




	<div> <div>एनडीवीसी</div> <div>NTPC</div> </div> <div>TECHNICAL REQUIREMENTS</div>		
5.18.01.06	<p>a. For pipes above 1800 mm upto and including 2300 mm dia. - 12 mm</p> <p>b. For pipes above 2300 mm upto and including 3200 mm dia. - 14 mm</p> <p>c. For pipes above 3200 mm upto and including 3750 mm dia. - 16 mm</p> <p>d. For pipes above 3750 mm upto and including 4000 mm dia. - 20 mm</p> <p>However, for ducts running below rail line in transformer yard/road, minimum thickness of CW liner shall be 20 mm.</p> <p>Suitable tap-offs shall be provided in the duct to connect CW blow down, ACW tapping etc. Based on the transient analysis, sufficient number of stub connection shall be provided in the duct to fix air release valves.</p> <p>All duct installation &amp; jointing shall be strictly in accordance with the stipulation given elsewhere in the specification for structural steel work. All the joints of liners shall be butt welded joints. The circular deformation of liner shall be less than 1% of diameter of liner while handling, transportation, erection &amp; construction. If required, temporary bracings may be provided, during handling, transportation &amp; concreting to reduce the deformation.</p> <p>The completed duct shall be tested for water tightness, for the pressure equal to twice the working pressure or 1.5 times the design pressure whichever is higher and shall be generally water tight to Engineer's satisfaction. The testing pressure shall be held for minimum period of 30 minutes without any signs of leakage or failure of weld. Any in flow / leakage of water from the duct shall be sealed / repaired at Contractor's cost. However, tests in part of length of duct may be permitted with prior approval only.</p> <p>Wherever required anchor / thrust blocks shall be provided with RCC M25 grade concrete. Suitable RCC chambers shall be provided with precast covers to install flow measurement devices and valves in the duct.</p> <p>Manholes of minimum 1000mm clear opening shall be provided in each CW duct at a spacing of 200M (approx.) to facilitate maintenance / dewatering of CW ducts. At least one manhole shall be provided at the deepest point for both intake &amp; discharge duct.</p> <p>Following shall be considered for design of C.W. ducts:</p> <ol style="list-style-type: none"> <li>Maximum design water pressure</li> <li>Surge or water hammer pressure of 5.0 Kg / Sq.cm.</li> <li>Expected vacuum conditions as arrived from transient analysis</li> <li>Soil overburden</li> <li>Surcharge Pressure of 2T/Sq.m</li> <li>The effect of concrete encasement shall not be considered in the design of CW duct</li> </ol> <p>Painting as per Cl. 6.04.03 shall be carried out on machined faces, flanges and external exposed surfaces of CW ducts. For external surfaces of CW ducts encased in concrete, painting shall be as specified in Cl. 6.04.02(a).</p> <p><b>CW Channel</b></p>		
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	<p>The channel shall be of RCC section with vertical wall projecting minimum 300mm above finished ground level. Hand rails with 32 NB (medium) pipe shall be provided on both walls of the channel where height of channel wall is less than 1200 mm above finished ground level.</p> <p>The channel shall be designed to carry the required discharge with minimum water level in cooling tower basin and considering minimum value of rugosity coefficient (n) of 0.018 for concrete surface. However, the maximum velocity in CW channel shall be restricted to 1.8m/sec.</p> <p>The channel shall be designed by working stress method with crack width limited to 0.2 mm on water face and as cracked section on outer face as per IS: 456 considering (i) no water inside the channel, with earth pressure of soil upto FGL, ground water table upto FGL and surcharge load of 2.0 ton / Sq.m from outside, and (ii) with water inside the channel upto maximum level in the forebay / channel and no earth pressure, ground water pressure and surcharge load from outside. Right from construction to operating stage, minimum factor of safety against uplift due to ground water shall be 1.2. The channel shall be checked against uplift due to 50% of the total water head considering ground water table upto FGL. In addition pressure relief valves with under drainage arrangement in the channel shall be provided to prevent uplift of the channel as per relevant IS Codes. Minimum wall thickness shall be 250 mm.</p> <p><b>Forebay Structure</b></p> <p>Forebay consists of retaining wall and forebay slab. The walls shall be analysed as a retaining wall for stability against overturning and sliding, similar to end piers of the pump house. Pressure relief valves and under drainage arrangements shall be provided below the forebay slab to prevent uplift of the forebay slab. Size and spacing of pressure relief valves shall be designed by the Bidder to take care of the uplift due to ground water table. However, centre to centre spacing of PRV shall not exceed 5000mm. The forebay slab shall be designed against uplift due to 50% of the total water head considering ground water table upto FGL. The forebay slab shall be minimum 250 mm thick. The forebay slab shall be structurally separated from the retaining walls and water stops shall be provided at the junction of slab and retaining wall. Minimum thickness of retaining wall at top shall be 250 mm. Hand rails with 32NB (medium) pipe shall be provided on both walls of the forebay.</p>		
5.18.01.07	<b>DELETED.</b>		
5.18.01.08	<b>Stop-logs and Trash Racks for CWPH, RWPH</b>		
5.18.01.08.01	<p><b>Stop-log gates</b></p> <p>Clear size of the stop logs shall be equal to the clear opening size of water inlet opening below breast wall. Number of segments of the stop log shall be decided to match the capacity of the electrically operated monorail hoist provided to handle it. Structural design of stop log shall conform to IS: 5620 and IS: 4622. Maximum water level for designing the stop logs shall be taken as maximum water level of the forebay. Top and bottom unit of stop log gates shall be designed for their respective water head, whereas the remaining interchangeable units shall be designed for the water head corresponding to the lower most interchangeable unit. The stop logs shall be operated under balanced water head and they are not to be designed for operating under flowing water. Filling valves shall be provided in the stop logs to balance the water pressure before lifting the stop log. These stop logs are used only during maintenance / inspection of pumps. The stop logs shall be operated by means of an electrically operated hoist. Suitable lifting beam shall be provided to operate the stop logs.</p>		
5.18.01.08.02	<p><b>Trash Racks</b></p> <p>Bar screen trash rack is to be provided at inlet of the sump of the pump house in order to prevent ingress of timber &amp; other floating particles which could damage the Pumps.</p>		
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5.18.01.08.03	<p>Each bay of pump sump shall be provided with Type - 1 trash rack (removable section rack), conforming to IS: 11388. Centre to centre spacing of trash rack bars shall be 100mm (max). The trash racks shall be provided with number of interchangeable segments, to facilitate easier handling by means of a lifting beam and electrically operated hoist. Trash rack bars shall be designed for a differential water head of 2.0m. and other structural members shall be designed for a differential water head of 1.0m. Minimum thickness of trash rack bars shall be 10mm. Suitable size of horizontal members and end members shall be provided as per design requirements, for efficient operation of trash rack.</p> <p>All trash racks should be capable of being lowered in the associated stop log groove to enable drawal of clean water while a particular trash rack is raised for cleaning purpose.</p> <p>Suitable arrangement for storing all the stop logs and stand by trash rack shall be provided by the Bidder, to keep them in good working condition.</p> <p><b>Lifting Beams</b></p> <p>Separate lifting beams (automatic) shall be designed &amp; fabricated with guide shoes, hooks, links and counter weights etc. complete for automatic operation to engage and disengage the stop logs and trash racks in the required position.</p>																														
5.18.01.08.04	<p><b>Leakage Tests of Stop logs</b></p> <p>Leakage tests shall be carried out with the stop logs lowered onto the sill. Before observation for leakage, the stop log shall be raised and lowered about one meter several times in order to dislodge any debris that might have lodged in the side and bottom seals, The leakage shall then be measured and it should not be more than 5 litres / minute / meter of length of seal under maximum head.</p>																														
5.18.01.08.05	<p><b>Material Specifications of Stop logs &amp; Trash racks</b></p> <p>All material used in the fabrication of stop log or trash rack shall be of high grade, free from defects and imperfections and shall be of the highest standard commercial quality suitable for the intended use. Radiographic examination or magnetic particle testing or other comparable tests shall be carried out for determining the soundness of steel castings and shall be conducted by the Bidder, if asked for by the Employer.</p>																														
5.18.01.08.06	<p><b>Materials for the various components of Stop logs</b></p> <table border="1"> <thead> <tr> <th>Sl. No.</th><th>Component Parts</th><th>Recommended materials</th><th>Reference</th></tr> </thead> <tbody> <tr> <td>1.</td><td>Stop log Leaf</td><td>Structural steel</td><td>IS 2062</td></tr> <tr> <td>2.</td><td>Stop log Frames, 1<sup>st</sup> stage embedded parts and structural steel members</td><td>Structural steel</td><td>IS 2062</td></tr> <tr> <td>3.</td><td>2nd stage embedment</td><td>Stainless steel</td><td>SS316L or IS:1570 (part-5)</td></tr> <tr> <td>4.</td><td>Wheels (the hardness of wheel track surface shall be kept 50 points higher than that of wheel tread)</td><td>Cast steel</td><td>IS : 1030</td></tr> <tr> <td>5.</td><td>Wheel axles, wheel track</td><td>Corrosion resistant steel.</td><td>IS 1570</td></tr> <tr> <td>6.</td><td>Seals</td><td>Rubber</td><td>IS 11855</td></tr> </tbody> </table>			Sl. No.	Component Parts	Recommended materials	Reference	1.	Stop log Leaf	Structural steel	IS 2062	2.	Stop log Frames, 1 <sup>st</sup> stage embedded parts and structural steel members	Structural steel	IS 2062	3.	2nd stage embedment	Stainless steel	SS316L or IS:1570 (part-5)	4.	Wheels (the hardness of wheel track surface shall be kept 50 points higher than that of wheel tread)	Cast steel	IS : 1030	5.	Wheel axles, wheel track	Corrosion resistant steel.	IS 1570	6.	Seals	Rubber	IS 11855
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5.18.01.08.07	Sl. No.	Component Parts	Recommended materials	Reference
	7.	Bearings	SKF or equivalent	04Cr19Ni
	8.	Seal seats	Stainless steel	SS316L or IS 1570 (part-5)
	9.	Lifting pin	Stainless steel	SS316L or IS 1570 (part-5)
	10.	Guide	Corrosion resistant steel	IS 6603
	11.	Guide shoe	Structural steel	IS 2062
5.18.01.08.07	Materials for various components of Trash Rack:			
5.18.01.08.08	Sl. No.	Component Parts	Recommended	Reference Materials
	1.	Trash rack and 1st stage embedded parts	Structural steel	IS 2062
	2.	2nd stage embedment	Stainless steel	SS 316L or IS 1570 (Part-5 )
	3.	Slide Block	Structural steel with bronze padding	IS 2062 & IS 305
	4.	Track base	Stainless steel	SS 316L or IS 1570 (Part-5 )
	5.	Track	Stainless steel	SS 316L or IS 1570 (Part-5)
5.18.01.08.08	6.	Guides	Corrosion resistant steel.	IS 6603
5.18.01.09	Painting Specification for Structural Steel parts for Stoplog Gates and Trash Racks			
	(i) All structural steel surfaces shall be cleaned by shot blasting.			
	(ii) All MS structural parts shall be galvanised to minimum coating of Sealed Zinc spray (250 Micron) as per BS 5493.			
5.18.01.09	(iii) Over zinc coating one coat of zinc Phosphate Epoxy primer having minimum 30 micron DFT and three coats of coal tar Epoxy paint having minimum 75 micron DFT / coat shall be provided. Total DFT of epoxy paint including primer shall be minimum 250 microns.			
	CONSTRUCTION REQUIREMENT AND ACCESS TO WORK AREAS			
	Contractor shall notify to the Engineer before start of work well in advance about the method of construction for crossing road, pipeline, cable, railway, canals, utility lines and other existing obstacles.			
5.18.01.09	Contractor shall not commence work on such crossings before having obtained approval from the authorities and land owners concerned to the satisfaction of the Engineer. The work at crossings shall meet at all times requirements and conditions of the permit issued by the authorities concerned. In the absence of any specific requirements by authorities, Bidder shall comply with Engineers' instructions.			
