

SECTION 3

ENCLOSURES TO THE SPECIFICATION

- (a) NTPC Technical Specification Document No CS-1240-572D-2
- (b) NTPC Indicative Field Quality Plan

NTPC Limited
(A Govt. of India Enterprise)



**RIHAND SUPER THERMAL POWER
PROJECT STAGE-III**

SECTION –VI

TECHNICAL SPECIFICATION

FOR

**400/132 kV SWITCHYARD EXTENSION
PACKAGE**

BID DOCUMENT No. CS-1240-572D-2

SECTION – VI

(TECHNICAL SPECIFICATION)

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PART-II
TECHNICAL SPECIFICATION
CIVIL


CHAPTER – C0:
SWITCHYARD CIVIL WORKS

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TECHNICAL SPECIFICATION
CIVIL

CHAPTER – C0: SWITCHYARD CIVIL WORKS

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1.00.00	<p style="text-align: center;">SWITCHYARD CIVIL WORKS</p> <p>GENERAL</p> <p>This chapter includes the technical requirements for Rihand STPP Switchyard extension package including associated design and preparation of all civil & structural drawings and execution of all associated civil works. This Chapter deals mainly with technical specifications for the design, supervision and construction of complete civil & structural works complete under the scope of this contract.</p> <p>The specifications are intended for general description of work, quality and workmanship. The specifications are not however exhaustive to cover minute details and the work shall be executed according to relevant latest Indian Standards / IRC or IRS Specifications. In the absence of the above, the work shall be executed according to the best prevailing practices in the trade, recommendations of relevant American or British Standards or to the instructions of Engineer. The List of IS standards / IRC or IRS specifications to be followed are mentioned in the technical specifications. They shall be latest edition / version of the same issued 15 days prior to the date of opening of this tender. The Bidder is expected to get himself clarified on any doubts about the specifications etc. before bidding, and the discussions recorded in writing with the Employer in respect of interpretation of any portion of this document.</p> <p>This specification covers design, preparation of general arrangement drawings, construction and fabrication drawings, supply of materials and construction of all civil, structural and architectural works.</p> <p>Description of various items of work under this specification and nature of work in detail are given hereinafter. Complete work under this scope is referred to as civil works. List of various civil works covered under the scope is given in Part-A and herein.</p> <p>The work to be performed under this specification consists of design, engineering and providing all labour, materials, consumable, equipment, temporary works, temporary storage sheds, temporary labour and staff colony, temporary site offices, constructional plant, fuel supply, transportation and all incidental items not shown or specified but reasonably implied or necessary for completion and proper functioning of the plant, all in strict accordance with the specifications and including revisions and amendments thereto as may be required during execution of the work.</p> <p>All materials including cement, reinforcement steel and structural steel etc. shall be provided by the Bidder. The material arranged by the contractor shall conform to quality standard specified elsewhere in the specification and shall be procured from licensed agencies / sources only with prior approval of Employer.</p> <p>The scope shall also include setting up by the Bidder a complete testing laboratory in the field to carry out all relevant tests required for the civil works for the project. Minimum facilities as specified in Sub-section-QA (Civil Work) shall be provided by the Bidder in this laboratory.</p>	

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	<p>For his site office and covered store buildings, the contractor shall adopt pre-engineered / pre-fabricated constructions made of steel with single / double skin, insulated or uninsulated roof and wall coverings (fabricated out of permanently color coated metal sheets). Alternatively, contractor can adopt readymade 'Portacabin' or similar construction. Contractor shall ensure that all such constructions are well engineered, neatly constructed and overall present a pleasing look.</p> <p>In line with Gazette Notification on Ash Utilisation issued by MOEF and its amendment thereafter, contractor shall use ash and ash based products in works as specified in these specifications, drawings and as per instructions of the Engineer. He shall also use ash and ash based products in construction of his offices, stores, staff quarters and labour huts etc. He shall furnish a compliance report along with all details of use of ash and ash based products along with each bill.</p> <p>Contractor shall establish/ set up at site suitable repair facilities for construction plant, equipment and machinery (like piling rigs, cranes, batching plant, dewatering pumps etc.). In case of piling rigs, cranes, batching plant etc. he will also make arrangements/ tie up with equipment manufacturers/ suppliers for periodic overhaul/ maintenance and for major breakdown, if any. He shall also keep adequate stock of spares at site for various plant, equipment and machinery to meet day to day requirements as recommended by the equipment manufacturer/ suppliers or as instructed by the Engineer. Contractor shall deploy dedicated qualified, full time mechanical/ electrical foreman/ supervisors for manning the repair facilities as specified above.</p> <p>The work shall be carried out according to the design/ drawings to be developed by the Bidder and approved by the Employer. For all building & structures, foundations, etc., necessary layout and details are to be developed by the Bidder keeping in view statutory & functional requirements and providing enough space & access for operation, use and maintenance. Certain minimum requirements are indicated in this specification for guidance purpose only. However, the Bidder's offer shall cover the complete functional requirements as per the best prevailing practices and to the complete satisfaction of the Employer.</p> <p>All the quality standards, tolerances, welding standards and other technical requirements as covered in this specification shall be strictly adhered to by the Bidder.</p> <p>The Bidder should fully appraise himself of the prevailing conditions at the proposed site, locations of adjoining facilities/ structures, climatic conditions including monsoon pattern, local conditions and site specific parameters and shall include for all such conditions and contingent measures in the bid, including those which may not have been specifically brought out in the specifications</p> <p>The Bidder shall take all necessary precautions to protect all the existing equipments, structures, facilities & buildings if applicable etc. from damage. In case any damage occurs due to the activities of the Bidder on account of negligence, ignorance, accidental or any other reason whatsoever, the damage shall be made good by the Bidder at his own cost to the satisfaction of the Engineer. The Bidder shall also take all necessary safety measures, at his own cost, to avoid any harm / injury to his workers and staff from the equipment & facilities of the power station.</p>	

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2.00.00	<p>During the progress of work, the Engineer will exercise supervision of the work to ensure that the technical provisions of the contract are being followed and the work is being executed accurately and properly. However, such supervision shall in no way relieve the Contractor of the responsibility for executing the work in accordance with the specifications.</p> <p>Before submitting the bid, the Bidder shall inspect and examine the site and its surroundings and shall satisfy himself as to the nature of the ground and subsoil, the availability of materials necessary for completion of the work, means of access to site and in general shall himself obtain all necessary information as to risks, contingencies and other circumstances which may influence or affect his offer. No extra claim consequent on any misunderstanding or otherwise shall be allowed.</p> <p>The layout and levels of all structures etc. shall be made by the Contractor at his own cost from the general grid of the plot and bench marks given by the Engineer. The Contractor shall give all help in instruments, material and men to the Engineer, at no extra cost, for checking the detailed layout & correctness of the layout and levels. However the Contractor shall be solely responsible for their correctness.</p> <p>SUBMISSIONS</p> <p>The following documents shall be submitted by the Bidder for approval of the Employer, prior to commencement of fabrication and erection / construction. This list is not exhaustive but indicative only:</p> <ol style="list-style-type: none"> 1. G. A. drawing showing co-ordinates of various Gantry structures and facilities. 2. Drawing showing underground facilities with co-ordinates of all facilities such as Tower/LM foundations, equipment foundations, Transformer/Reactor foundations R.C.C cable trenches, cable ducts, drains, sump pits, culverts, other foundations etc. 3. Proposed erection / construction scheme for various structural and civil works envisaged as per design requirement. 4. Foundation design & drawing for equipment supports, their control cubicles, bus post supports and bay marshalling kiosks 5. Details of RCC cable trenches and duct banks with necessary precast RCC removable covers with lifting facility, sump pits, cable tray supports etc. 6. Foundation design & drawing for Inter Bus Transformers (IBT) / Shunt reactors / Misc. transformers/ LT Transformers as required including associated rail tracks, oil soak pits, oil separation pits, firewall etc. 7. Design & drawing of roads and drains including road/drain/trench crossings. 8. Site preparation, soil sterilization / antiweed treatment including gravel filling, but excluding major leveling as required. 9. Fencing along with gate for the switchyard wherever required 	

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	<p>10. Structural steel fabrication drawings and Reinforcement bar bending schedules for reference.</p> <p>11. Electronic soft copy of all the approved drawings/calculations in Cat-II / Cat-I.</p>										
3.00.00	DESIGN CRITERIA										
3.01.00	General										
3.01.01	All switchyard structures and buildings including Control Room Building Gantry Towers & Beams, Lightning mast, Equipments supporting structures, Switchyard bay KIOSKS, Transformer foundations including oil pit, rail track, fire wall, cable trenches, Roads, Culvert, Drains, sewers, water supply, fencing with gates, gravel filling & antiweed treatment, disposal of soil, leveling/dressing of switchyard area etc. and other related works all complete are covered in the specification.										
3.01.02	Structures shall be designed for the most critical combinations of dead loads, imposed loads, equipment loads, crane loads, piping loads (static and dynamic), wind loads, seismic loads and temperature loads. In addition, loads and forces developed due to differential settlement shall also be considered.										
3.02.00	Loading										
3.02.01	Dead Loads										
	Dead loads shall include the weight of structure complete with finishes, fixtures and partitions and shall be taken as per IS: 875 (Part - I).										
3.02.02	Imposed Loads										
	<p>Imposed loads in different areas shall include live, 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 addition to imposed loads.</p> <p>For consideration of imposed loads on structures, IS: 875 (Part – II) “Code of practice for design loads (other than earthquake) for buildings & 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 data-bbox="395 1713 1436 1937"> <tr> <td>a)</td><td>Roofs</td><td>150 Kg / Sq.m</td></tr> <tr> <td>b)</td><td>Building floors</td><td>1000 Kg / Sq.m</td></tr> <tr> <td>c)</td><td>RCC floors (General) outdoor platforms</td><td>500 Kg / Sq.m</td></tr> </table>	a)	Roofs	150 Kg / Sq.m	b)	Building floors	1000 Kg / Sq.m	c)	RCC floors (General) outdoor platforms	500 Kg / Sq.m	
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	d)	Stairs, Landing and Balconies	500 Kg / Sq.m	
	e)	Toilets	200 Kg / Sq.m	
	f)	Chequered plates, Grating Floors etc.	500 Kg / Sq.m	
	g)	Walkways	300 Kg / Sq.m	
	h)	Roads	As per IRC and MOST	
	i)	Road Culverts and its allied structures including RCC pipes Crossings & Road Crossings of Trenches	Design for Class - 'AA' loading (wheeled and tracked both) and checked for Class - 'A' loading as per IRC standards.	
	j)	Underground structures such sumps, pits, trenches, drains etc.	In addition to the earth pressure and ground water pressure, the surcharge of 2000 Kg / Sq.m shall also be considered.	
	k)	Cable Trench Covers	400 Kg / Sq.m (General)	
	l)	Rail Culverts	As per Railway 'Bridge Rules'	
3.02.03	Equipment loads Loads of all equipment like Electrical control and relay panels, cable load, Pipe load (static and dynamic), Tanks, etc. shall be considered over and above the imposed loads. Cable and piping loads not less than 5 kN/sq.m hanging from the underside, shall also be considered additionally for floors where these loads are expected			
3.02.04	Crane Loads For crane loads, an impact factor of 25% and lateral crane surge of 10% (of lifted weight + trolley weight) shall be considered in the analysis of frame according to the provisions of IS: 875. The longitudinal crane surge shall be 5% of the static wheel load. Monorail load shall be considered in the analysis of frame according to provisions of IS: 875 (latest revision).			
3.02.05	Wind Load a) Switchyard gantries, towers, equipment supporting structures and lighting 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 (V_b) and terrain category			

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	<p>as stipulated in "Criteria for wind resistant design of structures and equipment" Appendix-I of Part-I of this specification.</p> <p>b) All other structures covered under the present package 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" Appendix-I of Part-I of this specification.</p>	
3.02.06	<p>Seismic Load</p>	
	<p>Seismic forces shall be considered as specified in Appendix-II of Part-I of this specification. Response spectrum method shall be used for the seismic analysis using at least first five modes of vibration.</p>	
3.02.07	<p>Temperature Load</p>	
	<p>For temperature loading, the total temperature variation shall be considered as 2/3 of the average maximum annual variation in temperature. The average maximum annual variation in temperature for this purpose shall be taken as the difference between the mean of the daily minimum ambient temperature during the coldest month of the year and mean of daily maximum ambient temperature during the hottest month of the year. The structure shall be designed to withstand stresses due to 50% of the total temperature variation.</p>	
	<p>Suitable expansion joints shall be provided in the longitudinal direction wherever necessary. The maximum distance of the expansion joint shall be as per the provisions of IS: 800 and IS: 456-2000 for steel and concrete structures respectively.</p>	
3.03.00	<p>Design Concepts for RCC Structures</p>	
3.03.01	<p>The different load combinations shall be taken as per IS: 875 (Part-V) and other relevant IS Codes. Wind and seismic forces shall not be considered to act simultaneously.</p>	
3.03.02	<p>The design and fabrication of steel structures shall be as per provisions of IS: 800 and other relevant IS standards. Flanges and web of crane girder and monorail hoist beams should not have any joints between the supports.</p>	
3.03.03	<p>All structures close to railway line shall have clearances conforming to Railway norms.</p>	
3.03.04	<p>a) Dispersion of load in any direction through soil shall be as per IS: 8009 (relevant part)</p>	
	<p>b) Dispersion of load through concrete shall be considered at an angle of 45 degree with horizontal from the edge of contact area.</p>	
3.03.05	<p>The design and construction of RCC structures shall be carried out as per IS: 456 - 2000. Generally limit state method as per IS: 456 shall be used for design and working stress method shall be adopted for the design wherever specifically mentioned in this specification.</p>	

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	<p>For design and construction of steel - concrete composite members, IS: 11384 shall be followed.</p> <p>For reinforcement detailing, IS: 5525 and SP: 34 shall be followed.</p> <p>Two layers of reinforcement (on inner and outer face) shall be provided for RCC wall sections having thickness more than 150mm.</p>	
3.03.06	For design of all underground structures/ foundations, ground water table shall be considered at the finished ground level.	
3.03.07	Earth pressure for all underground structures shall be calculated using coefficient of earth pressure at rest, coefficient of active or passive earth pressure whichever is applicable depending upon the structural configuration.	
3.03.08	The storm water drainage shall be designed taking into account the finished grade level of the surrounding area, area drainage pattern around the area, intensity of rainfall etc. The maximum velocity for pipe drains and open drains shall be limited to 2.4m/ sec and 1.8 m/ sec. respectively. However, minimum velocity of 0.6m/ sec. for self cleansing shall be ensured. Bed slope not milder than 1 in 1000 shall be provided. Maximum rainfall intensity for design of drain shall be in line with the provisions given elsewhere in this specification.	
3.04.00	Design Parameters for Gantry Towers & Beams, Lighting Mast and Equipment Supporting Structures	
3.04.01	Gantry structure, which consists of open web towers connected by girders, shall be made of structural steel conforming to Grade IS:2062 or IS:8500 and duly galvanized conforming to IS: 2629 and IS: 4759. All joints shall be bolted connections.	
3.04.02	All bolts for connections shall be of 16mm dia conforming to IS: 12427, property class 5.6 as specified in IS: 1367 (Part 3). Nuts shall conform to I.S 1363 (Part 3) of property class 5. Foundation bolts shall conform to IS: 5624, property class 4.6 as specified in IS: 1367 (Part 3).	
3.04.03	Butt splice shall be used for splicing the main members and splice shall be located away from the node point.	
3.04.04	IS: 802 "Code of practice for use of structural steel in overhead transmission line towers" shall be followed for design of structures. Height & 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 200 m for design purpose.	
3.05.00	<p>Loads and Loading Conditions</p> <p>Switchyard structures shall be designed for the worst combination following loads:</p>	

