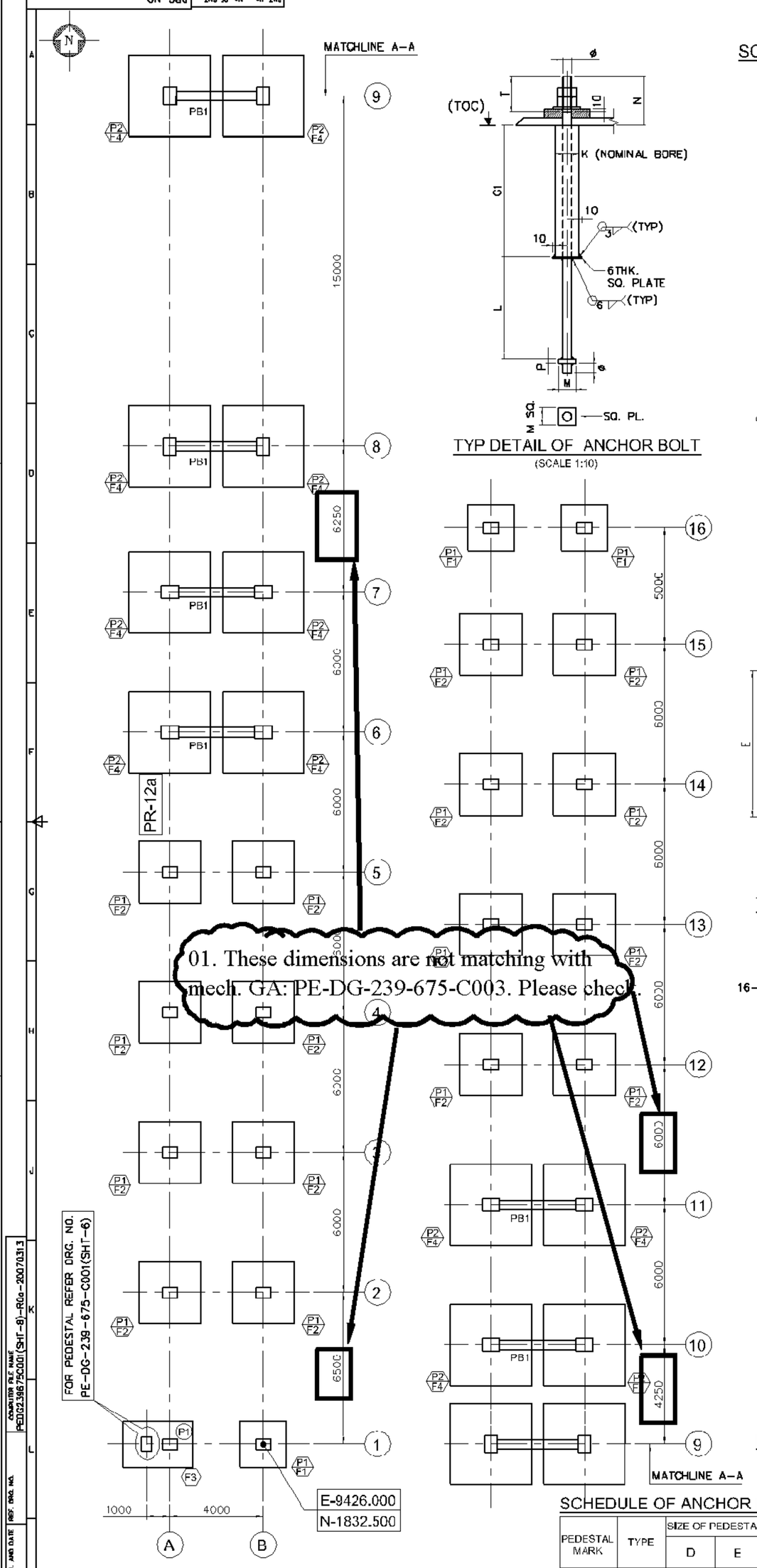
FIRST ANGLE PROJECTION



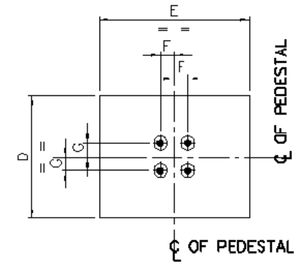
01. These dimensions are not matching with mech. GA: PE-DG-239-675-C003. Please check.

LAYOUT OF FOUNDATION FOR PIPE RACK MKD. PR12a
(SCALE 1:125)

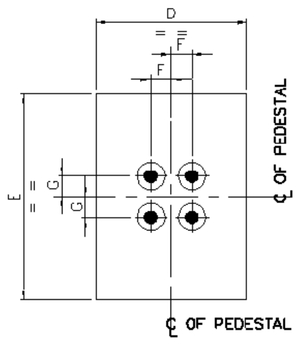
TYP DETAIL OF ANCHOR BOLT
(SCALE 1:10)

SCHEDULE OF ANCHOR BOLTS

DIMENSIONS	BOLT DIA (MM)		
	20 ø	32 ø	42 ø
L	250	350	350
G1	400	450	450
P	16	16	25
K	50	80	100
N	120	167	215
ø	20	32	42
M	50	60	100
T	80	120	150



TYPE I
(SCALE 1:15)
TYPICAL PEDESTAL DETAIL
(FOR ANCHOR BOLTS)



TYPE II&III
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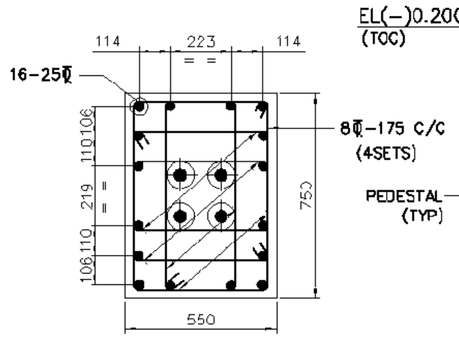
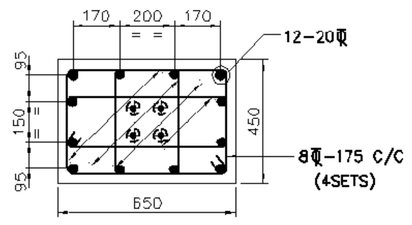
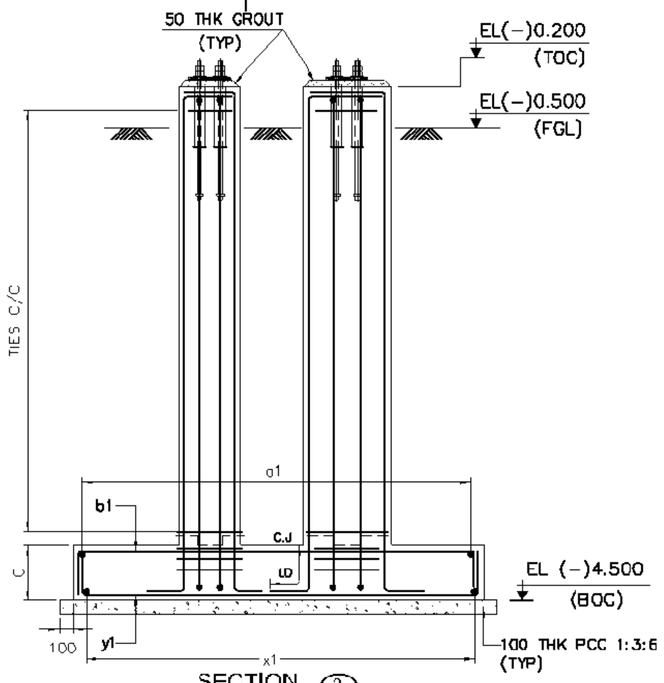
(FOR ANCHOR BOLTS)



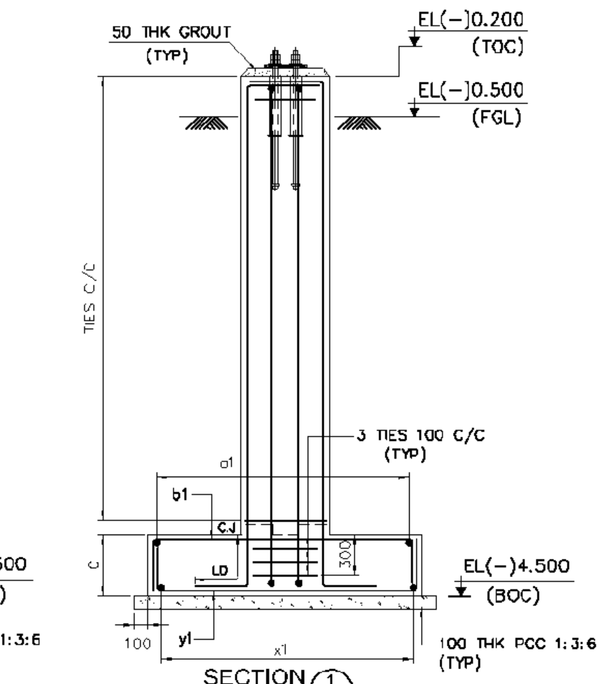
DETAILS OF PEDESTAL MKD.P2
(SCALE 1:15)



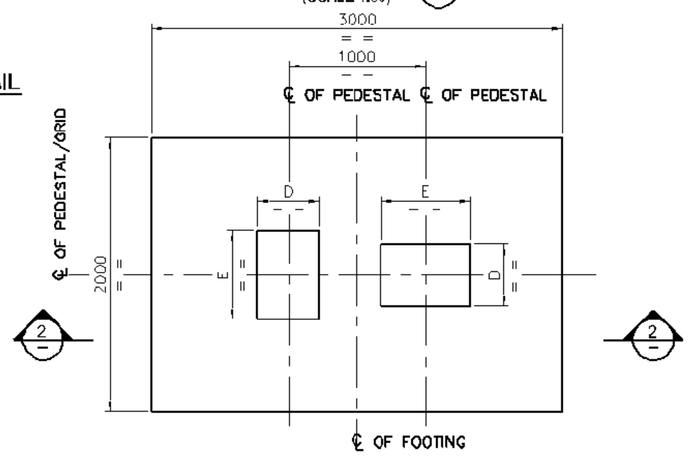
DETAILS OF PEDESTAL MKD.P1
(SCALE 1:15)



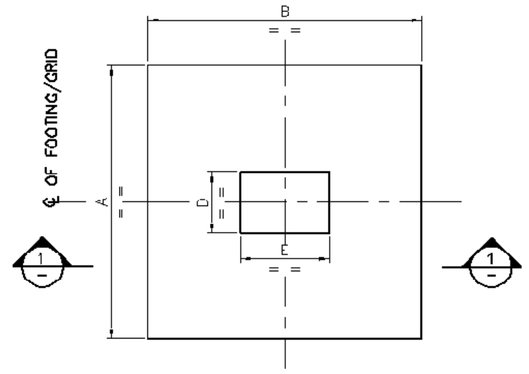
SECTION 2
(SCALE 1:30)



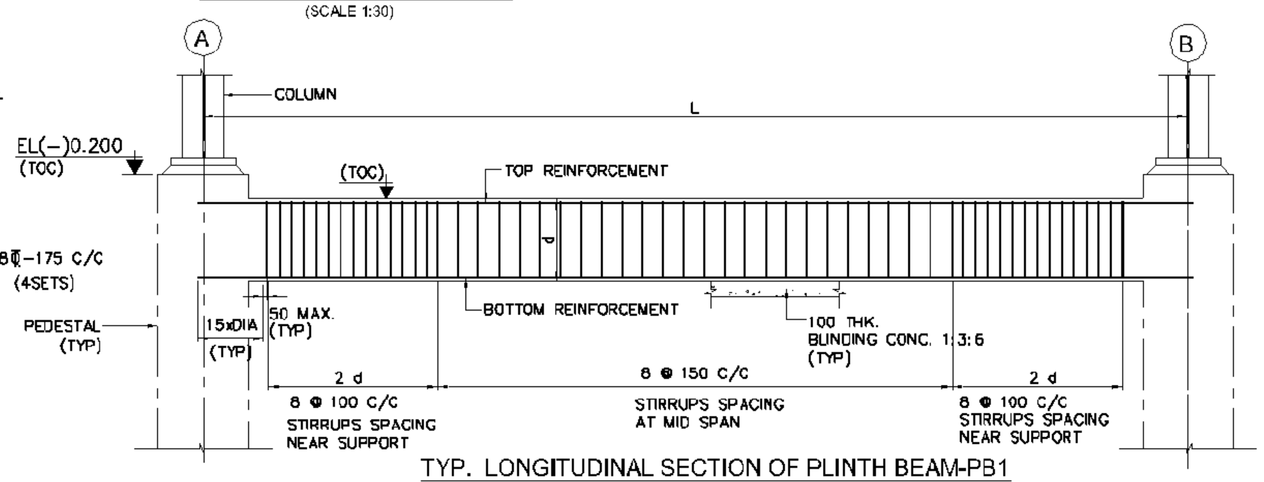
SECTION 1
(SCALE 1:30)



FOUNDATION PLAN FOR F3
(SCALE 1:30)



TYPICAL ISOLATED FOUNDATION PLAN
(SCALE 1:30)