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5.18.01.10	<p>Where the work areas come within the area of influence of high voltage electrical installations, contractor shall propose and provide adequate safety measures for all personnel working. He shall obtain necessary permission/permit from the concern authority. No work is allowed in such areas without Engineer's prior approval.</p> <p><b>Switch Gear / Control Room/ Remote IO room for CWPH, RWPH and MUWPH</b></p> <p>It shall be single storied building, framed RCC structure with beams, columns, floor and roof. It shall have non-load bearing brick wall cladding. It shall house the switch gear and MCC of respective Pump house &amp; associated cable trenches. The architectural features shall be as specified elsewhere in the specification.</p> <p>Bio Toilet shall be opted for make up water facility area outside the plant boundary. Specifications of same shall be as mentioned elsewhere in technical specifications.</p>		
5.18.02.00	<b>DELETED</b>		
5.19.00	<b>WATER TREATMENT PLANT-DM Plant, PT Plant, ETP and CW Chemical Treatment Civil Works, CSSP etc</b>		
5.19.01.00	<p><b>Design Concepts for Buildings/ Shed</b></p> <ol style="list-style-type: none"> <li>All buildings shall have framed super structure.</li> <li>Equipment/facilities with shed shall have structural steel superstructure with permanently colour coated metal sheeting at roof and side open. However, kerb wall shall be provided all around the plinth/ floor area above the Finished Floor Level (FFL). For other buildings brick wall cladding on exterior face shall be provided.</li> <li>Unless specified, the wall cladding for buildings shall be with minimum one brick thick on exterior face. However, brick wall for buildings adjacent to transformers shall be minimum 345mm thick.</li> </ol>		
5.19.01.02	Individual members of the frame shall be designed for the worst combination of forces such as bending moment, axial force, shear force, torsion, etc.		
5.19.01.03	The load and load combinations and design criteria shall be as specified elsewhere in the specification.		
5.19.01.04	<p>All liquid retaining structures shall be designed for following load conditions.</p> <p>Underground structures:</p> <ol style="list-style-type: none"> <li>Water filled inside up to design level and no earth outside.</li> <li>Earth pressure with surcharge of 2.0 T/m<sup>2</sup> and ground water table up to FGL outside and no water inside.</li> <li>Stability against uplift shall be checked for completed structure and under construction stage with no water inside and ground water table up to FGL, with a minimum factor of safety of 1.20 against uplift. Installation of pressure relief valves shall not be permitted in the base slab of any liquid retaining / conveying structure.</li> <li>The structure shall also be checked for normal working condition with water filled inside up to design level and earth pressure outside with no effect of surcharge and ground water table.</li> </ol> <p>For design of over - ground liquid retaining structures appropriate load cases shall be considered.</p>		
5.19.01.05	All liquid retaining and conveying structures shall be designed by working stress method as given in clause 4.5 of IS 3370(Part2):2009.		
5.19.01.06	In the wall of liquid retaining structures with cylindrical shape such as clarifiers, vertical reinforcement shall be checked assuming the walls were fully fixed at the base, and the		
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5.19.01.07  5.19.01.08  5.19.01.09  5.19.01.10  5.19.01.11  5.19.01.12  5.19.01.13  5.19.01.14          5.19.01.15  5.19.01.16  5.19.01.17  5.19.01.18  5.19.01.19	horizontal reinforcement shall be provided to resist horizontal (hoop) tension assuming hinged condition at the junction of the base slab & wall.																				
	Wherever sandwich slabs are provided in liquid retaining structures to take care of stability against uplift, only well graded sand of approved quality shall be used as fill material. The sand compaction shall be done with plate / disc compactors in such a manner that the bottom slab is not structurally damaged.																				
	Clear free board of at least 300 mm above design (total) water level shall be provided in all liquid retaining / conveying structures.																				
	Coefficient of active earth pressure shall be considered for design of free standing retaining walls and coefficient of earth pressure at rest shall be considered for design of top propped retaining walls.																				
	The minimum grade of concrete for all RCC structures associated with DM plant, PT plant, ETP and CW chemical treatment and CSSP shall be of grade M30.The minimum concrete clear cover to reinforcement bars in all RCC structures shall be as per IS:456(2000) and IS:3370(Part II) for water retaining structures. Durability of concrete shall conform to moderate exposure conditions as per Table-3 of IS 456 except noted specifically otherwise.																				
	Factor of safety against overturning and sliding																				
	The structure shall be checked for minimum factor of safety of 1.5 against overturning conditions (ratio of stabilizing moment to overturning moment) and 1.4 against sliding conditions as per IS: 456.																				
	For detailing of Reinforcement IS 5525, IS 13920, IS 4326 and SP 34 shall be followed.																				
	Two layers of reinforcement (on both faces) shall be provided for RCC sections having thickness of 150 mm and above.																				
	Minimum diameter of main and distribution Reinforcement bars in different structural elements shall be as follows:																				
	<table><tr><th>Sl. No.</th><th>Structural Element</th><th>Main Reinforcement</th><th>Distribution Reinforcement / Stirrups/ ties/ Anchor Bars</th></tr><tr><td>a)</td><td>Foundation</td><td>12 mm</td><td>12 mm</td></tr><tr><td>b)</td><td>Beams</td><td>12 mm</td><td>8 mm</td></tr><tr><td>c)</td><td>Columns</td><td>12 mm</td><td>8mm</td></tr></table>					Sl. No.	Structural Element	Main Reinforcement	Distribution Reinforcement / Stirrups/ ties/ Anchor Bars	a)	Foundation	12 mm	12 mm	b)	Beams	12 mm	8 mm	c)	Columns	12 mm	8mm
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	a)	Foundation	12 mm	12 mm																	
	b)	Beams	12 mm	8 mm																	
	c)	Columns	12 mm	8mm																	
	Spacing of reinforcement bars in walls and slabs of liquid retaining / conveying structures shall not be more than 200 mm.																				
	Suitable shrinkage reinforcement shall be provided at top face of foundations. Minimum shrinkage reinforcement shall be 10 mm dia. @ 200mm c / c.																				
	Minimum Reinforcement in all elements of liquid retaining / conveying structures shall be 0.24 % of cross sectional area distributed equally over top and bottom faces.																				
	Minimum tensile Reinforcement in each direction for all foundation slabs / rafts shall be 0.2% of cross sectional area.																				
Minimum thickness of foundation slab / raft and base slab of all liquid retaining tanks / pits shall not be less than 250 mm.																					
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5.19.01.20	Minimum thickness of all elements of RCC liquid retaining / conveying structures (except effluent drains, launders and aerator waste slab) shall be 200mm. Effluent drains (depth more than 500mm), aerator waste slab and launders shall have minimum element thickness of 150mm.		
5.19.01.21	All Insert plates (except edge protection angles) provided in liquid retaining structures shall be 12 mm thick GI with lugs not less than 12 mm diameter. Edge protection angles shall be provided as specified elsewhere.		
5.19.01.22	All water retaining structures shall be tested for water tightness as per provisions of IS: 3370 and IS: 6494.		
5.19.01.23	2.0m wide walkway with concrete paving shall be provided connecting all structures, buildings and facilities. The top of walkway shall be minimum 200mm above FGL.		
5.19.02.00	<b>Architectural Concepts and Finishing Schedule</b>  Architectural concepts and finishing schedule shall be as specified elsewhere in architectural specification.		
5.19.02.01	<b>Acid / Alkali Resistant Treatment:</b>  Acid / alkali resistant lining treatment shall be provided in different areas as follows:  Neutralization Pit: The walls shall be provided with one coat of bitumen primer, followed by 18 mm thick bitumastic layer, 115 mm thick A.R. bricks, 6 mm thick under bed of potassium silicate mortar, pointing the joints of bricks with acid / alkali resistant epoxy / furane mortar upto a depth of 20 mm and bitumastic end sealing. Suitable pilasters shall be provided with A.R. bricks at regular intervals depending upon the height of lining, as per the specification.  The floor of neutralization pit shall be provided with acid / alkali resistant lining treatment as given in the above para, except that the 115 mm thick A.R.bricks layer shall be replaced by 75 mm thick A.R. tile layer and pilasters shall be omitted.  The ceiling of neutralization pit shall be provided with one coat of epoxy primer followed by 2 coats of epoxy paint (150 micron).  Acid / Alkali storage area / projections above the floor, pedestals projecting from the floor / saddles. The floor shall be provided with one coat of bitumen primer followed by 12 mm thick bitumastic layer, 20 mm thick A.R. tiles, 6 mm thick under - bed by potassium silicate mortar, 6mm thick pointing of joints of tiles with acid / alkali resistant epoxy / furane mortar up to a depth of 20 mm and bitumastic end sealing. Dado of 1.0M high with above treatment shall also be provided if applicable in case of walls nearby.  Alum/Lime Storage area and first floor of Chemical House : One coat of bitumen primer followed by 12mm thick bitumastic layer, 20 mm thick A.R. tiles, 6 mm thick underbed of potassium silicate mortar, 6mm thick pointing of joints of tiles with acid /alkali resistant epoxy /furane mortar up to a depth of 20 mm and bitumastic end sealing.  Alum solution preparation tank: The wall shall be provided with one coat of bitumen primer followed by 12 mm thick bitumastic layer, 75 mm thick A.R. tiles, 6 mm thick underbed by potassium silicate mortar, pointing of joints of tiles with acid / alkali resistant epoxy / furane mortar upto a depth of 20 mm and bitumastic end sealing.  The floor shall be provided with acid / alkali resistant lining treatment as given in the above para except that the 75 mm thick A.R. tile layer shall be replaced by 12 mm thick A.R. tile layer.  Basket of Alum Solution Preparation tank: 5mm thick epoxy lining over a coat of epoxy primer.  Curved surfaces of saddles shall have minimum 12 MM thick bitumastic layer to support the vessel / tanks.		
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	<p>Effluent Drains: Acid Resistant lining treatment indicated for the storage area shall be provided on the bed as well as walls of the drains with 38 MM AR tiles. The underside of the pre-cast slab cover shall be applied with one coat of epoxy primer and two coats of epoxy coating, total DFT 150 microns.</p> <p>Lime tank: Two coats of bitumen paint conforming to IS : 9862, with total DFT 150 microns.</p> <p><b>Guarantee</b></p> <p>The Contractor shall give a guarantee for satisfactory functioning of the lining for a period of 36 months from the date of completion of the work or date of handing over the site to the Engineer, whichever is later.</p> <p>The Contractor shall replace / rectify defects is any, observed in the lining to the satisfaction of the Engineer without any extra cost during this period.</p>		
<b>5.19.02.02</b>	<b>DM Tank Foundation</b>		
<b>5.19.02.02.01</b>	<b>General Requirements</b>		
	The tank foundation shall be as per IS:803 and as specified in relevant clause of foundation chapter.		
<b>5.19.02.02.02</b>	<b>Sub Grade Preparation</b>		
	The surface of natural soil shall be thoroughly compacted by rolling or other means, as directed by Engineer, to obtain 95% of max. laboratory dry density for the soil, as per IS:2720 (Part-VII).		
<b>5.19.02.02.03</b>	<b>Anti Corrosive Layer</b>		
	Anti-corrosive layer shall consist of dscreened coarse sand, mixed with 80/100 bitumen or equivalent 8% to 10% by volume.		
	Bitumen shall be heated to a temperature 175° C to 190° C, with 3% kerosene, if required. Sand shall be thoroughly mixed with it in a mixing drum to obtain uniform mixture and shall be laid over the compacted surface, laid in line, grade and levels and as directed by the Engineer. Bitumen shall not be heated beyond the temperature limits given above.		
	The premix carpet shall be laid in two layers of 3 cm and 2 cm respectively. After compacting and laying the first layer of 3cm, a tack coat of hot bitumen at the rate of 1 Kg. per Sq.m. shall be uniformly applied to the surface, by means of Sprayer and the Second layer of 2cm thick shall be laid, tamped and compacted to the satisfaction of the Engineer.		
	Sand shall be spread on the final surface at the rate of 0.5 Cu. m per 100Sq.m.		
<b>5.19.02.02.04</b>	<b>Premix Materials</b>		
	<b>Sand</b>		
	Sand shall be clean, dry, coarse, hard angular, free from coatings of clay, dust and mix of vegetable and organic matters and shall conform to IS 383 (Grade -III).		
	<b>Stone Chippings</b>		
	Stone chippings shall be hard black trap or granite or approved locally available stone and shall conform to IS 383. The grading shall be of normally 12mm down size and 6mm down size, in the ratio of 3:2 respectively.		
	<b>Bitumen</b>		
	Bitumen required for the work shall be 80/100 grade or its equivalent quality.		
