

SECTION – C-1.13

SCOPE OF WORK / SUPPLY

(CIVIL, STRUCTURAL &

ARCHITECTURAL)

PART - 1

CIVIL

1.0 GENERAL

- 1.1 Specifications of materials and workmanship shall be as described in the latest CPWD Specifications including amendments.
- 1.2 These particular Specifications shall be supplementary to the specifications contained in the CPWD specifications, where at variance, these particular Specifications shall take precedence over the provisions in the CPWD Specifications.
- 1.3 Wherever Indian Standards Specifications, Codes of Practice are specified in the Specifications, Schedule of Quantities or Preambles, reference shall be to the latest edition.
- 1.4 Site Clearing – The site is generally flat terrain. However, minor obstructions and wild grass, Vegetation, the cutting of trees, bushes, shrubs, etc. and the pulling out of roots and stumps to effect a general, cleaning of the site area. All these materials shall be removed from the site area. Minor grading, if required, to be carried out without any additional cost.
- 1.5 Finished Grade Level in the plant battery limit area shall be 6.0 mt above Mean Sea Level. Finished floor level of Ground floor (Plinth Level) shall be minimum 7.0 mt above mean sea level. (i. e 1.0 mt above Finished Grade Level)

2.0 SOIL INVESTIGATION REPORT

- 2.1 Preliminary soil investigation report of adjoining area is attached with ITB. Foundation design may be done as per the requirement. Pile (“ Bored” or “Driven” cast in situ) foundation may be required for heavy equipment, tall towers etc. However type of foundations for Buildings, pipe racks & other structures etc shall be decided by the bidder on the basis of soil investigation reports. If any additional soil investigation is required, the same may be carried out by the contractor at their cost.

No claim shall be entertained on account of the difference in foundation design philosophy due to detailed soil investigation carried out by the contractor compared to preliminary soil investigation report attached with ITB.

3.0 CODES AND STANDARDS

The design shall be in accordance with the latest editions and revisions of established codes. Sound Engineering practices and shall conform to the statutory regulations applicable in India.

- 3.1 The main codes, standards and statutory regulations considered as minimum requirements are as follows. Latest revision of these shall be followed.
- 3.2 All buildings, structures, machine/equipment foundations, liquid retaining / storage / conveyance structures, pipe racks, Trenches, pits etc. shall be designed based on following IS Codes in general and other relevant IS Codes as applicable:

IS : 456, 875 1893,2911,2950,2974,3370, 4326, 13920,1172, 1742, 1905, 2212 & SP:16, SP:34, SP:24, SP:20

3.3 Design loads [Dead load, Live load, Wind load & Seismic load] Consideration of various loads for design of the structures is to be consider as stated hereunder:

Dead Load : As per IS 875 Part I
Live load : As per IS 875 or actual whichever is more.
Wind load : As per IS 875 Part III
Seismic load : As per IS 1893 (Part I): 2002 & IS 1893 (Part IV) : 2005

3.4 Structural steel shall be designed based on following IS Codes in general and other relevant IS codes as applicable.

IS : 800, 814, 816 & SP : 06

3.5 Roads and sanitary works shall be designed based on following IS Codes in general and other relevant IS codes as applicable.

IS : 2065, 8835, IRC: 6, 19, 37 & 58.

4.0 MATERIALS OF CONSTRUCTION

4.1 CONCRETE

Minimum grade of design mix reinforced concrete for foundations and super structures shall be M 30 (Minimum cement consumption shall be as clause 4.6) The characteristics strength of concrete shall be 30N/sqmm after 28 Days.

Minimum grade of design mix Reinforced concrete for pavement works shall be M 20 (Minimum cement consumption shall be 350 Kg per Cum) The characteristics strength of concrete shall be 20 N/sqmm after 28 Days.

Grade of plain cement concrete (Lean concrete) shall be M 10, minimum 75 mm thickness of lean concrete mix 1:4:8 (By weight, using 40 and down size grade crushed stone aggregate) shall be provided under all R. C. C Foundations.