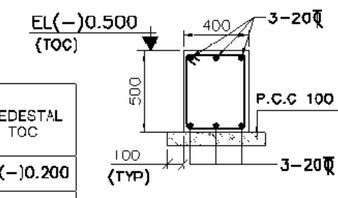
TYP. LONGITUDINAL SECTION OF PLINTH BEAM-PB1

SCHEDULE OF FOOTING

FOOTING MARK	TOTAL NO.	GRID MARK	BOTTOM OF FOOTING LVL (BOC)	FOOTING SIZE			TOP REINFORCEMENT		BOTTOM REINFORCEMENT	
				A	B	C	a1	b1	x1	y1
F1	3	B1,A16,B16	EL(–)4.500	2000	2000	450	10ϕ–150	10ϕ–150	12ϕ–150	12ϕ–150
F2	16	A2 TO A5,B2 TO B5 A12 TO A15,B12 TO B15	EL(–)4.500	2650	2650	450	12ϕ–150	12ϕ–150	12ϕ–150	12ϕ–150
F3	1	A1	EL(–)4.500	2000	3000	400	10ϕ–150	10ϕ–150	12ϕ–150	12ϕ–150
F4	12	A6 TO A11,B6 TO B11	EL(–)4.500	3500	3500	550	12ϕ–150	12ϕ–150	16ϕ–150	16ϕ–150

SCHEDULE OF ANCHOR BOLTS FOR PEDESTAL

PEDESTAL MARK	TYPE	SIZE OF PEDESTAL		NO. OF PEDESTAL	NO OF BOLTS	BOLT TOTAL QTY	ANCHOR BOLT DETAILS				PEDESTAL TOC
		D	E				GRID	DIA OF BOLTS	F	G	
P1	I	450	650	20	4	80	A1 TO A5 , B1 TO B5 A12 TO A16 , B12 TO B15	M20	50	50	EL(–)0.200
P2	II	550	750	4	4	16	A6,A11,B6,B11	M20	50	50	EL(–)0.200
	III	550	750	8	4	32	A7 TO A10 , B7 TO B10	M42	75	75	EL(–)0.200



TYPICAL DETAIL OF PB1
(SCALE 1:25)

NOTES

1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH THE TERMS CONDITIONS, AND SPECIFICATIONS OF THE CONTRACT.
2. ALL DIMENSIONS ARE IN MILLIMETER AND LEVELS ARE IN METERS, UNO.
3. ALL ELEVATIONS ARE REFERED TO TURBINE BUILDING FINISHED GROUND FLOOR ELEVATION ±0.0M WHICH CORRESPONDS TO RL 294.5M.
4. GRADE OF CONCRETE SHALL BE OF M30 WITH 20MM DOWN GRADED AGGREGATES.
5. REINFORCEMENT SHALL BE OF Fe 415 GRADE, CONFORMING TO IS 1786
6. REINFORCEMENT IF REQUIRED SHALL BE MARGINALLY SHIFTED TO CLEAR ANY ANCHOR BOLT, BUT IN NO CASE SHALL BE CUT WITHOUT PRIOR APPROVAL OF SITE ENGINEER
7. CLEAR COVER TO REINFORCEMENT SHALL BE AS FOLLOWS:

DESCRIPTION	TOP	BOTTOM	SIDES
FOUNDATION	50	75	50
PEDESTAL	50	–	30

8. REINFORCEMENT IS CALLED UP AS THUS :

5 16ϕ–200–T&B–B/W
- BOTHWAYS
- BOTTOM BAR
- TOP BAR
- BAR SPACING (CENTERS)
- TYPE OF STEEL (TOR–Fe 415)
- BAR SIZE
- NUMBER OF BARS

LEGEND

BOC – BOTTOM OF CONCRETE
℄ – CENTER LINE
C.J – CONSTRUCTION JOINT
EL – ELEVATION
FGL – FINSIHED GROUND LEVEL
LVL – LEVEL
MKD. – MARKED
PR – PIPERACK
THK – THICKNESS
TOC – TOP OF CONCRETE
TYP – TYPICAL
UNO – UNLESS NOTED OTHERWISE
(Fx) – FOOTING MARK
(Px) – PEDESTAL MARK
(Px) — PEDESTAL MARK
(Fx) — FOOTING MARK

REFERENCE DRAWINGS

(CONSTRUCTION)

PE-DG-239-600-C002 – GENERAL NOTES & STANDARD DETAILS FOR RCC WORKS.

PE-DG-239-675-C001 (SHT-6) – PIPE RACK & CABLE RACK (PR13&14) FOUNDATION LAYOUT & DETAILS

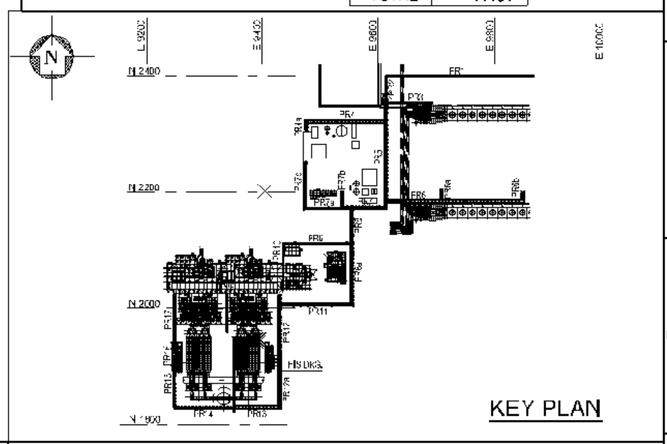
PE-DG-239-675-C003 (SHT-11) – PIPE & CABLE RACKS STEEL FRAMING PLAN , ELEVATION & MISC.DETAILS –PR12a

(ENGINEERING)

1. PE-DG-239-100-M001 – PLOT PLAN
2. PE-DG-239-100-C01 (SHT 1 TO 6) – PIPING LAYOUT ON PIPE RACK BOP AREA
3. PE-DC-239-100-C02 (SHT 1 TO 4) – PIPING LAYOUT ON MAIN PLANT AREA
4. PE-DC-239-507-E207 (SHT 1 TO 5) – INTER PLANT CABLE LAYOUT

BILL OF QUANTITIES

SL.NO.	DESCRIPTION	UNIT	QUANTITY
1	RCC (M30)	Cu.M	166.82
2	PCC (1:3:6)	Cu.M	23.44
3	REINFORCEMENT		
4	8 ϕ	MT	2.18
5	10 ϕ	MT	0.18
6	12 ϕ	MT	5.22
7	16 ϕ	MT	3.46
8	20 ϕ	MT	3.10
9	25 ϕ	MT	3.43
		TOTAL	17.57



KEY PLAN

CUSTOMER	NTPC–SAIL POWER COMPANY PVT. LTD
CUSTOMER'S CONSULTANT	BLACK & VEATCH, USA
JOB No. 239	EXPANSION OF BHILAI POWER PROJECT 2 X 250 MW – UNIT 1 & 2
STATUS CONTRACT	
DISTRIBUTION	

BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NEW DELHI

DEPT CODE		NAME	SIGN.	DATE
C	DRN	NB		13.03.07
	DFSN	MBR		13.03.07
	CHD	MMV		13.03.07
	APPD	SGI		13.03.07

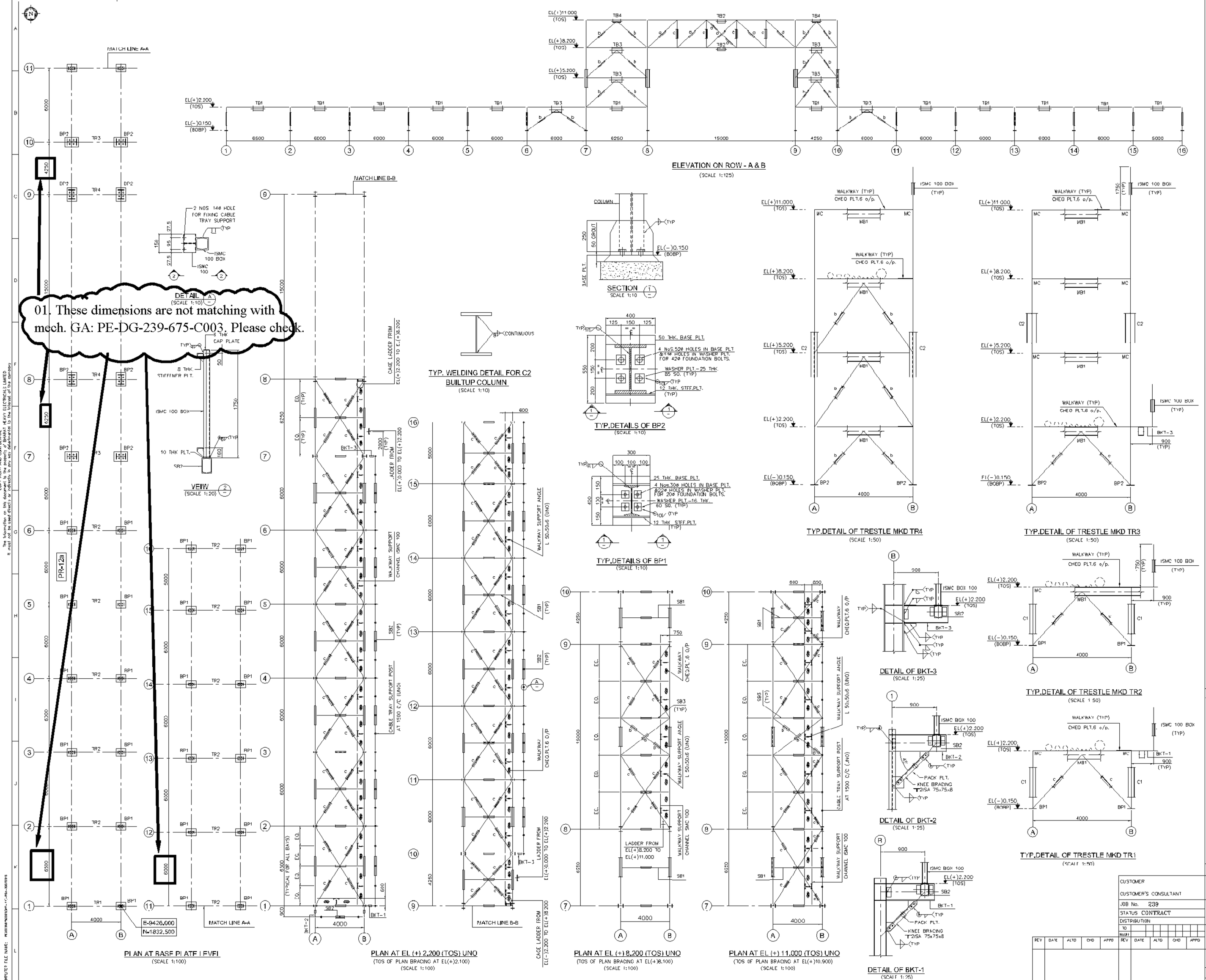
TITLE: PIPE RACK & CABLE RACKS (PR12a) FOUNDATION LAYOUT & DETAILS

CV | ME | EL | I&C | DEPT. | SCALE AS SHOWN | DRAWING NO. PE–DG–239–675–C001 | SIGN. | DATE | SHT. No 8 OF – | REV. 00

P135289.71.1000.15-C1408 0001 St:EN 03/23/07 MS-00843

KUL51250 23-Mar-2007 05:30:48

01. These dimensions are not matching with mech. GA: PE-DG-239-675-C003, Please check.



NOTES

1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH CONTRACT TERMS AND CONDITIONS, SPECIFICATION AND SCHEDULE OF ITEMS
2. ALL DIMENSIONS ARE IN MILLIMILIM AND LEVELS ARE IN MILIMS, UNO.
3. ALL ELEVATIONS ARE REFERED TO TURBINE BUILDING FINISHED GROUND FLOOR ELEVATION ±0.0M WHICH CORRESPONDS TO RL 294.5M
4. ALL ELEVATIONS ARE TO THE TOP OF STEEL UNO.
5. ALL WELDS SHALL BE 6mm FILLET CONTINUOUS UNLESS NOTED
6. SPLICING IN FLANGES AND WEB SHALL BE STAGGERED. SPLICING SHALL BE OF FULL STRENGTH BUTT WELD.
7. ALL END CONNECTIONS FOR BRACINGS SHALL BE DESIGNED FOR FULL TENSILE STRENGTH OF MEMBERS UNO.
8. FOR TYPICAL DETAIL OF SHEAR CONNECTION REF. DETAIL IN DRG. NO. PE-DG-239-000-C001.
9. QUANTITIES INDICATED IN BILL OF MATERIALS ARE APPROXIMATE AND DO NOT INCLUDE FOR STIFFENERS, SPLICING, GUSSETS, CONNECTIONS & WASTAGES.
10. ALL WORKING POINT AT COLUMN BRACING ARE CENTER OF THE MEMBER UNO.
11. ALL CONNECTIONS ARE SHEAR CONNECTIONS EXCEPT NOTED AS MC.
12. ALL GUESSET PLATES ARE 10 THK.

LEGEND

BKT	– BRACKET	MC	– MOMENT CONNECTION
BP	– BASE PLATE	PLT.	– PLATE
BOBP	– BOTTOM OF BASE PLATE	THK	– THICKNESS
BOS	– BOTTOM OF STEEL	TOS	– TOP OF STEEL
CHEQD	– CHEQUERED	TOCP	– TOP OF CHEQUERED PLATE
℄	– CENTER LINE	TYP	– TYPICAL
EL	– ELEVATION	UNO	– UNLESS NOTED OTHERWISE
LVL	– LEVEL		

REFERENCE DRAWINGS.
(CONSTRUCTION)

1. PE-DG-239-600-C001 – GENERAL NOTES & STANDARD DETAILS FOR STRUCTURAL STEEL WORKS.
2. PE-DG-239-675-C001 (SHT-8) – PIPE & CABLE RACKS (PR12a) FOUNDATION LAYOUT & DETAILS.
3. PE-DG-239-675-C003 (SHT-9) – PIPE RACK & CABLE RACKS STEEL FRAMING PLAN,ELEVATION & MISC. DETAILS – PR13&14
4. PE DG 239 675 C001 (SHT-6) – PIPE RACK & CABLE RACKS (PR13&14) FOUNDATION LAYOUT & DETAILS.