	<b>Laying</b>		
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	<p style="text-align: center;"><b>TECHNICAL REQUIREMENTS</b></p> 		
<b>5.20.00</b>	<p>Areas on which the premix is to be laid shall be thoroughly cleaned of all dust and loose materials. On the cleaned surface, a tack coat at the rate of 1.0 Kg. per Sq.M. of hot Bitumen shall be uniformly applied by Sprayers. The applied Binder shall be evenly brushed.</p> <p>The Binder bitumen 80/100 shall be heated to the temperature of about 190° C with 3% kerosene, if required and mixed with stone chippings of size, as mentioned above, at the rate of 400 KG, with Six (6) Cu. M. of stone chips, for 100 Sq.M. of surface. The total mixed quantity, as mentioned above, is the quantity required for the total 50mm thick for 100 Sq. m. of area. Mixing shall continue until the aggregate is well coated.</p>		
<b>5.20.01</b>	<p><b>Switchyard Civil Works</b></p> <p><b>Civil works for switchyard includes:</b></p> <ol style="list-style-type: none"> <li>Towers, girders, lightning masts and equipment supporting structures including proto type assembly etc.,</li> <li>Foundations and supporting pedestals for towers, lightning masts, equipment supporting structures etc.,</li> <li>Control room/Auxiliary building as required for switchyard, foundation for AC Kiosks etc.</li> <li>Foundations for transformers and reactors including oil pit, stone filling, laying and fixing of rails for movement of Transformers / reactors, rail track, jacking pad and fire walls as required, arrangement for cabling etc. all complete</li> <li>Earthing mat, single lane roads and R.C.C. drains in switchyard area including road/drain/trench crossings etc.,</li> <li>All necessary embedments, inserts, supporting structures &amp; supporting members as required etc.</li> <li>Cable trenches in switchyard and inside Control room/Auxiliary building including civil works for panel fixing etc.</li> </ol>		
<b>5.20.02</b>	<p><b>Design Criteria</b></p>		
5.20.02.01	<p>Gantry structure, which consists of open web towers connected by girders, shall be made of structural steel conforming to IS 2062 and duly galvanized conforming to IS: 2629 and IS 4759. All joints shall be bolted connections. All bolts for connections shall be of 16mm dia conforming to IS 12427 and of property class 5.6 as per IS 1367 (Part 3). Nuts shall conform to IS 1363 (Part 3) of property class 5. Foundation bolts shall conform to IS 5624 and property class shall be 4.6 as per IS 1367 (Part-3). Butt splice shall be used for splicing the main members and splice shall be located away from the node point. IS 802 "Code of practice for use of structural steel in overhead transmission line towers" shall be followed for design of structures. Height &amp; type of towers shall be established based on electrical requirements. A provision of ± 30 degree angle of deviation of line in horizontal plane and ± 20 degree deviation in vertical plane is considered and the resulting worst combination of forces shall be considered for design. For all outgoing and incoming feeders, the conductor span shall be taken as 200m for design purpose.</p> <p>The analysis of towers and gantries shall be carried out with combined model of critical configurations of towers and gantries using any established structural analysis software like STAAD Pro. etc.</p>		
5.20.02.02	<p>Switchyard structures shall be designed for the worst combination following loads:</p> <ol style="list-style-type: none"> <li>Dead loads (load of wires/conductors, insulator, electrical equipment and structural members),</li> <li>Live loads,</li> <li>Wind loads</li> </ol>		
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	<p style="text-align: center;"><b>TECHNICAL REQUIREMENTS</b></p> 		
	<p>a. Switchyard gantries, towers, equipment supporting structures and lightning mast shall be designed as per IS 802. The wind load calculations shall be made as per IS: 802 except the parameters basic wind speed (Vb) and terrain category as stipulated in "Criteria for wind resistant design of structures and equipment".</p> <p>b. All other structures shall be designed as per IS 456 / IS 800. The wind load calculations to be made as per IS: 875 shall be with the parameters as stipulated in "Criteria for wind resistant design of structures and equipment".</p> <p>4) Seismic loads,</p> <p>5) Loads due to deviation of conductor (gantries shall be checked for <math>\pm 30</math> deg. deviation in horizontal plane and <math>\pm 20</math> degree deviation in vertical plane),</p> <p>6) Loads due to unbalanced tension in conductor/wire,</p> <p>7) Torsional load due to unbalanced vertical and horizontal forces,</p> <p>8) Erection loads,</p> <p>9) Short circuit forces including snap in case of bundled conductors, etc.</p> <p><b>Note:</b></p> <p>i. The occurrence of earthquake and maximum wind pressure is unlikely to take place at the same time. The structure shall be designed for either of the two. However, temperature stresses can be ignored, as these towers are freestanding structure in open space.</p> <p>ii. Short Circuit forces and Wind pressure shall be considered to act together for design of switchyard structures</p> <p>iii. Direction of wind shall be assumed such as to produce maximum stresses in any member for the combination of wind load with conductor tensions. The wind acting perpendicular and parallel to bus conductor and shield wire shall be considered separately.</p> <p>iv. The conductor tension shall be assumed as acting on only one side of the gantry for the analysis and design of switchyard gantries.</p> <p>v. The distance between terminal and dead end gantry shall be taken as 200 meters.</p> <p><b>5.20.02.03 Factor of safety:</b></p> <p>The factor of safety for the design of members shall be considered as 2.0 for normal condition and broken wire condition, 1.5 for combined short circuit and broken wire condition. Foundation shall be designed for a factor of safety of 2.2 for normal and broken wire condition and 1.65 for combined short circuit and broken wire condition.</p> <p><b>5.20.02.04 Design consideration for switchyard equipment support:</b></p> <p>The supporting structure for B.P.I., LA, CVT &amp; Isolator equipment's shall be comprised of GI (ERW) pipe of grade YST:210 or of higher grade conforming to IS: 1161 &amp; shall be designed as per IS 806 "Code of Practice for use of steel tubes in general building construction".</p> <p>Minimum diameter of the pipe type support for 765kV structure shall be 300NB, 400kV structure shall be 250NB, for 220kV &amp; 132kV structures shall be 200NB and that for 66kV &amp; 33kV shall be 150 NB.</p> <p>The supporting structure for CT, CSE &amp; Wave Trap equipment shall be comprised of lattice structural steel conforming to IS 2062 and shall be designed as per IS: 802.</p> <p>Common raft foundation shall be provided for each pole of isolator.</p> <p><b>5.20.02.05 Special design consideration for lightning Mast:</b></p>		
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	<b>TECHNICAL REQUIREMENTS</b> 		
	<p>Diagonal wind condition shall be considered for lightning masts. Diagonal wind shall be taken as 1.2 times the wind calculated on Longitudinal/Transverse side. Lightning mast shall be provided with minimum two nos. of platforms as per requirement and an\ ladder for climbing purpose shall be provided up to platform at top level. Top of platform shall have grating, railing and toe guard plates. The minimum width of platform shall be 900mm. Live load of 300kg/m<sup>2</sup> above platforms shall be considered for design of Lightning Mast.</p>		
<b>5.20.02.06</b>	<p><b>Design Criteria for structures not covered under Cl. 5.20.02.01 to Cl. 5.20.02.05</b></p> <p>The Switchyard Control Room building shall have RCC framed super structure with one brick thick wall cladding on exterior face. The Control room building shall consist of rooms/facilities/ equipment/ monorail as per system requirement. An open space of one meter width (minimum) shall be provided on the periphery of the panel rows and equipment to allow easy operator movement and access for maintenance purposes.</p> <p>The design of RCC structures shall generally be carried out using limit state method of design as per IS 456. The minimum grade of concrete shall be of RCC M25 as per IS 456.</p>		
5.20.03	<p>The architectural features including roof water proofing, rain water down comers and RCC parapet walls etc. shall be as specified elsewhere in the specifications.</p>		
5.20.04	<p>The fabrication and erection of the switchyard works shall be carried out generally in accordance with IS 802 and IS 800. All materials shall be completely shop fabricated and galvanised.</p>		
5.20.05	<p>All structural steel members including stub members, bolts, nuts, spring washers, etc., shall be hot dip galvanised after fabrication. Minimum section thickness should not be less than 4 mm. Weight of zinc coating shall be at least 0.610 kg/m<sup>2</sup> and foundation bolts shall have heavier zinc coating at least 0.80 kg/m<sup>2</sup>.</p>		
<b>5.20.06</b>	<p><b>Cable Trenches</b></p> <p>Cable trenches shall be provided for routing of cables as required and shall be of adequate size. The trenches located within switchyard shall project at least 300 mm above the finished formation level so that no storm water shall enter into the trench. The bottom of trench shall be provided with a longitudinal slope of 1:500. The downstream end of cable trenches shall be connected to sump pits. The precast covers shall not be more than 300mm in width and shall not be more than 65 kg. Lifting hooks shall be provided in the precast covers. Trenches shall be given a slope of 1:250 in the direction perpendicular to the run of the trenches. Angle of size 50x50x6 mm (minimum) with lugs shall be provided in the edges of RCC cable trenches and any other place where breakage of corners of concrete is expected. All cable trenches shall be provided with suitable insert plates for fixing support angles of cable trays. All internal cable trenches shall have minimum 6mm thick (o/p) chequered plate covers while external cable trenches shall have pre - cast RCC covers. However, the portion of the cable trench behind and sides of control panel / MCC shall be provided with suitable chequered plate covers as directed by the Engineer. Cable trenches inside switchyard, having depth more than 500mm, shall have wall thickness of minimum 150mm with two layer reinforcement.</p>		
<b>5.20.07</b>	<p><b>PCC Layer &amp; Gravel Filling:</b></p> <p>PCC Layer and Gravel filling shall be provided as specified elsewhere in the specifications. Before laying of PCC layer, the subgrade shall be properly compacted and the top layer of the soil shall be treated for anti-weed considering the type of weeds found in the vicinity. The anti-weed - soil sterilization details such as manufacturer's name, their specification, test certificate, etc. shall be furnished for Owner's approval. Any modification if required in the proposed anti-weed treatment chemical shall have to be done by the contractor at no extra cost to the Owner. The contractor shall be required to furnish a performance guarantee of three years for the anti-weed treatment. This guarantee shall be commenced from the date of completion of work or date of handing over, whichever is later. Stone/gravel shall be chemically inert, hard, strong durable against weathering, of limited porosity and free from deleterious materials. It shall be properly graded and shall meet the requirements of IS: 383.</p>		
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5.20.08	<p><b>Transformer/reactor foundations</b></p> <p>Foundations of transformers/reactors shall be designed for seismic and wind loads in addition to other applicable loads. Solid RCC block foundation shall be provided for the main transformer/reactor block. Alternatively, transformer shall be supported on a RCC foundation comprising of common raft for rail supporting walls up to rail-cum-road along with pedestals for jacking pad, roller lock etc. Tie beams connecting roller lock pedestals at rail level shall also be provided. Common raft/solid RCC block shall be supported on soil or pile based on requirement specified elsewhere in the specification. Oil soak pit / oil water separation pit for transformer/reactor shall be provided as envisaged elsewhere in the specification. The oil soak pit shall be provided for each transformer and shall be filled with gravel of size 40mm. The volume of the soak pit shall be sufficient to store one-third (1/3) of the oil volume of transformer/reactor considering only 40% of the volume as available voids between gravel filling. The oil soak pit shall also be provided with a sump at the corner to allow drainage of water/oil from the soak pit. The Oil-water Separation pit shall be designed for an effective capacity of complete oil of one transformer having highest volume of oil along with 10 minutes of firewater. For calculating effective capacity of oil-water separation pit, effective depth excluding 200 mm freeboard below invert level of inlet pipe shall be considered. Plan area and depth of oil-water separation pit shall be decided based on above consideration. Oil-water Separation pit shall be provided with five separate chambers interconnected by pipes. First chamber shall be for collecting oil-water mix from transformers' soak pits in case of fire. After entering into first chamber, oil being the lighter in density floats above the water. The water from lower elevation flows in to subsequent chambers interconnected through galvanized MS pipes. The accumulated oil in the first chamber to be pumped out for subsequent usage or disposal. Water collected in the last chamber to be pumped out for subsequent disposal after treatment. Invert level of inlet Hume pipes (of NP-3 grade and adequate capacity), carrying oil and water from transformers soak pits, shall be designed for gravity flow. Freeboard of 200 mm shall be provided below the invert level of inlet pipes. Invert levels of interconnecting pipes of subsequent chambers shall be decided accordingly.</p> <p>Arrangement for moving the transformer into place using rail cum road, jacking pads and pulling blocks including inserts, as required, shall be provided along with the transformer/reactor foundations.</p> <p>RCC Firewall shall also be provided between the transformers wherever required.</p> <p>300 mm thick PCC M20 encasement all around the Pylon supports inside soak pit for fire fighting system shall be provided up to top of Stone filling. Coarse aggregate filling inside the transformer oil soak pit shall be carried out only after construction/erection of Pylon supports and PCC encasement.</p>		