4.2 STRUCTURAL STEEL

Unless otherwise specified all structural steel (including open grating and raised pattern plates, shapes, bars, hollow sections) shall be Fe 250 conform to IS 2062. Structural steel of only following makes shall be used for the work.

- (a) STEEL AUTHORITY OF INDIA LTD.
- (b) TATA IRON & STEEL CO. LTD.
- (c) RASTRIYA ISPAT NIGAM LIMITED (Vishakhapattanam)

4.3 REINFORCEMENT STEEL

The reinforcement steel shall be HYSD conforming to Fe 415/ Fe 500 (Characteristics yield strength 415/500 N/Sqmm) conforming to IS: 1786. Reinforcement steel of only following makes shall be used for the work.

- (a) STEEL AUTHORITY OF INDIA LTD.
(b) TATA IRON & STEEL CO. LTD.
(c) RASTRIYA ISPAT NIGAM LIMITED (Vishakhapattanam)

4.4 CEMENT

Ordinary portland cement 43 Grade conforming to IS 8112 shall be used for all works for foundations, pile caps, sub-structure & Super structure.

Sulphate resistant cement (SRC) conforming to IS : 12330 is to be used for piles.

4.5 AGGREGATES

These shall conform to IS : 383, specifications for Coarse & fine aggregates from Natural resources.

- 4.6 The minimum consumption of cement irrespective of design mix shall not be less than as follows :

1	M – 7.5 (1 : 4 : 8)	170	Kg/Cum
2	M – 10 (1 : 3 : 6)	220	Kg/Cum
3	M – 20	350	Kg/Cum
4	M – 25	380	Kg/Cum
5	M – 30 (With OPC)	420	Kg/Cum
6	M – 30 (With SRC)	400	Kg/Cum

5.0 SCOPE OF WORK

The scope of Civil-Structural works under this contract shall include complete design, detailing, supply and construction of all relevant civil and structural works for GTG based Captive Power Plant for KRIBHCO CPP, at Hazira, Gujarat as per the specified in the bid document.

Major Civil-structural works involved shall include but not be limited to the following:

Design and construction/installation of all foundations (including installation, testing etc. of piles) and superstructure for:

- i) Foundations for GTG based captive power plant comprising of Gas Turbine Generators (GTG) along with Heat Recovery Steam Generator (HRSG), and other auxiliaries equipments (static and dynamic), Bypass Stacks for GTGs and HRSGs etc.
- ii) Chimney for Heat Recovery Steam Generator (HRSG), Control Room, Substation building with switch gear/cable cellar, Structural shed for GTG with EOT crane, Pump foundations, Pipe Rack, Cable Rack, UG Cable Trenches, Platform & Pipe supports/sleepers, Transformer foundations, Cable supports etc. all complete.
- iii) All foundations and structures of Cooling Tower (as applicable).
- iv) Soil treatment for foundations, wherever required.

- v) Water proofing and damp proofing wherever specified/directed by Engineer-In-charge.
- vi) Protective lining/coatings wherever required as per the required (duly approved by Owner /Consultant).
- vii) Painting of structural steel members.
- viii) Preparation of fabrication drawings for all structural steel works and bar bending schedules for all RCC works.
- ix) Anti-termite treatment for buildings, if required.
- x) Obtaining statutory approval from local authorities such as Municipal Corporation, Development authorities, Inspector of Factories and any other concerned authorities before starting the works at site.
- xi) Monorails or over head cranes of required capacity for operation/maintenance of equipment/pumps in technological structures, Pump houses, under pipe racks, etc.
- xii) For further scope of civil structural works scope of works of General Civil, / Architectural, Packages and Electrical shall also be referred to.
- xiii) Any other civil and structural works required/directed by Engineer-in-charge for the satisfactory and successful completion of the project.

5.1 Detailed Scope of Work

5.1.1 General

Contractor shall develop the FEED to Approved For Construction (AFC) status, taking due account of the detailed requirements of the drawings, design basis, specifications and standards for architectural works for the scope of work covered under this Contract.

