

BHUSAWAL THERMAL POWER STATION 1X 660 MW UNIT - 6 PROJECT**PRE -BID QUERIES from Prospective Bidders****Bid Specification No. DG/BSL U-6/2011/T-1, Volume - VI A**

SR. No.	Section No.	Clause No.	Bid Specification Stipulation	Bidder's query/Stipulation	Resolution
105	1	4.2	5 mm stainless steel liner plates conforming to 304M Grade, fitted without allowing any projections in coal flow path shall be provided for conical hopper portion only.	As per standard engineering practice, Coal bunkers shall be provided with 3.15 mm thick stainless steel liner in the hopper portion only. Please confirm.	Bid specification prevails
106	1	5.00	Design Documents	The Civil / Structural Analysis, Design and calculation documentations will be performed using standard software like MS-Office, MathCAD, STAADPro, SAFE, SAP, ETABS, Dyna, in-house developed templates etc.	Accepted however Dyna, in-house developed templates etc. subject to validation.
107	1		Worskhop	Please clarify capacity of crane required in workshop.	Capacity of EOT Crane shall be 10 T .
108	1		Stores	We understand that for stores separate crane is not required. Please confirm. If crane is required please indicate capacity required.	Crane not required.
109	2	3.1.a)	Area grading, Levelling & dressing (Finished ground levels shall be as mentioned in Plot Plan & area grading drawings)	Please provide contour drawing and RL of bore holes. Please provide previous grading drawing if any.	Drawings & bore holes data already provided alongwith Bid documents.

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110	2	3.1 (h)	Drain Network	We presume the terminal point of storm water drain shall be at plant boundary. Please confirm. In case it is to be drained of to near by nallah please provide us the invert level of the same. Further all necessary clearances and right of way for the same shall be in scope of Owner. Please confirm.	There will be 2 nos. of disposal points for storm water drains. The locations of the same is at bridge no. 17 & 18 of railway siding for 2 X 500 MW unit. The required data will be provided to successful bidder during detail engineering. Necessary clearances for the same shall be in scope of Bidder.
111	2	3.1.2	Live Loads	Live load considerations for CW / ACW sump and Pump house will be as per IS codal provisions.	Bid specification prevails. Refer clause no. 3.1.2.5 of volume VI A Section 2.
112	2	3.1.2.1	Live Load on roofs Cl 3.1.2.1. (a (iii)) For accessible roofs, live loads shall be considered as 1.5 KN/ m ²	However, for inaccessible roof, we propose to use live load of 0.75kN/m ² as per IS-875.	Bid specification prevails
113	2	3.1.3 (h)	Laydown area loads Lay down areas in the Turbine Hall shall be investigated for concentrated loads resulting from equipment components to be stored during erection and maintenance operation	The structure shall be designed considering laydown loads as per the actual scheme and loading data provided by equipment vendors. Please confirm.	Bid specification prevails

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114	2	3.1.4 4.6.4 & 4.6.6.2	Wind loading Risk coefficient (k1) shall be considered as 1.07 for all structures. 3.1.5 Seismic	The risk coefficient as per IS875 (III) is 1.06. This shall be used for all structures other than Non plant buildings. K1 shall be 1.0 for all non-plant buildings. Please confirm.	The risk coefficient k1 shall be 1.06 as per IS: 875 (III) for all plant & non plant buildings.
115	2	3.1.7	Steam piping load Minimum intensity of steam piping load shall be 6.0 kN/Sqm for the areas at different levels through which steam piping is routed.	Steam piping loads will be considered as per actual pipe stress analysis results. Please confirm.	Bid specification prevails
116	2	3.1.11	Other loads All Power House columns adjacent to first row of Boiler columns shall be designed for an additional load of 500 kN to account for piping/cable rack loads.	No additional loads or blanket load shall be considered in addition to the actual loads based on the layout. Please confirm.	Bid specification prevails
117	2	3.40	" Whenever any structure under this contract will carry or receive additional load from the work of any other contract, the structures under this contract shall be provided with sufficient margin to carry the above load (like Mill Bay structure, Trestles etc.) details of which shall be finalized during detail engineering."	Since this is a BTG + BOP contract (full EPC), no additional loads are considered for others. However, suitable margins shall be considered during design phase to take care of engineering uncertainties.	Accepted
118	2	3.40	Design concepts 'Lifted Load' of crane shall not be considered during seismic condition.	For wind calculation, 50 % of the lifted load of Crane will be considered. Please confirm acceptance.	Bid specification prevails

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119	2	3.40	Design concepts In Turbine Bay, horizontal wind girders between A-row and B-row columns must be provided below Mezzanine and Operating floor at gable ends to transmit wind load from gable columns.	The turbine building shall be designed without wind girders at gable ends.	Bid specification prevails
120	2	4.1	Power House building The roofing will be done by cast-in-situ RCC slab over permanently color coated (on exposed face) galvanized M.S. troughed metal decking of approved profile supported by steel purlins which are spanning between two adjacent roof trusses.	Insulated sandwich panel sheet shall be used in roof instead of RCC over metal deck. Please confirm.	Bid specification prevails
121	2	4.9	Liquid retaining structures All water retaining/storage structures and all underground structure requiring dry working condition shall be designed assuming liquid up to the height of wall irrespective of provision of any over flow arrangement. Use of PRV to counter uplift shall not be allowed.	Pressure relief valves may be used for liquid retaining structures. Please confirm.	Bid specification prevails
122	2	4.9	Liquid retaining structures All water retaining/storage structures and all underground structure requiring dry working condition shall be designed assuming liquid up to the height of wall irrespective of provision of any over flow arrangement. Use of PRV to counter uplift shall not be allowed.	We propose to use pressure relief valves, as required, for all liquid retaining structures.	Bid specification prevails

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SR. No.	Section No.	Clause No.	Bid Specification Stipulation	Bidder's query/Stipulation	Resolution
123	1 & 2	4.9.1 (e) & 4.9	Liquid retaining structures	As per Cl. No. 4.9, Section 2, " the crack width for liquid retaining structures shall be limited to 0.1mm". All liquid retaining structures except filter water reservoir will be designed as per this clause.	Accepted
124	2	4.10	Power House building The roofing will be done by cast-in-situ RCC slab over permanently colour coated (on exposed face) galvanized M.S. troughed metal decking of approved profile supported by steel purlins which are spanning between two adjacent roof trusses.	As specification stipulates use of insulated metal side cladding, we would propose use of the same insulated sandwich panel in roof instead of RCC over metal deck. Any mechanical or other utilities can be placed on roof cutouts, supported on separate structural framing. Please confirm.	Bid specification prevails
125	2	4.30	Fly ash	Sufficient amount of fly ash shall be provided free of charges by the Owner. Please confirm.	Arranging fly ash conforming to IS: 3812 is the responsibility of the bidder. However if the required quality & quantity of fly ash is available with Mahagenco the same will be supplied to bidder on chargeable basis as per Mahagenco's prevailing

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SR. No.	Section No.	Clause No.	Bid Specification Stipulation	Bidder's query/Stipulation	Resolution
126	2	5.5.7	"After the tanks have been erected, hydro testing shall be done. Subsequent upon hydro testing of tank, the differential settlement"	The statement appears to be incomplete. Kindly state the requirements under this clause.	The sentence shall be read as "After the tanks have been erected, hydro testing shall be done. Subsequent upon hydro testing of tank, the differential settlement noticed if any shall be rectified to the satisfaction of Engineer Incharge"
127	3	1.3	Structural steel shall conform to Grade A of IS:2062 for rolled steel members or plates up to 20 mm thickness. For plates above 20 mm thickness and welded construction, steel conforming to Grade B (Killed and normalized) of IS: 2062 shall be used except for crane girders where Grade C (Killed and normalized) (IS: 2062) steel shall be used. All structural steel plates and sections shall be of main producer of such as "SAIL" or "TATA STEEL" or "RINL" or "JINDAL" make or vendor approved by MAHAGENCO.	Structural steel of grade Q235 / Q345 as per Chinese code shall be used in addition to Indian steel. Please confirm.	Bid specification prevails
128	3	1.4/1.11	Structural steel connections Shop connections will be all welded and field connections will generally be bolted unless specified otherwise.	Welded or Bolted type of connections will be used based on requirement.	Bid specification prevails
129	3	2.44	Boundary Wall As per Clause No.3.1 of Section 1; the boundary wall shall be made of uncoursed rubble masonry. However, as per cl. 2.44(Section 4), the boundary wall is made of masonry, painted with cement -based paint over plaster.	We understand that the existing boundary wall is made of UCR and hence we propose to follow Clause No.3.1 of Section 1 for the new boundary wall.	The boundary wall shall be of UCR masonry as per clause no. 3.1 of section 1. The anticlimbing fencing, finishing of wall etc. shall be as per clause no. 2-44 of section 4 & Bid drawing.

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SR. No.	Section No.	Clause No.	Bid Specification Stipulation	Bidder's query/Stipulation	Resolution
130	3	4.00	" it is envisaged that pipe/cable rack under this Package will have to accommodate some additional pipes and cables (such as Plant Water System etc.), which are not in the scope of the this Package. The Contractor shall in his offer keep reasonable margin for accommodating such additional pipes/ cables in the rack structure, details of which will be furnished to him during the detailed engineering stage. "	Since this is a BTG + BOP contract (full EPC), no additional trays/piping are considered for others. However, suitable margins shall be considered during design phase to take care of engineering uncertainties.	Accepted
131	3	5.00	Other specific requirements Interaction ratio shall be restricted to 0.9	The member design will be generally performed to reach allowable stresses. Wherever anticipated loads are not furnished, contingency loads will be provided.	Bid specification prevails
132	3	5.3	Horizontal deflection	Horizontal deflection for conveyor entry/exit of building & conveyor trestle will be H/325 (along gallery) and H/500 (across gallery)will be considered. Please confirm	Accepted
133	4	Item i	Stores	Please inform the number of stores building required.	During detail Engineering.

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SR. No.	Section No.	Clause No.	Bid Specification Stipulation	Bidder's query/Stipulation	Resolution
134	4	2.4 (a)/ 2.16	Cl. 2.4: handrails and ladder pipes shall be 50 mm nominal bore MS pipes... Cl. 2.16 (a) handrails and ladder pipes shall be 50 mm nominal bore MS pipes Cl. 2.16 (h) For any other floor of powerhouse building, plant & non-plant buildings, unless otherwise indicated in the specification the post and handrails of stairs, railings, etc. shall be of 32 mm dia G.I. pipes as per IS-1239-part (I) Cl. 2.4 (b) For stairs and around all floor openings at operating floors, 1000 mm high hand railing with 32 NB (polished) stainless steel pipe shall be provided. Cl. 2.16 (d) For RCC stairs and around all floor openings at operating floors, 1000 mm high hand railing with 32 NB (polished) stainless steel pipe shall be provided. Cl. 5.1.16 (c) 40ø NB stainless steel pipe handrail for Stair in T.G. Hall area and 32ø NB medium class G.I pipe Handrail for stairs in other areas,	Kindly clarify the handrail requirements in various areas/buildings in view of the contradictions in the referred clauses.	Clause no. 2.16 of section 4 prevails for handrailing in various areas & buildings.

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SR. No.	Section No.	Clause No.	Bid Specification Stipulation	Bidder's query/Stipulation	Resolution
135	4	2.26	Minimum 110mm thick R.C. concrete parapet Cl. No. 2.6, 110 mm thk parapet is to be provided. Cl. No. 2.28(o): 100 mm thick concrete parapet is to be provided, Section 2; Cl. No. 6.1, 125 mm thk parapet is to be provided.	We will consider 100 mm thick, 1000 mm high RCC parapet for accessible roofs and 400 mm high 230 thk masonry parapet for non accessible roof. Please confirm.	Clause no. 2.28 (o) shall prevail for parapets.
136	4	2.37	1) PCC paving of grade M-20, 100 mm thick laid over 75 mm thick bed of dry brick aggregate shall be provided for following areas: (i) 2.0 m wide pathway all along pipe/ cable corridor	We propose to provide local paving around the pipe/ cable corridor for the accessibility to the cage ladders. Please confirm.	2.0 m wide pathway all along the pipe/cable corridor consists of 150mm thick P.C.C. of grade M-20 overlaid on 230 mm thick stone soling with interstices filled with sand by water flooding. For paving around cooling tower, volume VI A section 1
137	4	4.1.1	Landscaping: administrative area	Since no separate administration building is envisaged in the scope of work for 1x660 MW plant kindly clarify the landscaping requirement for the same .	Administration building is not included in Bidder's scope. Landscaping is not envisaged for Admin. Building.
138	5	4.11.3.3	Blasting: No blasting shall be permitted for excavation of foundation even in rocky formation, unless permitted by the MSPGCL and subject to proper licenses and permission being obtained from the authorities concerned.	Weathered rocks are observed beyond 2.5m depth. Controlled Rock Blasting shall be permitted if required for laying foundation or any other work, subject to permissions from concerned authority.	Bid specification prevails

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139	-	-	--	Pl.furnish the following drgs .in autocad format: 1. PE-189GA-101 P2 - Plot plan	Already furnished.
140	-	-	-	Please furnish the high flood level and rainfall intensity in mm/hr.	For HFL refer note no. 6 of Bid Plot plan. Bid specification prevails .
141	4	2.37	1) PCC paving of grade M-20, 100 mm thick laid over 75 mm thick bed of dry brick aggregate shall be provided for following areas: (i) 2.0 m wide pathway all along pipe/ cable corridor	It is the proposed to provide paving locally around the pipe/ cable corridor for the accessibility to the cage ladders.	2.0 m wide pathway all along the pipe/cable corridor consists of 150mm thick P.C.C. of grade M-20 overlaid on 230 mm thick stone soling with interstitches filled with sand by water flooding. For paving around cooling tower, volume VI A section 1 clause 4.7.20.18 shall be applicable.
142	4	2.5/ 5.1.2	Cl. 2.5: For half brick thick wall 2 nos. 8 mm diameter bars shall be used at every third layer. Cl. 5.1.2 : 1:4 cement sand mortar with 2 nos. 6 mm diameter M.S. rod in every fourth layer.	We propose to follow Cl. No. 5.1.2 as per standard industrial practice.	Clause 2.5 of section 4 prevails.

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143	4	3.0 (a) (iii)	Intensive landscaping zone- Canteen, Service Building & similar buildings	Intensive landscaping will be provided for Canteen & Service Building only.	Bid specification prevails except Administrative building
144	4	3.1.3	Canteen, service building & similar building area:	Intensive landscaping shall be provided for Canteen & Service Building only. Please confirm.	Bid specification prevails except Administrative building
145	4	4.0	The control room shall have very high quality furniture of approved make similar to Godrej / Feather light	Furnitures required shall be provided only for Control room building of STG building, supply of furnitures for all other buildings & facilities shall not be in bidder's scope. Please confirm.	Bid specification prevails.
146	4	4.1(a)	Tree height shall be 6 to 15 m	Tree heights in the intensive landscaping will be 3 to 10m. Please confirm.	Bid specification prevails.
147	4	4.1.1	Landscaping shall be provided for administrative area,	We understand that there is no separate Administration building (not indicated in the Plot Plan / Specification also). Kindly clarify the administrative area.	Administration building is not included in Bidder's scope. Landscaping is not envisaged for Admin. Building.
148	4	4.1.2(a)	BROAD GUIDELINES FOR PLANT SELECTION Cooling tower area	Trees are not required in this Cooling Tower area. Please confirm.	To be decided during detail engineering

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149	4	5.1.10 (e)(f)(g)	(e) All windows and ventilators shall be glazed aluminium windows conforming to IS: 1949. & IS: 1948 (f) Alternatively pre-coated (polyester painted) steel windows and ventilators may be used for auxiliary plant buildings. (g) Alternatively, steel reinforced UPVC windows may be used for Service building if agreed by the owner.	It is proposed to provide Pre-coated (polyester painted) steel windows and ventilators in all buildings.	Bid specification prevails.
150	4	5.1.10(d)	Doors of W.C. and shower shall be wooden panel door. Cl 2.13: it shall be hinged type single leaf shuttered FRP with heavy-duty aluminium box section frame black powder coated. Cl. 5.1.10 (d) the same shall be wooden doors.	It is proposed to use FRP doors as per clause no. 2.13.	Clause no. 2.13 of section 4 shall prevail.
151	4	5.1.9 (g)	Plinth Protection Cl. No. 2.36, 1000mm wide and 100 mm thk plinth protection shall be provided. Cl. No. 5.1.9 (g), plinth protection shall be 750 mm wide.	We shall follow Cl. No. 5.1.9 (g) for all buildings.	1000 mm wide & 100 mm thk PCC of M20 grade plinth protection alongwith drains shall be provided for all buildings.

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SR. No.	Section No.	Clause No.	Bid Specification Stipulation	Bidder's query/Stipulation	Resolution
152	4 10	4 2.4.4	4.0 (VI-A/4): Flooring: Total thickness of floor finish shall be 40 mm 2.4.4(IV-B/10) : Earthing conductors shall be embedded in concrete floor of the building without having direct contact with the reinforcement rods. Minimum concrete cover above earthing flat shall be 50 mm.	Earthing flat bars will be embedded within the 50 mm thk. floor finish.	Floor finish thickness 50 mm shall be accepted.
153	4	2.29 III-I/ 3/D	Two numbers of roof water tanks (one for storing service water and another for potable water) of adequate capacities depending on the number of users and 8 hours storage capacity shall be provided for each building and pump house Annexure I - SCHEDULE OF MISCELLANEOUS STEEL TANKS (1) DM water storage tank in the vicinity of DM plant - 850m ³ - 2 Nos (2) Condensate Storage Tank near Compressor House - 1000 m ³ 1No (3) DMCW Make up tanks By Bidder - 2No (4) Service Water Storage Tank -75 m ³ 2 Nos (5) Potable water Storage Tank -25m ³ 2 Nos	Discrepancy noted between referred clauses for over head tank. We propose to provide following tanks: Service water: Two Steel tanks of 75 m ³ each capacity in TG building. Potable water - Two Steel tanks 25 m ³ each in TG building. Further, 5 m ³ capacity sintex or equivalent tank will be provided for Service building and 1 m ³ capacity sintex or equivalent overhead distribution tank in other building, where potable water will be required.	Clause as per III-I/3 / D shall prevail

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154	5	10.0	Signalling & Telecommunication for Railway Siding	The Tender Document is prescriptive of "Route Relay Interlocking". However we wish to propose the state-of-art "Electronic Interlocking" systems which shall benefit the Employer with improved line capacities, better traffic management, lesser maintenance and optimum life cycle cost.	Signaling & Telecommunication system for railway siding shall be as per railway norms.
155	A/1	4.4	Ash Handling Plant: Works shall include bottom ash slurry pipe supports, bottom ash extraction equipment supports, ash slurry pipe supports from ash slurry pump house to existing ash dyke area at VELHALA	We request customer to furnish the contours , details of existing structures, road/ nala crossings etc.	Refer Addendum II
156	A/1	3.1 k	Complete railway siding facilities for the project. The brief scope of railway siding consists of following works.	We request customer to exlcude this work from EPC scope as it innvolves many complicated works which can be done only by railway or regulor railway contractor.	Bid specification prevails.
157	A/1	4.4.1	The unsupported length of the all pipelines shall not be more than 6.0 meters.	We propose unsuported length shall be 7 meters normaly and more span shall be provided if required & support shall be designed acordingly. Please confirm.	Bid specification prevails.

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158	A/4	2.37	Paving: 2.0 m wide pathway all along pipe/ cable corridor	Please confirm whether paving along the ash slurry pipe line upto ash pond.	Paving along the ash slurry pipe line up to ash pond is not envisaged in bid.
159	A/4	2.11 a/b	12 mm thick 1:4 Cement: Sand Plaster with neeru finish in 2 coats to all internal surfaces....	Insude & Outside plastering shall be in CM 1:6. Please confirm the acceptance.	Bid specification prevails.
160				2. PE-189-CV-SK-4003 P2 - Area grading drawing	Adequate data in readbale format has already been furnished.
161				3. PE-189-CV-SK-4005 P2 - Road layout	
162				4. PE-189-CV-SK-4006 P1 - Compound Wall	
163				Please provide the AutoCAD version of following drawings: PE-189-CV-SK-4003 (Area Grading), PE-189-CV-SK-4005 (Road Layout), PE-189-CV-SK-4006 (Compound Wall Layout) PE-189-GA-101 (Plot Plan)	

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164				a) Please advise if the available soil investigation report, provided for BH12 (near crushed coal pile area), can be used for the boundary wall design between N' 500 and N' 1000 and E' 1500 through E' 2100. b) Also please advise about the soil data along the ash pipe corridor.	Please refer Volume VI A Section 2 clause no. 2 For soil data along ash pipeline refer Volume VI A Section 1 clause 4.4
165				Please provide legible version of Bore hole drawing No. PE-189-CV-SK-4001.	Will be furnished if available.
166			Pipe sleepers for Ash Piping	It is observed during site visit that for laying ash piping there is no space on the existing sleepers/ culverts/ bridges. Therefore, additional land for sleepers, culverts/ bridges would be required to lay ash piping. Owner to provide the necessary details.	Ash pipe line shall be laid in the existing / available land strip by making suitable supporting arrangement. Refer Addendum II
167			Road along the ash pipe	As observed during site visit, there is an existing road along the ash piping corridor outside plant boundary. Additional road as stipulated in Cl. No. 3.3, Vol VI -A.. Section1 may not be required. Please confirm.	Refer Addendum II

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168				It is observed during site visit, a RCC culvert below railway siding is existing, which is designed to discharge the anticipated storm water effluent from the proposed plant area. Please indicate the terminal point of the storm water drainage. We do not envisage any additional flow to be considered other than the proposed plant area (Offsite storm water).	There will be 2 nos. of disposal points for storm water drains. The locations of the same is at bridge no. 17 & 18 of railway siding for 2 X 500 MW unit. The required data will be provided to successful bidder during detail engineering Bidder to consider topography of entire plot area while designing the storm water drainage scheme.
169				Please provide the existing rail layout and proposed rail layout with levels.	Already shown in the Bid plot plan drawing (Rev P3)
170				Water retaining structures and other under ground structures will be designed as per IS 3370 with crack width limiting to 0.1 mm. Please confirm.	All water retaining structures and other under ground structures except filtered water shall be designed with limiting crack width to 0.1 mm.

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RESPONSE TO PRE - BID QUERIES

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VOLUME - VI B

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1	1	2.5.2	Necessary arrangement shall be done by the contractor at his own cost for locating and using the borrow areas as the source of supply of filling materials.	Identification of borrow pits, it's distance from plant boundary, acquisition & right of way shall be in Owner's scope. Please confirm.	Bid specification prevails
2	1	2.5.2	Borrow material...	The sub soil existing at project site, for soils other than clean graded sand, if found suitable, can the same be used for filling / grading.Pl.confirm.	The existing sub soil at site can be used as back fill material provided it does not have any swelling potential and the sub soil shall be tested for use as structural back fill material by the successful bidder as per approval of the Engineer incharge.
3	1&2	2.5.2 & 2.5.2	Borrow Material	Owner to indicate the location/source for borrowed earth.	Bid specification prevails
4	1	3.4	Felling of trees	All statutory clearances & permissions for tree cutting is excluded from bidder's scope. Please confirm.	Confirmed
5	1	3.6.5	Disposal of excess earth	Identification of disposal area, it's distance from plant boundary & right of way/acquisition shall be in Owner's scope. Please confirm.	Identification of disposal area outside plant boundary and right of way is included in bidder's scope

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S. No.	Section No.	Clause No.	Bid Specification Stipulation	Bidder's query/Stipulation	Resolution
6	1& 2	3.6.5 & 3.5.6	Disposal of excavated Surplus material	All surplus material from excavation shall be disposed off within plant boundary. Disposal of surplus earth outside plant boundary is not in the bidder's scope of work. Please confirm.	Disposal of all surplus material within inside & outside plant boundary is included in the bidder's scope.
7	1	3.8.1	Area filling for grading...	The sub soil existing at project site, for soils other than clean graded sand, if found suitable, can the same be used for filling / grading.Pl.confirm.	The existing sub soil at site can be used as back fill material provided it does not have any swelling potential and the sub soil shall be tested for use as structural back fill material by the successful bidder as per aproval of the Engineer incharge.
8	3	3.3	Structural concrete shall be of M30 grade and for other part of the work shall be as shown on the drawing as per grade classification of IS-456. In case of liquid retaining structures, IS:3370 will be followed.	Grade of concrete shall be provided as stipulated in Cl. No. (Vol. VI-A, Section2; Cl. No. 4.1).	Confirmed

BHUSAWAL THERMAL POWER STATION 1X 660 MW UNIT - 6 PROJECT
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Bid Specification No. DG/BSL U-6/2011/T-1, Volume - VI B

S. No.	Section No.	Clause No.	Bid Specification Stipulation	Bidder's query/Stipulation	Resolution
9	22	2.4.1	Gradients: If not specified the minimum gradients of soil and drainage pipe line shall be as follows: (a) 100 mm nominal dia : 1 in 35 (b) 150 mm nominal dia : 1 in 65 (c) 230 mm nominal dia : 1 in 120 (d) 300 mm nominal dia : 1 in 200	The minimum gradients of soil and drainage pipes will be provided such that minimum self-cleansing velocity (0.75 m/sec.) is obtained.	Bid specification prevails
10	22	Annexure-I	List of Civil Units: (a) Inlet Chamber (b) Manual Screen Chamber (c) Sanitary Water Storage tank (d) Grit Chamber (e) Fine screen chamber (f) Aeration tank (g) MBR Tank (h) Sludge Holding Tank (i) Chemical House	Civil units/items will be decided based on the Sewage Treatment Plant vendor requirements. Please confirm.	Given list is indicative but should not be limited to. Sludge thickener & Centrifuge are also deemed to be included in the given list.
11	22	Annexure-I	Sewage treatment plant cap	No. of users to be considered is 1500, where as as per Volume VI A, Section 1, cl 4.18.2, page 163 of 639, no. of users is 650. Pl clarify.	Follow specification Volume VI A, Section 1, cl 4.18.2, page 163 of 639, no. of users is 650.

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S. No.	Section No.	Clause No.	Bid Specification Stipulation	Bidder's query/Stipulation	Resolution
12	ADDENDU M- I	2.4	The distance from the existing river water pump house to the 1 x 660 MW unit (Unit # 6) is approximately 3 km. The proposed pipe line from Tapi river water pump house shall join the line coming from Ozerkheda near one day reservoir for 1 x 660 MW. The scope under this addendum covers the two numbers of intake water pumps and connecting pipework from river water pump house to the one day reservoir for 1 x 660 MW.	For laying of raw water pipeline and all associated civil works request you to kindly provide us the survey report & bore log details of the pipe route. In absence of the above reports the same would be excluded from our scope of work. Please confirm. Further for raw water intake, it's right of way & all statutory permissions & clearances shall be in Owner's scope. Please confirm.	ADDITIONAL WATER SOURCING as per Addendum -I is deleted from the scope , hence not applicable.
13	ADDENDU M- I	9.3	For crossing of the pipe lines with nallahs, rivers, canals etc, pipe shall be laid over RCC supports and bottom of pipe shall be kept at 0.5 m above H.F.L.	Please provide the HFL of the pipe corridor area.	ADDITIONAL WATER SOURCING as per Addendum -I is deleted from the scope , hence not applicable.

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RESPONSE TO PRE - BID QUERIES

Bid Specification No. DG/BSL U-6/2011/T-1

VOLUME - VII A1

BHUSAWAL THERMAL POWER STATION 1X 660 MW UNIT - 6 PROJECT					
PRE-BID QUERIES					
Bid Specification No. DG/BSL U-6/2011/T-1 "Volume-VII A1					
Sr . No	Section No.	Clause No.	Bid Specification Stipulation	Bidder's query/ Stipulation	Resolution
1	101 P2 (PLOT PLAN)		Railway crossings	Proposed Pipe rack towards fly ash silo which is shown in the plot plan is crossing the railway lines. Please confirm whether enough space is available in between railway lines for laying of pipes with structural supports.	Bid Specification prevails.
2	Plot Plan		Engineering reference drawings	Please provide all the engineering reference drawings mentioned in the plot plan.	These are not required for bidder
3	Plot Plan	-		As per plot plan, from farthest ESP to remote area silo distance is approximately 850 m to 900 m. Request to revisit the silo location. Single stage pressure conveying system is installed upto approximately 700 m to 750 m. In this context we would like to shift the silo location towards ESP area. Request to check and confirm.	Bid Specification prevails.

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PRE-BID QUERIES					
Bid Specification No. DG/BSL U-6/2011/T-1 "Volume-VII A1					
Sr . No	Section No.	Clause No.	Bid Specification Stipulation	Bidder's query/ Stipulation	Resolution
4		PE-189-GA-101 Rev P2 (General) 6.1.1 6.2.5 Criteria for Layout (Annexure-B) Sr No. 2.4.1 Specific Layout considerations (Annexure-D) Sr No. 20.0	All rail/road crossings for pipe/cable racks shall be done with minimum Seven (7) meters headroom from top of rail/road to bottom of rack. Similarly, top cover over underground pipes/cables shall be minimum one (1) meter. Vol II - Section 4 Fuel Oil (F.O.) piping shall be routed over trestles. The headroom for F.O. trestle in Boiler/ESP/ID fan/Chimney area shall be 8.0 M till the road behind chimney and 7.0 M in CD bay area. The headroom for F.O. trestle in outlying area shall be 3.0 M except at rail/road crossing where the headroom shall be 8.0 M. Under pipes/Cable racks at road crossings:- 8.0 Meters Head Room for pipe/cables trestles at rail, road crossing 8.0 M	We suggest that instead of 8 meters, the required Headroom over Road/Rail crossings shall be minimum 7 meters per Clause-6.1.1 of Vol-II Section-4. Please confirm.	Bid Specification prevails.
5		Drg no PE-189-GA-106	Vol II - Section 4 TG Building - Deaerator roof	We propose that Deaerator shall be without roof.	Bid Specification prevails.

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PRE-BID QUERIES					
Bid Specification No. DG/BSL U-6/2011/T-1 "Volume-VII A1					
Sr . No	Section No.	Clause No.	Bid Specification Stipulation	Bidder's query/ Stipulation	Resolution
6	117 P1 (COAL HANDLING PLANT)		GA Drawing of GHP & Conveyor 8 i.e SEC H-H	Please furnish GA drawing of GHP and Conveyor 8 i.e Sec H-H since same is not available with the specifications.	Refer Dwg.PE-189-GA-120
7	117 P1 (COAL HANDLING PLANT)		Stock pile dimensions	Since the no. of hours working of CHP and no. of days for coal stock is not mentioned, we consider the coal stock pile dimensions, 270X 50X 11 m3 as specified in the plot plan. Please confirm.	Confirmed
8	Drg no PE-189-GA-118,119		Tunnel Cross section and typical gallery cross section for single and double gallery	Tunnel Cross section and typical gallery cross section for single and double gallery to be decided based on belt width. Please review & confirm the sizes.	Drawing is being amended
9	Drg no PE-GA-120-118		TP 3: Top Floor height shown as 4 m	Since ILMS will be provided at head end of conv 3A/B, 4 m height is not sufficient.	Bidder shall optimize as per the space requirement for ILMS
10	Drg no PE-189-GA-120		Ground hopper for conv 8	Please furnish hopper size/capacity required.	Hopper shall be sized for 150 tons capacity
11	Drawing no.PE-189-PI-125		General Arrangement: Fuel oil Transfer pump house	Fuel oil transfer pump house sizing shall be as per actual requirement.Pl.confirm.	Bid specification prevails.
12	Drawing no.PE-189-PI-126		General Arrangement: HFO & LDO DAY Tank Area	Dyke area shall be provided as per OISD 118. Pl.confirm.	Bid specification prevails.

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PRE-BID QUERIES					
Bid Specification No. DG/BSL U-6/2011/T-1 "Volume-VII A1					
Sr . No	Section No.	Clause No.	Bid Specification Stipulation	Bidder's query/ Stipulation	Resolution
13	16		Service building GA PE-189-GA-136	No switchgear room is shown in the GA.	In case of switchgear room located in ground floor, the cable vault to be provided in the basement (Minimum 3.5m height) as per bid specification
14	General Arrangement - Service Building (Fourth Floor and Roof), PE-189-GA-138, Rev P0			As shown in the Bid drawings, AC Plant AHU room is provided in Service building roof at EL(+) 21.250 m. Considering the occupancy of this building, air distribution in each floor will be high and it will not be possible to distribute air from roof to all floors. Hence, it is proposed to provide air handling units/rooms in all floors of the building. Further, this will provide operational flexibility also. In view of the above, service building layout is expected to change during detailed engineering.	Bid specification prevails.
15	General Arrangement - Service Building (Fourth Floor and Roof), PE-189-GA-138, Rev P0		No switchgear room is shown in the GA.	We are considering switchgear room for Service building in ground floor. In case of switchgear room located in ground floor, the cables will be routed using cable trench. Please confirm.	In case of switchgear room located in ground floor, the cable vault to be provided in the basement (Minimum 3.5m height) as per bid specification

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RESPONSE TO PRE - BID QUERIES

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VOLUME - VII A2

BHUSAWAL THERMAL POWER STATION 1X 660 MW UNIT - 6 PROJECT
PRE-BID QUERIES
Bid Specification No. DG/BSL U-6/2011/T-1 "Volume-VII A2"

Sr . No	Section No.	Clause No.	Bid Specification Stipulation	Bidder's query/ Stipulation	Resolutions
1	PE-189-PF-201 Note-1		 Bidder shall develop detailed P&IDs meeting the overall intent of the scope and performance and furnish as part of proposal.	We would like to clarify that P&IDs shall not be provided with bid proposal and to be submitted during detailed engineering stage.	Bid Specification prevails
2	PE-189-PF-201 B3 & B8		Pneumatically operated spray control valves for HP & LP turbine bypass are shown.	We would like to clarify that if hydraulically operated HP & LP turbine bypass station is envisaged, all valves including steam and spray control valves shall be hydraulically operated.	Specification is self-explanatory.
3	PE-189-PF-201 B3 & E3		Manual bypass globe valve with upstream and downstream isolation valves for spray control valve of HP turbine bypass are shown.	We would like to clarify that no manual bypass valve with upstream and downstream isolation valves for spray control valve of HP turbine bypass are provided.	Bid Specification prevails
4	PE-189-PF-201		Double lead / pipe line for MS, HRH & CRH line are shown.	We understand that option of both single and double lead / pipe lines for MS, HRH & CRH are available with bidders.	Bid Specification prevails
5	PE-189-PF-201 B4 & A7		Warm-up line for HP & LP turbine bypass valves.	We would like to clarify that warm-up arrangement shall be provided if required as per manufacturer's standard practice.	Bid Specification prevails
6	Volume VII A2/ Drawing no : PE-189-PF-201		2 x 100% - HP Bypass Valves 2 x 50% - LP Bypass Valves	We propose 1 x 100% HP Bypass Valves and 2 x 50 % LP bypass valve system. Kindly confirm the acceptance for the same.	Bid Specification prevails

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Sr . No	Section No.	Clause No.	Bid Specification Stipulation	Bidder's query/ Stipulation	Resolutions
7	PE-189-PF-202 & 203		In PF-202 one control station is shown before LP htr 1 and one after LP htr 4.	Please clarify the purpose of two control stations. Normal practice is to provide single control station before LP heater #1.	Agreed that two control stations are not required
8	PE-189-PF-202		Dosing point shown after CPU outlet.	Dosing point should be just outlet of CPU to enable alkaline water should go to various make up and auxiliary cooling requirement.	Drawing is self- explanatory.
9	PE-189-PF-202		Common normal and emergency make up lines.	As per tender PFD there is duplication of control stations on emergency and normal make up line for better controllability and operatability we propose following, 1. Separate lines for normal (from DM plant) and emergency make up (From CST) shall be provided each having individual control station. 2. Both the emergency and normal make up lines shall directly feed to condenser and additional control station (as per tender PFD) shall not be provided.	Agreed
10	PE-189-PF-202 B5		Valve sealing, hydrazine, ammonia & sodium hydroxide dosing tapping are taken from CST discharge header.	These tapping shall be taken from CEP discharge.	Agreed
11	PE-189-PF-202 B8		Normal make-up water is shown connected from CST.	We would like to clarify that only emergency make-up shall be provided from CST and normal make-up shall be provided from DM water storage tank.	Bid Specification prevails

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Sr . No	Section No.	Clause No.	Bid Specification Stipulation	Bidder's query/ Stipulation	Resolutions
12	PE-189-PF-202 B9		Normal make-up control valves and emergency make-up control valve in parallel with downstream level control valve in series connected to hotwell via common pipe line.	We would like to clarify that separate lines shall be provided for normal make-up control valve from DM water storage tank to hotwell and emergency make-up control valve from CST to hotwell. No additional level control valve as shown in customer PFD is envisaged.	Will be evaluated after receipt of detailed scheme by bidder.
13	PE-189-PF-202 D3		Boiler fill pumps are connected to condensate storage tank for boiler initial and deaerator filling.	We would like to clarify that boiler fill pump shall be connected to DM water storage tank for boiler initial filling and deaerator filling.	Bid Specification prevails
14	PE-189-PF-202 D8		Separate LP heater 1 and 2 with separate LP heater 1 drain cooler.	Please note that low pressure heaters 1 & 2 are duplex type and located in condenser neck as per standard and proven practice of the Bidder. Since the heat balance cycle is optimised without drain cooling zone as bidder's standard practice, separate external drain cooler is not required for this LP heater in condenser neck.	Bid Specification prevails
15	PE-189-PF-202 D9		CEP individual minimum flow recirculation along with GSC common minimum flow recirculation line are shown.	GSC-cum-CEP common minimum flow recirculation line is sufficient for all CEP protection. No CEP individual minimum flow recirculation line is envisaged.	Bid Specification prevails

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PRE-BID QUERIES
Bid Specification No. DG/BSL U-6/2011/T-1 "Volume-VII A2"

Sr . No	Section No.	Clause No.	Bid Specification Stipulation	Bidder's query/ Stipulation	Resolutions
16	PE-189-PF-202 E4, F6, C5, C8		Motorised bypass ball valves with upstream and downstream manual isolation valves are shown for condensate control valve, condenser level control valve, normal make-up valve, emergency make-up valve, GSC & CEP minimum recirculation valve.	We would like to clarify that these are highly reliable control valves carefully selected with all operating conditions for the process control. As per Alstom standard practice and operation concepts, manual operation or control of the plant with motorised ball valves is detrimental to the safety of the plant and not recommended. Hence request you to delete these motorised bypass ball valves with upstream and downstream isolation valves.	Agreed
17	PE-189-PF-202 E4		Main condensate control station is 2 x 100% pneumatic control valve and 1 x 100% motorized ball valve.	We would like to clarify that condensate level control valves shall be 1 x 30% + 1 x 100% capacity pneumatic control valve for better controllability during start-up and normal operation of the plant. No motorised bypass valve is envisaged as explained above.	Bid Specification prevails
18	PE-189-PF-202 F4		Motorized bypass valve with upstream and downstream motorised isolation valves are shown for condensate polishing unit.	We would like to clarify that individual vessel isolation valves with complete CPU bypass valve shall be provided as per CPU supplier's standard practice and shall be in CPU supplier's scope. Hence no separate CPU motorized bypass valve with upstream and downstream motorised isolation valves are envisaged.	Bid Specification prevails
19	PE-189-PF-202 F7		Motorized bypass valve with upstream and downstream motorised isolation valves are shown for gland steam condenser.	As per Alstom standard and proven practice, GSC motorized bypass valve with upstream and downstream motorised isolation valves are envisaged.	Bid Specification prevails

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Sr . No	Section No.	Clause No.	Bid Specification Stipulation	Bidder's query/ Stipulation	Resolutions
20	PE-189-PF-202 G8		As per tender PFD, CEP sealing and wet steam washing line are shown after GSC.	We would like to clarify that as per equipment supplier's standard practice no Cep sealing and wet steam washing is required.	CEP sealing shall be provided.
21	PE-189-PF-202 G9		As per tender PFD, control valve in tapping line from CEP discharge header for vacuum pump make-up, valve gland sealing, BFP turbine exhaust hood spray and drain cooler loop seal make-up etc.	We would like to clarify that no such control valve is envisaged for these water lines as shown in customer PFD. Also clarify that no drain cooler loop seal make-up is required.	Bid Specification prevails
22	PID no. PE-189-PF-202		Motorised valve provided at the inlet, outlet and bypass of Gland Steam Condenser	As per standard practice, Isolation valves are always kept open. Hence, motorisation of these valves is not required. Isolation and bypass for GSC shall be manual with locked open/closed facility. Please confirm.	Bid Specification prevails
23	PID no. PE-189-PF-202		Motorised valve provided at the inlet, outlet and bypass of Condensate Polishing Unit	As per standard practice , motorised valves at the inlet, outlet and bypass of CPU are provided integral with CPU package. Hence, these valves are not required on condensate discharge line.please confirm.	Bid Specification prevails
24	PID no. PE-189-PF-202		Non return valve provided in LPH-1 bypass line	As per standard practice non return valve is already provided in condensate discharge header upstream of main condensate control station. NRV indicated in LPH-1 bypass line is not needed. Please confirm.	Agreed.

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Sr . No	Section No.	Clause No.	Bid Specification Stipulation	Bidder's query/ Stipulation	Resolutions
25	PFD (PE-189-PF-203)		FW Control Station location	We propose FW control station to be located upstream of HP heaters	Agreed.
26	PE-189-PF-203 A1		Motorised on-off valve at economiser inlet is shown.	Employer to note that the feed check valve shall be located at the downstream of the HP heaters. However there is no requirement to provide an isolation valve at such location as per Bidder's standard & proven practice. It shall be further noted that as per IBR amendment dated March 12, 2007 to regulation 520, feed water discharge piping for feed water system without economizer inlet isolating valve can be designed. Hence request you to delete this motorised on-off valve at economiser inlet.	MOV at Economiser inlet may be deleted if the system design does not require it.
27	PE-189-PF-203 A6		Two stage attemperation system for superheaters is shown.	Bidder would like to clarify that single stage desuperheating station shall be provided as per Alstom standard and proven practice.	Bid Specification prevails
28	PE-189-PF-203 C3		Feed water regulating station at downstream of HP heater.	We would like to clarify that feed control station along with necessary isolation valve at economiser inlet (downstream HP heaters) is shown which shall be located upstream of the HP Heaters (after BFPs) as per Bidder's standard & proven practice. This will substantially reduce design pressure of the feed water piping and HP heaters and same shall be designed corresponding boiler economiser design pressure instead of BFP shut off head. Kindly accept.	Agreed.
29	PE-189-PF-203 G1		Condensate level control station upstream of deaerator is shown.	Please delete this condensate level control station upstream of deaerator as condensate level control station is already shown in PE-189-PF-202. This additional level control valve is not required.	Agreed

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Sr . No	Section No.	Clause No.	Bid Specification Stipulation	Bidder's query/ Stipulation	Resolutions
30	PE-189-PF-203		1 x 100% HP Feed Heaters with individual motorised bypass & isolation valves are shown.	Please note that Bidder intends to offer either twin stream i.e. 2 x 50% HP feed water heaters with medium operated 3-way bypass valves at upstream and downstream of each train of heater (the bypass line of each train shall be 50% feed water flow capacity) or single stream i.e. 1 x 100% HP feed water heaters with medium operated 3-way bypass valve at upstream and downstream of each heater (the bypass line of train shall be 100% feed water flow capacity). These media operated 3-way valves ensures quick bypassing of HP heaters in case of tube leakages. In this case, motorized isolation valves at upstream and downstream of HP heaters and in bypass line are not required. Bidder confirms that there are many Alstom built plants worldwide which are in successful operation with same philosophy.	2 x 50 % heater trains agreed; rest to be taken up during bid evaluation.
31	PID no. PE-189-PF-203		Control station indicated near Deaerator in condensate inlet line	As per standard practice control station at this location is not required. Please confirm.	Agreed.
32	PID no. PE-189-PF-203		Arrangement of and around HP heaters	As per standard practice followed for supercritical units, all HP Heaters shall be of 2x50% capacity, arranged in 2x50% HP Heater banks provided with string bypass. Spring loaded bypass shall be provided for each heater bank.please confirm.	2 x50% heaters agreed; rest of the scheme will be evaluated during bid evaluation.

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Sr . No	Section No.	Clause No.	Bid Specification Stipulation	Bidder's query/ Stipulation	Resolutions
33	PID no. PE-189-PF-203		Location of Feed Control Station	As per standard practice followed for supercritical units, feed control station shall be located in BFP discharge line upstream of HP heaters and there shall be no isolating valve at boiler inlet. This meets IBR requirement. Please confirm.	Agreed
34	Process Flow Diagram - Feedwater System, PE-189-PI-203		Feed control station downstream of HP Heaters.	Boiler feed discharge pipe line downstream of feed control station shall be designed for maximum pressure expected from Steam generator side and not for BFP shut-off head. Feed control station shall be located upstream of HP heaters.	Agreed.
35	PE-189-PF-204		Extraction points for heaters	Location of extraction points shall be as per optimised design of bidder.	Specification is self-explanatory.
36	PE-189-PF-204		HP heaters 2 and 3 drain to deaerator	HPH3 and HPH2 emergency drain lines to condenser shall be provided. Separate emergency drain lines from these Heaters to deaerator as per tender PFD are not required and hence not envisaged. Please confirm.	Will be evaluated after receipt of detailed scheme by bidder.

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Sr . No	Section No.	Clause No.	Bid Specification Stipulation	Bidder's query/ Stipulation	Resolutions
37	PE-189-PF-204 G5 & G10		HP & LP drain flash tank for heater drains.	Owner to note that for all the drains which are routed to the condenser hotwell, instead of providing separate HP & LP flash tanks, Bidder shall provide flash boxes which shall be attached to the condenser as per standard and proven practice of the Bidder. Kindly accept.	Bid Specification prevails
38	PE-189-PF-204		Nos. and type of NRVs on turbine extraction lines.	NRVs in each extraction line will provided as per bidder's safety guidelines and standard proven practice. Please confirm acceptance of bidder's standard proven practice.	Bid Specification prevails
39	PID no. PE-189-PF-204		HP heater drains being led to deaerator	Drains from HP heaters shall be led to the next lower pressure heater, while the drain from the lowest pressure HP heater shall be led to deaerator. Alternate drain from all heaters shall be led to condenser. Please confirm.	Agreed
40	PID no. PE-189-PF-204		Spray line from CEP discharge to LP drain flash tank	As per standard practice spray connection for LP drain flash tank is not required, please confirm.	Bid Specification prevails
41	PID no. PE-189-PF-204		Non return valves indicated in various extraction lines	Non return valves in various extraction lines shall be provided as per turbine manufacturer's recommendations and turbine integral schemes. Please confirm.	Bid Specification prevails

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Sr . No	Section No.	Clause No.	Bid Specification Stipulation	Bidder's query/ Stipulation	Resolutions
42	PE-189-PF-205		High temperature and low temperature auxiliary steam header pressure temperature.	Bidder would like to clarify that high temperature auxiliary steam header pressure & temperature considered by us is 16 kg/cm2 and 310 deg C and low temperature auxiliary steam header pressure & temperature considered by us is 16 kg/cm2 and 210 deg C. Please confirm.	The scheme will be evaluated based on comprehensive data regarding the steam consumption requirement at the operating regimes expected.
43	PID no. PE-189-PF-205		Motorised isolation valve indicated in MS & CRH tap-off for Aux. PRDS	As motorised isolation valve is being provided on the upstream of high capacity pressure reducing valve (drawing steam from MS) and low capacity pressure reducing valve (drawing steam from CRH), additional motorised isolation valve in the tap-offs is not required. Please confirm.	Specification is self-explanatory.
44	Drg. no. PE-189-PF-226 Process Flow Diagram Coal Handling System		The Process Flow Diagram Coal Handling System Drg. no. PE-189-PF-226, travelling tripper TTR 1, 2, 3, 4, and Conveyor 5A,5B,6A,6B are provided with One way chute & end discharge Chute is provided at discharge end	In Travelling Tripper Motorized Two way discharge chute is required. Please Confirm.	Bid specification prevail.
45	226 P1 (COAL HANDLING SYSTEM)		GHP-Grizzle Hopper	We understand Grizzly hopper is a hopper which is having grating on the top of hopper.	Confirmed

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Sr . No	Section No.	Clause No.	Bid Specification Stipulation	Bidder's query/ Stipulation	Resolutions
46	226 P1 (COAL HANDLING SYSTEM)		Only Rod gate has been shown below the GHP in the coal flow diagram	Since Rack & pinion gate is required below the GHP along with the rod gate and also spares for rack & pinion gate were given in the spares list so we will consider rack & pinion gate in our offer. Please confirm your acceptance.	Confirmed
47	PE-189-PF-226 / P1 Process Flow Diagram : Coal Handling System		Reversible Belt Feeder-1 & 2 and Belt Feeder in crusher house.	Reversible Belt Feeder-1 & 2 and Belt Feeder in crusher house are shown. Please recheck whether these are required or not. We feel Reversible Belt Feeder-1 & 2 and Belt feeder both are not required and unnecessarily building height will increase.	Self explanatory
48	PE-189-PF-226 / P1 Process Flow Diagram : Coal Handling System		Vibrating screen is listed with the symbol in the Legend table.	Vibrating screen is no where located in the coal flow diagram but it is listed in the legend table. Please confirm the location of Vibrating screen if it is required.	Not required.

BHUSAWAL THERMAL POWER STATION 1X 660 MW UNIT - 6 PROJECT
PRE-BID QUERIES
Bid Specification No. DG/BSL U-6/2011/T-1 "Volume-VII A2"

Sr . No	Section No.	Clause No.	Bid Specification Stipulation	Bidder's query/ Stipulation	Resolutions
49	Vol-VII-A1, Drg no. PE-189- PF-226		Additional Belt Weigh Scale BW-5 Metal Detector MD-1 & MD-2 Additional Metal detectors MD-3 & MD-4 (Proposed) Magnetic Separators ILMS-3 Bunkers. Fixed tripper FTR-1 & FTR-2, Travelling tripper TTR-3 & TTR-4, transfer point TP-5, conveyor CC-5A & 5B and CC-6A & 6B.	BW-5 are required for the CC-8. Please confirm. Position of metal detector are replaced from CC-4A & 4B to CC-3A & CC-3B. Addition Metal Detectors MD-3 & MD-4 are included in scope of supply as the material before feed to crusher should not contain any metal particles. Please confirm. ILMS-3 has been excluded from scope of supply as the same is not required. Six (6) Nos. of bunkers are envisaged for this project and shall be located in the front of the boiler. These fixed trippers, travelling trippers and conveyors would not be required since the layout is based on front mill arrangement.	Confirmed Bid Specification prevail Bid Specification prevail Bid Specification prevail Bid Specification prevail Bid Specification prevail

BHUSAWAL THERMAL POWER STATION 1X 660 MW UNIT - 6 PROJECT
PRE-BID QUERIES
Bid Specification No. DG/BSL U-6/2011/T-1 "Volume-VII A2"

Sr . No	Section No.	Clause No.	Bid Specification Stipulation	Bidder's query/ Stipulation	Resolutions
50	Coarse Ash P&ID No. PE-189-PI-238, P1		Wet system with feeder ejector/Chimney ash tank/Jet pump	Ash collection in Chimney hopper being extremely low & of very fine nature, we recommend Stack hopper ash conveying in dry mode similar to ESP ash which will reduce water consumption & remove wet system equipment making the system cost effective. Please confirm acceptance.	Bid Specification prevail
51	Dwg No. PE-189-PI-242, P1	-		No. of bottom ash slurry pumps in series shall be decided based on system requirement and not as per the no. of ash slurry pumps indicated in the flow diagram. Please confirm.	Bid Specification prevail
52	flow diagram PE-189-PI-242, P1	-		Control valve in the ash slurry disposal system is not advisable. Please check and confirm the requirement.	
53	Process flow diagram - PE-189-PI-250 P0 _Effluent Treatment System (Zone M-5)		Plant rainfall runoff skid	Please confirm requirements of Plant rainfall runoff skid as no data and description is mentioned in Volume:III-E-1 water treatment system about Plant rainfall runoff skid. Please provide datasheet for the sump and pump.	Required details will be provided to the successful bidder during detail engineering

BHUSAWAL THERMAL POWER STATION 1X 660 MW UNIT - 6 PROJECT
PRE-BID QUERIES
Bid Specification No. DG/BSL U-6/2011/T-1 "Volume-VII A2"

Sr . No	Section No.	Clause No.	Bid Specification Stipulation	Bidder's query/ Stipulation	Resolutions
54	Drawing no.PE-189-PI-252		P & ID Fuel oil transfer, storage, heating and forwarding system	As per tender specifciation, a tapping from existing LDO tank is to be taken for filling proposed day oil tanks. We understand that the instruments indicated in the P&ID are already installed on tanks and none are to be provided by the bidder for existing tanks. Pl confirm. Further, we understand that a separate nozzle is available in the existing LDO tank for filling the proposed day oil tank. Pl. confirm.	Bidder shall collect the data from site.
55	Drawing no.PE-189-PI-252		P & ID Fuel oil transfer, storage, heating and forwarding system	Drain oil tank is used for draining of transfer pump. As there are both LDO and HFO transfer pumps in the system, drain oil tank will contain both LDO and HFO. As no heating facility is available in LDO storage tank. Hecne, it is not advisable to transfer oil from drain oil tank to LDO storage tank and oil from drain oil tank will be connected to HFO tank only. Pl confirm.	The schemes will be evaluated based on comprehensive data regarding the steam consumption requirement at the operating regimes expected.
56	Drawing no.PE-189-PI-252		P & ID Fuel oil transfer, storage, heating and forwarding system	since Rack & pinion gate is required below the GHP along with the rod gate and also spares for rack & pinion gate were given in the spares list so we will consider rack & pinion gate in our offer.	Agreed

BHUSAWAL THERMAL POWER STATION 1X 660 MW UNIT - 6 PROJECT
PRE-BID QUERIES
Bid Specification No. DG/BSL U-6/2011/T-1 "Volume-VII A2

Sr . No	Section No.	Clause No.	Bid Specification Stipulation	Bidder's query/ Stipulation	Resolutions
57	Drawing no.PE-189-PI-252		P & ID Fuel oil transfer, storage, heating and forwarding system	As indicated in P&ID, oil water separator tank along with oil water mixture collection tank which are to be provided is not clear. Customer to note that a gravity type oil water separator is provided for collection of oil water drain from the fuel oil handling area (In this case it is dyke area). Oil from oil water separator will be pumped back to the HFO day tank and water remains shall be discharged to plant drain. Customer to confirm.	Will be evaluated after receipt of detailed scheme by bidder.
58	P&ID For Fuel Oil Handling System, PE-189-PI-252		Return Oil Cooler	We understand that return oil cooler is required in the HFO return line even though it is not specified. Please clarify the scope of same.	Bidder shall consider as required.
59	General			Valves, instruments, scheme, accessories, specialties, etc. shown in P&IDs/Flow diagrams attached with specification are considered for reference. Valves, instruments, scheme, accessories, specialties will be decided during detailed engineering based on system requirement. Please confirm.	Specification is self-explanatory.