5.20.09	The switchyard roads, drains, fencing and gate shall be as specified elsewhere in the specification.		
5.21.00	<p><b>FIRE WATER PUMP HOUSE, FIRE WATER BOOSTER PUMP HOUSE&amp; FOAM SYSTEM</b></p> <p><b>Salient Features:</b></p> <p>The scope of the Bidder shall be design and construction of Civil, Structural, Architectural, Water Supply, Plumbing and Sanitary Works of Fire Water Pump House, Fire Water Booster Pump House and Foam system including supply of all materials.</p> <p>The fire water Pump House shall be single storeyed and single bay RCC superstructure provision for a structural steel monorail. MCC /switchgear rooms, control room etc. shall have RCC framed structure with cast-in-situ RCC roof slabs with brick cladding. The building shall be fully covered with external brick wall with provision for doors, windows, rolling shutters and exhaust fans.</p> <p>The Fire Water Booster Pump House shall be structural Steel Shed superstructure with provision for a structural steel monorail. Control room shall have RCC framed structure with</p>		
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	<p>cast-in-situ RCC roof slabs with brick cladding. . The shed and building shall be fully covered with external brick wall with provision for doors, windows, rolling shutters and exhaust fans.</p> <p>Steel shed with roof covering with provision for a structural steel monorail shall be provided for foam system including associated civil works for foam bladder tank foundations, grade slab, pipe pedestals etc. Control room shall have RCC framed structure with cast-in-situ RCC roof slabs with brick cladding. The shed and building shall be fully covered with external brick wall with provision for doors, windows, rolling shutters and exhaust fans. Fire water storage tank foundation shall be provided as detailed elsewhere.</p> <p>Fire water pipes shall be provided with either RCC trench or buried underground as per requirement. Tender drawings shall also be referred.</p> <p>Fire water trenches shall be open RCC type trench with removable RCC cover.</p> <p>Interlocking concrete block paving shall be provided over the buried fire water pipes as specified elsewhere in the specification.</p> <p>At road/rail/ drain crossings of fire water pipes, the fire water pipes shall be provided with minimum 200mm thick PCC encasement all around the pipe.</p>		
<b>5.22.00</b>	<b>DELETED</b>		
<b>5.23.00</b>	<b>COAL, BIO MASS &amp; GYPSUM HANDLING SYSTEM</b>		
<b>5.23.01</b>	<p><b>Track Hopper, Reclaim Hopper, Underground TP's &amp; Tunnel</b></p> <p>Track Hopper, Underground portion of TP's and Underground Tunnel shall be of RCC. Structural steel Shed shall be provided over Track Hopper.</p> <p>The vertical and inclined portion of coal hopper and beams in reclaim hoppers shall be provided with 50 mm thick guniting (shotcreting). Details of shotcreting have been given elsewhere in this specification.</p> <p>Expansion joints shall also be provided at locations wherever tunnel connects with Underground TP's, penthouse etc. width of 600mm water stop fabricated with 22G copper plate with bitumen board fillers and polysulphide sealing compound as specified elsewhere shall be used as expansion joint material. Reinforcement detailings at the expansion joint shall be done in such a way that there is no obstruction to copper plate installation.</p> <p>Track hopper, machinery hatches shall consist of underground portion, which shall be of RCC, and above ground portion, which shall be of structural steel shed covered with permanently Colour coated profiled steel sheets.</p> <p>The structural arrangement to be adopted for the design and construction of underground portion of track hopper and machinery hatches shall be as shown in tender drawing. It essentially consists of RCC frames spaced at approx. 3.0M centers with RCC wall panels on the sides and RCC raft/ raft and beam arrangement at the bottom, fixed to the frames. The top beam of the RCC frame supports the rail supporting beams and the coal hopper. Minimum thickness of RCC raft at bottom shall be 600 mm. Minimum thickness of RCC side walls shall be 600 mm at bottom and 300 mm at top.</p> <p>No columns shall be provided inside the Machinery Hatches.</p> <p>Foundation of all underground structures like underground TP's &amp; tunnels shall be of solid RCC raft. Raft cum beam/sandwich slab arrangement shall not be acceptable.</p>		
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	<p>The vertical and inclined portion of coal hopper, the beams and top of coal tray in the track hopper structure as shown in the tender drawing shall be provided with 50 mm thick guniting (shotcreting). Details of shotcreting have been given elsewhere in this specification.</p> <p>Expansion joints shall be provided in track hopper at a maximum distance of 40m unless otherwise shown in the tender 600 mm wide water stop fabricated with 22G copper plate with bitumen board fillers and polysulphide sealing compound as specified elsewhere shall be used as expansion joint material. Detailing of expansion joints and the reinforcement shall be coherent.</p> <p>Floor shall be provided with cross slope not flatter than 1 in 50 towards side drains. Side drains shall be sloped towards sump where sump pumps as specified elsewhere, shall be provided. The slope of side drains shall not be flatter than 1 in 400. Side drains and sump shall have removable type steel grating cover. Gratings shall be galvanized to grade 610 gm/m<sup>2</sup>.</p> <p>Water proofing / Damp proofing of underground portion of Track Hopper, reclaim hoppers, tunnels, underground (i. e. basement) portion of transfer houses shall be done by providing the following treatments:</p> <p>(A)Chemical injection grouting for inner faces (details as specified elsewhere)</p> <p>(B)Polymer modified cementitious coating on earth side face as per the following :</p> <p>(1.) On the outer surface of walls, frames and roof slabs coming in contact with earth, polymer modified cementitious coating in two layers as specified and as per manufacturer's specifications shall be provided directly on the concrete surface.</p> <p>(2.) 50 mm thick PCC (1 : 2 : 4 with 10 mm nominal size stone aggregates) shall be provided under the raft i.e. over the lean concrete, followed by polymer modified cementitious coating in two layers ( slurry mix application ) as per manufacturer's specification. 50 mm thick PCC ( 1 : 2 : 4 ) with 10 mm nominal size stone aggregates shall then be laid over the polymer modified cementitious coating before laying the raft.</p> <p>Steel gratings of mesh size 300 mm x 320 mm for track hopper shall be provided. The grating shall be built of min. 200mm x 28mm thick flats in main direction and min. 100mm x 20mm thick in secondary direction. The hopper and gratings shall be designed for movement of front end loader/ bulldozer over them. Bull-dozer weight shall be considered as about 35T. No painting/galvanization shall be provided in gratings. However, two coats of Red oxide Primer to be provided immediately after fabrication.</p> <p>Earth pressure to be considered for design shall be due to earth pressure at rest (K<sub>o</sub>) condition only. Earth pressure due to surcharge intensity of Railway Loads (where applicable) or Uniformly Distributed Load (U. D. L) of intensity 2 T / Sq. M. whichever is critical, shall be considered in the design.</p> <p>A minimum safety factor of 1.2 against uplift of wagon tippler/track hopper, transfer points (underground or with basement) and tunnels, due to ground water shall be ensured during execution and after execution, considering dead weight of the structure to be 0.9 times only, ground water table at adjoining formation level and soil wedge angle of not more than 15 degrees.</p>		
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<b>5.23.02</b>	<p>Also, FOS against uplift, to be taken as 1.0, considering the dead wt. of structure and soil resting on side projections if any in the vertical plane. Inclined wedge action of soil shall not be considered in this case.</p> <p>Wherever, slope of tunnel exceeds 10°, RCC steps shall be provided for the entire width of each walkway.</p> <p><b>Overhead / Ground Conveyor Galleries and Trestles</b></p> <p>Overhead conveyors for trough belt conveyor shall be located in a suitably enclosed gallery of structural steel. The overhead gallery shall consist of two vertical latticed girders having rigid jointed portal frame at both ends. Cross beams at floor level supporting conveyor stringer beams shall be made of single rolled steel beam or single channel section (ISMB or ISMC) or plate girder. Horizontal bracings are to be provided at top &amp; bottom plan of the gallery (latticed girders shall be braced together in plan at the top and bottom). Common end portal frame shall not be used for adjacent conveyor spans. Roof truss shall be provided at upper node points of latticed girders to form an enclosure.</p> <p>The maximum span of overhead gallery shall be limited to 25 meter unless higher span is required due to site conditions, which shall be subject to approval of the Engineer. The gallery should as far as possible be erected as a box section keeping all the vertical and horizontal bracing tied in proper position. The gallery should be checked for all erection stresses that are likely to develop during handling and erection and if required, temporary strengthening of gallery members during erection shall be made. Contractor can also use tubular steel sections for roof truss of conveyor galleries only. The tubular steel section shall be of circular/rectangular/square shape. The circular steel tube shall conform to IS:1161 and rectangular/square steel sections shall conform to IS:4923. The steel structures using tubular sections shall be designed and fabricated as per IS:806 – “Code of Practice for use of steel tubes in general building construction.” and EN 1993-1-8:2005.</p> <p>Seal plates under the conveyor galleries shall be provided in such a way that complete gallery bottom shall form a leak proof floor.</p> <p>Grade slab with brick toe wall and plinth protection along with drains shall be provided throughout the length of the ground conveyors. Top of pedestal for ground conveyor portals shall be 300mm above FFL. Bottom of the base plate of the columns of the trestles in Main Plant Block Area shall be kept 1.2m below the finished floor level of ground floor of Main Power House.</p> <p>For double stream conveyor gallery, two side and one central walkway of minimum width 800 mm and 1100 mm respectively shall be provided. The minimum width of two side walkways for single stream conveyor gallery shall be 800 mm and 1100 mm respectively. Both sides of central and side walkways shall be provided with pipe handrails all along the conveyor gallery. Hand railing should not be supported on conveyor supporting stringers. The walkways shall be chequered plate construction with anti - skid arrangement. The anti - skid arrangement will consist of welding of 10 mm square steel bars at a maximum spacing of 500 mm along the length of the gallery. Where the slope of walkway is more than 10°, chequered plate steps with nosing and toe guard shall be provided. The floor of conveyor gallery all along the gallery length, shall be provided with minimum 12 gauge thick seal plates (suitably stiffened) and other drainage arrangements as specified elsewhere.</p>		
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	<p>Trough belt conveyor gallery shall have permanently colour coated steel sheet covers on roof and both sides. However, in roof, a panel of minimum 1.5 m x 1.5 m area at about 6.0 m center alternatively on both slopes, shall be provided with translucent sheets of polycarbonate material for natural lighting. A continuous slit opening of 500 mm shall be provided on both sides just below the roof sheeting. Adequate provision of windows shall be kept on both sides of conveyor gallery as appended in Mechanical Section (Belt conveyor system). Windows shall be provided with wire mesh as specified elsewhere in this specification.</p> <p>Cross - over with chequered plate platform and ladder for crossing over the conveyors shall be provided at approximately every 90m intervals of conveyor. Crossover shall preferably be located over four-legged rigid trestle location.</p> <p>For railway tracks passing below overhead conveyor gallery and along conveyors, the railway clearances both underground as well as over ground shall have to be adhered to for design, execution and erection of foundations, trestles, galleries etc., so that movement of locomotives and wagons is not hampered in any way during execution and afterwards. However, at the location where the overhead conveyor gallery crosses road / rail line, minimum clearance of 8.5m above the road crest / rail top shall be provided.</p> <p>For calculation of material load on moving conveyor, a multiplication factor 1.6 shall be used to take care of inertia force, casual over burden and impact factor etc.</p> <p>Thus material load per unit length of each moving conveyor shall be</p> <div><div>1.6</div><div>X</div><div>Rated Capacity of Conveyor system</div><div>X</div><div>F</div><div>Conveyor Belt Speed</div></div> <p>Where, F = 1100/800 for coal, 800/600 for Biomass &amp; 1250/900 for gypsum</p> <p>It should be noted that for structural design, unit weight of lime shall be considered as 1700 kg/cu. m; unit weight of gypsum shall be considered as 1250 kg/cu. m.</p> <p>It should be noted that for structural design, unit weight of coal shall be assumed as 1100 kg/cu. m.</p> <p>Conveyor Gallery structure shall be designed considering both conveyors operating simultaneously.</p> <p>Conveyor gallery and supporting trestles located between transfer houses / buildings shall be arranged in any one of the following ways.</p> <div><div>a)</div><div>All gallery supporting trestles shall be four legged type only. One end of each gallery span shall be hinged to the supporting trestle and the other end shall be slide type. Slide type support shall be with PTFE bearings to allow both rotation &amp; longitudinal movements.</div></div>		
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	<div>OR</div> <div>b) In between transfer houses / buildings, four legged trestles shall be placed at a maximum interval of 90 metres. The arrangement shall be such so as to ensure that force in the longitudinal direction (i. e. along the conveyor length) of conveyor gallery of length not more than 90 m is transferred to any four legged trestle. In the space between each successive four legged trestles, two legged trestles shall be provided at regular intervals. The end supports resting on the four-legged trestle can have either ends hinged or one hinge and the other on slide type depending on the arrangements. Slide type support shall be with PTFE bearings to allow both rotation &amp; longitudinal movements.</div> <div>End of conveyor gallery which will be supported over transfer house, shall be so detailed that only vertical reaction is transferred from conveyor gallery and no horizontal force in longitudinal direction is transferred from conveyor gallery to transfer house structure and vice - versa.</div>			
5.23.03	For trestles and trestle foundations for conveyor galleries located adjacent to existing structures, over ground and underground facilities, location and details of these trestles and foundations shall have to be decided such that there is no interference both underground as well as over ground with existing structures and facilities. Base plates of trestle columns shall be kept 300 mm above the finished ground level.			