CONTRACTOR shall not proceed with construction till those documents which are specifically listed at "Review" category are reviewed by OWNER /CONSULTANT. The scope of architectural works under this contract shall include design, detailed engineering, procurement, supply and construction of all relevant works as per specifications enclosed with the bid document. The scope of work as defined herein shall be read in Conjunction with Job Specifications for Architectural works and Architectural Standards.

Scope of work by the Contractor shall consist of Architectural design & detail engineering including preparation of Architectural drawings, construction including construction supervision & supply of all materials, labour, tools & tackles etc., obtaining approvals from statutory Authorities, supply of deliverables like drawings, documents, preparation of As built drawings etc and co-ordination with EIL & the Owner etc. all complete for the following buildings:

1) Sub Station & Control Room Building

For these buildings Bidder shall made himself familiar with site and in consultation of Owner finalise the same preaward. Building shall comprise of Console Room, Rack Room, UPS Room, Battery Room, Cellar, MCC Room, A/C Plant Room, Opearator's Room, Storage Rooms as/ requirement, Toilet & D/w area etc.

2) G.T Shed

Steel structure, 0.50 mm thick Precoated Galvalume sheet roofing and side cladding.

3) Analyser Room

The building shall be RCC frame structure with brick masonry wall, RCC roof.

Analyser room shall be provided with suitable air-conditioner as approved by OWNER/CONSULTANT

4) Pump House

Steel structure, 0.50 mm thick Precoated Galvalume sheet roofing and side cladding.

5.1.2 Detail Engineering

Detail Engineering shall be based on "Architectural design basis" and approved preliminary drawings. The Contractor shall prepare construction drawings and submit the same to Owner/CONSULTANT for review/approval. The requirement of deliverables by the Contractor for detail engineering is indicated elsewhere.

5.1.3 Construction

The Contractor in strict conformity with Owner/CONSULTANT reviewed/approved construction drawings, using materials as per Specifications, Standards & List of Approved Manufacturers as attached in the Tender Documents shall carry out construction including construction supervision. Construction shall include supply of all materials, labours, plants.

5.1.4 Statutory Approvals

The Contractor shall obtain all necessary approvals from statutory authorities such as Factory Inspector, Tariff Advisory Committee (TAC). Local Municipal or Development Authorities for the design and construction. The Contractor shall also prepare all drawings, documents as required for obtaining such approvals. Any changes/ modifications etc. in design/construction required for obtaining such approvals shall also be done by the Contractor without any time & cost implication to the Owner or CONSULTANT.

5.2 Scope of Supply**5.2.1 Owner's Scope of Supply**

NIL

5.2.2 Contractor's Scope of Supply

All architectural/ Structural materials (consumables/non-consumables) including Cement and Steel required for satisfactory completion of the job shall be supplied by the contractor.

5.3 Deliverables by the Contractor

5.3.1 Drawings / Documents Required after Award of contract

The Contractor shall submit a detailed schedule of submission of deliverables as indicated herewith for review by Owner/CONSULTANT as per agreed schedule. Such a schedule shall be made in line with the overall time schedule indicated elsewhere in the Tender Documents. Submission of all deliverables shall be as per the said schedule as reviewed by Owner/CONSULTANT. All deliverables shall be prepared using Computer software and shall be complete in all respects including correct titles indicating Owner, Consultant, Contractor, Project name, CONSULTANT Job No., Dates, Issues, Revisions and signatures of Performer, Checker & Approver of the Contractor. Incomplete, unsigned & unchecked Documents/ Drawings shall not be accepted and shall be returned. All revisions shall be clearly pointed out clouded for easy identification/ review. All deliverables shall be submitted in requisite number of prints as per methodology mentioned elsewhere in the Tender Documents.

Deliverables by the Contractor shall be as listed herewith.