BHUSAWAL THERMAL POWER STATION 1X 660 MW UNIT - 6 PROJECT

RESPONSE TO PRE - BID QUERIES

Bid Specification No. DG/BSL U-6/2011/T-1

VOLUME - VII B

BHUSAWAL THERMAL POWER STATION 1X 660 MW UNIT - 6 PROJECT**PRE-BID QUERIES****Bid Specification No. DG/BSL U-6/2011/T-1 "VOLUME-"VII-B"**

Sr . No	Volume / Section	Clause No.	Bid Specification Stipulation	Bidder's query/ Stipulation	Resolution
ELECTRICAL					
1	PE-189-EL-501 Key Single Line Diagram	PE-189-EL-501 Key Single Line Diagram	PE-189-EL-501	Quantity & Rating : Quantity & Rating shown in the SLD considered for tender purpose only & not considered as minimum requirements. Master Single line diagram will be prepared during detail engineering, showing the actual quantity & rating required for Power & LT Transformers, HT Switchgears, LT PCC/PMCC/MCC/, IPBD, SPBD, NSPBD, HT & LT Motors, Lighting Transformer, ACDB, DCDB, MLDB, ELDB, DB, HT Cables, LT Cable, Control Cable, FS Cable, Battery & Battery Charger etc., with respect to the distribution scheme, geographical layout, load centres & as per the system requirement. Rating of each equipment will be substantiated with suitable calculation.	Bid Specification prevails
2	PE-189-EL-501 Key Single Line Diagram	PE-189-EL-501 Key Single Line Diagram	12 nos. dry type LT Transformers connected to 6 nos. of ESP LT PMCC by NSPBD & LT Transformers shall be fed from 11kV ESP switchgear feeder 6 nos. from each bus section of 11kV ESP switchgear through cables. 11kV ESP Switchgear shall be fed from 11kV Unit Switchgear 1 & 2	We confirm that adequate rating/quantity of 11/0.433kV ESP LT Transformers shall be provided & the same shall be connected to ESP LT PMCCs for feeding ESP loads. This ESP LT Transformers shall be fed from each 11kV Unit Switchgear.	Refer to corrigendum-II, & revised Key Single Line Diagram (PE-189-EL-501(P3))

BHUSAWAL THERMAL POWER STATION 1X 660 MW UNIT - 6 PROJECT**PRE-BID QUERIES****Bid Specification No. DG/BSL U-6/2011/T-1 "VOLUME-"VII-B"**

Sr . No	Volume / Section	Clause No.	Bid Specification Stipulation	Bidder's query/ Stipulation	Resolution
3		PE-189-EL-501	Lightning arrestor in SPBD connection to 11kV Station and Unit boards	Lightning arrestors on HV side of the GT & ST will be provided. Since BIL at 11kV side is already suitable for 75kVp, no Lightning arrestor is required in SPBD connection from Unit transformer and Station transformer to 11kV Station and Unit boards respectively.	Bid Specification prevails
4		PE-189-EL-501	Key SLD drawing.	We understand that electrical supply for Railway electrification shall be provided by Owner	Bid Specification prevails
5		PE-189-EL-501	Dry type station LT Aux. transformer.	We shall envisage dry type station LT Aux. transformer for power house area. Oil filled transformers shall be used for all other areas including transformers for ESP PMCC.	Bid Specification prevails
6		PE-189-EL-501 Note-1	"All ratings indicated in the drawings are the minimum required & tentative, exact rating of the same shall be decided by the vendor during detail engineering stage with owner's approval."	We propose that minimum rating of all equipment will be selected as per load requirement & associated sizing calculation	Bid Specification prevails
7		PE-189-EL-501		Spare motor feeder in 11kV Station switchgear is same as spare feeder for MDBFP	Confirmed

BHUSAWAL THERMAL POWER STATION 1X 660 MW UNIT - 6 PROJECT**PRE-BID QUERIES****Bid Specification No. DG/BSL U-6/2011/T-1 "VOLUME-"VII-B"**

Sr . No	Volume / Section	Clause No.	Bid Specification Stipulation	Bidder's query/ Stipulation	Resolution
8		PE-189-EL-501	11kV fire water and raw water Switchgear, 415V FW PMCC and 415V Raw water PMCC	We propose to remove 11kV fire water and Raw water Switchgear. Transformers SAT-7 & 8 for 3.3kV fire water and Raw water Switchgear shall be directly fed from 11kV Station Switchgear. Also, 415V FW PMCC and 415V Raw water PMCC shall be merged. SLT-21 & 22 shall be removed. SLT-17 & 18 shall be directly fed from 11kV Station Switchgear.	Bid Specification prevails
9		PE-189-EL-502	3.3kV, 40kA for 3 Sec.	The fault rating shall be finalized as per load data, transformer data viz. as per system study calculation. 40kA cannot be considered as the minimum rating.	Bid Specification prevails
10		PE-189-EL-502	IPBD	IPBD continuous current rating and CT ratio shall be as per approved sizing calculation. Minimum Primary rating cannot be fixed as 26kA.	Bid Specification prevails
11		PE-189-EL-503	5A CT secondary for GT differential protection	1A CT secondary shall also be acceptable for GT differential protection.	Bid Specification prevails
12		PE-189-EL-503	Spare CT in Generator neutral	Spare CTs shall be provided loose. It would not be mounted onto generator neutral side.	Bid Specification prevails
13		PE-189-EL-503	175KVA NGT	Minimum rating of NGT shall be as per approved sizing calculations and not 175kVA.	Bid Specification prevails

BHUSAWAL THERMAL POWER STATION 1X 660 MW UNIT - 6 PROJECT**PRE-BID QUERIES****Bid Specification No. DG/BSL U-6/2011/T-1 "VOLUME-"VII-B"**

Sr . No	Volume / Section	Clause No.	Bid Specification Stipulation	Bidder's query/ Stipulation	Resolution
14		PE-189-EL-509	ST and SATs are shown in east side of TG building.	Please provide confirmation that shifting of STs and SATs from east side of TG building to west side i.e. in front of service building is acceptable to MAHATRANSCO.	Bid Specification prevails
15		PE-189-EL-517	Earth mat is indicated in CW Pump house area.	Please note for BOP area would only have peripheral earthing as per IEEE 665.	Confirmed only for CW area. Other BOP area as per Bid specification
16		PE-189-EL-517	Illumination, Grounding & Lightning Protection zones in Power Plant EPC contractor's scope.	We understand that only hatched areas are to be considered for Illumination & Lightning	Drawing amended indicating hatching. Illumination, Grounding & Lightning Protection zones in entire Power Plant (EPC contractor's scope).
17		PE-189-EL-521	Wall separation between HT & LT Switchgears is indicated in the drawing.	We propose that no wall separation is required between HT & LT Switchgears.	Confirmed.

BHUSAWAL THERMAL POWER STATION 1X 660 MW UNIT - 6 PROJECT

RESPONSE TO PRE - BID QUERIES

Bid Specification No. DG/BSL U-6/2011/T-1

VOLUME - VII C

BHUSAWAL THERMAL POWER STATION 1X 660 MW UNIT - 6 PROJECT**PRE - BID QUERIES****Bid Specification No. DG/BSL U-6/2011/T-1 VII C**

Section No	Clause No	Bid Specification	Bidders query/ Stipulation	Resolution
PE-189-IN-SK-8001 P1 CONTROL SYSTEM ARCHITECTURE		Controller Configuration	Controller Configuration will be as per ALSTOM's standard proven validated practice for all the power plants globally. Please confirm the acceptance.	Control system architecture is indicative only. Controller Configuration/grouping shall be per cl.no.5.3.27/section V/volume V

BHUSAWAL THERMAL POWER STATION 1X 660 MW UNIT - 6 PROJECT

RESPONSE TO PRE - BID QUERIES

Bid Specification No. DG/BSL U-6/2011/T-1

VOLUME - III A

Bhusawal Thermal Power Station 1 x 660 MW Unit - 6 Project Pre - Bid Queries Bid Specification No. DG/BSL U-6/2011/T-1 Volume-III-A					
Sr. No.	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Revised Resolution
49	1	5.7.2	Primary reheat steam temperature control system shall utilise the tilting of burners.	Our offer envisages opposed wall firing with gas biasing dampers at economiser outlet in the divided backpass for Reheat steam temperature control.	Refer Corrigendum-IV
50		22.1.1	Arrangement of burners : Corner fire with Tilting arrangement		

BHUSAWAL THERMAL POWER STATION 1X 660 MW UNIT - 6 PROJECT

RESPONSE TO PRE - BID QUERIES

Bid Specification No. DG/BSL U-6/2011/T-1

VOLUME - III D

Bhusawal Thermal Power Station 1 x 660 MW Unit - 6 Project**Pre - Bid Queries****Bid Specification No. DG/BSL U-6/2011/T-1 Volume-III-D**

Sr. No.	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Revised Resolution
41	PAGE 30 OF 175	4.4.3, 6.15.3	Vertical clearance of over head pipe lines at the rail/road crossings & walk ways	Please clarify the contradiction in vertical clearance to be considered for over head piping above walk ways and road ways/rail ways which is mentioned as 6.2m & 8m in tender specifications.	Corrigendum-I prevail
52	PAGE 33 OF 175	4.18	cross country pipe	The Owner shall arrange for approvals from relevant authorities or private parties with respect to the pipe laying including corridor to be adopted, right of way for piping, clearing of trees or plants etc in the corridor, clearance for routing piping crossing roads and railways etc.	Bid Specification prevails.

BHUSAWAL THERMAL POWER STATION 1X 660 MW UNIT - 6 PROJECT

RESPONSE TO PRE - BID QUERIES

Bid Specification No. DG/BSL U-6/2011/T-1

VOLUME - IV A

Bhusawal Thermal Power Station 1 x 660 MW Unit - 6 Project**Pre - Bid Queries****Bid Specification No. DG/BSL U-6/2011/T-1 Volume-IV-A**

Sr. No.	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Revised Resolution
27/135A	4	3.3.(b)	The Unit Transformer shall be designed for 100% Capacity each to provide reliability against forced or planned outage of one Unit Transformer. Normally each Unit transformer shall be loaded 50% capacity.	As per Key SLD, there is no tie between Unit switchgear 1 to 2 to take care 100% unit load during one UT outage condition. In the event of one UT outage, we presume that the respective unit board will get the back up power supply from connected Station transformer. Please clarify.	Refer Corrigendum IV Volume IV A
	5	3.1.2 (e)	(e) In case of forced/planned outage of either UT, its load get transferred to respective ST bus with which they are interconnected through tie breaker.		Bid Specification prevails.
47	1	6.1.12	Number of rails and rail gauge will be well coordinated with number of wheels and orientation of all large transformers including those in switchyard right from unloading bay of Power House.	Please note that the railway arrangement work for switchyard transformer is not envisaged, since switchyard is not in bidder's scope of work.	Refer Corrigendum II Volume IV A
159	6	3.5(b) DataSheet-A	SPBD	Material of enclosure shall be Al alloy grade-31000 & material for conductor shall be Al alloy grade-63401.	Bid Specification prevails.

BHUSAWAL THERMAL POWER STATION 1X 660 MW UNIT - 6 PROJECT						
CLARIFICATIONS TO PRE -BID QUERIES						
Bid Specification No. DG/BSL U-6/2011/T-1,						
Volume - VI A						
Sr.No.	Volume	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Clarifications/Final Resolution
1	VI A	-	3.1a.Pg 6 of 76 Addendum-III	Providing and laying MS gravity pipeline in the inlet canal, from the existing river water pump house of Mahagenco located at tapi river to adequate slope.	During site visit it was observed that the inlet canal from existing pump house to the aqueduct was full of water. Hence, provide the cross sectional detail of inlet canal for estimation.	The cross section of inlet canal is enclosed herewith .
			13.8, Pg.37 of 76 Addendum-III	Laying of pipeline in canal and filling around with sand upto canal top.		
2			3.1c, Pg.7 of 76 Addendum-III	The scope shall also include cleaning and desilting approach canal to pump house.	We understand that the approach canal to be cleaned and desilted is stretched between the abandoned pump house and aqueduct. Please Confirm. Also, provide the detail of approach canal/adequate including cross section and longitudinal section for estimation.	Confirmed. Cross section of inlet channels and aqueduct enclosed. L-section of the proposed pipe line is already provided vide Addendum - III.

BHUSAWAL THERMAL POWER STATION 1X 660 MW UNIT - 6 PROJECT						
CLARIFICATIONS TO PRE -BID QUERIES						
Bid Specification No. DG/BSL U-6/2011/T-1,						
Volume - VI A						
Sr.No.	Volume	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Clarifications/Final Resolution
3			13.2, Pg. 36 of 76 Addendum-III	To obtain necessary various approvals from concerned departments/agencies.	Only customer's/customer consultant's approval on design/drawings are envisaged. Any statutory approval etc. from concerned department/agencies including necessary charges are beyond the scope of this tender. Please confirm.	Bid Specification shall Prevail.
4			13.7, Pg. 37 of 76 Addendum-III	Diversion of existing flow of water for connection of Pipeline from existing tank.	This clause is not understandable hence it needs to be clarified with details.	Proposed Pipe Line is to be laid in abandoned Canal which is Parallel to the Canal in use. After completion of Pipe Line work, end connection shall be done with existing tank near Tapi Pump House. Necessary arrangement for connections to existing tanks shall be done by the bidder.

BHUSAWAL THERMAL POWER STATION 1X 660 MW UNIT - 6 PROJECT						
CLARIFICATIONS TO PRE -BID QUERIES						
Bid Specification No. DG/BSL U-6/2011/T-1,						
Volume - VI A						
Sr.No.	Volume	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Clarifications/Final Resolution
5			9.3, Pg. 20 of 76 Addendum-III	The M.S. Gravity while designing the above pipeline, the agency shall ensure the same discharge after existing siphon arrangement.	Please provide the GA drawing for existing (abandoned) pump house indicating levels, as same are required for calculation of Pump TDH. Please provide the details of existing Siphon arrangement (including GA drawing) as same is not clear from specification. Please clarify.	For general arrangement of existing abandoned pump house the bidder is requested to visit the site. The drawings indicating the details of the siphon arrangement are attached herewith.



**MAHARASHTRA STATE POWER
GENERATION CO. LTD.**

**PROJECTS & PLANNING
DEPARTMENT**

BID SPECIFICATION NO.: DG/BSL U-6/2011/T-1

**CLARIFICATIONS TO PRE-BID
QUERIES**

TECHNICAL

CONSULTANT
PROCON ENGINEERS
(DIV. OF NIMOTO CONSULTING ENGINEERS PVT. LTD.)
202 A, Dosti Pinnacle, Plot E-7, Road no. 22,
Wagle Industrial Estate,
Thane (w)-400604

BHUSAWAL THERMAL POWER STATION 1X660MW UNIT - 6 PROJECT					
CLARIFICATIONS TO PRE-BID QUERIES					
BID SPECIFICATION No. DG/BSL U-6/2011/T-1					
VOLUME -II					
Sl. No.	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Final resolution
1	Section-2	7.14	Rainfall: 112 mm average annually	The value seems too low. Please check. Regarding the hourly maximum rainfall, please provide the reference data for the existing 2x 500 MW plant for the basic design purpose.	Please refer Pre-Bid clarification at Sr. no. 1 , Volume II and Sr. no. 95, Volume - VIA (Issued on date 07.07.2012)
2	SECTION - 3	5.0	(a) Residential accommodation to be built by the Contractor at his own expense for his employees near site.	Please inform us the location and area(m2) of the land for Contractor's accommodation and office.	This clause is deleted. Please refer Sr. no. 11 of Corrigendum -II, page 12 of 274 and will be dealt according to the Volume- I, Section-2B, clause no. 4.1.1.
3	SECTION - 3	5.0	(b) Site office, pre-assembly/storage yard to be constructed by Contractor at his own expense within plant site	Please inform us the location and area(m2) of the land for Contractor's accommodation and office.	Please refer area for Lay down space/contrsuction yard/Fabrication yard in Plot Plan for contractor's purpose.
4	SECTION - 3	5.0	5.2 Construction power at 11 kV AC +/-10%, 3 Phase, 50 Hz +/-5% and Construction water shall be made available at one point near the erection site by the Owner. Regarding charges, please refer Volume-I of this specification.	Please confirm if there is the limitation of consumption in Construction Power & Water.	Please refer Sr. no. 12 of Corrigendum -II, page 12 of 274 and also refer Volume -I. For limitation of consumption in Construction Power & water , Please refer Cl. No. 4.2 & 4.3, section- 2B, Volume-I.
5	4	17.1	"In case Ministry of Environment & Forest stipulates any other conditions not specified hereunder while clearing the project, same shall be complied with by the contractor"	Kindly furnish MOEF document, so that we know specific stipulation made by MOEF, for system design as per their recommendation.	The document is available on MOEF website in public domain
6	SECTION - 5	2.0	2.2 Generator Stator Lifting may be considered by either of the two options as mentioned below :	From the referred clauses, we understand the followings: 1. Tandem operation of TG hall EOT cranes are required if generator stator lifting is envisaged with turbine hall EOT cranes. 2. Capacity of each turbine hall crane shall be computed as $Y = 1.25 a/2$, if bidder opts for generator stator lifting by turbine hall cranes. Kindly confirm our understanding. Also, Mahagenco is requested to reconsider single EOT crane with genrator stator lifting option (b) since our generator stator is not recommended to lift after erection, which will save i. one TG hall EOT ii) Civil cost of TG building & other auxiliaries (Electrical).	Each crane shall have 125% of equipment weight. In case of bidder opting for option (b) mentioned in the specifications for lifting Generator Stator , two cranes shall be provided as per bid specification (Vol. III-I). Please also refer Corrigendum - VIII ..

VOLUME -II					
Sl. No.	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Final resolution
7	SECTION - 8	1.4.10	It shall be demonstrated at SH and RH outlets (in case of more than one outlet) that the temperature imbalance between the outlets does not exceed	It can be meet during only steady state. Doosan recommend to revise paragraph as below. It shall be demonstrated at SH and RH outlets (in case of more than one outlet) than the temperature imbalance between the outlets does not exceed 10°C under all loads.	Bid specification prevails .
8	SECTION - 8	1.4.16	(b) Maximum continuous output at generator terminals corresponding to all HP Heaters out of operation under rated steam conditions with 1% make up.	Mahagenco to clarify whether 100% TMCR output is required during all HP heater out condition.	Please refer Corrigendum - II / Sr. 30, page 18 Of 274.
9	SECTION - 8	1.4.18 (Sr.. no. 191 of Pre-bid clarification issued On 07.07.2012 and Sr. no. 16 of clarification issued on 10.12.2012.	(The constant pressure operation from 0 to 35/40% of TMCR & 90% TMCR to VWO condition and sliding pressure operation from 35/40% to 90% TMCR in conjunction with the steam generator, HP-LP bypass system and Instrumentation & Control system shall be demonstrated. In sliding pressure mode of operation, during quick load increase, the idle control valve (s) must respond rapidly to pick up 20% of operating load, so that immediate increase of boiler pressure is not required. The load response capability shall be demonstrated in steps of 5%. Changeover from constant pressure mode to sliding pressure mode and vice-versa shall also be demonstrated.	1) We are considering sliding pressure operation from 40% to 90% TMCR . Plaes confirm our understanding. 2) These capabilities of the plant can be checked as a part of Commissioning test and hence we request you to delete the requirement of catagory III guarantee. We propose following operation concept as per standard and proven practice of the Bidder : 1) 0 to 40% TMCR: Constant Pressure Operation. 2) 40% TMCR to 100% TMCR: Pure Sliding Pressure Operation, with instantaneous output increase of 5% achieved through overload valve. This is in accordance to cl. no. 4.8 (d) of Grid Code (L/68(84)/2006-CERC, dtd: 14/03/2006). 3) 100% TMCR to 105% TMCR: Constant Pressure Operation through overload valve. The generating unit shall be capable of instantaneously increasing the output by 5%, limited to 105% TMCR as per cl. no. 4.8 (d) of Grid Code (L/68(84)/2006-CERC, dtd: 14/03/2006). No throttling is envisaged in sliding pressure operation.	Bid specification prevails.
10	SECTION - 8	1.4.26	(c) Cold startup/hot startup of the unit using TDBFP with motive steam from auxiliary steam header shall be demonstrated.	Bidder requests Owner to delete this Category-III guarantee as unit start-up requirement using TDBFP is not envisaged in respective specification and customer PFDs i.e. PE-189-PF-204 & PE-189-PF-205. Auxiliary steam if considered for BFP Drive turbine operation then operation of drive turbine becomes inefficient with primary source of steam and is loss of cycle heat rate. It is therefore recommended to use 2 x 30% MDBFP for starting of the plant in case of cold startup/ Hot start up. Also, as per pre-bid clarification(sl no. 187), Mahagenco has clarified TDBFP connection with auxiliary steam is not required. Hence, MAHAGENCO is requested to clarify the same.	Pl. Refer PBQ clarification no. 205, Bid specification prevails.

BHUSAWAL THERMAL POWER STATION 1X660MW UNIT - 6 PROJECT					
CLARIFICATIONS TO PRE-BID QUERIES					
BID SPECIFICATION No. DG/BSL U-6/2011/T-1					
VOLUME -III A					
Sl. No.	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Final resolution
1	SECTION - 1	5.1.3	The Steam Generator unit shall be capable of operating on sliding pressure mode .The load range for sliding pressure unit operation shall be from 35% to 90% Turbine Generation Maximum Continuous Rating (TGMCR) to 90 % TGMCR and constant pressure mode between 90% TGMCR to 100% TGMCR.	1) We are considering sliding pressure operation from 40% to 90% TMCR . Plaes confirm our understanding. 2) These capabilities of the plant can be checked as a part of Commissioning test and hence we request you to delete the requirement of catagory III guarantee. We propose following operation concept as per standard and proven practice of the Bidder : 1) 0 to 40% TMCR: Constant Pressure Operation. 2) 40% TMCR to 100% TMCR: Pure Sliding Pressure Operation, with instantaneous output increase of 5% achieved through overload valve. This is in accordance to cl. no. 4.8 (d) of Grid Code (L/68(84)/2006-CERC, dtd: 14/03/2006). 3) 100% TMCR to 105% TMCR: Constant Pressure Operation through overload valve. The generating unit shall be capable of instantaneously increasing the output by 5%, limited to 105% TMCR as per cl. no. 4.8 (d) of Grid Code (L/68(84)/2006-CERC, dtd: 14/03/2006). No throttling is envisaged in sliding pressure operation.	Bid specification prevails.
2	SECTION - 1	5.16	5.16.20 Coal chutes of approved type and size shall be provided between raw coal Bunker shut off gate and inlet to the raw coal feeder and from feeder to the Mills. Height of coal chute between Bunker outlet and feeder inlet shall be adequate to prevent hot air to come up. A minimum height of 300 mm for each 75 mm water pressure shall be kept. Size of the coal chute at feeder inlet and outlet shall be minimum 900 mm. Material of chute shall be stainless steel. Coal chutes shall be provided with poke holes with 50% flanged type opening area and emptying chute to be suitable for loading trucks placed in ground floor.	Coal feeder outlet chute size will be applied minimum 600mm as per CEA regulations. In addition, to optimise coal mill performance & coal distribution coal chute design shall be applied as 600mm We have many experience applying to coal feeder outlet chute size as minimum 600mm.	Bid specification prevails.
3	SECTION - 1	5.16	5.16.23 The Bidder shall clearly describe in the proposal, the means provided to measure the coal level in the mill.	Coal level measuring is applied to tube mill. It isn't applicable to vertical spindle type mill.	Bid specification prevails .
4	SECTION - 1	DATASHEET - A	7.3 Unburnt Combustibles at Economiser outlet as % of Fly Ash to be considered for determining boiler efficiency	Please clarify whether 1.0% of fly ash is unburned heat loss(UBL) or unburned carbon in fly ash(UBC).If it means UBC, 1.0% is generally too low to meet.	Bid specification is self explanatory.

5	SECTION - 1	DATASHEET - A	10.5 RH temperature variation C (a) By burner tilting with supplementary water spray (between 60% and 100% BMCR) within $\pm 5^\circ\text{C}$ under steady state and in case of load change at the rate of 3% per minute within $\pm 10^\circ\text{C}$.	The 3%TMCR/min ramp rate with expected RH temperature variation $+15^\circ\text{C}$, -24°C are recommended for the stable operation of plant. And, the ramp rate test shall be conducted according to following conditions. 1. Ramp rates and times are based on no mills being put into or taken out of service during the ramp rate test. 2. Steady-state conditions of pressures, temperatures and flows must be established at the start of the test. 3. A dead band time due to the combustion system must be ignored to the ramp time. 4. The last part of load range must be ignored to the ramp time, because the controller will automatically reduce the the ramp rate near the final target load to reduce the variation and improve the stability.	Bid specification prevails.
6	SECTION - 1	DATASHEET - A	14.7 Material of Construction	All material and thickness of mill will be covented according to mill manufacturer's standard. Spring journal -> Hydraulic system applied.	Bid specification prevails .

BHUSAWAL THERMAL POWER STATION 1X660MW UNIT - 6 PROJECT

CLARIFICATIONS TO PRE-BID QUERIES

BID SPECIFICATION No. DG/BSL U-6/2011/T-1

VOLUME -III B

Sl. No.	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Final resolution
1	1	Data Sheet -A clause no. 1.3	0.5 to 35% TMCR - Constant Pressure Operation 35 % to 90% TMCR - Sliding Pressure Operation 90% to VWO - Constant pressure operation Maximum sustained overpressure of at least 10% of the design turbine inlet steam pressure.	1) We are considering sliding pressure operation from 40% to 90% TMCR. Please confirm our understanding. 2) These capabilities of the plant can be checked as a part of Commissioning test and hence we request you to delete the requirement of category III guarantee. We propose following operation concept as per standard and proven practice of the Bidder : 1) 0 to 40% TMCR: Constant Pressure Operation. 2) 40% TMCR to 100% TMCR: Pure Sliding Pressure Operation, with instantaneous output increase of 5% achieved through overload valve. This is in accordance to cl. no. 4.8 (d) of Grid Code (L/68(84)/2006-CERC, dtd: 14/03/2006). 3) 100% TMCR to 105% TMCR: Constant Pressure Operation through overload valve. The generating unit shall be capable of instantaneously increasing the output by 5%, limited to 105% TMCR as per cl. no. 4.8 (d) of Grid Code (L/68(84)/2006-CERC, dtd: 14/03/2006). No throttling is envisaged in sliding pressure operation.	Bid specifications prevail.
2	1	12.12	Components The system comprises of oil tanks, defoaming chambers, vapour extractors, pumps, coolers, filters, interconnecting pipes, fittings, valves, gauges, thermometers. A Control and monitoring panel complete with annunciation shall be furnished. Damper tank for supply of oil to seal oil system under emergency condition may be considered.	As per Bidder's standard practice, seal oil coolers are not provided.	Bid specifications prevail.
3	1	5.2.5, Data Sheet-A	SCR : Not less than 0.48	As per Bidder's standard practice SCR not less than 0.45 shall be provided.	Bid specifications prevail.
4	1	12.11	One (1) detector in water inlet and one (1) in water outlet of each hydrogen cooler.	As per Bidder standard practice only simplex type RTDs shall be provided.	Bid specifications prevail.
5	1	12.11	One (1) detector in gas stream entering and one (1) in gas stream leaving each hydrogen cooler.	As per Bidder standard practice only simplex type RTDs shall be provided.	Bid specifications prevail.

VOLUME -III B					
Sl. No.	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Final resolution
6	1	12.11	Twelve (12) detectors, four per phase and uniformly distributed around the stator, should be located at hottest possible zones between insulated coil sides in stator slots.	As per Bidder standard practice only simplex type RTDs shall be provided.	Bid specifications prevails .
7	1	12.11	Twelve (12) detectors for stator core of which six (6) shall be located in the end zones.	As per Bidder standard practice only simplex type RTDs shall be provided.	Bid specifications prevails .
8	1	12.12.3	Main Features The seal oil stream shall have three (2 x 100% AC & 1 x 100% DC motor driven) pumps one running and others standby for automatic cutting in on loss of seal oil pressure. Upon failure of both pumps, the seal oil supply shall be maintained by a 100% emergency seal oil pump (D.C. motor driven) without any interruption. There shall be individual starting/control panels for each pump and one common signalling panel. The A.C. seal oil pump shall also be connected with D.G. set to cater emergency. Seal Oil Coolers and filters shall be of 2 x 100% capacity designed for 36°C cooling water (DM quality) temperature. The piping and valve arrangement shall permit taking out any cooler/filter without affecting operation of the system. Seal Oil System shall have connection to turbine main oil system for make-up and also for excess return. The turbine main oil system shall also serve as a back-up to seal oil system. The H2 side oil drain shall be suitably degassed before being returned to main oil system. The Seal Oil system shall be supplied through two separate and independent streams - one for air side and the other for H2 side. The arrangement shall be such that even in case of failure of H2 - side stream, sealing shall be maintained by the air-side stream.	As per Bidders standard practice only one Main Seal Oil pump shall be provided.	Bid specifications prevails .
9	1	12.13	The gas system comprises a hydrogen gas circuit for cooling the stator core and rotor windings, a carbon-di-oxide scavenging system and compressed air supply. The system is required to fill the generator with hydrogen, maintain it under pressure, monitor and control gas purity, and to empty the generator of hydrogen. The design is such as to ensure safe filling/emptying by preventing formation of explosive H2 - air mixture. For filling, air is first displaced by CO2, which in turn is replaced by H2. While emptying, H2 is first displaced by CO2 before admission of air in the machine. The major system components are H2 and CO2 gas manifolds, H2 gas coolers, side stream H2 drying equipment, inter-connecting piping, fittings, valves, gauges and other instruments, control monitoring panel complete with annunciation. Hydrogen shall be circulated in the generator in closed circuit by fans fitted on the rotor shaft at either end. H2 gas is cooled by DM water heat exchangers located in the generator housing. The cooler shall be of sectionalised design such that with one cooler section out of service, the unit can carry at least three-fourth rated load continuously, without exceeding the permissible temperature limits. Hydrogen coolers shall be so designed that it is possible to meet the full load requirement of the machine with at least ten (10) percent of the tubes in each cooler plugged.	As per Bidder's standard practice hydrogen gas dryers are not provided.	Bid specifications prevails .

VOLUME -III B					
Sl. No.	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Final resolution
			Two (2) full capacity refrigeration type H2 - drier with in-situ reactivation facility shall be provided. The arrangement shall be such that one drier can be taken out of service for reactivation without affecting the system performance in any way. H2 Storage and handling Unit shall be located as per the rules of Indian Explosives. H2 Purity unit, online dew point measurement equipment & Gas analyzer shall be provided. The valves in gas system shall be of special design to minimise gas leakage. Safety relief valves shall be furnished both on low and highpressure sides of the gas system. A manually operated vent valve shall be provided for discharging casing hydrogen to atmosphere in case of emergency to a location outside the building top. During the transportation, storage and also during long shut down the machine shall be kept under nitrogen atmosphere. Bidder shall bring out the requirement, if any, of Nitrogen gas. The complete nitrogen system along with the necessary nitrogen cylinders shall be furnished.		
10	1	2.1.12.9 (e)	Simulated tests on excitation and AVR circuits to demonstrate control, response, discrimination and excitation limit features.	It is not Bidder's standard practice to perform integrated tests.	Bid specifications prevail .
11	SECTION - 3	1.1	Two (2) Turbine driven pumps will be operating normally while the two electric motor driven pumps (2 x 30%) shall remain as a standby units and will come into operation automatically in case any of the working pumps fail.	We understand that, during normal operation, on failure/trip of any working TDBFP, the 2 x 30% motor driven stand-by pumps will come into operation sequentially and not simultaneously	Confirmed that on failure/trip of any working TDBFP, the 2 x 30% motor driven stand-by pumps will come into operation sequentially and not simultaneously.
12	SECTION - 3	1.2	1.2.3 The pumps shall be designed to withstand transient condition due to load swing of the unit from full load to no load. Adequate design margins shall be provided in the pumps for turbine bypass operation.	"Adequate design margins shall be provided in the pumps for turbine bypass operation", does it mean only two(2 x 50%) CEP shall be able to cater the turbine bypass requirement? or the third CEP can also be taken into service during turbine bypass?	Only two(2 x 50%) CEP shall be able to cater the turbine bypass requirement.
13	SECTION - 3	2.1	2.1.1 (d) Sole plates, pin and key blocks or other support structure and a common base plate (with foundation anchor bolts/inserts, drip lip and drain) for booster pump and gearbox, motor drive.	We understand that "motor drive" is not applicable here.	Confirmed.
14	SECTION - 3	2.1	2.1.2 (b) Balance chamber leak-off flow orifice for boiler feed pump.	Cl. no. 2.1.1 (a) for Turbine drive BFP says "Balance chamber leak-off flow orifice for boiler feed pump, if required." we understand that the Cl. no. 2.1.2 (b) as "Balance chamber leak-off flow orifice for boiler feed pump, if required"	Confirmed.

VOLUME -III B					
Sl. No.	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Final resolution
15	SECTION - 3	2.1.3	(b) Exhaust ducts from the auxiliary turbines along with metallic expansion joint and butterfly valve. The exhaust duct shall be self-draining to the condenser.	In case of Drive turbine at 0m.(ground floor), the complete exhaust duct may not be self draining to condenser, in such case suitable drain arrangement along with automatic drain valve shall be provided to drain the condensate to condenser.	Agreed. Draining must be positive.
16	SECTION - 3	3.1	3.1.3 Each pump shall exhibit the same type continuously rising characteristic from rated duty point to shut-off. The pumps should be capable of parallel operation without instability at all speeds and share equal load. Shut-off head shall not, however, be less than 120% and shall not be more than 130% of the head developed at pump design point.	"...share equal load." we understand that this point is applicable only if either Two TDBFPs are operating in parallel or Two MDBFPs are operating in parallel.	Agreed.
17	SECTION - 3	3.1	3.1.5 The pumps shall be capable of accepting, without damage, any transient reduction in suction pressure including dry run condition causing cavitation and shall accept, without distress, the re-establishment of normal suction conditions following the transient, with no necessity for a pump shut down.	what is meaning of dry run condition? full dry running of BFP is not recommended by pump manufacturers.	Bid specifications prevail .
18	SECTION - 3	3.1	3.1.25 The Boiler Feed Pumps shall be capable of coasting down safely to standstill after it is tripped in the event of a sudden interruption of suction flow. The Bidder shall demonstrate this capability by a suitable dry-running test at his works and shall furnish full details of this proposed test including its duration etc in the bid.	is it required to be submitted during the bid satage?	Yes. It is required.
19	SECTION - 3	3.1	The feed pump shall be capable of a full dry running condition. The feed pumps shall have following capabilities:	Full dry running of pump is not recommended by suppliers.	Bid specifications prevail .
20	SECTION - 3	3.1	(b) The Feed Pumps shall be capable of accepting without damage transient reduction in suction pressure well below those required for freedom from cavitation and shall accept without distress, the re-establishment of normal suction conditions following the transient, with no necessity for a pump shut down.	Operation of pump with suction pressure below vapour pressure is not recommended.	Bid specifications prevail .
21	SECTION - 3	3.1	(c) The Feed Pump shall be capable of operating under full vapour locked condition for 15 minutes (i.e. following an inadvertent closure of suction valve) and rundown to rest from this vapour locked condition without endangering the pump rotor or subsequent detrimental effect in pump overall performance.	Meeting this requirement may not be possible. (to be checked with pump suppliers)	Bid specifications prevail .
22	SECTION - 3	3.1	(c) To establish above criterion, the Bidder shall necessarily submit the full backup calculation, rotor response characteristics, various internal clearances and other features, test reports for similar pumps meeting the above design condition.	as commented in the previous clause, meeting all the above conditions may not be possible	Bid specifications prevail .
23	SECTION - 3	3.1	In order to demonstrate the above capabilities at shop, the Bidder shall furnish complete testing procedure along with the bid.	we understand that this is not required during bid stage	Please refer Sr.no. 211 of PBQ clarifications dtd. 07.07.2012
24	SECTION - 3	3.2	3.2.3 Each Steam Turbine exhaust shall be separately ducted to the steam Surface Condenser, which serves the main Turbine Generator Unit. The exhaust duct shall be self draining to the Condenser.	In case BFP and the drive turbines are at ground floor, the drive turbine exhaust ducts may not be self draining to condenser, in such case suitable draining provision shall be provided to drain the exhaust duct to condenser.	Agreed. Draining must be positive.

VOLUME -III B					
Sl. No.	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Final resolution
25	SECTION - 3	3.3	3.3.9 The pump rotor assembly (with guides) shall be so designed as to keep its vibration, in both wet and dry running conditions, within the safe limits as specified in relevant International Standards/Codes. (e.g. 'Good' range of VDI 2056/MIS, USA recommendations).	Pump Vibration limits shall be as per HIS	Bid specification prevails .
26	SECTION - 3	5.6	5.6.1 Each Pump set shall be provided with a complete pre ssure lubrication system of sufficient capacity for both pump and drive motor, consisting of oil pump, sump tank, water cooled oil coolers (2 x 100%, shell & tube type or plate type heat exchanger), duplex oil filter, level indicator, sight flow indicator, thermometers, relief valves, pressure regulators and necessary valves, all interconnected piping and accessories. The oil cooler tubes shall be of SS-304. The coolers shall be designed for service with de mineralized water. The oil pump shall be driven by the feed pump shaft and all parts of the system shall be mounted as an integral part of the feed pump assembly. Provision must be made to ensure continuity of oil supply even during reverse rotation of feed pump, and during low frequency operation of oil pumps.	"The oil pump shall be driven by the feed pump shaft" -we understand that this is applicable for Motor driven BFP only	Noted. Bid specification prevails.

BHUSAWAL THERMAL POWER STATION 1X660MW UNIT - 6 PROJECT					
CLARIFICATIONS TO PRE-BID QUERIES					
BID SPECIFICATION No. DG/BSL U-6/2011/T-1					
VOLUME -III C					
Sl. No.	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Final resolution
1	Vol-III C	2.1.2	Rack and pinion gates	As per referred clause, Rack & Pinion Gates in between Apron Feeder & W. T. Hopper have been proposed which is not feasible whereas in the Process flow Diagram : Coal Handling System (Dwg. No. PE-189-PF-226, P1) nothing has been shown. So please confirm whether these are required or not.	Please refer corrigendum - I Sr. no. 3
2	Vol-III C	2.1.3	Coal feed	As per referred clause, Conveyor 1A/1B shall feed to conveyor 2A/2B through chutes and rack and pinion gates whereas in the Process flow Diagram : Coal Handling System (Dwg. No. PE-189-PF-226, P1) flap gates have been shown in the discharge chute of conveyor 1A/1B. Kindly specify which one to be considered.	Please refer corrigendum - I Sr. no. 4
3	Vol-III C	2.1.16	Coal feed	As per referred clause, Conveyor 5A/5B shall feed bunkers through Travelling Trippers having one way discharge chute whereas as per the Process flow Diagram : Coal Handling System (Dwg. No. PE-189-PF-226, P1) Conv 5A/5B shall discharge either by Travelling Trippers or discharge at head pulleys in the Bunkers. We are considering the travelling Trippers (TTR-1 & TTR-2) shall be fitted with two way discharge chutes with Flap gates. Please confirm.	Bid specification prevails.
4	Vol-III C	2.1.17	Coal feed	As per referred clause, Conveyor 6A/6B shall feed bunkers through Travelling Trippers having one way discharge chute whereas as per the Process flow Diagram : Coal Handling System (Dwg. No. PE-189-PF-226, P1) Conv 6A/6B shall discharge either by Travelling Trippers or discharge at head pulleys in the Bunkers. We are considering the travelling Trippers (TTR-3 & TTR-4) shall be fitted with two way discharge chutes with Flap gates. Please confirm.	Bid specification prevails.
5	Vol-III C	2.1.18 & 2.1.21	Blending	Kindly elaborate the capacity controlling method for blending of indigenous & imported coal.	Bid specification prevails.
6	Vol. - III C	5.1.7	Idlers	We are considering idler shall be fitted with seize resistant ball bearings instead of split case type bearings. Kindly confirm.	Please refer corrigendum - II, Sr. no. 25
7	Vol. - III C	5.1.10, 5.1.11, 5.1.12, 5.1.13, Data sheet of Gear Box, Couplings.	Type of drive	Please confirm the type of drive to be used.	Please refer PBQ clarification 51 dtd.07.07.2012
8	Vol. - III C	Data Sheet-A, Note-6	Standard	As per the referred clause, power requirement and belt tensions shall be calculated as per CEMA standard whereas in Sl. no. 10 of pg no. 267 of 495 of Data Sheet B of Vol.-III- A1, section -13, it is specified that power requirement and tension calculations shall be calculated as per IS-11592. Please clarify which one (CEMA or IS) we should follow.	CEMA should be followed for power and belt tensions.
9	Vol. - III C	8.1.3	Flow path	Kindly specify which of the flow paths to be considered for arriving at the Auxiliary power Consumption for Coal Handling System.	Bidder shall indicate Auxiliary Power Consumptions for all the paths and the path having maximum power consumption shall be considered for arriving at the Auxiliary Power Consumption for Coal Handling System.

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CLARIFICATIONS TO PRE-BID QUERIES					
BID SPECIFICATION No. DG/BSL U-6/2011/T-1					
VOLUME -III D					
Sl. No.	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Final resolution
1	Vol-III D	CL No. 3.1.1 & 5.4.1 ©	BA hopper volume	Bottom ash hopper volume shall be 8 hours of actual bottom ash generation at BMCR, as per data from boiler supplier. Kindly confirm.	Bid specification prevails.
2	Vol-III D	4.2.4 & DRG. No. PE-189-PI-238, P3	Flushing boxes	Flushing box with necessary arrangement below each eco-hopper shall be provided as specified in Vol-IIID, CL No. 4.2.4 , Page 25 of 175. Where Feeder ejector below each eco-hopper has been shown in DRG. No. PE-189-PI-238, P3. We understand that the scheme shown in drawing will prevail. Please confirm.	The scheme shown in DRG. No. PE-189-PI-238, P3 shall prevail.
3	Vol-III D	4.19 & 6.18.8 (d)	Flange connections on disposal piping	As per CL. No. 6.18.8 (d), Page 72 of 175, bidder to provide 10 disposal points. Hence, flange connections shall be provided on those 10 points and no other flange connection are required in HCSD system. Please confirm.	Bid specification prevails.
4	Vol-III D	5.5.1	FA extraction capacity	All 6 Nos. FA pressure conveying system may not be of same capacity as specified. Pressure conveying streams from 1st and 2nd field may be of higher capacity than that of from remaining fields. However the total FA transportation capacity for the unit will be 220 TPH which will evacuate entire ash of 8 hours shift in 6 hours as specified. Please review and confirm.	Bid specification prevails.
5	Vol-III D	4.21.17	PRV	No such automatic pressure relief valves are being installed in HCSD system and the same may be reviewed and deleted.	Agreed.

BHUSAWAL THERMAL POWER STATION 1X660MW UNIT - 6 PROJECT					
CLARIFICATIONS TO PRE-BID QUERIES					
BID SPECIFICATION No. DG/BSL U-6/2011/T-1					
VOLUME -III E1					
Sl. No.	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Final resolution
1	1	4	4.8.5 (h) Necessary toilets with basin & mirror and operator's cabins with drinking water facility.	As per tender, filtered water reservoirs to be sized to store filtered water of 24 hours requirement or 45000 m3 and 900 m3 for Non DM & DM filtered water storage tank respectively, whichever is higher. This requirement is unusual in power plant application. Kindly review the same & amend the requirement accordingly.	The query raised is not related to the clause in the specification. However, the reservoir capacities are already reviewed as 15000m³ and 900 m³ for Non DM & DM filtered water storage tank respectively.
2	1	2.2.1	Two numbers (2 x 100%) vertical wet pit type Potable water pumps for plant shall convey potable water to the potable water overhead Storage Tank to be located on the roof of TG building. Tank shall be designed for minimum 50 m3 storage.	Bidder offered the pressurized Potable water distribution system instead of gravity distribution to optimize the design load on TG building. Accordingly, Bidder provided 5 M3 capacity Potable water storage tank on TG building instead of 50 M3.	Bid specification prevails.
3	1	2.2.3	Service Water from Filtered Water Storage Tank shall be transferred to the Overhead Service water tank located on TG building roof by means of two numbers (2 x 100%) vertical wet pit type service water pumps. Tank shall be designed for minimum 150 m3 storage.	Bidder offered the pressurized service water distribution system instead of gravity distribution to optimize the design load on TG building. Accordingly, Bidder provided 10 M3 capacity service water storage tank on TG building instead of 150 M3.	Bid specification prevails.
4	1	4.5	Filtered Water Storage Tank for Non-DM shall be adequately designed for effective total capacity of one day storage, minimum 45000 m3.	Bidder provided 4 Hrs storage capacity to store the filtered water for Non-DM instead of 24 Hrs. Please confirm.	Please refer Corrigendum-VIII.
5	1	4.5	Filtered Water Storage Tank for DM shall be adequately designed for effective total capacity of one day storage, minimum 900 m3.	Bidder provided 4 Hrs storage capacity to store the filtered water for DM instead of 24 Hrs. Please confirm.	Bid specification prevails.
6	2	ANNEXURE-I	7.0 TDS ppm 870	Cation & Anion mentioned in the Raw water analysis as 585 ppm each, therefore TDS should be around 1170 ppm. Please clarify.	Annexure - I Sr. no. 7 shall prevail.
7	2	ANNEXURE-I	20.0 Total Suspended Solids ppm Not Available	Please furnish the following Raw water parameters currently mentioned as "Not Available": TSS, Carbonates, Boron, Oil&Grease.	TSS & Carbonates - Not available .Oil & Grease - Nil and boron - Less than 1 (one) ppm.
8	2	ANNEXURE-I	21.0 Carbonates as CaCO3 ppm Not Available	Please furnish the following Raw water parameters currently mentioned as "Not Available": TSS, Carbonates, Boron, Oil&Grease.	TSS & Carbonates - Not available .Oil & Grease - Nil and boron - Less than 1 (one) ppm.
9	2	ANNEXURE-I	22.0 Boron ppm Not Available	Please furnish the following Raw water parameters currently mentioned as "Not Available": TSS, Carbonates, Boron, Oil&Grease.	TSS & Carbonates - Not available .Oil & Grease - Nil and boron - Less than 1 (one) ppm.
10	2	ANNEXURE-I	23.0 Oil & Grease ppm Not Available	Please furnish the following Raw water parameters currently mentioned as "Not Available": TSS, Carbonates, Boron, Oil&Grease.	TSS & Carbonates - Not available .Oil & Grease - Nil and boron - Less than 1 (one) ppm.

VOLUME -III E1					
Sl. No.	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Final resolution
11	2	1.1	The design flow rate of Gravity filters for DM & Non DM is 50 m3/hr and 2000 m3/hr respectively.	As per the data sheet A (Clause No. 19.2.1 / Page no. 64 of 313) , Bidder considered the design capacity of the gravity filters is 1800 m3/hr & 100 M3/hr for Non-DM and DM. Please confirm.	Please refer PBQ clarification 12 dtd. 07.07.2012
12	2	3.1.5	Dosage rate of poly electrolyte : 5 ppm.	5 ppm Dosage rate of poly electrolyte is seems to be on higher side. 2 ppm is more than sufficient for Pre treatment plant applications. Please check and confirm.	Min. 2 (Two) ppm
13	2	7	Analysis of raw water : TDS - 870 ppm.	As per the tender specification, Resin based demineralization plant is envisaged. Resin based demineralization plant is not an economical option for such a high TDS i.e. 870 ppm. Please check and confirm.	Bid specification prevails.
14	3	3.4	The total time of regeneration of a complete DM Stream (Dual Media Filter, Activated Carbon Filter, Cation Exchanger, Anion Exchanger and Mixed Bed Exchanger Unit) shall not exceed four (4) hours.	As per the tender P & ID and specification for PT / DM Plant, Dual media filter is not applicable and bidder not considered the same. Please confirm.	Clause no.3.4 of the specification shall prevail.
15	3	1.0	1.1 The DM Plant capacity shall be arrived at based on bidder's basic engineering. However, a minimum net capacity of 2 x 100 m3/hr shall be provided. Under normal condition, one stream is envisaged to be kept in operation.	As per tender requirement two stream DM plant with 100 m3/hr each is envisaged. Also as per tender raw water chemistry, TDS of DM plant inlet is about 850 ppm. According to the above conditions, following are the concern for your review- 1. DM plant vessels size will be large enough which will not be techno commercial justified. 2. Since tender requires 2 DM storage tanks of 1000 m3 each & 1 CST of 850 m3. DM plant capacity seems to be on much higher side. 3. As per supercritical power plant worldwide there is no normal make up & 1% make is followed to compensate aux steam consumption & other cycle losses. Hence, 2x100 m3/hr DM plant is not suited for 1x660 MW supercritical power plant. We request Mahagenco to review our below proposals & amend the DM plant type & capacity- 1. RO-MB based DM plant with 100 m3/hr capacity, if Mahagenco requires high flow DM plant otherwise 2. Conventional DM plant (as asked in tender) of 60 m3/hr, each stream.	Bid specification prevails.
16	4	1.2.8	To reduce the Suspended Solids in the cooling water, at least 2.0 % of the total Circulating Water shall be passed through Automatic Valve less Gravity Filter Units.	As per the specification, Filtered water is envisaged as a make to the cooling tower. Hence, side stream filter is not applicable to maintain the solids load. Please check and confirm.	Bid specification prevails.
17	4	1.2.9	The redundancy in the Side Stream Filtration System shall be at least 15 % with a minimum of two (2) modules as standby. Autom atic Valve less Gravity Filters and all other accessories.	As per the data sheet A (Clause No. 2.1.1 / Page no. 216 of 313) , Bidder considered the One (1) number of standby filter (AVGF) as a redundancy instead of Two (2) numbers / 15% . Please confirm.	Bid specifiction prevails.
18	5	4.5	The treated water from OWS may be discharged in retention pit for treated water from OWS collection pit from where treated water shall be pumped finally to Ash Slurry Sump.	Mismatch with tender P & ID. As per the tender P & ID of effluent treatment system, the treated water from OWS shall be routed to in plant ash water tank. Please confirm.	There is no mismatch . The treated clear water from OWS shall be pumped in to the ash water sump and then finally to ash slurry sump through process. The sludge water shall be pumped to Ash Slurry sump.

VOLUME -III E1					
Sl. No.	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Final resolution
19	5	4.5	Suspended solids in treated water : 50 mg/l max.	Mismatch with data sheet. As per the data sheet A (Clause No. c / Page no. 261 of 313) , the suspended solids in treated water not to exceed 20 ppm. Please confirm.	Please Ref. Corrigendum -II/ #16
20	Addendum-III	2.2	Raw water source : From Ozerkheda (pipe line terminal) to One Day Reservoir as indicated in the plot plan and in line with the other details like terminal points etc. indicated in the Original Tender specification.	Kindly specify the coordinate of the tapping point from the existing pipe line for 2x500 MW unit for the Raw water to be drawn from Ozerkheda Reservoir along with the flow rate of raw water to be drawn from this point for the proposed 1X660 MW TPP and the available pressure at this tapping point. Also kindly furnish the relevant geotechnical report and contour along the said pipe route.	Minimum diameter of pipe leading to 1x660MW unit from Tapping point of Ozerkheda Pipeline shall be 1600mm. Also necessary isolation arrangement / flow control valve on pipe line leading to 2x500MW shall be provided to ensure required discharge for 1x660MW. Other details are as follows: (1) Intake level of water supply pipe line from Ozerkheda dam for 2X500MW unit is 261.600 M. (2) Intake level of tapping point from Ozerkheda pipe line leading to 1X660 MW project is 204.550 M. The head available at tapping point is (261.600 - 204.550) i.e. 57.050 M. (3) Considering the top of one day reservoir at FGL, the invert level of pipe line at one day reservoir will be 213.000 M.
21	Addendum-III	2.4	The scope under this addendum covers providing and laying MS gravity pipeline of requisite diameter in the existing inlet canal from Tapi river pump house to aqueduct along with tapping and isolation arrangement for 2x500 MW project.	Kindly furnish the coordinate of the interconnection point of proposed Raw water pipeline with the existing pipeline for 2x500 MW unit. Also kindly furnish the Contour along this path.	Co-ordinate of interconnection point will be decided during detailed engineering. Approximate length of pipe to be connected is given in data sheet. The existing pipe is to be extended for connection to the proposed pipe line coming through inlet canal as per site conditions with provision of isolation valve on MS. gravity line.
22	Addendum-III	3.1 (c)	Providing and laying M.S. pipe line from existing (abandoned) Pump House to one day reservoir of 1x660 MW unit including necessary isolation wherever required renovation of Pump House and sump along with provision of required electrical and mechanical works, including providing Three pumps (2W+1S/B), valves, electrical, control and instrumentation, and appurtenances."	We understand that the modification is required to be done by the EPC contractor. Kindly furnish the GA & elevation drawing of Existing (Abandoned) Pump house indicating the High, Low & Normal water level. Also kindly furnish the high & low level of the Canal.	Please refer note # 1 of the Annexure-II- May 2013.- Layout of proposed pipe line from Tapi river water pump house to aqueduct & proposed pipe line from existing (abandoned) pump house to one day reservoir of 1x660MW and clarification at Sr. no. 5 (Letter no.1863 dtd. 03.06.2013)
23	Addendum-III	-	'L Section of Pipe line for 660 MW' and 'Plan for pipe route 660 MW'	In the L-section drawing of proposed Raw Water Pipe line along the Intake canal from Existing River Water Pump House at Tapi river to existing Aqueduct, we found that there is a steady slope from 210.4 to 206.84. There is no crossing of any river/nallah/road. However, in the drawing named 'Plan for pipe route 660 MW', few crossing has been shown. Hence, requesting you to review the same and confirm. Also kindly furnish the geotechnical report for the said path.	There is no crossing of any river/nallah along the proposed route of pipe line between existing river water pump house at Tapi River and existing aqueduct.

VOLUME -III E1					
Sl. No.	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Final resolution
24	Addendum-III	-	'L Section of Pipe line for 660 MW' and 'Plan for pipe route 660 MW'	In the L-section drawing of proposed Raw Water Pipe line from Existing (Abandoned) pump house to one-day reservoir of proposed unit, we found that there are only two road crossing and one Ash pipe line crossing. However, in the drawing named 'Plan for pipe route 660 MW', crossing of 2 nos railway track, 5nos road crossing are shown. Hence, requesting you kindly review the same and confirm. Also kindly furnish the geotechnical report for the said path.	The tentative route of porposed raw water pipe line from abandoned pump house to one day reservoir is shown in the drawing shown plan view & number of crossings shall be considered accordingly. The Final route of the pipe line shall be decided during detailed engineering as per availability of space. Bidder may visit site for required details. The soil investigation along the route of pipe is in the scope of EPC bid.