5.23.04	<div>Transfer Houses</div> <div>The over ground portion of all transfer houses shall be framed structure of structural steel work with permanently colour coated profiled steel sheet side cladding (from lowest working floor level till top) and RCC floors comprising of RCC slab over profiled metal deck sheets (to be used as permanent shuttering without considering any composite action effect of metal deck sheet) over structural beams. Shear anchor studs shall be provided through metal deck at regular interval on all top flange/flange plate of structural beams. However, the lower portion of side cladding, at ground, for a minimum height of 0.9 m above the finished floor level shall be one brick thick wall plastered on both side. In some areas like MCC floors etc., one brick thick wall cladding shall be provided. Brick wall cladding shall be supported on encased wall beams and suitably anchored to adjoining columns and beams. Vertical bracings shall be provided only on four sides along the periphery. Grade slab with brick cladding of 0.9 m height, plastered on both sides shall be provided for all transfer houses. Bottom of the base plate of the columns of the transfer houses in Main Plant Block Area shall be kept 1.2m below the finished floor level of ground floor of Main Power House.</div> <div>Adequate steel doors and windows for proper natural lighting and ventilation shall be provided. In addition to steel windows, panels of suitable size to suit the architectural treatment and made of translucent sheets of polycarbonate material shall also be provided on the side cladding for natural lighting.</div> <div>The roof of Transfer points shall be provided with pre-fabricated insulated metal sandwich panels. Pre-Fabricated Insulated Metal Sandwich Panel for Roofing shall be laid to specified slope. Composition of Insulated Metal Sandwich Panels shall be as described in relevant section of Technical Specification. Adequate slope shall be provided for quick drainage of rain water.</div>			
5.23.05	<div>Crusher Houses</div> <div>The crusher house shall be framed structure of structural steel work with permanently colour</div>			
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	<p>coated profiled steel sheet side cladding. However, panels of suitable size to suit the architectural treatment and made of translucent sheets of polycarbonate material shall also be provided on the side cladding for natural lighting. The lower portion of side cladding, at ground, for a height of minimum 0.9m above the finished floor level shall be of one brick thick wall plastered on both faces. Floors shall be of RCC comprising of RCC slab over profiled metal deck sheets (to be used as permanent shuttering without considering any composite action effect of metal deck sheet) over structural beams. Shear anchor studs shall be provided through metal deck at regular interval on all top flange/flange plate of structural beams. Within this building, cubicles for resting room of operators shall be constructed with one brick thick brickwork having both sides plastered and roof slab. Adequate steel doors and windows for natural lighting and ventilation shall be provided. Vertical bracings shall be provided only on four sides along the periphery.</p> <p>The roof of crusher house shall be provided with pre-fabricated insulated metal sandwich panels. Pre-Fabricated Insulated Metal Sandwich Panel for Roofing shall be laid to specified slope. Composition of Insulated Metal Sandwich Panels shall be as described in relevant section of Technical Specification. Adequate slope shall be provided for quick drainage of rain water.</p> <p>Crushers shall be supported on RCC deck, which in turn will rest on suitable vibration isolation system consisting of springs and dampers. This RCC deck shall be isolated from the floor. However, the vibration isolation system consisting of springs and dampers may rest on main building framework. Detailed specification of vibration isolation system including the unbalanced force, frequency and amplitude criteria and other design requirements are appended elsewhere in this specification.</p>		
<b>5.23.06</b>	<p><b>Stacker Reclaimer Foundation</b></p> <p>Stacker – Reclaimer (S/R) foundation shall be in RCC and shall be designed as RCC framed structures (in longitudinal &amp; transverse direction). Lateral tie beams between two rail supporting elements shall be provided at a regular interval of approx. 3.0 m center. Conveyor short posts shall be supported on RCC beams at grade level. The foundation shall be designed for the most critical combination of loads as furnished by the equipment supplier. RCC retaining wall on both sides of the S/R foundation shall be provided as shown in the Annexure.</p> <p>The portion between the two rails and between rail and retaining wall on both sides shall be paved in concrete as per specification for grade slab of ground level specified elsewhere. However no metallic hardener finish over RCC slabs is to be provided. Drains shall be provided along the rails for drainage of rain / dust suppression / floor washing water. Drains shall be routed on both sides of the foundation along the rail as shown in Tender Drawing. Drains shall be connected to the network drainage system for finally discharge into coal settling tank. RCC drains shall be provided in Coal stockyard area with precast RCC covers.</p>		
<b>5.23.07</b>	<p><b>Control building, M. C. C. Buildings</b></p> <p>These shall be steel or RCC framed building with RCC roof and floor. For steel framed building roof/floor comprise of RCC slab over profiled metal deck sheets (to be used as permanent shuttering only) over structural beams. Shear anchor studs shall be provided through metal</p>		
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<b>5.23.08</b>	<p>deck at regular interval on all top flange/flange plate of structural beams. Cladding shall be of brickwork/concrete block work with plastering on both sides. Bidder has also the option to supply and construct pre-engineered buildings. Roof shall be provided with roof water proofing treatment, as specified elsewhere in the Technical specification. Suitable arrangement shall be provided so as to prevent ingress of water into the cable trenches inside the building from cable entry locations.</p> <p>All air - conditioned areas, shall be provided with the false ceiling system(details specified elsewhere) with under deck insulation.</p> <p>Adequate aluminium doors and windows shall be provided for natural lighting, ventilation and view. All windows in air conditioned rooms shall have hermetically sealed double glazing.</p>		
	<p><b>Pump Houses</b></p> <p>These shall be framed structure of structural steel work with permanently colour coated profiled steel sheet roof, grade slab and RCC foundations etc. Roof shall be provided with troughed profile permanently colour coated sheet with slope of 1 in 5 for quick drainage of rain water. Brick wall cladding (1m height above FFL) shall be provided all around the periphery of pump houses</p>		
<b>5.23.09</b>	<p><b>Pent House</b></p> <p>These shall be of RCC framed structures with columns, beams, slabs and foundations etc. Cladding shall be of brickwork with plastering on both sides. Roof shall be provided with roof water proofing treatment as specified elsewhere. Adequate nos. of steel doors and windows shall be provided for natural lighting and ventilation.</p>		
	<p><b>Gypsum Storage Shed</b></p> <p>The Gypsum storage shed shall be RCC framed structure with RCC wall (upto Tripper floor) and structural steel shed with permanently colour coated profiled steel sheet roof and side cladding (above Tripper floor). Roof shall be provided with troughed profile permanently colour coated sheet with slope of 1 in 5 for quick drainage of rain water. At grade level Heavy duty paving as detailed elsewhere in the specification shall be provided inside the shed.</p> <p>Finished floor level of Gypsum storage shed shall be kept at least 500mm above the finished ground level. The building shall be provided with 750 mm wide plinth protection all around as detailed elsewhere in the specification.</p>		
<b>5.23.11</b>	<p><b>Toilets</b></p> <p>Toilet with potable water line facilities shall be provided in each of the following locations:</p> <p>(A) Crusher House (Ground Floor) – (Gents Toilet – 1 No for each.)</p> <p>(B) In CHP/LHP/GHP Control Room building – (Gents and Ladies Toilets-1 No. each)</p>		
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	Each Gents toilet shall have brick enclosure, and the following fittings.			
	i)	Wall mounted glazed vitreous china European water closet with low flush having flow rate of 6.0 litres and 3.0 litres of water per flush, dual flush adopters for standard flushing for solid waste and a modified smaller flush for liquid waste flushing valves shall be provided.	1 no.	
	ii)	White glazed vitreous china flat back lipped urinal 390x375x610 mm (approx.) fitted with photovoltaic controls for flushing system and all requisite fittings.	1 no.	
	iii)	Wash Basin 450x550 mm (approx.) mounted over 18 mm thk granite beveled edge counter fitted with photovoltaic control system for water controls, bottle trap with two taps and all requisite items.	1 no.	
	iv)	Mirror 600x900x6mm thk. with beveled edges (Superior sheet glass) mounted with teak wood beading and minimum 12 mm thk. plywood backing.	1 no.	
	v)	C.P. Brass Towel Rod 600 x 20 mm	1 no.	
	vi)	Liquid Soap Container	1 no.	
	vii)	Washing Tap ( CP Brass )	1 no.	
	viii)	Overhead Polyethylene water tank (min. 500 litres capacity)	1 no.	
	ix)	Suitable provision for installation of drinking water cooler.	1 no.	
	x)	Space for Janitor room	1 no.	
5.23.12	Ladies toilet shall be similar to gent's toilet as detailed above, except item at s.no. ii and ix (urinal and provision for drinking water cooler). Package type STP shall be to be provided.			
	No other facilities shall be provided below toilet block except toilet. Toilet facilities shall be provided at control room floor level.			
	<b>Staircases</b>			
	All floors of transfer houses/crusher houses and roof/floors of all multistoried MCC/Control room buildings shall be accessible through staircase and mumty of staircase of mcc/control room shall be accessible through cage ladder. Cage ladders (min. 450mm wide) shall be provided for access to roof of penthouses & MCC/control room (with only ground floor).			
	All stairs of over ground portion of transfer houses & crusher house shall be of steel (minimum 1200 mm wide) and maximum rise should not be more than180 mm and minimum tread width 275 mm. Stringers shall be of rolled steel channel ( minimum ISMC 250 ) and tread shall be of electro forged steel gratings. Stairs shall be provided with 32 mm dia nominal bore medium duty M. S. pipe hand rail.			