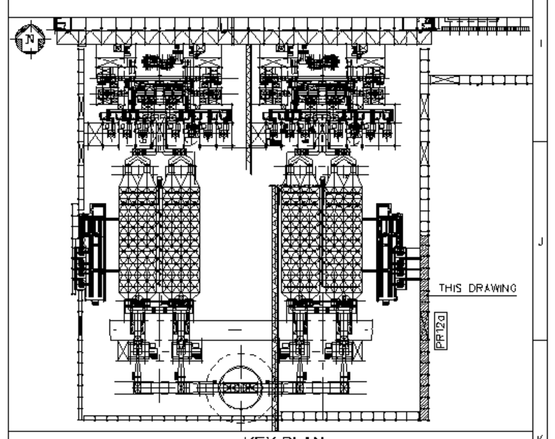
(ENGINEERING)

1. PE-DG-239-100-M001 – PLOT PLAN
2. PE-DG-239-100-001 (SHT 1 TO 6) – PIPING LAYOUT ON PIPE RACK BOP AREA
3. PE-DG-239-100-002 (SHT 1 TO 4) – PIPING LAYOUT ON MAIN PLANT AREA
4. PE-DG-239-507-E207 (SHT 1 TO 5) – INTER PLANT CABLE LAYOUT

MEMBERS SCHEDULE

MEMBER MKD.	SECTION	SHAPE
C1	ISMB 250	I
C2	a) FLG. PLT. 250X25 b) WEB. PLT. 350X12	250 25 350 12
TB1	ISMB 350	I
TB2	2 ISMC 300	I I
TB3	ISMB 500	I
TB4	ISMC 250 BOX	⊡
SB1	ISMB 300	I
SB2	ISMC 250 BOX	⊡
SB3	ISMB 350	I
MB1	ISMB 350	I
a	2ISA L100x100x8	T
b	2ISA L90x90x8	T
c	2ISA L75x75x8	T
BKT-1 & BKT-2	ISMB 350	I
BKT-3	ISMB 350	I

SL.NO.	MATERIAL	QUANTITY(MT)
1	50 THK PLT	0.69
2	25 THK.PLT.	8.75
3	16 THK.PLT.	0.04
4	12 THK.PLT.	3.43
5	ISMB 500	5.7
6	ISMB 350	16.4
7	ISMB 300	3.19
8	ISMB 250	2.10
9	ISMC 250	5.6
10	ISMC 100	3.42
11	ISMC 300	4.20
12	ISA 100X100X8	1.20
13	ISA 90X90X8	4.04
14	ISA 75X75X8	6.56
15	ISA 50X50X6	0.11
16	G o/p CHEQ PLT	3.46
	TOTAL WT.	68.69



KEY-PLAN

NTPC-SAIL POWER COMPANY PVT.LTD
BLACK & VEATCH, USA

EXPANSION OF BHILAI POWER PROJECT
2 X 250 MW - UNIT 1 & 2

BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NEW DELHI

DEPT	NAME	SIGN	DATE
DRN	NB		13.03.07
DESN	MBP		13.03.07
CHD	MAV		13.03.07
APPD	SGI		13.03.07

TITLE: PIPE RACK & CABLE RACKS
STEEL FRAMING PLAN, ELEVATION & MISC. DETAILS – PR12a

DRAWING No. PE-DG-239-675-C003
SCALE AS SHOWN
SHEET 31 OF – REV 00
SIZE- A0

P135289.71.1000.15-C2079 0001 St:EN 03/23/07 MS-00843

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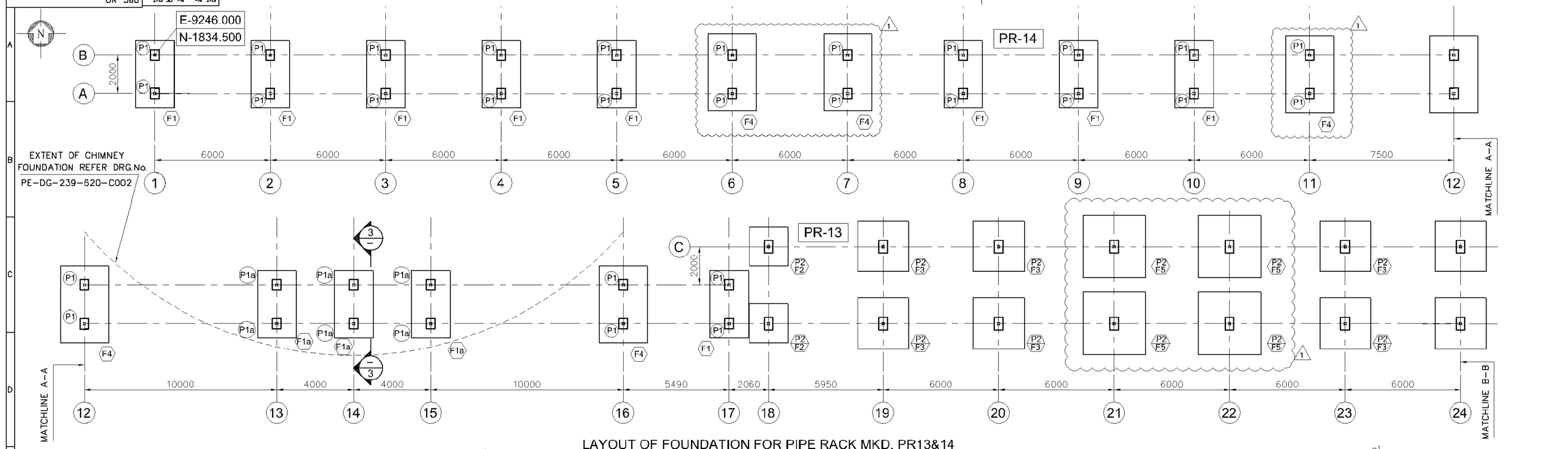
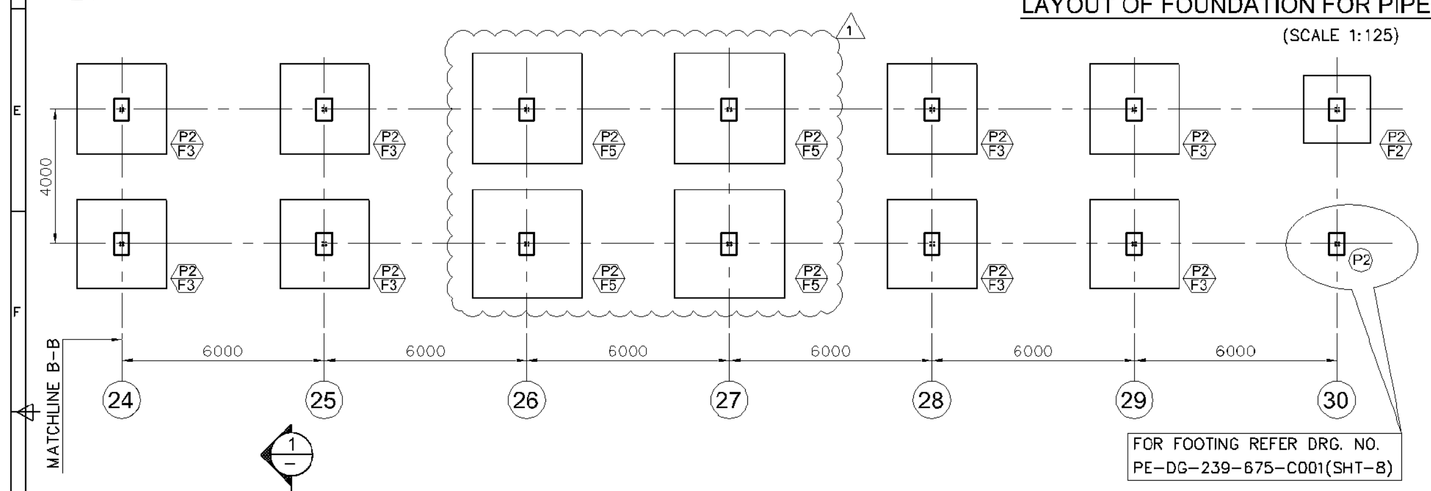
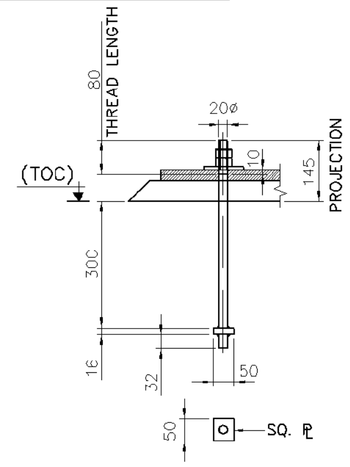
FIRST ANGLE PROJECTION

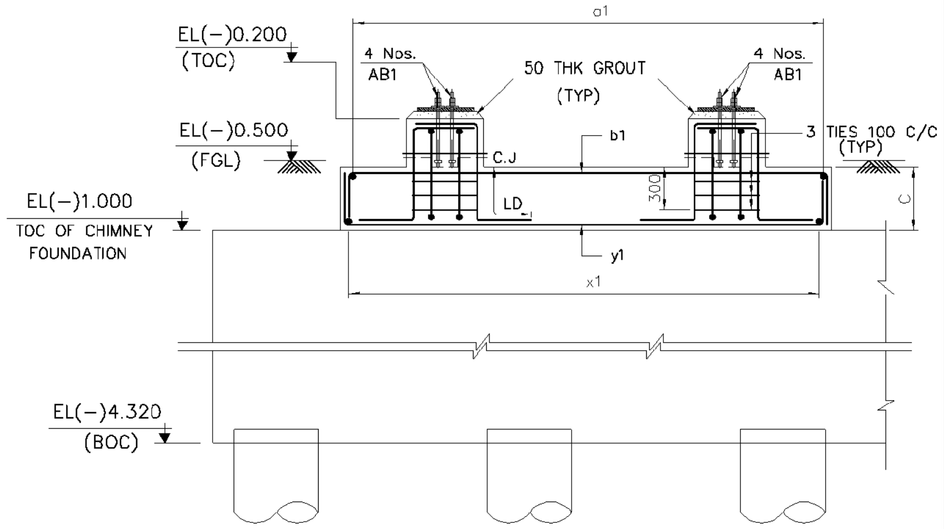


LAYOUT OF FOUNDATION FOR PIPE RACK MKD. PR13&14
(SCALE 1:125)

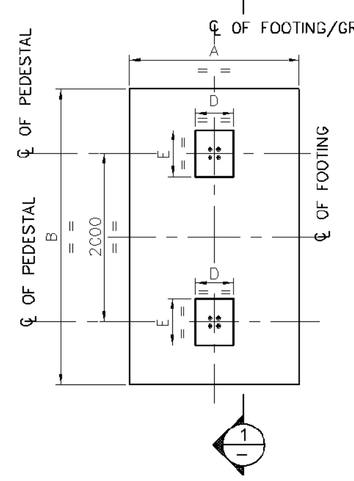




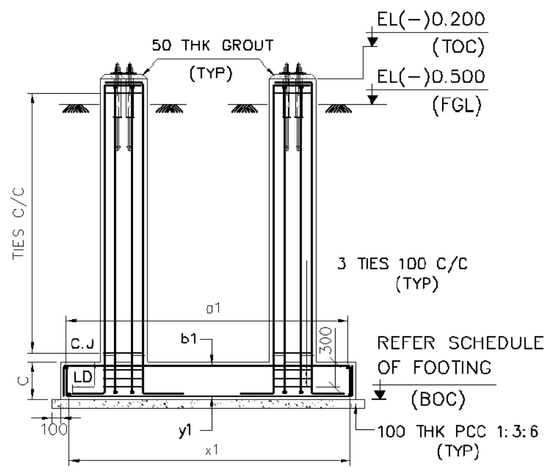
TYPICAL DETAIL OF AB1
(Nos. 24)
(SCALE 1:10)



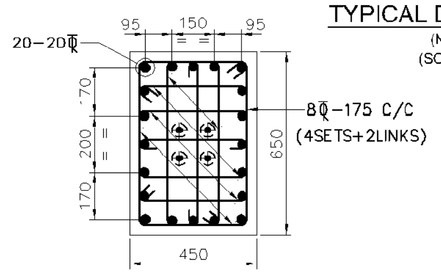
SECTION 3/- (SCALE 1:30)



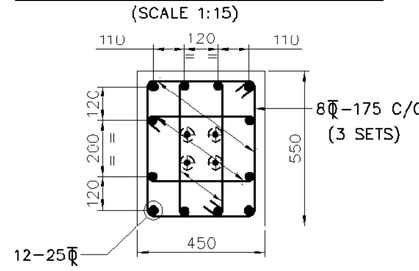
TYPICAL COMBINED FOUNDATION PLAN
(SCALE 1:50)



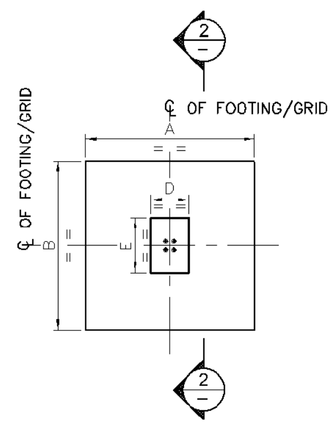
SECTION 1/- (SCALE 1:50)



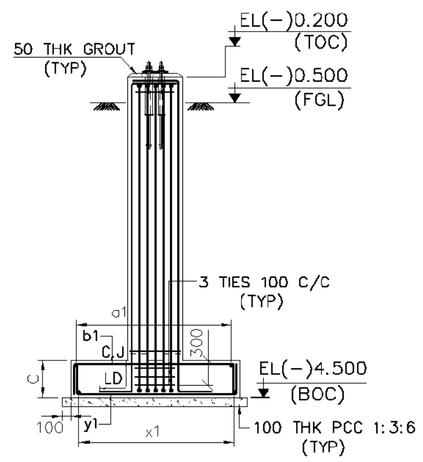
DETAILS OF PEDESTAL MKD.P2
(SCALE 1:15)