BHUSAWAL THERMAL POWER STATION 1X660MW UNIT - 6 PROJECT					
CLARIFICATIONS TO PRE-BID QUERIES					
BID SPECIFICATION No. DG/BSL U-6/2011/T-1					
VOLUME -III E2					
Sl. No.	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Final resolution
1	SECTION - 1	3.1	3.1.1 (c) Each individual sump in the CW Pump house shall be designed in accordance with the recommendations specified in Hydraulic Institute/British Hydraulic Research Association/equivalent international standard and its dimensions shall be finally selected after conducting necessary sump model tests by the Bidder.	As per Vol III E2, Sec-1, Cl 2.1.1, Page 13, we understand process software (CFD) is adequate for CW/ACW sump study. Please confirm our understanding.	Clause no. 3.1.1 (c) shall prevail .
2	SECTION - 1	3.1	3.1.11(g) Adequate provision shall be made in each of the pump sump so as to facilitate insertion of isolation gates. Gates shall be fabricated from mild steel, shall be water tight type and shall preferably be of identical size/dimensions to facilitate interchangeability. Sump gates shall be accessible by the pump house overhead crane.	As per CW & ACW pump house GA drawing PE-189-GA-108, Rev P1, we undersatnd that sump gate & screen shall be handled by monorail hoist instead of CW pump house overhead crane. Please confirm our understading.	Please refer Corrigendum-VIII
3	SECTION - 1	3.2	3.2.1 The required flow in this system shall be based on the requirement of each individual connected cooler in this system with respect to flow and terminal temperature rise as encountered during maximum possible thermal load conditions. Bidder shall list out the required flow and terminal temperature rise of each cooler and the number of individual eq uipment coolers (operating/standby) in his Bid proposal. A minimum of 20 % margin shall be considered over and above the total required flo w and heat load to compute the design DMCW flow and design heat load respectively in the closed circuit. In computing the design heat load and design DMCW flow in	Our understanding on heat load margin 20% shall be 20% margin on heat duty during 100% TMCR condition with two TDBFP in operation. Please confirm.	Please refer PBQ Sr. 13 , 14 & 16 dtd. 10.02.2012. Bid specification prevails.
4	SECTION - 1	3.2	3.2.1 individual DMCW system, Bidder shall ensure that the average temperature rise of DMCW is limited to 5.5 0C under all circumstances.	We are requesting Mahagenco to allow us 6.7 deg C average temperature rise of DMCW temperature as per our standard design. Please confirm.	Bid specification prevails.
5	SECTION - 1	3.2	3.2.2(b) Total dynamic head : A minimum of ten (10) % margin over frictional losses based on pumping capacity as obtained in (a) above. Bidder shall compute the frictional losses assuming C = 120 on Hazen and William's formula for design purposes.	We understand that 10% margin will be taken on piping frictional losses only not for losses due to equipment friction. Please confirm.	Confirmed that 10% margin will be taken on piping frictional losses only.
6	SECTION - 2	DATASHEET - A	Sr. 20. (a) Casing <----- ASTM-A296 Gr. CF8M ----->	Since ASTM A296 is withdrawn & replaced by ASTM A743, we are considering ASTM A743 wherever written as ASTM A296. Please confirm.	Please refer PBQ clarification (Sr. no. 24) dtd.07.07.2012
7	SECTION - 2	DATASHEET - A	Sr. 20. (b) Casing Liner <----- ASTM-A296 Gr. CF8M ----->	Since ASTM A296 is withdrawn & replaced by ASTM A743, we are considering ASTM A743 wherever written as ASTM A296. Please confirm.	Please refer PBQ clarification (Sr. no. 24) dtd.07.07.2012

VOLUME -III E2					
Sl. No.	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Final resolution
8	SECTION - 2	DATASHEET - A	Sr. 20. (c) Diffuser <----- ASTM-A296 Gr. CF8M----->	Since ASTM A296 is withdrawn & replaced by ASTM A743, we are considering ASTM A743 wherever written as ASTM A296. Please confirm.	Please refer PBQ clarification (Sr. no. 24) dtd.07.07.2012
9	SECTION - 2	DATASHEET - A	Sr. 20. (d) Impeller <----- ASTM-A296 Gr. CF8M----->	Since ASTM A296 is withdrawn & replaced by ASTM A743, we are considering ASTM A743 wherever written as ASTM A296. Please confirm.	Please refer PBQ clarification (Sr. no. 24) dtd.07.07.2012
10	SECTION - 2	DATASHEET - A	Sr. 20. (e) Wearing Rings <----- ASTM-A296 Gr. C440 ----->	Since ASTM A296 is withdrawn & replaced by ASTM A743, we are considering ASTM A743 wherever written as ASTM A296. Please confirm.	Please refer PBQ clarification (Sr. no. 24) dtd.07.07.2012
11	SECTION - 2	DATASHEET - A	Sr.21. (f) Suction and discharge pressure Indicator Yes, along with Diaphragm Seal Yes, along with Diaphragm Seal	Diaphragm Seal is not required for passivated DM water service. Mahagenco to check & confirm.	Agreed.
12	SECTION - 3A	DATASHEET - A	18.2 Pump type Below floor discharge	As per amendment, metal casing CW pump may be used as an alternate option. Hence, we are requesting Mahagenco to provide above floor discharge pump as an option for ACW & CW pumps.	Bid specification prevails.
13	SECTION - 3B	5.1	5.1.5 The maximum closed valve head shall not be greater than 15% of the rated head including tolerance, to prevent over-pressurisation of the concrete volute.	Shut off head 15% of the rated head seems to be on lower side for this type of pump. We are requesting Mahagenco to leave this clause to bidder & the same will be decided based on pump manufacturer recommendation during detail engineering.	Please refer PBQ clarification (Sr. no. 29) dtd. 07.07.2012
14	SECTION - 3B	5.1	5.1.12 The upper limit of pump efficiency to be considered for this contract is 89%. No credit shall be given for higher efficiency values. (Not applicable in this case).	We understand this clause is not applicable for this project. Kindly confirm.	Specification is self explanatory.
15	SECTION - 3B	5.1	5.1.17(ii) 5% margin over the maximum pump shaft input power required within its operating range including the shut-off point.	As per our understanding, pump motor will be selected based on 5% margin over the maximum pump shaft input power required within its operating range including the shut-off point at 50 Hz. Please confirm.	Bid specifications prevail(Worst condition shall be considered)
16	SECTION - 3B	DATASHEET - A	: All CW Pumps with the job motor	Concrete volute pump(prototype) will not be possible for performance test at shop. Mahagenco to clarify.	Agreed.
17	SECTION - 4	4	4.4.1. The required heat load shall be computed by obtaining the summation of the maximum permissible heat loads encountered in the respective operating coolers of Boiler and TG Islands which shall be cooled by DMCW system. A minimum of 20 % margin over and above the total required heat load as obtained above shall be taken into account by the Bidder to work out the design heat load rejected by DMCW system and to be picked up by ACW system for the same.	Clarification raised as above.	Please refer PBQ clarification (Sr. no. 32) dtd. 07.07.2012
18	SECTION - 4	DATASHEET - A	5.3 However, DMCW system temperature rise not to exceed 5.50C.	Please refer clarification raised above.	Bid specification prevails.
19	SECTION - 4	DATASHEET - A	5.4 . 39 0C (Max.) Bidder to workout. However, ACW temperature rise not to exceed 5.50C	Please refer clarification raised as above.	Bid specification prevails.

BHUSAWAL THERMAL POWER STATION 1X660MW UNIT - 6 PROJECT					
CLARIFICATIONS TO PRE-BID QUERIES					
BID SPECIFICATION No. DG/BSL U-6/2011/T-1					
VOLUME -III -I					
Sl. No.	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Final resolution
1	SECTION - 1/A	4.1	4.1.1 The safe working load (Y) for E.O.T. cranes shall be computed as $Y = 1.25 a$	From the referred clauses, we understand the followings: 1. Tandem operation of TG hall EOT cranes are required if generator stator lifting is envisaged with turbine hall EOT cranes. 2. Capacity of each turbine hall crane shall be computed as $Y = 1.25 a/2$, if bidder opts for generator stator lifting by turbine hall cranes. Kindly confirm our understanding. Also, Mahagenco is requested to reconsider single EOT crane with generator stator lifting option (b) since our generator stator is not recommended to lift after erection, which will save i. one TG hall EOT ii) Civil cost of TG building & other auxiliaries (Electrical).	Each crane shall have 125% of equipment weight. In case of bidder opting for option (b) mentioned in the specifications for lifting Generator Stator, two cranes shall be provided as per bid specification (Vol. III-I). Please also refer Corrigendum - VIII ..
2	SECTION - 1/A	ANNEXURE-I	1.0 Turbine Hall - Two (2)	From the referred clauses, we understand the followings: 1. Tandem operation of TG hall EOT cranes are required if generator stator lifting is envisaged with turbine hall EOT cranes. 2. Capacity of each turbine hall crane shall be computed as $Y = 1.25 a/2$, if bidder opts for generator stator lifting by turbine hall cranes. Kindly confirm our understanding. Also, Mahagenco is requested to reconsider single EOT crane with generator stator lifting option (b) since our generator stator is not recommended to lift after erection, which will save i. one TG hall EOT ii) Civil cost of TG building & other auxiliaries (Electrical).	Please refer clarifications to Sr. no.1 above.
3	SECTION - 1/A	ANNEXURE-I	CW Pump House Outside: - Two (2) Semi Gantry Cranes	As per CW & ACW pump house GA drawing no. PE-189-GA-108, Rev-P1, Two nos. monorail hoist (3 ton each) are shown to handle screen & stop log gate instead of semi gantry cranes. Mahagenco is requested to clarify the requirement.	Please refer Corrigendum - VIII.
4	SECTION-3/D	ANNEXURE-I	(4) Service Water Storage Tank Vertical Cylindrical By Bidder 75 2	Since both huge volume tanks are to be located on deaerator floor, it will have major impact on TG hall structural design. Hence, Mahagenco is requested to review the tank capacity & also the location can be left to the bidder choice to meet other tender functional requirement. Also please clarify pressurized service water system is acceptable or not (without tanks).	Please refer Corrigendum - I
5	SECTION-3/D	ANNEXURE-I	(5) Potable water Storage Tank Vertical Cylindrical By Bidder 25 2	Since both huge volume tanks are to be located on deaerator floor, it will have major impact on TG hall structural design. Hence, Mahagenco is requested to review the tank capacity & also the location can be left to the bidder choice to meet other tender functional requirement. Also please clarify pressurized service water system is acceptable or not (without tanks).	Please refer Corrigendum - I

VOLUME -III -I					
Sl. No.	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Final resolution
6	3/C	3.8	Two (2) Emergency make-up supply pumps located in Filtered Water pump house for Non-DM complete with electric motor drives and all other accessories as specified in this section and in the datasheet-A attached herewith.	Two (2) nos. Emergency make up supply pumps located in filter water pump house-Non DM have been mentioned in the referred clause although the same is not shown in Process Flow Diagram : Plant Water System (Dwg. No. PE-189-PF-227, P1). Kindly confirm the validity of these pumps along with its purpose.	Two (2) Emergency make-up supply pumps - Deleted.
7	4 /D	3.1	"The details of miscellaneous steel tanks.....as follows:"	Since it is not indicated in the tender specification, Bidder considered IS:2062, Gr. B as the grade of steel for DM water storage Tanks , Service Water Tank and Potable Water Tank fabrication with epoxy painting inside. Kindly confirm your acceptance.	Confirmed.

BHUSAWAL THERMAL POWER STATION 1X660MW UNIT - 6 PROJECT					
CLARIFICATIONS TO PRE-BID QUERIES					
BID SPECIFICATION No. DG/BSL U-6/2011/T-1					
VOLUME -IV-A					
Sl. No.	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Final resolution
1	SECTION - 1	5.9	5.9.3 Connection of the L.T. dry type transformers to 11kV HT switchgear will be through cable and to L.V. Boards through non-segregated phase bus duct.	Please note that the requirement of NSPBD or Cable at incomer of LV board shall be decided as per current rating during detailed engineering. Customer is requested to accept the same.	Bid specification Prevails.
2	SECTION - 2	3.0	3.2 GT shall be suitable to meet the Generator power rating of 660MW at 0.85 power factor lag without deducting the unit auxiliary power, excitation power or any other power. GT shall be sized with 10% design margin.	Toshiba envisages sizing of Generator Transformer as per Clause no. 3.10 of the bid specification which states- Generator Transformer should be sized to deliver the gross unit output of the generator with turbine operation in VWO (Valve Wide Open) condition and Unit Transformers out of service. The loads of Unit Transformers will be supplied from the station bus for an extended period.	Refer CORRIGENDUM - II , S.No:18, Page No: 104 of 274
3	SECTION - 2	3.0	3.6 The transformer shall be so designed that it is capable of operation at 125% rated voltage for a period of one minute and 140% rated voltage for a period of five seconds due to sudden load throw off.	Toshiba understands that the transformer shall be so designed that it is capable of operation at 110% rated voltage continuously, 125% rated voltage for a period of one minute and 140% rated voltage for a period of five seconds due to sudden load throw off. Please confirm.	Bid specification prevails.
4	SECTION - 2	4.3	4.3.1 Off-circuit tap change (OCTC) as specified in the annexure shall be provided on the high voltage winding.	Please clarify which annexure to be referred to.	Annexure here means Data Sheet - A
5	SECTION - 2	4.7	4.7.5 In general, the arrangement shall be such as to permit removal of transformer without dismantling the bus duct /cable connection.	Please clarify on this requirement.	Bid Specification prevails.
6	SECTION - 2	4.14	4.14.1 Neutral bushing current transformers and phase bushing current transformers shall be furnished when specified in the annexure.	Please clarify which annexure to be referred to.	Refer Annexure - A, Section - 2, Page No: 113 of 440 in same volume IV-A
7	SECTION - 2	4.16.2	Impact recorder/indicator shall be provided to monitor the impact experienced by the transformer during transport.	We envisage impact recorder on returnable basis. Please confirm.	Confirmed . Pl. Refer Corrigendum -XI, Sr. No.1.
8	SECTION - 2	5.0	5.31 Tap-changing gear complete with tap position indicator, operation counter etc. For OLTC gear (where specified), oil surge relay (OSL) with shut-off valve, Local control cabinet and tap changer control in ECP (RTCC) and also DDCMIS/DCS.	We understand OLTC gear is not applicable here. Please confirm.	Confirmed. Pl. Refer Corrigendum -XI, Sr. No.2
9	SECTION - 3	3.0	3.7 IPBD (main run IPBD, Delta run, common tap-off to UT/Individual IPBD tap off to UT, Excitation Transformer Tap-off, SPVT cubicle) shall be sized considering generator voltage +/-10% voltage variation from grid source & generator source.	IPBD (main run) will be sized based on Generator output at VWO condition with 5% negative voltage variation (as mentioned in Volume-IIIB, section-1, page no 53 of 308, clause no:11.6) at generator terminal. Please confirm.	Refer Addendum -V. Sr. no.1
10	SECTION - 3	3.8	(b) 10% margin shall be considered on rating arrived at (a) above.	As mentioned in corrigendum-II, volume-IV-A, sl no:18,IPBD will be sized inline with generator transformer rating. Please confirm.	Deleted. Pl. Refer Corrigendum -XI, Sr. No.3.

VOLUME -IV-A					
Sl. No.	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Final resolution
11	SECTION - 3	4.7	4.7.2 The links shall be suitable for shorting bus conductors/enclosures of three	The mentioned drawing is not available. Please furnish the drawing.	Pl. refer Corrigendum -XI, Sr. No.4.
12	SECTION - 3	DATA SHEET - A	1.1 Rated voltage kV Generation Voltage +/-10%	In view of contradiction between the mentioned clauses, we have envisaged voltage variation of generator as +/-5%. Please confirm.	Pl. refer Corrigendum -XI, Sr. No.5.
13	SECTION - 3	DATA SHEET - A	2.3 RATED CONTINUOUS CURRENT	Continuous current ratings shall be as per system calculations. Please confirm.	Pl. refer Corrigendum -XI, Sr. No.6
14	SECTION - 3	DATA SHEET - A	3.6 C.T. RATINGS	Quantity & parameters of CTs shall be finalized during detailed engineering & shall be as per Toshiba standard.	Bid specification Prevails.
15	SECTION - 3	DATA SHEET - A	5.7 OTHER RATINGS Accuracy Class Rated VA	VA rating of VT shall be finalised during detailed engineering.	Bid specification Prevails.
16	SECTION - 3	DATA SHEET - A	6.4 Voltage Ratio Generator voltage/ 220 volt	Secondary voltage of NGT shall be as per Toshiba standard.	Bid specification Prevails.
17	SECTION - 3	DATA SHEET - A	6.5 Rated Output kVA 175 for 5 min	NGT will be sized for 10 second. Accordingly rating of NGT shall be determined However continuous rating will be lesser than short time rating. Please confirm.	Bid specification Prevails.
18	SECTION - 3	DATA SHEET - A	7.3 Resistance ohms 0.212 (Tentative to be	NGR will be sized for 10 second duration. Current rating & ohmic value of the resistor will be as per actual requirement.	Bid specification Prevails.
19	SECTION - 3	DATA SHEET - A	7.5 Voltage V 220	Voltage rating of resistor shall be inline with Toshiba standard practice.	Bid specification Prevails.
20	SECTION - 4	1.0	1.2 MVA rating of the transformer, as indicated above, shall be considered as the minimum requirement for the project. HV side voltage shall change according to Generator voltage. Transformer offered by the bidder & shall be sized according to the maximum demand considering No Load Voltage Correction factor 4% while sizing of Transformer at most stringent condition plus minimum 10% margin. Bidder shall furnish sizing calculation for owners/ consultant review/approval	We have envisaged 5% margin on the operating load and 5% No Load Voltage Correction Factor over that for ST Sizing. Request to accept our proposal.	Bid specification Prevails.
21	SECTION - 4	4.3	4.3.1 On load tap changer (OLTC) as specified in the annexure shall be provided on the high voltage winding, i.e 21 kV	Please clarify which annexure to be referred to.	Annexure here means Data Sheet -A
22	SECTION - 4	4.7	4.7.6 In general, the arrangement shall be such as to permit removal of transformer without dismantling the bus duct/cable connection.	Please clarify on this requirement.	Bid specification prevails.
23	SECTION - 4	4.15	4.15.1 Neutral bushing current transformers shall be furnished when specified in the annexure.	Please clarify which annexure to be referred to.	Annexure A of section IV shall be referred for details of Neutral bushing current transformers.
24	SECTION - 4	4.17	4.17.2 Impact recorder	We have envisaged the impact recorder to be on returnable basis. Please Confirm.	Pl. Refer Corrigendum -XI, Sr. No.7
25	SECTION - 4	4.17	Impact recorder/indicator shall be provided to monitor the impact experienced by the transformer during transport.	We envisage impact recorder on returnable basis. Please confirm.	Pl. Refer Corrigendum -XI, Sr. No.7

VOLUME -IV-A					
Sl. No.	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Final resolution
26	SECTION - 4	DATA SHEET - A	14.0 Short-circuit impedance at 75c at principal tap 11.5% +-10% on 35 MVA base	% Impedance of the transformers shall be finalized based on System Study results carried out during detail engineering.	Bid specification Prevails.
27	SECTION - 4	DATA SHEET - A	21.3 (b). Protective creepage distance	We have envisaged the protective creepage distance to be less than or equal to 50% of the Creepage distance. Please Confirm.	This will be decided during detail engineering.
28	SECTION - 5	1	1.3 Transformer offered by the bidder shall be sized according to the maximum demand at most stringent condition plus minimum 10 % margin	We have envisaged 5% margin on the operating load and 5% No Load Voltage Correction Factor over that for ST Sizing. Request to accept our proposal.	Bid specification Prevails.
29	SECTION - 5	4.7	4.7.8 In general, the arrangement shall be such as to permit removal of transformer without dismantling the bus duct/cable connection.	We understand that the arrangement shall be such as to permit the removal of transformer only by dismantling bus duct/ cable termination.	Bid specification prevails.
30	SECTION - 5	4.16.2	4.16.2 Impact Recorder	We have envisaged the impact recorder to be on returnable basis. Request to accept our proposal.	Pl. Refer Corrigendum -XI, Sr. No.8.
31	SECTION - 5	DATA SHEET - A	21 (b). Protective Creepage distance mm/Kv Bidder to specify	We have envisaged the protective creepage distance to be less than or equal to 50% of the Creepage distance. Please Confirm.	This will be decided during detail engineering.
32	SECTION - 6	2.0	2.1 All equipment and materials shall be designed, manufactured and tested in accordance with the latest applicable Indian Standards (IS) and IEC except where modified and/or supplemented by this specification.	Please note that standards available as on date of bid submission shall be considered as latest version of standards. Further modification if any shall be considered with implication in all respects. Customer is requested to accept the same.	Standards available on date of bid submission shall be considered as latest version of standards.
33	SECTION - 6	3.0	3.6 Bus duct and auxiliary equipment shall be capable of withstanding the mechanical forces and thermal stresses of the short-circuit currents listed in the annexure without any damage or deterioration of material.	We understand that the annexure here means the "DataSheet-A" of Segregated Phase Bus-duct". Please confirm.	Annexure here means Data Sheet - A
34	SECTION - 6	4.2	4.2.9 Shipping length of the bus duct shall be not more than three (3) metres in length. Each shipping section shall have at least two (2) supports both for conductor in each phase and enclosure.	Please note that the shipping length of busduct shall be as per manufacturer standard. Customer is requested to accept the same.	Bid specification Prevails.
35	SECTION - 7	1	1.2 (d) 3.3 kV Bunker Switchboard	Please note that the voltage level of Bunker switchgear shall be selected as per the system requirement. Please confirm.	Pl. refer corrigendum XI, Sr. no. 9.
36	SECTION - 7	1	1.3 Additional 11kV switchgears or 3.3kV switchgears for power plant, if required shall also be included under the Scope of power plant EPC Contractor without any price implication. However, Unit rates of HT switchgear feeder shall be furnished for each type of rating.	Please note that we have considered the number of switchgears as per system requirement and the same is basis for our proposal. No additional switchgears are considered. Customer is requested to inform the same should there be any additional requirement, if any, at this stage. Addition of switchgears during detailed engineering stage shall be considered with implication in all respects.	Not acceptable. Specification is self-explanatory.
37	SECTION - 7	1	1.12 Incomer from all the Unit Transformers & Station Transformers shall be provided with Lightning Arrestor 11kV side.	Please note that there is no technical requirement for providing Lightning Arrestor on 11kV side of Unit & Station transformer. Customer is requested to revisit this requirement.	Bid specification Prevails.

VOLUME -IV-A					
Sl. No.	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Final resolution
38	SECTION - 7	2	2.1 All equipment and materials shall be designed, manufactured and tested in accordance with the latest applicable Indian Standards (IS) and IEC except where modified and/or supplemented by this specification.	Please note that standards available as on date of bid submission shall be considered as latest version of standards. Further modification if any shall be considered with implication in all respects. Please confirm.	Standards available on date of bid submission shall be considered as latest version of standards.
39	SECTION - 7	3	3.5 Switchgear ratings and quantities are detailed in the Enclosed drawings and Annexure. Equipment shall be furnished in strict accordance with the same. For indicative power distribution, scheme ""Key Single Line Diagram for Electrical systems"" Dwg. No. PE-189-EL-501 shall be referred. All the rating shown in the above drawing represents the minimum requirement only; exact rating, number and type of feeders etc. shall be decided by the bidder.	We understand that the annexure here means the "Data Sheet-A" of HT Switchgear". Please confirm.	Annexure here means Data Sheet - A
40	SECTION - 7	3.11	The continuous rating of the 11/3.3kV switchgear buses and incomer breaker shall be based on the rated LV winding current of the transformer with 20% margin rounded off to the next higher standard rating.	Please note that while arriving at MVA rating of transformer, margin is already considered and next higher standard rating is selected. So as common engineering practice the incomer breaker rating of associated switchgear shall be same as that of transformer secondary winding ampere rating. There is no need of further margin of 20% which will result in oversizing of breaker. Customer is requested to revisit this requirement.	Bid specification Prevails.
41	SECTION - 7	4.1	4.1.9 Each switchboard should be supplied with suitable drilled foundation frame and anchor bolts from mounting the switchboard at site.	The switchgear baseframe mounting arrangement shall be as per manufacturer standard. Request to accept the same.	Bid specification Prevails.
42	SECTION - 7	4.3	(4.3.9 (a) Two (2) nos. of Trip Coils	We understand that two coils shall be provided. One Closing Coil and One Tripping coil. Please clarify whether our understanding is correct or not.	Specification is self-explanatory. Bid Specification prevails.
43	SECTION - 7	4.17	4.17.4 Wherever, the schematic diagrams indicate a definite ground at the for each switchgear, a single wire circuit thus grounded shall be run independently to the ground bus and connected thereto.	This requirement is not clear. Customer is requested to please clarify the same.	Pl. refer Corrigendum - XI, Sr. no. 10
44	SECTION - 7	4.24	An automatic 32 bit or higher micro processor based real time operated fast backed up by slow transfer scheme shall be provided for change over between unit to station sources and vis-a-vis, station to station sources (11KV & 3.3KV). All hardware pertaining to above transfers shall be mounted in Auto Bus transfer (ABT) panel. The bus transfer module shall have features such as graphical user interface, virtual test simulation, object oriented programming, on line viewing, sequence of event logging, self diagnostic features and communication port for remote communication. The ABT panel shall be indoor, simplex type construction, vertical free standing, floor mounted type, metal clad suitable for installation at 50 C ambient. Panel enclosure shall be fabricated from 2 mm thick sheet steel and the same shall be IP 52 protected. Detail write up on	Please note that fast Auto Bus Transfer shall be provided at 11kV unit and station switchgear as per specification. 3.3kV switchgears shall be provided with slow bus transfer. Please confirm.	Pl. refer Corrigendum - XI, sr. no. 11

VOLUME -IV-A					
Sl. No.	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Final resolution
45	SECTION - 7	4.25	Microprocessor Based Fast Bus Transfer System (BTS) shall be provided for unit to station and vis-a-vis & station-to-station supply changeover on all 11kV & 3.3 kV unit /station Switchboards.	Please note that fast Auto Bus Transfer shall be provided at 11kV unit and station switchgear as per specification. 3.3kV switchgears shall be provided with slow bus transfer. Please confirm.	Pl. refer Corrigendum - XI, sr. no. 12
46	SECTION - 7	4.26	Microprocessor Based Fast Bus Transfer System (BTS) shall be provided for unit to station and vis-a-vis & station-to-station supply changeover on all 11kV & 3.3 kV unit /station Switchboards.	Please note that fast Auto Bus Transfer shall be provided at 11kV unit and station switchgear as per specification. 3.3kV switchgears shall be provided with slow bus transfer. Please confirm.	Pl. refer Corrigendum - XI, sr. no. 13.
47	SECTION - 8	5.1	5.1.14 PCCs/PMCCs/MCCs/DBs/SVBs shall be supplied with base frames of 100mm height of structural steel sections along with all necessary mounting hardware required for bolting/welding the base frames to the foundation.	The switchgear baseframe mounting arrangement shall be as per manufacturer's standard. Customer is requested to accept the same.	Bid specification Prevails.
48	SECTION - 8	5.5	5.5.1 Switches shall be triple/double pole, air break type and designed for duties as specified in Annexure-A. Motor duty switches shall be capable of safely making and breaking the locked rotor current of the associated motor circuit.	Please note that the "duties" are not specified in "Annexure-A". Customer is requested to please provide the relevant Annexure details for the same.	Pl. refer Corrigendum - XI, sr. no. 14.
49	SECTION - 8	5.6.1	(c) Contactors for forward and reverse direction of reversible drives shall preferably be both electrically and mechanically interlocked.	Please note that as per common engineering practice, only electrical interlock is provided between the forward and reverse operation contactor and the same is widely accepted. Customer to revisit the requirement of providing Mechanical interlock.	Pl. Refer Corrigendum -XI, Sr. No.15.
50	SECTION - 8	5.10	5.10.3. (a) Class PS for differential	We understand that this clause is not applicable as the LT transformers shall not be differentially protected. Please confirm.	Pl. Refer Corrigendum -XI, Sr. No.16.
51	SECTION - 8	5.13.1	(a) All relays & timers in the protection circuit shall be flush mounted with connection from inside. They shall have transparent, dust tight covers, removable from the front. They shall have built-in testing facilities. Except small auxiliary relays and timers, all relays shall be drawout type.	Timers shall be installed and mounted inside the panel/ cubicle so there is no requirement of flush mounting. Customer is requested to accept the same.	Pl. Refer Corrigendum -XI, Sr. No.17.
52	SECTION - 8	5.13.1	(k) All DDCMIS/DCS/PLC operated motor feeders of any rating shall have ammeter & current transducer at "Y" phase.	Ammeter & current transducer at 'Y' Phase will be provided for motor rated 30 KW and above. Kindly confirm	Bid specification Prevails.
53	SECTION - 8	5.13.3	(a) Unless otherwise specified, relay shall be suitable to accept both AC/ DC supplies with range 110V to 240V with tolerance of +20%. The auxiliary power supply shall preferably be site selectable requiring no additional hardware.	Please note that tolerance shall be $\pm 10\%$ for AC and $\pm 10\%$, $\pm 15\%$ for DC as per specification requirement. Please confirm.	Bid specification Prevails.
54	SECTION - 8	5.16	5.16.3 Gland plates shall be minimum 4 mm thick. The gland plate and supporting arrangement for 1/C power cables shall be non-magnetic type to minimise the flow of eddy current.	We propose Gland Plates of 3 mm thickness. Kindly confirm.	Bid specification Prevails.
55	SECTION - 10	6.7	6.7.1 Motor terminal box shall be phase segregated (PSTB) type and located in accordance with Indian Standards clearing the motor base- plate/ foundation.	Phase segregated (PSTB) motor terminal box shall be provided only for HT Motors. Please confirm.	Pl. Refer Corrigendum -XI, Sr. No.18.

VOLUME -IV-A					
Sl. No.	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Final resolution
56	SECTION 13	1.0	1.2 MVA rating of the transformer, as indicated above, shall be considered as the minimum requirement for the project. Transformer offered by the bidder shall be sized according to the maximum demand considering additional running of one largest standby motor with driven equipment, No Load Voltage Correction factor 4% while sizing of Transformer at most stringent condition plus minimum 10 % margin	We have envisaged 5% margin on the operating load and 5% No Load Voltage Correction Factor over that for Transformer Sizing. Request to accept our proposal.	Bid specification Prevails.
57	SECTION 13	4.11	4.11.2 Wiring shall be done with flexible, 650V grade PVC wires in conduit or PVC armored cable. Minimum wire size shall be 2.5 mm ² copper. Not more than two wires shall be connected to a terminal. 10% spare terminals shall be provided.	We understand that this shall be 660 V grade. Please clarify.	Pl. Refer Corrigendum -XI, Sr. No.19

BHUSAWAL THERMAL POWER STATION 1X660MW UNIT - 6 PROJECT					
CLARIFICATIONS TO PRE-BID QUERIES					
BID SPECIFICATION No. DG/BSL U-6/2011/T-1					
VOLUME -IV-B					
Sl. No.	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Final resolution
1	SECTION - 2	3.1	3.1.4 15% margin shall be considered while calculating the total load on Transformer.	LT transformer will be sized based on operating load with 10% design margin including largest motor starting criterion. Please confirm.	Bid specification prevails.
2	SECTION - 2	3.1	3.1.7 All anticipated future loads in or around the load centres shall be taken into consideration while finalising size of L.T. Transformers.	We have not envisaged any anticipated future loads for sizing of L.T. transformers. Please confirm.	Bid specification prevails.
3	SECTION - 2	DATA SHEET	21.2 L.V. Non-segregated phase busduct	LV terminal will be suitable for cable/ NSPBD. Please confirm.	Bid specification prevails.
4	SECTION - 3	DATA SHEET - A	2.6.2 The ripple content in charger DC output Limited to 1% (rms) with or without battery	We propose ripple content in output DC as 3%. Please confirm.	Bid specification prevails.
5	SECTION - 4	4.6	(h) Current rating capacity of cables should be 110 % of full load current, after considering the derating factors.	Please note margins shall be considered for transformer & motor sizing and selection from pump capacities. Therefore, further margins on full load current is not proposed to be considered for cable sizing. Derating factors shall be considered in line with the standards while cable sizing. Request to accept our proposal.	Bid specification prevails.
6	SECTION - 5	2.0	2.2 Main plant electrical system shall be controlled and monitored from Station DDCMIS/EDMS through dedicated operator's consoles.	We understand that DDCMIS & EDMS both are same. Please confirm.	DDCMIS & EDMS are different. (Refer CI 13.0 of section-1 of Vol IV-A for details of EDMS). Bid Specification prevails.
7	SECTION - 5	2.0	synchronizing equipments, HT Switchgear manual synchronizing equipment, governor and excitation control, metering equipment, breaker control switches for GTs, 11kV, 3.3 kV & 415V Unit / Station switchgear incomers, tie and outgoing non-motor feeder breakers, synchronizing selector switches, Auto-Manual, Remote-Local and other selector switches as required along with annunciation windows, indications and mimic diagram (from 400kV level to 415V level). Cooler control for Generator Transformers, Unit Auxiliary transformer, Station auxiliary transformer, Cooler control & Tap changer control for Station Transformers and Unit Transformers in Remote- Manual mode shall also be provided in the Back-up Control Panel. DGs shall also be control from DDCMIS/EDMS as well as Electrical control panel. OTI & WTI of GT, ST, UT, SAT and UAT shall also be repeated in Back up control panel in addition to EDMS/DDCMIS.	Coolers for Generator Transformers, Unit Transformers, Station Transformers shall be controlled from local and their control is not envisaged from ECP.	Bid specification prevails.
8	SECTION - 5	ANNEXURE - B	1.1.12 Generator Rotor second earth fault (trip) Operated	We have envisaged only single stage rotor earth fault protection. Hence alarm for the same is not envisaged.	Bid specification prevails.

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CLARIFICATIONS TO PRE-BID QUERIES					
BID SPECIFICATION No. DG/BSL U-6/2011/T-1					
VOLUME - V					
Sl. No.	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Final resolution
1	SECTION - 1	4.0	4.15 In general, temperature transmitters shall not be used. Instead, temperature elements shall be directly connected to their respective input modules. For non-critical measurement applications (such as measurements for Boiler metal temperature and Generator winding temperature) where the measurements are not used for control/ protection, Sensors may be grouped and connected to I/O modules in DCS.	As per Bidder's proven practice, temperature transmitter shall be used for all temperature measurements of Steam Generator. Please confirm.	Bid specification prevails.
2	1	7.5.3 (b)-i	In addition to above, 20% wired input/output spare channel should be provided for each I/O modules.	Based on our past EPC experiences we feel that 10% total spare channel are sufficient & optimised design. We request Owner to reconsider their specification.	Bid specification prevails.
3	1	7.10.6(g)	At least 20 percent spare unwired terminals shall be provided for all panels/cabinets /desks /junction box etc. This shall be in addition to 20% spare wired terminals of spare IO channels and 10% wired spare modules.	As per the specification total spare terminals required are 50%(20%+20%+10%) which is very high and will increase the size of DCS System & non-optimised design. Based on our past EPC experiences we feel total 10% spare is enough. We request Owner to reconsider their specification	Bid specification prevails.
4	2	1.3.13	In addition to this redundant 24 V DC battery system is envisaged for DCS system .	Control systems can efficiently work on external UPS 230VAC supply. UPS system are very reliable & Bidder has lot of experience. Any other voltage level like 24VDC shall be derived inside the control system from AC supply. Bidder will provide UPS of sufficient capacity for this purpose. This practice is very common & is followed all over the world. Therefore 24VDC battery system is not required.	Bid specification prevails.
5	2	1.3.14(k)	Fire detection & alarm system for entire power plant.	Fire detection & alarm system is already indicated in Vol-III-H. Bidder understand that this item is repeated in this clause.	The item is not repeated in the clause. The subject clause in Section-2 denotes "SCOPE OF WORK" , whereas "Volume-III H " is detailed technical specification for Fire Detection & Alarm System .
6	2	1.3.18	Optical Time Domain Reflectometer and splicing kit for optical fiber cable testing & maintenance.	This item will be covered under C&I Lab Instruments as described in section-9 of Vol-V. Bidder understand that this item is repeated in this clause.	The item is not repeated in the clause. The subject clause in Section-2 denotes "SCOPE OF WORK" where as Optical Time Domain Reflectometer and Splicing Kit (2 nos. each) shall be supplied as per specification given in the Section- 5 Clause no. 6.20.1.
7	2	1.3.19	Bidder shall set up instrument laboratory with all necessary testing & calibrating equipments & instruments and test bench etc this shall include supply, installation & commissioning of all equipment.	As per bidder's understanding, this is C&I Laboratory Instrument package as described in cl. No. 1.3.35, page no. 76 of 718.	Section -2, clause. No. 1.3.19, specifies that Bidder has to set up Control & Instrument laboratory of adequate dimensions and facilities where all necessary testing & calibrating equipment & instruments and test bench etc as specified in Section -9 shall be supplied , installed & commissioned.

VOLUME - V					
Sl. No.	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Final resolution
8	2	1.3.21	Minimum 2 (Two) numbers of hand held configurators for SMART Transmitters.	This item will be covered under C&I Lab Instruments as described in section-9 of Vol-V.	Minimum 2 (Two) numbers of hand held configurators for SMART Transmitters shall be supplied as described in Section-9 of Vol-V.
9	3A	10.4	AAQMS shall include monitoring of the following pollutant gases/parameters. However, any other gases/parameters recommended by relevant Central & State regulatory agencies during project implementation phase shall also be provided. There shall not be any cost implication for the same to Owner.	We feel it will be judicious that cost for any additional analyser shall be borne by Owner.	Bid specification prevails.
10	3A	10.8(k)	Facility to interface exiting plant AAQMS shall be envisaged.	We request to provide more detail	Existing AAQMS Central Monitoring System to be interfaced with the new system.
11	3B	6.4.7 (b)	Balance leak off Pressure	This specification requirement is not clear. Pl clarify	Bid specification prevails.
12	3B	6.4.7 (i)	Top & bottom temperature	This specification requirement is not clear. Pl clarify	It means suction & discharge.
13	3B	7.1(q)	Ejector steam pressure control station with pressure transmitters.	Vacuum pump will be applied for this project hence this is not applicable.	Noted.
14	5	5.1.7	Selected data from Owner's system & off-site plants such as Ash Handling Plant, Raw water & Pretreatment plant, Dematerialized water plant and Coal Handling Plant etc shall be displayed/historized in CCR.	Please clarify what is "Owner's System"?	The clause shall be read as " Off-site plants such as Ash Handling Plant, Raw water & Pretreatment plant, Dematerialized water plant and Coal Handling Plant etc shall be displayed/historized in CCR."
15	5	5.1.27(k)	Management Information System (MIS) (Plant View Server) - Total 40 off located all over the plant including service building, shift charge engineer's room etc.	Please refer Cl. No. 5.1.17 (page no. 310 of 718) of sec-5, Vol-V, where specified the requirement of only MIS server and MIS stations will be in owner scope. Please clarify	Bidder to supply MIS Server only which shall be capable of connecting to and serving 40 Clients.

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BID SPECIFICATION No. DG/BSL U-6/2011/T-1					
VOLUME - V I A					
Sl. No.	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Final resolution
1	SECTION- 1	2.1.3 (k)	VDI:2056 : Criteria for assessing mechanical vibrations of machines	As per latest, VDI 2056 and VDI 2060 are replaced with ISO 10816 and ISO 1940 respectively. Please replace the codes in the code list.	Refer volume -VI-A, section-2, Annexure-1, Clause no. 7.0 (Special attention)
2	SECTION- 1	2.1.3 (l)	VDI:2060 : Criteria for assessing the state of balance of rotating rigid bodies.	As per latest, VDI 2056 and VDI 2060 are replaced with ISO 10816 and ISO 1940 respectively. Please replace the codes in the code list.	Refer volume -VI-A, section-2, Annexure-1, Clause no. 7.0 (Special attention)
3	SECTION- 1	3.1 (a)	Area Grading, levelling & dressing (finished grade levels shall be as mentioned in Plot plan and Area Grading Drawings. UCR/RCC retaining wall shall be provided as per requirement to retain the soil. If space permits, slope (1:3) shall be provided between two different grade levels. However slopes shall be protected with stone pitching with cement mortar (1:4).	As per Volume-II, Section-4, Annexure-B, Sl. No-2.1.3, The maximum allowable side slope for unpaved embankment is 1:2. Please clarify the requirement.	The slope of 1:2 shall be provided between two different grade levels instead of 1:3 slope. However, the slope shall be protected with stone pitching with cement mortar (1:4) to avoid erosion of slopes.
4	SECTION- 1	4.2.2	Building roof will be of Cast-in-situ R.C.C. over permanently colour coated (on exposed face) galvanized M.S. troughed metal decking of approved profile supported on steel beams/girders and the sides will be clad with permanent colour coated sandwiched insulated metal cladding system from Tripper floor to roof. The remaining portion of the building below Tripper floor up to ground floor shall generally be unclad. However, brick cladding shall have to be provided, if required, as per TAC and any other statutory requirements.	Concrete slab on metal deck shall be provided only for feeder and tipper floor, and all other floors shall be grating / chequered plate. Roof shall be metal cladding. Please confirm.	Bid specification Prevails.
5	SECTION- 1	4.2.2	Floors shall be of cast-in-situ RCC over removable shuttering.	Concrete slab on metal deck shall be provided only for feeder and tipper floor, and all other floors shall be grating / chequered plate. Roof shall be metal cladding. Please confirm.	Bid specification Prevails.
6	SECTION- 1	4.7.5	4.7.5 The cold water from the basin shall be taken out through an opening connected to the main CW closed Channel/duct, which in turn leads to a fore-bay of the CW sump. The cold water from the basin shall flow by gravity to open approach channel leading to the fore-bay. The cold water channel shall be provided with a slide gate. Suitable handling arrangements with a monorail and a chain-operated hoist with a travelling trolley shall be provided for handling of the slide gate. In front of the outlet structure, provision shall be made for de-sludging facilities so that sediments can be withdrawn from the basin. In order to clean the cooling tower basin, sludge drain are to be provided along its perimeter with suitable sludge sump of minimum size 1.0 M x 1.0 M, from where the sludge will be taken out to sludge box/chamber outside the basin for pumping out. The size of Box	Please provide the location of the closed channel and open channel	Cold water channel including fore bay shall be closed type except maximum 5.0m portion near NDCT outlet required for operation of gates and screens.
7	SECTION- 1	4.7.17.3 (d)	(d) Loads due to temperature and shrinkage effects. Temperature effects due to solar radiation shall also be considered.	In general practice only temperature loads are considered. There is no provision for taking solar radiation effect in the loading. Please clarify.	Temperature stresses shall be considered as per Volume-VI (A), Section-II, Clause No. 3.1.6, Page 185.

VOLUME - V I A					
Sl. No.	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Final resolution
8	SECTION- 1	4.17	For pipe drains, concrete pipes of minimum grade Class NP2 will be used. However, for road concrete pipes of Class NP3 will be used and for rail crossing, railway norms shall be followed.	For Road Crossings NP3 class Hume Pipes shall be provided encased in PCC, instead of RCC culverts. Please confirm.	Bid specification Prevails.
9	SECTION- 1	4.17	However, for road concrete pipes of Class NP3 will be used and for rail crossing, railway norms shall be followed. R.C.C. Manholes will be provided at maximum 30m intervals along the length, at connection points and every change of alignment, gradient or diameter of pipeline. The drains shall generally be of open type RCC rectangular construction. R.C.C. drains shall be covered with perforated R.C.C. pre-cast slab (M-25) of minimum 75mm thickness with provision of openable galvanized steel grating covers at every	Please specify the minimum length of the openable galvanized steel grating cover.	Minimum length of openable galvanized steel grating cover 1.2 M shall be provided.
10	SECTION- 1	4.18	Inside surface of the drain will have smooth neat cement finish over screed concrete. Invert of the drain shall be decided in such a way that the water can easily be discharged to the recommended nearest main plant drainage system. The minimum slope of the drain shall be 1:1000 longitudinally to take care of the silting problems.	We propose the only plaster to the drain wall.	Bid specification Prevails.
11	SECTION- 1	4.20	Above the chain link a 600 mm high tensile serrated galvanized wire (HTSW) concertina made with wire diameter of 2.5mm shall be stretched to 6m and attached to two strands of galvanized HTSSW of 2.5 mm diameter by means of clips at 1m intervals. These two HTSSW strands shall be attached to the fence posts with 12 mm security fasteners.	The maximum loop spacing should be specified.	Maximum loop spacing shall be 250mm.
12	SECTION - 2	3.1.11	All Power House columns adjacent to first row of Boiler columns shall be designed for an additional load of 500 kN to account for piping/cable rack loads.	We understand 500 kN vertical loads to be applied on each column adjacent to first row of boiler column. Please clarify at what level the load to be applied. (Or the load is distributed different levels like mezzanine floor, operating floor level etc.)	Bid specification is self explanatory.
13	SECTION - 2	3.4	Ultrasonic pulse velocity tests shall be carried out for the top decks of all machine foundations including. T.G deck slab, TG foundation and TG super structure/substructures to ascertain the homogeneity of concrete. In addition, additional cubes (at the rate of one cube per 150 Cu.m of concrete subject to a minimum of six cubes) shall be taken to carry out Ultrasonic Pulse velocity (UPV) testing on the cubes, to serve as reference UPV values. Testing shall be done as per IS:13311 (Part-1). In case of any defect, the EPC Contractor shall rectify the defects suitable using cement/epoxy grout, etc.	Please clarify whether UPV testing is required for block foundations like PA fan, FD Fan, ID fan, Mill foundations.	Ultrasonic pulse velocity test shall be carried out for the top decks of all machine foundations viz. T.G. , BFP, ID fan, FD fan, PA fan mill & sub structure & superstructure of TG foundation to ascertain the homogeneity and integrity of concrete. In addition-----using cement/epoxy grout, etc.
14	SECTION - 2	4.9	All underground water retaining/conveying system structures shall have plasticiser cum waterproofing cement additives conforming to IS: 9103 of SIKKA, FOSROC make. In addition, limits on permeability as given in contact with soil shall be provided with minimum two coats of bituminous painting of grade 85/25 conforming to IS:702 @ 1.7 kg/sqm (minimum) for water/damp proofing. Storm water drains shall not be provided with bituminous paint and weep holes also shall not be provided in storm water drains.	Please clarify if bitumen paint shall be done to the surfaces in contact with soil only for " All underground water retaining/conveying system structures" except storm water drains.	Bid specification is self explanatory.

VOLUME - V I A					
Sl. No.	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Final resolution
15	SECTION - 2	5.2.7 (c)	Tension in piles shall not be allowed for any combination of loads.	As per general industrial practice, tension within the allowable uplift capacity of the pile should be allowed.	Bid specification Prevails.
16	SECTION - 3	1.7	1.7 Shop primer paint will be single coat of red oxide zinc- chromate primer conforms to IS-2074. The surface preparation will be done in accordance with IS: 1477 (Part I & II) Code of Practice for Finishing of Ferrous Metals in Buildings. Second coat of primer shall be applied after erection and final alignment of the erected structures. Two or more coats of synthetic enamel paint conforming to IS: 2932 of approved shade and quality shall also be applied after erection. Total Dry film thickness of the finished paint shall not be less than 110 microns.	As per Vol-II, section-4, cl. 15.4.2, the total minimum DFT is specified as 120 micron. Please clarify the requirement.	Stipulation in Clause no. 15.4.1 & 15.4.2 , Section -4 Volume -II - Master specifications shall prevail.
17	SECTION - 3	5.4	Grating flats : 5 mm	As per Cl. 5.0 of section-3, Vol-VI/A the minimum thickness of the main bearing bar shall be 4 mm. Minimum thickness of Grating flat shall be considered as 4mm. Please confirm.	All indoor gratings shall be ----- 30mm x 100 mm. The minimum thickness of the main bearing bar shall be 5 mm. All gratings shall be hot dip galvanized @ 610 gm. / sqm.
18	SECTION - 4	2.6	Masonry work facing any transformer yard up to a required height shall be fire resistant as per code/LPA requirement. Minimum thickness of firewalls shall be 345 mm for brick walls and 200 mm for concrete walls.	We understand that this 345 mm brick wall or 200 mm concrete wall.	Minimum thickness of firewalls shall be 345 mm brick wall or 200 mm concrete wall.
19	SECTION - 4	2.11 (b)	External : 20 mm thick 1:4 Sand faced cement plaster to be laid in two courses to all external surfaces.	As per Cl.No.5.1.5 of Section-4, for external and rough surfaces, 18 mm thick plastering shall be considered for power house and other building. Bidder requests to confirm the thickness of plastering (20mm or 18mm)to be provided for external surfaces of walls.	Stipulation at Clause no. 2.11(b) , Section- 4 shall prevail.
20	SECTION - 4	2.11 (e)	RCC walls : 12 mm thick 1:6 Cement: Sand Plaster	The Bidder recommends that the surface of RCC walls will be made smooth, and no need of plaster on RCC walls. Please confirm.	Bid specification prevails.
21	SECTION - 4	2.13 (b)	In non-plant buildings, solid core commercial flush doors shall be used unless otherwise mentioned.	Please clarify, whether this is solid core wooden flush door.	Type of doors & windows shall be as per doors & windows schedule given under clause No.6.1 of section-4 of Vol.VI/A.
22	SECTION - 4	2.17 (d)	All staircases shall be in structural steel unless otherwise noted.	As per Vol. VI-A, section-4, Cl. 2.4 (e) RCC staircase shall be provided for all RCC construction buildings and structural steel staircase for all structural steel buildings.Please clarify.	Volume-VI (A), Section-2.4(e) shall prevail.
23	SECTION - 4	2.20 (a)		Please clarify whether the access through lift shall be provided till roof level or machine room to be on roof level.	The access through lift shall be provided till machine room to be on roof level.
24	SECTION - 4	4.1	The Technical Building is a 5-storied building (size 48M x 15M) including ground floor Building is located adjacent to the Power House Building as	Please confirm whether the bidder has any flexibility to reduce the building size without affecting the functionality of the same.	The Plan area specified under specification is minimum requirement.

VOLUME - V I A					
Sl. No.	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Final resolution
25	SECTION - 4	4.1 (c)	For pantry and toilet false ceiling shall be perforated aluminium stove enamel finished panels of size 600x600mm.	Please clarify whether false ceiling is required for pantry and toilet.	For Pantry and Toilet area gypsym based false ceiling shall be provided.
26	SECTION - 4	5.1.5	Plaster : Exterior & rough side : 18 mm thick with 1:6 cemen t- sand of interior brick wall mortar in two layers except where special finish provided.	As per Vol- VI-A, Section-4, Cl. 2.11 Plastering: Exterior & rough side : 20 mm thick with 1:4 cement- sand of interior brick wall mortar in two layers except where special finish provided. Interior : 12 mm thick with 1:4 cement-sand mortar Ceiling : 6 mm thick with 1:3 cement-sand mortar Please clarify the requirement.	For all external and internal plastering of all buildings, Clause no. 2.11, Section- 4 , Volume VI shall be applicable. Clauses other than this clause describing plaster shall be superseded by this clause.
27	SECTION - 4	5.1.16 (a)	All stairs shall have not more than 13 risers in one flight but in case of fire escape stairs, 15 risers may be allowed instead of 13 risers. Height of risers and width of treads shall be 180 mm (maximum) and 250 mm (minimum) respectively for fire escape stairs and 166mm (maximum) & 250mm (minimum) for general staircases. Minimum width of stairs shall be 1000mm for fire escape stairs and 1200 mm for general stairs. In general, rises shall be 150 mm.	As per Vol- VI-A, Section-4, Cl. 2.17 (b) , All stairs shall have not more than twelve (12) risers in one flight. Please clarify the requirement.	Clause no. 5.1.6 (a) shall prevail.
28	SECTION - 4	5.1.19 (a)	(a) RCC roof water tank of adequate capacity depending on the number of users for 8 hours storage shall be provided for each building.	As per Vol- VI-A, Section-4, Cl. 2.29 , Two numbers of roof water tanks (one for storing service water and another for potable water) of Polyethylene water storage tanks conforming to IS: 12701 shall be used. The tanks shall be complete with all fittings including lid, float valve, stop cock, vent pipe, etc. There is a mismatch. Please clarify.	The capacity sizing criteria and type of material of service & potable water tanks specified under these clauses are applicable only for potable water & service water distribution tanks required for the users/personnel working in the respective buildings. While finalising the capacity of these tanks the water requirement for equipment cooling, makeup of associated system, floor washing, fire fighting etc. shall be suitably considered during finalisation of service / potable water scheme. The service & potable water distribution tanks upto 5000 litre capacity shall be of polyethylene make and tanks above 5000 litres capacity shall be of R.C.C. make. The capacity & make of potable & service water storage tanks located on main plant building and other system buildings shall be as per respective specifications and as per approved scheme of service & potable water system.
29	SECTION- 1	3.3	"Rainwater harvesting scheme which is statutory requirement.....Central Ground Water Authority /Board"	Please indicate the size of Rain Water Harvesting Pond based on Central Ground Water Agency. Also kindly specify whether the pond shall be earthen or RCC with weep holes.	Bid specification is self explanatory.
30	Addendum-III		Technical Specification for Additional Sourcing Of Raw Water	We understand the right of way of the pipe route and the aquaduct and other facilities along the route is arranged by the owner.	Bid specification is self explanatory.

VOLUME - V I A					
Sl. No.	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Final resolution
31	SECTION- 1	4.4	Scope include site survey, soil investigation, site development works, complete design engineering and construction of Civil, Structural. obtain necessary various approvals from Railways, other Departments/agencies well in advance including necessary charges for permission part born by the EPC contractor	We understand that the approval from Railway and other departments are included in the scope of EPC. However, the arrangement of land (purchase of land) along the pipe route is in scope of Owner. Please confirm.	Land for routing of ash pipe lines will be made available by Mahagenco
32	SECTION- 1	3.1 (h)	Drainage network (storm water drains, oils/effluent & sewage water)	As per clarification dated 07-07-2012, the outfall of the storm water drain shall be at existing bridge no. 17, 18 (box culverts) and the necessary detail for the same shall be given to the successful bidder. We understand our scope is to make arrangement to connect the drain point with the existing culverts and existing culverts are designed to cater the drain from this plant area. Please provide the invert level of the existing culverts (basic requirement) to design the plant drainage system.	The invert level of the existing culvert at upstream end is at RL205.010M and at downstream end is at RL204.690m .The upstream side of these culverts shall be extended beyond formation width of proposed railway siding. The plant storm water shall be connected to rain water harvesting scheme pond. The excess rain water from rain water harvesting scheme shall be disposed of through the extended existing culverts. The disposal of storm water from downstream of existing culverts into Bhogavati river including required cross drainage works at road / compound wall crossings are also included in the scope of EPC bid. The invert level of final disposal point of storm water drain shall be 500mm above HFL having RL 198.2m.
33	Addendum-III	3	Scope of work.	We understand there is no works in scope of bidder from the inlet of the aqueduct up to the forebay of the existing (abandoned) pump house. Please clarify.	Cleaning and desilting of the canal stretched between the abandoned pump house and aqueduct is in the bidder's scope. Pls refer Addendum III cl. 3.1 c page 7 to 76.
34	Addendum-III	3.1.(a) Page 6 of 76	Providing and laying M.S. gravity pipe line in the inlet canal, from the existing river water pump house of MAHAGENCO located on Tapi river to aqueduct including all necessary connections for conveyance of water to the existing Raw water system with adequate slope	During site visit it was observed that the inlet canal from existing pump house to the aqueduct was full of water. Hence, provide the cross sectional details of inlet canal for estimation.	Please refer sketch attached with our letter no. 1863 dtd. 03.06.2013.
	Addendum-III	13.8 Page 37 of 76	Laying of pipe line in canal and filling around with sand upto canal top		
35	Addendum-III	3.1.(c) Page 7 of 76	The scope shall also include cleaning and desilting of approach canal to pump house and sump pump house, repairing/replacing of screens, inlet gate, inlet canal including new utilities for electrical, mechanical and ICA works for smooth operation.	We understand that the approach canal to be cleaned and desilted is stretched between the abandoned pump and aqueduct. Please confirm. Also provide the detail of approach canal/aqueduct including cross section and longitudinal section for estimation.	Please refer Bid specification and also sketch attached with our letter no. 1863 dtd. 03.06.2013.