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5.23.13	<p>Handrails (for staircases, around openings, in walkways etc.) shall be of standard weight steel pipe of flush welded constructions, ground smooth using 32 mm nominal bore medium class pipe provided with double rail, top rail about 1.0 metre, minimum above platform level (upto height of 12m the height handrail shall be 1.0 m and above 12m height the height of handrail on staircase landing and around cutouts and openings shall be 1.2 m ) and pipe posts spaced not more than 1.5 metres apart. Angle handrail post may be provided when specifically called for in drawings approved by Engineering. Toe guard of size 100mm x 6mm shall be provided along the railing for all steel platforms/landings and RCC staircases.</p> <p>Smooth uniform curves and bends shall be provided at stair returns and also where so ever required. Posts connected to curb plates shall have a neat closure at the bottom and a 6 mm thick plate neatly welded to posts for attachment to curb plate. All necessary fittings including inner dowels at splices, brackets, belts, bends, flanges and chains, where required shall be plugged and welded. A minimum radius of 3 times the pipe diameter shall be provided at all points of direction changes in the handrail.</p> <p>Treads and landing shall be suitable for the prescribed loading. The maximum width of openings in gratings shall not exceed 40 mm. The minimum size of main bars shall be 25 x 6 mm and cross bar shall be 6mm. The usual span of grating will not generally exceed 1.5 meters. Stair case gratings shall be galvanized to grade 610g/m<sup>2</sup>. All gratings shall be electro forged types.</p> <p>Outside stairs to transfer points shall be open type. However, sheeting shall be provided at the top.</p> <p>Stairs of MCC/control room, wagon tipplers/track hopper and underground TP's shall be of RCC construction. The minimum width of stairs for MCC/Control room, wagon tippler/Track hopper, reclaim hopper/underground TP's shall be 1200 mm. Maximum rise should not be more than 180 mm and minimum tread with 250 mm. Minimum 50 x 50 x 6 mm size angles with lugs shall be provided as edge protection for treads of stairs in Track hopper/wagon tippler/underground TP's.</p> <p>Numbers and arrangement (including enclosures etc.) of stair cases shall be such as to meet the fire safety requirement as per guide lines of statutory regulatory bodies. External fire escape staircase along with internal staircase shall be provided for crusher house and multi-storied MCC cum control room building. Minimum headroom in all staircases and all levels shall be 2200mm from floor finish level.</p>			
	<p><b>Trenches</b></p> <p>All trenches for cables or any other underground facility as detailed out elsewhere shall be of RCC Cable trenches shall be provided with pre - cast RCC covers / chequered plate cover. Cable trenches as well as pre - cast covers shall be provided with edge protection angles. Lifting hooks shall be provided for all pre - cast RCC covers. All embedments / block outs as required and specified elsewhere in these specifications shall be provided. Trench pre - cast cover weight shall not be more than 65 Kgs. At road crossings &amp; entry locations, RCC trench covers designed for 10 T wheel load at centre shall be provided. Pre - cast covers shall be designed for central point load of 75 Kgs. RCC cable trenches shall be filled with sand after erection of cables, up to top level and covered with pre - cast RCC covers. For cable trenches outside buildings, top level shall be 200 mm above G.L and sand filling shall be overlaid with 50 thk. PCC.</p>			
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5.23.14	<p>Minimum 50 x 50 x 6 mm size angles with lugs shall be provided as edge protection all around cut outs / openings in floor slabs, edges of drains supporting grating/precast RCC covers, edges of RCC trenches supporting pre - cast covers, supported edges of pre - cast cover.</p> <p><b>Cable gallery/trestles</b></p> <p>Cable galleries/trestles shall be made of structural steel. The contractor can use either rolled sections or tubular steel sections. The tubular steel section shall be of circular/rectangular/square shape. The circular steel tube shall conform to IS:1161 and rectangular/square steel sections shall confirm to IS:4923. The steel structures using tubular sections shall be designed and fabricated as per IS:806 – “Code of Practice for use of steel tubes in general building construction.” and EN 1993-1-8. Galvanised gratings shall be provided for walkways as per approved electrical drawings. Ladders shall be provided for access from ground to cable galleries at maximum 100m intervals.</p>			
5.23.15	<p><b>WIND BARRIER</b></p> <p>Wind barrier need to be provided all around the stock pile area. Its foundation and super struicture need to be design considering 100% blockage condition of mesh.</p>			
5.23.16	<p><b>Biomass Storage Silo</b></p> <p>The supporting structure for silo shall be of structural steel. Enclosure with side metal cladding is to be provided above biomass Storage Silos for biomass handling equipment. Side metal cladding is also to be provided for outgoing conveyors below biomass storage silos. Stored biomass load shall be treated as dead load for analysis and design of silo supporting structure.</p>			
5.23.17	<p><b>Drainage &amp; Water Supply Works</b></p>			
5.23.17.01	<p><b>Drainage System:-</b></p> <p>The drainage arrangements shall be so planned so as to ensure quick disposal of drainage water without stagnation and / or overflow. It is envisaged to clean the conveyor galleries, transfer points, crusher building, penthouse etc. with water periodically.</p> <p>Minimum 4 nos. down comers shall be provided in each transfer house / crusher house. In case of conveyor galleries, the down comer shall be provided at every trestle location.</p> <p>Drainage of the complete coal stock pile, area around stacker reclaimer rails etc. shall be discharged into the coal slurry settling pond.</p> <p>For all coal Conveyors, each down comer shall lead the water / coal slurry to RCC pit (of 2 Cu.M capacity) to allow settlling of coal. The water from the pit shall overflow into contractor's R.C.C drain, which will lead the discharge finally into coal slurry settling pond.</p> <p>For Crusher House, pent house, transfer house each down comer shall lead the water / coal slurry into the peripheral drains (Brick drains with steel gratings provided around the building) which will lead the water / coal slurry to water / coal slurry to RCC pit (of 2 Cu.M capacity) to allow settling of coal. The water from the pit shall overflow into contractor's R.C.C drain, which will lead the discharge finally to the coal slurry settling pond.</p>			
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5.23.18	<p>For Track hopper/Wagon Tippler &amp; transfer houses peripheral drains (Brick drains with steel gratings provided around the building) shall lead the water / coal slurry to a local RCC pit (of 2 Cu. M. capacity) near each facility to allow settling of coal. The water from the pit shall overflow into contractor's R.C.C drain, which will lead the discharge to a coal slurry settling pit.</p> <p>In case of Control rooms and MCC buildings, Pump houses, etc water / coal slurry coming from down comers shall discharge into peripheral drains (Brick drains with steel gratings provided around the building) which will lead the water / coal slurry into contractor's RCC drain which will lead the discharge finally into coal slurry settling pond.</p> <p>Suitable kick plates/Curb beams shall be provided around the floor openings, stair case landings, in the transfer points, crusher house and other buildings.</p> <p>Contractor's scope shall also include construction of necessary culverts under the rail lines / roads as per railway / IRC standards and approval of Railway culverts from concern Railway authorities.</p>			
	<p><b>Internal and external water supply, drainage etc.:-</b></p>			
	<p>The scope for potable water supply includes all distribution systems, tanks, pipes, fittings etc. as required and as described here or elsewhere in these specifications.</p>			
	<p>The scope for service water supply and dust control water supply shall be as described elsewhere in these specifications.</p>			
	<p>For water supply, medium class galvanized mild steel pipes conforming to IS: 1239 shall be used.</p>			
	<p>The scope for drainage of surface water shall include design, layout and construction of drains for and from buildings and drains required for coal stockyard area, drainage up to main coal slurry settling tank including connection with the tank. Drainage system shall be designed for maximum intensity of rainfall as 75 mm/hr and 60 % runoff coefficient. Moreover, the drainage system shall also comply to detail mentioned in project information chapter. All buildings (including transfer houses, crusher house, MCC rooms, pump house etc.) shall be provided with open surface brick drains of minimum size of 300 mm width and 300 mm depth with removable steel gratings all around the periphery. All drains excepting the peripheral drains around the transfer points, crusher house, control / MCC. buildings, pumps house etc., shall be of RCC construction. All open RCC drains shall have removable steel gratings designed for loads as specified under loading clause. Minimum size of main bar of steel grating (Galvanised to 610 gm/m<sup>2</sup>) shall be 25 mm x 5mm and cross bars 6mm. At all entry or road/rail crossing point's RCC box/pipe culvert shall be provided. The opening size of grating shall not be more than 90 mm x 35 mm. All drains as well as pre - cast covers shall be provided with edge protection angles and lifting hooks.</p> <p>However, drains in coal stockyard area shall have pre cast RCC covers. RCC pre - cast cover weight shall not be more than 65 Kgs. RCC pre-cast covers near entry or at road crossings shall be designed for 10 T wheel load at centre. RCC pre - cast covers shall be designed for central point load of 75 Kgs.</p> <p>The scope for foul water from toilets shall include layout and laying of sewers for sewerage system together with all fittings and fixtures and inclusive of ancillary works such as</p>			
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5.23.19	<p>connections, manholes and inspection chambers within the building and from the building to the terminal point.</p> <p>For rain water down comer and those to be used for conveying water / coal slurry generated from cleaning of walkways/floors, Galvanized MS pipes conforming to IS: 1239 (for 150 mm NB Medium grade pipes) with welded joints shall be provided for MCC buildings, penthouse, control rooms and Galvanized steel ERW pipes (273mm OD, 4mm thk) of steel grade Fe330 conforming to IS: 3589 with welded joints shall be provided for all TP's, Crusher house, and Conveyor galleries.</p> <p>Galvanizing shall be as per IS: 4736. The minimum mass of zinc coating shall not be less than 360 gms/sq.m. as per IS:6745. The zinc coating shall be smooth and shall be subjected to testing as per IS: 2633, for uniformity of coating. The zinc coating shall be free from all defects as per IS: 2629.</p> <p>All rain water down comers shall be provided with roof drain heads and complete with shoes bends, junctions, sockets, adapters, brackets and finished with anti-corrosive painting over a coat or primer.</p> <p>For design of building drainage system IS: 1742 shall be followed.</p> <p>For sanitary / sewerage pipes above ground, sand cast iron pipes conforming to IS : 1729 with leak proof lead joints.</p> <p>For underground drain pipes, minimum class NP - 2 pipes conforming to IS: 458. At road crossings, concrete pipes of class NP 3 conforming to IS: 458 and at rail crossing RCC box culvert to be provided.</p> <p>For sewerage below ground stoneware pipes conforming to IS: 651 with concrete bedding and haunch.</p> <p><b>Roof Details</b></p> <p>Roof slabs for CHP and GHP buildings shall be minimum 150 mm thick(in case of metal decking thickness shall be measured from crest top) and shall have minimum 10 dia HYSD reinforcement bars placed at 200 mm center both ways at top and bottom.</p> <p>1000 mm high and minimum 100 mm thick RCC parapet wall shall be provided over roofs of all buildings. However, for mummy, 600mm high parapet wall shall be provided. Parapet wall shall have suitable coping. External face of parapet wall of the buildings provided with metal cladding shall also be finished with metal cladding of design and colour as per approved architectural drawings.</p> <p>Junction of roof and parapet shall be provided with 150 x 150 mm size concrete fillet.</p> <p>Drain level shall be provided with 45 x 45 cm size khurras having minimum thickness of 30 mm of M-15 concrete over PVC sheet of 1 m x 1m x 400 micron and finished with 12 mm 1 : 3 cement : sand plaster.</p> <p>Roofs of all M. C. C./control rooms, crusher house and TP(if applicable), penthouse etc., shall have roof water proofing treatment. Roof water proofing treatment shall be as mentioned else where in specification.</p>		
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5.23.20	<p>Roof of pump house shall be provided with single skin troughed profile permanently colour coated sheet with slope of 1 in 5 for quick drainage of rain water.</p> <p><b>Floors and Grade level details</b></p>		
5.23.20.1	<b>DELETED</b>		
5.23.20.2	<p>The floor slabs shall be minimum 150 mm thick(in case of metal decking thickness shall be measured from creast top) and shall have minimum 10 dia HYSD reinforcement bars placed at 200 mm center both ways at top and bottom. The RCC slab shall be designed without considering any composite action effect of metal deck sheet (ie the structural strength of metal deck sheet shall not be considered for RCC slab design).</p> <p>Floors of transfer points shall have cross slope of not flatter than 1: 80, towards the floor washing drainage outlets, for efficient drainage. For ground conveyor &amp; crusher house slope shall be 1:100.</p> <p>Chequered plates (used for floors, walkways etc.) shall be minimum 6 mm thick o/p or as indicated on drawings. The chequered plate pattern shall be approved by Employer / Engineer. Mild steel flats/angles of suitable size shall be welded to the bottom portion of chequered plates at a designed spacing to stiffen chequered plates to restrict deflection within span/200. Chequered plates shall be fixed by staggered welding of suitable size.</p> <p>Toe guard of size 100 x 6 mm shall be provided at various openings provided in floors e.g. around stair case openings, chute openings and other similar cutouts. For conveyor walkways, angle runner to act as toe guard shall be provided.</p> <p>All along the periphery of RCC floors (where no brick masonry walls are provided) 100 mm thick 300 mm high RCC wall and 900 mm high steel hand rails all around over this RCC wall shall be provided.</p> <p>The grade slab shall consists of 230 mm thick rubble soling (63 mm downgraded hard stone aggregate as per IRC specification, watering and compaction to minimum of 90% Standard Proctor density, including filling the interstices of stone aggregates with sand), over well compacted earth, overlaid by 75 mm thick P. C. C. M-7.5 and 100 mm thick RCC of grade M-25 with minimum 8 mm dia bars placed at 200 mm C / C in either direction respectively. There will be minimum 50 mm thick metallic hardener finish over the RCC slab.</p> <p>All buildings (including Wagon Tippler/track hopper and machinery hatches, truck hopper, penthouse, MCC rooms, pump houses, transfer houses and crusher house) and ground conveyors shall be provided with 750 mm wide plinth protection all around. It consists of 50 mm thick P.C.C. M-25 grade with 12 mm maximum size aggregate over 200 mm thick stone soling using 40 mm nominal size rammed, consolidated and grouted with fine sand.</p> <p>An area of 5 m width all round the water tanks near pump house, transfer houses and crusher house, Gypsum storage shed, truck tippler area, lime storage silo shall be paved. This paving will be in addition to plinth protection. The paving construction shall be as per specifications for the grade slab at ground level. However, 50 mm thick metallic hardener finish is not required to be provided in paved area. Paving shall also be provided in HGTU and VGTU area.</p> <p>Heavy duty paving shall be provided inside the building(Gypsum storage shed) if any vehicular movement is envisaged.</p> <p>Finished Floor level of all buildings shall be kept at least 500 mm above the finished grade / formation level.</p>		
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5.23.21	<b>Brickwork and allied masonry works</b>  Brickwork cladding for various structures shall be so provided that there is a clear gap of 40 mm between inside face of external brick wall and outside face of column flange. Structural steel wall beams supporting brickwork shall be provided at a maximum spacing of 3m and suitably encased with plaster or 1:2: 4 concrete as the case may be. In case of box type steel beam, encasement shall be done with cement sand plaster in specified thickness and proportions over G. I. wire netting of 0.9 mm thickness.  50 mm thick Damp proof course shall be provided at plinth level for all brick wall.			
5.23.22	<b>CONCRETE</b>  Refer General Specification.			
5.23.23	<b>De-watering of Deep Excavations</b>  For deep underground structures like wagon tippler/track hopper, tunnels and underground transfer houses, requiring open excavation with extensive de - watering, completely dry working conditions during excavation, shuttering, placement of reinforcement, concreting, water proofing of structures, backfilling and any other operation shall be maintained by suitable de - watering method of suitable capacity.			
5.23.24	<b>Galvanising</b>  All burrs and irregular edges of the structural steel members to be galvanised shall be ground smooth before galvanising.  Purity of Zinc to be used for galvanising shall be 99.5 % as per IS : 209 (latest edition).  The weight of the zinc coating shall be at least 610 Gms. / m <sup>2</sup> unless noted otherwise.			