DETAILS OF PEDESTAL MKD.P1&P1a
(SCALE 1:15)



TYPICAL ISOLATED FOUNDATION PLAN
(SCALE 1:50)



SECTION 2/- (SCALE 1:50)

NOTES

1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH THE TERMS CONDITIONS, AND SPECIFICATIONS OF THE CONTRACT.
2. ALL DIMENSIONS ARE IN MILLIMETER AND LEVELS ARE IN METERS, UNO.
3. ALL ELEVATIONS ARE REFERED TO TURBINE BUILDING FINISHED GROUND FLOOR ELEVATION ±0.0M WHICH CORRESPONDS TO RL 294.5M.
4. GRADE OF CONCRETE SHALL BE OF M30 WITH 20MM DOWN GRADED AGGREGATES.
5. REINFORCEMENT SHALL BE OF Fe 415 GRADE, CONFORMING TO IS 1786
6. REINFORCEMENT IF REQUIRED SHALL BE MARGINALLY SHIFTED TO CLEAR ANY ANCHOR BOLT, BUT IN NO CASE SHALL BE CUT WITHOUT PRIOR APPROVAL OF SITE ENGINEER
7. CLEAR COVER TO REINFORCEMENT SHALL BE AS FOLLOWS:

DESCRIPTION	TOP	BOTTOM	SIDES
FOUNDATION	50	75	50
PEDESTAL	50	–	50

8. REINFORCEMENT IS CALLED UP AS THUS :

5 16ϕ-200-T&B-B/W

- BOTHWAYS
- BOTTOM BAR
- TOP BAR
- BAR SPACING (CENTERS)
- TYPE OF STEEL (TOR-Fe 415)
- BAR SIZE
- NUMBER OF BARS

LEGEND

BOC – BOTTOM OF CONCRETE
℄ – CENTER LINE
C.J – CONSTRUCTION JOINT
EL – ELEVATION
FGL – FINSIHED GROUND LEVEL
LVL – LEVEL
MKD. – MARKED
PR – PIPERACK
THK – THICKNESS
TOC – TOP OF CONCRETE
TYP – TYPICAL
UNO – UNLESS NOTED OTHERWISE
(Fx) – FOOTING MARK
(Px) – PEDESTAL MARK
(Px) — PEDESTAL MARK
(Fx) — FOOTING MARK

REFERENCE DRAWINGS

(CONSTRUCTION)

PE-DG-239-600-C002 – GENERAL NOTES & STANDARD DETAILS FOR RCC WORKS.
PE-DG-239-675-C001 (SHT-8) – PIPE RACK & CABLE RACK (PR12a) FOUNDATION LAYOUT & DETAILS
PE-DG-239-675-C003 (SHT-9) – PIPE & CABLE RACKS STEEL FRAMING PLAN , ELEVATION & MISC.DETAILS –PR13&14

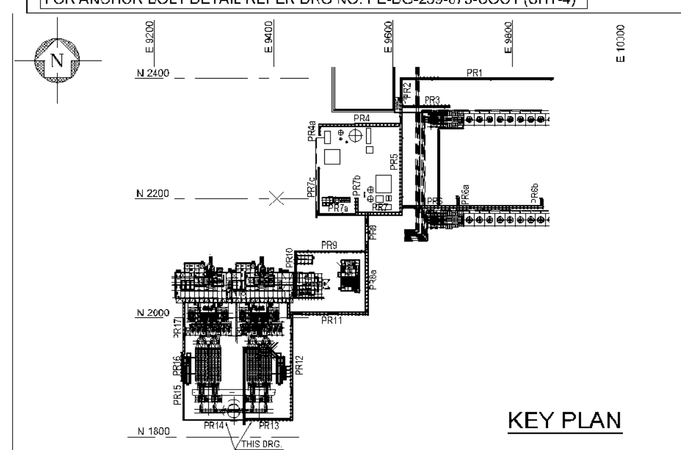
(ENGINEERING)

1. PE-DG-239-100-M001 – PLOT PLAN
2. PE-DG-239-100-001 (SHT 1 TO 6) – PIPING LAYOUT ON PIPE RACK BOP AREA
3. PE-DC-239-100-002 (SHT 1 TO 4) – PIPING LAYOUT ON MAIN PLANT AREA
4. PE-DC-239-507-E207 (SHT 1 TO 5) – INTER PLANT CABLE LAYOUT

BILL OF QUANTITIES

SL.NO.	DESCRIPTION	UNIT	QUANTITY
1	RCC (M30)	Cu.M	213.80
2	PCC (1:3:6)	Cu.M	31.98
3	REINFORCEMENT		
4	8 ϕ	MT	4.15
5	10 ϕ	MT	0.12
6	12 ϕ	MT	6.72
7	16 ϕ	MT	2.98
8	20 ϕ	MT	5.94
9	25 ϕ	MT	7.28
		TOTAL	27.19

FOR ANCHOR BOLT DETAIL REFER DRG NO. PE-DG-239-675-C001 (SHT-4)



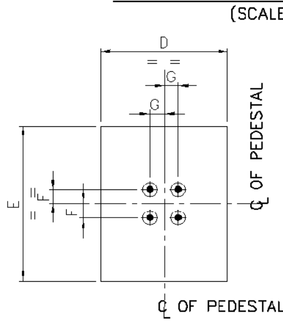
KEY PLAN

SCHEDULE OF ANCHOR BOLTS FOR PEDESTAL

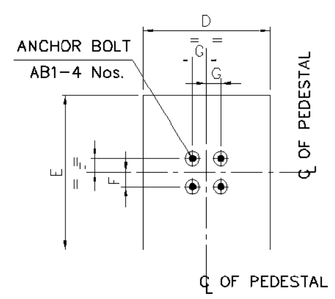
PEDESTAL MARK	TYPE	SIZE OF PEDESTAL D	SIZE OF PEDESTAL E	NO. OF PEDESTAL	NO OF BOLTS	BOLT TOTAL QTY	ANCHOR BOLT DETAILS GRID	ANCHOR BOLT DETAILS DIA OF BOLTS	ANCHOR BOLT DETAILS F	ANCHOR BOLT DETAILS G	PEDESTAL TOC
P1	I	450	550	28	4	112	A1 TO A12 , B1 TO B12 A16 TO A17 , B16 TO B17	M20	50	50	EL(-)0.200
P1a	II	450	550	6	4	24	A13 TO A15 , B13 TO B15	AB1	50	50	EL(-)0.200
P2	III	450	650	26	4	104	A18 TO A30 , C18 TO C30	M20	50	50	EL(-)0.200

SCHEDULE OF FOOTING

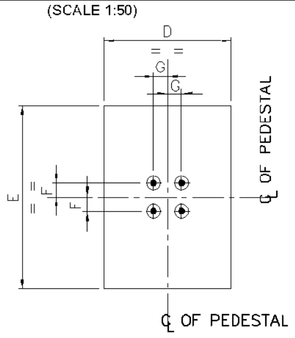
FOOTING MARK	TOTAL NO.	GRID MARK	BOTTOM OF FOOTING LVL (BOC)	FOOTING SIZE A	FOOTING SIZE B	FOOTING SIZE C	TOP REINFORCEMENT a1	TOP REINFORCEMENT b1	BOTTOM REINFORCEMENT x1	BOTTOM REINFORCEMENT y1
F1	9	1,2,3,4,5,8,9, 10,17	EL(-)4.500	2000	3500	450	12ϕ-150	12ϕ-150	16ϕ-150	16ϕ-150
F1a	3	13,14,15	EL(-)1.000	2000	3500	450	12ϕ-150	12ϕ-150	16ϕ-150	16ϕ-150
F2	3	A18,C18,C30	EL(-)4.500	2000	2000	450	10ϕ-150	10ϕ-150	12ϕ-150	12ϕ-150
F3	14	A19,20,23,24,25,28,29 C19,20,23,24,25,28,29	EL(-)4.500	2650	2650	450	12ϕ-150	12ϕ-150	12ϕ-150	12ϕ-150
F4	2	12,16	EL(-)5.500	2500	4000	500	12ϕ-125	12ϕ-125	16ϕ-125	16ϕ-125
	3	6,7,11	EL(-)4.500	2500	4000	500	12ϕ-125	12ϕ-125	16ϕ-125	16ϕ-125
F5	8	A21,A22,A26,A27, C21,C22,C26,C27	EL(-)4.500	3250	3250	450	12ϕ-150	12ϕ-150	12ϕ-150	12ϕ-150



TYPE I
(SCALE 1:15)
TYPICAL PEDESTAL DETAIL
(FOR ANCHOR BOLTS)



TYPE II
(SCALE 1:15)
TYPICAL PEDESTAL DETAIL
(FOR ANCHOR BOLTS)



TYPE III
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TYPICAL PEDESTAL DETAIL
(FOR ANCHOR BOLTS)

REV	DATE	ALTD	CHD	APPD
01	31.07.07	NB	MBR	MBJ/SGI

REVISED AS PER B&V COMMENTS THROUGH MS-00834 DATED ON 23/03/07

CUSTOMER	NTPC-SAIL POWER COMPANY PVT. LTD
CUSTOMER'S CONSULTANT	BLACK & VEATCH, USA
JOB No. 239	EXPANSION OF BHILAI POWER PROJECT 2 X 250 MW – UNIT 1 & 2
STATUS CONTRACT	
DISTRIBUTION	
TO	
No.OFT	

BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NEW DELHI

DEPT CODE		NAME	SIGN.	DATE
C	DRN	NB		09.03.07
	DESN	MBR		09.03.07
	CHD	MMV		09.03.07
	APPD	SGI		09.03.07

TITLE PIPE RACK & CABLE RACKS (PR13&14) FOUNDATION LAYOUT & DETAILS

CV | ME | EL | I&C | DEPT. | SCALE AS SHOWN | SIGN | DATE

DRAWING NO. PE-DG-239-675-C001

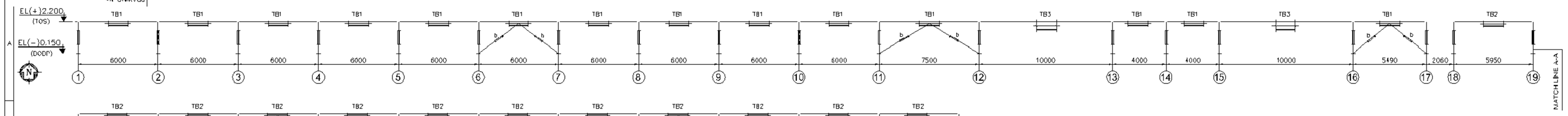
SHT. No 6 OF – REV. 01

R-1a SIZE-A1

38845/2020/PS-PEM-CIV
P135289.71.1000.15-C1399 0001 St:NE 08/07/07 MS-01166

KUL51250 23-Mar-2007 04:11:56

FIRST ANGLE PROJECTION — ALL DIMENSIONS ARE IN MM



ELEVATION ON A ROW
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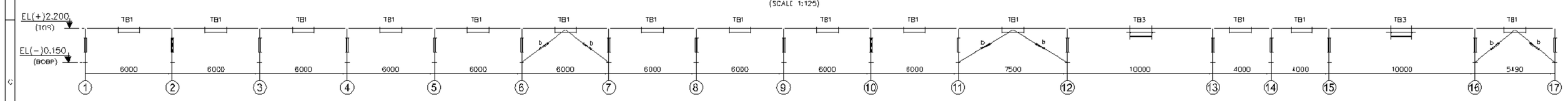

ELEVATION ON B ROW
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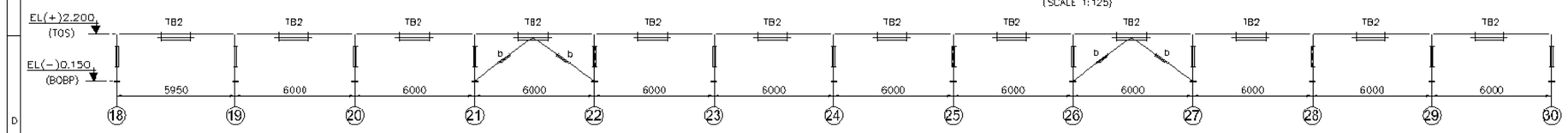
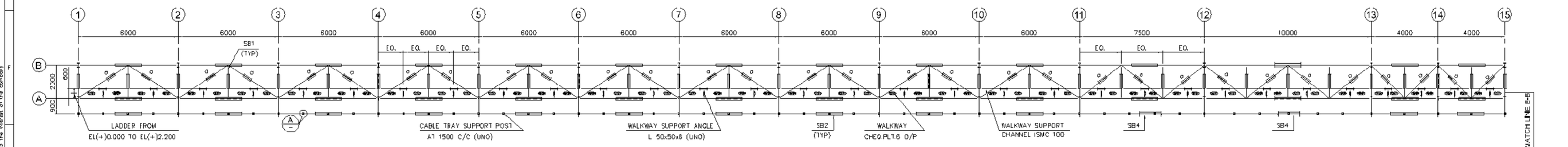
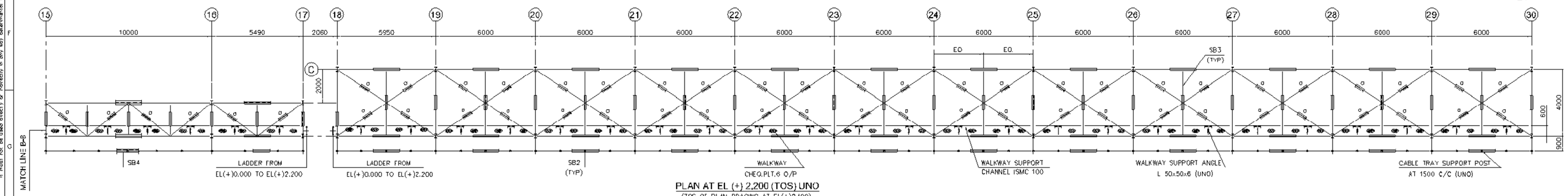
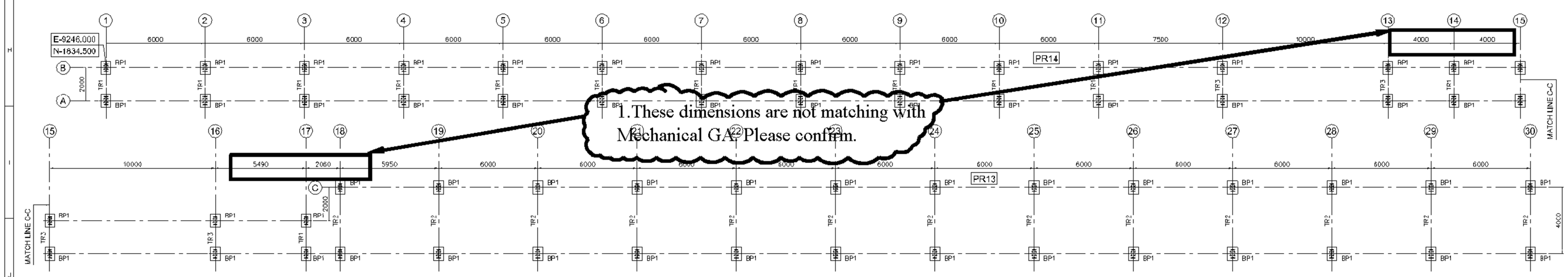