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3.08.00	<p>The supporting structure for B.P.I., LA, CVT and Isolator equipment's shall be comprised of GI (ERW) pipe of grade YST:210 or of higher grade conforming to IS: 1161 & 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 400kV structure shall be 250NB and that for 132kV shall be 200NB.</p> <p>The supporting structure for CT & Wave Trap equipment shall be comprised of lattice structural steel conforming to IS 2026 and shall be designed as per IS: 802.</p> <p>Common raft foundation shall be provided for each pole of isolator.</p> <p>Special design consideration for Lightning Mast:</p> <p>Diagonal wind condition shall be considered for Lightning Mast. Provision of IS: 875(Part-III) shall apply for inclined wind condition. Lightning mast shall be provided with minimum two nos. of platforms as per requirement and an internal ladder for climbing purpose shall be provided up to the platforms. Top of platform shall have grating, railing and two guard plates. The minimum width of platform shall be 900mm.</p> <p>Live load of 300kg/m² above platforms shall be considered for design of Lightning Mast.</p> <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 galvanized.</p>	
	<p>3.09.00 Minimum Thickness of Members & Galvanization</p> <p>All steel work used in construction of switchyard structures such as Towers & Beams, Lightning mast and equipment supporting structures including nuts, bolts and washers shall be galvanized.</p> <p>Minimum section thickness shall not be less than 4 mm. Weight of zinc coating shall be at least 0.610 kg/m² and foundation bolts shall have heavier zinc coating of at least 0.80 kg/m².</p>	
	<p>3.10.00 Design consideration for Foundation</p> <p>Design of foundation shall be as per IS: 4091 "code of practice for design and construction for transmission line tower and poles".</p> <p>The F.O.S. for foundation shall be 10% more than factor of safety for supporting structure i.e. 2.2 for normal condition and 1.65 for short-circuit condition</p>	
	<p>4.00.00 TRANSFORMER/REACTOR FOUNDATIONS</p> <p>Foundations of transformer/reactors shall be designed for the higher of seismic or wind loads. Block foundations shall be provided for the main transformer block.</p>	

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	<p>Oil soak pits shall be provided around the transformers/reactors to prevent spillage of oil from transformers onto the ground. The oil soak pit shall be filled with gravel of size 40mm. The volume of the soak pit shall be sufficient to store complete oil of the transformer along with 10 minutes of fire water considering only 40% of the volume available as voids between gravel filling. However, in case a separate oil collection tank is provided for the transformer/reactor, the minimum volume of oil soak pit around transformer shall be provided as one-third of the oil volume of transformer/reactor. The oil collection tank, in such cases, shall be designed for an effective capacity of complete oil of the transformer along with 10 minutes of fire water. The oil soak pit shall also be provided with a sump at the corner to allow drainage of water/oil from the soak pit.</p> <p>Arrangement for moving the transformer in 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>Firewall shall also be provided between the transformers wherever required.</p> <p>300 mm thick PCC M20 encasement all around the Pylon supports for fire fighting system shall be carried out up to top of gravel filling. However, the supply and erection of Pylon supports with anchor fasteners for HVW spray system are under scope of FDPS contractor. Coarse aggregate filling inside the transformer oil soak pit shall be carried out only after construction/erection of Pylon supports and PCC encasement.</p>	
5.00.00	<p>GRAVEL/STONE FILLING</p> <p>Gravel/stone filling shall be provided as per electrical requirement. Each layer shall be compacted by using half ton roller with 4-5 passes and suitable water sprinkling. Before laying the gravel/stone fill, 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.</p> <p>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.</p>	
6.00.00	<p>CABLE TRENCHES</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 RCC covers shall be as per tender drawing. 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</p>	

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7.00.00	<p>lugs shall be provided in the edges of RCC cable trenches and any other place where breakage of corners of concrete is expected.</p> <p>SWITCHYARD DRAINS</p> <p>Open RCC storm water drains shall be provided on both sides of the road and shall be designed to drain the road services as well as all the free and covered areas, etc. as shown in Tender Drawing. All drains shall be designed for maximum runoff velocity of 1.8 m/sec. The thickness of side wall and bottom slab of RCC drains shall be minimum 100 mm or as per design consideration whichever is higher. RCC box/pipe culvert shall be provided for road, rail and trench crossings.</p>	
8.00.00	<p>SWITCHYARD ROAD</p> <p>Roads for the switchyard area shall be of single lane roads with 3.75m wide black topping along with 1.0 m wide shoulder on either side. The base and sub base of the road shall be of water bound macadam. All roads shall be constructed as per section shown in Tender Drawing including edging and shoulder. Finished top of road shall be 300 mm above the surrounding ground level.</p> <p>Road construction including bitumen macadam, water bound macadam base and sub-base shall be as per IRC standards. For premix carpet, recommendation of IRC-14 shall generally be followed.</p>	
9.00.00	<p>CHAIN LINK FENCING</p> <p>Chain link fence and fixing detail including materials, all quality control tests and checks etc. for the work shall be as per IS:2721. The fence shall comprise of PVC coated G.I. chain link fencing of minimum 4 mm dia wire including PVC coating and with 2.5 mm dia GI bare wire with mesh size of 75X75 mm and of a height 2.5 m above the toe wall with a 600 mm high galvanised concertina at the top, such that total fence height of 3.1m above toe wall level is achieved. Toe wall shall be minimum 200 mm above the formation level/natural ground level (NGL).</p> <p>The PVC coated chain link wire mesh will be stretched and attached by clips at 0.5 m intervals to 3 strands of High Tensile Spring Steel (HTSS) wire of 4 mm dia interwoven in chain link wire mesh and kept under tension which in turn are attached to the fence post with security nuts and bolts. On every fourth post a clamping strip will be threaded through the links of chain link and bolted to the fence post with the help of security nuts and bolts. All nuts, fasteners, bolts, clamping strips, clamps, clips, etc. shall be galvanised.</p> <p>Above the chain link fence a 600 mm High Tensile Serrated Wire (HTSW) galvanised Concertina shall be provided at a maximum spiral pitch of 300mm and attached to 3 strands of HTSS wire by means of 'C' clips at 1 m intervals. The 3 HTSS wire strands will be attached to angle iron posts with 1/2" security fasteners.</p> <p>All bolts provided in the fence work shall be minimum 12 mm diameter. Length of all bolts shall be such that after fixing in position it shall have at least 12 mm projected length beyond the nut. All nuts & bolts shall be high quality as per BIS standard and heavy duty galvanized. The threads of projected length of the all bolts beyond nut</p>	

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	<p>after fixing in position shall be destroyed by hammering or by any suitable means to protect from any possible theft by miscreants.</p> <p>All fence posts shall be 75X75X6 MS angles spaced at 2.5m c/c distance. All straining posts i.e. end posts shall be 75X75X6 MS angles. All corner posts will have two stay posts and every tenth post will have a transverse stay post.</p> <p>Concrete foundations for the angle iron posts and stays shall be provided. Toe walls of brick masonry with bricks of minimum 75 kg/cm² compressive strength shall be provided between the fence posts all along the run of the fence with foundation. Toe wall shall be minimum 200 mm above the formation level with 75 mm thick PCC coping (1:2:4).</p> <p>M. S. Gate of minimum 4.0 mts wide and 2.25 mts. high shall be provided to provide access through the fencing. It shall be made in two leafs with locking arrangement. Hinges, aldrops, guide tracks, ball and bearing arrangement, castor wheel and other accessories shall be provided for effective working of the gate.</p> <p>All MS angles used in posts and gates shall be finished by blast cleaning of steel surfaces to near white metal surface (Sa 2 ½ Swedish standard) and applying inorganic zinc silicate primer of minimum 75 microns (DFT), followed by an intermediate coat of minimum 75 micron (DFT) epoxy based titanium dioxide / micaceous iron oxide, followed by finish painting with Epoxy based colour pigmented finish Poly amide cured paint. All paints including primer shall be of reputed brand / manufacturer and as approved by the Engineer.</p>	
10.00.00	<p>CORROSION PROTECTION MEASURES</p> <p>All structural steel and RCC members/ structures shall have to be provided with corrosion protection treatment unless specified otherwise.</p>	
10.01.00	<p>Structural Steel</p> <p>Corrosion Protection</p> <p>i) General</p> <p>a) All Painting shall be done as per approved painting scheme of the Vendors/ Manufacturers, which shall be submitted by the Bidder and as approved by the Employer. Painting scheme shall also include Item codification/ Description of all Coats of Paints for manufacturer's, from whom the Paint is intended to be procured.</p> <p>b) All Steel structures (except those embedded in Concrete), unless specified otherwise shall be provided with painting as given below which is designed for a minimum maintenance free life of Ten (10) years (expected life, long range Ten (10) years & expected life, long range Ten (10) to Twenty (20) years , as per BS : 5493.</p> <p>c) All Paints shall be of high build constitution.</p> <p>ii) Painting of Steel Surfaces embedded in Concrete</p>	

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	<p>For the portion of Steel surfaces embedded in Concrete, the surface shall be prepared by Manual Cleaning and provided with Primer Coat of Chlorinated Rubber based Zinc Phosphate Primer of Minimum 50 Micron Dry Film Thickness (DFT).</p> <p>iii) Painting of Steel Surface</p> <ol style="list-style-type: none"> All Steel surfaces shall be provided with self curing Inorganic Zinc Silicate Primer Coat (Solid by Volume Minimum 60%) of Minimum 75 Micron Dry Film Thickness (DFT) applied over blast cleaned surface to near white metal conforming to Sa 2 ½ finish of Swedish standard SIS –05-5900. Primer Coat shall be followed with the application of Intermediate Coat of Polyamide Cured pigmented Titanium Dioxide (TiO₂) or Micaceous Iron Oxide (MIO) Epoxy based Paint (Solid by Volume Minimum 60%) of Minimum 75 Micron DFT. This coat shall be applied in Shop after an interval of Minimum overnight (from the application of Primer Coat). Intermediate Coat shall be followed with the application of Finish Coat of Polyamide Cured colour pigmented Epoxy based paint (Solid by Volume Minimum 60%) of Minimum 75 Micron DFT. This Coat shall be applied after an interval of Minimum overnight and maximum indefinite (from the application of Intermediate Coat) either before Erection by Airless spray technique or after Erection by brush and / or spray. Colour and shade of the Coat shall be as approved by the Employer. The Finish Coat thickness of 75 Micron can be built up either in Single application at Shop or in two applications one at Shop and the other at Site. Finish Coat shall be followed with the application of Final Finish Coat of Polyurethane based colour pigmented Paint (Solid by Volume Minimum 40%) of Minimum 30 Micron DFT. This Coat shall be applied within Seven (7) days (from the completion of Finish Coat) after Erection by brush and/ or spray. Colour and shade of the Coat shall be as approved by the Employer. <p>iv) Touch-up Painting on damaged areas</p> <ol style="list-style-type: none"> For Coatings damaged up to metal surface <p>Surface preparation shall be carried out by Manual Cleaning. Minimum 6 inches adjoining area with existing Coating shall be roughened by Wire brushing, emery paper rubbing etc., for best adhesion of patch Primer.</p> <p>Primer Coat of self-priming Epoxy Touch-up Primer applied by brush immediately after the surface preparation. (Minimum DFT 100 Microns).</p> <p>Over this Primer Coat, Intermediate Coat, Finish Coat and Final Finish Coat shall be applied as covered above by brush with Intermediate Coat applied within maximum seven (7) days of application of touch up Primer.</p> For Coatings damaged up to Intermediate Coatings (i.e. where Primer Coat is intact). 	

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10.02.00	<p>Damaged area including Minimum 6 inches adjoining area with existing Coating should be roughened by wire brushing emery paper rubbing etc., for best adhesion of patch Primer without damaging the Primer Coat.</p> <p>Touch-up Primer, Intermediate, Finish and Final Finish Coats shall be applied as specified above for Coatings damaged up to metal surface.</p> <p>v) Painting of Welded areas / painting of areas exposed after removal of temporary supports/ Touch-up Painting on damaged areas of Employer's Structures, where inter-connection, Welding/ modification etc. has been carried out by the Bidder.</p> <p>a) Clean the surface to remove flux spatters and loose rust, loose Coatings in the adjoining areas of Weld seams by wire brush and emery paper.</p> <p>b) Painting procedure to be followed as mentioned above for Touch-up Painting on damaged areas.</p> <p>vi) Coating for Mild Steel parts in contact with Water</p> <p>All mild Steel parts coming in contact with water or water vapour shall be hot dip galvanised. The Minimum Coating of zinc shall be 610 gms/ Sq. M. for galvanised Structures and shall comply with IS: 4759 and other relevant Codes. Galvanising shall be checked and tested in accordance with IS: 2629.</p> <p style="text-align: center;">OR</p> <p>All mild steel parts coming in contact with water or water vapour shall be painted with sealed sprayed zinc coating, conforming to BS:5493 (Table -3, part-8) for very long (20 or more) years of maintenance interval.</p> <p>vii) Gratings</p> <p>All gratings shall be blast cleaned to Sa 2 ½ finish of Swedish standard SIS-05-5900 and shall be hot dip galvanised at the rate of 610 gms / Sq.M.</p> <p>viii) Hand Railings and Ladders</p> <p>All handrails and ladders shall be galvanised at the rate of 610 gms / Sq.M as per IS: 4736.</p> <p>RCC Members (Superstructure)</p> <p>The following preventive measures are required to be adopted by the bidder as minimum requirement.</p> <p>i) For Indoor RCC Members</p> <p>a) Dense and durable concrete is to be used. Minimum grade of concrete shall be M25.</p> <p>b) Water/ cement ratio shall generally be restricted to 0.5. Plasticizer, if required may be used.</p>	

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10.03.00	<p>ii) For Outdoor (or exposed) RCC Members</p> <p>a) Dense and durable concrete is to be used. Minimum grade of concrete shall be M25.</p> <p>b) Water/ cement ratio shall generally be restricted to 0.5. Plasticizer, if required may be used.</p> <p>RCC Members (Underground Sub-Soil Condition)</p> <p>The type of corrosion protection measures for concrete reinforcement steel and structural steel for under ground structures/ facilities shall be as specified elsewhere in specification.</p> <p>Protective measures shall be according to Geotechnical investigation and foundation system. In addition Water/ cement ratio shall generally be restricted to 0.45.</p>	
11.00.00	MISCELLANEOUS SPECIFICATIONS	
11.01.00	Two - part polysulphide sealant conforming to IS: 12118 shall be used for sealing of joints.	
11.02.00	Preformed bitumen impregnated fibre board conforming to IS: 1838 shall be used as joint filler.	
11.03.00	Monorails, monorail girders and fixtures shall be provided, wherever required to facilitate erection/ maintenance of equipment.	
11.04.00	In design of all buildings fire safety requirements conforming to IS: 1641 and IS: 1642 shall be followed in addition to TAC requirements. The height of RCC fire protection wall between transformers shall be as per system requirement.	
11.05.00	Wherever possible all floor openings shall be provided with 100mm thick 150 mm high RCC kerb all around. MS Angles of minimum size 50 x 50 x 6 mm with 8mm dia - 150mm Long MS lugs @ 150mm c / c shall be provided for edge protection around all cutouts / openings in floor slabs / walls, edges of drains supporting grating / pre-cast covers, edges of cable trench supporting pre-cast covers or chequered plates, edges of manhole supporting covers, around periphery of all removable pre-cast covers and any other place where breakage of corners of concrete is expected.	
11.06.00	Grouting of all pockets, blockouts, sleeves and the openings around the embedment, inserts, bolts etc. and under pinning below the base / sole plate shall be with non - shrink flowable grout. Grade of grout shall be one grade higher than concrete. However minimum grade of grout shall be M - 30.	
11.07.00	<p>a) All drains inside the building shall have minimum 40mm thick grating covers. In areas where heavy equipment loads would be coming, precast RCC covers shall be provided in place of steel grating.</p> <p>b) Peripheral drains around building shall have perforated precast RCC covers of minimum 50mm thickness with provision of openable steel grating cover at about 4.0m interval. In areas where vehicular loads would be coming precast</p>	