5.23.25	<b>CHEMICAL INJECTION GROUTING</b>  Minimum, 12 mm dia ( NB ) threaded nozzle of suitable length, shall be provided over the surface and along the construction joint line in a grid pattern at a spacing not exceeding 1.5 m c / c before concreting operation. Adequate precaution shall be taken to keep the nozzles plugged at both ends to prevent them from getting closed by concrete.  For fixing of any nozzle in set concrete suitable size hole shall be drilled, preferably by using repersive hammer drill electrically operated, in grid pattern and grouting nozzle shall be fixed in these holes.  After the nozzles are fully set, neat cement slurry admixed with water soluble non - shrink polymer / monomer based chemical shall be injected through the net - work of nozzles with low pressure grout pumps at a pressure of about 2.0 Kgs. / cm <sup>2</sup> . Cement slurry shall be prepared by mixing cement with non-shrink polymer/monomer @ 500 gm/50 kg bag of cement and water, ensuring that Water: Cement ratio does not exceed 2 (by weight). Wetter the structure, lesser should be the water cement ratio. The property of the polymer/monomer should be such that when it is mixed with water @0.5% by weight of water, the viscosity of the resultant solution (water and polymer/monomer) should not be more than 1.2 centipoises. Plasticizing agent shall be added wherever required. The grouting shall be started at very low			
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5.23.26	<p>pressure and increased gradually to a required pressure. The grouting shall continue, till the hole refuses to take any further grout, even at an increased pressure. Applied pressure shall not be more than the designed strength of the concrete. After completion of grouting operation, the nozzles shall be sealed properly to the satisfaction of the Engineer.</p> <p><b>POLYMER MODIFIED CEMENTITIOUS COATING</b></p>		
5.23.26.1	<p><b>Materials</b></p> <p>Modified liquid polymer blend shall be a dispersion containing 100 % acrylic based polymer solids. Polymer shall be mixed in the ratio of 1 cement: 0.5 polymer (for minimum solid content of polymer 30%).</p> <p>Portland cement based dry powder.</p> <p>Clean, fine specially prepared quartz sand approximately 0.6 mm size.</p>		
5.23.26.2	<p><b>Mixing</b></p> <p>The liquid polymer shall be stirred well and cement based powder shall then be added slowly to make a Slurry Mix. For preparation of Brush Topping Mix, quartz sand shall be added slowly and mixed well till a homogeneous mixture is obtained. The mix shall be used within half an hour of the preparation. Addition of quartz sand may not be necessary, in case dry power contains the same.</p>		
5.23.26.3	<p><b>Properties of Polymer Modified Cementitious Coating</b></p> <p>It must adhere to wet surface.</p> <p>It should develop adequate bond strength, with the concrete surface, not less than 2 N / Sq. mm.</p> <p>Co - efficient of permeability shall be about <math>5 \times 10^{-10}</math> Cm / Sec.</p> <p>Water absorption after continuous soaking shall not be more than 1 %.</p> <p>The materials shall be permeable under water vapour.</p> <p>The material shall be resistant to acids and alkalies present in the soil and underground water with normal pH value between 4 and 14.</p> <p>The co - efficient of thermal expansion of the material shall be close to that of concrete.</p>		
5.23.26.4	<p><b>Application</b></p> <p>The concrete surface shall be cleaned and made free from grease, oils or loosely adhered particles. The surface shall be damp without any free water. For exterior underground part, application (b) pertaining to Brush topping Mix shall be followed.</p> <p><b>(a) For Slurry Mix</b></p>		
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	<p>A minimum of 2 coats shall be applied on the surface. The first coat being applied, when the surface is still damp and left to harden for 4 to 6 hours. After 4 to 6 hours of the application of second coat, it shall be finished by rubbing down with a soft dry sponge. The coverage shall not be less than 1 : 1 Kgs. / m<sup>2</sup> in the 2 coats. A lap of 75 mm shall be provided at the joints.</p> <p>The coating shall be air dried for 4 to 6 hours and, thereafter, cured for 7 days after the application of last coat.</p> <p><b>(b) For Brush Topping Mix</b></p> <p>This shall be applied in two coats. A primary coat of slurry mix can also be first applied on the surface as first coat. After the coating has dried up, a coat of Brush Topping Mix shall be applied over it with a push broom or any other similar brush. It shall be left in broom finished condition. The nominal thickness shall be 1.5 mm and minimum thickness shall be 1.0 mm. A lap of 75 mm shall be provided at the joints. It shall be ensured that no pinhole exists and rebrushing shall be done to cover the pinholes, if any.</p> <p>The Coating shall be air dried for 4 to 6 hours and thereafter cured for 7 days after the application of last coat.</p> <p>Rate of application of coating shall be established to achieve the required thickness.</p>		
<b>5.23.27</b>	<b>Miscellaneous</b>		
<b>5.23.27.1</b>	Ordinary form work shall be used in roofs and floor slabs in transfer houses, footings, pedestals, cable trenches, pits etc., Plywood form work shall be used for all over ground exposed work like columns, beams, floors and ceilings in control room and M. C. C. buildings.		
<b>5.23.27.1</b>	Monorail girders and fixtures shall be provided for monorails at the locations as required and as described elsewhere in these specifications or drawings. Monorail openings in the walls shall be provided with steel frame doors preferably sliding type or otherwise open able inside, access platforms and ladders.		
<b>5.23.27.1</b>	<p>Steel frame around openings in roof and on external walls for mounting of exhaust fans shall be provided.</p> <p>Ready mix non - shrink cementitious grout of reputed manufacturer as approved by the Employer shall be used for grouting of block outs and foundation bolts, underpinning of base plates and machine bases. Crushing strength of grout shall be one grade higher than the foundation concrete. Minimum crushing strength shall be 30 N / mm<sup>2</sup> unless higher strength requirement is specified by the equipment supplier or the grout manufacturers.</p> <p>The bottom of steel in case of cable / pipe galleries and trestles shall be generally 3m above the ground except for rail / road crossing where it shall be 8m above the rail top / road crest/ground. Further in bunker areas it shall be 8 m above the ground.</p> <p>Polysulphide Sealing Compound shall be two-part polysulphide sealant and shall be from approved manufacturer, conforming to IS : 12118. Materials shall consist of polysulphide polymer and a curing agent. Gun grade material shall be used unless otherwise specified. The application of the sealant shall be strictly followed as per manufacturer's guidelines.</p>		
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	<p style="text-align: center;"><b>TECHNICAL REQUIREMENTS</b></p> 		
<b>5.23.28</b>	<p><b>SHOTCRETING</b></p> <p><b>General Requirements</b></p> <p>Generally, shotcreting shall be done in accordance with IS : 9012.</p> <p>Reinforcement for shotcreting shall be as detailed below, unless specified otherwise.</p> <p>(a.) Reinforcement in one direction consisting of 6 mm M. S. bars at 750 mm c / c shall be connected to the lugs for fastening of the wire fabric. This shall be used in case of 50 mm or above thick shotcreting.</p> <p>(b.) Wire fabric conforming to IS : 1566 shall be used as reinforcement and shall consist of wire, 3 mm diameter, spaced 50 mm both ways and shall be electrically cross welded. Wire fabric shall be securely tied to 6 mm bars for 50 mm thickness. Adjacent sheet of wire fabric shall be lapped at least 100 mm and tied.</p> <p>(c.) Clear cover to reinforcement mesh shall not be less than 15 mm.</p> <p>Minimum thickness of shotcreting shall be 50 mm for abrasion resistant work and 25 mm for ordinary surface protection work.</p> <p><b>Material</b></p> <p><b>Generally, the materials shall be in accordance with aggregates specification given here under.</b></p> <p>Fine aggregate shall consist of natural sand or crushed stone from a known source and shall be strong, hard, coarse, sharp, chemically inert, clean and free from any coating. It shall be free from clay, coal or coal residue, organic or any other impurities that may impair the strength or durability of the concrete and shall conform to IS : 383.</p> <p>Fine aggregate (Sand) shall be well graded and particles shall range in size within the following limits. The Engineer, may approved the use of any other grading as per requirement or as per IS : 9012.</p> <p>The fineness modulus shall be preferably between 2.5 and 3.3. Any other value can be used, with prior approval of the Engineer.</p> <p><b>Application</b></p> <p>After the placement of reinforcement and / or welded mesh and not more than six hours prior to the application of shotcrete, the surface shall be thoroughly cleaned of all loose materials and dirt. The Contractor shall properly prepare the surfaces, reinforcement and / or welded mesh to receive the shotcrete. Cleaned surfaces shall be wetted not more than hour prior to shotcreting.</p> <p>The mix as placed on surface shall be one part cement to three parts approved sand by mass. Cement and sand shall be dry mixed; not water shall be added after mixing and before using in the gun. The quantity of water when added shall be only that which is sufficient to hydrate the cement. For average atmospheric conditions, the water cement ratio for shotcrete in place shall be between 0.35 and 0.5 by mass. Suitable admixture shall be used wherever required.</p> <p>A uniform pressure of not less than 3 kg/cm<sup>2</sup> at the nozzle shall be maintained. Necessary adjustments shall be made to ensure this pressure, taking into account the length of hose and height of the place to be shotcreted, above location of the machine.</p>		
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	<b>TECHNICAL REQUIREMENTS</b> 		
5.23.29	<p>The application shall proceed in an upward direction. Beams, stiffeners and intermediate walls, if any, shall be wrapped with wire fabric and completely covered with shotcreting. All rebound shall be removed from the area of application as the work progresses and such rebound material shall not be reused.</p> <p>As soon as the freshly shotcreted surface shows the first dry patches, a fine spray of water shall be applied to keep too moist. After the surface has hardened, it shall be kept continuously moist for minimum seven days. If there is extreme heat, especially when accompanied by hot winds, the shotcreted surface, immediately upon completion, shall be covered with burlap or similar covering, which must be kept continuously moist for 14 days after shotcreting. The temperature of the lining shall not be permitted to exceed 38°C during placing and curing.</p> <p><b>VIBRATION ISOLATION SYSTEM</b></p> <p><b>These specifications are meant for the design, supply and erection of vibration isolation system for supporting coal crushers.</b></p> <p>Supporting Arrangement</p> <ul style="list-style-type: none"> <li>The crushers shall be supported on vibration isolation system consisting of steel helical springs and viscous dampers. The supporting arrangement for each crusher shall consist of an RCC deck supported on steel helical spring units and viscous damper units which in turn shall be supported on girders. The girders shall be an integral part of the crusher house building.</li> </ul> <p>The part of the structure consisting of the RCC deck, springs and viscous dampers shall hitherto be referred to as "spring supported foundation". The part of the structure, which is below the spring shall hitherto be called "supporting structure".</p> <p>The Contractor should do the Engineering / design, supply and erection of vibration isolation system consisting of steel helical spring units and viscous dampers supporting the top deck which in turn would support the coal crushers. The vibrations isolation system supplied shall be of a proven make. The Contractor or his sub - contractor who designs and supplies the system should have designed, supplied and installed such systems for not less than five machines of speeds and unbalance forces comparable to the machine proposed by the vendor. The vibration isolation systems installed by the contractor or his sub - contractor in such machines should have been working satisfactorily for atleast five years</p>		
5.24.00	<b>DELETED</b>		
5.25.00	<b>DELETED</b>		
5.26.00	<p><b>O&amp;M STORE BUILDING</b></p> <p>Salient Features:</p> <p>The scope of work of the Bidder shall be design &amp; construction of all Civil, Structural and Architectural, water supply, plumbing &amp; sanitary works of the O&amp;M store building including supply of all materials.</p> <p>The Permanent store Building shall comprise the following:</p> <p><b>a) Heavy Material Storage Hall</b></p> <p>The Heavy Material storage Hall shall have a Single Bay framed superstructure with RCC/Structural steel columns and structural steel roof truss and purlins supporting pitched roof. The roofing of the Heavy Material store shall be permanently colour coated insulated sandwiched metal sheet. An EOT crane shall be provided with chequered plate walkways</p>		
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	<div> <div> <b>TECHNICAL REQUIREMENTS</b> </div> <div>  </div> </div>		
	<p>at both ends inside the bay of the Heavy Storage Hall. The capacity of the EOT crane shall be 30MT. The clear height up to the bottom of roof truss of the Heavy material storage hall shall be finalized based on equipment/spare to be handled.</p> <p><b>b) Light Material Storage Hall</b> The Light Material Storage Hall with 3 tier Rack system shall have a Single Bay framed superstructure with RCC/Structural steel columns and structural steel roof truss and purlins supporting pitched roof. The roofing of light material store shall be permanently colour coated insulated sandwiched metal sheet. The light material store shall be fully covered with external brick wall of 250mm thickness with provision for doors, windows, rolling shutters as per architectural concept.</p> <p><b>c) General Light Material Storage Hall</b> The GERAL Light Material Store shall be RCC structure with cast in situ RCC beams &amp; slabs. The RCC building shall be two storied and all beam column joints shall be designed and detailed for adequate ductility.</p> <p><b>d) Office Complex</b> Office complex of this store shall be a single storeyed RCC building.</p> <p><b>Architectural Features</b> Total Floor area of the Permanent store building shall be 3000sqm. The minimum clear floor area of Heavy material storage hall shall be approximately 20% of the total area of the Permanent store with bay width of 15m Heavy material store shall have column free space for easy movement of materials. The Heavy Material storage hall shall be fully covered with external brick wall of 250mm thickness with provisions for doors, windows, rolling shutters as per architectural concept.</p> <p>The minimum clear floor area of Light Material Storage Hall (with 3 tier storage) shall be approximately 33% of the total floor area of the Permanent Store. The height of the Light Material Storage Hall (with 3 tier rack system) from ground floor slab to bottom of roof truss shall be 10.0m. A part of light material store shall have facility for storing electronic equipment / instruments. This particular area shall be air-conditioned for dust proof environment.</p> <p>The General Light Material Store shall be two storied building, completely covered with 250mm thick brickwork, doors, windows &amp; rolling shutters. The plan of the building shall be rectangular in shape with minimum floor area of approximately 20% of the total floor area of the Permanent Store.</p> <p>The area of the office complex building shall be approximately 17% of the total floor area of the Permanent Store, with clear height of 4.0m. The external Wall shall be 250mm thick brick wall with provisions for doors and windows.</p> <p>The central office shall be provided for management and monitoring the stored materials. Adequate space shall be kept for loading unloading of materials. Office shall space for Supervisor/In-Charge room, general office cum record-documentation area, toilets, pantry, etc. shall be provided as per requirement.</p> <p>All the above mentioned four buildings shall be interconnected by means of a covered passage 5.0m wide.</p> <p>External finish shall be of Premium Acrylic Smooth Paint with Silicone additives.</p>		
5.27.00	DELETED		
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	<b>TECHNICAL REQUIREMENTS</b> 		
5.28.00	<b>DOZER SHED</b>  <b>Architectural Feature</b>  This building shall be prefabricated steel framed structure with brick wall up to window sill height & prefabricated insulated double skin metal sheeting cladding above it. Roof of the building shall be prefabricated insulated double skin metal sheeting on steel roof truss. The building shall provide for Dozer shed space, Workshop space, Office Rooms, Stores, Toilet & Pantry as per functional requirement. Minimum size of the dozer shed shall be 500 Sq.m.  Metal side cladding shall be composed of different colour shades to match with the other buildings. External finish for brick walls shall be of Premium Acrylic Smooth Paint with Silicone additives		
5.29.00	<b>DELETED</b>		
5.30.00	<b>PARKING</b>  30 nos. of open car parking and 70 nos. of open scooter parking shall be provided in addition to all other parking requirements specified with buildings.		