VOLUME - V I A					
Sl. No.	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Final resolution
36	Addendum-III	9.3 Page 20 of 76	The M.S. gravity pipe line from existing river water pump house to aqueduct through inlet canal shall be designed for discharge of 9000 cum/hour (considering 24 hours operation per day). While designing the above pipe line, the agency shall ensure the same discharge after existing siphon arrangement.	Please provide the GA drawing for existing (abandoned) pump house indicating levels as same are required for calculation of pump TDH. Please provide the details of existing Siphon arrangement (including GA drawing) as same is not clear from specification. Please clarify.	Please refer Note no.1 of Annexure - II and sketch attached with our letter no. 1863 dtd. 03.06.2013.
37	Addendum-III	11.3.6(g)) Page 28 of 76	Cables coming from 6.6 KV feeders & from DG & compressor house shall have to cross railway line. Adequate duct bank shall be provided for crossing railway line.	If cables are coming from Existing 2x500MW Unit feeder, There is no cable crossing of railway line as per Plot plan, thus there is no Duct bank requirement. Please clarify.	Please refer Annexure-II- Layout of proposed pipe line from Tapi river water pump house to aqueduct & proposed pipe line from existing (abandoned) pump house to one day reservoir of 1x660MW.
38	Addendum-III	11.3.8 & Key SLD) Page 28 of 76	At present spare 220V DC feeders are not available in DG & Compressor house. Two feeders which are feeding 220 V DC supply to DG board PCC & AMF panel shall be disconnected and the same shall feed 2 nos new 220V DC Sub DBs to be supplied by the bidder. Required numbers of outgoing feeders are envisaged on these Sub DBs for owner's use. But as per Key SLD 4 nos. DC Fuse DB's are indicated.	Please clarify that DG and Compressor House pertains to 2x500MW or 3x210 MW unit for estimating cable route .	DG and Compressor House pertains to 2x500MW as indicated in Annexure II-Layout of proposed pipe line from Tapi river water pump house to aqueduct & proposed pipe line from existing (abandoned) pump house to one day reservoir of 1x660MW. Sr. no. 34 in Annexure-II is DG and Compressor House .
39	Addendum-III	13.2. Page 36 of 76	---to obtain necessary various approvals from concern Departments/agencies -----	Only customer's/customer's consultants approval on design/drawings are envisaged . Any statutory approval etc. from concerned department/agencies including necessary charges are beyond the scope of . Please confirm. this tender	Bid specification prevails.
40	Addendum-III	13.7 Page 37 of 76	Diversion of existing flow of water for connection of pipe line from existing tank.	This clause is not understandable , hence it needs to be clarified.	Proposed pipeline is to be laid in abandoned canal which is parallel to the canal in use. After completion of pipeline work, end connection shall be done with existing tank near Tapi Pump House. Necessary arrangement for connections to existing tanks shall be done by the bidders.

BHUSAWAL THERMAL POWER STATION 1X660MW UNIT - 6 PROJECT					
CLARIFICATIONS TO PRE-BID QUERIES					
BID SPECIFICATION No. DG/BSL U-6/2011/T-1					
VOLUME - V II-A2					
Sl. No.	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Final resolution
1	PE-189-PF-210		Ammonia dosing at CCCW system	Since NaOH will be dosed to CCCW circuit, no other (like Ammonia) is required . Please confirm our understanding.	Bid specification prevails.
2	PE-189-PF-210		NRV at CCCW Pump suction	As per referred flow diagram, NRV shown on connecting line between CCCW expansion tank & pump suction, which will oppose to expand hot water. Mahagenco to clarify.	Agreed.
3	PE-189-PF-210		Type of valve	Type of instrument root valve, cooler inlet & outlet valve will be decided during detail engineering stage based on bidder standard practice. Please confirm.	Bid specifications prevail

BHUSAWAL THERMAL POWER STATION 1X660MW UNIT - 6 PROJECT					
CLARIFICATIONS TO PRE-BID QUERIES					
BID SPECIFICATION No. DG/BSL U-6/2011/T-1					
VOLUME - V II-D					
Sl. No.	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Final resolution
1	PE-189-CV-SK-4005 P2 (ROAD LAYOUT)		Asphalt road in EPC scope.	In the Road layout drawing, there is road connecting existing road passing through the railway tracks of the existing plants. Please clarify the accessibility, permission for the construction of the roads to be arranged by the owner.	The road layout shall be finalised as per revised bid plot plan drawings & considering the accessibility to various systems /structures.



**MAHARASHTRA STATE POWER
GENERATION CO. LTD.**

**PROJECTS & PLANNING
DEPARTMENT**

BID SPECIFICATION NO.: DG/BSL U-6/2011/T-1

**CLARIFICATIONS TO PRE-BID
QUERIES**

TECHNICAL

CONSULTANT
PROCON ENGINEERS
(DIV. OF NIMOTO CONSULTING ENGINEERS PVT. LTD.)
202 A, Dosti Pinnacle, Plot E-7, Road no. 22,
Wagle Industrial Estate,
Thane (w)-400604

BHUSAWAL THERMAL POWER STATION 1X660MW UNIT - 6 PROJECT					
CLARIFICATIONS TO PRE-BID QUERIES					
BID SPECIFICATION No. DG/BSL U-6/2011/T-1					
VOLUME -II					
Sl. No.	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Final resolution
1	4	Annexure- D (SPECIFIC LAYOUT CONSIDERA TION)/CORRIGE NDUM-VII, S. NO. 2.0 PAGE 7 OF 34	AB -bay 36.0M, Mezzanine floor elevation : 9.0M, AB bay, BC bay floor levels at 0.0 M, 9.0M, 17.0M, 24.0M, 28.0M, 32.8M,38.0M. TDBFP Located at 17.0M Deaerator Floor - 38.0M	In line with present 660 MW projects under execution and OEM design, it is proposed to offer the optimised TG Building layout. The offered optimised layout will meet all O&M criteria. The overall project cost will unnecessarily increase if TG Building dimensions as specified in Tender Documents are retained. MahaGenco is requested to review & accept the optimised TG Building Layout. Following optimised layout dimesions of TG Building is proposed: AB-Bay-30.0M, Mezzanine floor elevation: 8.5M. AB & BC bay floor levels at 0.0 M, 8.5M,17.0M,25.5M & control tower floor elevations are at 0.0M, 8.5M,12.0M, 17.0M, 24.0M, 27.5M. TDBFP Located at 5.0M. Deaerator Floor- 25.5 M	Bid Specification and Corrigendum-VII, S. No. 2.0 Page 7 of 34 shall prevail.
2	4 PLOT PLAN (Drg. No. PE-189-GA-101) Issue-5, Note no.4	6.1.10 Note no.4	Plot Plan 1. Concept of various mechanical and electrical equipment location and building dimesnions (including column-row spacing) as shown in Plot Plan / Floor Plan drawing are to be adhered as far as possible. Any departure from this suggestive layout is primarily not recommended. 2. Bidder to note that the relative orientations and dimensions of various facilities as well as the inter-facility clerances shown in the plant layout have been conceived by the owner/ owner's consultant keeping in view the requirement of safe and hassle-free approach for operation and maintenance, Disaster management as well as logistic convenience with the existing power plant units. Bidder shall review the layout and improve upon, if deemed necessary keeping in view the overall intent of the project.	There is mismatch in the Tender requirements as per the two clauses. It is proposed to optimise the space requirements of various plant facilities as indicated in the Tender Plot Plan layout drawing. Various facilities as shown in the Tender Plot Plan drawing are proposed to be relocated / reoriented, without effecting the requirement of operation & maintenance space. The overall project cost will unnecessarily increase if the location / orientation / dimensions of various power plant facilities as indicated in Tender Plot Plan layout are retained. MahaGenco is requested to review & accept the optimised Plot Plan Layout.	There is no mismatch in the Tender Requirement as per the two clauses. Bid specification shall prevail. Bidder shall note that the dimensions indicated in Plot Plan & Tender Documents are minimum requirements and any increase in these dimensions, if required , from the point of safe and hassle free approach for Operation & Maintenance of the equipment, shall be in the scope of the Bidder only.



MAHAGENCO

**MAHARASHTRA STATE POWER
GENERATION CO. LTD.**

**PROJECTS & PLANNING
DEPARTMENT**

BID SPECIFICATION NO.: DG/BSL U-6/2011/T-1

CLARIFICATIONS TO PRE-BID QUERIES

BHUSAWAL THERMAL POWER STATION 1X 660 MW UNIT - 6 PROJECT							
CLARIFICATIONS TO PRE -BID QUERIES							
Bid Specification No. DG/BSL U-6/2011/T-1,							
Volume - I							
Volume	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Mahagenco Reply	Bidder's Query/ Clarification	Final Resolution
I	3	6.3	Auxiliary Power Consumption table, Sl. No. 5 - Excitation losses (in case of static excitation system with rectifier transformer)	As per Specification Vol III-B, Section-1, C..... ..excitation losses from auxiliary consumption list.	Bid Specification Prevail	1. Excitation power is considered in HR calculation as well as in auxiliary consumption. 2. Mahagenco r..... Auxiliary power consumption. This clarity will bring bidder's understanding at the same level	Clause as per Vol -I prevails.

BHUSAWAL THERMAL POWER STATION 1X 660 MW UNIT - 6 PROJECT					
CLARIFICATIONS TO PRE -BID QUERIES					
Bid Specification No. DG/BSL U-6/2011/T-1					
Volume - I					
S. No	Section No.	Clause No.	Bid Specification Stipulation	Bidder's query/Stipulation	MAHAGENC O Reply
292	3	2.2.2.3	"The generator to be supplied shall be manufactured assembled and tested in the factory where generator of at least 500 MW has been manufactured in the past or is under manufacturing / assembly at factory having testing facilities of international standard acceptable to technical agency / institutions to be approved by Owner	The clause may please modified to accommodate Indian manufacturing company set up to manufacture generators for supercritical projects Accordingly we request to you to add the following at the end of the para <i>"Alternately the same can also be manufactured in Indian Manufacuring Company set up as per clause 4.2.1 of Section 1/ Volume I"</i>	Refer Corrigendum- VI
293	3	2.2.3	Provenness Criteria of LPFWH: Capacity not less than 1300 MT/hr	Please modify as below: Feed Water Low Pressure Heater of a 500 MW or higher size unit	Refer Corrigendum- VI
294	3	2.2.3	Provenness Criteria of HPFWH: Capacity not less than 800 MT/hr for each string	Please modify as below: Feed Water High Pressure Heater of a 500 MW or higher size unit	Refer Corrigendum- VI
295	3	2.2.3	Provenness Criteria of LPFWH: Feed water handling Capacity not less than 1600 MT/hr	Please modify as below: Deaerator of a 500 MW or higher size unit	Refer Corrigendum- VI

296	3	2.2.3	Provenness Criteria of HP Bypass system	The HP Bypass Valves developed by us are suitable for both 500 MW sub-critical units as well as for 660 MW supercritical sets. These valves have been tested successfully at supercritical steam parameters and flow, temperature and pressure requirements and have been working for more than 2 years in 500 MW sets in the country. We interpret that our HP Bypass valves are proven. Kindly confirm.	Bid Specifications shall prevail.
297	3	2.2.3	Feed water high pressure heaters - Capapcity not less than 800 MT / hour for each string	Client to note that as per prevailing practice 2 x 50 % HP Hetaers string can be offered. Please confirm	Refer Corrigendum-VI

298	3	2.4.1	Power cycle piping The contractor / his proposed sub vendors should have designed, engineered (including static and dynamic analysis) fabricated / got fabricated AND should have experience in fabrication and welding of main steam piping	The two conditions of this clause contradict each other as the 1st condition allows fabrication by others while the 2nd condition stipulates fabrication experience also. We request you to delete the 2nd condition since fabrication is a specialised job done by fabricators/erection agencies Further We request you to add a new condition at the end of this clause In case the bidder / his sub vendor does not meet the requirements stipulated above in part or full but he is a regular piping design and engineering firm and currently carrying out the design and engineering plant units, may also be considered qualified provided he collaborates subcontracts / associates with a design firm / agency who meets the requirement of the clause above for the purpose of execution of design and engineering of power cycle piping system for this package. In such a case the bidder / its subvendors shall get the design / engineering documents as per technical specification duly vetted by his collaborator / sub contractor / associate for the part of design for which he is not qualified."	Refer Corrigendum- VI
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BHUSAWAL THERMAL POWER STATION 1X 660 MW UNIT - 6 PROJECT								
RESPONSE TO PRE - BID QUERIES								
Bid Specification No. DG/BSL U-6/2011/T-1								
VOLUME - II								
Sr No	Volume	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Clarification from Customer	Bidder's response	Final Resolution
1	II	4	17.2.1	Maximum noise level shall not exceed 85 dB (A) when measured at 1.0 M away from the noise emission source.	We understand that the.... of noise emissions.	Shall not exceed 85 dB(A) 1.0m equipment outline.	Bidder requests to consider "surface sound pressure level averaged over the measurement equipment area shall not exceed 85 dB(A)". Moreoverequipment. Please confirm ISO 3746 to be followed for Noise	Earlier response prevails.
2	II	4	17.2.3	Any statutory changes to Maharashtra Pollution Control Board or Central Pollution Control Board orll comply with the requirement. An exception will be made for the p.....and for the safety valves.	For the design of the Plant, ALSTOM can consider the statutory requirements regarding noise limitation, which are in force at the signing of the Contract and will be binding..	Bid Specification Prevail	With the specified tender requiriment the extent of meeting the statutory requirement is not limited and may impose the risk on bidder to meet the same wihtout additional cost even after signing of contract. Customer to relook at bidder's query.	Earlier response prevails.

BHUSAWAL THERMAL POWER STATION 1X 660 MW UNIT - 6 PROJECT								
RESPONSE TO PRE - BID QUERIES								
Bid Specification No. DG/BSL U-6/2011/T-1								
VOLUME - II								
Sr No	Volume	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Clarification from Customer	Bidder's response	Final Resolution
3	II	4	ANNEX URE-D	Level of Mezzanine floor 9.0m	Mezzanine floor shall be 8.5m as per std practise. Please confirm.	Bid Specification Prevail	Bidder will follow Mahagenco's specification for overall plot plan, TG hall width etc. However Bidder has proven engineered TG hall layout with mezzanine floor at 8.5m elevation. change in elevation will not make any difference to performance but will get benefit from proven solution. Bidder requests to have flexibility in selecting floor levels of TG hall.	Elevation can be altered by bidder subject to provision of adequate clearances between equipments, trouble free access for O & M etc. However, the acceptance of this deviation is subject to comprehensive review and approval of the layout considering all aspects during detailed engineeering.

BHUSAWAL THERMAL POWER STATION 1X 660 MW UNIT - 6 PROJECT								
RESPONSE TO PRE - BID QUERIES								
Bid Specification No. DG/BSL U-6/2011/T-1								
VOLUME - II								
Sr No	Volume	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Clarification from Customer	Bidder's response	Final Resolution
4	II	4	ANNEXURE-D	TDBFP at Operating Floor and MDBFP at Ground Floor in AB Bay	TDBFP at Operating Floor and MDBFP at Mezzanine Floor in AB Bay	Bid Specification Prevail	Bidder will follow Mahagenco's specification for overall plot plan, TG hall width etc. However Bidder has proven engineered TG hall layout, piping routing with MDBFP located at Mezzanine floor. change in elevation will not influence performance, but will get benefit from proven solution of bidder. Bidder requests to have flexibility to locate MDBFP at Mezzanine floor.	TDBFP can be located at mezzanine floor; however, this is subject to the bidder meeting all requirements related to engineering and O & M aspects; However, the acceptance of this deviation is subject to comprehensive review and approval of the layout considering all aspects during detailed engineering.
5	II	7	Annexure A	FORMAT OF QUALITY ASSURANCE PROGRAMME ANNEXURE - A	We understand that referred format is for Manufacturing quality plan. Bidder.....ble to transfer these into MAHAGENCO's format b. For BOP equipment, Quality plans shall be submitted in Annexure A- format	Bid Specification Prevail	Bidder request Owner to reconsider Bidder's clarification.	Bid Specification Prevail

BHUSAWAL THERMAL POWER STATION 1X 660 MW UNIT - 6 PROJECT								
RESPONSE TO PRE - BID QUERIES								
Bid Specification No. DG/BSL U-6/2011/T-1								
VOLUME - II								
Sr No	Volume	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Clarification from Customer	Bidder's response	Final Resolution
6	II	8	1.1.8 (III)	The P. G. test shall be carried out within four (4) months after first synchroni.....n the first synchronisation and PG test exceeds four (4) months. (i) 0.1 % for the following eight (8) months (ii) 0.06 % for the period following thereafter.	As per tender specification P. G. test shall be carried out in line with ASME PTC 6. Aging shall be considered in line with ASME PTC 6 Report. We request you to accept the bidders proposal.	Bid Specification Prevail	Bidder request Owner to reconsider Bidder's clarification inline with ASME PTC 6.	Earlier response prevails.
7	Volume-II	8	1.4.3	Run back capabilities: The automatic runback capability of the unit (boiler- turbine-generator) on loss of critical auxiliary equipment (such as tripping of one ID/FD/PA fan/airheater/BFP/ CEP etc) shall be demonstrated ensuring smooth and stable runback operation.		Bid Specification shall prevail	Boiler output shall be automatically reduced to a preset value when the follwing unit operating condition occurs: One ID fan Trip, One PA fan Trip , One FD fan Trip, One AH Trip, Loss of Main turbine. Target load is 50%BMCR, except for Loss of main turbine where it will be 60%BMCR variable pressure mode(HP-LP bypass capacity). Run back rate will be 50% per min. Please confirm	Earlier response prevails.

BHUSAWAL THERMAL POWER STATION 1X 660 MW UNIT - 6 PROJECT								
RESPONSE TO PRE - BID QUERIES								
Bid Specification No. DG/BSL U-6/2011/T-1								
VOLUME - II								
Sr No	Volume	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Clarification from Customer	Bidder's response	Final Resolution
8	Volume-II	8	1.4.4	Rate of change of load and sudden load change withstand capability: The capability of boiler-turbine-generator in regard to ramp rate and step load change as specified shall be demonstrated.		Bid Specification shall prevail	The rate of load change as per design shall be as follows. <u>Ramp Rate</u> Load Range Sliding Pressure Operation 30-50% 2% MCR/min 50-90% 3% MCR/min 90-100% 1.5% MCR/min <u>Step Load Change(sliding pressure):</u> From 100% to 50% :±10%	Earlier response prevails.
9	Volume-II	vol- II,sec-8, pg 169-555	1.4.5	a) Capacity output of one coal pulveriser ----100% mill loading at rated pulverised coal fineness with specified design coal with new set of grinding elements	Capacity test of ONE mill at rated capacity (i.e 90% of the Mill max. theoretical capacity) will be done for establishing its capacity at rated pulverized coal fineness (i.e 70% through 200 mesh and 98% through 50 mesh) and specified "design coal", applying corrections for variation in HGI, Moisture and PF Fineness.The capacity test shall be done in ONE Mill after 3000 hours of Mill Operation.	bid specification prevail	Tender specification does not describe nearly worn out condition for grinding elements. Typically this is 80% of the allowable maximum wear. Please confirm for 80% Mill wear, 90% output of the new condition	Specification is self-explanatory.

BHUSAWAL THERMAL POWER STATION 1X 660 MW UNIT - 6 PROJECT								
RESPONSE TO PRE - BID QUERIES								
Bid Specification No. DG/BSL U-6/2011/T-1								
VOLUME - II								
Sr No	Volume	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Clarification from Customer	Bidder's response	Final Resolution
10	Volume-II	8	1.4.6	Life of mill wear parts Life of mill wear parts, in hours of operation, for the entire range of coal characteristics specified.	Wear life for grinding elements shall be 6000 hours with a coal of max. 50 YGP. Correction curve supplied by MILLS shall be used if actual coal being grinded is of a higher YGP. Wear life shall be defined as achievement 100 mm of wear on grinding rolls and 45 mm of wear on BRS.	bid specification prevail	Tender specification does not mention coal YGP or how the wear life is determined. We assume that wear life for grinding elements shall be 6000 hours with a coal of max. 50 YGP. Correction curve supplied by MILLS shall be used if actual coal being grinded is of a higher YGP. Wear life shall be defined as achievement 100 mm of wear on grinding rolls and 45 mm of wear on BRS. Customer to confirm.	Earlier response prevails.

BHUSAWAL THERMAL POWER STATION 1X 660 MW UNIT - 6 PROJECT								
RESPONSE TO PRE - BID QUERIES								
Bid Specification No. DG/BSL U-6/2011/T-1								
VOLUME - II								
Sr No	Volume	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Clarification from Customer	Bidder's response	Final Resolution
11	Volume-II	8	1.4.7	No fuel oil support above 30% BMCR load It shall be guaranteed that oil support for flame stabilization shall not be required beyond 30% of BMCR load when firing the coals from the range identified. It shall be demonstrated that with any combination of mills/ adjacent mills in service, the steam generator does not require any oil firing for stable and efficient boiler operation at and above 30% BMCR loads.	The minimum stable load without fuel oil support shall be 40% of BMCR load, with two adjacent mills in service and mill loading not less than 50%	bid specification prevail	OEM recommendation is as follows Min stable load without oil support will be 35%BMCR or 40%TMCR load. Please confirm	Earlier response prevails.
12	Volume-II	8	1.4.10	Steam temperature imbalance It shall be demonstrated at SH and RH outlets (in case of more than one outlet) that the temperature imbalance between the outlets does not exceed 10 deg. C under all loads including transients.	The SH & RH temperature imbalance between the outlets are considered maximum 30 °C differential during steady state operation only	bid specification prevail	OEM design is for maximum 30Deg C differential. Based on the bidder's experience, the steam temperature imbalance between outlets will exceed 10 deg.C during some transients; therefore, the specified imbalance is only offered during steady state operation. please confirm	Earlier response prevails.

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13	Volume-II	8	1.4.11	It shall be guaranteed and demonstrated that the spray water flow to SH attenuation system does not exceed the value considered for design (to be indicated in the bid) while maintaining the rated SH outlet steam temperature at BMCR. It shall also be guaranteed and demonstrated that the RH temperature is maintained at the rated value without any spray water requirement, at all loads for which the specified RH steam temperature is required to be maintained at the rated value.	SH spray shall be maintained at around 4% at all operating loads. RH spray shall be zero at guarantee load of 100% TMCR only.	bid specification prevail	The RH Spray (Nil) shall be guaranteed at TMCR DC (SG Performance Guarantee load) alone. Please confirm	RH sparay (Nil) shall be guaranteed at 100 % and 80 % TMCR

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14	Volume-II	8	1.4.12	It shall be demonstrated that maximum furnace exit gas temperature (FEGT) shall be minimum 60 Deg C below the minimum initial deformation temperature (IDT) of ash. A comprehensive thermal performance test (TPT) shall be conducted for this purpose. FEGT shall be demonstrated through such TPT by indirect measurement.		Bid Specification shall prevail	The maximum variation in FEGT is about 50 deg C higher than predicted value which is 60 deg C below IDT . TPT will be combined along with PG test. No separate TPT is envisaged.Please confirm	Earlier response prevails.
15	Volume-II	8	1.4.13	Air Heater exit temperature.		Bid Specification shall prevail	SG Efficiency is already being guaranteed per PTC 4. RAPH exit gas temp will be not be part of Functional guarantees. Pl. confirm	Earlier response prevails.
16	II	8	1.4.18	Constant Pressure and Sliding Pressure Operation - The c.....demonstrated. In sliding pressure mode of operation,.....hall also be demonstrated.	Thesetagory III guarantee. We propose following operation c.....R: Constant Pressure Operation through overload valve. The generating unit shall be capable of3/2006). No throttling is envisaged in sliding pressure operation.	Will be evaluated after receipt of detailed scheme by bidder.	Bidder requests to accept the Bidder's operation concept as it have impact on guarantees.	Earlier response prevails.

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17	II	8	1.4.20	Short Circuit Capability The Gene.....ed voltage and with fixed excitation for 3 seconds as per IEC 34-4.	This requirement is design require.....tor electrical and mechanical integrity and should be avoided.	Bid Specification Prevail	Bidder request Owner to reconsider Bidder's clarification.	Refer to point no 4.0 Vol II ,of corrigendum V.
18	Volume-II	8	1.4.37	Flue Gas Temperature demonstration: The Bidder shall demonstrate that flue gas temperature at the entry and exit of various Boiler heating surfaces and also the variation across the cross section perpendicular to gas flow do not exceed the values considered for the pressure parts design at all loads of boiler.		Bid Specification shall prevail	Indicative value shall be provided and will not be part of Functional guarantees as It will be noted during commissioning. Please confirm	Earlier response prevails.

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VOLUME - III A								
Sr No	Volume	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Clarification from customer	Bidder's response	Final Resolution
1	IIIA	1	Data sheet A-1.19	Feed water temp at HP heater outlet (290-300 deg C)	Bidder wants to delete the band	Bid Spec prevail	Bidder wants to delete the band	Bid Spec prevail
2	IIIA	1	Note -1	BMCR Capacity	Bidder wants 107 % TMCR	Bid Spec prevail	Bidder wants 107 % TMCR	Bid Spec prevail
3	Volume-III A	1	2.3.12, 2.3.1.4 2.3.2.5 2.3.2.6 2.3.2.8 5.25.2.3	Start-up drain and vent regulating valves and isolating valves shall ... at superheater and reheater outlets, lowest set pressure safety valves on the water separators shall be provided with silencers. All vent pipes and safety valves escape pipes to a level of 1 meter above SG house roof. Start-up drain and vent regulating valves with motor drives Start-up drain and vent isolating valves with motor drives All start-up vents, lowest set pressure spring loaded safety valves on Superheater outlet and Reheater outlet shall be provided with silencers shall be provided with silencers. The start-up vent lines shall be provided with one motorised isolating valve and one motorised regulating valve.	For once through supercritical boilers start-up vents are not envisaged since the boiler will be started with HP-LP bypass in operation. The vent valves provided will be used for air release purpose only during boiler filling. Hence motorised valves and silencers are not necessary. As per the bidder standard the vent pipe shall be routed to the safe location.	Bid Specification shall prevail	As per design, Safety valve and ERV at SH O/L & RH O/L are provided with Silencer to lowest set pressure only. Startup vent at SH O/L is provided with silencer, however it is not provided at RH O/L for IP steam air vent. Two motorized isolating valve shall be provided for startup vent & drain. No regulating valves are envisaged. Please confirm	This will be taken up during bid evaluation stage after revieweing the details

4	Volume-III A	1	2.3.2.10	MSSV	we understand that the bypass line referred here is small capacity bypass for equalising. Please confirm.	motorised regulating as well as isolation valve for charging shall be provided.	Motorised ON/OFF type MSSV & manual isolation valve shall be considered as per OEM practice. Please confirm	Bid Specification is self-explanatory
5	Volume-III A	1	2.5.1 (c) 13.8	Electrically operated guillotine type gas tight isolations: Before and after each regenerative air heater on both flue gas and air side Double multi louvre type isolation dampers shall be provided before and after each regenerative air heater on air side	Kindly confirm whether double multi louvre type isolation dampers can be provided on the gas side also from layout considerations.	Bid Specification shall prevail	Guillotine type dampers /gates are envisaged at a) individuals FD and PA fan outlets, b) Inlet & outlet of each ESP gas stream, c) Before & after each ID fan. d) Manual transfer dampers shall be provided at seal air fan discharge. e) Pneumatic control & isolation dampers shall be provided at Hot and Cold air duct to each mill. f) Guillotine type dampers at inlet & outlet of APHs on flue gas side & air side are not envisaged, however Bi-planar/Louver type of isolation dampers shall be provided at each air heater inlet & outlet both on the flue gas side and air side. Please confirm	Earlier response prevails.
6	Volume-III A	1	5.8.1	The outlet temperature of SH and RH shall be guaranteed to be maintained within $\pm 5^{\circ}\text{C}$ of the rated temperature condition from 60% to 100% BMCR.....	Please clarify whether the required steam temperature control range has to be considered as 60% TMCR (control load) to 100% BMCR.	50% to 100 % BMCR	As per OEM design, 60%TMCR as a lower control range point for rated SH/RH temp to be considered. Please confirm	Earlier response prevails.

7	Volume-III A	1 / 53 1 / 53 1 / 90	5.11.95.11.9 Data sheet-A. Sr.No:13.1	The Air Heater shall have peripheral duplicate A.c. The Air Heater shall have peripheral duplicate A.c. drive to be able to run the air heater at the rated RPM in the event of failure of one of the Air Heater drives. Air Heater: Rotary Regenerative, Tri-sector type or Bisector Type. Each with two peripheral AC motor drive and one independent air motor drive along with one air receiver of minimum 10 minutes capacity.	As per OEM standard centrally mounted motor. As per OEM standard centrally mounted motor drive shall be provided.	Bid Specification shall prevail	Each Air preheater is provided with 1 AC motor and 1 air motor as per OEM design. Please confirm	Earlier response prevails.
8	Volume-III A		5.12.4	Cross-connections with sufficient number of power operated dampers shall be provided such that, to the limits of their capacity, the Steam Generator may continue to operate safely following the loss of any one F.D. fan, I.D. fan or air heater (if applicable).	Cross-connection duct at FD and PA fan outlet shall not be provided due to layout constraints. However Cross connection shall be provided at ESP outlet for ID fans.	Bid Specification shall prevail	Only single stream operation (1 FD fan, 1 ID fan, 1 PA fan & 1 RAPH on the same side) is applicable as per OEM design	Earlier response prevails.

9	Volume-III A	1	10.7	Tube and header materials: Design Metal Temperature: Upto & including 550° C :Alloy steel to ASME SA 335:P Upto & including 550° C :Alloy steel to ASME SA-335:P-11/ P-12/P-22/;ASME SA213:T-11/T-12/P-22/;ASME SA213:T-11/T-22/or equivalent Upto & including 600° C: Alloy steel ASME SA-335/P-91/ 92; SA213 T-91/92 or equivalent	Design Metal Temperature: Upto & including 550° C :Alloy steel to ASME SA-335:P-11/ P-12/P-22/;ASME SA213:T-11/T-12/T-22/or equivalent 22/or equivalent Upto & including 600° C: Alloy steel ASME SA-335/P-91/ 92; SA213 T-22/T-91/92 or equivalent, Austenitic stainless steel	Clause suitably amended; please refer Corrigendum- II	Upto & Including 400 deg C - SA 106Gr C, SA210 Gr C. Upto & including 510 Deg C : Alloy steel to ASME SA-335:P-11/ P-12/;ASME SA213:T-11/T-12/or equivalent Upto & including 550 Deg C : Alloy steel to ASME SA-335:P-22, ASME SA213:T-22 or equivalent Upto & including 605° C: Alloy steel ASME SA-335/P-91/ 92; SA213 T-91/92 or equivalent Temp >605 deg C. Austenitic Stainless steel, SA213 TP347H, SA 213 304H clause 10.6 while replying this point.	Upto & Including 400 deg C - SA 106Gr C, SA210 Gr C. Upto & including 500 Deg C : Alloy steel to ASME SA-335:P-11/ P-12/;ASME SA213:T-11/T-12/or equivalent Upto & including 550 Deg C : Alloy steel to ASME SA-335:P-22, ASME SA213:T-22 or equivalent Upto & including 600° C: Alloy steel ASME SA-335/P-91/ 92; SA213 T-91/92 or equivalent austenitic stainless steel Temp >600 deg C. Austenitic Stainless steel, SA213 TP347H, SA 213 304H/ equivalent.
10	Volume-III A	1	data sheet A	Minimum load with separator running dry shall be 30% BMCR	Minimum once through load with separator running dry shall be 35% BMCR (i.e SGMCR).	Bid Specification shall prevail	As per OEM design, minimum once through load with separator running dry shall be 35% BMCR (i.e SGMCR). Pls. Accept.	Earlier response prevails.

11	Volume-III A	1	Data sheet-A. Sr.No:19.5	ID fan capacity: (i) Excess air-20% over Stoichiometric air. (ii) Air heater air in-leakage - Primary air leakage 15% and Secondary air leakage 10%. (iii) Air in leakage-1 % of ESP inlet gas flow and 2% through ducts	(ii) Since bidder will provide the trisector air heater in the proposed project the total airheater leakage (primary + secondary) is about 6%. Hence for the ID fan selection the total airheater leakage shall be considered instead of primary air and secondary air leakage separately. (iii) Since we ensure the air ingress through the duct is zero same shall be considered for ID fan sizing.	Bid Specification shall prevail	The RAPH leakage shall be considered as 10% for ID fan sizing calculation at BMCR Worst coal. Please confirm.	Earlier response prevails.
12	Volume-III A	1	Datasheet :Note 6(page 106)	Mill turn down ratio shall normally be 4:1.	Mill turn down ratio shall be 2:1, as minimum 50% mill loading is recommended.	Bid Specification shall prevail	The Coal firing system (each mill with corresponding firing elevation) shall have a turndown ratio of 2:1, since mill loading 50%, with minimum two adjacent mills in operation is always recommended. Please confirm	1: 2.5 shall be considered against 1:4 specified.
6	Volume-III A	1	2.2.4	Steam generator structure, water circulation system, water-steam separator system with two or more separators and a storage vessel for collecting the separated water. Minimum Two (2) steam separators along with a drain collection vessel at the evaporator outlet shall be provided.	Alstom standard design is with two (2) nos. of Integral Separator cum Storage Tank for a 660 MW power plant capacity.	Bid Specification shall prevail	This is as per OEM design. Please accept	Bid Specification is self-explanatory

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Volume	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Mahagenco Reply	Bidder's Query/ Clarificafication	Final Resolution
IIIB	1	2.1.3	Duplex type Turbine digital electro hydraulicure, level switch, primary sensing device etc.), as required	Load control will be carried out by Electroh.....sign. Please confirm acceptance of bidder's design.	Bid Specification Prevail	This is OEM specific design . Bidder request Owner to consider OEM standard design	Earlier response prevails.
IIIB	1	2.1.37	The scope of Instrumentation & Control shall include but not be limited to the following, as elaborated in Volume V. (g) Electro-hydraulic Governor with mechanical backup.	Electronic backup for electrohydraulic governor is provided as per bidder's proven practice. Mechanical backup is not applicbale as per bidder's design. Please provide acceptance of bidder's standard design.	Bid Spec is self explaninatory	OEM specific requirement.	Earlier response prevails.
IIIB	1	2.1.37	The scope of Instrumentation & Control shall include but not be limited to the following, as elaborated in Volume V. (g) Electro-hydraulic Governor with mechanical backup.	Electronic backup for electrohydraulic governor is provided as per bidder's proven practice. Mechanical backup is not applicable as per bidder's design. Please provide acceptance of bidder's standard design.	Bid Specification Prevail	This is OEM specific design . Bidder request Owner to consider OEM standard design	Earlier response prevails.

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Volume	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Mahagenco Reply	Bidder's Query/ Clarificafication	Final Resolution
IIIB	1 & 4	3.4 & 4.1	Condenser pressure to be 76 mm Hg absolute			In the corrigendum -II, deviation between cl.3.4(sec.I) and cl.4.1(sec 4) observed.Pl. clarify	Reply given against setioc -4, Cl. 4.1, at Sr. no. 30 on page 44 of 274 of the corrigendum - II shall prevail.
IIIB	1	5.1	The Steam Turbine shall be of Supercritical, Condensing, Reheat andoutput have been indicated in Datasheet-A.	As per bidder's design only throttling governing is envisaged. Please confirm acceptance of OEM design.	Bid Specification Prevail	This is OEM specific design . Bidder request Owner to consider OEM standard design	Earlier response prevails.
IIIB	1	6.1.4	The Steam Turbine casings shall be horizontally split at the centreline.	HP turbine casing shall be as per OEM proven design. Please confirm.	Bid Specification Prevail	This is OEM specific design . Bidder request Owner to consider OEM standard design	Earlier response prevails.
IIIB	1	6.2.1	Alternatively, the rotor could also be of proven welded construction. & If the HP-IP or IP-LP rotor is of welded type, only one weld is permissible between the rotors	OEM's standard & proven design is with w.....od ules & there is no welding involved for HP-IP or IP-LP.. Also refer to clause 6.2.2	Bid Specification Prevail	This is OEM specific design . Bidder request Owner to consider OEM standard design	Specification is self-explanatory

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IIIB	1	6.2.4	Critical speed of composite rotor and blade assembly shall not be within $\pm 15\%$ of operating speed.	As per bidder's design and proven practice the critical speed of the combined turbine and generator rotor shall not lie within a range of + 15% or - 10% of the operating speed of 3000 rpm. Please consider bidder's proposal.	Bid Specification Prevail	Critical speed is OEM specific design. Bidder request Owner to consider OEM standard design	Earlier response prevails.
IIIB	1	6.2.8	Facility for wet steam washing of turbine casings and rotors shall be provided with a tapping from nearby piping and procedure for the same shall be furnished by the bidder. Wet steam washing system for Turbines, if recommended by the bidder.	Wet steam washing system for turbines is not recommended by the bidder. Pl. refer to clause 2.1.13 also	Will be evaluated after receipt of detailed scheme by bidder.	OEM specific requirement.	Earlier response prevails.
IIIB	1	6.3.3	LP Turbine shall have stand-alone type blades capable of sustaining -5% & +3% grid frequency variation.	LP last stage blades shall be as per OEM's standard design.	Bid Specification Prevail	As per Bidder's design, last stage blade are shrouded to reduce vibration stresses and it improves life of the blades. This is OEM specific design . Bidder request Owner to consider OEM standard design	In case the bidder proposes shrouded blades, the bidder shall describe the wetness and erosion mitigation measures provided.

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IIIB	1	6.9.4(a)	Double valves shall be provided on all extraction lines except for extraction line to LP Heater-I in Condenser neck. For extraction line to de-aerator, both the NRV's shall be power operated type.	NRVs in each extraction line will provided as per bidder's safety guidelines and standard proven practice. Please confirm acceptance of bidder's standard proven practice.	Bid Specification Prevail	Bidders standard and proven practice inline with ASME TDP requirements.	Earlier response prevails.
IIIB	1	6.11.3	Speed Changer The Turbine shall be provided with a speed..... synchronising of the Generator with the bus	As per bidder's design, speed regulati..... and proven design.	Bid Specification Prevail	This is OEM specific design . Bidder request Owner to consider OEM standard design	Earlier response prevails.
IIIB	1	6.11.4	Load Limiting Device Turbine shall be equipped with ae generator supervisory panel.	As per bidder's design, speed regulati..... of bidder's standard and proven design.	Bid Specification Prevail	This is OEM specific design . Bidder request Owner to consider OEM standard design	Earlier response prevails.
IIIB	1	11.11	CAPACITY WITH ONE GAS COOLER OUT OF SERVICE In the of the machine being exceeded.	Following IEC 60034-3, the offered generato.....the machine being exceeded.	Bid Specification Prevail	Bidder request Owner to reconsider Bidder's clarification.	Bidder's request is accepted. As per IEC 60034-3, the offer generator shall be capable of carring 67% of rated load continuously without the permissible temperature of the machine being exceeded.

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Volume	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Mahagenco Reply	Bidder's Query/ Clarificafication	Final Resolution
IIIB	1	12.3	Ripple springs shall be provided below.....he bars in the slot during operation.	The Bidder's proven stator slot wedgi.....rs in firm position in slots.	Bid Specification Prevail	Bidder request Owner to reconsider Bidder's clarification.	Being OEM intrinsic design, bidder's request is accepted.
IIIB	1	12.4	The seal off bushing shall be porcelain type and complete with silver plated terminal connectors.	The bushings design will meet DIN 48124 Part 2 standard. The bushings are of moulded resin-insulated type.	Bid Specification Prevail	Bidder request Owner to reconsider Bidder's clarification.	Being OEM intrinsic design, bidder's request is accepted. However type test certificate shall be submitted along with the Bid. Also customer reference list of last five years shall also be submitted along with Bid.
IIIB	1	12.12.2 12.12.3	The system comprises of oil tanks, defoamingbef ore being returned to main oil system.	Bidder's seal oil system is separated from.....su pply, which should be always available by owner.	Specification is selfexplanatory	Bidder request Owner to reconsider Bidder's clarification.	Earlier response prevails.
IIIB	1	12.15.3.2	(iii) Gate Firing... b. It shall be able to shift the gate pulse in the time over a range of about 150 electrical degrees under a signal from the regulator.	In OEM solution of power converters, the gate pulses could be changed in range 10 to 140 electrical degrees.	Bid Specification Prevail	Bidder request Owner to reconsider Bidder's clarification.	Being OEM intrinsic design, bidder's request is accepted.

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IIIB	2	5.1.2	The lowest pressure heater may be located in the Condenser neck in case that is the standard arrangement of the manufacturer. In such a case, a separate external drain cooler may be provided instead of being integral to the heater.	Please note that low pressure heaters 1 & 2 are duplex type and located in condenser neck as per standard and proven practice of the Bidder. Since the heat balance cycle is optimised without drain cooling zone as bidder's standard practice, separate external drain cooler is not required for this LP heater in condenser neck.	Bid Specification Prevail	Bidders standard & proven practice used in all 660 MW supercritical plants supplied worldwide.	Earlier response prevails.
IIIB	2	5.1.3 (c)	Heat transfer area shall be calculated considering 10% of the tubes plugged.	Please note that as a standard & proven practice of the Bidder, the heaters shall be designed for 100% TMCR with 0% MU condition without considering any tube plugging margin. Kindly accept and confirm.	Bid Specification Prevail	Considering supercritical technology and very high quality of water chemistry, tube plug margin is not required and not envisaged. Heaters with 10% additional margin will have impact on demonstrating the performance of heaters and in turn impact on performance guaratnees. Till date all heaters designed by Bidder is without any margin and running successfully.	Earlier response prevails.

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IIIB	2	5.1.4	The H.P. Heaters shall be designed for the shut-off pressure of the Boiler Feed Pumps (at maximum speed of operation) on the tube side.	We would like to clarify following : 1) As per & proven practice. 2) As per Tender PFD (PE-189, PF-203), feed.....as per Bidder's standard & proven practice. 3) As per IBR amendment dated March 12, 2007 t..... shut off pressure being communicated to the piping system. 4) This willcorresponding boiler economiser design pressure. Kindly accept.	1). HP heater shall be designed for shut off pressure of boiler feed pumps. 2). Economiser isolation valve may be deleted. Rest will be evaluated after receipt of bid.	There is discrip.....iping corresponding to BFP shut-off pressure. Hence, HP heaters on tube side and feed water piping downstream feed control station shall be designed corresponding boiler economiser design pressure.	Earlier response prevails.

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Volume	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Mahagenco Reply	Bidder's Query/ Clarificafication	Final Resolution
IIIB	4	4.1	Performancre requirement The condenser shall be designed such that.... Lower with 5% of tube.	Since this is an EPC Contract,bidder.....the best heat rate for the turbine cycle.			Earlier response prevails.
IIIB	4	4.1	The Condenser shall be designed such that.....r shall remain within 9.5 °C (during maximum thermal load).	Datasheet-A, clause no. 3.0, Design margin on heat load at TG VWO, 1% make-up and design CWT of 33 °C. = 5 % We would like to clarify following points in continuation with the reference clauses: 1) Make-up water..... Data sheet A. 2) The c..... optimised by bidder. 3) As thee benefit in plant performance. 4) Only LPcriteria accordingly..	Design Make up shall be 1 %; For the rest, Bid Specification shall prevail.	1) Reply is acceptable 2) As per corrigendum temp rise is withdrawn. 3) As the condenser is already designed at VWO condition with 1% make-up..... benefit in plant performance. 4) Only LP heater drains to the condenser to be considered for condenser sizing. Bidder confirms that the above design criteria is inline with best engineering & design practices followed in India & worldwide and request you to amend the design criteria accordingly..	Earlier response prevails.

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IIIB	4	5.1.1	The condenser shall be of two pass..... The cooling water inlet connections shall be at the bottom and outlet connection at the top.	The offered condenser shall be of single pass type. Accordingly, the cooling water will enter at the centre from one side and exit from other side of the condenser water box. Hence, we request you to specify single pass condenser as well in the specification.	Bid Specification Prevail	Considering OEM design of TG pedestal, Bidder request to allow single pass condenser as double / two pass condenser has layout restriction.	From design perspectivem, single pass condenser is acceptable; however, bidder sall furnish the layout including CW intake/ outlet piping/ valves and ensure that there is no operational hassle. Final acceptance of the deviation is subject of approval of scheme and layout by Owner.

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VOLUME - III E2						
Sr No	Volume	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Final Resolution
1	IIIE2			CW Pump Type	Bidder wants metallic option also	Option shall be left to the bidder to select concrete volute OR vertical metal casing, wet type CW pump. However, if vertical pit type CW pump is considered then additional stand by pump shall be required. For Concrete Volute :- 2x 50% For Vertical Metal casing wet type : 3x 50%

BHUSAWAL THERMAL POWER STATION 1X 660 MW UNIT - 6 PROJECT							
RESPONSE TO PRE - BID QUERIES							
Bid Specification No. DG/BSL U-6/2011/T-1							
VOLUME - V							
Sr. No.	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Clarification from Customer	Bidder's response	Final Resolution
1	1	3.4	Bidder shall indicate the year in which the offered models of C&I system have been introduced and how long the commercial production of the same is expected to continue. In any case, Bidder shall ensure supply of spare parts for the lifetime of the plant. In case if it is felt by the bidder that certain equipment is likely to become obsolete, Bidder shall clearly bring it to the notice of the owner and indicate step proposed to deal with obsolescence. Any part/ module not listed in recommended spares shall be deemed to have a life expectancy of 30 years.	During the first ten years of the plant operation, ALSTOM PAC commits itself to support the customer with spares and service. Beyond ten years, Spares and service can be offered "on request" basis through a separate dedicated maintenance contract.	Specification prevails	Due to continuous technology advancement, upgrades in C&I parts / modules by the manufacturer will be brought to the notice of the Owner / Consultant, in the form of recommended spares for upgradation. Owner may be required to upgrade, before these products become obsolete, even though the life expectancy of these items could be lesser than that of life expectancy of the plant.	Earlier response prevails

BHUSAWAL THERMAL POWER STATION 1X 660 MW UNIT - 6 PROJECT							
RESPONSE TO PRE - BID QUERIES							
Bid Specification No. DG/BSL U-6/2011/T-1							
VOLUME - V							
Sr. No.	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Clarification from Customer	Bidder's response	Final Resolution
2	1	4.4	Transmitters and electro-pneumatic positioners shall be SMART type. Each SMART equipment shall communicate in the form of analog signal 4-20 mA DC with superimposed digital signal having proven HART protocol to facilitate configuration, zero adjustment, calibration and diagnostic from remote location. All microprocessor based transmitters/analyser shall have the same type of protocol. Bidder shall provide separate HART management system along with PC and necessary software and hardware for remote calibration and diagnostic.	Transmitters supplied for Steam Turbine are HART compatible. Most of these transmitters are associated with the Protection of turbine. In view of safety and availability concern the feature of online monitoring by HART management is not allowed. Hand held HART calibrators can be used for local calibration and use of it shall be as per O&M manual.	Specification prevails	Transmitters supplied for Steam Turbine are HART compatible. Most of these transmitters are associated with the Protection of turbine. In view of safety and availability concern the feature of online monitoring by HART management is not allowed. Hand held HART calibrators can be used for local calibration and use of it shall be as per O&M manual.	Earlier response prevails

BHUSAWAL THERMAL POWER STATION 1X 660 MW UNIT - 6 PROJECT							
RESPONSE TO PRE - BID QUERIES							
Bid Specification No. DG/BSL U-6/2011/T-1							
VOLUME - V							
Sr. No.	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Clarification from Customer	Bidder's response	Final Resolution
3	1	4.15	In general, temperature transmitters shall not be used. Instead, temperature elements shall be directly connected to their respective input modules. For non-critical measurement applications (such as measurements for Boiler metal temperature and Generator winding temperature) where the measurements are not used for control/protection, Sensors may be grouped and connected to I/O modules in DCS.	Application of Temperature Transmitter in critical and non-critical temperature measurements will be as per standard & proven practice and grouping of temperature transmitters will be done in local JB's during detailed engineering.	Specification prevails	Application of Temperature Transmitter in critical and non-critical temperature measurements will be as per standard & proven OEM practice and grouping of temperature transmitters will be done in local JB's during detailed engineering.	Earlier response prevails

BHUSAWAL THERMAL POWER STATION 1X 660 MW UNIT - 6 PROJECT							
RESPONSE TO PRE - BID QUERIES							
Bid Specification No. DG/BSL U-6/2011/T-1							
VOLUME - V							
Sr. No.	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Clarification from Customer	Bidder's response	Final Resolution
4	1	4.34	Above I/Os used in OLCS or CLCS loops shall be redundant	Redundant I/O is not required for all OLCS and CLCS. Normally only critical Loops IOs will be redundant. Please review.	Refer the CORRIGENDUM-II TO BID SPECIFICATION VOLUME - V CONTROL & INSTRUMENTATION Sr No 3.	Redundant I/O cards are not considered for all OLCS and CLCS loops, only critical protection related signals shall be redundant as per standard proven OEM practice	Earlier response prevails
5	3B	2.1	Turbine protection shall be based on triple modular redundant configuration in hardware & software meeting NFPA requirement. Configuration shall be realized with three independent trip channels.	Offered Turbine Protection is 2oo3 configuration, FireProtection is part of Turbine Protection scheme as per Bidder's standard and proven practice.	Refer the CORRIGENDUM-II TO BID SPECIFICATION VOLUME - V CONTROL & INSTRUMENTATION Sr No 11.	Offered Turbine protection scheme shall be of 2oo3 configuration, each rack has a separate controller and I/O cards with independent trip channels as per proven standard OEM practice and will comply to the codes and standards mentioned in the PTP20A47049-EJ ALSPA CONTROSTEAM V3 - Standards and Codes.pdf	Earlier response prevails
6	3B	2.1	Redundant EHG valve position control modules	EHG valve position control modules will be as per ALSTOM's standard proven validated practice for all the power plants globally. As per standard OEM practice, the control valve positioning module are distributed in such a way that failure of one module will result in only partial load reduction.Hence redundant EHG valve postion control modules are not envisaged.	Specification Prevails	EHG valve position control modules will be as per ALSTOM's standard proven validated practice for all the power plants globally. As per standard OEM practice, the control valve positioning module are distributed in such a way that failure of one module will result in only partial load reduction.Hence redundant EHG valve postion control modules are not envisaged.	Earlier response prevails

BHUSAWAL THERMAL POWER STATION 1X 660 MW UNIT - 6 PROJECT							
RESPONSE TO PRE - BID QUERIES							
Bid Specification No. DG/BSL U-6/2011/T-1							
VOLUME - V							
Sr. No.	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Clarification from Customer	Bidder's response	Final Resolution
7	3B	3.13.1(b)	Frequency compensation adjustment shall be within 2 to 8%.	As per IEC-45-1 guideline, droop regulation shall be adjustable within 3 to 8% rated speed.	Specification prevails	As per IEC-45-1 guideline, droop regulation i.e. Frequency compensation adjustment shall be adjustable within 3 to 8% rated speed.	Earlier response prevails
8	1	4.25	All Drives shall have its local control station comprising of start and emergency stop pushbutton and with a local & remote selection switch in SWGR/MCC (Refer electrical volume of the specification). Local stop pushbutton shall always be active. During the trial run of drives from local, safety permit and protection shall be ensured.	Local field operation is not a part of Bidder's standard control philosophy for safety and availability reason.	Specification prevails	Emergency pushbutton shall be provided, but local field operation is not a part of Bidder's standard control philosophy for safety and availability reason.	Earlier response prevails

BHUSAWAL THERMAL POWER STATION 1X 660 MW UNIT - 6 PROJECT							
RESPONSE TO PRE - BID QUERIES							
Bid Specification No. DG/BSL U-6/2011/T-1							
VOLUME - V							
Sr. No.	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Clarification from Customer	Bidder's response	Final Resolution
9	5	5.3.24	Redundancy in input / output modules	At IO level -redundancy is considered only in the output module for HT drives, and few critical LT drives and modulating control drives.	Specification prevails	Redundant I/O cards are not considered for all OLCS and CLCS loops, only critical protection related signals shall be redundant as per standard proven OEM practice	Earlier response prevails
10	5	7.3.3(g)	All Printed Circuit card connectors shall be gold plated.	Offered control system electronic modules does not have gold plated connectors. Please confirm	Specification prevails	Offered control system electronic modules does not have gold plated connectors. Please confirm	Earlier response prevails

BHUSAWAL THERMAL POWER STATION 1X 660 MW UNIT - 6 PROJECT							
RESPONSE TO PRE - BID QUERIES							
Bid Specification No. DG/BSL U-6/2011/T-1							
VOLUME - V							
Sr. No.	Section No.	Clause No.	Bid Specification Stipulation	Bidder's Query / Stipulation	Clarification from Customer	Bidder's response	Final Resolution
11	5	7.3.5 (c)	Bidder shall provide atleast 20% or minimum 2 number whichever is higher and 10% or minimum 1 number, whichever is higher complete spare IO module in each control group.	Please clarify, how much spare IO's we have to consider minimum as 10% or 20% or 30%?	Bidder shall provide at least 20% or minimum two numbers, whichever is higher, spare channels as hot on rail spares in each configured IO modules. In addition to this 10% or minimum one number, whichever is higher, extra assigned complete spare IO modules mounted on rails in sub racks as hot on rail spare for each category of installed IO modules shall also be provided	Turbine control and protection shall be as per the standard proven OEM practice. Overall 30 % spare channels shall be considered. Please confirm.	Earlier response prevails



**MAHARASHTRA STATE POWER
GENERATION CO. LTD.**

**PROJECTS & PLANNING
DEPARTMENT**

BID SPECIFICATION NO.: DG/BSL U-6/2011/T-1

**CORRIGENDUM – I
&
ADDENDUM – I**



**MAHARASHTRA STATE POWER
GENERATION CO. LTD.**

**PROJECTS & PLANNING
DEPARTMENT**

BID SPECIFICATION NO.: DG/BSL U-6/2011/T-1

CORRIGENDUM - I

	MAHARASHTRA STATE POWER GENERATION CO. LTD.	
	BID SPECIFICATION NO.: DG/BSL U-6/2011/T-1	
	CORRIGENDUM - I	

CONSULTANT : PROCON ENGINEERS

	MAHARASHTRA STATE POWER GENERATION CO. LTD.			
	BID SPECIFICATION NO.: DG/BSL U-6/2011/T-1			
	CORRIGENDUM - I			
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3.0	VOLUME III A	:	STEAM GENERATOR AND AUXILIARIES	49
4.0	VOLUME III C	:	COAL HANDLING SYSTEM	53
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6.0	VOLUME III E1	:	WATER TREATMENT SYSTEMS	81
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8.0	VOLUME III F	:	PIPING SPECIALTIES & THERMAL INSULATION	89
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12.0	VOLUME VI A	:	CIVIL, STRUCTURAL AND ARCHITECTURAL WORKS	115
13.0	VOLUME VII A1	:	BID PURPOSE DRAWINGS (MECHANICAL)	217
14.0	VOLUME VII A2	:	BID PURPOSEDRAWINGS (MECHANICAL)	221
15.0	VOLUME VIII A1	:	DATA / DRAWINGS TO BE FURNISHEDBY BIDDER (MECHANICAL)	225
16.0	VOLUME VIII D	:	DATA / DRAWINGS TO BE FURNISHED BY BIDDER (CIVIL)	231

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CORRIGENDUM TO BID SPECIFICATION

VOLUME-I

COMMERCIAL AND GENERAL CONDITIONS OF

CONTRACT

CONSULTANT : PROCON ENGINEERS

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		CORRIGENDUM - I		
Sr. No.	Section/Page No./ Cl. No.	Existing Particulars	To be read as	
1.	Section 1, Page 33/Cl.No.11.1.2	The Queries shall be submitted so as to reach the at least 7 working days	The Queries shall be submitted so as to reach the owner at least 10 working days	
2.	Section 1, Page 40/ Cl. No.19.1 Sr. no.1	Loading for evaluation of shortfall in performance	Loading for evaluation of shortfall in performance	
		INR 15,000,000/- (INR Fifteen Million only)	INR 15,000,000/- (INR Fifteen Million only) per day	
3.	Section 2B, Page 272, Cl.No.27.3.1(ii)	Packing slip for each consignment included in invoice.	Service entry sheet approved by the owner: 3 copies.	