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	RCC covers of suitable thickness without perforations and designed for the vehicular loading shall be provided.	
11.08.00	Anti termite chemical treatment shall be given to all vulnerable areas susceptible to termite including column pits, wall trenches, foundations of buildings, filling below the floors etc. as per IS: 6313 and other relevant Indian Standards.	
11.09.00	Wherever possible minimum 900 mm high hand railing shall be provided around all floor/ roof openings, projections/ balconies, platforms, walkways etc. All handrails and ladder pipes shall be 32 mm nominal bore MS pipes (medium class) conforming to IS: 1161 and shall be galvanised as per IS: 4736 and IS: 1239. All rungs and ladders shall also be galvanised. Minimum weight of galvanising shall be 610g/ sq.m.	
11.10.00	For RCC stairs, hand railing with 20 mm square M.S. bar balustrades with suitable M.S. flats and aluminium hand rail shall be provided.	
11.11.00	Suitable arrangement for draining out water collected from floor washings, fire fighting etc. shall be provided for each floor with suitable floor drains.	
11.12.00	Duct banks consisting of PVC conduits for cables shall be provided with proper sealing arrangement consisting of fire retardant sealing compound.	
11.13.00	Unless specified all sand filling shall be compacted to minimum 80% of the relative density and backfilled earth shall be compacted to minimum 90% of the Standard proctor density at OMC. However, sub - grade for the roads shall be compacted to minimum 95% of the Standard Proctor density at Optimum moisture content (OMC).	
11.14.00	All buildings shall be provided with peripheral drains by the side of plinth protection for catering to the rain water from roofs and storm water from adjacent area.	
11.15.00	Non - shrink flowable grout shall be used for under - pinning work below base plates. Nominal thickness of grout shall be 50 mm. Non - shrink cum plasticizer admixture shall be added in the grout. Crushing strength of the grout shall generally be one grade higher than that of the base concrete. Minimum grade of grout shall be M-30.	
11.16.00	Suitable expansion joints shall be provided in the longitudinal direction wherever necessary with provision of twin columns.	
11.17.00	The building auxiliary services like air conditioning and ventilation systems, fire protection and detection systems and all other miscellaneous services shall be designed in accordance with the requirements specified in relevant section or elsewhere in this Specification.	
11.18.00	The building lighting shall be designed in accordance with the requirements of relevant section.	
11.19.00	Plywood formwork shall be used for all concrete works	
11.20.00	Water supply line and drainage of buildings shall be connected to the drainage network	


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11.21.00	Design, construction and joints of all the structures shall be as per relevant Indian Standard Codes unless specified otherwise.	
11.22.00	All foundation embedments, inserts, blockouts required for mounting of equipments and supporting any other facility like pipes etc. shall be provided.	
11.23.00	All cable trenches shall be provided with suitable insert plates for fixing support angles of cable trays.	
11.24.00	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.	
11.25.00	Earthing mat shall be provided around buildings and structures as per specifications / approved drawings.	
11.26.00	Detailed scheme for dewatering shall be prepared before starting of deep excavation work. IS: 9758 shall be followed as general guidance for dewatering.	
11.27.00	Broad gauge rail (52kg/m minimum) shall be used for rail tracks required for movement of ICT/Shunt Reactor.	
12.00.00	REQUIREMENTS FOR CONCRETE	
12.01.00	Structural concrete shall be of design mix complying with the relevant provisions of IS Codes or any International Code of Practice as approved by the Employer. All concreting shall be carried out using centralized batching plant, transit mixers and concrete pumps. Numbers and capacity of batching plant, transit mixers and concrete pumps to be deployed by the bidder to achieve the required progress of work shall be specified in the relevant schedules of the bid documents.	
12.02.00	Minimum grade of structural concrete shall be M25 as follows conforming to IS: 456: Blinding concrete below foundations, cable trenches shall be 75mm thick PCC of minimum grade M-7.5 and under brick foundations minimum 150mm thick PCC of minimum grade M-10.	
12.03.00	Coarse and fine aggregates shall be specially selected to ensure that they are not susceptible to alkali/ chloride attack or prone to disintegration at high temperatures. In particular, limestone aggregates shall never be used. The maximum size of coarse aggregate shall not be larger than 1/8th of narrowest dimension between reinforcement bars nor more than 20 mm.	
12.04.00	Washing and screening of coarse and fine aggregates to remove fines, dirt of other deleterious materials shall be carried out by approved means if desired by the Employer.	
12.05.00	The maximum water cement ratio by weight shall be 0.45 or 0.50 as specified elsewhere, including moisture in the aggregates, and slump should be suitably decided to provide good quality concrete work, as specified elsewhere in the specification.	


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12.06.00	<p>Admixture</p> <p>Admixtures may be permitted to be used in accordance with relevant IS codes to modify the rate of hardening or setting, to improve workability or as an aid to control concrete quality. The Employer reserves the right to direct the Bidder to conduct laboratory tests or use test data, or other satisfactory reference before granting approval. The cost of all tests conducted shall be borne by the Bidder. The admixture shall be used in strict accordance with the manufacturer's directions and/ or as directed by the Employer. No extra payment will be made to the Bidder on account of using admixtures.</p>	
12.07.00	<p>Removal of air and water at the form surface shall be by vibration and rodding. Particular attention shall be paid to accurately shape the corners at the openings.</p>	
12.08.00	<p>Point of discharge of the concrete in to the forms shall be 1500 mm above the concrete surface. Concrete shall be deposited in layers of approximately uniform level not greater than 400 mm deep unless permitted otherwise.</p>	
12.09.00	<p>Sampling and testing of concrete shall be carried out as stated elsewhere in Technical Specification and as per relevant Indian Standard Codes.</p>	
12.10.00	<p>Cover to Reinforcement</p> <p>Unless indicated otherwise the clear concrete cover for reinforcement shall be as per IS Codes.</p> <p>The correct cover shall be maintained by cement mortar cubes or other approved means. Reinforcement for footings/ pile caps, grade beam, and slabs on subgrade shall be supported on precast concrete cover block as approved by Employer. The use of pebbles or stones as cover blocks shall not be permitted.</p>	
12.11.00	<p>The 28 days crushing strength of cement mortar cubes/ precast concrete cover block shall be atleast equal to the specified strength of concrete in which the cubes/ blocks are embedded.</p>	
12.12.00	<p>The minimum clear distance between reinforcing bars shall be in accordance with IS: 456 (Latest edition) or as specified elsewhere in this specification.</p>	
12.13.00	<p>All lapping of reinforcement bars shall be by lapping as per relevant codal provisions. Prior approval of the Employer shall be taken for deciding the method of lapping the reinforcement bars.</p>	
13.00.00	<p>MATERIALS</p>	
13.01.00	<p>Cement</p>	
	<p>Ordinary portland cement of Grade 43 conforming to IS : 8112 or fly ash based portland pozzolana cement conforming to (IS : 1489 Part -1) with minimum 28 days compressive strength of 43N/mm² shall be used for all concrete construction. However, in place of fly ash based portland pozzolana cement, OPC mixed with fly ash can be used. Batching plant shall have facility for mixing fly ash. Fly ash shall conform to IS 3812 (Part I & Part II). Percentage of fly ash to be mixed in concrete</p>	

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13.02.00	<p>shall be based on trial mix. Mix design shall be done with varying percentage of fly ash with cement.</p> <p>Aggregates</p> <p>a) Coarse aggregate - Coarse aggregate for concrete shall be chemically inert, hard, strong durable against weathering, of limited porosity and free from deleterious materials. It shall be properly graded. It shall meet the requirements of IS: 383.</p> <p>b) Sand - Sand shall be hard, durable, clean and free from adherent coatings of organic matter and clay balls or pellets. Sand, when used as fine aggregate in concrete shall conform to IS: 383. For plaster, it shall conform to IS: 1542 and for masonry work to IS: 2116.</p>	
13.03.00	<p>Reinforcement Steel</p> <p>All reinforcement bars shall be TMT (Thermo Mechanically Treated) of grade Fe 500 conforming to IS: 1786 with minimum percentage elongation of 14.5 %.</p> <p>Mild steel & medium tensile steel bars and hard drawn steel wire shall conform to grade - 1 of IS: 432 (Part - I). Welded wire fabric shall conform to IS: 1566.</p>	
13.04.00	<p>Structural Steel</p> <p>Structural steel (including embedded steel) shall be straight, sound, free from twists, cracks, flaw, laminations and all other defects. Structural steel shall be of tested quality and shall be of Mild steel of Grade 'A' upto 20mm thickness and of Grade 'B' normalised for thickness above 20 mm and shall conform to IS: 2062. High Strength low alloy steel (HSLA) conforming to IS: 8500 may also be used in place of Mild steel. Chequered plate shall conform to IS: 3502 and pipes for hand rail shall conform to medium grade IS: 1611.</p> <p>All gratings shall be pressure locked/ electroforged. Minimum thickness of the grating shall be 40mm. The opening size shall not be more than 30mm x 100mm. The minimum thickness of the main bearing bar shall be 3mm. All gratings located inside the building shall be sand blasted and provided with two coats of suitable primer and two coats of finish paint(black colour) as per approved painting system. All gratings located outside the building shall be hot double dip galvanised at the rate of 610 gms / Sq. M. Supply of all structural steel shall be in Bidder's scope.</p>	
13.05.00	<p>Bricks</p> <p>Bricks shall be table moulded/machine made of uniform size, shape and sharp edges and shall have minimum compressive strength of 75 kg/cm². Burnt clay fly ash bricks and fly ash lime bricks shall conform to IS: 13757 and IS: 12894 respectively. Minimum fly ash content in fly ash based bricks shall be minimum 25%. Common burnt clay bricks shall conform to IS: 1077. In case bricks of compressive strength 75 kg/cm² are not available then bidder may also use hollow concrete blocks (minimum grade M 25) for super structure works and solid concrete blocks (minimum grade M 25) for substructure works.</p>	

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13.06.00	<p>Water</p> <p>Water used for cement concrete, mortar, plaster, grout, washing of coarse aggregate, soaking of bricks, etc., shall be clean and free from oil, acids, alkalis, organic matters or other harmful substances in such amounts that may impair the strength or durability of the structure. Potable water shall generally be considered satisfactory for all masonry and concrete works, including curing. The Bidder shall carry out necessary tests in advance to prove the suitability of the water proposed to be used. When water from the proposed sources is used for making the concrete, the maximum permissible impurities, development of strength and initial setting time of concrete shall meet the requirements of IS: 456.</p>	
14.00.00	<p>STATUTORY REQUIREMENTS</p>	
14.01.00	<p>Bidder shall comply with all the applicable statutory rules pertaining to Factories Act (as applicable for the state of Bihar), Fire Safety Rules of Tariff Advisory Committee, Water Act for pollution control, Explosives Act, etc.</p>	
14.02.00	<p>Provisions of safety, health and welfare according to Factories Act shall be complied with. These shall include provision of continuous walkway of minimum 500mm wide along the crane - girder level on both sides of building/ pump house, comfortable approach to EOT crane cabin, railing, fire escape, toilets, etc.</p>	
14.03.00	<p>Statutory clearances and norms of State Pollution Control Board shall be followed.</p>	
14.04.00	<p>Bidder shall obtain approval of Civil/Architectural drawings from concerned authorities before taking up the construction work.</p>	
15.00.00	<p>GEOTECHNICAL INVESTIGATION & FOUNDATION SYSTEM</p> <p>Geotechnical Investigation and Foundation system to be adopted for switchyard area shall be as per the details given in Chapter C1.</p> <p>For reference codes and standards, refer APPENDIX-I of this Sub-section.</p>	
16.00.00	<p>TESTS FOR MATERIAL / WORKMANSHIP</p> <p>All tests required for various bought out items, materials, quality of workmanship or any other tests as desired by Project Manager and as specified in technical specification shall be carried out by the Contractor at his own cost in the presence of the authorised representative of the Engineer.</p> <p>The quality assurance check lists are given separately in respective chapters / sections of this specification. The Contractor shall submit comprehensive Quality Assurance plan for all materials, equipment, workmanship, services etc. and get it approved from the Engineer. This shall include setting up a test laboratory at site. However, such check list shall in no way limit the liability and responsibility of the Contractor in regard to quality of workmanship as detailed out in the specifications.</p>	

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17.00.00	<p>DRAWINGS</p> <p>The successful Bidder shall first submit the structural design calculations along with general arrangement drawings for approval. After the approval of the design calculations by the Owner, detailed construction drawings shall be prepared and submitted for Owner's approval along with revised design calculations, if required, within 15 days. Required number of sets of design calculations, drawings and documents shall be submitted by the Contractor. All documents including design calculations shall be prepared in MS office and all drawings shall be drafted using AutoCAD (Release - 2000 or higher version). During every submission one soft copy of the document shall also be submitted. When final approval is obtained from the Employer the Contractor shall submit all the documents in TWO sets of CD ROM (One + One Back - up) together with minimum three sets of distribution prints well documented and page controlled with details of Employer's approval marked thereon. Approval of drawings / documents shall not relieve the contractor of the responsibility regarding the adequacy of design and correctness of drawings.</p>	
18.00.00	<p>ALTERATION IN SPECIFICATION AND DESIGN</p> <p>The Project Manager shall have the power to make any alteration and omissions from, additions to or substitution for, the original specifications, drawings, designs and instructions that may appear to him to be necessary during the progress of the work, and the Contractor shall carry out the work in accordance with any instruction which may be given to him in writing signed by the Project Manager and such alterations, omissions, additions or substitutions shall not invalidate the contract and any altered, added or substituted work which the Contractor may be directed to do in the manner above specified as part of the work shall be carried out by the Contractor on the same conditions in all respects on which the Contractor agreed to do the original contract work. The time for completion of work shall be altered in the proportion that the altered, added or substituted work bears to the original contract work, and the certificate of the Project Manager shall be conclusive as to such proportion.</p> <p>The rates for the altered items of work shall be worked out on the following basis and necessary alternations in the total amount shall be made on that basis:</p> <p>(a.) The rates to be reimbursed or recovered shall be taken as same as those given in CPWD - DSR (latest) for those items for which the rates are available in CPWD - DSR (latest). However, the premium as officially declared by CPWD's official circulars, at the time of carrying out these works, the same shall also be applicable.</p> <p>(b.) Rates for the items not covered under CPWD - DSR (latest) shall be derived from the rates of similar items of CPWD schedule of rates. However, the premium as officially declared by CPWD on the above DSR rates if existing or prevalent through CPWD's official circulars, at the time of carrying out these works, the same shall be applicable.</p>	

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	<p>(c.) In the event there is no similar class of work specified in the CPWD - DSR (latest) the Contractor shall work on a rate for such an item on the basis of the prevalent market rates for materials / men / machines and submit the same together with the detailed analysis to the Project Manager with in 7 days. The Project Manager shall thereafter review the correctness and then conduct necessary negotiations with the Contractor to arrive at a mutually agreeable rate. Engineer's decision in regard to rates of such items shall be final and binding on the Contractor.</p> <p>In case of conflict between this chapter and other Chapters of Technical Specifications, provisions given in this chapter shall govern.</p>	

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		APPENDIX-I
1.00.00	CODES AND STANDARDS	
1.01.00	All standards, specifications, acts and code of practice referred to herein shall be the latest editions including all applicable official amendments and revisions.	
1.02.00	In case of conflict between this specification and those (IS standards, codes etc.) referred to here - in, the former shall prevail.	
1.03.00	Some of the relevant Indian standards, Acts and Codes are referred to here below:	
	(a.) EXCAVATION AND FILLING	
	IS : 2720 (Part - II, IV TO VIII, XIV, XXI, XXIII, XXIV, XXVII TO XXIX, XL)	
	Methods of test for soils - determination for water content etc.	
	IS : 4701 Code of practice for earth work on canals.	
	IS : 9758 Guide lines for Dewatering during construction	
	IS : 10379 Code of practice for field control of moisture and compaction of soils for embankment and sub - grade.	
	(b.) PROPERTIES, STORAGE AND HANDLING OF COMMON BUILDING MATERIALS	
	IS : 280 Specification for mild steel wire for general engineering purposes.	
	IS : 456 Code of practice for plain and reinforced concrete.	
	IS : 457 Code of practice for general construction of plain & reinforced concrete for dams & other massive structures.	
	IS : 516 Method of test for strength of concrete.	
	IS : 650 Specification for standard sand for testing of cement.	
	IS : 1199 Methods of sampling and analysis of concrete.	
	IS : 1791 General requirements for batch type concrete mixers.	
	IS : 1838 (Part - I) Specification for preformed fillers for expansion joints in concrete pavements and structures (non - extruding and resilient type).	
	IS : 2438 Specification for roller pan mixer.	
	IS : 2502 Code of practice for bending and fixing of bars for concrete reinforcement.	