1. Drawing/Document Schedule

The schedule shall include all Drawings/ Documents with Title, Number, Dates of issues (scheduled & actual) & present review status etc. The schedule shall be updated and submitted at regular intervals as mentioned elsewhere.

2. Drawings

- A. Preliminary Architectural Drawings of the buildings in accordance with bid indicating Plans, Sections & Elevations & Architectural treatment. Such preliminary dwgs shall be prepared after finalisation of sizes & layout of the required spaces/ areas/ rooms and approval of the same by the originating department of OWNER / CONSULTANT.
- B. Construction drawings of all the Buildings shall be prepared incorporating comments etc. on the preliminary Dwgs.

Construction Drawings shall contain the followings.

- 1. Plan of all levels, Terrace Plan, Key Plan.
- 2. Sections as required for complete understanding of the Design & Construction.
- 3. Elevations of all sides.
- 4. Door/Window details.
- 5. False ceiling details & layouts.
- 6. Schedule of Architectural Finishes.
- 7. Architectural details as required.
- 8. Any other Dwg as required for complete understanding of the Design & Construction.

Drawings shall be prepared using AutoCAD software of latest (at the time of floating the Tender) version.

Drawings shall be prepared in 1:100 or 1:50 scale. For Construction details, Door Window Details the scale shall be 1:20 to 25. For key plans larger but legible scale may be used.

3. Specifications

The Contractor shall prepare & submit specifications of materials etc., which are not covered or attached in the Tender Documents for review by Owner/CONSULTANT.

4. Documents/ Drawings for Statutory Approval

The Contractor shall prepare & submit Documents/Drawings for Statutory Approval in accordance with the statutory requirement for Information/Record of Owner/CONSULTANT.

5. As Built Drawings

The Contractor shall prepare & submit As-built drawings both in requisite no. of hard prints as well as in form of computer files for Information/Record of Owner/CONSULTANT.

6. List of Sub- vendors/ authorised applicators for specialised items

The Contractor shall submit list of all Sub- vendors/ authorised applicators to be engaged for execution of various specialised items (like Aluminium Doors and Windows, Waterproofing and Underdeck Insulation, False ceiling, False Flooring etc.- as applicable) for approval.

5.3.2 Review of the Contractor's Drawings/Documents

Drawings/ Documents submitted by the Contractor shall be reviewed by Owner/CONSULTANT within agreed upon time schedule.

Successful bidder shall submit Design criteria, specification of work, Drawing/document for approval of OWNER/CONSULTANT. Review by Owner/ CONSULTANT shall not relieve the Contractor of his responsibility for correct Design, Engineering and Construction. The sole responsibility of the correctness of Design, Engineering & Construction shall lie with the Contractor irrespective of the fact that the Drawings/Documents submitted are reviewed or not reviewed by Owner/CONSULTANT. The Contractor shall correct all faulty design & construction detected at any stage of work without any cost & time implication to CONSULTANT or the Owner.

Following Parameters of Design & Drawings shall not be reviewed.

- A. Adequacy of provisions (in terms of spaces, services & utilities) and space/ area/ Room sizes for Plant Buildings or Plant Areas in other Buildings. The Contractor shall ensure correctness of such provisions vis-à-vis Owner/ CONSULTANT reviewed/ approved G.A. drawings & submit Architectural dwgs only after approval/ review of such provisions by concerned deptt. of CONSULTANT.
- B. Correctness of Drawings in terms of dimensions, matching of Plan, Elevation, Section, etc. These parameters may be reviewed at random only.
- C. Location, Co-ordinates, Orientation & Road/Ground/Pavement levels. The Contractor shall ensure correctness of these approved G.A.drawings.

5.4 List of Enclosures

5.4.1 Drawings

5.5 Architectural Design Basis

Architectural design of the buildings shall be in conformity with the following:

5.5.1 Codes and Standards

- A. National building Code of India
- B. Local Municipal or other authority's bye-laws
- C. Relevant state Govt. Factory Acts
- D. TAC (Tariff Advisory Committee) regulations
- E. Any other rules/regulations/recommendations as applications

5.5.2 Space Requirement :

Space requirement shall be based on one or combination of the following depending upon the specific situation

- a. Occupancy
- b. Equipment layout and clearances
- c. Maintenance and safety requirements
- d. Storage requirement

The height of the buildings shall be provided as per the statutory requirements and equipments and crane/ monorail requirement.