ELEVATION ON C ROW
(SCALE 1:125)

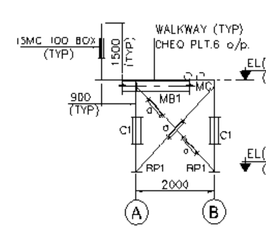




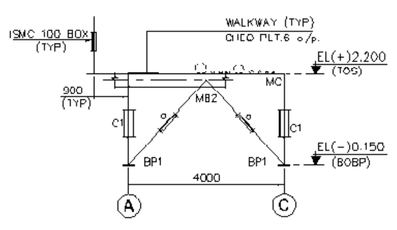
PLAN AT EL (+) 2,200 (TOS) UNO
(TOS OF PLAN BRACING AT EL(+)2.100)
(SCALE 1:100)



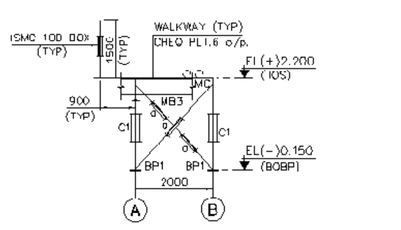
PLAN AT BASE PLATE LEVEL
(SCALE 1:100)



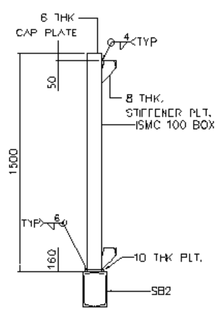
TYP.DETAIL OF TRESTLE MKD TR1
(SCALE 1:75)



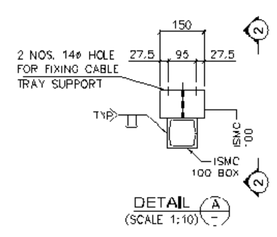
TYP.DETAIL OF TRESTLE MKD TR2
(SCALE 1:75)



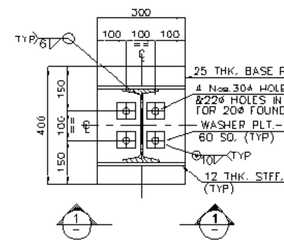
TYP.DETAIL OF TRESTLE MKD TR3
(SCALE 1:75)



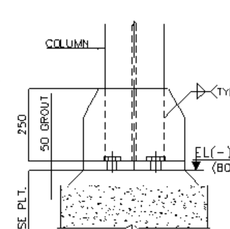
VEIW 2
(SCALE 1:20)



DETAIL A
(SCALE 1:10)



TYP.DETAILS OF BP1
(SCALE 1:10)



SECTION 1
SCALE 1:10

NOTES

1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH CONTRACT TERMS AND CONDITIONS, SPECIFICATION AND SCHEDULE OF ITEMS
2. ALL DIMENSIONS ARE IN MILLIMETER AND LEVELS ARE IN METERS, UNO.
3. ALL ELEVATIONS ARE REFERED TO TURBINE BUILDING FINISHED GROUND FLOOR ELEVATION ±0.0M WHICH CORRESPONDS TO RL 294.5M
4. ALL ELEVATIONS ARE TO THE TOP OF STEEL UNO.
5. ALL WELDS SHALL BE 6mm FILLET CONTINUOUS UNLESS NOTED
6. SPLICING IN FLANGES AND WEB SHALL BE STAGGERED. SPLICING SHALL BE OF FULL STRENGTH BUTT WELD.
7. ALL END CONNECTIONS FOR BRACINGS SHALL BE DESIGNED FOR FULL TENSILE STRENGTH OF MEMBERS UNO.
8. FOR TYPICAL DETAIL OF SHEAR CONNECTION REF. DETAIL IN DRG. NO. PE-DG-239-600-C001.
9. QUANTITIES INDICATED IN BILL OF MATERIALS ARE APPROXIMATE AND DO NOT INCLUDE FOR STIFFENERS, SPLICING, GUSSETS, CONNECTIONS & WASTAGES.
10. ALL WORKING POINT AT COLUMN BRACING ARE CENTER OF THE MEMBER UNO.
11. ALL CONNECTIONS ARE SHEAR CONNECTIONS EXCEPT NOTED AS MC.
12. ALL GUSSET PLATES ARE 10 THK

LEGEND

BKT	– BRACKET	MC	– MOMENT CONNECTION
BP	– BASE PLATE	PLT.	– PLATE
BOBP	– BOTTOM OF BASE PLATE	THK	– THICKNESS
BOS	– BOTTOM OF STEEL	TOS	– TOP OF STEEL
CHEQD	– CHEQUERED	TOCP	– TOP OF CHEQUERED PLATE
℄	– CENTER LINE	TYP	– TYPICAL
EL	– ELEVATION	UNO	– UNLESS NOTED OTHERWISE
LVL	– LEVEL		

REFERENCE DRAWINGS.

(CONSTRUCTION)

1. PE-DG-239-600-C001 – GENERAL NOTES & STANDARD DETAILS FOR STRUCTURAL STEEL WORKS.
2. PE-DG-239-675-C001 (SHT-6) – PIPE & CABLE RACKS (PR13&14) FOUNDATION LAYOUT & DETAILS.

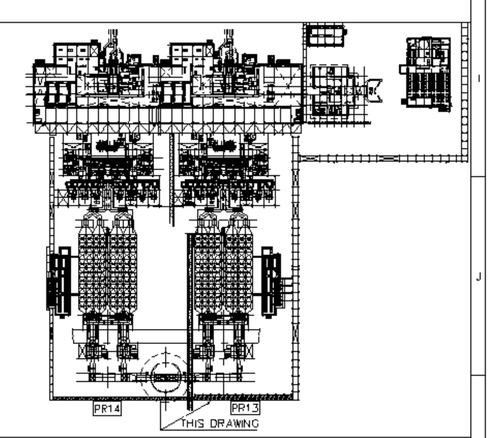
(ENGINEERING)

1. PE-DG-239-100-M001 – PLOT PLAN
2. PE-DG-239-100-001 (SHT 1 TO 6) – PIPING LAYOUT ON PIPE RACK BOP AREA
3. PE-DG-239-100-002 (SHT 1 TO 4) – PIPING LAYOUT ON MAIN PLANT AREA
4. PE-DG-239-507-E207 (SHT 1 TO 5) – INTER PLANT CABLE LAYOUT

MEMBERS SCHEDULE

MEMBER MKD.	SECTION	SHAPE
C1	ISMB 250	I
MB1	ISMB 300	I
MB2	ISMB 350	I
MB3	ISMB 450	I
SB1	ISMB 250	I
SB2	ISMC 250 BOX	⊡
SB3	ISMB 300	I
SB4	ISMC 400 BOX	⊡
TB1	ISMB 300	I
TB2	ISMB 350	I
TB3	ISMB 600	I
a	2ISA L75x75x8	⊤
b	2ISA L90x90x8	⊤

SL.NO.	MATERIAL	QUANTITY(MT)
1	25 THK.PLT.	1.46
2	16 THK.PLT.	0.11
3	12 THK.PLT.	0.85
4	ISMB 450	0.90
5	ISMB 350	11.01
6	ISMB 300	9.52
7	ISMB 250	6.70
8	ISMC 400	1.32
9	ISMC 250	7.41
10	ISMC 100	5.45
11	ISA 90X90X8	1.32
12	ISA 75X75X8	6.94
13	ISA 50X50X6	0.16
14	6 o/p CHEQ.PLT	4.89
	TOTAL WT.	58.14



KEY-PLAN

CUSTOMER	NTPC-SAIL POWER COMPANY PVT. LTD BLACK & VEATCH, USA
CUSTOMER'S CONSULTANT	
JOB No. 239	EXPANSION OF BHILAI POWER PROJECT 2 X 250 MW - UNIT 1 & 2
STATUS CONTRACT	
DISTRIBUTION	BHARAT HEAVY ELECTRICALS LTD POWER SECTOR PROJECT ENGINEERING MANAGEMENT NEW DELHI
TITLE	PIPE RACK & CABLE RACKS STEEL FRAMING PLAN, ELEVATION & MISC. DETAILS – PR13&14
DRAWING No.	PE-DG-239-675-C003
SCALE	AS SHOWN
SHEET	9 OF –
REV	00

REV	DATE	ALTD	CHD	APPD

	NAME	SIGN	DATE
DRN	NB		09.03.07
DCN	MBP		09.03.07
CHD	MAV		09.03.07
APPD	SD		09.03.07

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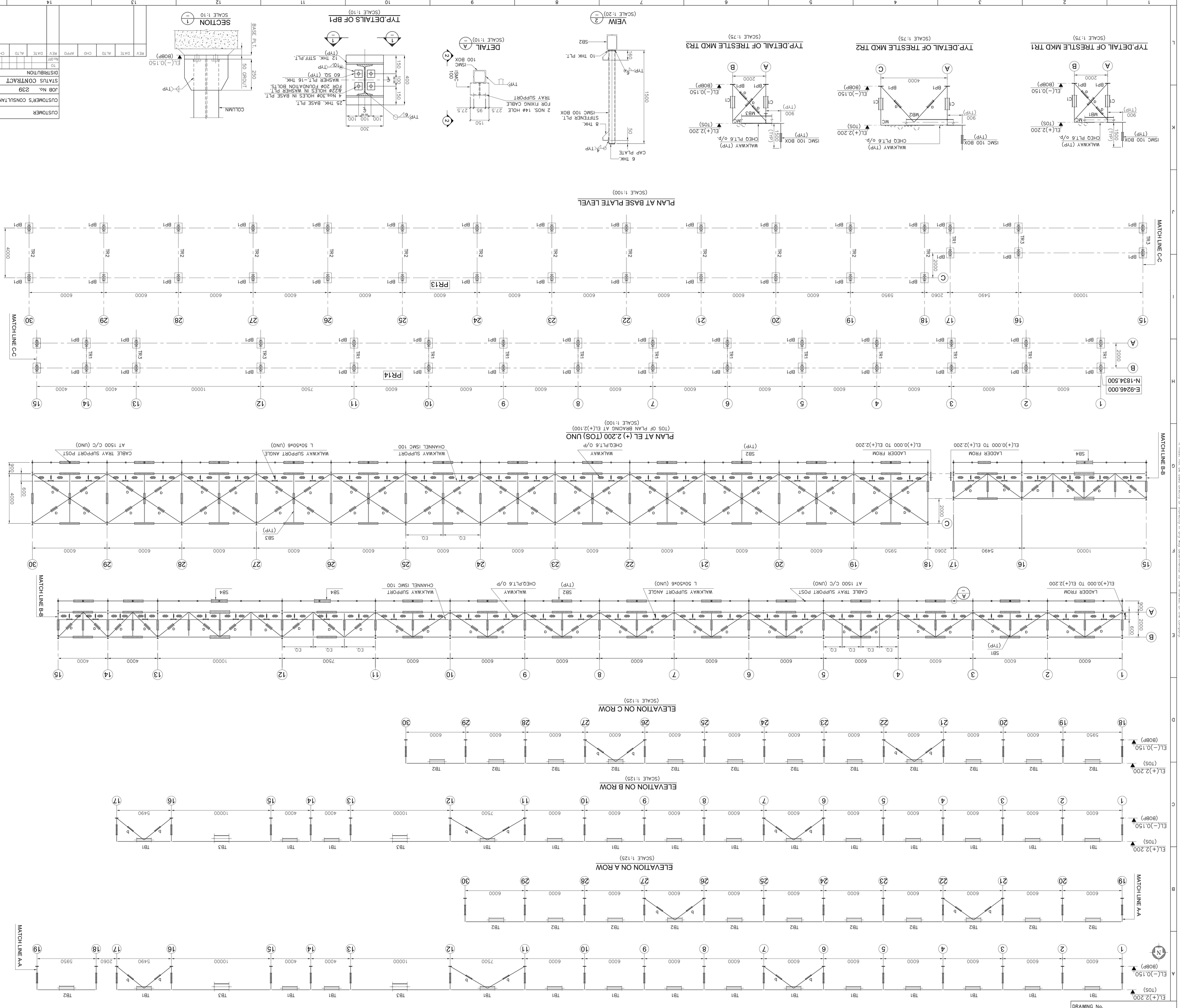
COPY RIGHT AND CONFIDENTIAL
COMPUTER FILE NAME: PE-DG-239-675-C003.DWG

38845/2020/PS-PEM-CIV



NOTES

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7. ALL END CONNECTIONS FOR BRACINGS SHALL BE DESIGNED FOR FULL TENSILE STRENGTH OF MEMBERS UNO.
8. FOR TYPICAL DETAIL OF SHEAR CONNECTION REF. DETAIL IN DRG. NO. PE-DG-239-600-C001.
9. QUANTITIES INDICATED IN BILL OF MATERIALS ARE APPROXIMATE AND DO NOT INCLUDE FOR STIFFENERS, SPLICING, GUSSETS, CONNECTIONS & WASTAGES.
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12. ALL GUESSET PLATES ARE 10 THK.