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	<p>IS : 2505 General requirements for concrete vibrators, immersion type.</p> <p>IS : 2506 General requirements for concrete vibrators, screed board type.</p> <p>IS : 2514 Specification for concrete vibrating tables.</p> <p>IS : 2645 Specification for Integral cement water proofing compounds. IS : 2722 Specification for portable swing weigh batches for concrete. (single and double bucket type)</p> <p>IS : 2750 Specification for Steel scaffolding.</p> <p>IS : 2751 Code of practice for welding of mild steel plain and deformed bars for reinforced concrete construction.</p> <p>IS : 3025 Methods of sampling and test waste water.</p> <p>IS : 3366 Specification for Pan vibrators.</p> <p>IS : 3370 (Part I to IV) Code of practice for concrete structures for the storage of liquids.</p> <p>IS : 3414 Code of practice for design and installation of joints in buildings.</p> <p>IS : 3550 Methods of test for routine control for water used in industry.</p> <p>IS : 3558 Code of practice for use of immersion vibrators for consolidating concrete.</p> <p>IS : 4014 (Parts I & II) Code of practice for steel tubular scaffolding.</p> <p>IS : 4326 Code of practice for earthquake resistant design and construction of buildings.</p> <p>IS : 4656 Specification for form vibrators for concrete.</p> <p>IS : 4925 Specification for batching and mixing plant.</p> <p>IS : 4990 Specification for plywood for concrete shuttering work.</p> <p>IS : 5256 Code or practice for sealing joints in concrete lining on canals.</p> <p>IS : 5525 Recommendations for detailing of reinforcement in reinforced concrete work.</p>	

CLAUSE NO.	TECHNICAL REQUIREMENTS	एनटीपीसी NTPC
	<p>IS : 5624 Specification for foundation bolts.</p> <p>IS : 6461 Glossary of terms relating to cement concrete.</p> <p>IS : 6494 Code of practice for water proofing of underground water reservoirs and swimming pools.</p> <p>IS : 6509 Code of practice for installation of joints in concrete pavements.</p> <p>IS : 7861 Code of practice for extreme weather concreting. (Parts I & II)</p> <p>IS : 9012 Recommended practice for shot concreting.</p> <p>IS : 9103 Specification for admixtures for concrete.</p> <p>IS : 9417 Recommendations for welding cold worked steel bars for reinforced concrete construction.</p> <p>IS : 10262 Recommended guidelines for concrete mix design.</p> <p>IS : 11384 Code of practice for composite construction in structural steel and concrete.</p> <p>IS : 12118 Specification for two - parts poly sulphide.</p> <p>IS : 12200 Code of practice for provision of water stops at transverse contraction joints in masonry and concrete dams.</p> <p>IS : 13311 Method of non - destructive testing of concrete.</p> <p>Part - 1 Ultrasonic pulse velocity.</p> <p>Part - 2 Rebound hammer.</p> <p>SP : 23 Handbook of concrete mixes</p> <p>SP : 24 Explanatory Handbook on IS : 456 - 1978</p> <p>SP : 34 Handbook on concrete reinforcement and detailing.</p>	
	<p>(c.) CAST - IN - SITU CONCRETE AND ALLIED WORKS</p> <p>IS : 280 Specification for mild steel wire for general engineering purposes.</p> <p>IS : 456 Code of practice for plain and reinforced concrete.</p> <p>IS : 457 Code of practice for general construction of plain & reinforced concrete for dams & other massive structures.</p> <p>IS : 516 Method of test for strength of concrete.</p>	

CLAUSE NO.	TECHNICAL REQUIREMENTS	एनटीपीसी NTPC
	<p>IS : 650 Specification for standard sand for testing of cement.</p> <p>IS : 1199 Methods of sampling and analysis of concrete.</p> <p>IS : 1791 General requirements for batch type concrete mixers.</p> <p>IS : 1838 (Part - I) Specification for preformed fillers for expansion joints in concrete pavements and structures (non - extruding and resilient type).</p> <p>IS : 2438 Specification for roller pan mixer.</p> <p>IS : 2502 Code of practice for bending and fixing of bars for concrete reinforcement.</p> <p>IS : 2505 General requirements for concrete vibrators, immersion type.</p> <p>IS : 2506 General requirements for concrete vibrators, screed board type.</p> <p>IS : 2514 Specification for concrete vibrating tables.</p> <p>IS : 2645 IS : 2722 Specification for Integral cement water proofing compounds. Specification for portable swing weigh batches for concrete. (single and double bucket type)</p> <p>IS : 2750 Specification for Steel scaffolding.</p> <p>IS : 2751 Code of practice for welding of mild steel plain and deformed bars for reinforced concrete construction.</p> <p>IS : 3025 Methods of sampling and test waste water.</p> <p>IS : 3366 Specification for Pan vibrators.</p> <p>IS : 3370 (Part I to IV) Code of practice for concrete structures for the storage of liquids.</p> <p>IS : 3414 Code of practice for design and installation of joints in buildings.</p> <p>IS : 3550 Methods of test for routine control for water used in industry.</p> <p>IS : 3558 Code of practice for use of immersion vibrators for consolidating concrete.</p> <p>IS : 4014 (Parts I & II) Code of practice for steel tubular scaffolding.</p> <p>IS : 4326 Code of practice for earthquake resistant design and</p>	

CLAUSE NO.	TECHNICAL REQUIREMENTS	एनटीपीसी NTPC
	<p>construction of buildings.</p> <p>IS : 4656 Specification for form vibrators for concrete.</p> <p>IS : 4925 Specification for batching and mixing plant.</p> <p>IS : 4990 Specification for plywood for concrete shuttering work.</p> <p>IS : 5256 Code or practice for sealing joints in concrete lining on canals.</p> <p>IS : 5525 Recommendations for detailing of reinforcement in reinforced concrete work.</p> <p>IS : 5624 Specification for foundation bolts.</p> <p>IS : 6461 Glossary of terms relating to cement concrete.</p> <p>IS : 6494 Code of practice for water proofing of underground water reservoirs and swimming pools.</p> <p>IS : 6509 Code of practice for installation of joints in concrete pavements.</p> <p>IS : 7861 Code of practice for extreme weather concreting. (Parts I & II)</p> <p>IS : 9012 Recommended practice for shot concreting.</p> <p>IS : 9103 Specification for admixtures for concrete.</p> <p>IS : 9417 Recommendations for welding cold worked steel bars for reinforced concrete construction.</p> <p>IS : 10262 Recommended guidelines for concrete mix design.</p> <p>IS : 11384 Code of practice for composite construction in structural steel and concrete.</p> <p>IS : 12118 Specification for two - parts poly sulphide.</p> <p>IS : 12200 Code of practice for provision of water stops at transverse contraction joints in masonry and concrete dams.</p> <p>IS : 13311 Method of non - destructive testing of concrete.</p> <p>Part - 1 Ultrasonic pulse velocity.</p> <p>Part - 2 Rebound hammer.</p> <p>SP : 23 Handbook of concrete mixes</p> <p>SP : 24 Explanatory Handbook on IS : 456 - 1978</p>	

CLAUSE NO.	TECHNICAL REQUIREMENTS	एनटीपीसी NTPC
	<p>IS : 8183 Bonded mineral wool.</p> <p>IS : 8869 Washers for corrugated sheet roofing.</p> <p>IS : 12093 Code of practice for laying and fixing of sloped roof covering using plain and corrugated galvanised steel sheets.</p> <p>IS : 12866 Plastic translucent sheets made from thermosetting polyester resin (glass fibre reinforced).</p> <p>IS : 14246 Specification for continuously pre - painted galvanised steel sheets and coils.</p>	
	(g.) FABRICATION AND ERECTION OF STRUCTURAL STEEL WORK	
	IS : 2016 Specification for plain washers.	
	IS : 814 Specification for covered Electrodes for Metal Arc Welding for weld steel.	
	IS : 1852 Specification for Rolling and Cutting Tolerances for Hot rolled steel products.	
	IS : 3502 Specifications for chequered plate.	
	IS : 6911 Specification for stainless steel plate, sheet and strip.	
	IS : 3757 Specification for high strength structural bolts	
	IS : 6623 Specification for high strength structural nuts.	
	IS : 6649 High Tensile friction grip washers.	
	IS : 800 Code of practice for use of structural steel in general building construction.	
	IS : 816 Code of practice for use of Metal Arc Welding for General Construction.	
	IS : 4000 Code of practice for assembly of structural joints using high tensile friction grip fasteners.	
	IS : 9595 Code of procedure of Manual Metal Arc Welding of Mild Steel.	
	IS : 817 Code of practice for Training and Testing of Metal Arc Welders.	
	IS : 1811 Qualifying tests for Metal Arc Welders (engaged in welding structures other than pipes).	
	IS : 7215 Tolerances for fabrication steel structures.	
	IS : 12843 Tolerance for erection of structural steel.	


CLAUSE NO.	TECHNICAL REQUIREMENTS	एनटीपीसी NTPC
	<p>IS : 4353 Recommendations for submerged arc welding of mild steel and low alloy steels.</p> <p>SP : 6 (Part 1 to 7) ISI Hand book for structural Engineers.</p> <p>IS : 1608 Method of Tensile Testing of Steel products other than sheets, strip, wire and tube.</p> <p>IS : 1599 Method of Bend Tests for Steel products other than sheet, strip, wire and tube</p> <p>IS : 802(1977) Code of practice for use of Structural Steel in Over head Transmission Line Towers.</p> <p>IS : 228 Methods of chemical Analysis of pig iron, cast iron and plain carbon and low alloy steel.</p> <p>IS : 2595 Code of Practice for Radio graphic testing.</p> <p>IS : 1182 Recommended practice for Radiographic Examination of fusion welded butt joints in steel plates.</p> <p>IS : 3664 Code of practice for Ultra sonic Testing by pulse echo method.</p> <p>IS : 3613 Acceptance tests for wire flux combination for submerged Arc Welding.</p> <p>IS : 3658 Code of practice for Liquid penetrant Flaw Detection.</p> <p>IS : 5334 Code of practice for Magnetic Particle Flaw Detection of Welds.</p> <p>(h.) PLASTERING AND ALLIED WORKS</p> <p>IS : 1635 Code of practice for field slaking of Building lime and preparation of putty.</p> <p>IS : 1661 Application of cement and cement lime plaster finishes.</p> <p>IS : 2333 Plaster - of - paris.</p> <p>IS : 2402 Code of practice for external rendered finishes.</p> <p>IS : 2547 Gypsum building plaster.</p> <p>IS : 3150 Hexagonal wire netting for general purpose.</p> <p>(i.) WATER SUPPLY, DRAINAGE AND SANITATION</p> <p>IS : 458 Specification for concrete pipes.</p> <p>IS : 554 Dimensions for pipe threads, where pressure tight joints are</p>	

CLAUSE NO.	TECHNICAL REQUIREMENTS	एनटीपीसी NTPC
	made on thread. Specification for salt glazed stoneware pipes.	
IS : 651		
IS : 774	Flushing cisterns for water closets and urinals.	
IS : 775	Cast iron brackets and supports for wash basins and sinks.	
IS : 778	Copper alloy gate, globe and check valves for water works purposes.	
IS : 781	Cast copper alloy screw down bib taps and stop valves for water services.	
IS : 782	Caulking lead.	
IS : 783	Code of practice for laying of concrete pipes.	
IS : 1172	Basic requirements for water supply, drainage and sanitation.	
IS : 1230	Cast iron rain water pipes and fittings.	
IS : 1239	Mild steel tubes, tubulars and other wrought steel fittings.	
IS : 1536	Centrifugally cast (Spun) iron pressure pipes for water, gas and sewage.	
IS : 1537	Vertically cast iron pressure pipes for water, gas and sewage.	
IS : 1538	Cast iron fittings for pressure pipe for water, gas and sewage.	
IS : 1703	Ball valves (horizontal plunger type) including float for water supply purposes.	
IS : 1726	Cast iron manhole covers and frames.	
IS : 1729	Sand cast iron spigot and socket, soil, water and ventilating pipes, fittings and accessories.	
IS : 1742	Code of practice for building drainage.	
IS : 1795	Pillar taps for water supply purposes.	
IS : 1879	Malleable cast iron pipe fittings.	
IS : 2064	Code of practice for selection, installation and maintenance of sanitary appliances.	
IS : 2065	Code of practice for water supply in building.	
IS : 2326	Automatic flushing cisterns for urinals.	
IS : 2470 (Part - I	Code of practice for installation of septic tanks.	

CLAUSE NO.	TECHNICAL REQUIREMENTS	एनटीपीसी NTPC
	<p data-bbox="391 208 454 241">& II)</p> <p data-bbox="391 275 1284 309">IS : 2501 Copper tubes for general engineering purposes.</p> <p data-bbox="391 342 1197 376">IS : 2548 Plastic seat and cover for water - closets.</p> <p data-bbox="391 409 1260 477">IS : 2556 (Part 1 to 15) Vitreous sanitary appliances (vitreous china).</p> <p data-bbox="391 510 1364 544">IS : 2963 Non - ferrous waste fittings for wash basins and sinks.</p> <p data-bbox="391 544 1236 577">IS : 3114 Code of practice for laying of cast iron pipes.</p> <p data-bbox="391 577 1420 611">IS : 3311 Waste plug and its accessories for sinks and wash basins.</p> <p data-bbox="391 645 1228 678">IS : 3438 Silvered glass mirrors for general purposes.</p> <p data-bbox="391 712 1173 745">IS : 3486 Cast iron spigot and socket drain pipes.</p> <p data-bbox="391 779 1468 846">IS : 3589 Electrically welded steel pipes for water, gas and sewage (200mm to 2000mm nominal diameter).</p> <p data-bbox="391 880 1468 947">IS : 3989 Centrifugally cast (Spun) iron spigot and socket soil, waste and ventilating pipes, fittings and accessories.</p> <p data-bbox="391 981 1428 1048">IS : 4111 (Part I to IV) Code of practice for ancillary structure in sewerage system.</p> <p data-bbox="391 1081 1380 1115">IS : 4127 Code of practice for laying of glazed stone - ware pipes.</p> <p data-bbox="391 1149 1468 1216">IS : 4764 Tolerance limits for sewage effluents discharged into inland - surface waters.</p> <p data-bbox="391 1249 1468 1317">IS : 4827 Electro plated coating of nickel and chromium on copper and copper alloys.</p> <p data-bbox="391 1350 1468 1417">IS : 5329 Code of practice for sanitary pipe work above ground for buildings.</p> <p data-bbox="391 1451 1460 1485">IS : 5382 Rubber sealing rings for gas mains, water mains and sewers.</p> <p data-bbox="391 1518 1468 1585">IS : 5822 Code of practice for laying of welded steel pipes for water supply.</p> <p data-bbox="391 1619 1157 1653">IS : 5961 Cast iron grating for drainage purpose.</p> <p data-bbox="391 1686 1077 1720">IS : 7740 Code of practice for road gullies.</p> <p data-bbox="391 1753 1468 1821">IS : 8931 Cast copper alloy fancy bib taps and stop valves for water services.</p> <p data-bbox="391 1854 1348 1888">IS : 8934 Cast copper alloy fancy pillar taps for water services.</p>	