5.5.3 Safety Requirements

Safety from fire and like emergencies shall be taken into account in building design. Every building meant for human occupancy shall be provided with sufficient no. of exits (as per TAC requirements) to permit safe escape of occupants in case of emergency.

Following references shall be adhered to in this regard :

- A. National Building Code of India
- B. State Factory Act
- C. Tariff Advisory Committee

5.5.4 Day Lighting And Ventilation

Established level of illumination shall be maintained for all parts of the building by means of windows, ventilators, skylights etc. For this IS:3646 Part I & II and IS:2440 shall be adhered to. For the purpose of illumination day lighting shall be supplemented by artificial illumination. Established level of ventilation in items of air changes per hour shall be maintained for all spaces. IS:3103 and IS:3362 shall be adhered to for this purpose. Natural ventilation shall be supplemented by mechanical/electrical means.

5.5.5 Aesthetics

Architectural design and treatment of the buildings/sheds shall ensure proper aesthetics by adopting general principles of Architecture. An overall architectural control shall be maintained with the rest of the buildings of the project,

5.5.6 Building Elements

a) Plinth Protection

All the buildings & sheds shall be provided with minimum 1000 mm wide plinth protection around the building/shed plinth at top of Finished Grade Level. The rain water down pipes shall discharge rain water on this pavement.

b) Steps/Ramps

Steps/ramps shall be provided for access to the Buildings/sheds for Pedestrian/Vehicular, equipment entry. Minimum 1000 mm wide platform shall be provided in between Entrance door and steps/ramps. Following dimensions of the steps/ramps shall be adhered to.

- A. Tread =250 mm minimum
- B. Riser =175 mm maximum
- C. Slope of Ramp = Not steeper than 1:6
- D. Ratio of Tread & Riser= 2 Riser + Tread= 600 to 648 mm

c) Windows/ventilators

Windows/ventilators shall be provided in all areas for natural lighting, ventilation and visibility at working level. For the purposes of ventilation, total openable area of the windows/ ventilators shall be as per Factory Act subjected to a minimum of 15% of the floor area to be ventilated. However, Room office areas etc. where visibility from inside is of prime importance, increased window area shall be provided. Areas accommodating panels/ equipments shall be normally provided with ventilators at high level for unobstructed distributed lighting.

d) Shading Devices

Shading devices shall be provided over all windows, openable ventilators for rain & sun protection. These devices shall be in the form of horizontal projections, vertical projected fins or combination of both as per building facade treatment. Minimum projection shall be 600 mm. Windows in closed condition should not allow any rain water inside.

5.6 Specific Architectural Requirements

Only relevant clauses as applicable for each type of building shall be referred

5.6.1 Floor Finishing:

Floor finishing shall be based upon the occupancy or function of the particular area. However the following parameters shall be adopted unless otherwise specified. Panel dividers wherever required shall be provided as per specification.

- a. Cellar area : Steel trowel finish with hardner.
- b. MCC Room., : Kota stone flooring.
- c. Battery Room : Acid resistant tile flooring with 2.0 M dado of acid proof tiles.
- d. Console Rm., Rack Rm. & UPS Rm requirement.: It shall have fire resisting floating floor made in galvanized steel frame 600 mm x 600 mm supported on adjustable jack arrangement, tiled by 35 mm thick fire resistant teak wood particle board finished on top

with antistatic type Formica/Vinyl of matching colour with adjacent environment with 3 mm thick hard PVC liping along all four sides. 24 gauge GI sheet is to be provided on the other side of particle board.