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		BID SPECIFICATION NO.: DG/BSL U-6/2011/T-1			
		CORRIGENDUM - I			
Sr. No.	Vol. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as	
4.	II/Sec. 3/57 of 555/ 3.6	Exclusions		<u>To be added:</u> (3.6) Traction substation for railway OHE.	
5.	II/Sec. 3/57 of 555/ 4.1	Terminal Points	<u>RAIL TRACK</u> Take off point at the 2x500 MW railway line (as indicated in plot plan drawing) Exact co-ordinate will be furnished to the successful bidder.	<u>RAIL TRACK</u> Take off point at the 2x500 MW railway line (as indicated in plot plan drawing) is tentative. Exact co-ordinates will be finalised as per detailed engineering. Terminal point for OHE, Signalling and telecommunication shall be as per railway requirement/site requirement.	
6.	II,Sec- 3/60 of 555 /4.0	Terminal Points	----	<u>To be added</u> 4.12 Ash Recovery water from ash Bund– Tap off from the existing recovery water line for 2x500 MW units at convenient location preferably between (E900, E1000) and (N600, N700).	
7.	II, Sec- 4/70 of 555 /6.1.6		All buildings...facility for drinking water.....comp	All buildings including All Transfer points in Coal Handling Plant, Bunker Floor shall be provided with adequate number	

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Sr. No.	Vol. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as	
			lied with	of Toilets with effluent discharge system and facility for Drinking water which shall include water cooler and UV Purifier of reputed make as may be approved by Owner.complied with.	
8.	II, Sec-4/70 of 555 /6.1.7		All rail/road crossings for pipe /cable racks shall be done with minimum seven (7) meters head room from top rail /road to bottom of rack	All rail/road crossings for pipe /cable racks/ conveyors shall be done with minimum 8.5 meters head room from top rail /road to bottom of rack/ conveyor structure. All the clauses related to the head room at rail/road crossings in entire specification stands modified to this extent.	
9.	II, Sec-5/118 of 556 /1.4		Keeping in mind ----- will be held at initially at least once in two (2) months at Mumbai/site ----- once in a month.	Keeping in mind ----- will be held at least once in a month.	
10.	II, Sec-5/121 of 556 /1.13		Supply of LDO, Chemicals, lubricating oils up to COD	Supply of LDO, Chemicals, lubricating oil/ lubricants, consumables etc. up to COD. All the clauses related to the above in entire specification stands modified to this extent.	
11.	II, Sec-5/140		The Contractor shall provide-----	The Contractor shall provide----- in the form of Two (2)	

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		BID SPECIFICATION NO.: DG/BSL U-6/2011/T-1			
		CORRIGENDUM - I			
Sr. No.	Vol. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as	
	of 556 /4.1		- in the form of one (1) soft copy in CD and 15 hard copies.	soft copy in CD form and fifteen (15) hard copies.	
12.	II, Sec-9	General	(a) 10% of total quantity used for each type & size with minimum One (1) for each type and size. (b) 10% of total quantity used for each type & size or minimum One (1) for each type and size.	Please note that wherever such or such type of sentence is mentioned in the specification for quantity of mandatory spares to be supplied , the bidder shall supply the quantity whichever is more in both cases [(a) & (b)].	
13.	II, Sec-9/ 197 of 555 /(new)	Annexure A - Mandatory Spares List (Mechanical)	--	<u>To be added</u> Spares for Mill Reject Handling System	
				Isolation valve seat	10% of each type and size
				Isolation valve gates/flaps/domes	10% of each type and size
				Isolation valve complete assembly/ Dome valve	10% of each type and size

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		CORRIGENDUM - I			
Sr. No.	Vol. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as	
				Pneumatic Cylinder	10% of each type and size
				Pneumatic Cylinder internal gate	20% of each type and size
				Coupling	10% of each type and size
				Pipes	10% of each type and size
				Pipe line fittings (Bends/Elbows/ laterals)	15% of each type and size
				Switch valve	10% of each type and size or one(1) which is more
				Pneumatic panel	2 of each type or one(1) which is more
				Air Inlet valve (above Air lock vessel)	10% of each type and size
				Air discharge valve (below Air lock vessel)	10% of each type and size

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		CORRIGENDUM - I			
Sr. No.	Vol. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as	
				Vent valve	10% of each type and size
				Spares of Conveying Compressor for Mill Reject Handling System	
				<u>HP STAGES OF COMPRESSOR</u>	
				HP element	One (1) Set
				Packing Set	Four (4) Sets
				Axial thrust brg.	Two (2) Sets
				Labyrinth oil seal or radial seals or double acting seals for drive shafts	Four (4) Sets
				Bearing for male & female rotors (DE & NDE)	Two (2) each
				Timing Gears	One (1)
				Suction & discharge valves	Two (2) each
				<u>LP STAGES OF COMPRESSOR</u>	
				LP element	One (1) Set
				Graphitic ring shaft seals for	Four (4) Sets

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		CORRIGENDUM - I			
Sr. No.	Vol. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as	
				compressor chamber or white metal	
				Packing Set	Four (4) Sets
				Axial thrust Bearing	Two (2) Sets
				Bearing for male & female rotors (DE & NDE)	Two (2) each
				Timing Gears	One (1)
				Suction & discharge valves	Two (2) each
				Main Bearing	Two (2) each
				Set up gear/pinion	One (1)
				Air intake filter element with gaskets	Eight (8)
				Oil filter element with gaskets & seals	Eight (8)
				Safety valve springs & gaskets	Four (4)

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		CORRIGENDUM - I			
Sr. No.	Vol. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as	
				One set of inbuilt automatic drain valve	Four (4)
				Gearcase breather filterelemnt	One (1)
				Drain valve kit	One (1)
				<u>COMPRESSORS COOLERS</u>	
				Gaskets & seals for inter cooler and after cooler	Four (4)
				Inter cooler drain check valve	One (1)
				<u>OIL PUMP/MOTOR</u>	
				Oil pump complete assembly	One (1)
				Pump impeller/rotor with shaft	One (1)
				Set of bearings	Two (2) Sets
				Oil pump motor bearing	Two (2)

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		CORRIGENDUM - I			
Sr. No.	Vol. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as	
				<u>SHAFT DRIVEN OIL PUMP</u>	
				Drive gear with shaft	One (1)
				Driven gear with shaft	One (1)
				Drain tap elements	Four (4)
				Moisture tap elements	Four (4)
				Oil cooler gaskets and seals	Four (4)
				Seal Washer	Two (2)
				Mass flow Meter	One (1)
14.	II, Sec-9/ 255 of 555 /(new)	Annexure A - Mandatory Spares List (Mechanical)	----	<u>To be added</u>	
				Spares for Belt Cleaners:	
				External Belt Cleaners	4 sets
				Belt cleaning Disc for return idlers complete with mounting brakes	20
				Internal Belt Cleaners	4 sets

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		CORRIGENDUM - I			
Sr. No.	Vol. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as	
				Modular segments for Belt cleaners	10% of total population
15.	II, Sec-9/ 255 of 555/ (new)	Annexure A - Mandatory Spares List (Mechanical	----	To be added Spares for Metal detector:	
				Primary circuit Boards	Five (5)
				Relays	Five (5)
				Sand back Markers	Five (5)
16.	II, Sec-9/258 of 555 /3.3	Annexure A - Mandatory Spares List (Mechanical)	Apron pan: 10% of the total quantity for one machine	Apron pan: 10% of the total quantity used .	
17.	II, Sec-9/258 of 555 /3.0	Annexure A - Mandatory Spares List (Mechanical)		To be added 3.7 Spares for Apron Feeder Hydraulic Drive	
				Impeller with wearing plates	One(1) Set
				Pumps Bearings	One(1) Set
				Motor Bearings	One(1) Set
				Couplings	One(1) Set
				Gaskets, dust seals & 'O' Rings	One(1) Set

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		CORRIGENDUM - I			
Sr. No.	Vol. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as	
				Shaft sleeves	One(1) Set
				Nuts & Bolts etc.	One(1) set
				Gland Packing	Two(2) sets
				Oil seals	Two(2) sets
				Pipe fittings for hydraulic system	One(1) set
				Valves for hydraulic system	One (1) set of each type and rating
18.	II, Sec-9/259 of 555 /4.3.1	Annexure A - Mandatory Spares List (Mechanical)	<u>Bucket Wheel</u> Complete Set of Drive Gear Box Unit : One (1) set	<u>Bucket Wheel</u> Complete Set of Hydraulic drive Unit : One (1) set	
19.	II, Sec-9/263 of 555 /5.1.1	Annexure A - Mandatory Spares List (Mechanical)	1800 mm Belt width (35 ^o Troughing angle)	1200 mm Belt width (35 ^o Troughing3 angle)	
20.	II, Sec-9/263 of 555 /5.2.1	Annexure A - Mandatory Spares List (Mechanical)	1800 mm Belt width	1200 mm Belt width	
21.	II, Sec-9/263 of 555	Annexure A - Mandatory Spares List	1800 mm Belt width	1200 mm Belt width	

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Sr. No.	Vol. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as	
	/5.3.1	(Mechanical)			
22.	II, Sec-9/264 of 555 /5.4.1	Annexure A - Mandatory Spares List (Mechanical)	1800 mm Belt width (35 ^o Troughing angle)	1200 mm Belt width (35 ^o Troughing angle)	
23.	II, Sec-9/264 of 555 /5.5.1	Annexure A - Mandatory Spares List (Mechanical)	1800 mm Belt width (35 ^o Troughing angle)	1200 mm Belt width (35 ^o Troughing angle)	
24.	II, Sec-9/264 of 555 /5.6.1	Annexure A - Mandatory Spares List (Mechanical)	1800 mm Belt width	1200 mm Belt width	
25.	II, Sec-9/264 of 555 /5.7.1	Annexure A - Mandatory Spares List (Mechanical)	1800 mm Belt width	1200 mm Belt width	
26.	II, Sec-9/264 of 555 /5.8.1	Annexure A - Mandatory Spares List (Mechanical)	1800 mm Belt width	1200 mm Belt width	
27.	Similar quantities of idlers indicated for 1800 mm width at Sr. No. 5 on page nos. 263/555 and 264/555 , Volume II, Section-9 shall also be applicable for 1400 mm belt width and shall be supplied by the Bidder.				
28.	II, Sec-9/ 265	Annexure A - Mandatory	Mandatory spares for Conveyor Drive	Mandatory spares for Conveyor Drive	Conveyor System wherever

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		CORRIGENDUM - I			
Sr. No.	Vol. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as	
	of 555/ /6.3	Spares List (Mechanical)	System	applicable	
29.	II, Sec-9/ 265 of 555/ /6.0	Annexure A - Mandatory Spares List (Mechanical)		<u>To be added:</u>	
				6.9 Mandatory spares for Hydraulic Drive System for conveyors	
				Impeller with wearing plates	One(1) Set
				Pumps Bearings	One(1) Set
				Motor Bearings	One(1) Set
				Couplings	One(1) Set
				Gaskets, dust seals & 'O' Rings	One(1) Set
				Shaft sleeves	One(1) Set
				Nuts & Bolts etc.	One(1) set
				Gland Packing	Two(2) sets
Oil seals	Two(2) sets				

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		CORRIGENDUM - I			
Sr. No.	Vol. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as	
				Pipe fittings for hydraulic system	One(1) set
				Valves for hydraulic system	One (1) set of each type and rating
30.	II, Sec-9/ 266 of 555/ /7.0	Annexure A - Mandatory Spares List (Mechanical)	Magnetic Separator	In Line Magnetic Separator	
31.	II, Sec-9/267 of 555 /8.4	Annexure A - Mandatory Spares List (Mechanical)	Liners with Bolts: One(1) set for each type	Liners with Bolts: Not Required.	
32.	II, Sec-9/268 of 555 /10.0	Annexure A - Mandatory Spares List (Mechanical)	RING GRANULATOR	IMPACTOR CRUSHER	
33.	II, Sec-9/272 of 555 /(new)	Annexure A - Mandatory Spares List (Mechanical)		<u>To be added:</u> Mandatory Spares for Fixed Tripper	
				Tripper Head Pulley with Pillow Block & Bearing	One (1) set
				Tripper Bend Pulley with Pillow	One (1) set

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		BID SPECIFICATION NO.: DG/BSL U-6/2011/T-1													
		CORRIGENDUM - I													
Sr. No.	Vol. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as											
				Block & Bearing											
34.	II, Sec-9/269 of 555 /10.13	Annexure A - Mandatory Spares List (Mechanical)	Hydraulic drive	<u>To be added</u> 10.13.10 Pipe fittings for hydraulic system – One(1) set 10.13.11 Valves for hydraulic system –One (1) set of each type and rating											
35.	II, Sec-9/272 of 555 /17.0	Annexure A - Mandatory Spares List (Mechanical)	Electric Hoists	Spares indicated shall be deleted. Following spares shall be supplied: <u>ONE SET CONSISTING OF TWO (2) BEARING FOR:</u> <table><tr><td>Travel wheel</td><td>One (1) set</td></tr><tr><td colspan="2">One set consisting of Two (2) brake linings with rivets for :</td></tr><tr><td>Hoist brake</td><td>One (1) set</td></tr><tr><td>Travel brake</td><td>Two (2) sets</td></tr><tr><td>Hoist creep brake</td><td>One (1) set</td></tr></table> <u>ONE SET CONSISTING OF TWO (2) BRAKE SHOES WITH LINING FOR :</u>		Travel wheel	One (1) set	One set consisting of Two (2) brake linings with rivets for :		Hoist brake	One (1) set	Travel brake	Two (2) sets	Hoist creep brake	One (1) set
Travel wheel	One (1) set														
One set consisting of Two (2) brake linings with rivets for :															
Hoist brake	One (1) set														
Travel brake	Two (2) sets														
Hoist creep brake	One (1) set														

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		CORRIGENDUM - I			
Sr. No.	Vol. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as	
				Hoist brake	One (1) set
				Travel brake	Two (2) sets
				Hoist creep brake	One (1) set
				<u>ONE SET CONSISTING OF SIX (6) CARBON BRUSHES FOR :</u>	
				Hoist motor	One (1) set
				Travel motor	Two (2) sets
				<u>ONE SET CONSISTING OF THREE (3) BRUSH HOLDERS FOR :</u>	
				Hoist motor	One (1) set
				Travel motor	Two (2) sets
				Fixed and moving contacts for each type of contactor: One (1) set	
				<u>OVERLOAD RELAY FOR</u>	
				Hoist motor	One (1)
				Travel motor	Two (2)
				<u>MOTOR BEARINGS</u>	
				Hoist motor	Two (2)
				Travel motor	Two (2)

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		CORRIGENDUM - I			
Sr. No.	Vol. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as	
				<u>BEARING FOR</u>	
				Main Pulley	Two (2)
				Eq. Pulley	Two (2)
				Bearings for gear boxes for each type of hoist: Two (2) sets	
				Brake liners for all the brakes: 100% of total population of each type & size	
				Oil seals: 100% of total population of each type, size rating	
				Brake springs for all brakes: 100% of total population of each type, size rating	
				Wire ropes for hooks: 100% installed on each hoist	
				Solenoid coils for brakes: Two (2) sets	
				Limit switches for hoists and travel mechanisms: Two (2)sets	
				Spare motors for hoist of each capacity: One (1)	
				Travel machinery	

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		CORRIGENDUM - I			
Sr. No.	Vol. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as	
				Gear wheel	One (1) set
				Internal clip	Two (2)
				Pinion	One (1)
36.	II, Sec-9/273 of 555 /20.4	Annexure A - Mandatory Spares List (Mechanical)	Piston with Piston Rod Assembly for each stage : 100 % for one compressor	Not Applicable.	
37.	II, Sec-9/273 of 555 /20	Annexure A - Mandatory Spares List (Mechanical)	Sr No 20.1 to 20.12	<u>Spares for Compressors:</u> To be supplied as under	
				<u>HP STAGES OF COMPRESSOR</u>	
				HP element	One (1) Set
				Packing Set	Four (4) Sets
				Axial thrust brg.	Two (2) Sets
				Labyrinth oil seal or radial seals or double acting seals for drive shafts	Four (4) Sets
				Bearing for male & female rotors (DE & NDE)	Two (2) each
				Timing Gears	One (1)
				Suction & discharge valves	Two (2) each

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		CORRIGENDUM - I			
Sr. No.	Vol. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as	
				<u>LP STAGES OF COMPRESSOR</u>	
				LP element	One (1) Set
				Graphitic ring shaft seals for compressor chamber or white metal	Four (4) Sets
				Packing Set	Four (4) Sets
				Axial thrust Bearing	Two (2) Sets
				Bearing for male & female rotors (DE & NDE)	Two (2) each
				Timing Gears	One (1)
				Suction & discharge valves	Two (2) each
				Main Bearing	Two (2) each
				Set up gear/pinion	One (1)
				Air intake filter element with gaskets	Eight (8)
				Oil filter element with gaskets & seals	Eight (8)
				Safety valve springs & gaskets	Four (4)

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		CORRIGENDUM - I			
Sr. No.	Vol. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as	
				One set of inbuilt automatic drain valve	Four (4)
				Gear case breather filter element	One (1)
				Drain valve kit	One (1)
				<u>COMPRESSORS COOLERS</u>	
				Gaskets & seals for inter cooler and after cooler	Four (4)
				Inter cooler drain check valve	One (1)
				<u>OIL PUMP/MOTOR</u>	
				Oil pump complete assembly	One (1)
				Pump impeller /rotor with shaft	One (1)
				Set of bearings	Two (2) Sets
				Oil pump motor bearing	Two (2)
				<u>SHAFT DRIVEN OIL PUMP</u>	
				Drive gear with shaft	One (1)

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		CORRIGENDUM - I			
Sr. No.	Vol. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as	
				Driven gear with shaft	One (1)
				Drain tap elements	Four (4)
				Moisture tap elements	Four (4)
				Oil cooler gaskets and seals	Four (4)
				Seal Washer	Two (2)
				Mass flow Meter	One (1)
38.	II, Sec-9/ 275 of 555 /42.0	Annexure A - Mandatory Spares List (Mechanical)	----	<u>To be added:</u> (42.0) Spares for Ash Water Pumps	
				Complete Bowl Assembly	One (1) Set
				Set of Impellers	One (1) Set
				Set of line shafts	One (1) Set
				Casing wear rings	One (1) Set
				Impeller wear rings	One (1) Set
				Shaft sleeves	One (1) Set
				Shaft coupling	One (1) Set
				Shaft nuts and keys	Two (2) sets

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		CORRIGENDUM - I			
Sr. No.	Vol. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as	
				Pins (for non-reversible ratchet)	Two (2) sets
				Lantern rings	One (1) Set
				Bell mouth liner	One (1) Set
				Bearings of various types as applicable	Complete One (1) Set (one set means total requirements for one Pump)
				Coupling set (between pump and motor) with accessories	One (1) Set
39.	II, Sec-9/283 of 556 /15.10	Annexure A - Mandatory Spares List (Mechanical)	Air lock vessel (Below ESP Hopper) 5% of each type and size or minimum one	Air lock vessel (Below ESP Hopper) 5% of each type and size or minimum one number whichever is higher	
40.	II, Sec-9/315 of 556 /(new)	Annexure A - Mandatory Spares List (Mechanical)		<u>To be added:</u> <u>9.0 Spares for Ozonisation Plant</u>	
				Suction/Discharge	Two (2) each

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		CORRIGENDUM - I			
Sr. No.	Vol. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as	
				valve for Compressor	
				Seal Kits for pneumatic valves	Five (5)
				H.T. elements for H.E. of Ozone Electrode	Four Hundred (400)
				Dielectric tubes for H.E. of Ozone Electrode	Four Hundred (400)
				Viton Gaskets for Ozone Electrode	One (1) set
				Compressor Lub oil	Eighty (80) lit
				Air/oil filters for Compressor	One (1) each
				Rota meter for ozone gas	Two (2)
				Drive Motor	One (1)
41.	II, Sec-9/286 of 556 /23	Annexure A - Mandatory Spares List (Mechanical)		<u>To be added</u> <u>Spares for Instrument Air Compressor</u>	

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		CORRIGENDUM - I			
Sr. No.	Vol. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as	
				<u>HP STAGES OF COMPRESSOR</u>	
				HP element	One (1) Set
				Packing Set	Four (4) Sets
				Axial thrust brg.	Two (2) Sets
				Labyrinth oil seal or radial seals or double acting seals for drive shafts	Four (4) Sets
				Bearing for male & female rotors (DE & NDE)	Two (2) each
				Timing Gears	One (1)
				Suction & discharge valves	Two (2) each
				<u>LP STAGES OF COMPRESSOR</u>	
				LP element	One (1) Set
				Graphitic ring shaft seals for compressor chamber or white metal	Four (4) Sets
				Packing Set	Four (4) Sets
				Axial thrust Bearing	Two (2) Sets
				Bearing for male &	Two (2)

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		CORRIGENDUM - I			
Sr. No.	Vol. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as	
				female rotors (DE & NDE)	each
				Timing Gears	One (1)
				Suction & discharge valves	Two (2) each
				Main Bearing	Two (2) each
				Set up gear/pinion	One (1)
				Air intake filter element with gaskets	Eight (8)
				Oil filter element with gaskets & seals	Eight (8)
				Safety valve springs & gaskets	Four (4)
				One set of inbuilt automatic drain valve	Four (4)
				Gear case breather filter element	One (1)
				Drain valve kit	One (1)
				<u>COMPRESSORS COOLERS</u>	
				Gaskets & seals for inter cooler and	Four (4)

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		CORRIGENDUM - I			
Sr. No.	Vol. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as	
				after cooler	
				Inter cooler drain check valve	One (1)
				<u>OIL PUMP/MOTOR</u>	
				Oil pump complete assembly	One (1)
				Pump impeller / rotor with shaft	One (1)
				Set of bearings	Two (2) Sets
				Oil pump motor bearing	Two (2)
				<u>SHAFT DRIVEN OIL PUMP</u>	
				Drive gear with shaft	One (1)
				Driven gear with shaft	One (1)
				Drain tap elements	Four (4)
Oil cooler gaskets and seals	Four (4)				

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		CORRIGENDUM - I			
Sr. No.	Vol. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as	
				Seal Washer	Two (2)
				Mass flow Meter	One (1)
42.	II, Sec-9/287 of 556 /24	Annexure A - Mandatory Spares List (Mechanical)	----	<u>Spares for Transport Air Compressor</u>	
				<u>HP STAGES OF COMPRESSOR</u>	
				HP element	One (1) Set
				Packing Set	Four (4) Sets
				Axial thrust brg.	Two (2) Sets
				Labyrinth oil seal or radial seals or double acting seals for drive shafts	Four (4) Sets
				Bearing for male & female rotors (DE & NDE)	Two (2) each
				Timing Gears	One (1)
				Suction & discharge valves	Two (2) each
				<u>LP STAGES OF COMPRESSOR</u>	
				LP element	One (1) Set
				Graphitic ring shaft seals for compressor chamber or white metal	Four (4) Sets

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		CORRIGENDUM - I			
Sr. No.	Vol. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as	
				Packing Set	Four (4) Sets
				Axial thrust Bearing	Two (2) Sets
				Bearing for male & female rotors (DE & NDE)	Two (2) each
				Timing Gears	One (1)
				Suction & discharge valves	Two (2) each
				Main Bearing	Two (2) each
				Set up gear/pinion	One (1)
				Air intake filter element with gaskets	Eight (8)
				Oil filter element with gaskets & seals	Eight (8)
				Safety valve springs & gaskets	Four (4)
				One set of inbuilt automatic drain valve	Four (4)
				Gear case breather filter element	One (1)
				Drain valve kit	One (1)

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		CORRIGENDUM - I			
Sr. No.	Vol. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as	
				<u>COMPRESSORS COOLERS</u>	
				Gaskets & seals for inter cooler and after cooler	Four (4)
				Inter cooler drain check valve	One (1)
				<u>OIL PUMP/MOTOR</u>	
				Oil pump complete assembly	One (1)
				Pump impeller / rotor with shaft	One (1)
				Set of bearings	Two (2) Sets
				Oil pump motor bearing	Two (2)
				<u>SHAFT DRIVEN OIL PUMP</u>	
				Drive gear with shaft	One (1)
				Driven gear with shaft	One (1)
				Drain tap elements	Four (4)
				Moisture tap elements	Four (4)

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		CORRIGENDUM - I			
Sr. No.	Vol. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as	
				Oil cooler gaskets and seals	Four (4)
				Seal Washer	Two (2)
				Mass flow Meter	One (1)
				Drive Motor	One (1)
43.	II, Sec-9/287 of 556	Annexure A - Mandatory Spares List (Mechanical)	----	<u>Mandatory spares for Air Drying Plant.</u>	
				Pre filter element (ceramic candle)	Two (2)
				After filter element (ceramic candle)	Two (2)
				Heater element (if required)	Two (2)
				Blower bearing (if required)	Two (2)
				Blower motor bearing (if required)	Two (2)
				Valve actuators	Two (2)
				Inlet & Outlet valve for Dryer	One (1) Set
				Automatic drain valves (No air loss	One (1) Set

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Sr. No.	Vol. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as	
				type)	
				Expansion valves	One (1) Set
				Filter Dryer	One (1) Set
				Air cooler condenser fan	One (1) Set
				Items as applicable as per the C & I list	As per the C & I list
44.	II, Sec-9/ 291 of 555/ /36.2	Annexure A - Mandatory Spares List (Mechanical)	Pipe (ERW and Seamless above 65NB)	Pipe (ERW and Seamless below 65NB)	
45.	II, Sec-9/ 293 of 555/ /38.9	Annexure A - Mandatory Spares List (Mechanical)	Drive Motor - One(1)	Drive Motor - One (1) of each type.	
46.	II, Sec-9/323 of 555 /1.0	Annexure A - Mandatory Spares List (Mechanical)	Compressed Air System (Applicable for one IA Compressor and one SA Compressor)	Bidder to supply two sets of spares mentioned against Sr. no. 1.1.1 to 1.1.18, one each for IA Compressor and SA Compressor	
47.	II, Sec-9/340 of 555 /2.0	Annexure A - Mandatory Spares List (Mechanical)	DIESEL ENGINE (ONE SET MEANS ITEM REQUIRED FOR ONE DIESEL ENGINE)	DIESEL ENGINE (ONE SET MEANS ITEM REQUIRED FOR ONE DIESEL ENGINE OF EACH TYPE AND MAKE). Bidder to supply one set of these spares for diesel engines of each type and	

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Sr. No.	Vol. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as	
				make.	
48.	II, Sec-9/341 of 555 /4.0	Annexure A - Mandatory Spares List (Mechanical)	Package Compressor Air	<u>Spares for Air Compressor</u>	
				<u>HP STAGE OF COMPRESSOR</u>	
				HP element	One (1) Set
				Packing Set	Four (4) Sets
				Axial thrust brg.	Two (2) Sets
				Labyrinth oil seal or radial seals or double acting seals for drive shafts	Four (4) Sets
				Bearing for male & female rotors (DE & NDE)	Two (2) each
				Timing Gears	One (1)
				Suction & discharge valves	Two (2) each
				<u>LP STAGE OF COMPRESSOR</u>	
				LP element	One (1) Set
				Graphitic ring shaft seals for compressor chamber or white metal	Four (4) Sets

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		CORRIGENDUM - I			
Sr. No.	Vol. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as	
				Packing Set	Four (4) Sets
				Axial thrust Bearing	Two (2) Sets
				Bearing for male & female rotors (DE & NDE)	Two (2) each
				Timing Gears	One (1)
				Suction & discharge valves	Two (2) each
				Main Bearing	Two (2) each
				Set up gear/pinion	One (1)
				Air intake filter element with gaskets	Eight (8)
				Oil filter element with gaskets & seals	Eight (8)
				Safety valve springs & gaskets	Four (4)
				One set of inbuilt automatic drain valve	Four (4)
				Gear case breather filter element	One (1)

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Sr. No.	Vol. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as	
				Drain valve kit	One (1)
				<u>COMPRESSORS COOLERS</u>	
				Gaskets & seals for inter cooler and after cooler	Four (4)
				Inter cooler drain check valve	One (1)
				<u>OIL PUMP/MOTOR</u>	
				Oil pump complete assembly	One (1)
				Pump impeller / rotor with shaft	One (1)
				Set of bearings	Two (2) Sets
				Oil pump motor bearing	Two (2)
				<u>SHAFT DRIVEN OIL PUMP</u>	
				Drive gear with shaft	One (1)
				Driven gear with shaft	One (1)
				Drain tap elements	Four (4)
				Moisture tap	Four (4)

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		CORRIGENDUM - I			
Sr. No.	Vol. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as	
				elements	
				Oil cooler gaskets and seals	Four (4)
				Seal Washer	Two (2)
				Mass flow Meter	One (1)
	Note: In case the bidder choose to offer centrifugal compressors, necessary mandatory spares based on the bidders judgment shall be considered, listed and included in the offer. The list however shall be subject to Owner’s review and approval.				
49.	II, Sec-9/341 of 555 /10.0	Annexure A - Mandatory Spares List (Mechanical)	----	<u>To be added:</u> Basket Type Strainers: 20% of population of each type and size	
50.	II, Sec-9/349 of 555 /(new)	Annexure A - Mandatory Spares List (Mechanical)		<u>Note:</u> In case, Bidder desires to supply VVFD for EOT Crane, following mandatory spares for the same shall be supplied	
				• Thysrister	Twelve (12)
				• Ignition Transformer	Twelve (12)
				• Firing card	Four (4)
				• Control	Two (2)

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				Transformer • Auxiliary contactor	Two (2) each
51.	II, Sec-9/350 of 555 /2.0	Annexure A - Mandatory Spares List (Mechanical	ELECTRIC HOISTS	Note : In addition, other applicable spares for Hoist as mentioned elsewhere shall also be supplied	
52.	II, Sec-9/351 of 555 /3.2	Annexure A - Mandatory Spares List (Mechanical)		<u>Elevators for Boiler Area</u> To be added 3.2.22 Bushing (for door front) – Two (2) sets 3.2.23 Pinion - Two (2) sets of each type	
53.	II, Sec-9/357 of 555 /4.11.6	Annexure A - Mandatory Spares List (Mechanical)		Pl. supply following items also (a) Rope guide and rope tighter – One (1) of each type	
54.	II, Sec-9/ 347 of 555 /(new)	Annexure A - Mandatory Spares List (Mechanical)	----	<u>To be added</u> <u>Spares for Stack Elevator</u> <u>BRAKE</u>	

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Sr. No.	Vol. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as	
				Brake Disc	One (1)
				Magnet Coil (SEW)	One (1)
				Pressure Plate (SEW)	One (1)
				<u>WORM GEAR</u>	
				O Ring (Type - I)	Two (2)
				O Ring (Type - II)	Two (2)
				Sealing Ring (Type - I)	Two (2)
				Sealing Ring (Type - II)	Two (2)
				Worm Wheel	One (1)
				<u>DOOR FRONT</u>	
				Bearing	Two (2)
				Bushing	Two (2)
				Roller	Two (2)
				<u>LIMIT CAMS</u>	
				Sensor	One (1)
				Switch	Two (2)
				Switch Arm	Two (2)
				<u>CAB</u>	

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Sr. No.	Vol. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as	
				Guide Roller	Six (6)
				Switch	One (1)
				<u>SLIDING DOOR</u>	
				Roller (lower)	Five (5)
				Roller (upper)	Five (5)
				<u>MACHINERY</u>	
				Counter roller	Two (2)
				Groove Ring	Six (6)
				Pinion	One (1)
				Rubber Inserts (Spider Rotex)	One (1)
				<u>CABLE TROLLEY</u>	
				Ball Bearing	Two (2)
				Cable trolley Guide Roller	Four (4)
				<u>ELECTRICAL</u>	
				Motor for each type and rating	One (1)
				Auxiliary Transformer	One (1)
				Battery Charger	One (1)

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Sr. No.	Vol. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as	
				Contactor (Control)	One (1)
				Contactor (Power)	One (1)
				Emergency Stop Button	Two (2)
				Isolator Switch	One (1)
				Limit Switch Type - I	Two (2)
				Limit Switch Type - II	Two (2)
				Push Button with Element (R,Y,B)	Two (2)
				Rectifier	One (1)
				Relays (Over load)	One (1)
				Three Phase Switch	One (1)
				Timer	Two (2)
				Tone Frequency Receiver (TFR)	One (1)
				Tone Frequency Transmitter (TFT)	One (1)
55.	II, Sec-9/ 385 of 555/ /10.1	Battery	Battery Cell - 5 Nos.	Battery cell – Two (2) for each battery.	

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Sr. No.	Vol. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as	
56.	II ,Sec-9/ 385 of 555/ /10.2	Battery	Cell container of each type - 5 Nos.	Cell container of each type – Two (2) for each battery.	
57.	II ,Sec-9/ 385 of 555/ /10.3	Battery	Level Indicators- 2 Nos.	Level Indicators – One (1) for each battery.	
58.	II ,Sec-9/ 385 of 555/ /10.4	Battery	Vent Plugs- 5 Nos.	Vent Plugs - Two (2) for each battery.	
59.	II ,Sec-9/ 385 of 555/ /10.5	Battery	Intercell connector - 5 Nos.	Intercell connector - Two (2) for each battery.	
60.	II ,Sec-9/ 385 of 555/ /10.6	Battery	Set of nuts, bolts & washer - 5 Nos.	Set of nuts, bolts & washer - Two (2) for each battery.	
61.	II ,Sec-9/ 385 of 555/ /10.7	Battery	Teakwood cable clamps with hardware - 6 Nos.	Teakwood cable clamps with hardware – Three (3) for each battery	
62.	II ,Sec-9/ 386 of 555/	Battery Charger	Electronic cards of each type & rating (With all components	Electronic card of each type & rating (With all components mounted) - 1 set for each battery	

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Sr. No.	Vol. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as	
	/11.1.1		mounted)-1 set.	charger.	
63.	II ,Sec-9/ 386 of 555/ /11.1.3	Battery Charger	SCR for each type & rating-2 Nos.	SCR for each type & rating Two (2) for each battery charger.	
64.	II ,Sec-9/ 386 of 555/ /11.1.4	Battery Charger	Blocking diode of each type & rating-1 No.	Blocking diode of each type & rating – One (1) for each battery charger.	
65.	II ,Sec-9/ 386 of 555/ /11.1.5	Battery Charger	Potentiometer of each type & rating (Pulse Transformer) - 1 No.	Potentiometer of each type & rating (Pulse Transformer) - One (1) for each battery Charger.	
66.	II ,Sec-11/ 549 of 555/5. 0 Sr No 1.0	List of Approved Vendors (Civil)		<u>Approved Vendors for FILL</u> <u>To be added</u> (g) M/s Hewitech GMBH & CO., Germany	
67.	II ,Sec-11/ 549 of	List of Approved Vendors	Aviation Warning Lights	Aviation Warning Lights	

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	555/5.0 Sr No 11.0	(Civil)	(a) FLASH TECHNOLOGY (b) USA (c) AVAIDS TECHNOVATORS PVT LTD (d) GURGAON OR EQUIVALENT.	(a) FLASH TECHNOLOGY, USA (b) AVAIDS TECHNOVATORS PVT LTD, GURGAON	

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CORRIGENDUM TO BID SPECIFICATIONS

VOLUME-III A

STEAM GENERATOR AND AUXILIARIES

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Sr. No.	Vol. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as	
1.	III-A/67 of 223 /5.17.2	Mill reject system	Two mill reject ----- storage capacity.	Two mill reject ----- storage capacity. Radio frequency level transmitter shall be provided for each silo.	
2.	III-A/68 of 223 /5.17.6	Mill reject system	----	<u>To be added :</u> (p) Capacity : 125 % of Mill reject generated with worst coal at 100% BMCR condition	

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CORRIGENDUM TO BID SPECIFICATIONS

VOLUME-III C

COAL HANDLING SYSTEM

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		CORRIGENDUM - I			
Sr. No.	Vol. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as	
1.	III-C/10 of 245 /2.0	Coal Handling System	However, it is to be specifically noted --- -- industry practices.	However, it is to be specifically noted ----- industry practices subject to approval of Owner / Owner's Consultants	
2.	III-C/10 of 245 /2.1.1	Coal Handling System	Indigenous Coal of (-) 300 mm size and imported Coal of (-) 50 mm size shall be received at Bhusawal site by Box -N type wagons and -----side arm chargers.	Indigenous Coal of (-) 300 mm size and imported Coal of (-) 50 mm size shall be received at Bhusawal site by Box/Box -N type wagons and -----side arm chargers	
3.	III-C/10 of 245 /2.1.2	Coal Handling System	Coal from W.T. Hopper-1 & 2 shall be ----- in TP-1 through Apron Feeder fitted below respective W.T. Hopper.	Coal from W.T. Hopper-1 & 2 shall be ----- in TP-1 through Apron Feeder and Rack & Pinion gates fitted below respective W.T. Hopper.	
4.	III-C/10 of 245 /2.1.3	Coal Handling System	Conveyors 1A & 1B (1W+1S) shall convey coal to TP-2 and feed either to Conveyor 2A or 2B through chutes & flap gates.	Conveyors 1A & 1B (1W+1S) shall convey coal to TP-2 and feed either to Conveyor 2A or 2B through chutes and Rack & Pinion gates.	

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Sr. No.	Vol. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as	
5.	III-C/15 of 245 /3.1.14	Coal Handling System	-	<u>To be added:</u> One portable oil filtration machine to filter oil of two (2) microns and minimum Eight (8) lpm capacity shall be provided for conveyors .	
6.	III-C/16 of 245 /3.2	Coal Handling System	Belt Conveyor and Accessories: The following ----- --- push buttons in local control stations etc.	Belt Conveyor and Accessories: The following ----- push buttons in local control stations, EHT brakes for Horizontal Conveyors etc.	
7.	III-C/16 of 245 /3.2	Coal Handling System	Monorail beam with suitable approach ----- gravity take up tower	Monorail beam with suitable approach ----- gravity take up tower. Suitable foundation /anchoring arrangement for motorised winch shall be provided at each vertical gravity take up location.	
8.	III-C/17 of 245 /3.3.6	Coal Handling System	Crusher house building with one number operator's room of adequate size at crusher floor level.	Crusher house building with operators' room (of transparent Glass) of adequate size at crusher floor level.	
9.	III-C/17 of 245 /(new)	Coal Handling System		<u>To be added</u> 3.3.10 Facility of Toilet block, drinking water along with water cooler, UV Purifier and soundproof cabin for operator	

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Sr. No.	Vol. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as	
10.	III-C/18 of 245 /3.5.4	Coal Handling System	One (1) portable hydraulic press type -----supplied. The machine shall be suitable for vulcanising 2200 mm belt used in the plant and ----.i.e. belt feeder.	One (1) portable hydraulic press type ----- supplied. The machine shall be suitable for vulcanising 2000 mm belt used in the plant and ---- .i.e. belt feeder.	
11.	III-C/19 of 245 /3.9.7	Coal Handling System	Necessary Pay loader.	Necessary Pay loader (Minimum 4) of adequate capacity along with Two (2) sets of mandatory spares	
12.	III-C/22 of 245 / 4.13	Coal Handling System	Supply of all lubricants -----till successful completion of trial operation	Supply of all lubricants and consumables----- till successful completion of COD .	
13.	III-C/22 of 245 / 4.14	Coal Handling System	Supply of consumables and chemicals required - ---- up to successful completion of trial operation	Supply of consumables and chemicals required ----- upto successful completion of COD .	
14.	III-C/23 of 245/ 4.19	Coal Handling System	Any other services, although not specifically called for such a vital contract of the size and nature indicated in this specifications.	Any other services, although not specifically called for such a vital contract of the size and nature included in this specifications.	

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15.	III-C/25 of 245 / 5.1.7 (c)	Coal Handling System	All rollers of similar type of idlers shall be complete with heavy duty antifriction bearing,- ----- etc.	All rollers of similar type of idlers shall be complete with heavy duty antifriction Split case type bearing,-----etc.	
16.	III-C/28 of 245 / 5.1.9 (c)	Coal Handling System	All drive pulleys shall be lagged ----- ---neoprene rubber.	All drive pulleys shall be lagged -----neoprene rubber and all tail pulleys shall be lagged with 12 mm thick herring bone /diamond (shore hardness - 60) grooved neoprene rubber.	
17.	III-C/28 of 245 / 5.1.9	Coal Handling System		<u>To be added</u> (k) The clearance between pulley structure and wall shall be at least 1500 mm.	
18.	III-C/42 of 245 / 5.3.2 (a)	Coal Handling System	----- Walkways shall be chequered plate construction.--- -----	----- Walkways shall be constructed with chequered plate of 6 mm thick. -----	
19.	III-C/42 of 245 / (new)	Coal Handling System		<u>To be added</u> 5.3.1(f) Facility of Toilet block, drinking water along with water cooler, UV Purifier and soundproof cabin for operator	
20.	III-C/46 of 245 / (new)	Coal Handling System		<u>To be added</u> 5.4.14 Facility of Toilet block,	

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				drinking water along with water cooler, UV Purifier and soundproof cabin for operator	
21.	III-C/49 of 245 / 5.7	Coal Handling System	Side Arm charger The side arm charger ----- of materials. It shall be used for pushing/pulling a rake of fully loaded wagons and locating wagons one by one on tippler.	Side Arm charger The side arm charger ----- of materials. It shall be used for pushing/pulling a rake of 60 fully loaded wagons and locating wagons one by one on tippler.	
22.	III-C/56 of 245 / 5.9.8	Coal Handling System	The slewing movement ----- shall be around + 105 deg.	The slewing movement ----- shall be around +/- 105 deg.	
23.	III-C/69 of 245 / 5.20.1	Coal Handling System	Steel grating shall be provided over wagon tippler hopper, sump pits, - ---- and boiler bunkers. All the grating ----- civil construction.	Steel grating shall be provided over wagon tippler hopper, sump pits, ----- boiler bunkers . The grating over grizzly/reclaim hopper shall be designed for movement of three (3) pay loaders. All the grating -- ----- civil construction.	
24.	III-C/77 of 245 / 5.24.1.2	Coal Handling System	Service air required for ----- by providing 2x100% compressors. The bidder should	Service air required for ----- by providing 2x100% compressors. The bidder should include air receiver and oil separator ----- cleaned and dry air.	

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			include air drier , air receiver and oil separator ----- cleaned and dry air.		
25.	III-C/79 of 245 / 5.24.1.7	Coal Handling System	Plain Water Type Dust Suppression System : a) The crushed coal -----concrete pillar 5.0 m height	Plain Water Type Dust Suppression System : a) The crushed coal ----- concrete pillar 5.0 m height. The rate of Water sprinkling shall be 6.25 lit/hr/tonne of coal.	
26.	III-C/91 of 245 / 5.24.3.2 (c)	Coal Handling System	The CHP ----- windows. Roof extractor ----- ventilation. CHP Control building shall be provided with exhaust fans (Minimum 12 nos.) of adequate capacity for ventilation purpose.	The CHP -----windows. Roof extractor -----ventilation. CHP Control building shall be provided with exhaust fans with louvers (Minimum Twelve) of adequate capacity for ventilation purpose.	
27.	III C/95 of 245 /5.25.1	Coal Handling System	Stationery Auger sampler shall be ---- -- from BOX/BOXN wagons	Two (2) Stationery Auger samplers with 360 ⁰ movement shall ----- from BOX/BOXN wagons. Each sampler shall be suitable for collection of samples from wagons on both railway tracks (inhaul side of Wagon	

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				Tippler)	
28.	III-C/101 of 245 / 5.34	Coal Handling System	Annunciation	<u>To be added</u> Hydraulic motor driven conveyors.	
29.	III-C/107 of 245 / 7.4	Coal Handling System	After the trial is carried out ----- signed between Chief General Manager (Gen. O&M) Mahagenco, Bhusawal TPS, General Manager (gen. Proj.) Bhusawal Project ---- -- and the Contractor.	After the trial is carried out ----- signed between Chief Engineer , (O&M), MAHAGENCO, Bhusawal TPS, Chief Engineer (Proj.), Bhusawal Project ----- and the Contractor.	
30.	III-C/108 of 245 / 8.1.2	Coal Handling System		<u>To be added</u> (c) Flow Path 3: From Coal Stock Pile to Bunkers for both Indigenous and Imported coal.	
31.	III-C/109 of 245 / 8.1.9	Coal Handling System	Bidder shall guarantee the performance requirement of all coal handling paths for designed capacity of 1500	Bidder shall guarantee the performance requirement of all coal handling paths for specified capacity of 1500 TPH for each ---- --- as applicable	

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			TPH for each ----- as applicable.		
32.	III-C/117 of 245 / Note: (5)	Coal Handling System	Breaker ply shall be provided for belt handling ROM coal.	Breaker ply shall be provided for belt handling ROM coal and all belt feeders.	
33.	III-C/117 of 245 / Note: (6)	Coal Handling System	Power requirement and belt tensions shall be calculated for design capacity on the basis -----to Owner's approval.	Power requirement and belt tensions shall be calculated for rated capacity on the basis ----- to Owner's approval	
34.	III-C/120 of 245 / 16	Coal Handling System	Type of bearing Anti-friction double –row spherical roller (Refer note 6.0)	Type of bearing Split case bearings.	
35.	III-C/121 of 245 / Note. 6	Coal Handling System	All underground conveyors pulleys shall have Split case bearings.	All conveyors pulleys shall have split case bearings.	
36.	III-C/129 of 245 / 8.4	Coal Handling System	Type of Bearing : Antifriction Ball/Roller	Type of Bearing : Split case	
37.	III-C/133 of 245 / 1.5	Coal Handling System	Belt Width - 1800 mm/2000 mm	Belt Width – as applicable	

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38.	III-C/133 of 245 / 1.6	Coal Handling System	Maximum Moisture Content - 15 %	Maximum Moisture Content - 20 %	
39.	III-C/133 of 245 / 2.1	Coal Handling System	Material Crushed coal – Electric /Sail hard	Material Crushed coal – Tiscral /Sail hard	
40.	III-C/137 of 245 / 1.10	Coal Handling System	Moisture content: 15 % (Max.)	Moisture content: 20 % (Max.)	
41.	III-C/141 of 245 / 1.3	Coal Handling System	Belt Width and speed - 1800 mm; 3.0 m/sec	Belt Width and speed – as applicable; 3.0 m/sec	
42.	III-C/142 of 245 / 2.5	Coal Handling System	Quantity of separator: Two(2) for each stream	Quantity of separator: Two (2) for each stream + One (1) on Conveyor 7	
43.	III-C/145 of 245 / 1.2	Coal Handling System	Material handled : Coal	Material handled : Uncrushed / crushed Coal	
44.	III-C/145 of 245 / 1.3	Coal Handling System	Lump size : 20 mm	Lump size : 300 mm (Indicative)	
45.	III-C/149 of 245 / 2.5	Coal Handling System	Bearing Antifriction ball/roller	Bearing Split case type	
46.	III-C/150 of 245 / 4.3	Coal Handling System	Plate thickness : 10 mm	Plate thickness : 16 mm	

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47.	III-C/150 of 245 / 4.4	Coal Handling System	Liner required : Yes , as per data sheet	Liner required : No	
48.	III-C/150 of 245 / 4.5	Coal Handling System	Liner material : As per data sheet	Liner material: Not required.	
49.	III-C/151 of 245 / 1.6	Coal Handling System	Belt Width – 1800 mm	Belt Width – 1200 mm	
50.	III-C/151 of 245 / 1.7	Coal Handling System	Capacity: 1200 TPH	Capacity: 1500 TPH	
51.	III-C/151 of 245 / 2.5	Coal Handling System	Bearing Antifriction ball/roller	Bearing Split case type	
52.	III-C/152 of 245 / 4.4	Coal Handling System	Plate thickness : 10 mm	Plate thickness : 16 mm	
53.	III-C/152 of 245 / 4.5	Coal Handling System	Liner required : Yes , as per data sheet	Liner required : No	
54.	III-C/152 of 245 / 4.6	Coal Handling System	Liner material : As per data sheet	Liner material: Not required.	
55.	III-C/161 of 245 / 9.0	Coal Handling System	Hoist speed: 4 m/min (min)	Hoist speed: 3 m/min	

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Sr. No.	Vol. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as			
56.	III-C/161 of 245 / 10.0	Coal Handling System	Carriage Travel speed: 10m/min (min)	Carriage Travel speed: 15 m/min (min)			
57.	III-C/166 of 245 /	Coal Handling System	Note: ** Electric or Manual to be decided based on capacity (All hoist above 3T shall be electrically operated).	Note: ** Electric or Manual to be decided based on capacity (All hoist above 2T shall be electrically operated).			
58.	III-C/173 of 245 / 8	Coal Handling System	Material Temperature : 50° C Max. and 5° C Min.	Deleted			
59.	III-C/175 of 245 / 1.5	Coal Handling System	Material Temperature : 50° C Max. and 5° C Min.	Deleted			
60.	III-C/181 of 245 / 4.5.1	Coal Handling System	Belt Width – 1800 mm	Belt Width – 1200 mm			
61.	III-C/189 of 245 / (new)	Coal Handling System	Sump Pump Schedule Datasheet A	<u>To be added:</u>			
				Sr No	Location	Capacity (m³/hr)	Quantity
				4	Grizzly Hopper area	30	2 (1W + 1S)

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Sr. No.	Vol. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as	
62.	III-C/192 of 245/ (new)	Coal Handling System		<u>To be added:</u> Note 6 – Rail stop shall be provided on inhaul and outhaul sides of Wagon Tippler	
63.	III-C/198 of 245 /	Coal Handling System	Total dry film thickness of primer & finish paint shall not be less than 20 microns or 500 microns.	<u>Note:</u> Total dry film thickness of primer & finish paint shall not be less than 500 microns	
64.	III-C/203 of 245/9.0	Coal Handling System	Belt width : 1800 mm	Belt width : 1200 mm	
65.	III-C/207 of 245/8.0	Coal Handling System	Material Temperature : 50° C Max. and 5° C Min.	Deleted	
66.	III-C/211 of 245/1.0	Coal Handling System	DE-1 & DE-2 : Function/ Location: Crusher House. To extract dust from discharge pulley of Conv. 2A/B, Feed point WF and crusher, feed & Discharge point of RBF-1,2,3,4,5 &6 and feed & discharge point of conv. 7	DE-1 & DE-2 : Function/ Location: Crusher House. To extract dust from discharge pulley of Conv. 2A/B, Feed point WF and crusher, feed & Discharge point of RBF-1,2,3,4 belt feeder and feed & discharge point of conveyor 7	

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Sr. No.	Vol. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as	
67.	III-C/218 of 245/5.0	Coal Handling System	VE -2	VE-2, VE-3	
68.	III-C/219 of 245/6.0	Coal Handling System	VE-5	VE-4, VE-5	
69.	III-C/223 of 245/3.0	Coal Handling System	MOC & Thickness of Main Plate MS & 8 mm thickness.	MOC & Thickness of Main Plate Tiscral /Sail Hard, 16 mm thick.	
70.	III-C/223 of 245/4.0	Coal Handling System	MOC & Thickness of liner Liner shall be Tiscral /Sail Hard, 3mm thick	MOC & Thickness of liner : Not required.	

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<u>CORRIGENDUM TO BID SPECIFICATIONS</u> <u>VOLUME-III D</u> <u>ASH HANDLING SYSTEM</u>		

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		CORRIGENDUM - I			
Sr. No.	Vol. No./ Page no./ Cl. No.	Equipment	Existing Particulars	To be read as	
1.	III-D/12 of 175/3.3.1	Ash Handling System	Fly ash is ----- rail wagons). Ash in pressure ----- with the aid of Four (4) (2W+2S) screw type / Centrifugal type conveying compressors. For conveying ash from HCSD silos to remote silo, One(1) compressor shall be provided..	Fly ash is ----- rail wagons). Ash in pressure ----- with the aid of Two (2) (1W+1S) screw type/Centrifugal type conveying compressors For conveying ash from HCSD silos to remote silo, Two (2) (1W+1S) compressor shall be provided.	
2.	III-D/ 18 of 175 / 3.5.4	Ash Handling System	For tendering purpose, Bidder shall consider estimated slurry discharge pipe length from pump end to farthest disposal point as 12 Km considering piping required around dyke for distribution of the slurry.	For tendering purpose, Bidder shall consider estimated slurry discharge pipe length from pump end to farthest disposal point as 12 km considering piping required for garlanding around dyke with offshoots for uniform distribution of the slurry. Bidder shall supply the discharge pipe length of 12 km (minimum). In case the disposal pipe length is more than 12 km, then the same shall be arranged by the bidder within contract price.	

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Sr. No.	Vol. No./ Page no./ Cl. No.	Equipment	Existing Particulars	To be read as	
3.	III-D/26 of 175/ (f)	Ash Handling System	Total Five (5) [Two working and two stand by] oil free non lubricated water cooled type screw compressors for pneumatic ash conveying. Two compressor shall be dedicated for transfer of ESP ash to HCSD silo and one for transport of ash from HCSD silo to remote silo	Total Four (4) [Two working and two stand by] oil free non lubricated water cooled type screw type/centrifugal type compressors for pneumatic ash conveying. One compressor shall be dedicated for transfer of ESP ash to HCSD silo and one for transport of ash from HCSD silo to remote silo	
4.	III-D/ 30 of 175 / 4.4.3	Ash Handling System	There shall be Two (2) ----- considered at El 281 M. The pipe line at rail/road crossing shall be on pipe rack keeping minimum height of 6.5M or culvert as required shall be provided.	There shall be Two (2) ---- -- considered at El 281 M. The pipe line at rail/road crossing shall be on pipe rack keeping clear head room of 8.5 M (minimum) or culvert as required shall be provided.	
5.	III-D/ 33 of 175 / 4.19	Ash Handling System	All the cross country ash pipelines including bottom ash slurry lines as well as HCSD pipelines up to ash disposal area which is about 12 Km shall be in the scope of the bidder.	All the cross country ash pipelines including bottom ash slurry lines as well as HCSD pipelines up to ash disposal area which is about 12 Km shall be in the scope of the bidder and bidder shall supply the discharge pipe length of 12 Km (Minimum) . In case the	

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Sr. No.	Vol. No./ Page no./ Cl. No.	Equipment	Existing Particulars	To be read as	
				disposal pipe length is more than 12 Km , then the same shall be arranged by the bidder within contract price.	
6.	III-D/ 44 of 175 /5.3.5	Ash Handling System	Lift of Hoists and cranes ---- ---erection and maintenance, but the capacity of the crane for handling HCSD pumps shall be kept 105% of the total weight of the pump assembly.	Lift of Hoists and cranes -- -----erection and maintenance, but the capacity of the crane for handling HCSD pumps shall be Min. 25T or 125% of the total weight of the equipment to be handled whichever is more.	
7.	III-D/75 of 175/ 8.1.5	Ash Handling System	-----	(After 3 rd Paragraph, please add) – On receiving permission from (HCSD) silo area HCSD control panel, HCSD can be controlled from AHP MCP.	
8.	III-D/77 of 175/ (i)	Ash Handling System	(i) Operation of Bottom Ash (ii) Operation of Coarse Ash and APH hopper ash (iii) Operation of Fly Ash pressurised conveying ----- remote Dry Fly Ash silo.	(i) Operation of Bottom Ash (ii) Operation of Coarse Ash and APH hopper ash (iii) Operation of Stack Ash (iv) Operation of Fly Ash pressurised conveying --- remote Dry Fly Ash silo.	

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Sr. No.	Vol. No./ Page no./ Cl. No.	Equipment	Existing Particulars	To be read as	
9.	III-D/77 of 175/ (v) of Cl. (i)	Ash Handling System	(i) Operation of sludge pumping series and number of pumps operating.	Shall be deleted	
10.	III-D/138 of 175/ 10.1.2	Ash Handling System	Number – Five (5) (3W+2S) 2no's working for ESP to HSSD silo, 1 no working for HCSD silo to remove silo.	Number – Four (4) (2W+2S). One (1) is working for ESP to HSSD silo, One (1) is working for HCSD silo to remote silo. One (1) each standby for ESP to HSSD silo and HCSD silo to remote silo. Capacity and pressure shall be as per requirement	
11.	III-D/140 of 175/ 10.2.1	Ash Handling System	Type Centrifugal Compressor	Centrifugal Compressor (Oil Free Non Lubricated)	
12.	III-D/140 of 175/ 10.2.7	Ash Handling System	Motor rating : By Bidder	By Bidder as per specification	
13.	III-D/141 of 175/ 10.2.10	Ash Handling System	Quantity: -	Four (4) (2W+2S) One working for ESP to HCSD silo, One working for HCSD silo to remote silo	

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14. Volume III D, page 129 of 175 – Datasheets for Ash Handling Systems shall be appended as under:

Sr No 30, page 170 - Minimum Rating for various equipments in Ash Handling System:

The minimum ratings to be offered for various equipments/pumps which are not covered in the specification is covered in this amendment. Final selection of various equipment rating shall be substantiated by the contractor by detail design calculations. The same shall be subjected to the owner's approval. In case design calculation indicates requirement of higher rating, the same shall be provided by the contractor without any financial implication to the owner.