CLAUSE NO.	TECHNICAL REQUIREMENTS	एनटीपीसी NTPC
	<p>IS : 9762 Polyethylene floats for ball valves.</p> <p>IS : 10446 Glossary of terms for water supply and sanitation.</p> <p>IS : 10592 Industrial emergency showers, eye and face fountains and combination units.</p> <p>IS : 12592 Specification for precast concrete manhole covers and frames.</p> <p>IS : 12701 Rotational moulded polyethylene water storage tanks.</p> <p>SP : 35 Hand book on water supply and drainage.</p> <p>- Manual on Sewerage and sewage treatment (Published by CPH & EEO) As updated.</p>	
	<p>(j.) PILING AND FOUNDATION</p> <p>IS : 1080 Code of practice for design and construction of simple spread foundations.</p> <p>IS : 1904 Code of practice for design and construction of foundations in Soils; General Requirements.</p> <p>IS : 2950 (Part- I) Code of practice for designs and construction of Raft foundation.</p> <p>IS : 2974 (Part - I TO V) Code of practice for design and construction of machine foundations.</p> <p>IS : 6403 Code of practice for determination of Allowable Bearing pressure on Shallow foundation.</p> <p>IS : 8009 Code of practice for calculation of settlement of foundation subjected to symmetrical vertical loads.</p> <p>Part - I Shallow foundations.</p> <p>Part – II Deep foundations.</p> <p>IS : 12070 Code of practice for design and construction of shallow foundations on rocks.</p> <p>DIN : 4024 Flexible supporting structures for machines with rotating machines.</p> <p>VDI : 2056 Criteria for assessing mechanical vibrations of machines.</p> <p>VDI : 2060 Criteria for assessing rotating imbalances in machines.</p> <p>(k.) ROADS</p> <p>IRC : 5 Standard specifications and Code of practice for road bridges, section - I general Features of Design.</p>	

CLAUSE NO.	TECHNICAL REQUIREMENTS	एनटीपीसी NTPC
	<p>IRC : 14 Recommended practice of 2cm thick bitumen and tar carpets.</p> <p>IRC : 16 Specification for priming of base course with bituminous primers.</p> <p>IRC : 19 Standard specifications and code of practice for water bound macadam.</p> <p>IRC : 21 Standard specifications and Code of practice for road bridges, section - III - Cement concrete (plain and reinforced).</p> <p>IRC : 37 Guidelines for the Design of flexible pavements.</p> <p>IRC : 86 Geometric Design standards for urban roads in plains.</p> <p>IRC : SP : 13 Guidelines for the design of small bridges & culverts.</p> <p>IRC - Publication Ministry of Surface Transport (Roads Wing), Specifications for road and bridge works.</p> <p>IS : 73 Specification for paving bitumen</p>	
	(l.) Loading	
	<p>IS : 875 (Pt. I to V) Code of practice for design loads other than earthquake) for buildings and structures.</p> <p>IS : 1893 Criteria for earthquake resistant design of structures.</p> <p>IS : 4091 Code of Practice for design and construction of foundation for transmission line towers & poles.</p> <p>IRC : 6 Standard specifications & code of practice for road bridges, Section - II Loads and stresses.</p> <p>M.O.T. Deptt. of railways Bridge Rules.</p>	
	(m.) SAFETY	
	<p>IS : 3696 (Part I & II) Safety code for scaffolds and ladders.</p> <p>IS : 3764 Safety code for excavation work.</p> <p>IS : 4081 Safety code for blasting and related drilling operations.</p> <p>IS : 4130 Safety code for demolition of buildings.</p> <p>IS : 5121 Safety code for piling and other deep foundations.</p>	

CLAUSE NO.	TECHNICAL REQUIREMENTS	
	<p>IS : 5916 Safety code for construction involving use of hot bituminous materials.</p> <p>IS : 7205 Safety code for erection on structural steelwork.</p> <p>IS : 7293 Safety code for working with construction machinery.</p> <p>IS : 7969 Safety code for handling and storage of building materials</p> <p>IS : 11769 Guidelines for safe use of products containing asbestos.</p> <p>Indian Explosives Act. 1940 as updated.</p>	

LOGO	Supplier's Name and Address:	INDICATIVE FIELD QUALITY PLAN						PROJECT:		Remarks
		ITEM : CIVIL WORKS SUB-SYSTEM :	Rev. No. : 01 DATE:	Q.P. NO. : 01 DATE:	Quantum Of check	Reference Document	Acceptance Norms	Format of Record		
Sl. No	Activity and operation	Characteristics / instruments	Class# of check	Type of Check	Quantum Of check	Reference Document	Acceptance Norms	Format of Record	Remarks	
1	2	3	4	5	6	7	8	9	10	
1.0	EXCAVATION AND FILLING									
1.1		Nature of soil/rock	As required	Visual	Random	As per Contractors scheme for excavation/appcd. Drg.	-do-	SR		
1.2		Initial ground level	Digital Total Station	Measurement	100%			SR		
1.3		Dimensions of excavated pit.	As required	Measurement	100%			SR		
1.4		Final pit/bed level.	As required	Measurement	100%			SR		
1.5		Side slope during excavation	As required	Measurement	Random			SR		
1.6		Excavation in Hard Rock.								
1.7		a) Receipt & Storage of Explosive b) Blasting Operation Excavation in Hard Rock-do- (Blasting Prohibited)	- Compressor / Drilling Machine	Physical Physical Physical	100% 100% 100%	Indian Explosive Act 1940/all statutory norms IS:4081 As per approved drawing/scheme		SR SR SR	Agency employed shall have to be approved from NTPC Site Engr. Incharge.	
		LEGEND: D* Records, identified with "Tick" (✓) shall be essentially included by supplier in QA				DOC. NO.:				
		Legend to be used: Class # : A = Critical, B=Major, C=Minor; SR,TR,MfrTC, LB								
Sub-supplier	Main-supplier	'A' shall be witnessed by NTPC FQA, 'B' shall be witnessed by ntpc erection / construction deptt. and 'C' shall be witnessed by erection supplier (A & B check shall be NTPC CHP stage); SR = Site Register, TR= Test Report, MfrTC = Manufacturer's Test Certificate				For NTPC USE				
Signature		This document shall be read in conjunction with NTPC Tech. Specifications, BOQ & Drawings& FQP No.2.				REVIEWED BY		APPROVED BY		
								APPROVAL SEAL		

FORMAT NO.: QS-01-QAIP-09/F2-RO

LOGO	Supplier's Name and Address:	INDICATIVE FIELD QUALITY PLAN						PROJECT: PACKAGE: CONTRACT NO. MAIN-CONTRACTOR	Remarks	
		ITEM : CIVIL WORKS SUB-SYSTEM :	QP NO. : 01 REV. NO.: 00 DATE:	PAGE:	Class# of check	Type of Check	Quantum Of check			Reference Document
Sl. No	Activity and operation									
1	2	3	4	5	6	7	8	9	D*	
ii		Calcium carbonate	Reagents and indicators, Burette, flask, funnels etc.	Physical	One in every 5000 cum for each type and source of fill materials	Part XXIII of IS-2720		SR/TR		
iii		pH value	As required	Physical	-do-	Part XXVI of IS-2720		SR/TR		
iv		Total soluble sulphate	As required	Physical	-do-	Part XXVII of IS-2720		SR/TR		
1.3.6		Standard proctor Test to determine optimum moisture content and max. apparatus, etc.	As per IS: 2720, Proctor needle	Physical	One in every 2000 cum for each type and source of fill materials	IS 2720 (Pt. VII)		SR/TR		
1.3.7		Moisture content of fill before compaction	As per IS: 2720, balance, oven etc.	Physical	One in every 2000 cum for each type and source of fill materials	IS 2720 (Pt. II)		SR/TR		
1.3.8	Degree of compaction fill									
i		Dry density by core cutter method	As per IS: 2720/compaction test (core cutter), balance etc.	Physical	i) For foundation back fill one for every 10 foundations for each compacted layer.	IS 2720 (Pt. XXIX)		SR/TR	test for soil	
		OR								
		Dry density in place by sand displacement method	As per IS: 2720/compaction test, sand replacement apparatus etc.	Physical	ii) For area filling, one every 1000 SQM area for each compacted layer.	IS 2720 (Pt. XXVIII)		SR/TR	test for soil	
ii		Relative density (Density Index)	As per IS: 2720, balance oven etc.	Physical	-do- (i) & (ii) above	IS 2720 (Pt. XIV)		SR/TR		
		LEGEND: D* Records, identified with "Tick" (✓) shall be essentially included by supplier in QA Legend to be used: Class # : A = Critical, B=Major, C=Minor; SR, TR, MfrTC, LB								
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	Signature									
FORMAT NO.: QS-01-QALP-09/02-KO										
		DOC. NO.:								
		For NTPC USE								
		REVIEWED BY							APPROVED BY	
									APPROVAL SEAL	

LOGO		INDICATIVE FIELD QUALITY PLAN					PROJECT:		REMARKS	
Supplier's Name and Address:		ITEM : CIVIL WORKS		QP NO. : 01		PACKAGE:		CONTRACT NO.		
SUB-SYSTEM :		DATE:		REV. NO.: 00		MAIN-CONTRACTOR		Acceptance Norms		
Sl. No	Activity and operation	Characteristics / Instruments	Class# of check	Type of Check	Quantum Of check	Reference Document	Format of Record			
I	2	3	4	5	6	7	9	D*	10	
III		Dry Density by proctor / needle penetrometer	B	Physical	Random checks to be carried out for each compacted layer	Standard practice	SR/TR			
1.8.9		Sand	B	Physical	Random	IS-2720,383	SR/TR		applicable where sand and stone is used as filling material	
1.8.10		Stone	B	Physical	Random	IS-2720,383	SR/TR			
2.0 CAST-IN-SITU CONCRETE										
2.01 MATERIALS										
2.01.01 CEMENT										
2.01.02-i)	Coarse Aggregate	a) Ensure that cement is stored in weather tight covered storage on raised platform. b) If cement is stored more than 60 days in godown of contractor same shall be retested for comp. Strength & setting time. Moisture content	as per IS: 4082	Visual	100% covered storage	Covered storage, weather tight on raised platform.	SR/LB	Test Report	Each consignment of cement shall be duly correlated with manufacturer's TC. In case the cement is supplied by the contractor one sample from each lot shall be tested for setting time and compressive strength. Acceptance norms shall be as per relevant IS	
					At Random	As per relevant IS Codes				
					Once for each stack of 100 Cu.M. or part thereof Except during monsoon when this has to be done every day before start of concreting	IS:2386 Part-III IS : 456 IS : 383/Tech Spec	SR/LB		Accordingly water content of the concrete will be adjusted	
LEGEND: D* Records, identified with "Tick" (✓) shall be essentially included by supplier in QA										
Legend to be used: Class # : A = Critical, B=Major, C=Minor; SR,TR,Mfr,TC, LB										
Sub-supplier Main-supplier										
Signature										
FORMAT NO.: QS-01-QAIP-09/02-RO										
DOC. NO.:										
For NTPC USE										
REVIEWED BY										
APPROVED BY										
APPROVAL SEAL										

LOGO		INDICATIVE FIELD QUALITY PLAN					PROJECT:			
Supplier's Name and Address:		ITEM : CIVIL WORKS		QP NO. : 01		PACKAGE:		CONTRACT NO.		
SUB-SYSTEM :		REV. NO.: 00		DATE:		MAIN-CONTRACTOR				
Activity and operation		Characteristics / Instruments		PAGE:		Reference Document		Acceptance Norms		
Sl. No		3	4	5	6	7	8	9	10	
i										
ii		Specific gravity, bulk density, voids, water absorption,	Balance, sieves (conforming to IS:460-1962) etc.	Physical	Once for each source & for every change of source	S: 2386 Part-III, IS:456, IS:383/Tech Spec		SR/LB/ Test Report	These tests will be carried out white establishing design mix and the results to be intimated to NTPC.	
iii		Particle, size & Shape analysis, thickness gauge determination of material, length gauge metal flaker than 75 micron, scoop etc.	Sieves, balance oven, thickness gauge metal	Physical	One per 100 cum., or part thereof/change of source whichever is earlier	S: 2386 Part-I, IS:383/Tech Spec		SR/LB	-do-	
iv		Deliterious materials & organic impurities (determination of clay lumps, fine silt, fine dust, light weight pieces, soil particle & estimation of organic impurities.)	Balance, sieves (conforming to IS:460-1962) etc.	Physical	Once per source/ on every change of source	S: 2386 Part-II, IS:383/Tech Spec		SR/LB/ Test Report	Experts opinion regarding suitability of the aggregates shall be obtained from the specialist agency such as NCB BalihGarh etc. finalised during preaward. Results will be reported nearest to 0.1 % of clay lumps.	
		LEGEND: D* Records, identified with "Tick" (✓) shall be essentially included by supplier in QA Legend to be used: Class # : A = Critical, B=Major, C=Minor; SR,TR,Mfr,TC, LB					DOC. NO.:			
Sub-supplier	Main-supplier	'A' shall be witnessed by NTPC FQA, 'B' shall be witnessed by ntpc erection / construction deptt. and 'C' shall be witnessed by erection supplier (A & B check shall be NTPC CHP stage). SR = Site Register, TR= Test Report, MfrTC = Manufacturer's Test Certificate					For NTPC USE			
Signature		This document shall be read in conjunction with NTPC Tech. Specifications, BOQ & Drawings& FQP No.2.					REVIEWED BY		APPROVED BY	
							APPROVED BY		APPROVAL SEAL	

FORMAT NO. : QS-01-QAIP-09/02-RO

LOGO	Supplier's Name and Address:	INDICATIVE FIELD QUALITY PLAN						PROJECT: PACKAGE: CONTRACT NO. MAIN-CONTRACTOR	Remarks
		ITEM : CIVIL WORKS SUB-SYSTEM :	QP NO. : 01 REV. NO.: 00 DATE: PAGE:	Quantum Of check	Type of Check	Class# of check	Reference Document		
Sl. No	Activity and operation	Characteristics / Instruments							
i	2	Soundness	3	4	5	6	7	8	9
v		reagents (sodium sulphate or magnesium sulphate) etc	B	Physical	-do-	S: 2386 Part-V, IS:383	SRLB/ Test Report	D*	10
vi		Alkali aggregate reactivity scales, weight, sieves, glass graduates, mixing bowl, trowel, container, length comparator, etc	B	Physical	-do-	S: 2386 (Part-VII), IS:383 Tech Spec	SRLB/ Test Report		the quantity of dissolved silica, and reduction in alkalinity to be reported and hence the aggregate type(deleterious/innocuous)result should be supported by petrographic examination
vii		Petrographic examination screens, hand lens, microscope etc	B	Physical	-do-	S: 2386 Part-VIII, IS:383 Tech Spec	SRLB/ Test Report		Reporting of petrographic examination shall be done as illustrated in IS 2386 (part-VIII)-1963. petrographic report shall be supported by the analysis and recommendation by a specialist institute.
viii		Crushing value abrasion standard apparatus for these tests shall be used	B	Physical	-do-	S:383, IS-2386 Par IV/Tech Spec	SRLB/ Test Report		
		LEGEND: D* Records, identified with "Tick" (✓) shall be essentially included by supplier in QA Legend to be used: Class # : A = Critical, B=Major, C=Minor; SR,TR,MfrTC, LB						DOC. NO.:	
Sub-supplier	Main-supplier	*A* shall be witnessed by NTPC FQA, 'B' shall be witnessed by ntpc erection / construction deptt. and 'C' shall be witnessed by erection supplier (A & B check shall be NTPC CHP stage);SR = Site Register , TR= Test Report,MfrTC = Manufacturer's Test Certificate This document shall be read in conjunction with NTPC Tech. Specifications, BOQ & Drawings& FQP No.2.						For NTPC USE	
Signature								REVIEWED BY	APPROVED BY