- e. Office areas, Corridors : Polished vitrified tiles
- f. Toilets & D/W area : Antiskid ceramic tiles flooring of approved colour & pattern with 2.1 M dado using matching colour ceramic tiles.
- g. Skirting : 125mm high skirting in all areas using same material as that of floor.
- h. Analyser room : Kota stone flooring

5.6.2 Doors, Windows, Ventilators

ALL Doors, windows, ventilators shall be provided of anodized aluminum including frames as per requirement with toughened glass. Their sizes shall be according to requirements and equipment to be placed. All doors, windows shall be provided with necessary approved quality fittings and fixtures and painted/polished as per specifications. Doors and windows in air conditioned/ pressurised/equipment areas shall be airtight and provided with rubber beading all around.

Equipment Entry Doors: Mechanically operated rolling shutter made of G. I. Pressed Steel doors with 2mm thk. sheeting as per requirement.

Control room shall have two exits. Doors in Office area, toilet shall be laminated wooden flush doors with pressed steel frames.

Steel Louvers: 18 gauge M.S. sheet louvers bent to shape as per specification.

Safety Bars: 12mm square safety bars shall be provided in windows & ventilators where required.

5.6.3 Plastering And Pointing

Plastering

- : 12 mm thick cement plaster in 1:4 on fair side of all walls.
- : 15mm thick cement plaster in 1:4 on rough side of 230 thick brick walls.
- : 20 mm thick sand face plaster in two coats on all external faces of brick walls.
- : 6mm thick plaster in 1:3 in ceiling, chajjas & on cols. etc.
- : 15mm thick cement plaster mixed with water proofing compound on inside surfaces of R.C.C. gutter. If required.
- : 15mm thick cement plaster mixed with water proofing compound on outer surfaces of the bldg., if required.
- : 20 x 10mm groove in plaster as per specifications to be provided wherever required.

5.6.4 Roofing Treatment

Minimum slope of 1:80 shall be obtained in roof by providing lean concrete 1:3:6 over roof keeping 25mm min. concrete at disposal/gutter ends. Alternately roof shall be laid to slope as desired. Roof tops shall be given water proofing treatment as mentioned hereunder:

All flat roof slab shall have integral cement base water proofing system (brick bat coba) and slopping or pre cast slab have 3mm thick polymer modified bituminous membrane waterproofing treatment. Suitable insulation treatment is to be provided under the roof slab,

if required. Water proofing treatment shall have leak proof performance guarantee of Five years.

All the storm water drains within the battery limit of the Plant shall be of reinforced cement concrete with necessary slopes and connected to the existing storm water drain net work. It shall be covered with hot deep galvanized grating. Thickness of flat for grating shall be minimum 5.0 mm. The thickness of galvanized coating shall be minimum of 86 micron.

Different effluents i. e oily water including surface water from specified areas shall be collected by underground pipe network of suitable material with the approval of the Owner, to pits/ sumps, oil separators.

Septic tank of suitable size for sanitary sewage shall be provided and it is to be connected with the existing system of the Plant.

Process/effluent drains are not to be connected with storm water drains.

Any sunk area, before cinder filling shall be finished with 15 mm thk. water proof cement plaster. Rain water down take pipes shall be PVC pipes embedded in concrete.

5.6.5 **White Washing, Colour Washing Distempering, Painting, Polishing Ceiling :**

All ceilings of Sub-station analyzer room & canopy/porch, shall be finished with plastic emulsion paint.

Inside Walls :

All office corridor, analyzer room , control room, Toilet & substation shall be finished with plastic emulsion paint with plaster of Paris (POP) punning as per requirement.

Outside Walls :

All outside surfaces of building shall be finished with Exterior Acrylic Emulsion paint.

Doors And Windows :

All steel doors, windows & ventilators shall be finished with two coats of Epoxy paint over a coat of primer.

5.6.6 **Sanitary Fittings/Fixture**

Battery room shall be provided with sink and Toilets shall be provided with all necessary approved Indian standard fittings and fixtures.