(a) HP Ash Water Pump

(i) Numbers : Two (2) (1W+1S)

(ii) Capacity : 800 m³/hr

(iii) Head : 120 Mwc

(iv) Type : Horizontal centrifugal

(b) B.A.LP Ash Water Pump

(i) Numbers : Two (2) (1W+1S)

(ii) Capacity : 300 m³/hr

(iii) Head : 30 mWC

(iv) Type : Horizontal centrifugal

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(c) Refractory Cooling Water Pump

(i) Numbers : Two (2) (1W+1S)

(ii) Capacity : 500 m3/hr

(iii) Head : 30 mWC

(iv) Type : Horizontal centrifugal

(d) LP Ash Water Pump (for HCSS)

(i) Numbers : Two (2) (1W+1S)

(ii) Capacity : 350 m3/hr

(iii) Head : 25mWC

(iv) Type : Horizontal centrifugal

(e) LP Seal Water Pump

(i) Numbers : Two (2) (1W+1S)

(ii) Capacity : 25 m3/hr

(iii) Head : 125mWC

(iv) Type : Horizontal centrifugal multistage

(f) HP Seal Water Pump

(i) Numbers : Two (2) (1W+1S)

(ii) Capacity : 25 m3/hr

(iii) Head : 250 mWC

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(iv)Type:Horizontal centrifugal multistage

(g)Bottom Ash Overflow Transfer Pump

(i)Numbers:Two (2) (1W+1S)

(ii)Capacity:500 m3/hr

(iii)Head:25 mWC

(iv)Type:Horizontal centrifugal

(h)Sump Drainage Pump (for AHS Pump house area)

(i)Numbers:Two (2) (1W+1S)

(ii)Capacity:50 m3/hr

(iii)Head:15 mWC

(iv)Type:Vertical centrifugal

(i)Sump Pump (near remote dry fly ash silo area)

(i)Numbers:Two (2) (1W+1S) vertical drain pumps and One (1) ejector type jet pump

(ii)Capacity:50 m3/hr for vertical drain pumps (minimum)

(iii)Head:25mWC for vertical drain pumps (minimum)

(j)Sump Pump (near HCSS silo area)

(i)Numbers:Two (2) (1W+1S) vertical drain pumps and One (1) ejector type jet pump

(ii)Capacity:50 m3/hr for vertical drain pumps (minimum)

(iii)Head:25mWC for vertical drain pumps (minimum)

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(k) Fly Ash Unloader Conditioning Pump

(i) Numbers : Two (2) (1W+1S)

(ii) Capacity : 70 m³/hr

(iii) Head : 50 mWC

(iv) Type : Horizontal centrifugal

(l) Emergency flushing Pump for HSCC

(i) Numbers : Two (2) (1W+1S)

(ii) Capacity : (bidder to decide) m³/hr

(iii) Head : to suit maximum pressure requirement for HCSS

(iv) Type : Triplex Reciprocating type High Pressure pump

(m) As per Tender specification (Volume III D, 154/175, Sr No 17.5), the minimum capacity of Ash Slurry pump is indicated as 1115 m³/hr which shall be corrected as 1215 m³/hr. The capacity considered is for maximum ash slurry concentration of 20%. However if the bidder agrees to provide Ash slurry pump suitable for handling upto 25% slurry concentration, the minimum capacity of ash slurry pump shall be 950 m³/hr.

(n) Minimum crane capacities (for pump houses/buildings in Ash Handling System)

(i) HCSD Pump House : Minimum 25 T main hoist EOT crane or equal to 1.25 times the maximum weight to be handled, whichever maximum.

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(ii) Ash Slurry pump house : 7.5 T single girder EOT crane (iii) Ash compressor house : 7.5 T single girder EOT crane (iv) Ash water Pump house : 6.0 T single girder EOT crane (v) Remote silo utility building : 3.5 T under slung crane (vi) HCSC Silo utility building : 3.5 T under slung crane (o) Ash water pump : (i) Capacity : 1000 m3/ hr (ii) Head : bidder to estimate.			

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VOLUME III E1

WATER TREATMENT SYSTEMS

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Sr. No.	Vol.No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as	
1.	III-E1/ 94 of 313/ Sr No 1.2.19	Water Treatment Systems	Voltage, Phase & Frequency ($\pm$ % Variation) : 415 V (+10%), 3 Phase, 50 HZ	Voltage, Phase & Frequency ($\pm$ % Variation) : Please refer Volume II or Volume IV A.	
2.	III-E1/ 227of 313 / 3.1.1 (a) (i)	Water Treatment Systems	Maximum permissible Noise level for Air Compressors and Blowers : 95 dB (A)	Maximum permissible Noise level for Air Compressors and Blowers : 85 dB (A)	
3.	III-E1/ 246 of 313/ 7.1.11	Water Treatment Systems	The tubes/plates shall be inclined by 50 – 600 Angle to the horizontal.	The tubes/plates shall be inclined by 60 ⁰ to the horizontal.	
Note : The item at Sr No 1 above is applicable to all motors mentioned in this Volume III E1					

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Sr. No.	Vol.No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as	
1	III-E2, Sec-1/16 of 113/3.1.8	Main & Auxiliary Cooling Water System	The velocity of water in CW and ACW system shall not exceed 3.0 and 2.5 m/sec respectively.	The velocity of water in CW and ACW system shall not exceed 2.5 m/sec.	

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VOLUME III F

PIPING SPECIALTIES & THERMAL INSULATION

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Sr. No.	Vol.No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as	
1.	III-F, Sec-3/101 of 158/5.1.1(b)	Piping Specialties & Thermal insulation	Condenser CW discharge : 3.0 m/s	Condenser CW discharge : 2.5 m/s	

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VOLUME III H

FIRE PROTECTION AND DETECTION SYSTEM

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Sr. No.	Vol.No./ Page No./ Cl. No.	Existing Particulars	To be read as	
1.	III-H/ 9 of 123 / 3.1	Hydrant System	To be added: s) Stores	
2.	III-H/ 29 of 123 / 5.1.21	One (1) Solar Blind Infra detector with inbuilt air purging unit for conveyor	Three (3) Solar Blind Infra detector with inbuilt air purging unit for each conveyor	
3.	III-H/ 32 of 123 / (new)		<u>To be added:</u> 5.1.32 Transformers of 220 KVA and above shall be provided with Nitrogen Injection based Fire Protection System in addition to HVW Spray system.	
4.	III-H/ 89 of 123 / 6.0	Drive: Electric motor & V-Belt drive	Drive: Electric motor	
5.	III-H/ 98 of 123 / (D) 3.0	Flow: 2500-2700 liter/min at 7 Kg/cm ²	Flow: 2700 litre/min at 7 Kg/cm ²	
6.	III-H/ 98 of 123 / (D) 5.0	Throw of monitors a) Horizontal = 25-30 M b) Vertical = 25-30 M	Throw of monitors a) Horizontal = 30 M b) Vertical = 30 M	

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CORRIGENDUM TO BID SPECIFICATIONS

VOLUME III I

MATERIAL HANDLING AND MISCELLANEOUS

EQUIPMENTS (STORAGE TANKS)

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Sr. No.	Vol No./ Page No./ Cl. No.	Existing Particulars	To be read as	
1.	III-I/19 of 328/4.1.1	4.1.1 The safe working load (Y) for E.O.T. cranes shall be computed as $Y = 1.25 a$ Where a = Weight of single heaviest equipment expected to be handled. (Excluding ----- of 130 Tonnes for EOT crane at TG Hall)	4.1.1 The safe working load (Y) for E.O.T. cranes shall be computed as $Y = 1.25 a$ Where a = Weight of single heaviest equipment expected to be handled.	
2.	III-I/26 of 328/5.5.3	Every platform shall be provided with steel chequered plate top and be secured fenced with one to two meters high double tier hand rails of 32 mm diameter GI pipe and toe boards.	Every platform shall be provided with steel chequered plate of 8 mm thick top and be securely fenced with 1.2 meters high double tier hand rails of 32 mm diameter GI pipe and toe guards . Vertical posts shall not be spaced more than 1.5 m.	
3.	III-I/48 of 328/3.1(a)	Duty Class : Mechanism class: Class 2 as per IS- 3177 and IS-807	Duty Class : Mechanism class: M:5 as per IS- 3177 and IS-807	
4.	III-I/48 of 328/3.1(b)	Duty Class : Electrical Service Class : Class 4 as per IS- 3177	Duty Class : Electrical Service Class : M:8 as per IS- 3177	
5.	III-I/48 of 328/3.2	Operation : Cabin with Pendant Station or Radio Remote Control for Crane at Sr. No.1 in	Operation : Cabin with Pendant Station and Radio Remote Control for Crane at Sr. No.1 in Annexure-I,	

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Sr. No.	Vol No./ Page No./ Cl. No.	Existing Particulars	To be read as	
		Annexure-I, Pendant station for cranes at sr. No. 2 to 13 in Annexure-I.	Pendant station for cranes at Sr. No. 1 to 13 in Annexure-I.	
6.	III-I/99 of 328/4.1.1	Capacity of each hoist shall be 1.2 times the maximum working load.	Capacity of each hoist shall be 1.25 times the maximum working load.	
7.	III-I/99 of 328/4.1.2	Hoists of capacity up to 3 tonnes shall be manual hoists.	Hoists of capacity up to 2 tonnes and height not exceeding 5.0 m shall be manual hoists.	
8.	III-I/99 of 328/4.1.3	Hoists of capacity equal & above 3 tonnes shall be electric hoists.	Hoists of capacity up to 2 tonnes and height not exceeding 5.0 m shall be manual hoists.	
9.	III-I/201 of 328/3.1.1	Two (2) Potable Water tanks shall be installed on the roof of deaerator floor.	One (1) Potable Water tank shall be installed on the deaerator floor.	
10.	III-I/201 of 328/3.1.2	Two (2) Service Water tanks shall be installed on the roof of deaerator floor.	One (1) Service Water tank shall be installed on the deaerator floor.	
11.	III-I/211 of 328/ Annexure I, Sr No 4	Service Water Tank – Capacity – 75 m ³ , Numbers - 2	Service Water Tank with partition of 75 m ³ each. Total Capacity – 150 m ³ , Number - 1	
12.	III-I/211 of 328/ Annexure I, Sr No 5	Potable Water Tank – Capacity – 25 m ³ , Numbers - 2	Potable Water Tank – Capacity – 50 m ³ , Number - 1	
13.	III-I/308 of 328	Annexure-I List of Recommended	Annexure-I List of Mandatory Spares High	

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Sr. No.	Vol No./ Page No./ Cl. No.	Existing Particulars	To be read as	
		Spares for Two years of operation of High Volume Sampler.	Volume Sampler.	
14.	III-I/309 of 328	Annexure-I List of Recommended Operational Spares for Stack Monitoring Kit	Annexure-I List of Mandatory Spares for Stack Monitoring Kit	

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Sr. No.	Vol. No./ Page No./ Cl. No.	Existing Particulars	To be read as	
1.	V/22 of 718 / 4.3	Suggestive control system Architecture for the DCS is schematically shown in Drawing No. PE-189-IN-Sk-8001/ P0 .	Suggestive control system Architecture for the DCS is schematically shown in Drawing No. PE-189-IN-Sk-8001/ P1 .	
2.	V/37 of 718 / 5.1	The offered model of DCS, Microprocessor based control system must have been successfully supplied, erected, tested and commissioned as complete station Control & Instrumentation system for at least two units of capacity not less than 600 MW supercritical Thermal Power Station(s) with reheat type pulverized coal fired boiler. Further, these units should be in successful operation for a minimum period of two (2) years	The offered model of DCS must have been successfully supplied, erected, tested and commissioned as complete station Control & Instrumentation system for at least one unit of capacity not less than 500 MW Thermal Power Station(s) with reheat type pulverized coal fired boiler which is in successful operation for a minimum period of one year as on date of opening of Bids.	
3.	V/72 of 718/ 1.3.10	Proposed DCS control system architecture is illustrated in drawing no. PE-189-IN-Sk-8001/ P0 .	Proposed DCS control system architecture is illustrated in drawing no. PE-189-IN-Sk-8001 / P1 .	
4.	V/80 of 718/ 1.5.3/(ii)	CCTV scheme drawing ,specification & datasheet : Schm. & Speac.-A, Datasheet-I	CCTV scheme drawing, specification & datasheet : Schm. & Speac.-A, Datasheet-A	

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Sr. No.	Vol. No./ Page No./ Cl. No.	Existing Particulars	To be read as	
5.	V/80 of 718/ 1.5.3/(jj)	Telephone system scheme drawing, specification & datasheet : Schm. & Spec.-A, Datasheet-I	Telephone system scheme drawing, specification & datasheet : Schm. & Spec.-A, Datasheet-A	
6.	V/81 of 718/ 1.5.3/(pp)	UPS & 24 V DC battery & battery charger scheme drawing, specification & datasheet : Schm. & Spec.-A, Datasheet-I	UPS & 24 V DC battery & battery charger scheme drawing, specification & datasheet : Schm. & Spec.-A, Datasheet-A	
7.	V/403 of 718/ 7.3.7/(c)/(i)	Key Board (i) Type : Flat spill proof membrane type or positive depression type	Key Board (i) Type: Flat spill proof membrane type.	
8.	V/480 of 718/ 6.1/(h)/(ii)	(ii) Type of battery for emergency supply : 24V/Ah, Plant A type	(ii) Type of battery for emergency supply : 24V /Ah, Plante type with 12 Hr. back-up	
9.	V/480 of 718 / 6.2/(a)	<u>MAIN DISTRIBUTION FRAME(MDF)</u> (a) Make & Type : To be decided by the Bidder	<u>MAIN DISTRIBUTION FRAME(MDF)</u> (a) Make & Type: from approved vendor list.	
10.	V/481 of 718/ 6.3/(a)	(a) Make & Type : To be decided by the Bidder	(a) Make & Type: from approved vendor list.	
11.	V/481 of 718/ /6.4/(a)	(a) Make & Type : To be decided by the	(a) Make & Type: from approved vendor list.	

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Sr. No.	Vol. No./ Page No./ Cl. No.	Existing Particulars	To be read as	
		Bidder		
12.	V/486 of 718/ /7.5.1	Heavy duty, flush mounting, indoor type, 2 pin sockets shall be furnished in Control Equipment Rooms ANNEXURE-Dthrough matching plugs.	Heavy duty, flush mounting, indoor type, 2 pin sockets shall be furnished in Control Equipment Rooms, Unit Control Rooms & other areas / control rooms & various rooms of Technical Office Building as indicated in ANNEXURE-A to this section. Concealed type conduit wiring for each telephone set for above areas/ rooms shall be terminated to the 2 pin socket to which the respective telephone set shall be connected through matching plugs.	
13.	V/486 of 718/ /7.5.2	Heavy duty, wall/ column mounted, ANNEXURE-D to this section.	Heavy duty, wall/column mounted, outdoor weatherproof type 2 pin sockets, metal clad, gasketted construction, screwed metal cover tied to it by a metal chain, 20mm conduit entry, suitable for both indoor & outdoor installation shall be furnished in areas as indicated in ANNEXURE-A to this section.	
14.	V/492 of 718/ /8.11.9	Distribution of communication system in Unit Control Rooms, ANNEXURE-D	Distribution of communication system in Unit Control Rooms, Control Equipment Rooms, DAS Rooms, Shift Charge Engineer	

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Sr. No.	Vol. No./ Page No./ Cl. No.	Existing Particulars	To be read as	
		shall be connected with matching plugs.	Rooms, SWAS Rooms, ESP Control Rooms, other areas /Control Rooms and various rooms of Technical Office Building, all as indicated in ANNEXURE-A to this section shall be through concealed cabling which may be effected by running telephone cables through PVC pipes concealed in the walls. The telephone cabling & wiring in each such rooms & areas shall be terminated to two pin sockets, to which respective telephone sets shall be connected with matching plugs.	
Additionally bidder shall consider the following as clause no. 13 in Section-5, Volume V (page 440/718). <u>SPECIAL REQUIREMENTS OF INSTRUMENTATION BASED ON ENERGY AUDIT PROGRAMME</u> 13.1 <u>INTRODUCTION</u> Measurement of important parameters which affect the input costs like coal, oil, water need to be measured and not estimated. Both receipt and consumption need to be separately monitored and reconciled through computerized system. There must not be human intervention in the measurement and recording systems of coal, fuel oil and water resources which affect the station input costs. Supply chain optimization of raw material inputs through modernization of technology needs to be taken up. Transit loss, specific fuel consumption and GCV are interlined and realistic quantification of these will only be possible if a fuel monitoring system is in place.				

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The system should aim at procurement of digital instrumentation which can be seamlessly integrated into a DDCMIS. Intelligent Electronic Devices (IEDs) must be the preferred Instrumentation Systems. Information and communication system needs to be got audited for obtaining a holistic picture of its structure and efficiency.

13.2 COAL

13.2.1 Station Coal Measurement (Coal Receipt Measurement)

Fully automated pitless in motion weigh bridges with digital interface and provision for data communication to control room shall be envisaged. These must act as Intelligent Electronic Devices (IEDs) and seamlessly communicate with the overall plant automation. Besides, fully automatic rail signature at the receiving end shall have provision for acting as IEDs to communicate with the plant automation.

13.2.2 Unit Coal Measurement (Coal Consumption Measurement)

(a) The coal entry into the boilers shall be measured. The various technologies for coal measurement are given in clause no. 13.6 of this section.

(b) An online process (without any human intervention) which would give the online coal consumption with uncertainties of $\pm 1.0\%$ shall be envisaged and the technology for the same must be well proven and established. The conventional stacking method can be used for reconciliation of data/cross verification only and not for coal consumption measurement.

(c) The stacking inventory procedure shall not be used for measurement of coal for declaring the station heat rate. Instead the use of fully automated, tamper-proof modern instrumentation without human intervention for on-line coal inflow and consumption shall be envisaged.

(d) The difference in belt weighers/gravimetric feeders and receiving end coal measurements must not exceed more than 0.06 kg/kWh

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(0.03 kg/kWh for increase in moisture from tripling to bunkering, stones weights and 0.03 kg/kWh for handling loss). (e) Based on an assessment of the different technologies the following are recommended: (i) Installation of Belt Weighers for all coal conveyors. The offered system shall monitor the time elapsed by a belt over a given bunker and which involves integration of the output of the Belt Weighers over the total bunkers of the unit in a given period of time. The bidder must come out with a viable and innovative scheme for monitoring the bunker wise coal from the belt weigher data. (ii) Microwave or Ultrasonic Bunker Level Monitoring System with digital data output, communication of data to system server or control room is required. (iii) Coal flow for the plant shall be monitored by gravimetric feeders which provide accurate and authentic coal flow measurements, in addition to belt weighers. The differences in the two are to be within 0.5%. The data from the belt weighers and the gravimetric feeder can be cross verified, calibrated and reconciled. Necessary signal exchange shall be considered by the bidder. (iv) Necessary software shall be included in the offer for online coal energy management in the plant. The software shall take input data from the various field instruments for coal receipt from various sources and coal consumption at various bunkers. (v) Computation of unit coal consumption. This is purely from the reading of the belt weigher and bunker monitoring system. This coal consumption is to be used for computation of unit and station heat rate for normal and cycling operations. In all the above instruments, the following must be considered:		

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(a) Differential pressure orifice plate or nozzle type or mass based oil flow meters with provision for continuous digital data transfer shall be installed. (b) The oil gun on-off operation data must be recorded through a time based system automatically to give a time trace of when the guns are on and when the guns are not in service. This will be useful for performance optimization group to study the operator to operator variations, coal to coal variations, variation in different seasons, etc.		
13.3.3 Integrated Fuel Oil Receipt and Consumption Monitoring A Fuel Oil Monitoring software Package shall be provided. When ultrasonic level measurement for tanks is used, the software package shall calculate the oil receipts.		
13.3.4 DM Water and Associated Water Systems On-line monitoring of DM water flow and unit make up with integrators shall be envisaged to control the energy efficiency as the make up is directly proportional to the steam lost from the system and affects the unit heat consumption and heat rate. Hence, it is envisaged to go in for fully automatic on line measurement of water consumption for both production and consumption measurement of raw water, DM water, soft water and drinking water. The following are to be considered for DM (De-mineralized) and associated water systems: (a) Both DM water production and DM water consumption must be separately measured and audited. (b) Installation of differential pressure orifice plate or nozzle type flow meters with digital output, communication media to relay the data to the DM control room computer and provision for downloading the data into a data base for on line monitoring of make up especially during cycling operations. On line monitoring would help in control of unit heat rate as well as give an accurate account of the chemicals consumed for DM water production.		

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(c) Water Monitoring Software Package shall be provided. The package must have capability to draw inputs from the various field instruments and make an on-line continuous data base grid of the information for generation various types of information such as consumption per shift, consumption during cycling operations, operator-wise consumption, etc. to enable the performance optimization group to take control action on the areas of wastage and excessive consumption. Consumption and production shall be separately monitored.

13.4 SPECIFICATIONS OF IN-MOTION WEIGH BRIDGES

13.4.1 Particulars Of Pit-Less In-Motion Weigh Bridges

(a) The system is basically in-motion rail dual in-weigh sensors with analog electrical signals which are digitized and communicated to a control room through communication media where it is recorded. The record shall be in a usable format of a data base with a tie stamp.

(b) Accuracy : ±0.5% or better for individual wagon and ±0.2% for the entire rake.

(c) Power Supply : 700W

(d) Reliability Index : SAIDI (System Average Interruption During Index) : 48 hours / year or better
SAIFI (System average interruption frequency index): 2 times / year or better.

Further details and latest amendments can be obtained from Research Design Standards Organization (RDSO) of Indian Railways (www.rdso.gov.in).

13.5 METHODS OF MEASUREMENT OF COAL USED IN THE BOILERS

13.5.1 Particulars Of Pit-Less In-Motion Weigh Bridges

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(a) Belts weighment at the entrance of the raw coal bunkers. (b) Bunker level calibration and flow measurement based on bunker level. (c) Volumetric measurement based on raw coal feeder speed. (d) Volumetric measurement based on pulverized coal feeder speed. (e) Gravimetric measurement at outlet of raw coal feeder. (f) Pressure drop across pulverized coal pipe leading to the burner through fixed geometry devices. (g) Variable orifice dampers. (h) Dirty pitot tube measurement in the coal pipe leading to the burner. (i) Passive Electrostatic Sensors (j) Screw-in Microware Sensor. (k) Passive Acoustic Sensors (l) Laser through beam or retro reflex sensors (m) Calibration of mills as a function of their power input. 13.6 <u>SPECIFICATIONS OF BELT WEIGHER</u> 13.6.1 Particulars Of Belt Weighers (a) Micro Processor based electronic belt weighers with communication facility to continuously transmit the data to a control room as well as local reading. (i) Type : Electronic, Multi-idler type		

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(ii) Location : Refer mechanical specification of Coal Handling Plant (iii) Belt Speed : Refer mechanical specification of Coal Handling Plant (b) Coal Properties and Capacity (i) Bulk density : Refer mechanical specification of Coal Handling Plant (ii) Capacity : Refer mechanical specification of Coal Handling Plant (c) Duty Conditions (i) Moisture : Refer mechanical specification of Coal Handling Plant (ii) Dust : Refer mechanical specification of Coal Handling Plant (iii) Rain and high RH : Refer mechanical specification of Coal Handling Plant (d) Accuracy : ±0.25% or better of actual flow rate (dynamic). Weigh idler deflection less than 0.025 mm at full load. (e) Reliability Index : SAIDI (System Average Interruption During Index) : 48 hours/year or better SAIFI (System average interruption frequency index): 2 times/year or better. (f) Overload Capacity : Up to 25% with 100% overload protection (g) Capacity range of accuracy : 0 to 100%			

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(h)	Electronic Components	: Electronic digitiliser / monitors, cable, totalizer, sub- totalizer, tacho generator, printer, transmission of the impulse of flow rate as well as total quantity conveyed to control room through communication media. Fully digital with microprocessor and battery back-up memory.	
(i)	Mode of weighment primary sensors	: Super precision stainless steel strain gauge load cell applied in tension for highly accurate load measurement. Hermetically enclosed measuring device, compact designed, suitable for all customary belt widths. Speed measurement: Brushless digital tacho provides accurate measurement of speed.	
(j)	Outputs	: Electronic signals to control room and to local instrument display. Status Annunciator for set points.	
(k)	Printout weigh, total and error reports	: Provision for zero setting on empty belt and further calibration. Special electronic calibration facility for frequent calibration checks without handling standard weights.	
(l)	Special trunion bushes	to absorb normal shocks and transverse forces.	
(m)	Fully automatic tare and span calibration.		
(n)	Self-checking diagnostics	for fault indications.	

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Sr. No.	Vol. No./ Page No./ Cl. No.	Building/Area	Existing Particulars	To be read as	
1.	VI-A/Sec-1/42 of 639/3.1(xi)		Construction of ROB, Bridges, concrete or UCR Retaining wall & concrete drains, culvert, pitched drains, concrete apron etc.	Construction of ROB, Bridges, concrete or UCR Retaining wall & concrete drains, culvert, pitched drains, concrete apron and Seven (7) 300 dia NP3 RCC Hume pipes at railway crossing as per site requirement.	
2.	VI-A /Sec 1/ 140 of 639/ 4.9.1 (d)	Raw water treatment plant	Pretreatment chemical house ----- with Acid/Alkali proof tile lining.	Pretreatment chemical house ----- with Acid/Alkali proof tile lining. Chemical lab shall consist arrangement of storeroom with racks, lab sinks, cupboards, storing compartments with shutters below testing platform (Granite top) along with provision of toilet block.	
3.	VI-A /Sec 1/ 142 of 639/ 4.9.3 (a)	DM plant	Dimension and height ----- rating as per TAC.	Dimension and height ----- rating as per TAC. Chemical lab shall consist arrangement of storeroom with racks, lab sinks, cupboards, storing compartments with shutters below testing platform (Granite top) along with provision of toilet block.	

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Sr. No.	Vol. No./ Page No./ Cl. No.	Building/Area	Existing Particulars	To be read as
1.	VI A / sect 4 / 400 of 639 / 2.15 (i)		The Multiwall ----- a temperature of 1000C.	The Multiwall ----- a temperature of 100 °C.
2.	VI-A/Sec-5/577 of 639/9.6.14.1		Measurements The span length shall not vary more than 50 mm as measured along the appropriate rail. The cumulative error of measurement of all spans in a kilometer shall be not more than 1000 mm.	deleted

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This refers to Volume VI A, Section 1, page 136, clause 4.7.20.18 (pp) of the bid specification. The details under Sr No (i), (ii) of the clause stand replaced as under:

(pp) The valves shall generally meet the following requirements:

(a) Butterfly Valves:

(i)	Type	:	Manually operated Double flanged Butterfly Valve
(ii)	Standard	:	AWWA C – 504/ BS: 5155
(iii)	POD (Proof of Design) Test	:	AWWA C – 504. Bidder to submit for reference.
(iv)	Operating Fluid	:	Water at 40 °C to 45 °C
(v)	Design Pressure	:	5.0 Kg./Sq.cm.
(vi)	Max. differential pressure	:	5.0 Kg./Sq.cm.
(vii)	Head loss	:	Max. 0.3 MWC
(viii)	Body	:	Cast Iron conforming to IS: 210 Grade FG 260 or Fabricated steel conforming to IS:2062/ IS:2002
(ix)	Shaft	:	Stainless Steel AISI 410
(x)	Bearing type	:	Self lubricated type
(xi)	Disc seat	:	Nitrile Rubber
(xii)	Body Seat	:	SS – 316
(xiii)	Internal Hardware	:	Stainless Steel
(xiv)	External Hardware	:	High Tensile Steel
(xv)	Fasteners	:	SS – 304 / SS – 316

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(xvi)	Gland Packing	:	Teflon
(xvii)	Gaskets, Rings, etc.	:	Nitrile Rubber
(xviii)	Accessories	:	2 Nos. of 2NO + 2NC limit switches 'OPEN' & 'CLOSE.

All the butterfly valves shall be complete with graduated position indicator, arrow indicating the flow direction. The valves shall be suitable for erection in any position (Horizontal/Vertical, etc.). The operating mechanism shall be mounted directly on or supported from valve body. All the butterfly valves shall be provided with hand wheel. Butterfly valves of size 350 NB and above shall be provided with reduction gear units. Valves shall close in clockwise direction. The hand controls shall be dimensioned to guarantee an easy manoeuvre under most severe conditions. The hand controls shall be provided with locking systems to avoid the disk assuming a not desired position during operation. The pulling force required on the hand wheel-rim shall not exceed 30 Kg. when operating the valve under full flow and operating pressure. The reduction units shall be watertight, complete with lubrication and position indicator. Only one type of valve shall be provided, either cast or fabricated type. Mixing of two types of valves is not considered acceptable.

(b) Ball Valves

(i)	Standard	:	IS: 9890
(ii)	Type	:	Threaded
(iii)	Pattern and Construction	:	Full bore in single piece
(iv)	Nominal size	:	As specified elsewhere
(v)	Design pressure	:	5 Kg./sq.cm.
(vi)	Material of construction	:	Carbon Steel Valves confirms to IS: 9890

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(The contents of the following table shall be considered in continuation to the requirements specified under Volume VI A, section 4, clause no 6.0)		

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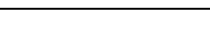
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TABLE- I

Schedule of Internal Finishes for different Pump Houses with Permanent Housing

Sr. No.	Description	Insulation Specified in Data Sheets	Flooring	Skirting	Plastering/ Painting			Roof	Lifting Arrange-ment
					Internal Wall	Ceiling	External Wall		
1.A	Water Treatment System								
1.0	Sludge Transfer Pumps	Not Specified	Heavy Duty, 25mm Thick Steel crete Tiles over concrete / grade slab	150 mm high Steel crete tiles	Oil bound distem- per over 12 mm thick internal plaster With neeru finish	Oil bound distem- per over 6 mm thick ceiling plaster With neeru finish	Water proof exterior acrylic paint over 20 mm thick external plasters over brick work	R.C.C. Roof	Required
2.0	Thickened Sludge Transfer Pumps	Class “B” insulation IPW55	-do-	-do-	-do-	-do-	-do-	-do-	-do-

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Sr. No.	Description	Insulation Specified in Data Sheets	Flooring	Skirting	Plastering/ Painting			Roof	Lifting Arrange-ment	
					Internal Wall	Ceiling	External Wall			
1.B	DM plant									
1.0	DM Plant Supply Pumps	Not Specified	-do-	-do-	-do-	-do-	-do-	-do-	-do-	
2.0	Degasser Air Blowers	-do-	-do-	-do-	-do-	-do-	-do-	-do-	-do-	
3.0	Acid Unloading Pumps	-do-	-do-	-do-	-do-	-do-	-do-	-do-	-do-	
4.0	Caustic Unloading Pumps	-do-	-do-	-do-	-do-	-do-	-do-	-do-	-do-	
5.0	Neutralized Effluent disposal Pumps	-do-	-do-	-do-	-do-	-do-	-do-	-do-	-do-	
1.C	Effluent Treatment Plant									
1.0	Backwash Waste Water Transfer Pumps	-do-	-do-	-do-	-do-	-do-	-do-	-do-	-do-	
2.0	Boiler Blow Down Transfer Pumps	-do-	-do-	-do-	-do-	-do-	-do-	-do-	-do-	
3.0	Oily Waste Transfer Pumps						-do-			
(a)	Fuel Oil Storage Area	-do-	Heavy Duty, 25	150 mm high Steel	Oil resistant	Oil bound	-do-	-do-	-do-	

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Sr. No.	Description	Insulation Specified in Data Sheets	Flooring	Skirting	Plastering/ Painting			Roof	Lifting Arrange-ment
					Internal Wall	Ceiling	External Wall		
			mm Thk Steel crete Tiles over concrete / grade slab	crete Tiles	paint over 12mm thick internal plaster With neeru finish	distem- per over 6 mm thick ceiling plaster With neeru finish			
(b)	Power House Area	-do-	-do-	-do-	-do-	-do-	-do-	-do-	-do-
(c)	Transformer Area	-do-	-do-	-do-	-do-	-do-	-do-	-do-	-do-
4.0	Common Oily Water Transfer Pumps	-do-	-do-	-do-	-do-	-do-	-do-	-do-	-do-
5.0	Oily Water Separator Treated Effluent Transfer Pumps	-do-	-do-	-do-	-do-	-do-	-do-	-do-	-do-
6.0	CPI Sludge Transfer Blowers	-do-	Heavy Duty, 25 mm Thk Steel crete Tiles over	150 mm high Steel crete Tiles	Oil bound distem- per over 12 mm	Oil bound distem- per over 6	-do-	-do-	-do-

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Sr. No.	Description	Insulation Specified in Data Sheets	Flooring	Skirting	Plastering/ Painting			Roof	Lifting Arrange-ment
					Internal Wall	Ceiling	External Wall		
			concrete/ grade slab		thick internal plaster With neeru finish	mm thick ceiling plaster With neeru finish			
7.0	CPI Sludge Transfer Pumps	-do-	-do-	-do-	-do-	-do-	-do-	-do-	-do-
8.0	Decanted Water Transfer Pumps	-do-	-do-	-do-	-do-	-do-	-do-	-do-	-do-
9.0	Clariflocculator Sludge Transfer Pumps	-do-	-do-	-do-	-do-	-do-	-do-	-do-	-do-
10.0	Air Blower for Clariflocculator sludge Pit	-do-	-do-	-do-	-do-	-do-	-do-	-do-	-do-
2.	Roof Treatment	As per clause -2.24, section IV of architectural specification							
3.	Door	Provide 40 mm thick hollow metal pressed steel door to all above pump houses							
4.	Windows	Provide aluminium powder coated windows- openable windows at operating level, fixed windows at high levels to all above pump houses							

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Note:**Interior Finish Schedule for Buildings:**

Sr. No.	Vol. No./Sec/ Page No./ Cl. No.	Building/Area	Existing Particulars for flooring/skirting/dado	To be read as
1.	VI-A/Sec 4/ 45 of 639 / 6.0	Flooring/ Skirting/Dado for Building Areas indicated at Sr No k), l), p), q), r), u), v), w), ee), ff), gg) of the clause.	Overall 40 mm thick heavy duty concrete floor with metallic hardener	Heavy Duty, 25 mm thick Steel crete Tiles over concrete/grade slab

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<u>DOORS/WINDOWS SCHEDULES:</u>					
Sr. No.	Vol. No./Sec/ Page No./ Cl. No.	Rooms/Area	Existing Particulars	To be read as	
1	VI-A/Sec 4/462 of 639/ 6.1 (DOORS/ WINDOWS SCHEDULE)	Windows for Rooms indicated at Sr No a), b), e), j), k), m), n),p) of the table in clause	Aluminium powder coated windows ----.	Aluminium powder coated windows ---- with M.S safety grill of weight not less than 20 kg/sqm.	
2	--do--	Windows for Room indicated at Sr No c) of the table in clause	Aluminium powder coated fixed windows	Aluminium powder coated fixed windows with M.S safety grill of weight not less than 20 kg/sqm.	
3	--do--	Windows for Rooms indicated at Sr No d), f), l), o), r) of the table in clause	Aluminium powder coated openable windows	Aluminium powder coated openable windows with M.S safety grill of weight not less than 20 kg/sqm.	
4	--do--	Windows for Room indicated at Sr No h) of the table in clause	M.S openable windows -----.	M.S. openable windows ----- with M.S. safety grill of weight not less than 20 kg/sqm.	
5	--do--	Windows for Room indicated at Sr No s) of the table in clause	Steel framed glazed window and ventilator.	Steel framed glazed window and ventilator with M.S. safety grill of weight not less than 20 kg/sqm.	

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CLAUSE NO.	PARTICULARS		
1.0	SCOPE OF WORK		
2.0	DESIGN CRITERIA FOR FLYOVER/ ROB		
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4.0	SPECIFICATIONS FOR RETRO-REFLECTIVE SHEETING		
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1.0

SCOPE OF WORK:

The following items & shall be executed in accordance with design criteria as stated:

(a)

Obtaining necessary approvals/permission/clearances of railway authorities before and during execution as well as after completion of railway works as per requirements of Railway department / Mahagenco /local bodies like panchayat, PWD,/or any other department required for commissioning well in advance so as to start the railway traffic in schedule time frame.

(b)

Design and Construction of ROB within Railway Boundary with launching scheme including footpath and wearing coat.

(c)

Design and Construction of ROB viaduct in non-railway and railway area including wearing coat.

(d)

Design and Construction of ROB approach ramps including required earthwork, GSB, WBM and BT works etc.

(e)

Design and Construction of Anti-crash Barrier for entire ROB, friction slab for approaches as required.

(f)

Drainage arrangement for entire ROB including GI spouts, down take pipes, water collection chambers of 450 x 600 size near piers and abutments, RCC-NP3, 450 mm dia pipe connection from collection chambers to road side drain or Nalla.

(g)

RCC pier protection in viaduct portion on either side in Non-Railway and Railway area.

(h)

Painting to entire ROB structure including approach ramp and staircases by waterproof cement paint.

(i)

Maintenance of existing slip/service roads during construction till completion of work.

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(j) Any other works not specified but required for completion of scheme. (k) Providing suitable and required ducts / conducts / openings / boxes / slots etc. for electrical and streetlight installations in Bridge concrete structure at appropriate location as per electrical installation scheme. (l) Designing of electrical and street lighting system/circuitry for entire work and obtaining necessary approval from the Maharashtra State Power Transmission Company Ltd /Electrical Inspector as required. (m) Construction of roadside drains along the diversion road. (n) Providing and fixing aluminium cat-eye-stud as required. (o) Providing and fixing cautionary / warning signboards / information signboard. (p) Providing and laying thermoplastic road marking material as per Specification. (q) Construction of diversion road as per required section provided. General Details of Work to Be Executed Under Total Contract 1.1 <u>WIDTH AND CROSS SECTION:</u> Width of the Road Over Bridge and the requirements of carriageway shall be as per requirement. 1.1.1 <u>LENGTH OF BRIDGE :</u> (a) Railway Bridge Portion : Two span of 20 to 25 M Total length of Bridge in Railway portion is approximately 50 M. (b) Non-Railway Bridge Portion : 10 spans of 25.00M each i.e. @ 250.00 meters.		

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Total length of viaduct in Non-Railway portion is 250.00 M.

1.1.2 APPROACHES:

(a) Solid ramp on both ends with gradient 1:30

(b) Diversion cum service road with drain approximate: 950 M

1.1.2.1 Carriage Width:

(a) In Railway Portion : 5.5M + 1.5M footpaths on both Sides + 0.50M anticrash barriers on both sides +125 mm parapet both side
Total width =9.75 M

(b) In non Railway Portion : 5.5M + 0.5M antic rash barriers on both sides
Total width=6.5 M

1.1.3 LENGTH OF ROB AND VIADUCT:

The contractor's proposal shall provide the length of the Road Over Bridge, viaduct and approaches strictly as per standard specifications / drawings to suit the requirements of minimum horizontal i.e. clear span and vertical clearance i.e. rail top to sofit of superstructure as indicated for Railway Bridge portion and viaduct as per specified gradient not steeper than required specifications for Railway portion is obligatory. The contractor shall provide the Road Over Bridge to confirm to these requirements and including properly designed vertical and horizontal curves for a design speed of 80 km/h (Summit curve in the central portion and valley curve on either ends). Valley curves are to be provided at either ends of the Road Over Bridge. In the inner half portion of the valley curve-retaining structure shall be continued. In the outer half portion of the valley curve, crash barrier shall be provided upto the point where height of fill is more than 10 cms above the existing road level.

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1.1.4

CAMBER AND SUPER ELEVATION:

Minimum camber to be provided to the carriageway shall be 2.5%. Super elevation where required shall be as per actual design (subject to a maximum of 4% if super elevation needs to be provided in structural portion).

1.1.5

TRAFFIC DIVERSION:

The contractor may adopt a suitable scheme of construction, which shall be got approved from Railway Authorities, Traffic (Police) Department. The responsibility of obtaining the permissions for scheme to be adopted from concerned authorities e.g. Railways, Traffic (Police) shall be that of the contractor. No extra cost will be paid on account of such diversion.

In situ staging for construction of superstructure is not permitted over the Railway span. End launching or any other method (acceptable to Railway) shall only be permitted. Precast RCC shuttering slab for PSC girder is not permitted.

1.1.6

Programme of construction of railway bridge portion shall be arranged in such a way that it is complete in the shortest time period.

1.1.7

Interim support at minor bridges/CD works on the existing road shall not be allowed for construction superstructure.

1.2

SITE CLEARANCE / SETTING OUT:

1.2.1

Making out the center line of the ROB and various components and complete lining out with masonry and concrete pillars for proper lines and levels with precision theodolite survey including constructing theodolite stations, bench marks etc., as directed. This includes all the allied works like clearing the road side line removing and stacking of the existing kerb stones, obstructing bushes, trees etc. The surveying instrument used on the works shall be modern electronic equipment.

1.2.2

Providing all documentation such as audio/video cassettes or CDs/photographs, record drawings etc.

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1.3

FOUNDATION :

1.3.1

Open Foundation – In case of open foundation, taking foundations through all strata upto required foundation level including embedment as per specification/design criteria. Rock levels/line as per Geo-tech report.

1.3.2

Pile Foundation – In case of pile foundations providing MS liners of (i) 8mm thick for the Railway bridge portion (foundation covering span over the railway boundary) and (ii) 6mm thick for rest of the foundation including coal tar epoxy anticorrosive paint of zinc rich epoxy primer and two coats of coal tar epoxy paint (total dry film thickness = 50 + 80 + 80 = 210 micron) to the mild steel liners on surface in contact with earth. The bottom shoe of liner of 12 mm thick shall attain minimum height provided and placed in position prior to driving 8mm / 6mm thick MS liner. These MS liners are to be provided up to top of rock or refusal level as approved by the Engineer.

1.3.3

Load test on pile (Initial) – Providing and casting test pile and carrying out load test as per design criteria for initial load test. **Only by STATIC method of testing.**

1.3.4

Load test on pile (Routine) – Carrying out routine load test on pile conforming to design criteria. Only STATIC method of testing shall be adopted.

Pile Cap – Providing RCC pile cap : The top of the pile caps shall be atleast 0.5m below ground level.

1.3.5

The foundation level/depth for pile foundation of structures for bridge portion shall be as per design data.

1.4

SUBSTRUCTURE:

Providing sub structure of piers, abutments, returns etc., as per design criteria with suitable RCC caps.

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1.5

SUPER STRUCTURE:

Providing superstructure and decking shall be conforming to the design criteria suitable for roadway particulars footpaths, central median etc. as shown in the departmental drawings. Only prestressed concrete superstructures are allowed. Steel and composite superstructures are not allowed. For Railway portion only precast prestressed girders are allowed as per GAD approved by Railways.

1.6

RAILING, KERBS, BEARINGS, EXPANSION JOINTS, WEARING COAT ETC.:

1.6.1

Providing necessary bearings, pedestals for bearings, expansion joints water spouts, mastic layer on the deck wearing coat, road kerbs, anti crash barriers etc., as per design criteria. Anti crash barrier for the ROB & viaduct portion shall be as per section indicated in MORTH Specification of concrete grade of deck slab. For approaches same section shall be provided with suitable friction slab, design with suitable length & keys. The design shall be approved by the Engineer.

1.6.2

Drainage:

Providing minimum 150mm GI water spouts CIMS grating and 150mm GI runner pipes and down take pipes at each pier and abutment location. The GI pipes shall be painted with oil paint in three coats. Chambers shall be provided at the pier and abutment locations and 150 mm dia down take pipes to connect to these chambers. These chambers shall be connected by 300 mm dia. NP-3 Class RCC pipes to take the collected water upto near by nallah or adjoining existing drain as directed by Engineer.

1.7

APPROACHES

Providing approach structures as follows:

1.7.1

Providing vertical retaining structure with outer face in plumb for embankment of approaches in ramps at either ends of ROB proper comprising RCC retaining wall resting on strata of required bearing capacity and as per provisions of design criteria. Providing granular filling

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	in RCC retaining wall as per specifications and as approved by the Engineer including CC kerb drains of 250mm wide adjacent to crash barrier and intermediate down take arrangement.		
1.7.2	Providing Rubble filling behind the abutment and returns for 0.6m width. The height of rubble filling shall be up to the bottom of rubble matt/crust.		
1.7.3	Providing Rubble matt of 900mm thickness, below the road crust between the returns for a length of 4 m on either sides of the ROB.		
1.7.4	The details of the crust for solid approach ramp of ROB and approach Road from the end of solid Ramp to the junction point on either side is as under:		
	(a)	Granular Sub base	: 150 mm thick.
	(b)	WBM with stone screening with grade I metal layer compacted by vibratory roller	: 150 mm (Two layers each 75mm thick)
	(c)	WBM with stone screening with grade II metal layer compacted by vibratory roller	: 150 mm (Two layers each 75 mm thick)
	(d)	Bituminous Bound macadam 75mm thick with 250 Kg/100 sqm vibratory roller including tack coat @ 5kg per 10 Sq.m. of bitumen grade 60/70.	: 75mm thick Bituminous Bound macadam (Bitumen grade 60/70)
	(e)	Bituminous Macadam 50mm thick with 60/70 grade With 5% bitumen with vibratory roller including tack coat @ 5kg. per 10sqm. of asphalt	: 50mm (Bitumen grade 60/70)

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grade 60/70.

(f) Asphalt concrete : 15mm thick Asphalt concrete
15mm thick with 6.5% (Asphalt grade of 60/70).
Bitumen with vibratory
roller including tack coat
@ 5kg. per 10 sqm. of
asphalt grade 60/70.

1.7.5 Providing wearing coat over the bridge superstructure as follows:

(a) Dense Bituminous : 50 mm average thickness
Macadam as per job mix (Asphalt Grade 60/70)
design with minimum 5%
bitumen by wt. including
tack coat @ 5Kg per
10sqm.with vibratory
roller

(b) Mastic Asphalt : 15 mm thick (Grade 10/20)

Profile correction for camber, super elevation and vertical curve shall be provided in deck, itself.

1.7.6 All known overhead utility services if any like electric poles & lines, the telephone poles & lines and known underground service pipe lines, cables etc., falling in the alignment of ROB proper, solid ramp, approach Road shall be shifted by contractor at appropriate locations.

1.7.7 Cross Drainage:

Providing cross drainage in drawing if required and as directed by the Engineer.

1.7.8 SOIL INVESTIGATION:

Soil investigation shall be carried out as required for designing and to confirm the soil investigation report attached and as directed by Engineer in charge.

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1.8

WIDENING – ROAD WIDENING FOR TRAFFIC DIVERSION:

1.9

ANTICORROSIVE TREATMENT, PAINTING, FIXTURES ETC.

1.9.1

Painting/ Anticorrosive Treatment

Providing protective painting to the concrete surface for foundation by bituminous paint and the substructure and superstructure etc., shall be painted with three coats of water proof cement paint. Median verge shall be painted with three coats of oil paint as approved by the Engineer.

1.9.2

Fixtures

Fixing the fittings and fixtures, instrumentation as may be supplied by the corporation and railways at specified location on bridge structure for certain amenities such as lighting arrangement on ROB and providing items as per design criteria.

1.10

PIER PROTECTION, ROADSIDE KERBS:

1.10.1

Providing pier protection to all the piers as directed by Engineer by constructing RCC pardi of 25 cm thick (M-20) finished with cement plaster in CM 1:4 to exposed faces around piers for a height of 1.25m above G.L. with a gap of one meter between pier and pardi filling the gap with moorum inside and 150mm rubble soling over laid by PCC of M-15 grade of 100 mm thick. The vertical reinforcement of 16mm dia at 200mm center to center and 10mm dia. at 200mm center to center as distribution steel shall be provided on the outer face and nominal steel on inner face 10 mm dia. at 200 mm. at center to center both ways in the RCC pardi. Providing foundation for pardi of minimum size 0.45m x 0.50m in M-15 over rubble soling of 0.15m Pier protection is required only to RCC pier column.

1.10.2

Providing and fixing continuous precast **RCC kerbs stones in cement concrete M-20 of size 1000mm x 300mm x 600mm embedded 300 mm in ground along the bridge adjacent** to the solid ramp portion on both sides upto the end of ramp @ 300 mm clear distance from R.E. Walls with 150 mm dia drainage spouts @ 2000 mm c/c including oil painting of approved colour and shade by Engineer.

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These kerb stones shall be provided on roadside parallel to the retaining wall or reinforced earth structure to protect it from damages and to channelize the traffic running on side roads.

1.11 LABORATORY:

1.11.1 Providing and maintaining an adequately equipped field laboratory as required for site control on the quality of material and the works. It shall have adequate area for the entire equipment and working as directed by the Engineer.

1.11.2 The field laboratory of adequate floor area shall be located on the site as shown or as directed and approved by the Engineer. It shall be provided with all amenities like water supply, electric supply etc.

1.12 BLASTING OF ROCK:

Blasting of Rock/Boulder etc., is not permitted. Only chiseling should be resorted to.

1.13 DOCUMENTATION:

Providing documentation such as videocassettes, CDs, photographs as built drawings etc., as specified in the tender. All drawings shall be on Auto CAD of latest version.

1.14 CONSTRUCTION PHASING:

The contractor has to prepare detailed work plan with his bid which shall take into account, the traffic position, milestones specified in the tender, and availability of men, material, machinery and shuttering material with him. He has to indicate how he intends to divert the traffic during construction.

1.15 Waterproof cement based paint shall be provided to the finish surface of the Road Over Bridge, viaduct and approaches as approved by the Engineer.

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1.16

AESTHETICS:

Aesthetics aspects like smooth profile of soffit, precast fascia, geometric profile, grooves, crash barriers etc., which may lead to enhance overall look of bridge and area is desirable. Precast RCC Fascia of minimum M-25 grade with minimum 80 mm thick and 1500 depth below RTL with necessary grooves / pattern shall be provided if proposed by the contractor for viaduct portion to match the overall aesthetics of the bridge.

1.17

Thermoplastic road marking – Yellow and white continuous lane marking at 3 locations per lane carriage as directed by the Engineer for entire length of the work including markings for junction developments as approved by the Engineer.

1.18

Sign, caution, informatory board, and hazard markers of Retro reflective type as approved by the Engineer.

1.19

Cat-eyes as approved by Engineer.

1.20

ROB – BRIDGE WITHIN RAILWAY BOUNDARY

All the structural designs for all components including foundations substructures, Bearings, Expansion Joints, Superstructures, Railway/ Crash barriers, Footpaths, Stair cases etc., shall have to be got approved by the contractor from the Railway authorities. Nothing extra will be paid on this account to the contractor.

2.0

DESIGN CRITERIA FOR FLYOVER/ ROB

2.1

SPECIFICATIONS FOR DESIGN AND CODES TO BE FOLLOWED :

2.1.1

The design of structural components shall conform to the criteria laid down in the latest editions of the following codes of Practice and Standard specifications published up to the last date of receipt of tender and subject to the departures stipulated.

2.1.1.1

Standard Specifications and Codes of Practice for Road Bridges. :

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(a)	Section - I	:	I.R.C. 5 (1998) General features of design. (Reprint April-2002)
(b)	Section -II	:	I.R.C. 6 (2000) Loads and stresses. (Reprint April-2002)
(c)	Section -III	:	I.R.C.21 (2000) Cement concrete plain and Reinforced (Third Revision). (Reprint November-2002)
(d)	Section - V	:	I.R.C.24 (2001) Steel road bridges.(Second revision) (Reprint October-2003)
(e)	Section -VI	:	I.R.C.22 (1986) Composite construction (Reprint November-2002)
(f)	Section -VII	:	I.R.C.78 (2000) Foundation and substructure. (Second revision) (Reprint April-2002)
(g)	Section -IX	:	I.R.C.83 (1999) Metallic Bearings (Part-I). (First revision December-1999) (Reprint May-2003)
(h)	Section -IX	:	I.R.C.83 (2002) POT, POT CUM PTFE, PIN AND METALLIC GUIDE BEARINGS. (Part-III)
(i)	I.R.C: 18-2000	:	Design criteria for prestressed concrete Road Bridges (Post tensioned concrete). (Reprint Sept-2002)
(j)	I.R.C. -38-1988	:	Guidelines for Design of Horizontal Curves for Highways and Design Tables. (First revision Sept. 1989)
(k)	I.R.C. -89-1997	:	Guidelines for Design & Construction of River Training & Control Works for Road

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Bridges. (First revision) (l) I.R.C. –SP- 23 – : 1983 Vertical Curves for Highways (Reprint Sept. 1989) (m) I.R.C. –SP- 37 – : 1991 Guidelines for Evaluation of Load Carrying Capacity of Bridges. (Year 1991) (n) I.R.C. –SP-51 – : 1999 Guidelines for Load Testing of Bridges (o) I.S.- 1893 – 1984 : (First Reprint - July-1999) Criteria for Earthquake Resistant Design of Structures. (p) I.S.- 13920 – : 1993 (Reaffirmed 1998) Edition 1.2 (2002-03) Ductile Detailing of Reinforced Concrete Structures subjected to Seismic Forces Code of Practice. 2.1.1.2 Any I.R.C. standard specifications and codes of practice or criteria for road bridges other than "2.1.1.1" above 2.1.1.3 For any item not covered by 2.1.1.1 & 2.1.1.2 above, specification for Road and Bridge works published by I.R.C. for Ministry of Road Transport and Highways, Government of India. 2.1.1.4 For items not covered by any of the 2.1.1.1, 2.1.1.2 & 2.1.1.3 above, Standards and Specifications Provisions of IS codes of practice. 2.1.1.5 For Precast Segmental Construction B.S: 5400. 2.1.1.6 For Pretensioned Construction B.S:5400 2.1.1.7 For any item not covered by any of the above codes and specifications, the relevant provisions from B.S./ AASHTO (LRFD) Codes.			

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2.1.1.8

For items not covered by any of the above Standards and Specifications, Sound Engineering practice and provisions relevant Codes of other nation shall be referred.

2.1.1.9

In case of ROB/RUBs involving the bridges over/under railways, the relevant provisions of railway codes/railway authorities shall supercede the provisions in this criteria in the portion of bridge where these are applicable.

2.2

DESCRIPTION OF WORK AND OBLIGATORY PROVISIONS

2.2.1

Alignment and Location :-

Alignment and location of the FLYOVER/ROB shall be as shown in the Departmental drawings.

2.2.2

The Length Of Flyover/Rob And Viaduct :-

The length of the FLYOVER/ROB and via-duct shall satisfy the following criteria.

(a)

Maximum height at abutment location shall not be more than those shown in departmental drawing.

(b)

Longitudinal gradient shall not be steeper than those shown in departmental drawings.

(c)

Restrictions on terminal points if specially mentioned in departmental drawings.

(d)

Any other criteria shown on the departmental drawings / supplementary data.

(e)

Overall length of bridge proper i.e. FLYOVER/ROB and Viaduct shall not be less than the length shown in departmental drawing.

(f)

The minimum vertical and horizontal clearances under the Railway Bridge Portion shall not be less than those shown in drawing.

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2.2.3

Road level on the flyover/rob and roadway particulars:

(a)

Roadway particulars and carriageway widths shall be as per relevant drawing.