FORMAT NO.: QS-01-QALP-09/F2-RO

LOGO	INDICATIVE FIELD QUALITY PLAN				PROJECT:		Remarks
	ITEM : CIVIL WORKS		PACKAGE:		Acceptance Norms	Format of Record	
	SUB-SYSTEM :		CONTRACT NO. MAIN-CONTRACTOR				
Sl. No	Activity and operation	Characteristics / instruments	Class# of check	Type of Check	Quantum Of check	Reference Document	
1	2	3	4	5	6	7	8 9 10
2.01.03 Fine Aggregate							
I		moisture content	B	Physical	To be done every day before start of work	S: 2386 Part-III IS:383	SR/LB/TR
II		Mortar making properties	B	Physical	Once per source & for on every change of source	S: 2386, IS:383	SR/LB/TR
III		Silt, Clay content and organic impurities	B	Physical	Once per source & for on every change of source	S: 2386 Part-II, IS:383	SR/LB/TR
IV		All other tests similar to coarse aggregates as mentioned above.	B	Physical	Refer S.No. 2.01.02	S-2386, IS-383	SR/LB/TR
2.01.04 Water							
I		Test for acidity & alkalinity by using neutralization of water using indicator, and check for sulphate and chloride content.	B	Testing	One per month for each source.	S:3025 part 22 and 23 (for test procedure), IS:456 (for acceptance criteria)	SR/LB/TR
II		Tests for ascertaining limit of solids	B	Physical	One per month for each source.	S:3025 part 18 (organic), IS:456	SR/LB/TR
III		Tests for pH Value	B	Testing	One per month for each source	S:3025, IS:456	SR/LB/TR
IV		Check for initial set time for used water and distilled water		Test	Once per source		
LEGEND: D* Records, identified with "Tick" (✓) shall be essentially included by supplier in QA Report. Legend to be used: Class # : A = Critical, B=Major, C=Minor; SR,TR,Mfr,TC, LB						DOC. NO.:	
Sub-supplier	Main-supplier	This document shall be read in conjunction with NTPC Tech. Specifications, BOQ & Drawings & FQP No.2.				For NTPC USE	
Signature						REVIEWED BY	APPROVED BY
APPROVAL SEAL							

FORMAT NO.: QS-01-QAIP-09/02-RO

LOGO		INDICATIVE FIELD QUALITY PLAN				PROJECT:		PACKAGE:	
Supplier's Name and Address:		ITEM : CIVIL WORKS		QP NO. : 01		CONTRACT NO.		MAIN-	
SUB-SYSTEM :		REV. NO.: 00		DATE:		CONTRACTOR		Acceptance	
Activity and operation		Characteristics / Instruments		Type of check		Quantum		Reference Document	
Sl. No		3		4		5		6	
1		2		3		4		5	
v		standard sand and compression testing machine		Test		Once per source		7	
2.02.01		Concrete		B		A		A	
i		Workability - slump test		Standard apparatus for different method used for measuring workability		As required		As required	
ii		Trial mix (Cubes compressive strength) Mix Design		As required		As required		As required	
iii		Compressive strength (works Tests cubes)		As required		As required		As required	
iv		Water cement ratio		Chemical Reagent, Buret, Conical flask, As required		As required		As required	
v		Cement content		As required		As required		As required	
vi		Admixtures for Concrete		As per IS Code		As per IS Code		As per IS Code	
vii		Water Tightness Test for Water Retaining Structures		As per IS Code		As per IS Code		As per IS Code	
viii		Dimensions and visual examination of finished structure		As per IS Code		As per IS Code		As per IS Code	
		LEGEND: D* Records, identified with "Tick" (✓) shall be essentially included by supplier in QA		Legend to be used: Class # : A = Critical, B=Major, C=Minor; SR,TR,MfrTC, LB					
Sub-supplier		Main-supplier		Signature		Signature		Signature	
FORMAT NO.: QS-01-QAIP-09/F2-RO									
1		standard sand and compression testing machine		Test		Once per source		7	
v		Check for Concrete compressive strength with used water and distilled water		Test		Once per source		7	
2.02.01		Concrete		B		A		A	
i		Workability - slump test		Standard apparatus for different method used for measuring workability		As required		As required	
ii		Trial mix (Cubes compressive strength) Mix Design		As required		As required		As required	
iii		Compressive strength (works Tests cubes)		As required		As required		As required	
iv		Water cement ratio		Chemical Reagent, Buret, Conical flask, As required		As required		As required	
v		Cement content		As required		As required		As required	
vi		Admixtures for Concrete		As per IS Code		As per IS Code		As per IS Code	
vii		Water Tightness Test for Water Retaining Structures		As per IS Code		As per IS Code		As per IS Code	
viii		Dimensions and visual examination of finished structure		As per IS Code		As per IS Code		As per IS Code	
		LEGEND: D* Records, identified with "Tick" (✓) shall be essentially included by supplier in QA		Legend to be used: Class # : A = Critical, B=Major, C=Minor; SR,TR,MfrTC, LB					
Sub-supplier		Main-supplier		Signature		Signature		Signature	
FORMAT NO.: QS-01-QAIP-09/F2-RO									

LOGO	Supplier's Name and Address:	INDICATIVE FIELD QUALITY PLAN						PROJECT:		Remarks
		ITEM : CIVIL WORKS				PACKAGE: CONTRACT NO.		Acceptance Norms	Format of Record	
		SUB-SYSTEM :				MAIN-CONTRACTOR				
Sl.No	Activity and operation	Characteristics / Instruments	Class# of check	Type of Check	Quantum Of check	Reference Document				
1	2	3	4	5	6	7	8	9	10	
2.02.02 Concrete conveying, placing & compaction										
i	Mixing of concrete shall be done in a approved mixer such as to produce a homogenous mix				To be calibrated at the time of starting and subsequently once in three months, and shall confirm to IS:4925	Review of calibration chart/ Certificate, IS 457	✓	time of mixing will be as given in IS 457		
iii	Handling and Transportation of concrete buckets, chutes, belts, c onveyer etc	B	Physical	100%	as per construction/erection methodology	SR		Free fall or drop shall be limited to 150 cm unless permitted concrete should be placed within 30 min of its removal from mixture. Construction methodology to be approved one week prior to start of work		
iv	Placement of concrete	B	Physical	100%	as per construction/erection methodology as per tech.specs	SR		No concrete shall be placed until the place of deposit has been thoroughly inspected and approved, the concrete shall be deposited in such a manner to maintain, until completion of unit, a plastic horizontal surface throughout		
vi	Check for placement	B	Physical	100%	As per approved construction methodology	SR		If water accumulates at surface due to bleeding or other causes taking place concreting shall be stopped as far as possible, for reconsideration of mix design, accumulated water shall be removed by sponge, in no case the such accumulation of water shall be covered with concrete, or dry concrete		
vii	Compacting	As required	Physical	At Random	Check for segregation as per IS 456	SR		Exposed concrete surface shall be protected against heating and drying for atleast 72 hrs after placement, curing compound may be used		
viii	Curing	As required	Physical	At Random	Check for period of curing as per IS 456	SR				
ix	Cleanliness, provision of chute and arrangement for transportation & placement of concrete.	As required	Visual	100%	Before clearance for concreting	Inspection Report				
x	check for segregation	As required	Visual	100%	Tech Spec/Relevant IS , IS :456					
LEGEND: D* Records, identified with "Tick" (✓) shall be essentially included by supplier in QA Legend to be used: Class # : A = Critical, B=Major, C=Minor; SR,TR,Mfr,TC, LB										
Sub-supplier	Main-supplier	'A' shall be witnessed by NTPC FQA, 'B' shall be witnessed by ntpc erection / construction deptt. and 'C' shall be witnessed by erection supplier (A & B check shall be NTPC CHP stage); SR = Site Register , TR= Test Report, MfrTC = Manufacturer's Test Certificate								
Signature		This document shall be read in conjunction with NTPC Tech. Specifications, BOQ & Drawings& FQP No.2.								
		REVIEWED BY APPROVED BY APPROVAL SEAL								

FORMAT NO. : QS-01-QAIP-09/02-RO

Supplier's Name and Address:		INDICATIVE FIELD QUALITY PLAN						PROJECT:	
ITEM : CIVIL WORKS SUB-SYSTEM :		QP NO. : 01 REV. NO.: 00 DATE:		CONTRACT NO. MAIN- CONTRACTOR		PACKAGE: CONTRACT NO. MAIN- CONTRACTOR		Remarks	
Sl. No	Activity and operation	Characteristics / Instruments	Class# of check	Type of Check	Quantum Of check	Reference Document	Acceptance Norms	Format of Record	Remarks
1	2	3	4	5	6	7	8	9	10
TEST/CHECK ON RCC STRUCTURE IN HARDENED CONDITIONS									
2.02.03		Dimensional check or finished structures & Dimensional tolerances	B	Measurement	Approved Drawing	As per IS:456/tech. Specification.		SR/LB	
v		Rebound Hammer test	A	physical	as required by the NTPC engineer	As per relevant / tech. Specification.		SR/LB	
2.03	REINFORCEMENT STEEL								
i		Physical and Chemical Properties for each lot as per relevant IS codes	A	Review of TCS	Each consignment	IS : 1786, IS:432, IS:1566		Mfr. TCS	Tested steel to be supplied by NTPC. In the absence of manufacturer's test certificate testings shall be carried out. Consignment shall be considered in lots of 50MT
ii		Cutting tolerance	B	Measurement	At Random	IS : 1852, IS: 432, IS:1786		SR/LB	Tolerance as per specifications
LEGEND: D * Records, identified with "Tick" (✓) shall be essentially included by supplier in QA Legend to be used: Class # : A = Critical, B=Major, C=Minor; SR,TR,MfrTC, LB									
Sub-supplier	Main-supplier	'A' shall be witnessed by NTPC FQA. 'B' shall be witnessed by ntpc erection / construction deptt. and 'C' shall be witnessed by erection supplier (A & B check shall be NTPC CHP stage); SR = Site Register, TR= Test Report, MfrTC = Manufacturer's Test Certificate							
Signature		This document shall be read in conjunction with NTPC Tech. Specifications, BOQ & Drawings& FQP No.2.							
		REVIEWED BY						APPROVED BY	
		APPROVAL SEAL							

FORMAT NO.: QS-01-QAIP-09/F2-RO

LOGO	Supplier's Name and Address:	INDICATIVE FIELD QUALITY PLAN						PROJECT:	
		ITEM : CIVIL WORKS	QP NO. : 01 REV. NO.: 00	DATE: PAGE:	CONTRACT NO. MAIN-	CONTRACTOR	Acceptance Norms	Reference Document	Format of Record
Sl. No	Activity and operation	Characteristics / instruments	Class# of check	Type of Check	Quantum Of check	Reference Document	Format of Record	Remarks	
1	2	3	4	5	6	7	9	10	
iii		Freedom from cracks, surface flaws, Lamination, (Visual Examination).	B	Visual	100%	(S: 1852, IS:432, IS:1786)	SR/LB	To be checked at site. Steel collected from source should be free from excessive rust. To be stored as per Technical Specs.	
2.03.01	Placement of Reinforcement Steel								
i		Check for bar bending schedule with necessary laps, Spacers & Chairs	B	Visual & Measurement	100%	Approved Drawings	SR		
ii		Check for cover, spacing of bars	B	Visual & Measurement	100%	Approved Drawings	SR		
iii		Check for bending of bars	B	Visual & Measurement	100%	Approved Drawings	SR		
iv		Check for spacers and chairs after the reinforcement cage is put inside the formwork	B	Visual & Measurement	100%	Approved Drawings	SR		
v		Lapping of bars	B	Measurement	100%	IS : 456/ Drawings & approved bar bending schedule	SR		
vi		Check all joints, Crossing	B	Visual	Random	Approved drawing/bar bending schedule	SR		
		LEGEND: D* Records, identified with "Tick" (✓) shall be essentially included by supplier in QA Legend to be used: Class # : A = Critical, B=Major, C=Minor; SR,TR,Mfr,TC, LB			DOC. NO.:				
Sub-supplier	Main-supplier	This document shall be read in conjunction with NTPC Tech. Specifications, BOQ & Drawings& FQP No.2.			For NTPC USE				
Signature					REVIEWED BY				
					APPROVED BY				
					APPROVAL SEAL				

FORMAT NO. : QS-01-QMIP-09/T2-RO

LOGO	Supplier's Name and Address:	INDICATIVE FIELD QUALITY PLAN							PROJECT: PACKAGE: CONTRACT NO. MAIN- CONTRACTOR	Format of Record	Remarks
		ITEM : CIVIL WORKS	Q.P. NO. : 01 REV. NO.: 00 DATE: PAGE:	Characteristics / Instruments	Class# of check	Type of Check	Quantum Of check	Reference Document			
Sl. No	Activity and operation										
1	2	3	4	5	6	7	8	9	D*	10	
2.04	STAGING AND FORMS										
2.04.01		Materials and accessories	As required	B	Visual	Once	As per relevant IS	SR		Proper care should be taken in order to combat corrosion. Proper care should be taken while cleaning, moving and stacking the scaffolds	
i		Soundness of staging, shuttering and scaffolding	As required	B	Visual	Once	As per manufacturer's spec. and as per 3696, 4014, 4990	SR			
ii		Plywood for concrete shuttering work (Moisture content, glue adhesion in dry state, water resistance test)					IS 4990:1993, IS 1734; (Part 1 -11)				
iii		Connection between individual scaffolding units and safe slenderness ratio. Two independent safety measures against collapse	As required	B	Visual	Fortnightly	As per National Safety Council & relevant IS Codes i.e. IS:14687 & IS:3696	SR		Manufacturer will supply technical data (type of adhesive used, type of preservative used, density of plywood species of timber etc.) and recommended method of use and loading	
iv		Concrete strength during climbing process.	As per IS provision	B	Physical Testing	For each lift of shuttering	As per provisions and tolerances	SR			
v		Hoisting for personnel and materials	As required	B	Visual	Fortnightly	As per manufacturer recommendation & safety codes	SR			
vi		Alignment/Shape	As required	B	Measurement	For each lift of shuttering	As per approved drawings	SR/LB			
vii		Check form's seam marks and water tightness	As required	B	Physical	Random	As per approved drawings	SR/LB			
		LEGEND: D* Records, identified with "Tick" (✓) shall be essentially included by supplier in QA Legend to be used: Class # : A = Critical, B=Major, C=Minor; SR,TR,Mfr,TC, LB							DOC. NO.:		
Sub-supplier	Main-supplier	'A' shall be witnessed by NTPC FQA, 'B' shall be witnessed by ntpc erection / construction deptt. and 'C' shall be witnessed by erection supplier (A & B check shall be NTPC CHP stage); SR = Site Register, TR= Test Report, Mfr-TC = Manufacturer's Test Certificate							For NTPC USE		
Signature		This document shall be read in conjunction with NTPC Tech. Specifications, BOQ & Drawings & FQP No.2.							REVIEWED BY	APPROVED BY	APPROVAL SEAL

FORMAT NO.: QS-01-QAIP-0072-RO

LOGO	Supplier's Name and Address:	INDICATIVE FIELD QUALITY PLAN										PROJECT: PACKAGE: CONTRACT NO. MAIN- CONTRACTOR	Remarks	
		ITEM : CIVIL WORKS				QP NO. : 01 REV. NO.: 00				Reference Document	Acceptance Norms			Format of Record
		SUB-SYSTEM :		DATE:		PAGE:		REV. NO.:						
Sl. No	Activity and operation	Characteristics / Instruments	Class# of check	Type of Check	Quantum Of check	Document	Acceptance Norms	Format of Record	Remarks					
1	2	3	4	5	6	7	8	9	10					
2.05	Embedded part (including laying of rails & anchor fasteners)													
i	Position and level of embedded parts	As required	B	Dimensional	100%	As per drawing/ Technical Specifications.	SR	SR	Exposed surface of the embedded parts other than holding down bolts are to be painted with primer ,chlorinated , rubber baed zinc phosphate					
ii	Position depth and size of bolt hole	As required	B	Dimensional	At random	As per drawing/ Technical Specifications.	SR	SR						
iii	Location verticality of pipe sleeve/opening of bolt hold	As required	B	Dimensional	At random	As per drawing/ Technical Specifications.	SR	SR						
iv	Welding / tying of embedment to reinforcement	As required	B	Dimensional	At random	As per drawing/ Technical Specifications.	SR	SR						
2.06	Pre-cast concrete													
i	crushing strength	compression strength testing machine	A	Physical	one sample of six cubes per 50m m3 or part thereof	As per IS:456/IS: 456	SR/LB	SR	a minimum of three specimen shall be tested for 28 days comp. strength					
ii	Workmanship free from visual defects	Visual	B	Physical	100%	Tech. Spec.	Register	Register	The precast units shall be free from defects like honeycombing, reinforcement exposure and should have good finish. All relevant tests like workability, cube test shall be carried out as per IS 456-2000 Same as applicable to cast in situ concrete.					
iii	Dimension of structure	As required	B	Measurement	100%	As per IS:456/NTPC Tech. specification.	SR	SR	If the material already tested of the cast-in-situ concrete and part of the same is used for precast concrete, further testing is not required, otherwise testing is required for every 50 Cum. Of Concrete.					
LEGEND: D* Records, identified with "Tick" (✓) shall be essentially included by supplier in QA Legend to be used: Class # : A = Critical, B=Major, C=Minor; SR,TR,MfrTC, LB														
Sub-supplier	Main-supplier	'A' shall be witnessed by NTPC FQA, 'B' shall be witnessed by ntpc erection / construction deptt. and 'C' shall be witnessed by erection supplier (A & B check shall be NTPC CHP stage); SR = Site Register , TR= Test Report, MfrTC = Manufacturer's Test Certificate This document shall be read in conjunction with NTPC Tech. Specifications, BOQ & Drawings& FQP No.2.												
Signature		DOC. NO.: For NTPC USE REVIEWED BY APPROVED BY APPROVAL SEAL												