LEGEND

BKT	– BRACKET	MC	– MOMENT CONNECTION
BP	– BASE PLATE	PLT.	– PLATE
BOBP	– BOTTOM OF BASE PLATE	THK.	– THICKNESS
BOS	– BOTTOM OF STEEL	TOS	– TOP OF STEEL
CHEQD	– CHEQUERED	TOCP	– TOP OF CHEQUERED PLATE
℄	– CENTER LINE	TYP	– TYPICAL
EL	– ELEVATION	UNO	– UNLESS NOTED OTHERWISE
LVL	– LEVEL		

REFERENCE DRAWINGS.
(CONSTRUCTION)

1.PE-DG-239-600-C001	– GENERAL NOTES & STANDARD DETAILS FOR STRUCTURAL STEEL WORKS.
2.PE-DG-239-675-C001 (SHT–6)	– PIPE & CABLE RACKS (PR13&14) FOUNDATION LAYOUT & DETAILS.

(ENGINEERING)

1. PE-DG-239-100-M001 – PLOT PLAN
2. PE-DG-239-100-001 – PIPING LAYOUT ON PIPE RACK BOP AREA (SHT 1 TO 6)
3. PE-DG-239-100-002 – PIPING LAYOUT ON MAIN PLANT AREA (SHT 1 TO 4)
4. PE-DG-239-507-E207 – INTER PLANT CABLE LAYOUT (SHT 1 TO 5)

MEMBERS SCHEDULE

MEMBER MKD.	SECTION	SHAPE
C1	ISB 250	I
MB1	ISB 300	I
MB2	ISB 350	I
MB3	ISB 450	I
SB1	ISB 250	I
SB2	ISMC 250 BOX	⊡
SB3	ISB 300	I
SB4	ISMC 400 BOX	⊡
TB1	ISB 300	I
TB2	ISB 350	I
TB3	ISB 600	I
a	2ISA L75x75x8	⊤
b	2ISA L90x90x8	⊤

SL.NO.	MATERIAL	QUANTITY(MT)
1	25 THK.PLT.	1.46
2	16 THK.PLT.	0.11
3	12 THK.PLT.	0.85
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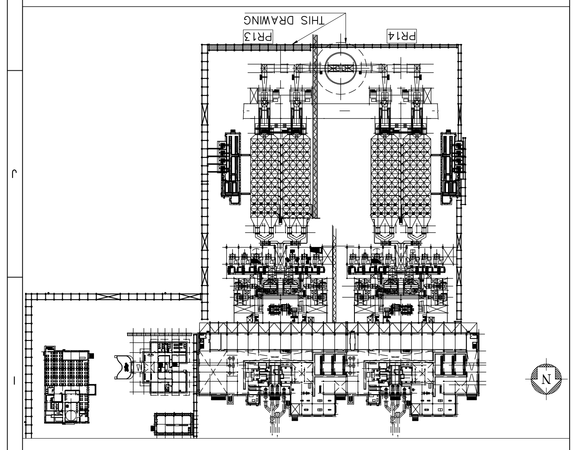
5	ISMB 350	11.01
6	ISMB 300	9.52
7	ISMB 250	6.70
8	ISMC 400	1.32
9	ISMC 250	7.51
10	ISMC 100	5.45
11	ISA 90X90X8	1.32
12	ISA 75X75X8	6.94
13	ISA 50X50X6	0.16
14	6 o/p CHEQ.PLT	4.89
	TOTAL WT.	58.14

KEY-PLAN



NTPC-SAIL POWER COMPANY PVT. LTD

BLACK & VEATCH, USA

EXPANSION OF BHILAI POWER PROJECT
2 X 250 MW – UNIT 1 & 2

BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NEW DELHI

PIPE RACK & CABLE RACKS
STEEL FRAMING PLAN, ELEVATION & MISC. DETAILS – PR13&14

DRAWING No. PE-DG-239-675-C003

SCALE AS SHOWN

SHEET 9 OF – REV 00

CUSTOMER'S DRAWING No.

DRAWING No. PE-DG-239-675-C003

FIRST ANGLE PROJECTION

ALL DIMENSIONS ARE IN MM

SIZE-A0

3884S/2020/PS-PEM-CIV

COMPUTER FILE NAME: PE0239675C003(SR-2)-Rev-20200309

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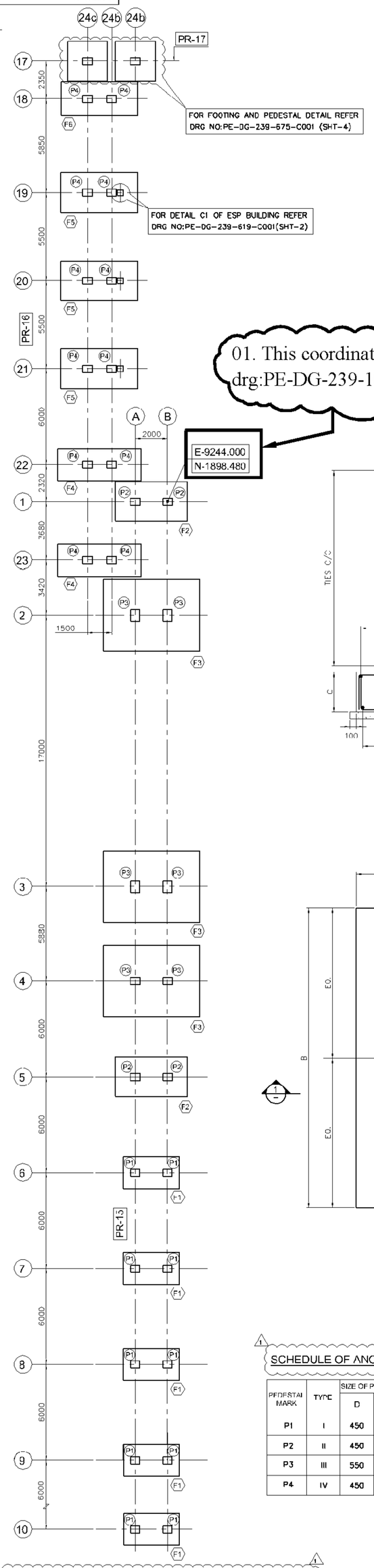
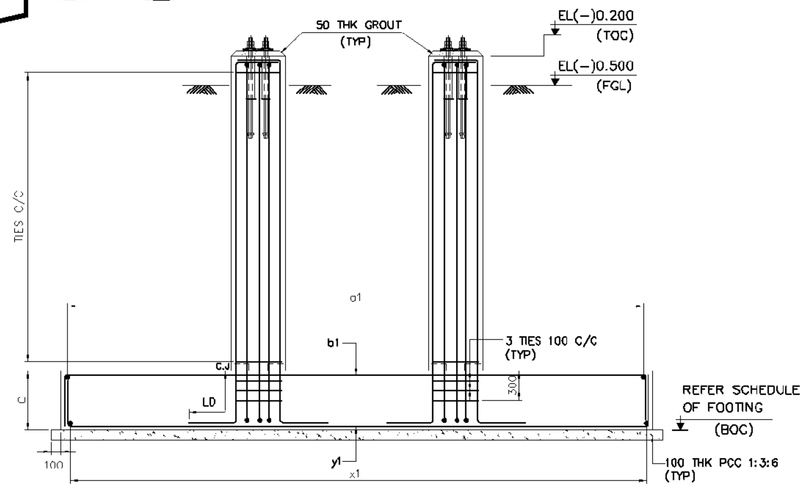


LAYOUT OF FOUNDATION FOR PIPE RACK MKD. PR15&16
(SCALE 1:125)



SECTION 1
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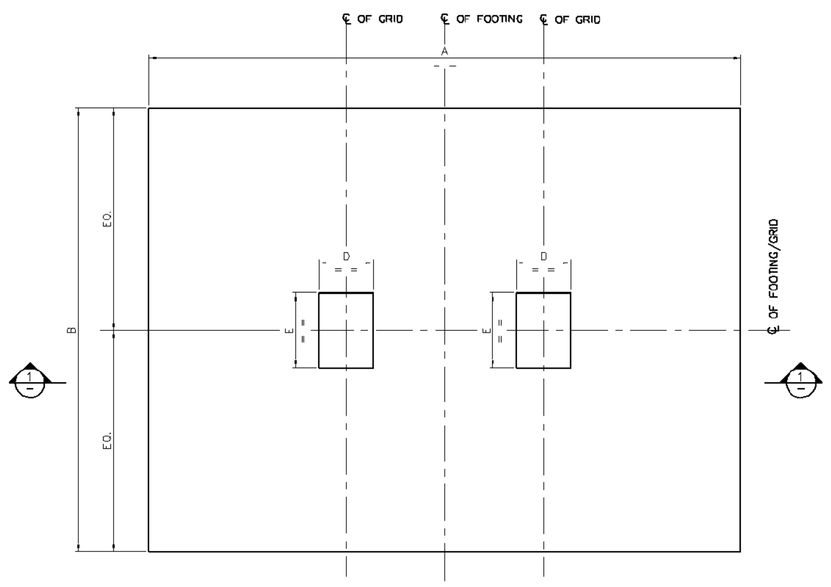
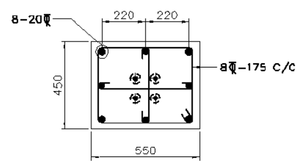
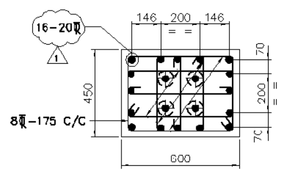


TYP FOUNDATION PLAN
(SCALE 1:30)



DETAILS OF PEDESTAL MKD.P1
(SCALE 1:15)



DETAILS OF PEDESTAL MKD.P2
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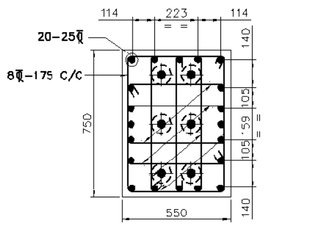
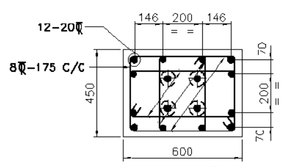
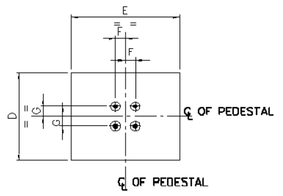


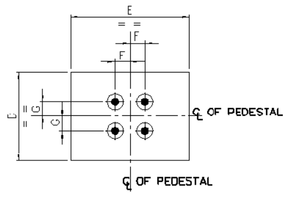
DETAILS OF PEDESTAL MKD.P3
(SCALE 1:15)



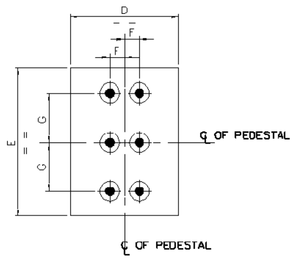
DETAILS OF PEDESTAL MKD.P4
(SCALE 1:15)



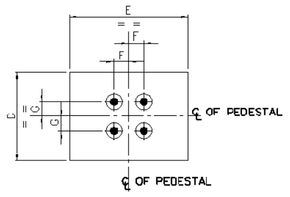
TYPE I
(SCALE 1:15)
TYPICAL PEDESTAL DETAIL
(FOR ANCHOR BOLTS)



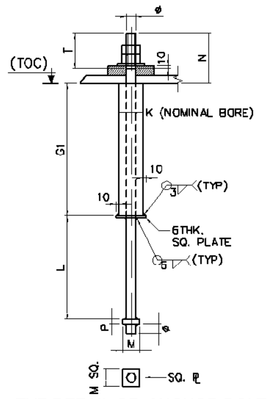
TYPE II
(SCALE 1:15)
TYPICAL PEDESTAL DETAIL
(FOR ANCHOR BOLTS)



TYPE III
(SCALE 1:15)
TYPICAL PEDESTAL DETAIL
(FOR ANCHOR BOLTS)



TYPE IV
(SCALE 1:15)
TYPICAL PEDESTAL DETAIL
(FOR ANCHOR BOLTS)



TYP DETAIL OF ANCHOR BOLT
(SCALE 1:10)

SCHEDULE OF ANCHOR BOLTS

DIMENSIONS	BOLT DIA (MM)		
	20 ϕ	32 ϕ	42 ϕ
L	250	350	350
G1	400	450	450
P	16	16	25
K	50	80	100
N	120	167	215
ϕ	20	32	42
M	50	60	100
T	80	120	150