(b)

The vertical geometry of the finished surface of deck slab and wearing course shall be in the form of a smooth curve where change in gradient occurs. The design of curves shall be got approved from the Engineer. The design of curves shall comply relevant IRC Codes / Guidelines. The design speed on curve shall be as stipulated in **Design Data**.

2.2.4

Supplementary data for design shall be as per Design Data.

2.3

DESIGN LOADS: -

2.3.1

Live loads :

2.3.1.1

The bridge shall be designed for Loading(classAA) as per IRC: 6-2000. During construction a construction load of 300kg/sqm shall be considered. The Bridge shall also be designed for Service Loads as specified in Design Data.

2.3.1.2

For Railway portion – As per IRC:6-2000 Or as approved by Railway Authority whichever produces worst effect.

2.3.2

Wind Forces:-

Wind forces shall be considered for the design.

2.3.2.1

Temperature-Range :-

For calculation of thermal forces effect of 'E' value of concrete should be taken as 50 % of the instantaneous value so as to account for effects of creep on thermal strains.

2.3.2.2

Earth Pressure:

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The abutment shall also be designed to be safe for a back fill with dry density of soil 1.8 t/cum, saturated density 2.00 t/cum, $\phi = 30$ degree and $C = 0$.

2.4 FOUNDATIONS :

2.4.1 Piers/ Abutments:

2.4.1.1 The details of the borings with levels & their locations are in the drawing/tender document for general guidance of the bidder only. The contractor shall have to take borings by double tube boring machine at the final location of each pier and abutment prior to the commencement of the work to ascertain the rock levels/quality at the location of the foundations and this shall form part of the contract and no payments will be made by the Department for boring, soil sampling and testing etc.

2.4.2 Ramp/Retaining Walls :-

2.4.2.1 The solid ramp portion of the Flyover/Road Over Bridge shall be a retaining structure. The retaining structure resting on strata other than rock shall not be accepted, unless they are of R.C.C. wall. The foundation of retaining structure shall be rested at least 1.0 metre below the ground level on strata other than rock.

2.4.2.2 For foundation of Retaining structure if design requires to increase SBC at foundation level by any soil stabilization method or any type of additional foundation arrangement, treatment etc is required, the same shall be included in the tendered amount. No payment will be made separately for the same.

2.4.3 Pile Foundations:

2.4.3.1 Minimum embedment into rock and S.B.C. of the strata shall be considered as follows

Sr. No.	Type of strata	Min. Embedment in rock	S.B.C. of rock
(a)	Hard rock	1.5 x diameter of pile	400 t/m ²

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		1.0 x diameter of pile	300 t/m ²
(b)	Soft rock	3.0 x diameter of pile	250 t/m ²
		2.0 x diameter of pile	200 t/m ²
		1.5 x diameter of pile	150 t/m ²

The values of S.B.C. given above consider the effect of embedment in rock and global behavior of the pile and hence friction resistant of pile shall not be further added.

2.4.3.2 Only end bearing bored cast in situ piles drilled with rotary rig or regular tripod rigs will be accepted.. Design with single row of piles per Substructure shall not be accepted. Annular piles filled or not filled shall not be accepted.

2.4.3.3 Minimum 6mm thick permanent M.S. Liner for piles shall be provided, for piles up to top of rock. For Railway bridge portion the minimum thickness of permanent M.S. Liner for piles shall be as per the requirements of railway codes/authorities.

2.5 SUBSTRUCTURE:

2.5.1 For continuous spans, pier with fixed bearing shall be designed to take all the horizontal forces

2.5.2 The thickness of counter-fort shall not be less than 400 mm and that of any other element shall not be less than 300 mm.

2.5.3 Dead man anchors or friction slabs shall not be accepted behind abutment for relieving moments

2.5.4 Scope for accessibility for inspection and arrangement for lifting of the superstructure for future replacement of bearings shall be provided for in the design of substructure. The positions of jacks shall be distinctly marked on the drawing and also on the structure.

2.5.5 The height of pedestals shall be limited to 500 mm and shall not be less than 300mm.

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2.6 <u>SUPERSTRUCTURE:</u> 2.6.1 Deck slab thickness shall not be less than 300 mm and not less than 200 mm at tip of cantilever, irrespective of the provisions elsewhere.. The slab shall be checked for punching shear. The cantilever projection of slab in transverse direction shall not be more than 1.8m. 2.6.2 In case of voided slab structure, analysis & design shall be based on the provisions of B.S-5400. The minimum thickness of concrete around the void of deck shall be 300 mm. 2.6.3 Minimum thickness of intermediate diaphragm where provided shall be 300 mm and that of end diaphragm shall be 500 mm for the cast in situ work. Manholes shall kept at a spacing not more than 150m with arrangement for access inside the box. 2.6.4 In the absence of rigorous analysis for torsional and distorsional moments and forces due to warping torsion at ends, the design live load moments and shear force in the longitudinal direction shall be increased by 20% and transverse reinforcement by 5%. 2.6.5 For pre-stressed Superstructure with box girders, the cross diaphragms shall be minimum one each at supports and at each abrupt change in soffit geometry. 2.6.6 The provision for imparting 20% of design prestress at a future date shall be made in the deck and suitable anchorages, bulkheads, deviator blocks etc. shall be constructed for the purpose. Arrangement for external prestressing shall be got approved. 2.6.7 In addition to post tensioning as per I.R.C. codes, precast segmental construction as well as pre-tensioned construction are also permitted as per B.S.:5400. 2.7 <u>BEARINGS BELOW SUPERSTRUCTURE :</u> 2.7.1 Type of bearings shall be permitted: - POT PTFE.		

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2.7.2	The bearings shall be easily accessible for inspection.
2.7.3	Scope for lifting the superstructure for future replacement of bearings shall be provided for in the design of bearing.
2.8	<u>EXPANSION JOINTS:</u>
2.8.1	Expansion joints shall conform to MORT&H specifications. The detailed working drawing for the joint shall be in conformity with overall geometry of deck. Geometrical profile shall be achieved by adjusting the dimensions of superstructure.
2.8.2	The expansion joints should generally be spaced at not less than 100 m. except in case of unavoidable circumstances.
2.9	<u>CRASH BARRIERS :</u> Anti crash barriers having a typical cross section as shown in Departmental Drg shall be provided for FLYOVERS/ROBs with footpaths / without footpaths.
2.10	<u>WATER SPOUTS:</u> Water spouts as per MOST Type design No.SD/303 shall be provided. However, the dia of pipe shall be 150 mm. Waterspout shall be connected to runner pipe of suitable diameter (Minimum 150 mm) on either side of roadway and taken down by down take pipes of suitable diameter at approved locations.
2.11	<u>WEARING COAT :</u> A wearing coat of uniform thickness shall be provided for riding surface. The configuration of wearing coat shall be as per the Design Data .
2.12	<u>ANTICORROSIVE TREATMENT:-</u>

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Anti-corrosive protective paint as mentioned below and approved by the Engineer shall be provided. This paint shall be got tested from the approved laboratory and shall be of approved quality, colour and shade. The protective coating shall consist of: 2.12.1 Mild steel liner to piles: One coat of Zinc-rich Epoxy Primer and two coats of coal tar epoxy.(Total dry film thickness 50 + 80 + 80 = 210 microns) 2.12.2 Reinforcement steel shall be cleaned with sand blasting before placing in position. 2.12.3 Part of substructure exposed to atmosphere - Water proof cement based paint of approved quality and colour in three coats. 2.12.4 Part of substructure in contact with earth upto GL – one coat of primer and two coats of coal tar epoxy. 2.12.5 The superstructure shall be treated with following protective coatings. (a) <u>Parapets/ Railings / Crash Barriers</u> Waterproof cement based paint of approved quality and colour in three coats. (b) <u>Deck/Girder/box and inside of RCC/PSC Box</u> Waterproof cement based paint in three coats of approved quality and colour. (c) <u>Steel Structures</u> The anti – corrosive protective paint shall be provided as approved by Railways. 2.13 <u>LOAD TEST :</u> 2.13.1 In case a structure or a component of structures proposed by the contractor, in the opinion of the Engineer is of unusual nature, then the Engineer shall		

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	have the right to call upon the contractor to carryout model testing and/or load testing of the structure or component to prove its suitability. The cost of such test shall be borne by the contractor only.	
2.13.2	Any defect noticed in the structure or any damage done to the bridge at the time of testing, which affects or is likely to affect the strength of the bridge shall be rectified by contractor at his own cost by remedial measures or replacement as approved by the Engineer.	
2.13.3	The test shall be carried out in the presence of Engineer.	
2.14	<u>DOCUMENTATION, INSTRUMENTATION :</u>	
	The following items shall be deemed to be included in the tendered cost.	
2.14.1	All final drawings and Microfilms and Compact Discs of all approved drawings and “as built” drawings and calculations shall be supplied by the Contractor free of cost.	
2.14.2	Three DVD of 180-minute duration each of the bridge covering the different phases of construction from start to finish shall be supplied by the Contractor free of cost.	
2.14.3	A “Maintenance Manual” describing access arrangements, important obligatory precautions from the point of view of structural safety, and procedure for minor and major repairs of each component of the bridge, renewals of finishes and periodical treatments shall be supplied by the Contractor free of cost.	
2.14.4	A “Quality Assurance Manual” covering all aspects of designs and drawings, mix-designs, materials, testing, soil and rock properties, statistical quality control, etc. shall be prepared by the Contractor free of cost well before starting the work.	
2.14.5	A “Construction manual” covering various aspects of construction methods, difficulties faced and how they were overcome during execution etc. shall be supplied by the contractor free of cost at the time of finalization of work.	

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2.14.6	The Contractor shall install fixtures and fastenings provided by the Department for housing any instrumentation that may be useful for the Employer at his cost.		
2.14.7	Fixing arrangement for internal and external lighting shall be got approved from competent authority and executed.		
2.15	<u>PROCEDURE FOR CHECKING DETAILED CALCULATIONS WORKING DRAWINGS:</u>		
2.15.1	Within one month of the receipt of work order, the contractor shall submit a program of submission of designs. The program of submission of designs of various components should be consistent with the program of work prepared by the contractor and approved by the Engineer.		
2.15.2	The consultant shall have the latest official version of the software being used for design and same shall be made available for scrutiny of design to the Engineer if demanded.		
2.15.3	Detailed calculations and working drawings of all the component parts of the Bridge shall be submitted well in advanced of the execution, in accordance with the above program. Two sets of such design calculations and Three sets of drawings accompanied by complete information and sufficient data shall be submitted to the Engineer for checking the design calculations. The designs and drawings for various component parts shall be submitted progressively. If computer is used for design or analysis, the contractor shall submit with design, the detailed description of method of analysis with explanatory notes and manually done sample calculations for adequate number of typical cases & soft copy. The Computer Program as submitted will be further tested by comparison with solutions of worked examples. The Contractor should submit along with his tender note giving his design approach and construction scheme conforming to the basic requirements which should be approved by the authorities while awarding the work so as to avoid the possibility of major changes being required in the design at a later date.		
2.15.4	Drawings and designs shall be in metric units. Calculations shall be neat and clear and supplemented by full explanatory notes and sketches		

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wherever required. The drawings of initial submissions and final approval shall be stenciled and in 420 mm x 297 mm size only. It is entirely the responsibility of the contractor to submit the design in a good time to enable the Engineer to approve them in time. No claim shall be granted on account of late approval to the design and consequent delay in the execution. Schedule of reinforcement and rate reinforcement Per Cum. Of Concrete quantity (and also percentage with respect to gross cross sectional area of the component) should also be shown on each drawing.		
2.15.5	Nine sets of approved working drawings along with one soft copy in the form of Compact Disk and four sets of approved designs calculations shall then be supplied by the Contractor which will be formally authenticated by the Engineer. These drawings shall be submitted in the plastic folders for each set and calculations in plastic files & bags.	
2.15.6	After completion of each stage of work, three sets of records plans based on the work as actually executed on site, shall be supplied by the Contractor, to the Engineer.	
2.15.7	Approval to drawings and designs and design calculations by the Engineer shall not in any way relieve the Contractor of his responsibility for their correctness and soundness, structural stability and safety of the structure.	
2.15.8	The approved drawings and the design calculations of the bridge shall be the property of the Employer.	
2.15.9	The Contractor’s designer or consultant shall attend all the design review meetings conducted by Employer Personnel from time to time, without any extra cost.	
2.15.10	For the Railway Bridge portion the structural designs and drawings with Temporary Arrangement Drawing for launching Scheme along with supporting designs and calculations shall have to be proof checked by approved structural consultants approved by Railways and further approval by the concerned Railways Authorities with lout any extra cost.	

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DESIGN DATA			
Sr No.	ITEMS		
1.0	CARRIAGEWAY WIDTH:		
1.1	Railway Portion	:	5.5 Mtrs Each
1.2	Viaduct Portion	:	5.5 Mtrs Each
1.3	Approaches	:	5.5 Mtrs Each
2.0	Width of Footpath		1.50 Mtr at both end (In Railway Portion only)
3.0	Overall Width of Bridge		
3.1	Railway Portion		9.75 Mtrs.(outer to outer parapet wall)
3.2	Viaduct Portion		6.5 Mtrs
3.3	Approaches		6.5 Mtr.
4.0	Width of Median Verge		Not applicable.
5.0	Seismic Effects		
5.1	Seismic Zone		III
5.2	Basic Horizontal Seismic Coeff. (α)		As per IRC-6-2000
5.3	Importance Factor (λ)		1.50
6.0	Design Speed of Vehicles		80 kmph.
7.0	Longitudinal Gradient		1:30
8.0	Exposure Condition (Moderate or Severe)		Moderate
9.0	Loading due to service		As mentioned in Design Criteria
10.0	Temperature range		Max. Temp. = 50 ⁰ C, Min. Temp. = 13 ⁰ C

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Sr No.	ITEMS			
11.0	Underground Water Table for design of the structures			Shall be considered 1.0 M below ground level for design purpose.
12.0	For Design of Temperature effects, atmospheric Exposure condition			Moderate
13.0	Live load on Footpath			500 kg/m ²
14.0	Configuration of wearing coat			
14.1	For ROB/Viaduct			50 mm thick DBM + 15 mm thick Mastic asphalt
14.2	For Approaches			BBM 75mm + 50mm thick DBM with 5% bitumen + 15mm thick asphalt concrete with 6.5% bitumen.
15.0	Clear headroom above rail top			6.25 Mtr / as required by railway authorities.

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SPECIFICATIONS

The General Technical Specifications comprise of the "Specifications for Road and Bridge Works" (Fourth Revision – August 2001) by Ministry of Surface Transport Roads Wing, Government of India and Published by the Indian Roads Congress, New Delhi, Specifications for Road & Bridge Work (Fourth revision – 2001) of M.O.R.T & H and Indian Railway Standard Code of Practice for plain, Reinforced and pre-stressed concrete for General Bridge construction (Concrete Bridge Code), second revision 1997 issued by Ministry of Railways, which are not reproduced here. The contractors shall obtain their copies of the specifications directly from IRC and Railways.

Full text of all modifications, amendments and additions to MOST Specifications are reproduced here below and will override or supplement the respective provisions of MOST specifications.

SECTION 100

GENERAL

105.1 Scope of Work

107.1

The work to be carried out under the Contract shall consist of the various items as generally described in the tender document under the heading Scope of Work

SECTION 107

CONTRACT DRAWINGS

Sub-Section 107.2

The drawings provided in the tender are the drawings showing proposal of the Employer. Since the offers are invited on the basis of contractor’s own design, the drawings submitted by the contractor along with his tender shall be treated as contract drawings subject to conditions laid down in the contract. The Contractor

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should visualize the nature and type at work contemplated and ensure that price quoted by him have due consideration of qualitative and quantitative variations, as may be found at the site and complexities of work involved during actual execution/construction

Sub-Section 107.3

The contractor shall submit a programme of submission of designs as per the stipulations made in the design criteria. The program of submission of designs of various components shall be consistent with the programme of work prepared by the contractor and approved by the Employer.

Detailed design calculations and working drawings of all the component of the bridge including launching scheme shall be submitted well in advance of execution, in accordance with the above programme. Three sets of such design calculations and drawings accompanied by complete information and sufficient data shall be submitted to the Engineer after getting the same proof checked by approved structural consultant approved by Railways for checking. The designs and drawings shall be submitted progressively. If computer is used for design or analysis, the contractor shall submit with design, the detailed description of method of analysis with explanatory notes and manually done sample calculations for adequate number of typical cases. The Computer Programme as submitted will be tested by comparison with solutions as worked examples.

Drawings and designs shall be in metric units. Calculations shall be neat and clear and supplemental by full explanatory notes and sketches wherever required. The drawings of initial submission and final approval shall be stenciled and in A-1 size only.

If during the scrutiny of detailed design calculations and drawings including temporary arrangements for launching, any changes therein are found necessary in the opinion of Engineer, they shall be incorporated without altering the Lump-sum price quoted. It will be entirely the responsibility of the contractor to submit properly prepared designs and drawings in good time to enable the competent authority to approve them in time.

Schedule of reinforcement and the rate of reinforcement per cum of concrete quantity (and also percentage with respect to gross cross sectional area of the component) should also be shown on each drawing.

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Eight sets at approved working drawing including one set on reproduction tracing film and 4 sets at approved design calculations shall then supplied by the contractor which will be formally authenticated by the Engineer (5 copies of drawings and one set of design calculations for field officers, one set to be returned to the contractor and three to be retained by Engineer). These drawings shall be submitted in approved plastic folders and calculations in approved plastic files free of cost.

Sub-Section 107.4

After completion of each stage of work, 3 sets of record plans and one set of final design calculations based on the work actually executed including one soft copy on CD compatible to window 98, office 2000 & AutoCAD 2000I or 2002, shall be supplied by the contractor to the Engineer / MSPGCL as directed.

Approval to drawings and designs by the Engineer shall not in any way relieve the contractor of his responsibility for the correctness, soundness, stability and safety of the structure.

The approved drawings and design calculations of the bridge shall be the property of the Employer.

SECTION 110

PUBLIC UTILITIES

Sub-Section 110.1

Drawings showing the affected services like electric lines, telephone lines, water pipes, sewers, oil pipelines, cables, gas ducts etc. owned by various authorities including Public Undertakings and Local Authorities are indicated on the drawings. The contractors alternative proposal shall be such that the shifting of utilities is not required. If during the course of execution such utilities are encountered then the contractor shall shift the utilities and will be reimbursed as per the estimate prepared by the concerned department and approved by Employer. The work shall be carried out under the supervision of the concerned department. In case in the opinion of the Engineer it is not possible to divert the

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utilities, the Contractor shall make necessary modifications in the structure at no extra cost to the Employer.

SECTION 112

ARRANGEMENT FOR TRAFFIC DURING CONSTRUCTION

Sub-Section 112.7

The Contractor shall have to prepare a detailed traffic diversion plan as per the requirement of traffic authorities. The Contractor shall have to carry out the modifications in the traffic diversion plan at various stages of work as required. The Contractor will have to maintain liaison with the traffic police and Railways authorities so as to ensure smooth flow of traffic at all stages of the work without causing inconvenience to the traffic.

Traffic Rotary -The Contractor shall provide traffic rotary showing traffic direction made up of four blinkers mounted on M.S. Frame of 50 × 50 ×6 m size 250 Hz frequency electrically operated at both ends of the cordoned area to help and guidance of the road use. Necessary arrangement for supply of electricity shall be made by the contractor.

Road delineator - Road delineators as per IRC- 79 and as per relevant drawings and as directed by Engineer shall be fixed at suitable intervals to have a suitable guidance to the road users at the night time to follow the passage. Delineators shall be fixed firmly in the ground. Also red flags, cat eye reflectors shall be fixed on the barricades. Alternate arrangement shall also be kept ready in case of failure of electricity.

SECTION 809

KERBS, CRASH BARRIERS

Concrete crash barriers, curbs, medians shall be laid preferably with machine.

SECTION 1000

REINFORCEMENT

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Sub-Section 1009.3
Reinforcement /Untensioned Steel

(a) Cutting, bending of all reinforcement shall be allowed with bar bending machine and also by manually. But heating shall not be permitted.

(b) All reinforcement steel shall be HYSD.

SECTION 1100

PILE FOUNDATIONS

Sub-Section 1102.

Add following to the specifications

(a) Only large diameter bored cast in situ piles constructed using of hydraulically operated rotary drilling machines similar to Bauer B.G. Series piling machines will be preferred, other kind of machine for boring shall also be permitted. Regular tripod rigs also shall be allowed.

(b) The liner to piles shall be of mild steel conformity to IS 226/IS 2062 weldable quality. The methodology and equipment for providing M.S. Liner shall be got approved. The liner shall be fabricated truly in cylindrical shape with inner dia equal to diameter of pile. The bottom shoe of liner of 12 mm thick shall attain minimum height provided and placed in position prior to driving 6 mm thick M.S. Liner. The M.S. Liner shall be painted with one coat of Zinc rich primer and two coats of Coal for epoxy. Care shall be taken that the shape of liner does not change while driving.

SECTION 1500

FORM WORK

Sub-Section 1502

The form work used shall be made preferably of marine ply wood properly stiffened, such as DOKA /PERI type form work

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Sub-Section 1510.1

The form for piers shall be provided such that concreting of piers from 0.5m below ground upto pier cap bottom shall be done for full height in one pour without any construction joint. Form Work shall be properly designed. The formwork shall be such that it either requires no supports or supports do not protrude outside permissible working area and provided within the carriageway.

For pier cap also the shuttering shall be such that it is possible to erect it as a single piece with the help of crane in very short time. It also shall be supported only from the already constructed pier below it.

SECTION 1700

STRUCTURAL CONCRETE

The work shall consist of forming and placing of concrete. All concrete preferably shall be ready mixed concrete except for railway portion. For railway portion necessary approval to use of RMC from the railway authorities shall have to be sought by the contractor if he proposes so.

SECTION 1702

Materials

No creek sand shall be allowed in concreting. Only crushed sand and or river sand from approved source shall be allowed. The suspicious aggregates shall be dealt in accordance with IS 2386 (part VII) for alkali aggregate reactivity.

SECTION 1705

ADMIXTURES

Calcium/Chloride shall not be used, Air entraining, agents workability aids retarding agents may be used if permitted by the Engineer.

SECTION 1707

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EQUIPMENT

The Equipment for production, Transportation and compaction of concrete shall be as under

(a) For Production of concrete

(i) Deleted

(ii) For all concrete work – batching and mixing Plant fully automatic with electronic controls or Mini mobile batching plant with adequate capacity as approved by the Engineer. Ready Mixed Concrete if RMC is used.

(b) For concrete Transportation – Transit truck, mixer, concrete distributor booms, tremies, cranes etc if RMC is used.

(c) Weigh - Batching for concrete mixed at site is compulsory if RMC is not used.

SECTION 2000

BEARINGS

The bearings shall be only Pot PTFE with cast steel plates. The bearings shall be procured only from manufactures approved by MSPGCL/MOST.

SECTION 2300

SUPERSTRUCTURE

Only following type of superstructure shall be allowed.

Superstructure with precast / prefabricated /cast in situ elements in pre/post tensioned Box/ Voided Slab/ Prestressed girders with cast-in-situ slabs for obligatory and not obligatory spans.

RCC Superstructure is not permitted.

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For Railway portion superstructure shall be provided as approved by Railway authority.

SECTION 2309

Protective Coating to the faces of superstructure shall be as per design criteria and scope of work

SECTION 2600

EXPANSION JOINTS

The Expansion Joints shall be strip seal /modular strip seal as per requirement and shall conform to latest MOST specifications and shall be procured only from manufactures approved by MSPGCL/ MOST.

3.0 SPECIFICATIONS FOR BITUMINOUS BOUND MACADAM (BBM)

Item : Providing and laying 50/75 millimetre thick bituminous bound macadam road surface including supplying all materials, preparing the existing road surface, spreading 40 mm. stone metal layers, heating and spraying the bitumen, spreading 12 mm. size chips compacting with vibratory roller etc. complete.

(a) Including picking of existing W.B.M./W.M.M. surface.

(b) Including applying tack coat at the rate of 50 Kg/100 Sqm. on existing bitumen surface.

3.1 GENERAL

The work consists of supply of materials and labour required for providing and laying bituminous bound macadam surface for compacted thickness of 50/75 mm. This item includes preparing the existing road surface to receive the bituminous bound macadam course i.e. picking the existing W.B.M./W.M.M. surface or application of tack coat on existing B.T. surface spreading of 40 mm size metal layer in required thickness with compaction with vibratory roller heating and spraying bitumen with sprayer etc. spreading key aggregates 12 mm chips and final compaction with vibratory

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roller etc. complete and finishing in accordance with the requirement in close conformity with grades lines, cross sections and thickness as per approved drawings etc. complete.

3.2 DIVERSIONS

Temporary diversions shall be constructed and maintained by the contractor at his own cost. Diversion shall be watered if dust is likely to blow onto the road being bituminised.

3.3 MATERIALS

3.3.1 Aggregates

The aggregates for providing B.B.M. surface shall comply with specification Nos. Rd-41 for 40 mm. and 12 mm. size metal, and shall normally comply with the following regarding size and quantity of aggregates and grade and quantities of bitumen.

Description	Rate of application for 100 sqmt.			
	75 mm.		50 mm.	
	On asphalt surface	On W.B.M. surface	On asphalt surface	On W.B.M. surface
(a) 40 m. size crusher broken metal	9.00 cum	9.00 cum	6.00 cum	6.00 cum
(b) 12 mm. size chips.	1.8 cum	1.8 cum	1.2 cum	1.2 cum
(c) Bitumen for grouting I.S. Grade	200 kg.	200 kg.	175 kg.	175 kg.
S 35 with 30/40 penetration or S 65 with 60/70				

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penetration				
(d) Tack coat for existing bituminous surface	50 kg.	--	50 kg.	--

3.3.2 Bitumen

The bitumen shall be paving bitumen of suitable penetration grade within the range S 35 to S 65 & A 35 to 65 (30/40 to 60/70) as per Indian Standard Specification for “Paving bitumen” IS: 73-1992.

3.4 PREPARING THE BASE

Any pothole in the existing bituminous road surface and broken edges shall be patched well in advance and the surface shall be brought to correct level and camber with additional metal and bitumen as required which will be paid separately. Before starting the work the bituminous surface shall be swept clean of all the dirt, mud cakes, animal droppings other loose foreign material.

If so required by the Engineer, the contractor shall keep the side width & nearby diversion watered to prevent dust from blowing over the surface to be bituminised.

Existing W.B.M./W.M.M. surface shall be picked for and surface loosened for a depth of 2.5 cm. and the picked surface shall be brought approximately to the correct camber and section. Edge line shall be correctly marked by dog belling the surface to form a continuous notch.

There shall always be sufficient length of prepared surface ahead of the bituminous surfacing operations as directed by the Engineer to keep these operations continuous.

3.5 TACK COAT ON BITUMEN SURFACE

Applying tack coat for existing B.T. surface only at the rate of 50 Kg./100 m² as per specification No. Rd-47.3.3.

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3.6	<u>PICKING OF EXISTING W.B.M./W.M.M. SURFACE</u> Picking of existing W.B.M. surface for receiving Bituminous Bound Macadam as per Rd-33.
3.7	<u>SPREADING AND COMPACTION.</u>
3.7.1	Spreading of 40 mm. Size metal 40 mm. size metal shall be spread only at the specified rate of 9 cubic meter/6 cubic meter per 100 square meter of area so as to form a layer over the width of road with correct camber/super-elevation as required. Any foreign matter, organic matter, dust, grass etc. shall be removed immediately. The sections shall be checked with camber board and straight edge batten etc. Any irregularities shall be made good by adding aggregates in case of depressions and removing aggregates from high spots checked with camber board and straight edge batten etc. Any irregularities shall be made good by adding aggregates in case of depressions and removing aggregates from high spots.
3.7.2	Compaction of 40 mm. Size metal. The surface of 40 mm. size metal layer after bringing it to necessary grades and sections shall be rolled with the use of vibratory roller. Rolling shall commence from the edges and progress towards center longitudinally except on super elevated portion where it shall progress from the lower to upper edge parallel to the centerline of pavement. When the roller has passed over the whole area any high spots or depressions, which become apparent shall be corrected by removing or adding aggregates. The rolling shall then be continued till the entire surface has been rolled to desired compaction such that there in no crushing of aggregates and all roller marks have been eliminated. Each pass of roller shall uniformly overlap not less than one third of the track made in the preceding pass.
3.8	<u>APPLICATION OF BITUMEN.</u> Bitumen of I.S. grade S. 35 or S. 65 supplied for the work shall be heated to temperature of 177 ⁰ Celsius to 191 ⁰ Celsius (350 ⁰ F. to 375 ⁰ F.) in a bitumen boiler and temperature shall be maintained at the time of actual application.

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The hot bitumen shall be applied through a pressure sprayer on the road surface uniformly at the rate of 200 Kg./100 Sqmt. or 175 Kg./100 Sqmt. The road surface shall be divided into suitable rectangles marked by chalk so as to ensure correct rate of application of the bitumen.

3.9 KEY AGGREGATES

On completion of bitumen application, 12 mm size key aggregate shall be spread immediately at a uniform rate of 1.8 cubic meter/1.2 cubic meter per 100 square meter of area when entire surface is in hot condition. Brooms shall be used to ensure even, distribution of key aggregates.

3.10 FINAL COMPACTION

Immediately after spraying of bitumen and spreading of key aggregates, the surface shall be rolled with a vibratory roller to obtain full compaction and to force the blindage of key aggregates into the interstices of the coarse aggregate. The rolling shall continue till the asphalt surface hardens and key aggregates stop moving under roller.

3.11 SURFACE FINISH AND QUALITY CONTROL.

The surface finish shall confirm to requirements of clause 902 of specification for Road and Bridges by Ministry of Surface Transport. Quality Control Test and their frequencies shall be as per table below.

Sr. No.	Test	Frequency
(a)	Quality of binder.	Two samples per lot to be subjected to all or some test as directed by the Engineer.
(b)	Aggregate Impact Value.	One test per 200 cubic meter of aggregate.
(c)	Flakiness Index and Elongation Index.	One test per 200 cubic meter of aggregate.

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(d)	Stripping value	Initially one set of three representative specimen for each source of supply, subsequently when warranted by changes in the quality of aggregate.
(e)	Water absorption of aggregates.	Initially one set of three representative specimen for each source of supply, subsequently when warranted by changes in the quality of aggregate.
(f)	Aggregate grading.	One test per 100 cubic meter of aggregate.
(g)	Temperature of binder at application.	At regular close intervals.
(h)	Rate of spread of binder.	One test per 500 square meter of area.

3.12

ITEM TO INCLUDE

3.12.1

Diversions unless separately provided in the tender.

3.12.2

Preparing the road surface.

3.12.3

Applying tack coat on existing B.T. or Picking the existing W.B.M./W.M.M. surface.

3.12.4

Supplying, spreading and compaction of 40 mm size aggregates.

3.12.5

Supplying, heating and spraying bitumen.

3.12.6

Supplying, spreading and compaction of 12 mm size chips.

3.12.7

All labour, materials, including bitumen and aggregates, use of tools, plants and equipment for completing the item satisfactorily.

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4.0

SPECIFICATIONS FOR RETRO-REFLECTIVE SHEETING

4.1

GENERAL REQUIREMENTS

The retro-reflective sheeting used on the sign shall consist of the white or coloured sheeting having a smooth outer surface, which has the property of retro-reflection over its entire surface. It shall be weather – resistant and show colourfastness. It shall be new and unused and shall show no evidence of cracking scaling, pitting, blistering, edge lifting or curling and shall have negligible shrinkage or expansion. A certificate having tested the sheeting for these properties in an unprotected outdoor exposure (stating retained reflection of 80%) facing the sun for three year and its having passed these tests shall be obtained from a reputed independent test laboratory, by the manufacturer of the sheeting of the sheeting and the same should be submitted while taking up the actual work.

The retro reflective sheeting shall be of wide-angle prismatic lens type of ASTM Type-IX.

4.2

The retro reflective sheeting shall be of wide angle Prismatic lens type, consisting of cube corner lenses and pressure sensitive adhesive and should be applied to the sign substrate at room temp 18°C, transparent, waterproof of plastic having smooth surface. The coefficient of retro reflective as determined in accordance with STM standard E-810 shall give the minimum values as indicated in table given below.

TABLE – 1

Minimum coefficient of Retro-reflection for retro-reflective sheeting
Prismatic lens type candelas / lux / sq.m)

Observation Angle (in deg.)	Entrance Angle (in deg.)	White	Yellow	Green	Red	Blue
0.1	-4	660	500	66	130	30
0.1	+30	370	280	37	74	17

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0.2	-4	380	285	38	76	17
0.2	+30	215	162	22	43	10
0.5	-4	240	180	24	48	11
0.5	+30	135	100	14	27	6
1.0	-4	60	60	8	16	3.6
1.0	+30	45	34	4.5	9	2

When totally wet, the sheeting shall not show less than 90% of the values of retro reflectance indicated in Table 100-1. At the end of 7 years, the sheeting shall retain at least 75% of the original retro reflectance.

4.3 MESSAGES / BORDERS

The messages (legends, letters, numerals etc.) and borders of cautionary / regulatory signboards shall be screen – printed, Screen – printing shall be processed and finished with materials and in a manner specified by the sheeting manufacturer and shall be bonded with the sheeting in the manner specified by the manufacturer. The message (Legends, letters, numerals etc.) and borders of information signs, shall be of cut letters made in transparent overlay film pasted over the base sheeting with pressure sensitive adhesive or as instructed by the manufactures or as directed by the Engineer.

4.4 For screen-printed transparent coloured areas on white sheeting the co-efficient of retro-reflection shall not be less than the values of corresponding colours in Tables.

4.5 Cut-out message and borders, wherever used, shall be made in transparent film applied on base sheeting with pressure sensitive adhesive with the coefficient of retro reflection shall not be less than the valued of corresponding colour in Tables-1. For background colour of the sign the coefficient of retro reflection shall not be less than the specified in table no. 1 for the respective colours.

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4.6

COLOUR

Colour shall be as specified and shall conform to the requirements of table II. Conformance to colour requirements shall be determined spectrophotometrically in accordance with STM E 1164, with instruments utilizing either 45/0 or 0/45 illumination/viewing conditions or tolerances as described in ASTM E 1164 for retro-reflective materials.

Article I. Table-II

								Reflectance Limit (y)		
Colour	X	y	x	y	x	y	x	y	Min	Max
White	.30	.3	.35	.35	.33	.37	.28	.32	40.0	
Yellow	.48	.42	.54	.45	.46	.53	.42	.48	24.0	45.0
Red	.69	.31	.59	.31	.56	.34	.65	.34	3	15
Blue	0.7	.17	.15	.22	.21	.16	.13	.03	1.0	10.0
Green	.03	.39	.16	.36	.28	.44	.20	.79	3.0	9.0

The four piers of chromaticity co-ordinates determine the acceptable colour in terms of CIE 1931 standard colorimetric system measured with standard illumination source D65 – these colures are equivalent to those listed in ASTM D4956 using source C.

The colour shall be durable and uniform in acceptable value when viewed in daylight or under Normal headlights at night.

4.7

ADHESIVES

The sheeting/firm shall have a pressure sensitive adhesive of the aggressive tack type requiring no heat, solvent or other preparation for adhesion to a smooth clean surface. The adhesive shall be protected by an easily removable liner (removable by peeling without soaking in water or other solvent) and shall be suitable for the type material of the base plate such that it shall not be possible to remove the sheeting from the sign base in one piece by use of sharp instrument. The adhesive shall form a durable bond to

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smooth, corrosion and weather resistant surface of the base plate. In case of pressure sensitive adhesive sheeting, the sheeting shall be applied in accordance with the manufacturer’s specifications reflective sheeting. If the surface is rough, approved surface primer may be used. After cleaning metal shall not be handled, except by suitable or clean canvas gloves, between all cleaning and preparation operation and application of reflective sheeting / primer. There shall be no opportunity for metal to come in contact with grease, oil or other contaminants prior to the applications of retro-reflective sheeting.

4.8 Complete sheets of the materials shall be used on the signs except where it is unavoidable, at splices; sheeting with pressure sensitive adhesives shall be overlapped not less than 5 mm. When screen-printing with transparent colours is proposed, only but jointing shall be used. The material shall cover the sigh surface evenly and shall be free from twists, cracks and folds. The transparent overlay film in which cutout messages have been made shall be bounded with sheeting in the manner specified by the manufacturer.

4.9 WARRANTY AND DURABILITY

The contractor shall obtain from the manufacturer a seven year pre-qualification warranty for satisfactory field performance including stipulated retro-reflectance of the retro-reflective sheeting of Prismatic lens type and that of transparent film before taking up actual work. In addition, a seven year warranty for satisfactory in field performance of the finished signs with retro-reflective sheeting of Prismatic lens type, inclusive of the screen printed or cut-out letters/legends, transparent film and their bonding to the retro-reflective sheeting shall be obtained before taking up actual work. The contractor / supplier shall also furnish a certification that the signs and materials supplied against the assigned work meets all the stipulated requirements and carry the stipulated warranty.

Warranties should be given in original and should have legal jurisdiction in India. Warranties given by power of attorney holders will not be acceptable.

Processed and applied in accordance with recommended procedures, the reflective material shall be weather resistant and following, cleaning, shall show no appreciable discoloration, cracking, blistering or dimensional change and shall not have less than 50 per cent of the specified minimum

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reflective intensity value (Table 100-1) when subjected to accelerated weathering for 1000 hours, using type E or EH weatherometer (AASHTO Designation M 268)

Special Conditions of the Contract

* The contractor shall obtain from the manufacturer a seven year pre-qualification warranty for satisfactory field performance including stipulated retro-reflectance of the retro-reflective sheeting of Prismatic lens type and that of transparent film before taking up actual work.

* A certificate of having tested the sheeting for these properties in an unprotected outdoor exposure (stating retained reflection of 80%) facing the sun for three years and its having passed these tests shall be obtained from a reputed independent test laboratory, by the manufacturer of the sheeting and the same should be submitted to the Engineer before taking up actual work.

Customer Name :

Name of Work :

Due on :

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PRE-QUALIFICATION WARRANTY

This is to certify that Micro-prismatic Retro-reflective Sheeting of ASTM type-IX supplied by ABC to M/s XYZ for Retro Reflective signboards as mentioned above will conform to published specifications. ABC and M/s XYZ the sign fabricators, jointly and severally agree to repair or replace at their option, warranted Retro reflective signboard fabricated by M/s XYZ, from Micro-prismatic Retro-reflective Sheeting of ASTM type – IX and supplied to you by M/s. XYZ, provided:

- 1) The sign is ineffective for its intended purpose when viewed from a moving vehicle under normal day and night driving conditions by a driver with a normal vision, and
- 2) The coefficient of retro-reflection at the end of 7 years is less than 75% of values as specified in the following table:

Observation Angle (in deg.)	Entrance Angle (in Deg.)	White	Yellow	Green	Red	Blue
0.1	-4	660	500	66	130	30
0.1	+30	370	280	37	74	17
0.2	-4	480	285	38	76	17
0.2	+30	215	162	22	43	10
0.5	-4	240	180	24	48	11
0.5	+30	135	100	14	27	6
1.0	-4	60	60	8	16	3.6
1.0	+30	45	34	4.5	9	2

All measurements shall be made after cleaning according to sheeting manufacturer's recommendations.

ABC LIMITED XYZ

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4.10

ARRANGEMENT FOR TRAFFIC:

The contractor shall at all times carry out work on the road in manner creating least interference to the flow of traffic while consistent with the satisfactory execution of the same. The contractor shall in accordance with directions of Engineer provide and maintain, during execution a clear passage for traffic along part of the existing carriageway or along a temporary diversion as directed if it is found necessary. When the traffic can be allowed on the roadside berms without much inconvenience to the traffic or impediment to the work, this shall be provided by the contractor at his own cost.

4.10.1

Traffic safety and control:

The contractor shall take all necessary measure for the safety of traffic during construction and provide, erect and maintain such barricades, including signs, marking, flags, lights and flagmen as may be required by Engineer for information and protection of traffic approaching or passing through the section of pavement under improvement. The sign set up shall be of approved design and of refractory type, temporary warning lamps shall be installed at the barricades during the hours of darkness and kept light at all times, during these hours.

4.10.2

Maintenance of diversion and traffic control devices:

Signs, lights, barricades and other traffic control devices as well as the riding surface of diversions shall be maintained in satisfactory condition till such time they are required by the Engineer. The temporary travelled way shall be kept free of dust by frequent application of water if necessary.

4.11

PRECAUTIONS WHILE WORKING IN THE VICINITY OF TRACK:

4.11.1

When the work is required to be done along or near existing railway track, the contractor(s) shall take steps as are necessary for the safety of the track labour working at site. He / They will also be required to make Programme of his/their work so as not to interfere with the movement of trains. No extra payment shall be allowed for these precautions and also for crossing track/tracks required during execution of the work. It should be ensured

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that the ballast of the railway track(s) is not spoiled or mixed with earth or disturbed.

4.11.2 In addition to the precautions taken by the contractor for the safety of the track and labour, it may be necessary to post flagmen in some locations as an additional safety measure. The contractor(s) shall be fully responsible for any damage to or trespass caused by his/their men to surrounding structure, MSPGCL bears no liability whatsoever on this account.

4.11.3 Instruction given by Railway Authority regarding safety shall be strictly followed during execution of work.

4.12 **SAFETY PRECAUTIONS :**

4.12.1 The Contractor/s shall at all times adopt such safe methods to work as will ensure safety of structure, equipment and labour. If at any time the MSPGCL finds the safety arrangements unsafe, the contractor/s shall take immediate corrective action as directed by the MSPGCL in the matter. This shall in no way absolve the contractor/s of his/their sole responsibility to adopt safe working methods.

4.12.2 The Contractor/s shall design and execute temporary works such as formwork and supports, so as to ensure absolute safety of contractor/s personnel as well as Consultant/MSPGCL staff and personnel engaged on the work. The Contractor/s should indemnify the MSPGCL against damages and injury to workmen. MSPGCL reserves the right to enforce safety regulations on the contractor/s and recover any cost, which may be incurred for the purpose.

4.12.3 Whenever a lorry or any other form of road transport is required to ply along or in the vicinity of a running line or any other railway track where railway Engines or trains are scheduled to move, the contractor shall inform the Engineer in writing of such requirement specifying the locations and the duration of time over which such specified road vehicles have to operate in the area (for loading, leading or unloading of earth, ballast or any other material, plant or equipment) without any obstruction or dislocation to the running of trains. The contractor also should furnish the particulars of vehicles and the name and photograph of drivers and attendants retained for each legal to enable the engineer to issue necessary along the holder to

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operate the vehicles, with such restrictions regarding the durations and / or locations as are considered necessary. Such permit shall be returned to the engineer as soon as the work for which it is issued is over.		
4.12.4	The contractor shall execute a bond undertaking to ply to road vehicles in a safe and satisfactory manner and strictly in accordance with the stipulations and other conditions specified by the engineer and to engage and retain only the permit holder to be the contractor agent in charge of the vehicles, while driving or a rest. The person in charge of the vehicles in the attendant shall at all times be vigilant and on the look out for signals from the look out men, flagmen or other personnel available at site with a view to stop for regulate the road movement so as to ensure adequate margin of safety for the timely passage of an approaching train or railway engine, without any delay or detention.	
4.12.5	The contractor shall also be bound by the provision of this agreement, to ply the road vehicles only with adequate margin of safety, well clear of the fixed structure profile of infringement, as stipulated in the rules made under the Indian Railway Act and to seek and be guided by the signal and other directions of any lookout men for other personnel retained for the purpose of ensuring safety, and to ensure care and vigilance while turning, reversing or moving the road vehicle in any other manner, at an inclination to the running railway track or the siding, as the case may be.	
4.12.6	The contractor also undertakes to make good at his own cost any inconvenience, loss, damage, or other expenses caused to or incurred by the railway administration and to pay such amount as determined by the engineer to be recoverable from the contractor as penalty or damage for any omission, negligence, careless, oversight or accidents on the part of any of the contractor's agents, drivers or attendant or any person to whom the services of the holder of the permit (issued by the Engineer) has been lent other wise made accessible or available.	
4.12.7	Any breach of these conditions by the contractor and/or his agent affecting the safety of movements of trains, engines or other rolling stock of the Railway shall constitute a breach of contract by the contractor entailing liability for termination of contract for default on the part of the contractor.	

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4.12.8	The Tenderer/s will be permitted to make use of the level crossing for crossing the track after observing the standard railway safety precaution. If such precautions are not taken these will be enforced by the railway by adequate arrangements and the cost thereof shall be recovered from the contractor.
4.12.9	The contractor/s shall inspect the proposed site of work and acquaint himself / themselves with site conditions working hours storing spaces for materials, approach road / pathway available etc. and all relevant items connected with the execution of work. No. claim shall be entertained from contractor/s and shall make his own arrangements for approach/approach roads from out side railway land and contractor will bear entire expenses such as road taxes payment on right of way etc. to outsiders.
4.13	<u>PROTECTION AT THE WORKS SITE :</u>
4.13.1	On Railway track where the train traffic will be operational during the execution of the contract work, the protection of the works site as considered appropriate and adequate shall be arranged by the contractor at his own cost.
4.13.2	Notwithstanding the aforementioned protection at the works site provided by the Engineer’s representative, the contractor shall be responsible for providing appropriate and adequate system for warning the contractor’s workmen about the train traffic on or in the vicinity of the site of work. The decision of the Engineer’s representative whether the facilities provided by the contractor in this regard are appropriate and adequate or not, shall be final and conclusive. In case of non-following of instruction issued by Railway/MSPGCL by the third party quality audit agency, the MSPGCL shall have the right to terminate the agency and direct the contractor to appoint another agency duly approved by the Railway.
4.14	<u>WORKS DURING BLOCK PERIOD</u> For excavation nearer to the Railway track proper shoring and strutting shall be used, shoring and strutting arrangement shall be approved by the Railways.

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4.15

Incase of any accident during construction due to which the Railway undergone monetary or structural losses, it is the responsibility of the contractor to bear such losses. Any assessment made by the Railway shall be binding on the contractor.

4.16

Supervision of the works within the Railway boundary shall be done by the Railway as well. Any instructions given by the Railways regarding the works shall be binding on the contractor. Contractor shall arrange for the necessary conveyance for the officers of Railways for the supervision/inspection of the portion of works within the Railway boundary.

4.17

Precast concrete panel for shuttering below the deck slab is not permitted for the works within the Railway boundary. Necessary removable shuttering shall be provided by the contractor. Arrangements for shuttering for deck slab shall be planned and designed by the contractor by providing sleeve holes into the web of the girder.

4.18

BLOCK DURING LAUNCHING & ANY OTHER ACTIVITY :

4.18.1

It is the responsibility of contractor to arrange necessary blocks from Railways during launching operation or any other activity requiring blocks. Necessary assistance however shall be provided by MSPGCL. The necessary charges payable to Railways in this regard as required and demanded by Railway authority shall be borne by the Contractor.

4.18.2

The contractor shall ensure that block period sanctioned is not violated. The contractor shall be liable for penalty for each block bursting for an amount if claimed by Railways towards bursting of block. So, also, prolongation of caution order than the agreed programme will be liable for penalty if claimed by the Railways. Any expenditure on this account shall have to be borne by the Contractor.

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5.0 **SPECIFICATION FOR ELECTRIFICATION OF ROAD OVER BRIDGE (SPECIFICATION FOR THE ELECTRICAL WORK)**

5.1 **THE FOLLOWING WORK SHALL BE CARRIED OUT BY THE CONTRACTOR.**

5.1.1 415 Volts Feeder Pillar:

Feeder Pillar panel rated for 415 Volts, 3 phase, 4 wire, 50 HZ, supply, pedestal/bracket mounting, cubical type weather proof, suitable for outdoor installation, complete with double door, canopy arrangement and including civil foundation. Internal painting shall be milky white, external Opaline green. Sheet steel enclosure shall be fabricated out of 14 SWG thick sheet. Suitable gland plates and stud type terminations shall be provided at top/bottom for entry and exit of following cables.

Incoming - 3 1/2C x 50 sqmm.

Outgoing - 4C x 16 sqmm.

The feeder pillar shall be mounted over a suitable civil foundation with a clear height of 500 mm from finished ground level. Rate quoted shall included associated civil works.

5.1.2 Feeder Pillar - 1&2

Incoming feeder shall have 1 No.4 pole, 40 Amps MCB with shunt release, 1 No. core balance CT with earth leakage relay setting range from 0.5 - 2 amps, 3 Nos. current transformers - ring type ratio 25/5 Amps, 15VA, accuracy class-1, 1 No. Ammeter with Selector Switch - digital type, 1 No. Voltmeter ith selector switch - digital type, 1 No.25 Amps, 3 pole AC - 3 duty contactor, 1 No.16A time switch with running reserve time 100 Hrs. MDS - Legrand make, type - MaxiRex Qt (24 Hrs)-49754. 3 Nos. current transformers - ring type ratio 25/5 Amps, 15VA accuracy class - 1 for KWH meter. Provision for mounting 1 No.KWH meter and 3 Nos. CT's in a separate sealable compartment.

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	Outgoing feeder consisting of 1 No.25 Amps, 4 pole MCB, 3 Nos.20 Amps TPN MCB's, 2 Nos. 20 Amps TPN MCB as spare, 2 Nos. On/Off push buttons.	
5.1.3	Luminaire	
	Street Light Luminaire complete with polyester filled copper wound ballast, electronic ignitor, capacitor, mains connector and earthing terminal. Luminaire to be provided with 1x250 Watts HP Mercury Vapour Lamp. Philips make-Type CRP 330/250W or equivalent.	
5.1.4	Octagonal Poles	
	Poles with 9M mounting height galvanized octagonal pole (of fixture from road level) with double and decorative brackets as per Deg.No.E&PBU-SL-WR-015-00IR. Poles to be fixed on Median verge only.	
5.1.5	M.S.Sleeve	
	MS Sleeve of 160mm ID and 1000mm height provided with base plate 12mm thick 400mm square MS plate suitably anchored to the crash barrier.	
	Note :	
	The light poles shall be inserted in to MS sleeves and suitable anchored with fasteners. The lighting poles shall have a 75mm diameter opening at sides to receive the cables from its associated junction box through a inclined rigid PVC pipe. An earth strip of 25x3mm GI – 150mm length shall be provided for each pole as shown in the drawing. 4 core cables for street light poles shall be terminated with loop in and loop out facilities/termination proper. Generally the spacing between poles to be maintained at 25 mtrs. and quality of poles are indicative and may marginally vary depending on site conditions.	
5.1.6	Junction Box / Light Controls Mcb Box	
	Weather proof junction box for road lighting luminaries for road above flyover mounted/embedded into crash guard /concrete pedestal, fabricated out of 14 SWG sheet steel consisting of one number 6 way terminal suitable	

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5.1.7	for entry/exit of upto 4x16 sqmm. AI Conductor Cable and 1 No. 20 Amps DP MCB and earth terminal with suitable termination / looping in and looping out of its associated phases and neutral conductors. 1.1 KV Grade Pvc Insulated Armoured Aluminium Conductor Cables And Terminations. Supply and laying 1100 volts grade, PVC insulated aluminium conductor, steel wire armoured power cable. The cable shall be laid indoor/outdoor. The rate shall include laying as per specification. Brick sand backfilling etc., for outdoor laying. Cable shall be clamped at regular intervals using clamps and fasterers. (Length of the cable indicated is approximate. Exact length of the cable shall be ascertained as per the site condition before supplying the same to site.) 3 1/2 x 50 sqmm – incoming cable, 4 x 16 sqmm (These cables shall be run through 75mm dia PVC pipes laid in crash battier.	
5.1.8	Codes & Standards The design manufacture, testing and supply of the cables under this specification shall comply with the latest revisions including amendments of the following standards. (a) IS : 7098-I - XLPE insulated heavy duty cables for working voltages upto 1100 volts. (b) IS : 3961-II - Recommended current ratings for cables. (c) IS : 8130 - Conductors for insulated cables. (d) IS : 5831 - XLPE insulation and outer sheath of electric cables. (e) IS : 7098-I - Test Procedures for cables. (f) IS : 10418 - Specification for drums for electric cables. (g) IS : 3975 - Mild steel wire, strips, and tapes for armouring of cables.	

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5.1.9 Technical Requirements:

5.1.9.1 All XLPE Aluminium / Copper Power Cables shall be 1100 volts grade, multi core constructed as IS : 7098 Part-I of 1988 as follows :

- (A) Standard Aluminium / Copper conductor in case of 10 sq.mm and above and solid conductor in case of 10 sq.mm and below.
- (b) All Aluminium / Copper XLPE cables insulation shall be of high grade Cross-linked Polyethylene from insulation for extrusion process.
- (c) Cores laid-up.
- (d) The inner sheath should be bounded over with termo-plastic material for protection against mechanical and electrical damage.
- (e) Armouring should be provided over the inner sheath to guard against mechanical damage. Armouring should be galvanized steel wires or galvanized steel strips. (In single core cables used in A.C system armouring should be non-magnetic hard aluminium Wires / Strips.
- (f) The outer sheath should be specially formulated heat resistant black PVC compound conforming to the requirement of type ST2 of IS : 5831-1984 extruded to form the outer sheath.

5.1.10 Conductor shall be of electrolytic Aluminium / Copper conforming to IS : 8130 and are compact circular or compact shaped.

5.1.10.1 Insulation shall be of XLPE type as per latest IS general purpose insulation for maximum rated conductor temperature 70 degree centigrade.

5.1.10.2 In inner sheath laid up core shall be bounded over with thermoplastic material for protection against mechanical and electrical damage.

5.1.10.3 Insulation, inner sheath and outer sheath shall be applied by extrusion and lapping up process only.

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5.1.10.4 Armouring shall be of galvanized steel wire / flat.

5.1.10.5 Repaired cables shall not be used.

5.1.10.6 Current ratings of the cables shall be as per IS : 3961.

5.1.11 XLPE Cables:

 The XLPE insulated cables shall conform to latest revision as read along with this specifications.

 The Conductor shall be stranded Aluminium / Copper circular / sector shaped and compacted.

 In multi core cables the core shall be identified by red, yellow, blue and black colouring of insulation.

 The XLPE insulated 1100 volts grade power cables shall conform to latest IS and shall be suitable for a steady conductor temperature of 70 degree centigrade.

 The conductor shall be stranded Aluminium / Copper as called for in the Schedule of Quantities.

 The outer sheath shall be as per the requirement of type ST-2 of IS:5831 of 1984.

5.1.12 Supply and Laying Of Cables

 The cables shall be suitable for laying in racks, ducts, trenches, conduits and underground buried installation with uncontrolled back fill and chances of flooding by water.

 Progressive automatic in line sequential marking of the length of cables in meters at every one meter shall be provided on the outer sheath of all cables. Cables shall be supplied in non returnable wooden drums as per IS : 10418.

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	Both ends of the cables shall be properly sealed with PVC / Rubber caps so as to eliminate ingress of water during transportation, storage and erection.		
5.1.13	Test and Test Reports		
	Cables shall be subjected to type tests, acceptance tests and routine tests as per 7098 Part-I. Four (4) copies of all test reports shall be submitted for approval to the Engineer.		
5.1.14	Drawings and Data		
	The contractor shall furnish technical particulars of cables type, make and catalogue for the approval of Engineer.		
5.1.15	The product should be coded as per IS – 7098 Part-I and the codes shall be as follows:		
	Aluminium Conductor	A	
	XLPE Insulation	2X	
	Steel round wire armour	W	
	Steel strip armour	F	
	Steel Double round wire armour	WW	
	Steel Double strip armour	FF	
	Non-magnetic (A1) round wire armour	Wa	
	Non-magnetic (A1) strip armour	Fa	
	PVC outer sheath	Y	
5.1.16	End Termination		
	Cable and terminations for 1.1 KV grade PVC insulated armoured heavy duty aluminium conductor cables complete with double compression type brass cable glands, crimping type aluminium lugs, necessary insulation type etc., complete in all respects.		
5.1.17	Installation of MV Cables		
5.1.17.1	General		

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(A) MV Cables shall be inspected prior to laying, laid tested and commissioned in accordance with drawings, specifications, relevant Indian Standards Specifications and cable Manufacturer's instruction. The Cable shall be delivered at site in original drums with manufacturer's name drum No. length and size of cable clearly written on the drum.