FORMAT NO.: QS-01-QAIP-09/F2-RO

Logo	Supplier's Name and Address:	INDICATIVE FIELD QUALITY PLAN										PROJECT:		Remarks
		ITEM : CIVIL WORKS		QP NO. : 01 REV. NO.: 00		SUB-SYSTEM :		DATE:		PAGE:		Acceptance Norms	Format of Record	
				Class# of check	Type of Check			Quantum of check	Reference Document					
Sl. No	Activity and operation	Characteristics / Instruments	3	4	5	6	7	8	9	10				
i	Load Test	As required	B	Physical	5% at random or as decided by NTPC E-I.C.	S:456/ As decided by Site Engr. Incharge.			Inspection Report SR/LB	10				
iv	Workability	slump test apparatus	B	Physical	one sample every two hrs from mixing plant	S:1199 & IS:456						These tests shall also be carried out, in case of doubt regarding grade of concrete and poor quality		
vi	Water cement ratio	As required	B	Physical	At random	S:1199			SR/LB			According to the mix design		
vii	Cement content	As required	B	Physical	At random at the time of batching	S:1199 /tech spec						According to the mix design		
Brick Masonry & allied works														
3.00														
3.01	i)	Brick Masonry Test on Bricks												
		Dimensions, colour,	A	Measurement/ Physical Test	As per relevant IS Code/ One Sam ple for 30,000 Nos. or part thereof	S: 1077,			Inspection Report				Efflorescence shall be checked at each source.	
		compressive strength, water absorption, warpage efflorescence.				S: 1077, IS:3495 part I (Compressive Strength) Part II (Water Absorption) Part III(Efflorescence) Part IV (War page)							Preconditioning of brick shall be done as per IS. For compressive strength, warpage and water absorption	
	ii)	Test on Mortar											Cement used in mortar shall confirm to either IS 269: 1976 or IS 455- 1976 sand shall confirm to IS 2116-1980	
		Compressive strength, consistency and water retentivity for each portion of walls, plasters and ceilings.	B	Test	At random	S 2250-1981			-do-					
	iii)	Masonry construction												
		Workmanship, verticality and alignment	B	Visual/ Physical	100%	S 2212, IS 1905 As per Technical Specifications			SR/LB					
LEGEND: D* Records, identified with "Tick" (✓) shall be essentially included by supplier in QA														
Legend to be used: Class # : A = Critical, B=Major, C=Minor; SR,TR,Mfr,TC, LB														
For NTPC USE														
DOC. NO.:														
Sub-supplier	Main-supplier													
Signature														
		APPROVED BY												
		APPROVAL SEAL												

FORMAT NO.: QS-01-QALP-00F2-RO

LOGO	Supplier's Name and Address:	INDICATIVE FIELD QUALITY PLAN						PROJECT:		Remarks
		ITEM : CIVIL WORKS SUB-SYSTEM :		REV. NO.: 00 DATE:	QP NO. : 01	Reference Document	Acceptance Norms	Format of Record		
Sl. No	Activity and operation	Characteristics / Instruments	Class# of check	Type of Check	Quantum Of check	7	8	9	D ³	
1	2	3	4	5	6	7	8	9	10	
4.00	FINISH ITEMS									
4.01	Plastering									
i)		Check for defects and the remedial measure for bond filler, blistering, cracking and crazing, efflorescence and irregularity of surface texture	As required	B	Visual/ Physical	at random	As per Tech. Specs./relevant code	SR		
ii)		Truness of plastering system	As required	B	Visual/ Physical	at random	As per Tech. Specs./relevant code	SR	finished plaster surface shall not show any deviation more than 4 mm when checked with straight edge of 2 m length	
iii)	Materials- Fine sand Sand for Plastering	General quality	As required	B	visual	one per 100 m ³ or part thereof or change of source whichever is earlier	As per Tech. Specs./relevant code, Cl. 6.3.4 of IS:1905	SR		
a)		Detecious Material	As required	B	Physical	-do-	As per Tech. Specs./relevant code, IS : 2386 (Part-I & II) & IS :2116	SR	Table -I of IS:2116	
b)		Grading	As required	B	Physical	50 Cum /or part thereof	IS:3150,1542& Apprd. Drgs	SR		
c)		Galvanized hexagonal wire netting for lath plastering	As required	B	Review of Mfr.T.C.	100%	As per Tech. Specs./relevant code,	-do-		
iv)		Ensure that the plastering of brick walls shall be of min. 18mm thick for outside & 12mm for inside face	Steel Tape	B	Visual/ Measurement	100%	As per IS 1661 /Technical Specifications/approved drawings	SR/LB	finished plaster surface shall not show ant deviation more than 4 mm when checked with straight edge of 2 m length	
v)		Ensure that the plastering of concrete ceiling 6mm thick (min.) mortar	Steel tape	B	-do-	100%	-do-	-do-		
vi)		Ensure that the curing of plastering surface are carried out for 7 days (Min.)		B	Visual	100%	-do-	-do-		
vii)		plaster of paris		B	Physical	50 Cum /or part thereof	As per IS : 2547/ IS 2333/tech spec	-do-		
		LEGEND: D * Records, identified with "Tick" (✓) shall be essentially included by supplier in QA Legend to be used: Class # : A = Critical, B=Major, C=Minor; SR,TR,MfrTC, LB								
Sub-supplier	Main-supplier	'A' shall be witnessed by NTPC FQA, 'B' shall be witnessed by ntpc erection / construction deptt. and 'C' shall be witnessed by erection supplier (A & B check shall be NTPC CHP stage); SR = Site Register , TR= Test Report,MfrTC = Manufacturer's Test Certificate This document shall be read in conjunction with NTPC Tech. Specifications, BOQ & Drawings& FQP No.2.								
Signature		REVIEWED BY APPROVED BY APPROVAL SEAL								

FORMAT NO.: QS-01-QAIP-0972-RO

Logo		INDICATIVE FIELD QUALITY PLAN				PROJECT:				
Supplier's Name and Address:		ITEM : CIVIL WORKS SUB-SYSTEM :		QP NO. : 01 REV. NO.: 00 DATE:	PACKAGE: CONTRACT NO. MAIN- CONTRACTOR					
Activity and operation		Characteristics / Instruments		Class# of check	Type of Check	Quantum Of check	Reference Document	Acceptance Norms		
Sl. No										
1	2	3		4	5	6	7	8	9	10
<div> <div>5.00</div> <div>GROUTING</div> </div>										
5.01		Grouting pressure	Test Set Up	B	Physical	At Random	Approved drawings	SR	Random to be checked by FQA	
5.02		Composition of grout		B	Physical	Each Lot/ Batch	As per manufacturer's technical specifications	SR		
5.03		compressive strength	Test set up	A	Test	Each Lot/ Batch	NTPC tech. Specifications	SR/TR		
<div> <div>6.00</div> <div>Bought out Items</div> </div>										
a		All bought out items to be procured from the approved vendor and or approval of Quality plans by NTPC	-	B	Verification of TC and/or Testing	100%	NTPC Tech. Spec. /BOQ	SR/LB	The TC submitted should bear proper identification or correlation with the batch of material supplied and same shall be brought out in the challan/ consignment note .	
b		Submission of list of Bought out items and their vendors for each of the bought out item identified ,for approval within the period agreed , in LoA.	-	A	Physical	One time			To be submitted to CQA for approval with a copy to site .	
<div> <div>LEGEND: D*</div> <div>Records, identified with "Tick" (✓) shall be essentially included by supplier in QA Legend to be used: Class # : A = Critical, B=Major, C=Minor; SR,TR,MfrTC, LB</div> </div>										
Sub-supplier		<div> <div>'A' shall be witnessed by NTPC FQA, 'B' shall be witnessed by ntpc erection / construction deptt. and 'C' shall be witnessed by erection supplier (A & B check shall be NTPC CHP stage).SR = Site Register , TR= Test Report,MfrTC = Manufacturer's Test Certificate</div> <div>This document shall be read in conjunction with NTPC Tech. Specifications, BOQ & Drawings& FQP No.2.</div> </div>								
Main-supplier		For NTPC USE								
Signature		APPROVED BY								
		REVIEWED BY								
		APPROVAL SEAL								

FORMAT NO.: QS-01-QMIP-09/T2-RO

LOGO		INDICATIVE FIELD QUALITY PLAN					PROJECT:			
Supplier's Name and Address:		ITEM : CIVIL WORKS SUB-SYSTEM :		REV. NO.: 00 DATE:		PACKAGE: CONTRACT NO. MAIN- CONTRACTOR				
Sl. No	Activity and operation	Characteristics / Instruments	Class# of check	Type of Check	Quantum Of check	Reference Document	Acceptance Norms	Format of Record	Remarks	
1	2	3	4	5	6	7	8	9	10	
7.00.00	Anti weed treatment	anti weed treatment before gravel filling		Visual	100%	NTPC Specification		SR/LB		
		Procurement of soil sterilization chemical		Visual	100%	NTPC Specification		SR/LB		
8.00.00	RCC PIPES									
8.01.00	Tests at Manufacturer's Works									
8.01.01		Hydrostatic Test	A	Physical	As per IS 458	Testing Procedure as per IS 458	IR/TC	✓	Frequency of sampling & testing procedure and acceptance norms as per IS 458	
8.01.02		Absorption Test	A	Physical	As per IS 459	Testing Procedure as per IS 459	IR/TC	✓		
8.01.03		3 Edge Bearing Test	A	Physical	As per IS 460	Testing Procedure as per IS 460	IR/TC	✓		
8.01.04		Straightness Test	A	Physical	As per IS 461	Testing Procedure as per IS 461	IR/TC	✓		
8.01.05		Dimensional Check & Visual Inspn.	A	Physical	As per IS 462	Testing Procedure as per IS 462	IR/TC	✓		
8.02.00	Checks at site									
8.02.1		Check for Laying and Jointing	B	Visual	As per IS 783	As per IS 783 & NTPC Tech. Spec	IR/TC	✓		
9.00.00	ROAD WORKS : ALL TESTS AS PER IRC19/ RELEVANT IRC CODES.									
		LEGEND: D* Records, identified with "Tick" (✓) shall be essentially included by supplier in QA Legend to be used: Class # : A = Critical, B=Major, C=Minor; SR,TR,Mfr/TC, LB								
Sub-supplier	Main-supplier	*A* shall be witnessed by NTPC FQA, *B* shall be witnessed by ntpc erection / construction deptt. and *C* shall be witnessed by erection supplier (A & B check shall be NTPC CHP stage); SR = Site Register , TR= Test Report, Mfr/TC = Manufacturer's Test Certificate								
Signature		This document shall be read in conjunction with NTPC Tech. Specifications, BOQ & Drawings& FQP No.2.								
							REVIEWED BY	APPROVED BY	APPROVAL SEAL	

FORMAT NO.: QS-01-QAIP-09/F2-RO

Supplier's Name and Address:		INDICATIVE FIELD QUALITY PLAN						PROJECT:		REMARKS			
		ITEM : CIVIL WORKS SUB-SYSTEM :		QP NO. : 01 REV. NO.: 00 DATE: PAGE:		Reference Document		Acceptance Norms					
Sl. No	Activity and operation	Characteristics / Instruments	Class# of check	Type of Check	Quantum	Of check	7	8	9	D*	10		
1		3	4	5	6								
STRUCTURAL STEEL WORKS													
10.00.00	Material	i) Physical and Chemical Properties of Material	As required/ agreed	A	Review of MTC/ TR	Once per each Lot	Manufacturer's TC or Laboratory Test Report, Technical Specification	MTC/TR	✓	Review of co-related Mill Test Certificates or check testing in absence of MTC.			
10.01.00		ii) UT on Plates 40 mm and beyond thick	NDT	A	Review of MTC/ TR	Each plate			SR		✓	UT to be carried out by L2 qualified personnel	
10.02.00		Welding	i) Welding Procedure and welder qualification test	As required/ agreed	A	WPS			Before start of welding		SR	✓	As per requirement of NTPC Engineer
			Fillet Welds j). Check for size and visual examination ii). Microtech Examination on production test coupons	As required/ agreed	B	Measurement			Random		SR	✓	As per requirement of NTPC Engineer
		iii). Dye Penetration Test - Crane Girder	As required/ agreed	B	Physical	Main plate weld with min one joint per built up beam, columns and crane girders	SR	✓	-Do-				
		iv). Dye Penetration Test - Except Crane Girder, other Fillet Welds	As required/ agreed	B	Physical	25% weld length of tension member of crane girder	SR	✓	-Do-				
			As required/ agreed	B	Physical	5% of Weld length with min. 300mm per location	SR	✓	-Do-				
LEGEND: D* Records, identified with "Tick" (✓) shall be essentially included by supplier in QA													
Legend to be used: Class # : A = Critical, B=Major, C=Minor; SR,TR,MtrTC, LB													
Sub-supplier	Main-supplier	'A' shall be witnessed by NTPC FQA, 'B' shall be witnessed by ntpc erection / construction deptt. and 'C' shall be witnessed by erection supplier (A & B check shall be NTPC CHP stage); SR = Site Register , TR= Test Report,MtrTC = Manufacturer's Test Certificate											
This document shall be read in conjunction with NTPC Tech. Specifications, BOQ & Drawings& FQP No.2.													
Signature							For NTPC USE						
								REVIEWED BY	APPROVED BY	APPROVAL SEAL			