SCHEDULE OF ANCHOR BOLTS FOR PEDESTAL

PEDESTAL MARK	TYPE	SIZE OF PEDESTAL D	SIZE OF PEDESTAL E	NO. OF PEDESTAL	NO. OF BOLTS	BOLT TOTAL QTY	ANCHOR BOLT DETAILS GRID	ANCHOR BOLT DETAILS DIA OF BOLTS	F	G	PEDESTAL TOC
P1	I	450	550	10	4	40	A6 TO A10 , B6 TO B10	M20	50	50	EL(-)0.200
P2	II	450	600	4	4	16	A1,B1 & A5,B5	M32	75	75	EL(-)0.200
P3	III	550	750	6	6	36	A2 TO A4 , B2 TO B4	M42	75	250	EL(-)0.200
P4	IV	450	600	12	4	48	18 TO 23 ALONG 24c & 24b'	M32	75	75	EL(-)0.200

SCHEDULE OF FOOTING

FOOTING MARK	TOTAL NO.	GRID MARK	BOTTOM OF FOOTING LVL (BOC)	FOOTING SIZE A	FOOTING SIZE B	FOOTING SIZE C	TOP REINFORCEMENT a1	TOP REINFORCEMENT b1	BOTTOM REINFORCEMENT x1	BOTTOM REINFORCEMENT y1
F1	4	6,7,8,9	EL(-)0.500	3500	2000	400	12ϕ-150	12ϕ-150	12ϕ-150	12ϕ-150
	1	10	EL(-)4.500	3500	2000	400	12ϕ-150	12ϕ-150	12ϕ-150	12ϕ-150
F2	2	1,5	EL(-)4.000	4900	2500	500	12ϕ-150	12ϕ-150	16ϕ-150	16ϕ-150
F3	3	2,3,4	EL(-)4.000	6000	4500	750	16ϕ-150	16ϕ-150	20ϕ-150	20ϕ-150
F4	2	22,23	EL(-)4.000	5200	2000	600	12ϕ-150	12ϕ-150	16ϕ-150	16ϕ-150
F5	3	19,20,21	EL(-)4.000	4800	2500	500	12ϕ-150	12ϕ-150	16ϕ-150	16ϕ-150
F6	1	18	EL(-)4.000	4750	2100	500	12ϕ-150	12ϕ-150	16ϕ-150	16ϕ-150

NOTES

1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH THE TERMS CONDITIONS, AND SPECIFICATIONS OF THE CONTRACT.
2. ALL DIMENSIONS ARE IN MILLIMETER AND LEVELS ARE IN METERS, UNO.
3. ALL ELEVATIONS ARE REFERED TO TURBINE BUILDING FINISHED GROUND FLOOR ELEVATION ±0.0M WHICH CORRESPONDS TO RL 294.5M.
4. GRADE OF CONCRETE SHALL BE OF M30 WITH 20MM DOWN GRADED AGGREGATES.
5. REINFORCEMENT SHALL BE OF Fe 415 GRADE, CONFORMING TO IS 1786
6. REINFORCEMENT IF REQUIRED SHALL BE MARGINALLY SHIFTED TO CLEAR ANY ANCHOR BOLT, BUT IN NO CASE SHALL BE CUT WITHOUT PRIOR APPROVAL OF SITE ENGINEER
7. CLEAR COVER TO REINFORCEMENT SHALL BE AS FOLLOWS:

DESCRIPTION	TOP	BOTTOM	SIDES
FOUNDATION	50	75	50
PEDESTAL	50	–	50

8. REINFORCEMENT IS CALLED UP AS THUS :

5 16T-200-T&B-B/W
- BOTHWAYS
- BOTTOM BAR
- TOP BAR
- BAR SPACING (CENTERS)
- TYPE OF STEEL (FOR-Fe 415)
- BAR SIZE
- NUMBER OF BARS

LEGEND

BOC – BOTTOM OF CONCRETE
℄ – CENTER LINE
C.J – CONSTRUCTION JOINT
EL – ELEVATION
FGL – FINISHED GROUND LEVEL
LVL – LEVEL
MKD. – MARKED
PR – PIPERACK
THK – THICKNESS
TOC – TOP OF CONCRETE
TYP – TYPICAL
UNO – UNLESS NOTED OTHERWISE
Fx – FOOTING MARK
Px – PEDESTAL MARK
Px/Fx – PEDESTAL MARK / FOOTING MARK

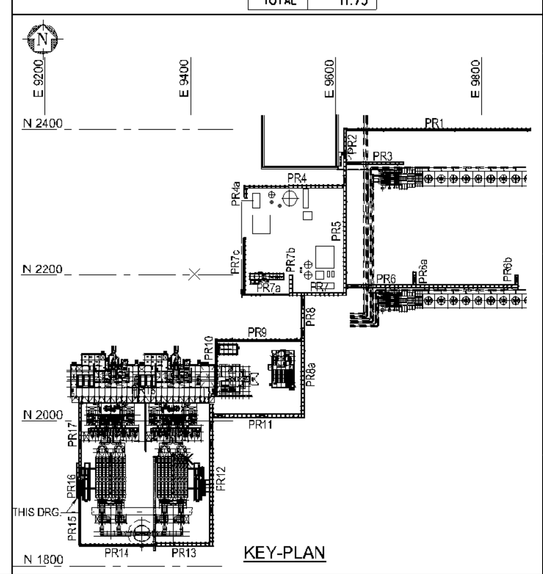
REFERENCE DRAWINGS

(CONSTRUCTION)
- PE-DG-239-600-C002 – GENERAL NOTES & STANDARD DETAILS FOR RCC WORKS.
- PE-DG-239-675-C003 (SHT-8) – PIPE & CABLE RACKS STEEL FRAMING PLAN & ELEVATION MISC.DETAILS –PR15&16
- PE-DG-239-619-C004 (SHT-1&2) – ESP CONTROL BUILDING ARCHITECTURAL PLAN,ELEVATION,SECTIONS

(ENGINEERING)
1. PE-DG-239-100-M001 – PLOT PLAN
2. PE-DG-239-100-001 (SHT 1 TO 6) – PIPING LAYOUT ON PIPE RACK BOP AREA
3. PE-DG-239-100-002 – PIPING LAYOUT ON MAIN PLANT AREA
4. PE-DG-239-507-E207 (SHT 1 TO 5) – INTER PLANT CABLE LAYOUT

BILL OF QUANTITIES

SL.NO.	DESCRIPTION	UNIT	QUANTITY
1	RCC (M30)	Cu.M	148.0
2	PCC (1:3:6)	Cu.M	23.98
3	REINFORCEMENT		
	8 ϕ	MT	1.24
	12 ϕ	MT	2.00
	16 ϕ	MT	4.10
	20 ϕ	MT	2.85
	25 ϕ	MT	1.56
		TOTAL	11.75



KEY-PLAN

CUSTOMER	NTPC–SAIL POWER COMPANY PVT. LTD
CUSTOMER'S CONSULTANT	BLACK & VEATCH, USA
JOB No. 239	EXPANSION OF BHILAI POWER PROJECT 2 X 250 MW – UNIT 1 & 2
STATUS CONTRACT	
DISTRIBUTION	

BHARAT HEAVY ELECTRICALS LTD POWER SECTOR PROJECT ENGINEERING MANAGEMENT NEW DELHI

REV	DATE	ALTD	CHD	APPD
01	26.03.07	NB	NBR	NMV/SGI

PR–16 PIPE RACK ADDED & REVSED AS PER B&V COMMENTS THROUGH MS–00787 DATED ON 05/03/07.

CODE		NAME	SIGN	DATE
C	DRN	NB		15.02.07
	DESN	NBR/VSK		15.02.07
	CHD	NMV		15.02.07
	APPD	SGI		15.02.07

TITLE: PIPE & CABLE RACKS (PR15 & 16) FOUNDATION LAYOUT & DETAILS

MPL | C | MSE | I | MAV | E | DEPT. | SIGN | DATE

SCALE AS SHOWN

DRAWING No. PE–DG–239–675–C001

SHEET 5 OF – | REV 01 | R-1a | SIZE-A0

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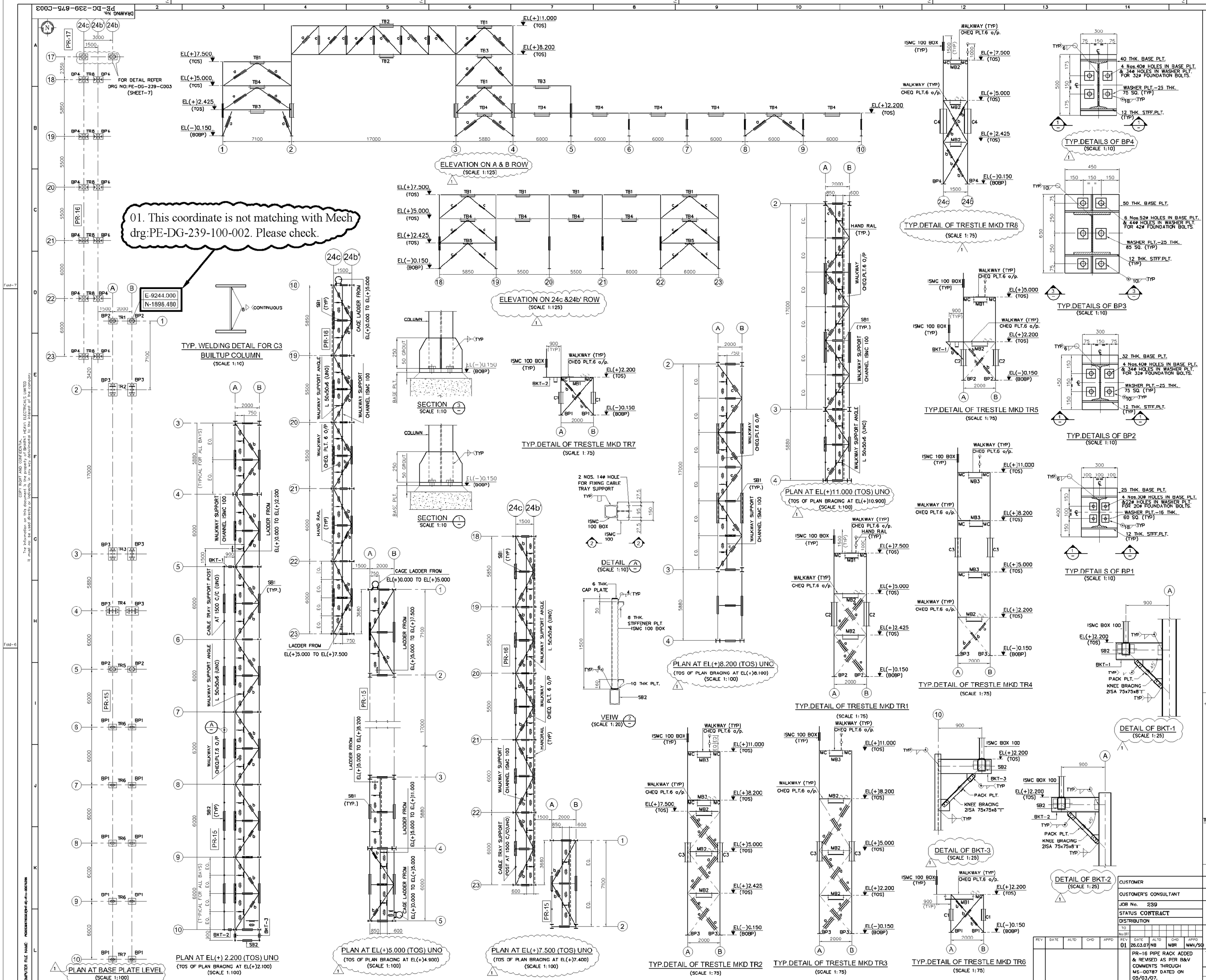


NOTES

1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH CONTRACT TERMS AND CONDITIONS, SPECIFICATION AND SCHEDULE OF ITEMS.
2. ALL DIMENSIONS ARE IN MILLIMETER AND LEVELS ARE IN METERS, UNO.
3. ALL ELEVATIONS ARE REFERED TO TURBINE BUILDING FINISHED GROUND FLOOR ELEVATION ±0.0M WHICH CORRESPONDS TO RL 294.5M
4. ALL ELEVATIONS ARE TO THE TOP OF STEEL UNO.
5. ALL WELDS SHALL BE 6mm FILLET CONTINUOUS UNLESS NOTED
6. SPLICING IN FLANGES AND WEB SHALL BE STAGGERED. SPLICING SHALL BE OF FULL STRENGTH BUTT WELD.
7. ALL END CONNECTIONS FOR BRACINGS SHALL BE DESIGNED FOR FULL TENSILE STRENGTH OF MEMBERS UNO
8. FOR TYPICAL DETAIL OF SHEAR CONNECTION REF. DETAIL IN DRG. NO. PE-DG-239-600-C001.
9. QUANTITIES INDICATED IN BILL OF MATERIALS ARE APPROXIMATE AND DO NOT INCLUDE FOR STIFFENERS, SPLICING, GUSSETS, CONNECTIONS & WASTAGES.
10. ALL WORKING POINT AT COLUMN BRACING ARE CENTER OF THE MEMBER UNO.
11. ALL CONNECTIONS ARE SHEAR CONNECTIONS (SC) EXCEPT NOTED AS MC.

LEGEND

BKT	– BRACKET	MC	– MOMENT CONNECTION
BP	– BASE PLATE	PLT.	– PLATE
BOBP	– BOTTOM OF BASE PLATE	THK.	– THICKNESS
BOS	– BOTTOM OF STEEL	TOS	– TOP OF STEEL
CHEQD	– CHEQUERED	TOCP	– TOP OF CHEQUERED PLATE
℄	– CENTER LINE	TYP	– TYPICAL
EL	– ELEVATION	UNO	– UNLESS NOTED OTHERWISE
LVL	– LEVEL		

REFERENCE DRAWINGS.