(b) The recommendations of the cable manufacturers with regard to jointing and sealing shall be strictly followed.

5.1.17.2 Inspection

(a) All cables shall be inspected upon receipt at site and checked for any damage during transit.

(b) While selecting cable routes, corrosive soils, ground surrounding sewage effluent etc., shall be avoided; where this is not feasible, special precautions as decided by the Engineer-in-charge, shall be taken. Street lighting and Service line to each area have separate route.

5.1.17.3 Proximity to communicate Cables

Power and communication cables shall as far as possible cross at right angles. Where power cables are laid in proximity to communication cables the horizontal and vertical clearances shall not normally be less than 60 cms.

5.1.17.4 Laying Methods

(a) Cables shall be laid direct in ground, in pipes/closed ducts, in open ducts or on surface depending on environmental and site conditions.

(b) During the preliminary stages of laying the cables, consideration should be given to proper location of the joint position so that when the cables are actually laid the joints are made in the most suitable places. As far as possible water logged locations, carriage ways, pavements, proximity to telephone cables, gas of water mains, inaccessible places, ducts pipes racks etc., shall be avoided for joint position.

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5.1.17.5 Laying direct in ground

General

This method shall be adopted where the route is through open country, along roads/lanes etc., and where no frequent excavations are encountered and where re-excavations is easily possible without affecting other services.

5.1.17.6 Trenching

Width of Trench

The width of the trench shall first be determined on the following basis :

- (a) The minimum width of trench for laying single cable shall be 35 cm.
- (b) Where more than one cable is to be laid in the same trench in horizontal formation, the width of trench shall be increased such that the inter-axial spacing between the cables, except where otherwise specified shall be atleast 20 cm.
- (c) There shall be a clearance of atleast 15 cm. between axis of the end cables and the sides of the trench.

5.1.17.7 Depth of Trench

The depth of the trench shall be determined on the following basis

- (a) Where cables are laid in single tier formation, the total depth of trench shall not be less than 75 cm for cables upto 1.1 KV and 1.20 m for cables above 1.1 KV.
- (b) When more than one tier of cables is unavoidable and vertical formation of laying is adopted, depth of trench in above shall be increased by 30 cm. for each additional tier to be formed.

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5.1.17.8 Laying of Cables in Trench

- (a) At the time of issue of cable for laying the cores shall be tested for continuity and insulation resistance.
- (b) When the cable has been properly straightened, the cores are tested for continuity and insulation resistance and the cable is then measured. The ends of all lead sheathed cables shall be sealed with solder immediately. In case of PVC cables suitable moisture seal tape shall be used for this purpose.
- (c)
 - (i) Cable laid in trenches in a single tier formation shall have a covering of clean dry sand of not less than 17 cms above the base cushion of sand before the protective cover is laid.
 - (ii) In the case of vertical multi-tier formation after the first cable has been laid, a sand cushion of 30 cms shall be provided over the initial bed before the second tier is laid. If additional tiers are formed, each of the subsequent tiers also shall have a sand cushion of 30 cms. as stated above. The top most cable shall have a final sand covering not less than 17 cms. before the protective cover is laid.
- (d) At the time of original installation, approximately 3m of surplus cable shall be left on each end of the cable and on each side of underground joints (straight through/Tee/Termination) and at entries and places as may be decided by the Engineer. The surplus cable shall be left in the form of a loop. Where there are long runs of cable length, loose cable may be left at suitable intervals as specified by the Engineer.
- (e) Unless otherwise specified, the cables shall be protected by second class bricks of not less than 20cm x 10cm x 10cm (nominal size) protection covers placed on top of the sand, (bricks to be laid breadth wise) for the full length of the cable to the satisfaction of the Architect/Consultant. Where more than one cable is to be laid in the same trench, this protective covering shall cover all the cables and project atleast 5cm. over the sides of the end cables.

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5.1.17.9 Back Filling

(a) The trenches shall be then back filled with excavated earth free from stones or other sharp edges debris and shall be rammed and water, if necessary, in successive layers not exceeding 30 cm. Unless otherwise specified, a crown of earth not less than 50 mm in the center and tapering towards the sides of the trench shall be left to allow for hazard to vehicular traffic. The temporary reinstatements of roadways should be inspected at regular intervals, particularly during the wet weather, and any settlement should be made good by further filling as may be required. After the subsidence has ceased, trenches cut through roadways or other paved areas shall be restored to the same density and material as the surrounding area and repaved to the satisfaction of the Engineer.

(b) Where road cutting, excavation in lawns kerb stones displaced etc., the same shall be repaired and made good except turfing/asphalting to the satisfaction of the Engineer and all surplus earth or rock removed to places as specified.

5.1.17.10 Route Marker

(a) Route Marker shall be provided along straight runs of the cables at locations approved by the Engineer and generally at intervals not exceeding 100m. Markers shall also be provided to identify change in the direction of the cable route and also for location of every underground joint.

(b) Route Markers shall be made out of 100mm x 100mm x 5mm GI/Aluminium plate, welded or bolted on to 35mm x 35mm x 6mm angle iron 60cm long. Such plates marker shall be mounted parallel to and 0.5m or so away from the edge of the trench.

(c) The word ‘cable’ and other details such as voltage grading size etc., as furnished by the Engineer shall be inscribed on the marker.

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5.1.17.11 Laying in Pipes/Closed Ducts

(a) In locations such as road crossing, entry to buildings, on poles in paved areas etc., cable shall be laid in pipes or closed ducts.

(b) Stone ware pipes, GI, CI or Spun reinforced concrete pipes shall be used for such pruposes. In the case of new construction, pipes as required shall be laid along with the Civil works and jointed as per the instructions of the Engineer. The size of the pipe shall be decided by the Engineer and shall not be less than 10cm in diameter for a single cable and not less than 15cm for more than one cable.

These pipes shall be laid directly in ground without any special bed except for SW pipe which shall be laid over 10cm thick cement concrete 1 : 3 : 6 (1 cement : 3 coarse sand : 6 graded stone aggregate of 40mm nominal size) bed. No sand cushioning or tiles need be used in such situations. Unless otherwise specified, the top surface of pipes shall be at a minimum depth of 1m from the ground level when laid under roads, pavements etc., where steel pipes are employed for protection of single core cables feeding AC load, the pipe should be large enough to contain both cables in the case of single phase system and all cables in the case of polyphase system.

(c) Pipes for cable entries to the building shall slope downwards from the building and suitably to prevent entry of water inside the building. Further, the mouth of the pipes at the building end shall be suitably sealed to avoid entry of water.

(d) All chases and passage necessary for the laying of service cable connections to buildings shall be cut as required and made good to the original finish and to the satisfaction of the Engineer.

(e) Cable grips/draw wires and winches etc., may be employed for drawing cables through pipes/closed ducts etc.

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5.1.17.12 Laying of Open Ducts

- (a) Open ducts with suitable removable covers shall be preferred in sub stations, switch rooms, plant rooms, workshop etc.
- (b) The cable ducts should be of suitable dimensions so that the cables can be conveniently laid. If necessary, cables may be fixed with clamps on the walls of the such or taken in troughs in duct. The duct should be covered with removable slabs or chequered plates.
- (c) Ducts may be filled with dry sand after the cable is laid and covered as above or finished with cement plaster specially in high voltage applications.
- (d) Splices or joints of any type shall not be permitted inside the ducts.
- (e) As far as possible laying of cables with different voltage ratings in the same duct shall be avoided.
- (f) Where considered necessary, hooks or racks shall be provided for supporting the cables in masonry/concrete cable ducts, cable troughs. Otherwise cables shall be laid direct in the trench or trough etc. While deciding the layout of cables in such ducts, care should be exercised to ensure that unnecessary crossing of cables is avoided.

5.1.17.13 Laying on Surface

- (a) The cables may be laid in troughs or brackets at regular intervals or directly cleated to wall/ceiling. When laid over bracket supports, the cables shall be clamped to prevent undue sag.
- (b) Cable clamps shall be made from materials such as mild steel, porcelain, wood, aluminium etc., in case of single core cables the clamps shall be non-magnetic materials. A suitable non-corrosive packing shall be used for clamping unarmoured cables, to prevent damage to the cable sheath.

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5.1.17.14 Cable Identification Tags

Wherever more than one cable is laid/run side by side, marker tags as approved, inscribed with cable identification details shall be permanently attached to all the cables in the manholes/open ducts etc. These shall also be attached to various cables laid direct in ground at suitable intervals as directed by the Engineer before trenches are filled up.

5.1.17.15 Jointing

- (a) Jointing work shall be carried out only by a licensed/experienced cable jointer.
- (b) At the preliminary stages of laying a cable, a proper jointing position should be selected.
- (c) Sufficient surplus cable shall be left on each side of joints as mentioned in clause 3.5.3.4.
- (d) Joints shall be staggered by 2 to 3 m when two or more cables are laid together in the same trench.
- (e) Jointing materials and accessories like conductors ferrules, solder, flux, insulating and protective tapes, filling compound, jointing boxes etc., of right quality and correct sizes, conforming to relevant Indian Standards, wherever they exist, shall be used. The design of the joint box and the composition of the filling compound shall be such as to provide an effective sealing against entry of moisture in addition to affording proper electrical characteristics to joints. Where special type of splicing connector kits or epoxy resin spliced joints are specified materials approved for such application shall be used and instructions of the manufacturer/supplier of such materials shall be strictly followed.
- (f) Insulation resistance of cables to be jointed shall be measured with 500 volts megger upto 1.1 KV grade and with 2,500/5,000 volts megger for cable of higher voltage. Unless the insulation resistance values are satisfactory, jointing shall not be done.

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(g) Cores of the cables must be properly identified before jointing.

(h) Where a cable is to be jointed with the existing cable, the sequence should be so arranged as to avoid crossing of cores while jointing.

5.1.17.16 Jointing Procedure

(a) While it would be best to follow strictly the instructions for jointing furnished by the manufacturers/suppliers of cable and joint boxes.

(b) All outdoor jointing of PVC cable shall be done using best quality of compound and jointing materials. For indoor termination of PVC cables, joints with compression type glands shall be preferred.

5.1.17.17 Testing

(a) All cables before laying shall be tested with a 500 volts megger for 1.1 KV grade or with a 2,500/5,000 volts megger for cables of higher voltages. The cable cores shall be tested for continuity, absence of cross phasing, insulation resistance to earth/sheath/armour and insulation resistance between conductors.

(b) All cables shall be subjected to above mentioned tests during laying, before covering the cables by protective covers and back filling and also before the jointing operations.

(c) In the absence of facilities for pressure testing, it is sufficient to test for one minute with 1,000 volts megger for cables for 1.1 KV grade with 2,500/5,000 volts megger for cables of higher voltages.

5.1.17.18 Completion Plan and Completion Certificate

The work shall be carried out in accordance with the drawings enclosed with the tender and also in accordance with the modifications thereto from time to time approved by the Engineer.

(a) Layout of cable work.

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(b) Length, size, type and grade of cables.

(c) Method of laying i.e. direct in ground in pipes etc.

(d) Location of each joint with jointing method followed.

(e) Route marker and joint marker with respect to permanent land marks available at site.

(f) Name of work, job number, accepted tender reference, date of completion, names of division and sub-division, names of contractor with their signature and scale of drawing.

5.1.18 Earthing

Earthing shall be as per IS:3043 standards for earthing of feeder pillar, street lighting poles, interconnections between earth electrodes. The rates to be quoted shall include all necessary clamps, saddles, hardware, fixing arrangements excavation, as required. 25 x 3mm GI flat. GI pipe type earth electrodes as per IS:3043 standards, complete with excavation, civil works, funnel, cast iron cover earth pit makers etc.

Note :

25x3mm GI flat along the side of the road above flyover shall be embedded in crash battier by the electrical contractor during the civil works.

5.1.19 Lighting Protection

Supply & fixing of GI pipe earth station conforming full to IS:3043, complete with brick masonry chamber, GI cover, water funnel etc.

Supply and running 40x6 GI strip as lightning conductor lead, clamped to structure.

Supply & installation of Air termination rod with 5 Nos. 10mm. dia solid copper spikes mounted on copper ball with 25 dia. long copper tube mounted on base plate with necessary clamp bolts, grouting etc., complete.

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5.1.20	The contractor shall carryout and completes the said work under this contract in every respect in conformity with the current rules and regulations of the local electrical authority, the Indian Standard Institution with the directions of and to the satisfaction of the Engineer-in-charge. The contractor shall furnish all the labour and install all materials, appliances, equipment necessary for the completion and testing of the whole electrical installation as specified herein and shown on the drawings. This also includes any material, appliances, equipment not specifically mentioned herein or noted on the drawings as being furnished or installed but which are necessary and customary to make complete installation in all respect as shown on the drawings or described in specification herein properly connected with electrical installation such as excavation of trenches and back filling, cutting / drilling and grouting for fixing of fixtures, equipment etc., further all the liaison work with the Supply Authorities for obtaining electrical load sanction, obtaining the released order from supply authority for release of supply and other bodies like compliances, drawings etc., shall be done by the contractor without any extra cost. No separate amount towards the same will be paid by the MSPGCL.
5.1.21	Contractor has to submit detailed drawing to the Engineer-in-charge for approval before commencement of work. All the drawings to be prepared in AutoCAD (Latest release only).
5.1.22	Further the contractor has to liaise with the supply authority for getting the load sanctions and release of L.T. supply to the premises and to individual owners. The MSPGCL will assist the contractor for giving the necessary dates for filling the form. The contractor shall be solely responsible for submission of application along with all necessary documents to supply authority. Further he shall be responsible for follow up the application and getting the release of the supply to lighting. The necessary cost involved for the said work is to be included in the cost of the work. No separate payments will be made by the clients towards the same.
5.1.23	The contractor shall also be responsible for getting approvals from the various bodies such as Supply Authority, Electrical Inspector, PWD, MSEB, Government of Maharashtra and any other statutory bodies. The cost involved for getting the necessary approvals is to be included in the cost of

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the overall work. No separate payment towards the same will be paid to the contractor. The owner will reimburse the official fees paid by the contractor to the various departments. The contractor will have to submit the original copies of the bills / challans and copy of the receipt of the payment made to the various departments.		
5.1.24	The contractor will have to carry out the entire electrical works to the satisfaction of the Engineer-in-charge. The brief description of the work is as follows :	
5.1.24.1	Main Cabling The Contractor will have to lay the LT XLPE armoured cables from the feeder pillar to street light poles, junction boxes, lighting fixtures etc. Before laying this cable the contractor will have to do necessary voltage drop calculations for each size of the cables and get it approved from Engineer-in-charge. The termination of the cables will be carried out using good quality heavy duty brass double compression glands of approved makes and heavy duty tinned copper crimping lugs. The cost of all the cables will be included in the scope of the contract. After laying of the cables all the cables will have to be neatly dressed using necessary clamps. The cable identification tags shall be provided at both ends and at every 15-20 meters.	
5.1.24.2	Feeder pillar : The Feeder Pillar for the said work is to be supplied by the contractor. The feeder pillar will be out door duty fabricated using minimum 14 SWG white CRCA sheets and the same shall be double door type and rain canopy fixed on top. The feeder pillar will under go the seven tank painting process. It will be painted using powder coated granule finish Siemens gray PAL 7032 colour shade Busbars used for the same will be tinned copper & with colour code heat shrinkable sleeve only, a separate compartment with necessary sealing arrangements for the energy meter. The Feeder Pillar shall have bottom cable entry and top copper bus bar chamber. The Feeder Pillar shall be installed on the concrete pedestal of minimum 500mm high from the finished road level. The contractor will have to submit the necessary drawings in detail to the Engineer-in-charge for his approval before fabrication work started. All the cost towards the supply, installation, testing and commissioning including all necessary civil work will be borne	

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by the contractor. Before the Feeder Pillar dispatched to the site the same shall be inspected and tested at the manufacturing tests before the final commissioning.

(a) Before erecting the Feeder Pillar at site, a thorough inspection shall be done by the Contractor and reported to the Engineer if any difficulties are envisaged for erection. Thereafter, an erection sketch shall be prepared, indicating the dimensions and the clearances between the Boards. A similar marking will also be made at site.

(b) Feeder Pillar shall be tested for mechanical endurance. After checking wiring and cable connections the entire boards, shall be erected in places indicated and marked on the plan. All touching up work of points shall then be done and foundation bolts grouted. All necessary holes and civil works shall be done as per directions. The Feeder Pillar after duly testing shall be put to commission for trial.

5.1.24.3 Lighting fixtures :

All the fixtures shall be of good quality and of approved lighting make only. All the fixtures shall be provided with high frequency electronic ballast's. All the fixture shall be installed as per the G.I.pipe or G.I. pipe suspension using ball and socket and necessary G.I. hardware. The fittings shall be installed either on wall or ceiling mounted. The sample of each fitting should be submitted to Engineer-in-charge for approval prior to procurement of the fixtures.

5.1.24.4 Earthing system:

Prior to staring the earthing work the contractor will have to submit the detail earthing calculations for the approval of Engineer-in-charge. 2 nos. earthing with plate type of earthing to be provided for the feeder piller. 1 No. pipe earthing system approach to Road Over Bridge to Kamptee side and 1 No. pipe earthing system approaches to Road Over Bridge to Bhandara side and necessary earth wire to be provided to earth street light poles. 1 No. pipe earthing system to be provided to high mast lighting tower. The earthing results should be less than 1.0 Ohms for grid. From earth pit to the feeder pillar, high mast tower and upto first street light pole 25 x 6 hot-dipped G.I. Strip is to be used.

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5.1.24.5 Earth Electrodes In Earth Pits

Plate electrodes of Copper shall be 600 x 600 x 6mm thick and 600 x 600 x 12mm thick for GI unless otherwise specified.

5.1.24.6 Earth Bus and Earth Continuity Conductor

- (a) Earth bus is a copper strip or flat of specified size interconnecting all earth electrodes.
- (b) Switchgears and Power Distribution Board's shall be earthed by a copper flat strip/Hot dipped Galvanized Iron strip wire.
- (c) Panels, fused DBs and motors upto 30 KW rating shall be earthed by a continuity conductor, as specified. Minimum size of continuity conductor shall be 25 x 3mm bare copper strip, soft drawn.
- (d) Road Lighting Poles shall be earthed with GI wire.

5.1.24.7 Earth Bus Station:

Earth Bus Station shall be provided to facilitate tapping of earth continuity conductor from earth bus/grid very conveniently it will comprise of a 400 mm long 50 x 6 mm bare copper strips / flat fixed with raw plugs / bolts securely on wall / column above floor level. Spacers of 20 mm to 25 mm shall be provided to keep the flat away from wall and facilitate connections of earth conductor for which 6 mm dia holes 8 to 10 numbers are provided with proper size proper size brass nuts, bolts and washers. Earth bus shall be connected to it.

5.1.24.8 Resistance to earth:

The contractor shall measure the resistance of the individual earthing pit and report to the Engineer-in-charge. The contractor will make after due consultation with Engineer-in-charge, No. of earth pits, such that, the overall resistance in the earth mat does not exceed 1.0 Ohm.

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5.1.24.9 Earthing Station

Plate Electrode Earthing:

Earthing electrode shall consist of a tinned copper plate not less than 600 x 600 x 12 mm G.I. as called for in the drawings. The plate electrode shall be buried as far as practicable below permanent moisture level but in any case not less than 3 mtrs. below ground level. Wherever possible earth electrode shall be located as near the water tap, water drain or a down take pipe as possible. Earth electrodes shall not be installed in proximity to a metal fence. It shall be kept clear of the buildings foundations and in no case shall it be nearer than 1 meter from the outdoor face of the wall. The earth plate shall be set vertically and surrounded with 150 mm thick layer of charcoal dust and salt mixture. 20 mm G.I. pipe shall run from the top edge of the plate to the ground level. The top of the pipe shall be provided with a funnel and a mesh for watering the earth through earth. The main earth conductors shall be connected to the electrode just below the funnel, with proper terminal lugs and checks nuts. The funnel over the G.I. pipe and earth connections houses 300 mm wide and 300 mm deep. The masonry chamber shall be provided with a cast iron cover resting cover a C.I. frame embedded in masonry.

5.1.24.10 Guarantee:

At the cost of the work and before issue of final certificate of virtual completion by the Engineer-in-charge, the contractor shall finish a written guarantee indemnifying the owner against defective material and workmanship for a period of one year after completion. The contractor shall hold himself fully responsible of reinstallation or replace free of cost to the MSPGCL.

5.1.24.11 Completion Certificate:

On completion of the Electrical Installation a Certificate shall be furnished by the contractor, counter signed by a Licensed Supervisor, under whose direct supervision the installation was carried out. This certificate shall be in the prescribed form as required by the local supply authority. The

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contractor shall be responsible for getting the Electrical Installation inspected and approved by the Local Authorities concerned.

5.1.24.12 Test to be called for approval purpose:

- (a) The tenderer/bidder shall carryout in presence of Engineer’s Representative all tests. Such tests shall be carried out at the manufacturers or at works of the bidder.
- (b) The tenderer shall forward all the relevant copies of tests so performed in for the record of the Engineer-in-charge.
- (c) The tenderer shall give clear 15 days prior intimation in writing for all such tests to be carried out at relevant place of manufacture, works, sub-works etc. The cost incidental to such tests being carried out shall be borne by the tenderer. However, the expenditure for Engineer’s Representative making such visits for inspection only is borne by the Contractor.

5.2 GENERAL CONDITIONS OF SUPPLY OF ELECTRICAL EQUIPMENTS

5.2.1 The tenderer/bidder shall submit all technical data and catalogues of all relevant manufacturers he wishes to supply in his offer. However the supply and selection of materials and makes shall comply with the standards and approvals set herein only. If any deviations are noted, they shall be listed separately. The tenderer at his own discretion may list out any such reasons on quality/specifications/technical data for deviating from the approved makes. These shall then be appropriately considered. However all such deviations shall only be made by the bidder as alternate to the makes and materials specified. If these are not indicated then the tenderer’s offer is likely to be rejected in to.

5.2.2 All tests to be performed prior to supply shall be indicated clearly by the tenderer. It is generally expected that all type and routine tests for all equipment required to be supplied under this tender shall complied to, however if the tenderer wishes to deviate for certain reasons all such reasons should be clearly brought out in the offer, specifically all tests shall be called for noted in this section.

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5.2.3	The successful tenderer before placing the orders or before supplying shall seek clearance in a meeting with the Engineer the final list of supply of materials at the time of signing of the contract by the Engineer and the successful tenderer/bidder. The successful bidder/tenderer shall then strictly adhere to these approved lists of makes and materials and proceed to supply the same. If any deviation and/or for any unforeseen reasons the makes or materials are to be altered, the successful tenderer shall obtain the proposal from Engineer in charge in writing and then only be may proceed to supply.	
5.2.4	The successful tenderer shall be entirely responsible for Guarantee of every equipment supplied performing in a continuous manner and mode acceptable to the Engineer.	
5.2.5	The successful tenderer shall submit minimum eight sets of all equipment, maintenance manuals, test certificates, guarantee of equipment etc., to the owner at the time of supply.	
	a) PREFERRED MAKES	
	Light fittings - Philips, Crompton Greaves, Bajaj,	
	Street light poles - Bajaj/ Bombay poles KL Industries.	
	Cables - Asian/Fort Gloser/Finolex Industries/C.C.T. / Universal	
	MCCBS - L&T / ABB / GEC Alsthatham Crompton	
	Timer - L&T	
	Contractor - BCH, Siemens, C&W, L&T	
5.3	<u>SAFETY MEASURES:</u>	
5.3.1	Scaffolds:	
	Suitable scaffolds shall be provided for workmen for all works that cannot be safely done from the ground, or from solid construction, except such period work as can be done safely from ladders. When a ladder is used, it shall be of rigid construction made either of good quality wood or steel. The steps shall have minimum width of 450mm and a maximum rise of 300mm. Suitable hand holds of good quality wood or steel shall be	

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	provided and the ladder shall be given an inclination not steeper than 1/4 to 1 (1/4 horizontal and 1 vertical).	
5.3.2	Scaffolding or staging more than 4 meters above the ground floor, swing or suspended from an overhead support or erected with stationary support shall have a guard rail properly attached, bolted braced and otherwise secured atleast one meter high above staging and extending along the entire length of the outside and ends thereof with only such openings as may necessary for the delivery of materials. Such scaffolding or staging shall be so fastened to prevent it from swaying from the building structure.	
5.3.3	Working platforms gangways and stairways shall be so constructed that they do not sag unduly or if more than 4 meters above ground level or floor level they shall be closely bordered, have adequate width and be suitable fenced.	
5.3.4	Every opening in a working platform shall be provided with suitable means to prevent falls of persons or materials by providing suitable fencing or railing.	
5.3.5	Whenever there are open excavations in ground, they shall be fenced off by suitable railing and danger signals installed at night so as to prevent persons slipping into the excavations.	
5.3.6	Safe means of access shall be provided to all working places, Every ladder shall be securely fixed. No portable single ladder shall be over 9 meters in length; width between side rails in rung ladder, shall in no case be less than 290mm for ladders upto and including 3 meters in length. For longer ladders this width shall be increased atleast 20mm for each additional meter of length.	
5.3.7	Adequate precautions shall be taken to prevent danger from electrical equipment. No material or any of the sites of work shall be so stacked or placed as to cause danger or inconvenience to any person or the public.	
5.3.8	Other safety measures:	
5.3.8.1	All personnel of contractor working within site shall be provided with safety helmets. All welders shall wear welding goggles while doing	

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welding work and all metal workers shall be provided with safety gloves. Persons employed on metal cutting and grinding shall wear safety glasses.

5.4 ELECTRIC SUPPLY AND MSEDCL CONNECTION:

Contractor shall arrange to provide electric supply from MSEDCL including required power meters. The necessary meter & connection charges and deposit to MSEDCL shall be paid by the contractor and the same will be reimbursed by MSPGCL on producing the MSEDCL receipts certified by the PMC.

5.5 HANDING OVER OF STREET LIGHTING SYSTEM:

Contractor shall hand over the entire lighting system erected for the project to the Executive Engineer (Electrical), after its completion and made operational through PMC / Engineer. An undertaking in prescribed format along with its enclosures in triplicate shall have to be given by the contractor within fifteen (15) days of its certification of its completion from PMC/Engineer. The contractor shall be responsible for handing over all installations of street lighting arrangement. The necessary co-operation if required will be extended by the Engineer and client.

5.6 DECLARATION:

I/ We hereby declare that I / We have read and understand the scope of the work for electrification and the detail technical specifications. I / We hereby declare that our offer also include all the materials required to complete the said job as per the requirements spelt out in the said Tender. I / We shall not claim any extra amount for completing the said work. Further we will supply and install all the material as required to complete the said work as per the entire satisfaction of the Engineer-in-charge and approving authorities for electrification work.

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6.0 **TRAFFIC SAFETY MEASURES**

6.1 **TRAFFIC SAFETY MEASURES DURING CONSTRUCTION AND MAINTENANCE OF ROADS AND BRIDGES WHERE TRAFFIC IS TO BE PASSED OVER A DIVERSION**

Providing Traffic Safety Measures on DIVERSION During Construction / Reconstruction of BRIDGE / C. D. WORKS comprising of Road Traffic Sign Boards and devices as per detailed design, drawing, specification and as directed by Engineer.

The Contractor will have to provide the traffic safety arrangements as per detailed drawing before allowing traffic on the diversion. The traffic safety arrangements will have to be got approved from Engineer by the Contractor before taking any construction activities for Bridge / C. D. Works.

The Engineer shall get himself satisfied about the traffic safety arrangement provided on the work site before commissioning of Diversion and a certificate to that effect shall be recorded.

6.1.1 The Sign No. 1 the board display the message “GO SLOW – WORK IN PROGRESS’ shall be placed at a distance of 120 m. away from the point where the Diversion begins. The signboard shall be of size 1.0 m x 1.0 m. having Red Background and messages in white colour.

6.1.2 The Sign No. 2 “SPEED LIMIT (20)” shall be placed at a distance of 100 m. away from the point where the Diversion begins. The board shall be of size 60 cm. Dia. having white background and Red Border and the numerals shall be in black colour as per IRC:67-1977. Distance between Sign No. 1 and Sign No. 2 shall be minimum 20 m.

6.1.3 Speed Breakers / Humps shall be provided and marked with black and white colour in checkered pattern in accordance with IRC:99-1988. Speed breaker shall be provided at a distance of at least 20 m. away from the point where diversion begins.

6.1.4 The Sign No. 3 – The cautionary signboard indicating “SPEED BREAKER” shall be placed on either side of the speed breaker at a distance of at least 40

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m. away from the Speed Breaker. The cautionary board shall be of an equilateral triangle of size 90 cm. having white colour background, retro-reflective border in red colour and non-reflective symbol in black colour. The definition plate shall be of size 60 cm. x 20 cm. having retro-reflective white colour background and message with non reflective black colour as per IRC:99-1988.

Retro-reflective “CAT – EYE” (Aluminium) shall also be provided on either side of the speed breaker as shown in the drawing.

6.1.5 The Sign No. 4 – DIVERSION board shall be placed at the point of detour. The signboard shall be of size 0.90 m x 0.60 m having red background and white retro-reflective messages.

6.1.6 Road marking for guiding the traffic (centerline / edge line marking) approaching the traffic where diversion begins shall be provided on the pavement with pavement marking paint in white colour as per IRC:35-1970.

Retro-reflective Cat – Eye made of aluminium body shall be placed along centerline marking before speed breakers as shown in the drawing. Sand filled plastic cones mounted with Retro-reflective Arrow Hazard Marker sign shall be placed as indicated in the drawing. Plastic cone shall be 73 cm. in height having 39 cm. square / hexagonal base.

6.1.7 Retro-reflective Strong Inviolable Stand Type Barrier painted black and having white Retro-reflective Strips for closer of traffic shall be placed on to cover the entire width of carriageway including shoulders as per drawing. The barricades shall be opened for the use of construction machinery only in the presence of responsible field person of the department. The Barricades shall not be removed unless the permission is given by the responsible officer of the rank not less than Resident Engineer. The Barricade shall have two plates of size 1.30 m x 0.20 m. painted Black and shall have White Retro-reflective Strips and mounted on angle Iron Stand of 1.0 m. height.

6.1.8 Yellow light flasher shall be kept lit from sunset to sunrise, three nos. at the point of detour and two nos. at barriers on both sides as indicated in the drawing.

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6.1.9	Informatory sign board indicating name of work, Amount of Contract, Completion period, Defect Liability period, Name of Contractor with Telephone No., Name of Executive Engineer with Telephone No. shall be provided between sign board No. 4 and the barricade. The sign board shall be having Blue Stove Enamel Paint background and white messages retro-reflective as per IRC:67-1977.	
6.1.10	The sign No. 5 “RESTRICTION ENDS” sign shall be placed at 200 m. beyond the edge of work area. The size of sign plate shall be 60 cm. dia having white background retro-reflective and black band of non-reflective.	
The Signs, Lights, Barricades and other traffic control devices shall be well maintained, till such time the traffic is commissioned on the New Bridge / C.D. Work. The size, shape and colour of all the sign and caution boards shall be as mentioned above as per detailed drawings in accordance with the relevant I.R.C. specifications and as per Ministry of Surface Transport’s Specifications.		
6.2	<u>TRAFFIC SAFETY MEASURES DURING RECONSTRUCTION OF CROSS DRAINAGE STRUCTURES WHERE TRAFFIC CAN BE PASSED OVER PART WIDTH</u>	
Providing Traffic Safety Measures on road during RECONSTRUCTION OF CROSS DRAINAGE STRUCTURES in part width, comprising of traffic signboards and devices as per detailed design, drawing and specification as directed by Engineer.		
This includes providing traffic safety arrangements required for traffic control within the vicinity of work site before actual start of the widening of the C.D. Work. The Contractor will have to provide the traffic safety arrangements as per the detailed drawing before starting the dismantling the existing structure. The traffic safety arrangements will have to be got approved from the Engineer by the Contractor before taking any construction activity for the C.D. work.		
The Engineer shall get himself satisfied about the traffic safety arrangement provided on the work site before allowing Contractor to dismantle the existing structure and certificate to get effects shall be recorded in the Measurement Book.		

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6.2.1	The Sign No. 1 the board display the message “GO SLOW – WORK IN PROGRESS’ shall be placed at a distance of 120 m. away from the point of detour and shall be of size 1.0 m. x 1.0 m. having red background and messages in white colour.	
6.2.2	The Sign No. 2 “SPEED LIMIT (20)” shall be placed at a distance of 100 m. away from the point of detour. The boards will be of size 60 cm. dia. having white background and red border and the numerals shall be in black colour as per IRC:67-1977. Distance between Sign No. 1 and Sign No. 2 shall be minimum 20 m.	
6.2.3	Speed Breakers / Humps shall be provided and marked with black and white colour in checkered pattern and stop line 20 cm. wide with letters “STOP” painted white on the pavement in accordance with IRC:99-1988 and IRC:35. Speed breakers shall be provided at a distance of minimum 20 m. away from the point of detour and line indicating “STOP” shall be exactly on the point of detour.	
6.2.4	The Sign No. 3 – The cautionary signboard indicating “SPEED BREAKER” shall be placed on either side of the speed breaker at a distance of at least 40 m. away from the speed breaker. The cautionary board shall be of an equilateral triangle of size 90 cm. having white colour background, Retro-reflective border in red colour and non-reflective symbol in black colour. The definition plate shall be of size 60 cm. x 20 cm. having retro-reflective white colour background and message with non reflective black colour as per IRC:99-1988. Retro-reflective “CAT – EYE” (Aluminium) shall also be provided on either side of the speed breaker as shown in the drawing.	
6.2.5	The Sign No. 4 – STOP sign with definition plate indicating “ONE WAY TRAFFIC” shall be placed at the point of detour. The STOP sign shall be octagonal in shape of size 90 cm having red background and message in white colour as per IRC:67-1977.	
6.2.6	Road marking for guiding the traffic (centerline / edge marking) approaching the work area shall be provided on the pavement with pavement marking paint in white colour as per IRC:35-1970 as shown in the drawing.	

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Retro-reflective Cat – Eye made of aluminium body shall be placed along centerline marking before speed breakers as shown in the drawing. Sand filled plastic cones mounted with Retro-reflective Arrow Hazard Marker sign shall be placed as indicated in the drawing. Plastic cone shall be 73 cm. in height having 39 cm. square / hexagonal base.

6.2.7 Retro-reflective Strong Inviolable Stand Type Barrier painted black and having white Retro-reflective Strips shall be placed at either ends of the widening area in half width of the carriageway edge of the formation. The barricades shall not be removed unless the permission is given by the responsible officer of the rank not less than Resident Engineer. The Barricade shall have two plates of size 1.30 m x 0.20 m. painted black and shall have White Retro-reflective Strips and mounted on Angle Iron Stand of 1.0 m. height.

6.2.8 Retro-reflective Hazard Marker shall be provided on opposite side of work area at both the ends of parapet wall of cross drainage structure. The size of sign plate shall be 30 cm. x 90 cm. painted with black colour and yellow retro-reflective strips as per IRC:79-1981

6.2.9 Yellow light flasher shall be kept lit from sunset to sunrise, 2 Nos. along the white painted line and 3 Nos. at barriers on both sides as indicated in the drawing.

6.2.10 Informatory sign board indicating name of work, Amount of Contract, Completion period, Defect Liability period, Name of Contractor with Telephone No., Name of Executive Engineer with Telephone No. shall be provided between sign board No. 4 and the barricade. The sign board shall be having Blue Stove Enamel Paint background and white messages retro-reflective as per IRC:67-1977.

6.2.11 The sign No. 5 “RESTRICTION ENDS” sign shall be placed at 200 m. beyond the edge of work area. The size of sign plate shall be 60 cm. dia having white background retro-reflective and black band of non reflective.

The Signs, Lights, Barricades and other traffic control devices shall be well maintained, till such time that the traffic is commissioned on the new C.D. Work. The size, shape and colour of all the sign and caution boards shall be as mentioned above

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as per detailed drawings in accordance with the relevant I.R.C. specifications and as per Ministry of Surface Transport's Specifications.		

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Following revised drawings shall be considered for TG Building GA				
Vol. No./Page No./Sr. No.	Dwg. No.	Revision	TITLE	
VII A1/7 of 9/6	PE-189-GA-106	P1	GENERAL ARRANGEMENT: TG BUILDING (EL.(+)32.800M, (+)38.000M, (+)50.000M)	

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CORRIGENDUM TO BID SPECIFICATIONS

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BID PURPOSE DRAWINGS

(MECHANICAL)

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Following revised drawings shall be considered for Ash Handling System			
Vol. No./Page No./Sr. No.	Dwg No	Revision	TITLE
VII A2/8 of 11/23	PE-189-PF-235	P2	PROCESS FLOW DIAGRAM : BOTTOM ASH AND COARSE ASH HANDLING SYSTEM
VII A2/8 of 11/24	PE-189-PF-236	P2	PROCESS FLOW DIAGRAM : FLY ASH HANDLING SYSTEM
VII A2/8 of 11/25	PE-189-PI-237	P3	P & I DIAGRAM : BOTTOM ASH HANDLING SYSTEM
VII A2/9 of 11/26	PE-189-PI-238	P2	P & I DIAGRAM : COARSE ASH HANDLING SYSTEM
VII A2/9 of 11/27	PE-189-PI-239	P2	P & I DIAGRAM : FLY ASH HANDLING SYSTEM
VII A2/9 of 11/28	PE-189-PI-240	P2	P & I DIAGRAM : HCSD SILO & REMOTE SILO
VII A2/9 of 11/29	PE-189-PI-241	P1	P & I DIAGRAM : HIGH CONCENTRATION SLURRY DISPOSAL SYSTEM
VII A2/9 of 11/30	PE-189-PI-242	P2	P & I DIAGRAM : COMMON ASH SLURRY DISPOSAL SYSTEM

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CORRIGENDUM TO BID SPECIFICATION

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DATA / DRAWINGS TO BE FURNISHED BY BIDDER

(MECHANICAL)

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Data Sheet –B of Transport Air Compressor in Ash Handling System (Sec-14, Sr no: 3.14) is amended as under:			
<u>SR.NO.</u>	<u>ITEM</u>	<u>UNIT</u>	
1.0	Designation		
2.0	Numbers offered		
3.0	Type of compressor		
4.0	Make and model number		
5.0	Testing standard		
6.0	Number of stages		
7.0	Capacity FAD	m ³ /min	
8.0	Type of suction and discharge valve		
9.0	Suction pressure	Kg/cm ² (g)	
10.0	Discharge pressure	Kg/cm ² (g)	
11.0	Suction temperature each stage	°C	
12.0	Discharge temperature each stage	°C	
13.0	Selected compressor speed	rpm	
14.0	BKW		
15.0	Recommended maximum speed		
16.0	BKW at recommended maximum speed		
17.0	Volumetric efficiency		
18.0	Load/unload setting	Kg/cm ² (g)	
19.0	Auto start stop setting	Kg/cm ² (g)	

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SR.NO.	ITEM	UNIT	
20.0	Motor make, rating and speed		
21.0	Lube oil type and consumption for each compressor		
22.0	Lube oil pump driven by compressor motor		
23.0	Type and make of bearings		
24.0	Painting		
25.0	Cooling water requirement		
25.1	Flow rate	m ³ /hr	
25.2	Inlet and minimum outlet pressure	Kg/cm ²	
25.3	Inlet and maximum outlet temperature	°C	
26.0	Intake filter type		
26.1	Filter element		
26.2	Rated capacity		
26.3	Efficiency		
26.4	Type and Number of steps		
26.5	Method Employed in case of constant speed type		
27.0	Weight of Entire unit mounted on common base frame	Kg. apx.	
28.0	Overall dimensions of common base frame L x W x H	mm	
29.0	Single largest component to be lifted during maintenance		
30.0	Discharge flange- final stage size/standard / rating		

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<u>SR.NO.</u>	<u>ITEM</u>	<u>UNIT</u>		
31.0	Coolers (Air Water)			
31.1	Numbers Offered			
31.2	Type			
31.3	Capacity	m ³ /hr		
31.4	Design pressure (Air / Water)	Kg/cm ²		
31.5	Air / Gas Inlet /Outlet Temperature	°C		
31.6	Cooling water inlet/maximum outlet temperature			
31.7	Code of construction			
31.8	Corrosion allowance	mm		
31.9	Number of passes			
31.10	Moisture Traps			
32.0	Oil cooler			
32.1	Type			
32.2	Qty			
33.0	Silencer			
33.1	Qty			
33.2	Type			
34.0	Material of construction		For screw compressor	For centrifugal compressor
34.1	Compressor chamber casing			
34.2	Rotors			
34.3	Bull gear			
34.4	Pinion Gear			

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34.5	Timing Gears			
34.6	Drive shaft			
34.7	Oil cooler (Plate type)			
34.8	Inter cooler and After cooler casing			
34.9	Inter cooler and after cooler Tubes			
35.0	Capacity of Compressor **	m ³ /min		
36.0	Discharge Pressure **	Kg/cm ² (g)		
37.0	Power consumption on Load **	kW		
	For discharge pressure of 8.8kg/cm2(g)	kW		
38.0	Power consumption Unload	kW		
39.0	Temperature of air at outlet of after cooler	°C		
40.0	Cooling water flow rate	m ³ /hr		
41.0	Cooling water outlet temp	°C		
42.0	Cooling water pressure drop	Kg/cm ² (g)		
43.0	Temperature	°C		
44.0	Relative humidity	%		
45.0	Atm. Pressure	%		
46.0	Elevation above Mean sea Level	M		
47.0	Noise level	dBA		
48.0	Pressure drop across air filter	Bar		
49.0	Motor	kW		

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CORRIGENDUM TO BID SPECIFICATION

VOLUME VIII-D

DATA / DRAWINGS TO BE FURNISHED BY BIDDER

(CIVIL)

(DATASHEET-C)

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2.1.8	Maximum drift loss (at design)	m ³ /hr		
2.1.9	Required pumping head w.r.t NWL	MWC		
2.1.10	Hot water temperature	°C		
2.1.11	Cold water temperature	°C		
3.0	<u>INLET AIR PROPERTIES</u> (BS air properties)			
3.1.1	Dry bulb temperature	°C		
3.1.2	Wet bulb temperature	°C		
3.1.3	Dry air density	kg/m ³		
3.1.4	Wet air density,	kg/m ³		
3.1.5	Relative Humidity	%		
3.1.6	Specific Humidity	Kg/kg of dry air		
3.1.7	Enthalpy	(Kcal/k g)		
4.0	<u>EXIT AIR PROPERTIES</u> (BS air properties)			
4.1.1	Dry bulb temperature	°C		
4.1.2	Wet bulb temperature	°C		
4.1.3	Dry air density	kg/m ³		
4.1.4	Wet air density,	kg/m ³		
4.1.5	Relative Humidity	%		
4.1.6	Specific Humidity	Kg/kg of dry air		
4.1.7	Enthalpy	(Kcal/k g)		

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5.0	Heat Transfer Data			
(a)	Heat transfer co-efficient (K)			
(b)	Tower co-efficient (C = KaV/L)			
(c)	Cooling water flow (L), per Sq.m of fill area	kg/hr		
(d)	Dry air flow (G), per Sq.m of fill area	kg/hr		
(e)	Ratio of water to air weights, (L)/(G)			
(f)	Water Heat load	Kcal/sec		
(g)	Evaporation loss at design condition	m ³ /hr		
(h)	Evaporation heat load	Kcal/sec		
(i)	Total heat load (f + h)	Kcal/sec		
(j)	Heat gain by air	Kcal/kg of air		
(k)	Total heat gained by air	Kcal/sec		
(l)	Sensible heat gained by dry air	Kcal/kg		
(m)	Latent heat gained by dry air	Kcal/kg		
(n)	Difference in air densities (wet)	Kg/m ³		
6.0	<u>DRAUGHT CALCULATION</u>			
6.1	Draught Losses			
(a)	Inlet to fill	mmWC		
(b)	Through fill	mmWC		
(c)	Distribution Pipes/ troughs, etc.	mmWC		
(d)	At throat	mmWC		
(e)	Total	mmWC		
6.2	Necessary Draught Height = Total draught losses in mmWC/Density difference of air(m) + above fill mean			

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	elevation			
6.3	Tower height to be provided	M		
6.4	Draught Factor (f)			
6.5	Performance Co-efficient(C)			
6.6	Duty Co-efficient (D)			
7.0	<u>PUMPING HEAD</u>			
7.1	Static head above normal water level	MWC		
7.2	Frictional losses in pipes and distribution	MWC		
7.3	Margin	MWC		
7.4	Total	MWC		
8.0	Wind load & seismic effect considered in design, as specified?			
9.0	<u>TOWER DIMENSION</u>			
9.1	CL diameter of basin at the center-at the basin invert level	M		
9.2	CL diameter at sill top	M		
9.3	CL diameter of Ring beam bottom	M		
9.4	Diameter of shell at Fill top	M		
9.5	Diameter of shell at the distribution level	M		
9.6	CL diameter of shell at throat	M		
9.7	CL diameter of shell at top			
9.8	OD of paving around the tower			
10.0	<u>HOT WATER INLET</u>			
10.1	Number			
10.2	Nominal diameter, metre			

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10.3	Description, location, etc.			
10.4	Centre line height above basin kerb, metre			
11.0	<u>ELEVATIONS (w.r.t. sill top)</u>			
11.1	Finished ground level (FGL)	M		
11.2	Normal water level	M		
11.3	Minimum water level	M		
11.4	Basin invert level at the centre	M		
11.5	Air inlet Top (Ring Beam bottom) level	M		
11.6	Fill Bottom Level	M		
11.7	Fill Top level	M		
11.8	CL of HW Pipe at entry of primary duct			
11.9	Invert level of distribution pipe	M		
11.10	Top of Deck of water ducts	M		
11.11	Throat level	M		
11.12	Top of Shell	M		
12.0	<u>FLOW CONTROL VALVE</u>			
12.1	Make			
12.2	Type			
12.3	Size			
12.4	Numbers offered			
13.0	<u>COOLING TOWER BASIN</u>			
13.1	Material		RCC	
13.2	Storage Capacity of basin at normal working level	m ³		

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13.3	Height of basin kerb from grade level	M		
13.4	<u>BASIN DIAMENSION</u>			
13.4.1	Basin diameter	M		
13.4.2	Height from bottom to basin kerb,	M		
(a)	At the cold water outlet end			
(b)	Near sludge pit			
13.4.3	Maximum, minimum and normal water levels with respect to basin kerb	M		
14.0	<u>ISOLATING VALVES IN SLUDGE PIT</u>			
14.1	Numbers offered			
14.2	Nominal size	mm		
14.3	Type			
14.4	Name of Manufacturer			
14.5	Conforms to IS 780 (indicate also the applicable class)			
14.6	<u>MATERIAL OF CONSTRUCTION</u>			
14.6.1	Body			
14.6.2	Stem			
14.6.3	Trim			
14.7	Type of connection between valve stem and pedestal type operator spindle			
14.8	<u>PEDESTAL TYPE OPERATOR</u>			
14.8.1	Type			
14.8.2	Make			
14.8.3	Rising spindle?		Yes/No	
14.8.4	Type of valve position indicator			

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15.0	<u>SPRAY NOZZLES</u>			
15.1	Type			
15.2	Material for Construction		Poly Propylene	
15.3	Nozzle orifice size			
15.4	Nozzle flow capacity required			
15.5	Spray area coverage for nozzle(Enclose curve indicating head (vs) Area coverage)			
15.6	Fixing arrangement of spray nozzle to distribution headers(pipes & ducts)			
15.7	Spray nozzle spacing			
16.0	<u>SCREEN</u>			
16.1	Numbers			
16.2	Size & materials of bars			
16.3	Mesh Opening size, wire netting type and wire size			
16.4	Screen guide frame material of construction			
16.5	Screen material of construction			
16.6	Weight of screen			
16.7	Lifting arrangement			
17.0	<u>SLIDE GATES</u>			
17.1	No. of gates provided			
17.2	Gate size			
17.3	Handling arrangement type and details			
17.4	Side seal type and material			
17.5	Bottom seal type and material			

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17.6	Gate guide frame material of construction			
17.7	Gate material of construction			
17.8	Lifting arrangement			
17.9	Weight of gate			
17.10	Gate to be suitable for Bi-directional sealing			
18.0	<u>FILL & FILL SUPPORTS</u>			
18.1	Fill type		Double edge folded /edge thickened –cross fluted-Film type fill	
18.2	Average Sheet spacing(17 mm minimum)			
18.2.1	Material ,colour & protection		PVC, Black, UV stabilised	
18.2.2	Type of joining		Glued	
18.2.3	Fill module size: m(tentative) x m x m height			
18.2.4	Fill Height			
18.2.5	No. of fill pack layers in vertical height (minimum 2)			
18.2.6	Enclosed with proposal full detail of Tenderer's or his foreign collaborator's experience with cooling tower having similar fill as offered ?			
18.2.7	Arrangement of fill			
18.2.8	Wetted surface area per m³ of fill	m²		
18.2.9	Gross fill packing area	m²		
18.2.10	Effective fill volume	m³		
18.2.11	Effective wetted surface area of fill	m²		

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18.2.12	Water loading per m ² of fill	Kg/m ² /hr		
18.2.13	Air loading per m ² of fill	Kg/m ² /hr		
18.2.14	Fill pack PVC sheet thickness after forming (minimum 0.25 mm)			
18.2.15	PVC sheet edge formation		Double edge folded/edge thickened	
18.2.16	Fill packing arrangement details		Stacked	
18.2.17	Method to prevent dislocation of fills			
18.2.18	Material/size of ropes/wires for fixing up fill with supporting grids			
18.3	<u>FILL SUPPORT GRIDS</u>			
18.3.1	Fill supporting arrangement details		RCC CAST-IN-SITU/PRE-CAST BEAMS	
18.3.2	No. of support points per pack length			
18.3.3	Manner of joining these structural members			
18.4	<u>GRID SUPPORT FRAMES</u>			
18.4.1	Type			
18.4.2	Material			
18.4.3	Type of treatment			
18.5	<u>FASTNERS</u>			
18.5.1	Type			
18.5.2	Material			
18.6	Fill			
18.7	Fill support grids			

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18.8	Frames for supporting the grids			
19.0	<u>DRIFT ELIMINATORS</u>			
19.1	Drift Eliminator Provided ?		Yes/No	
19.2	Whether drift rate is limited to 0.01% of water flow rate?		Yes/No	
19.3	Number of passes			
19.4	Gross face area per pass per cell	m ²		
19.5	Type of Drift eliminator			
19.6	Material of Drift Eliminator			
19.7	Support Span			
19.8	<u>ELIMINATOR BLADES</u>			
19.8.1	Material			
19.8.2	Type of treatment			
19.8.3	Maximum length of blade	mm		
19.8.4	Size and shape of blades			
19.9	Type and material of drain boards			
19.10	<u>BLADE SUPPORT SPACERS</u>			
19.10.1	Type			
19.10.2	Material			
19.10.3	Type of treatment			
19.11	Support for Spacers			
19.11.1	Type			
19.11.2	Material			
19.11.3	Type of treatment			
19.12	Fastners			

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19.12.1	Type			
19.12.2	Material			
20.0	<u>COLD WATER CHANNEL AND DUCT ARRANGEMENT</u>			
20.1	Size and shape of channel			
20.2	Flow Capacity	M ³ /hr		
20.3	Bottom Elevation & Top Elevation			
20.4	No. Of Bays provided in the channel			
20.5	Flow velocity through cold water ducts			
21.0	<u>HOT WATER SUPPLY HEADERS OUTSIDE TOWER</u>			
21.1	Size and shape of supply header: OD in mm X mm thk PIPE			
21.2	Velocity of flow	m/sec		
21.3	Material of construction		M.S.	
21.4	Supporting system			
22.0	<u>HOT WATER PRIMARY DUCT</u>			
22.1	Duct size			
22.2	Material of construction			
22.3	Bottom elevation			
22.4	Velocity of flow	m/sec		
22.5	Flushing and inspection provision details			
23.0	<u>HOT WATER SECONDARY DUCT</u>			
23.1	Header size, shape			
23.2	Material of construction			

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23.3	Bottom elevation (invert level)			
23.4	Velocity of flow	m/sec		
24.0	<u>DISTRIBUTION PIPE</u>			
24.1	Material and class of pipe			
24.2	Size of pipes			
24.3	Velocity of flow	m/sec		
24.4	Spacing of AC / PVC pipes			
24.5	Pipe support			
24.6	Flushing provision details			
25.0	<u>ELECTRICAL</u>			
25.1	Whether lighting protection system conforming to IS2309 is provided?		Yes/No	
25.2	Whether Earthing protection system conforming to IS3043 is provided ?		Yes/No	
25.3	Whether aviation warning system provided in toto with ICAO norms (High intensity Type-A lights)?		Yes/No	
26.0	<u>MONORAIL, CHAIN PULLEY HOIST & ACCESSORIES FOR LIFTING SCREEN</u>			
26.1	Individual monorail to serve screen and gate in each cold water tunnel?			
26.2	Number of push type trolleys, for mounting of chain pulley hoist, furnished			
26.3	<u>CHAIN PULLEY / HOISTS</u>			
26.3.1	Number furnished			

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26.3.2	Type			
26.3.3	Hoisting capacity, each	kg		
26.3.4	Conforms to IS-3932 Class 2?			
26.3.5	Make			
26.3.6	Suitable for outdoor installation?			
26.4	Number of chains, hooks, furnished for attaching the screen with chain pulley hoists			
27.0	<u>BUTTERFLY VALVES (BFV)</u>			
27.1	Manufacturer			
27.2	Type		Double flanged ,Manual operating type valve conforming to AWWA-C-504/BS standard	
27.3	Size/Numbers provided			
27.4	Installation (Horizontal/Vertical Shaft)			
27.5	Design flow	m ³ /hr		
27.6	Maximum allowable flow	m ³ /hr		
27.7	Design Pressure			
27.8	Maximum allowable flow velocity thru valve	m/s		
27.9	Pressure drop at design flow	MWC		
27.10	Operating time from open to "Close" condition and vice/versa	Secs		
27.11	Design standard/pressure class			
27.12	Whether material of construction as per specification			

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27.13	Operator & Accessories			
27.13.1	Valve operator			
27.13.2	Gearing			
(a)	Overall reduction ratio			
(b)	Lubrication			
27.14	<u>BALL VALVES</u>			
27.14.1	Type		Threaded ,full bore pattern in single piece as per IS: 9890	
27.14.2	Size (minimum 80 mm)			
27.14.3	Numbers provided			
27.14.4	Design Pressure			
27.14.5	Material of construction			
27.14.6	Type of valve position indicator			
27.15	Approximate weight of each valve assembly, including head stock,	kg		
28.0	<u>STRUCTURAL</u>			
28.1	Basic wind speed	m/s		
28.2	Earthquake Zone			
29.0	<u>WEIGHT OF EQUIPMENT</u>			
29.1	Total weight of cooling tower excepting basin			
29.2	Weight of heaviest part to be handled			
29.3	Size of largest part to be handled			
30.0	Pressure Ratio (i.e. the ratio of system pressure drop from the inlet to the eliminator exit plane to velocity pressure			

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	at the average at the average entrance velocity)			
31.0	To ensure uniform water distribution over fill whether nozzle arrangement and the design of tower structure in the spray chamber have full and even coverage, but not less than 90% of the plan area?			

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