5.6.7 **Roofing**

All sheds shall have pre coated galvanized sheets for roofing and cladding. The sheets shall be min. 0.50mm thick. The roofing system shall include all accessories like ridges, north light curves, apron pieces, corner pieces, m.s. flat windties etc.

5.6.8 **False Flooring, False Ceiling and Underdeck Insulation**

Console Room, Rack Room, UPS Room, Operator's Room , corridors & toilet areas shall have Aluminium plank false ceiling with under deck insulation. Wherever false flooring is required, It shall have fire resisting floating floor made in galvanized steel frame 600 mm x 600 mm supported on adjustable jack arrangement, tiled by 35 mm thick fire resistant teak

wood particle board finished on top with antistatic type Formica/Vinyl of matching colour with adjacent environment with 3 mm thick hard PVC lipping along all four sides. 24 gauge GI sheet is to be provided on the other side of particle board.

False ceiling shall be of pre-coated metallic members of approved pattern and colour as per manufacturer's recommendation. Minimum height from finished floor to false ceiling shall be 3.2 M.

5.6.9 Control Room :

The building shall be single storey. The control room shall have two exits.

It will have RCC blast resistant walls on all four sides. The BIDDER shall submit the layout plan of the building along with their bid.

Proper air conditioning system shall be provided for control room.

5.6.10 MCC Room /Electrical sub-station

It will have RCC frame structure and brick walls. The bidder shall submit the layout plan of the building along with their bid. Building shall be constructed at safe distance from process area.

5.6.12 PIPE RACK :

The pipe rack structures shall be of reinforced cement concrete only. In case the rack is of precast concrete, all structures steel joints shall be embedded in concrete. At road crossings, minimum clearance of 10 mtr. height shall be kept. It shall be painted with two coats of epoxy paint over a primer coat as per manufacturer's recommendation.

If cable trays are fixed on side of columns of pipe rack then separate trays for Electrical and Instrument are required with adequate distance. Trays shall be fixed on the external side of columns only.

Expansion joint shall be provided at a distance not more than 50 m

In each stretch between two expansion joints at least one bay shall be provided with column bracing.

Entire area underneath of pipe rack shall be paved using min. 80mm thick, coloured interlocking paver block having minimum compressive strength of 300 Kg / sqcm be laid over 300 mm thick sand bed with 40mm bed of sharp sand or stone dust in level and joints in required pattern and finishing the joints with sweeping dry sand in to joints including vibrating with plate compactor. The edges/ends of the pavement shall be finished with concrete.

5.6.13 Entire area within the battery limit of the Plant shall be paved with concrete. The pavement will be of following types:

(a) Light Duty Concrete Pavement:

Minimum thickness of Light duty pavement shall be 100 mm with single layer of reinforcement over minimum 300 mm thick sand filling where there is no vehicular access.

(b) Heavy Duty Concrete Pavement:

Minimum thickness of heavy duty pavement shall be 150 mm with double layer of reinforcement having base course of two layers (each layer of minimum 150 mm thickness) of granular base and sand filling (minimum 300 mm thick). Heavy duty pavement will be provided in the area of vehicular and crane movement.

(c) Roads:

All the roads within the battery limit of the Plant shall be of heavy duty RCC paving as per the specification mentioned under (b) hereinabove

5.6.14 Equipment supporting structures shall be of RCC. It shall be painted with two coats of epoxy paint over a primer coat as per manufacturer's recommendation.

5.6.15 Grouting of Anchor Bolts :

All static equipment will be grouted with concrete using shrinkkomp or equivalent anti shrinkage compound of approved manufacturer as per their recommendation.

The rotating equipments like compressors shall be grouted with epoxy mortar.

Technical specification of work**5.6.16 FORMWORK/SHUTTERING**

(a) The shuttering or form work shall be so constructed as to remain sufficiently rigid during placing and compacting of the concrete and shall be sufficiently tight to prevent loss of liquid from the concrete. Surface that becomes exposed on the removal of forms shall be examined by OWNER or his authorized representative before any defects are made good. Work that has sagged or bulged out, or contains, honey combing, shall be rejected. All shuttering shall be plywood or steel shuttering. Quality of shuttering materials, plywood or steel plates shall be suitable for exposed finish or concrete surfaces.