(CONSTRUCTION)

1. PE-DG-239-600-C001 – GENERAL NOTES & STANDARD DETAILS FOR STRUCTURAL STEEL WORKS.
2. PE-DG-239-675-C001 (SHT-5) – PIPE & CABLE RACKS (PR15&16) FOUNDATION LAYOUT & DETAILS.

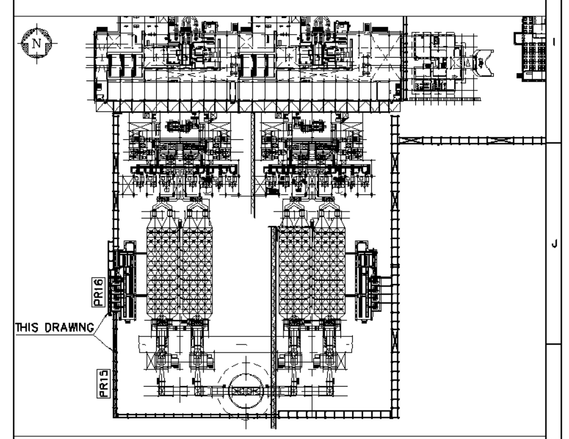
(ENGINEERING)

1. PE-DG-239-100-M001 – PLOT PLAN
2. PE-DG-239-100-001 (SHT 1 TO 6) – PIPING LAYOUT ON PIPE RACK BOP AREA
3. PE-DG-239-100-002 (SHT 1 TO 4) – PIPING LAYOUT ON MAIN PLANT AREA
4. PE-DG-239-507-E207 (SHT 1 TO 2) – INTER PLANT CABLE LAYOUT

MEMBERS SCHEDULE

MEMBER MKD.	SECTION	SHAPE
C1	ISMB 250	
C2	ISMB 300	
C3	c) FLG. PLT. 300X20 b) WEB. PLT. 310X10	
C4	ISMB 400	
TB1	ISMC 250 BOX	
TB2	2 ISMC 300	
TB3	ISMC 300 BOX	
TB4	ISMB 300	
TB5	2 ISA L110X110X12	
SB1	ISMB 250	
SB2	ISMC 250 BOX	
MB1	ISMB 300	
MB2	ISMB 250	
MB3	ISMB 350	
a	2ISA L90x90x8	
b	2ISA L75x75x8	
c	2ISA L90x90x8	
BKT-1	ISMB 350	
BKT-2&3	ISMB 300	

SL.NO.	MATERIAL	QUANTITY(MT)
1	50 THK.PLT.	0.69
2	40 THK.PLT.	0.56
3	32 THK.PLT.	0.14
4	25 THK.PLT.	0.34
5	20 THK.PLT.	6.41
6	16 THK.PLT.	0.02
7	12 THK.PLT.	1.14
8	10 THK.PLT.	1.65
9	ISMB 400	5.65
10	ISMB 350	0.68
11	ISMB 300	8.96
12	ISMB 250	4.83
13	ISMC 300	7.57
14	ISMC 250	7.62
15	ISMC 100	1.67
16	ISA 110X110X12	0.92
17	ISA 90X90X8	7.00
18	ISA 75X75X8	4.56
19	ISA 50X50X6	0.18
20	6 o/p CHEQ.PLT	5.84
	TOTAL WT.	66.43



KEY-PLAN

REV	DATE	ALTD	CHD	APPD
01	26.03.07	NB	MBR	MMV/SGI

PR-16 PIPE RACK ADDED & REVISED AS PER B&V COMMENTS THROUGH MS-00787 DATED ON 05/03/07.

CUSTOMER

CUSTOMER'S CONSULTANT

JOB No. 239

STATUS CONTRACT

DISTRIBUTION

NTPC-SAIL POWER COMPANY PVT. LTD

BLACK & VEATCH, USA

EXPANSION OF BHILAI POWER PROJECT

2 X 250 MW - UNIT 1 & 2

BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NEW DELHI

CODE		NAME	SIGN	DATE
C	DRN	NB		15.02.07
	DESN	MBR		15.02.07
	CHD	MMV		15.02.07
	APPD	SGI		15.02.07

TITLE

PIPE RACK & CABLE RACKS

STEEL FRAMING PLAN, ELEVATION & MISC. DETAILS - PR15&16

SCALE AS SHOWN

DRAWING No. PE-DG-239-675-C003

SHEET 8 OF – REV 01

SIZE-A0

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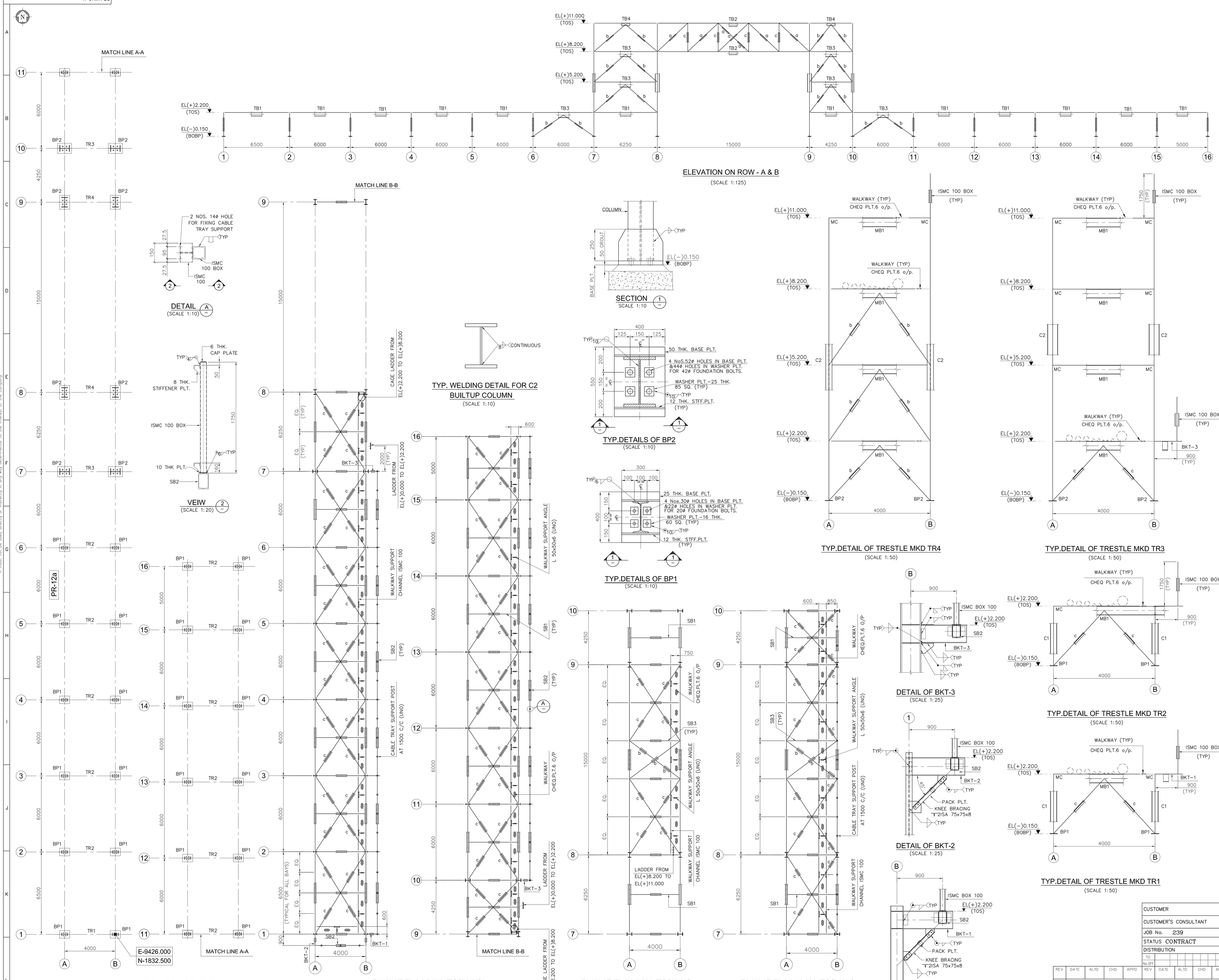

NOTES

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2. ALL DIMENSIONS ARE IN MILLIMETER AND LEVELS ARE IN METERS, UNO.
3. ALL ELEVATIONS ARE REFERED TO TURBINE BUILDING FINISHED GROUND FLOOR ELEVATION ±0.0M WHICH CORRESPONDS TO RL 294.5M
4. ALL ELEVATIONS ARE TO THE TOP OF STEEL UNO.
5. ALL WELDS SHALL BE 6mm FILLET CONTINUOUS UNLESS NOTED
6. SPLICING IN FLANGES AND WEB SHALL BE STAGGERED. SPLICING SHALL BE OF FULL STRENGTH BUTT WELD.
7. ALL END CONNECTIONS FOR BRACINGS SHALL BE DESIGNED FOR FULL TENSILE STRENGTH OF MEMBERS UNO.
8. FOR TYPICAL DETAIL OF SHEAR CONNECTION REF. DETAIL IN DRG. NO. PE-DG-239-600-C001.
9. QUANTITIES INDICATED IN BILL OF MATERIALS ARE APPROXIMATE AND DO NOT INCLUDE FOR STIFFENERS, SPLICING, GUSSETS, CONNECTIONS & WASTAGES.
10. ALL WORKING POINT AT COLUMN BRACING ARE CENTER OF THE MEMBER UNO.
11. ALL CONNECTIONS ARE SHEAR CONNECTIONS EXCEPT NOTED AS MC.
12. ALL GUESSET PLATES ARE 10 THK.

LEGEND

BKT	– BRACKET	MC	– MOMENT CONNECTION
BP	– BASE PLATE	PLT.	– PLATE
BOBP	– BOTTOM OF BASE PLATE	THK.	– THICKNESS
BOS	– BOTTOM OF STEEL	TOS	– TOP OF STEEL
CHEQD	– CHEQUERED	TOCP	– TOP OF CHEQUERED PLATE
℄	– CENTER LINE	TYP	– TYPICAL
EL	– ELEVATION	UNO	– UNLESS NOTED OTHERWISE
LVL	– LEVEL		

REFERENCE DRAWINGS.

(CONSTRUCTION)

1. PE-DG-239-600-C001 – GENERAL NOTES & STANDARD DETAILS FOR STRUCTURAL STEEL WORKS.
2. PE-DG-239-675-C001 (SHT-8) – PIPE & CABLE RACKS (PR12a) FOUNDATION LAYOUT & DETAILS.
3. PE-DG-239-675-C003 (SHT-9) – PIPE RACK & CABLE RACKS STEEL FRAMING PLAN,ELEVATION & MISC. DETAILS – PR13&14
4. PE-DG-239-675-C001 (SHT-6) – PIPE RACK & CABLE RACKS (PR13&14) FOUNDATION LAYOUT & DETAILS.

(ENGINEERING)

1. PE-DG-239-100-M001 – PLOT PLAN
2. PE-DG-239-100-001 (SHT 1 TO 6) – PIPING LAYOUT ON PIPE RACK BOP AREA
3. PE-DC-239-100-002 (SHT 1 TO 4) – PIPING LAYOUT ON MAIN PLANT AREA
4. PE-DC-239-507-E207 (SHT 1 TO 5) – INTER PLANT CABLE LAYOUT

MEMBERS SCHEDULE

MEMBER MKD.	SECTION	SHAPE
C1	ISMB 250	I
C2	a) FLG. PLT. 250X25 b) WEB. PLT. 350X12	250 25 / 350 12
TB1	ISMB 350	I
TB2	2 ISMC 300	I I
TB3	ISMB 500	I
TB4	ISMC 250 BOX	▯
SB1	ISMB 300	I
SB2	ISMC 250 BOX	▯
SB3	ISMB 350	I
MB1	ISMB 350	I
a	2ISA L100x100x8	⊤
b	2ISA L90x90x8	⊤
c	2ISA L75x75x8	⊤
BKT-1 & BKT-2	ISMB 350	I
BKT-3	ISMB 350	I

SL.NO.	MATERIAL	QUANTITY(MT)
1	50 THK.PLT.	0.69
2	25 THK.PLT.	8.75
3	16 THK.PLT.	0.04
4	12 THK.PLT.	3.43
5	ISMB 500	5.7
6	ISMB 350	16.4
7	ISMB 300	3.19
8	ISMB 250	2.10
9	ISMC 250	5.6
10	ISMC 100	3.42
11	ISMC 300	4.20
12	ISA 100X100X8	1.20
13	ISA 90X90X8	4.04
14	ISA 75X75X8	6.56
15	ISA 50X50X6	0.11
16	6 o/p CHEQ.PLT	3.46
	TOTAL WT.	68.69

CUSTOMER	NTPC–SAIL POWER COMPANY PVT.LTD
CUSTOMER'S CONSULTANT	BLACK & VEATCH, USA
JOB No. 239	EXPANSION OF BHILAI POWER PROJECT 2 X 250 MW – UNIT 1 & 2
STATUS CONTRACT	
DISTRIBUTION	

BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NEW DELHI

DEPT CODE		NAME	SIGN	DATE
C	DRN	NB		13.03.07
	DESN	MBR		13.03.07
	CHD	MMV		13.03.07
	APPD	SGI		13.03.07

TITLE: PIPE RACK & CABLE RACKS
STEEL FRAMING PLAN, ELEVATION & MISC. DETAILS – PR12a

MPL | C | MSE | I | MAX | E | DEPT. | SCALE AS SHOWN | DRAWING No. PE-DG-239-675-C003
SIGN
DATE | SHEET 11 OF – | REV 00

REV	DATE	ALTD	CHD	APPD	REV	DATE	ALTD	CHD	APPD

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