FORMAT NO.: QS-01-QALP-09/F2-RO

INDICATIVE FIELD QUALITY PLAN										
LOGO	Supplier's Name and Address:		ITEM : CIVIL WORKS SUB-SYSTEM :				PROJECT:			
			Rev. No. : 00 DATE:	QP NO. : 01 DATE:	Reference Document	Acceptance Norms	Format of Record	Remarks		
Sl. No	Activity and operation	Characteristics / Instruments	Class# of check	Type of Check	Quantum Of check	Reference Document	Acceptance Norms	Format of Record	Remarks	
1	2	3	4	5	6	7	8	9	10	
10.03.00	Butt Welds i) Visual examination ii) DPT iii) Mechanical testing iv) Radiography Test	As required/ agreed	B	Visual	100%	As per technical specifications	✓	SR	As per requirement of NTPC Engineer	
		As required/ agreed	B	Physical	100%	Min. one joint per built up beams, columns and crane girder.	As per technical specifications and construction drawings	✓	IR	All butt welds to be back gouged before DPT
		As required/ agreed	B	Physical	100%	100% radiography test on butt welds of tension flange (bottom flange) of crane girder. All other butt welds shall be subjected to 10% weld length of each welder.	As per technical specifications and construction drawings	✓	IR	Test on production test coupons
		As required/ agreed	A	Physical				✓	IR	Wherever RT is not feasible UT to be carried out.
11.00.00	Other Full Penetration Welds Fabrication and erection of structures	As required/ agreed	A	Physical	i) 100% UT on the web flange joint of crane girder ii) 10% UT on other full penetration joints	AWS D 1.1 and Technical Specifications	✓	IR	In case of failure of any welds in SPOT/RT or UT the % of retesting shall be doubled at that particular location. Acceptance criteria of NDT on welds shall be as per AWS D1.1.	
		As required/ agreed	A	Measurement/ Visual	1st and 10 th set of identical structure shall be checked for control assembly at shop.	As per technical specifications and construction drawings	✓	IR		
		As required/ agreed	B	Measurement/ Visual	All Structures	As per IS 7215 and IS 12843	✓	IR		
		As required/ agreed	B	Measurement/ Comparison	As required by NTPC engineer	As per technical specifications and construction drawings	✓	IR		
PAINTING AND ALLIED WORKS										
	a) Check for the Materials b) Preparation of the Surfaces (SA 2 1/2) c) Application of Paint d) Check for DFT and no of Coats	As required/ agreed	A	Review of MTC	Each Lot	As per Technical Specifications and approved drawings	✓	MTC		
		As required/ agreed	B	Physical	random	As per Technical Specifications and approved drawings, BS	✓	SR/LB		
		As required/ agreed	B	Physical	Random in Each Shift	As per Technical Specifications	✓	SR/LB		
		As required/ agreed	B	Physical	Random in Each Shift	As per Technical Specifications and approved drawings	✓	SR/LB		
LEGEND: D* Records, identified with "Tick" (✓) shall be essentially included by supplier in QA Legend to be used: Class # : A = Critical, B=Major, C=Minor; SR,TR,MfrTC, LB										
Sub-supplier	Main-supplier	This document shall be read in conjunction with NTPC Tech. Specifications, BOQ & Drawings& FQP No.2.								
Signature	APPROVED BY									
FORMAT NO.: QS-01-QAIP-09/F2-RO										

LOGO	Supplier's Name and Address:	INDICATIVE FIELD QUALITY PLAN					PROJECT:		
	ITEM : CIVIL WORKS SUB-SYSTEM :	QP NO. : 01 REV. NO.: 00 DATE: PAGE:	CONTRACT NO.	MAIN-CONTRACTOR					
Sl. No	Activity and operation	Characteristics / Instruments	Class# of check	Type of Check	Quantum Of check	Reference Document	Acceptance Norms	Format of Record	Remarks
1	2	3	4	5	6	7	8	9	10
12.00.00	FENCING AND GATES								
i)	Materials		B	Review of Mfr. T.C	Once per lot	Tech Specs./Relevant IS	Apprd. dgrs	SR/MTC	Mfr.'s T.C. shall be correlated with the consignment received.
ii)	Workmanship	As Required	B	Visual / Physical	100%		Apprd. dgrs	SR	Erection shall be as per NTPC Tech. Specs.
iii)	Verticality & Alignment	As Required	B	Physical	100%		Apprd. dgrs	SR	
13.00.00	WATER SUPPLY - Drainage & sanitation								
13.01.00	Vitrous China sanitary appliances (Water closets, Wash basins, urinals)								
13.01.01	Surface finish, freedom from cracks and other defects.	As required	B	Visual as per IS 2556 (Pt. 1)	Each		As per Technical Specification	SR/LB	a) Tolerance limit as per IS 2556 (Pt. 1) b) Make size and colour shall be as per approved drawing and shall be of 1st. Quality.
13.01.02	Dimensions and construction	As required	B	IS 2556 (Relevant part)	10% subject to minimum 3 nos. each type of appliance.		As per Technical Specification	SR/LB	Tolerance limit shall be as per relevant part of IS: 2556
13.02.00	Pantry Sink								
13.02.01	Material Grade	As required	B	Visual as per MTC	Each		As per Technical Specification	MTC	Make size and colour shall be as per approved drawing
13.02.02	Dimensions and construction	As required	B	Physical	As desired by Engineer		As per Technical Specification	SR	-
13.02.03	Surface Finish	As required	B	Physical	As desired by Engineer		As per Technical Specification	SR	-
13.03.00	Photo Voltaic Control System								
13.03.01	Make and size	As required	B	Visual as per MTC	Each		Relevant Is Codes	TC	Make size and colour shall be as per approved drawing. Tolerance limit shall be as per relevant IS Codes.
13.04.00	Misc. Sanitary fittings								
13.04.01	Materials & finish dimensions	As required	B	Visual / Physical	10% subject to minimum 3 nos.		IS 2556 pt 1 and Tech Specification	TC	
13.04.02	Powder coating thickness	As required	B	Visual / Physical	10% subject to minimum 3 nos.		Make colour and drawing shall be as per approved drawing	SR	
	LEGEND: D* Records, identified with "Tick" (✓) shall be essentially included by supplier in QA Legend to be used: Class #: A = Critical, B=Major, C=Minor; SR,TR,MfrTC, LB								
Sub-supplier	Main-supplier	*A* shall be witnessed by NTPC FQA, 'B' shall be witnessed by ntpc erection / construction deptt. and 'C' shall be witnessed by erection supplier (A & B check shall be NTPC CHP stage); SR = Site Register, TR= Test Report, MfrTC = Manufacturer's Test Certificate							
Signature		This document shall be read in conjunction with NTPC Tech. Specifications, BOQ & Drawings& FQP No.2.							
		REVIEWED BY							
		APPROVED BY							
		APPROVAL SEAL							

FORMAT NO.: QS-01-QAIP-09/F2-RO

LOGO		INDICATIVE FIELD QUALITY PLAN						PROJECT:	
Supplier's Name and Address:		ITEM : CIVIL WORKS				PACKAGE: CONTRACT NO.		MAIN-CONTRACTOR	
SUB-SYSTEM :		REV. NO.: 00				DATE:			
Activity and operation		PAGE:				Reference Document		Acceptance Norms	
Sl. No	Characteristics / Instruments	Class# of check	Type of Check	Quantum Of check	Reference Document	Acceptance Norms	Format of Record	Remarks	
1	2	3	4	5	6	7	8	9	10
Cast Iron Pipe fittings									
13.05.01	Surface finish	As required	B	Visual / Physical	10% subject to minimum 3 nos.	Technical Specification and Relevant IS Codes	SR	✓	Tolerance limit as per applicable Is code (IS: 1729, 1536)
13.05.02	Hammer test	As required	B	Test	10% subject to minimum 3 nos.	Technical Specification and IS 1729	SR	✓	
13.05.03	Leakage Test	As required	B	Test	10% subject to minimum 3 nos.	Technical Specification and IS 1729, IS 1230 IS 1537	SR	✓	Pipes shall be capable of withstanding at least 1.5 sec an internal hydrostatic pressure of 0.7 kg/cm ²
13.05.04	Dimensions & Class	As required	B	Visual / Physical	10% subject to minimum 3 nos.	Technical Specification and Relevant IS Codes	SR	✓	
Concrete Pipe									
13.06.01	Surface finish	As required / agreed	B	Visual IS : 458	Each 5% of each lot	Technical Specification and Relevant IS Codes	SR	✓	Tolerance as per relevant IS codes
13.06.02	Dimensions & Class	As required / agreed	B	Visual IS : 459	Each 5% of each lot	Technical Specification and Relevant IS Codes	SR		
Overhead/Loff tank									
13.07.01	Capacity	As required / agreed	B	Visual as per specification	Each	Technical Specification and Relevant IS Codes	SR		a) Tolerance as per relevant Is codes
13.07.02	Water tightness	As required / agreed	B	Leakage test as per specification	Each	Technical Specification and Relevant IS Codes	SR		b) Make size and colour shall be as per approved drawing.
After installation a) Water pipes and fittings b) Drain and sewer pipes									
13.08.00	Hydraulic Pressure Test and flow	As required / agreed	B	Physical	Each Streach	IS 2065	SR	✓	a) Make size and colour shall be as per approved drawing.
13.08.01	Air, Smoke water and straightness test	As required / agreed	B	Physical	Each Streach	Technical Specification and Relevant IS Codes	SR	✓	b) Tolerance as per relevant Is codes
LEGEND: D * Records, identified with "Tick" (✓) shall be essentially included by supplier in QA									
Legend to be used: Class # : A = Critical, B=Major, C=Minor; SR,TR,MfrTC, LB									
Sub-supplier	'A' shall be witnessed by NTPC FQA, 'B' shall be witnessed by ntpc erection / construction deptt. and 'C' shall be witnessed by erection supplier (A & B check shall be NTPC CHP stage); SR = Site Register, TR= Test Report, MfrTC = Manufacturer's Test Certificate This document shall be read in conjunction with NTPC Tech. Specifications, BOQ & Drawings & FQP No.2.								
Main-supplier	For NTPC USE								
Signature	APPROVED BY								
REVIEWED BY									APPROVAL SEAL

FORMAT NO.: QS-01-QAIP-09/02-RO

LOGO	Supplier's Name and Address:	INDICATIVE FIELD QUALITY PLAN										PROJECT: PACKAGE: CONTRACT NO. MAIN- CONTRACTOR	Remarks
		ITEM : CIVIL WORKS				QP NO. : 01		REV. NO.: 00		DATE:			
		SUB-SYSTEM :				PAGE:							
Sl. No	Activity and operation	Characteristics / Instruments	Class# of check	Type of Check	Quantum Of check	Reference Document	Acceptance Norms	Format of Record					
1	2	3	4	5	6	7	8	9	10				
14.00.00	FOUNDATION SYSTEM												
14.01.00	Open / Shallow Foundation												
14.01.01		Check for the foundation excavation - Location, Layout, size, depth etc	B	Physical	Each location	As per technical specifications and construction drawings	SR	✓	lines and levels to be checked				
14.01.02		Check for the foundation casing - Layout, Shape, dimensions, Reinforcement, concreting, curing etc	B	Physical	Each foundation	As per technical specifications and construction drawings	SR		lines and levels to be checked. Concrete Grade to be checked as per Mix Design				
14.02.00	Pile Foundation												
14.02.01		Check for Piling Layout, Check for Lines and Levels	B	Measurement	100% Each pile	As per technical specifications and construction drawings	SR	✓					
14.02.02		Boring, Cleaning/Flushing of Piles	B	Visual	Random	As per IS 2911	SR	✓					
14.02.03		Check for Size and termination of boreholes	B	Physical	Each borehole	As per technical specifications and construction drawings	SR	✓					
14.02.04		Check for pile casting - reinforcement, concreting etc	B	Physical	Each pile	As per technical specifications and construction drawings	SR	✓					
14.02.05		Pile Termination level	A	Soil data	Each pile	As per technical specifications and construction drawings	SR	✓					
14.02.06		Check for Pile Caps - Lines, levels, shape, size, reinforcement, concreting, curing etc.	B	Physical	Each pile cap	As per technical specifications and construction drawings	SR	✓					
14.02.07													
		LEGEND: D* Records, identified with "Tick" (✓) shall be essentially included by supplier in QA										DOC. NO.:	
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Signature		This document shall be read in conjunction with NTPC Tech. Specifications, BOQ & Drawings& FQP No.2.										REVIEWED BY	APPROVED BY
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INDICATIVE FIELD QUALITY PLAN									
LOGO	Supplier's Name and Address:		ITEM : CIVIL WORKS				PROJECT:		
			SUB-SYSTEM :				PACKAGE: CONTRACT NO. MAIN-CONTRACTOR		
Sl. No	Activity and operation	Characteristics / Instruments	Class# of check	Type of Check	Quantum Of check	Reference Document	Acceptance Norms	Format of Record	Remarks
1	2	3	4	5	6	7	8	9	10
14.03.00	Testing :								
14.03.01		Check for Bentonite Collection and testing of mud sample from bottom of pile bore	B	Physical	Once per each Lot Each pile	As per technical specifications and relevant IS code	SR / LB	✓	Draft/interim report to be submitted at site along with plots
14.03.02		As required / agreed	B	Physical	As per above for concrete works	As per technical specifications and relevant IS code	SR / LB	✓	
14.03.03		Check for Slump test of concrete, cube Test (work test cubes)	B	Physical	As specified in technical specifications	As per technical specifications and relevant IS code	SR / LB	✓	
14.03.04		Initial pile load test, Lateral (compression) and pullout (tension)	A	Testing	As specified in technical specifications	IS 2911 & as per Tech Spec.	SR / LB	✓	
14.03.05		Routine pile test, Compression and horizontal	A	Testing	As specified in technical specifications	IS 2911 & as per Tech Spec.	SR / LB	✓	
14.03.06		Pile Integrity Test	A	Testing	Each pile	As per technical specifications and relevant IS code	Test Report	✓	
		LEGEND: D * Records, identified with "Tick" (✓) shall be essentially included by supplier in QA Legend to be used: Class # : A = Critical, B=Major, C=Minor; SR,TR,Mfr,TC, LB							
Sub-supplier	Main-supplier	'A' shall be witnessed by NTPC FQA, 'B' shall be witnessed by ntpc erection / construction deptt. and 'C' shall be witnessed by erection supplier (A & B check shall be NTPC CHP stage); SR = Site Register, TR= Test Report, Mfr-TC = Manufacturer's Test Certificate							
Signature		This document shall be read in conjunction with NTPC Tech. Specifications, BOQ & Drawings& FQP No.2.							
		For NTPC USE						APPROVED BY	
								APPROVAL SEAL	

FORMAT NO.: QS-01-QAIP-09/F2-RO

Gravel specification

Clause No.	TECHNICAL REQUIREMENTS												
	<p>The various minimum heights of the switchyard shall be as given below from plinth level :</p> <table border="1"> <tr> <th>Voltage level</th><th>Eqpmt./1st level</th><th>2nd level</th><th>3rd level</th></tr> <tr> <td>132kV (Double bus scheme)</td><td>4600mm</td><td>10000mm</td><td>--</td></tr> <tr> <td>400kV (1½ breaker scheme.)</td><td>8000mm</td><td>16000mm</td><td>--</td></tr> </table>	Voltage level	Eqpmt./1 st level	2 nd level	3 rd level	132kV (Double bus scheme)	4600mm	10000mm	--	400kV (1½ breaker scheme.)	8000mm	16000mm	--
Voltage level	Eqpmt./1 st level	2 nd level	3 rd level										
132kV (Double bus scheme)	4600mm	10000mm	--										
400kV (1½ breaker scheme.)	8000mm	16000mm	--										
1.01.11	Circuit breakers shall be supplied with necessary interpole cabling, and its cost shall be included in the cost of equipment.												
1.01.12	All equipment shall be suitable for hot line washing.												
1.01.13	The Contractor shall cooperate in all respects and exchange the necessary technical data/ drawings with other agencies and Employer's other Contractors under intimation to Employer to ensure proper coordination and completion of work in time.												
1.01.14	The sag tension, conductor spacing, short circuit forces, spacers location, conductor swing and clearances shall be carried out in accordance with IEC 60865 to achieve the specified clearances.												
1.01.15	All overhead stringing shall be carried out by minimum double tension string insulator assembly.												
1.01.16	Post insulators shall be provided near transformers and other jumpers so as to avoid mechanical forces on the LA's and Bushings etc.												
1.01.17	Necessary fire wall shall be provided between single phase of transformers. The fire wall height shall be 500mm above transformer bushing.												
1.01.18	Gravel filling shall be provided in the switchyard extension area with broken stone filling which shall consist of two layers. The first layer shall be 75 mm thick base course of 20 mm of normal size and second layer surface course of 40 mm nominal size.												
1.01.19	The pit size of transformer shall be designed for minimum 1000 mm beyond the physical dimensions of the transformer.												
1.01.20	All gantries and towers as required are to be provided by the Contractor. For 400kV & 132kV Switchyard, busbars shall be 4" IPS Al. Tube. The equipment												

RIHAND STPP-III SWITCHYARD EXTN. PKG.	BID DOC. NO: CS-1240-572D-2	TECHNICAL SPECIFICATIONS	PART-II SECTION-VI	Page E0- 3 of 8
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