5.31.00	<b>FQA BUILDING</b>  FQA building shall be RCC construction of single or double storey. Total area shall be decided based on the requirements based in QA chapter, however, minimum area shall not be less than 800 Sqm. Apart from space required to accommodate and operate all the equipments mentioned in the equipment list, office space for 5 executives, one meeting room, spectroscope room, NDT lab, storage room, welding booth, welding simulator area, platforms for instruments/equipments, ladies and gents toilets, space for water cooler and pantry has to be provided as per specifications mentioned elsewhere in the technical specifications.		
5.32.00	<b>DELETED</b>		
5.33.00	<b>Safety Control Room</b>  Safety control room shall be a single storied RCC framed building of minimum area 60sqm to accommodate equipments and personals as mentioned in C&I chapter for 24X7 operation. Additionally, it shall have ladies and gents toilet, space for water cooler and Pantry.		
5.34.00	<b>BIO TOILET</b>  Bio-Toilet shall be provided near all the modular worker's sheds/accommodation, the makeup water pump house building, CHP building outside the plant boundary. Besides these areas, any toilet block provided in area far from plant boundary shall be a Bio-toilet. Bio-toilets shall be made for anaerobic bacterial decomposition of human waste. After decomposition and treatment of the human waste, the residual water from Bio-Toilet shall be: colorless, odorless, devoid of any solid particles and shall have pathogen inactivation by 99%. The water thus obtained shall require no further treatment / waste management and shall be used for irrigation purposes. Bio toilet shall have all fixtures that shall include following fixtures besides the requirements stipulated by DRDO standards. a) One number wall mounted colored (excluding premium colors) glazed vitreous China European water closet and flushing valve system, water faucet, toilet paper holder as per IS:2556  or		
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	<p>One number white glazed vitreous China Orissa pan (580 x 440 mm) and flushing valve system, toilet paper holder as per IS:2256</p> <p>b) One number colour (excluding premium colors) glazed ceramic oval shaped wash basin 450x 550 mm (approx.) mounted over 20mm thick granite beveled edge counter fitted with photo-voltaic control system for water controls, bottle trap as per IS:2556. For common toilets, number of washbasins shall be as per requirement. However, for Pump Houses the same shall be provided without photo voltaic control system for water control.</p> <p>c) For Male Toilets Urinal as per requirements, with all fittings with photovoltaic control flushing system as per IS: 2556.</p> <p>d) One number looking mirror 600 x 900 x 6 mm, edge mounted with teak beading and minimum 12 mm thick plywood backing, one number stainless towel rail 600 x 20 mm, one number liquid soap dispenser</p> <p>Bio toilet/Bio digester shall be comprised of four compartments and a soak pit. The size of the tank shall be as per the number of users. This four-compartment tank shall be constructed underground and shall be made of FRP with required strength as stipulated by DRDO norms. The bio-toilet constructed shall have S-trap and ball valve for ease of operation and maintenance. It shall have all necessary arrangement and fixture for future operation and maintenance as per manufacturer guidelines.</p> <p>In addition to above sample collection provision(tap/alternate arrangement) to be made before reaching of treated effluent to soak pit. This is to ascertain the quality of effluent at all periods of time and this would also help in the seeding requirement of bacteria.</p>		
5.35.00	<p><b>NON-BIODEGRADABLE BUILDING</b></p> <p>The Building shall be as per Tender drawing</p>		
5.36.00	<p><b>WORKER'S ACCOMODATION BUILDINGS</b></p> <p>Worker's Accommodation shall be provided as per NBC requirement and Local factory act. The Building design shall be as per Tender Drawing. It shall have Brick wall around the Kitchen, Toilet, bathroom and washing area. It shall have Aerated Concrete panel wall with steel structure having sandwich panel roof sheeting.</p>		
5.37.00	<p><b>OTHER BUILDINGS</b></p> <p>For all other buildings mentioned in the scope of work but requirement not furnished in this chapter, the Bidder shall develop the details of such buildings based on the functional and statutory requirements.</p>		
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<b>D-1-6</b>	<b>DESIGN CRITERIA</b>		
6.01.01	<b>General</b>		
	The design criteria given herein is applicable for all sub-structure, super-structure works/ buildings/ facilities and various other works included in the scope of the Bidder.		
6.01.02	Structures shall be designed for the most critical combinations of dead loads, imposed loads, equipment loads, crane loads, piping loads (static, friction and dynamic), earth pressure & surcharge loads, hydrostatic & hydrodynamic loads, wind loads, seismic loads and temperature loads. In addition, Erection loads, loads and forces developed due to differential settlement shall also be considered.		
6.01.03	<p>i) All the buildings shall have framed super structure. If the superstructure of building is a steel structure, the framed superstructure shall be moment resisting sway frame in the lateral direction and axially braced in the orthogonal direction. For columns having depth of 1000mm &amp; above, the longitudinal bracings shall comprise a pair of members (spaced) with spacing equal to the column depth. Columns having depth less than 1000mm may have bracing in single plane and at the centerline of column. In both the cases (single bracing or pair of bracing) detailing shall be adequate to restrain the entire column cross-section including both the flanges. Only where axial bracing to one vertical plane is to be waived due to functional requirement, columns in that vertical plane may be allowed to undergo biaxial bending. Beam column joints shall be detailed as per seismic resistant joint with adequate ductility.</p> <p>All 2-legged structural steel trestles shall be completely braced in the vertical plane. All 4-legged structural steel trestles shall be completely braced in all four vertical planes. In addition, specified horizontal planes shall be completely braced to provide stiffness against torsional sway.</p> <p>If the superstructure is RCC structure, the superstructure shall be moment resisting sway frame in both orthogonal direction and all the members shall be designed for biaxial bending. Design of RCC structures shall be done as per IS 456. Detailing for ductility shall be followed as per guidelines of IS13920 to be effective against seismic load. Design of liquid retaining structures shall be done as per IS 3370.</p> <p>ii) The Bunker building, transfer towers, conveyor galleries and trestles, crusher house, boiler, ESP Control Building, ESP supporting structures, including inlet and exhaust duct support structures, Compressor House, Pipe cable Gallery shall have structural steel framed super structure.</p> <p>iii) All other buildings may have either RCC or structural steel framework.</p> <p>iv) All buildings having RCC framing shall have masonry cladding of minimum one masonry unit thickness (not less than 225 mm.) on exterior face.</p>		
6.02.00	<b>Loading</b> For consideration of loads on structures IS : 875 - 'Code of practice for structural safety of buildings' shall be followed. In addition to the dead load, live load, equipment load (including impact / vibration), Temperature loads etc. various loading conditions arising due to operation and maintenance of equipment shall be considered in the design.		
6.02.01	<b>Dead loads</b> Dead loads shall include the weight of structure complete with finishes, fixtures and partitions and shall be taken as per IS: 875 (Part-I)		
6.02.02	<b>Imposed loads</b> Imposed loads in different areas shall include live loads, erection, operation and maintenance loads. Equipment loads (which constitute all loads of equipment to be supported on the building frame) are not included in the imposed loads furnished below and shall be considered in		
LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW) EPC PACKAGE	TECHNICAL SPECIFICATION SECTION-VI, PART-B	SUB-SECTION-D-1-6 CIVIL WORKS DESIGN CRITERIA	PAGE 1 OF 25

CLAUSE NO.	TECHNICAL REQUIREMENTS		<div>एनटीपीसी NTPC</div>																																																																
	<p>addition to imposed loads.</p> <p>For consideration of imposed loads on structures, IS:875 (Part-2) “Code of practice for design loads (other than earthquake) for buildings and structures” shall be followed. The following minimum imposed loads as indicated for some of the important areas shall however be considered for the design. If actual expected load is more than the specified minimum load, then actual load is to be considered.</p> <table><thead><tr><th>Sl.No.</th><th>Location</th><th>Imposed Loads (T/Sq.m.)</th></tr></thead><tbody><tr><td>A)</td><td>Mill and Bunker Bay</td><td></td></tr><tr><td>i)</td><td>Ground floor</td><td>2.5</td></tr><tr><td>ii)</td><td>Feeder floor</td><td>0.50</td></tr><tr><td>iii)</td><td>Tripper floor</td><td>0.50</td></tr><tr><td>iv)</td><td>Roof</td><td>0.15 (Where no equipment are located) 0.50 (Where equipment are located)</td></tr><tr><td></td><td></td><td>0.075 (For Inaccessible roof)</td></tr><tr><td>B)</td><td>Turbine Building</td><td></td></tr><tr><td>i)</td><td>Ground floor (general)</td><td>2.50</td></tr><tr><td>ii)</td><td>Ground floor (heavy equipment storage area)</td><td>5.00</td></tr><tr><td>iii)</td><td>Mezzanine floor</td><td>1.00</td></tr><tr><td>iv)</td><td>Operating floor</td><td></td></tr><tr><td></td><td>a) Rotor Removal area</td><td>5.00</td></tr><tr><td></td><td>b) Equipment lay-down area</td><td>3.50</td></tr><tr><td></td><td>c) Other areas (corridors, etc.)</td><td>1.50</td></tr><tr><td>v)</td><td>Gratings, chequered floors, walkways, platforms, stairs, etc.,</td><td>0.50</td></tr><tr><td>vi)</td><td>Roof (Where no equipment is located)</td><td>0.15</td></tr><tr><td>C)</td><td>Deaerator and Heater Bay</td><td></td></tr><tr><td>i)</td><td>H.P/L.P. heater floor</td><td>1.00</td></tr><tr><td>ii)</td><td>Deaerator floor</td><td>1.00</td></tr><tr><td>iii)</td><td>Cable gallery (In addition to this, actual cable load</td><td>0.50</td></tr></tbody></table>				Sl.No.	Location	Imposed Loads (T/Sq.m.)	A)	Mill and Bunker Bay		i)	Ground floor	2.5	ii)	Feeder floor	0.50	iii)	Tripper floor	0.50	iv)	Roof	0.15 (Where no equipment are located) 0.50 (Where equipment are located)			0.075 (For Inaccessible roof)	B)	Turbine Building		i)	Ground floor (general)	2.50	ii)	Ground floor (heavy equipment storage area)	5.00	iii)	Mezzanine floor	1.00	iv)	Operating floor			a) Rotor Removal area	5.00		b) Equipment lay-down area	3.50		c) Other areas (corridors, etc.)	1.50	v)	Gratings, chequered floors, walkways, platforms, stairs, etc.,	0.50	vi)	Roof (Where no equipment is located)	0.15	C)	Deaerator and Heater Bay		i)	H.P/L.P. heater floor	1.00	ii)	Deaerator floor	1.00	iii)	Cable gallery (In addition to this, actual cable load	0.50
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