(b) The BIDDER shall be responsible for sufficiency and adequacy of all form-work. Centering and form-work shall be approved by the OWNER before placing of reinforcement and concreting.

(c) Stripping Time

Forms shall not be struck until the concrete has reached a strength at least twice the stress to which the concrete may be subjected at the time of removal of form-work. The strength referred to shall be that of concrete using the same cement and aggregates, with the same proportions and same cement and cured under conditions of temperature and moisture similar to those existing on the work. Where possible, the form-work shall be left longer as it would assist the curing.

Note 1 : In normal circumstances and where ordinary Portland cement is used, forms may generally be removed after the expiry of the following periods :

a.	Walls, columns and vertical faces of all structural members	24 to 48 hours as may be decided by the OWNER
b.	Slabs (props left under)	3 days
c.	Beam soffits (props left under)	7 days
d.	Removal of props under slabs	
	i) Spanning upto 4.5 m	7 days
	ii) Spanning over 4.5 m	14 days
e.	Removal of props under beams and arches :	
	i) Spanning up to 6 m	14 days
	ii) Spanning over 6 m	21 days

For other cements, the stripping time recommended for ordinary Portland cement may be suitably modified.

Note 2 : The number of props left under, their sizes and disposition shall be such as to be able to safely carry the full dead load of the slab, beam or arch as the case may be together with live load likely to occur during curing or further construction.

5.6.17 BRICKWORK

(A) Bricks

All bricks shall locally available best bricks conforming to quality as per IS : 1077.except the compressive strength 35 Kg /Sqcm

(B) Cement and Water shall conforming to the requirement laid down for cement concrete work.

(C) Sand for masonry mortars shall be coarse sand generally conforming to IS : 2116 Maximum quantities of clay, fine dust shall not be more than 5% by weight Organic impurities shall not exceed the limits laid down in IS : 2116.

(D) Mixing of mortar shall be done in a mechanical mixer. When the quantity involved is small, hand mixing may be permitted by the OWNER. Any mortar remaining unused for more than 30 monutes after mixing shall be rejected.

(E) Brickwork

Brickwork shall be built in English bond, unless otherwise specified. The thickness of joints shall be 10 mm. Thickness of joints shall be kept uniform. In case of foundations and manholes etc. Joints up to 15 mm may be accepted.

(F) Half Brick Masonry

All courses shall be laid with stretchers. Reinforcement comprising 2 Nos. 6 mm dia. MS bars shall be provided over the top of the first course and thereafter at every Third course.

(G) Laying

All iron fixtures, pipe spouts, hold fasts of doors and windows, which are required to be built into the wall shall be embedded in cement concrete blocks 1 : 2 : 4 mix (1 cement; 2 coarse sand; 4 graded stone aggregate, 20 mm nominal size) 150 mm x 100 mm x 100 mm size.

(H) Curing

Brickwork shall be protected from rain by suitable covering when the mortar is green. Masonry work shall be kept constantly moist on all faces for a minimum period of seven days.

5.6.18 PLASTERING

(A) Sand for plastering shall be 50% fine & 50% coarse sand from approved source.

(B) Preparation of surface shall be done as per CPWD Specifications.

(C) Cement mortar shall be of the mix as indicated in the items and shall be mixed as specified in the CPWD Specifications.

(D) Joints in wall etc. shall be raked to a depth of 12 mm, brushed clean with wire brushed, dusted and thoroughly washed before starting the plaster work.

(E) The surface shall be thoroughly washed with water, cleaned and kept wet to saturation point before plastering is commenced.

(F) Cement mortar as indicated, shall be firmly applied to the masonry walls in a uniform layer to the thickness specified and will be pressed into the joints. On concrete surfaces rendering shall be dashed to the roughened surface to ensure adequate bond. The surface shall be finished even and smooth.

(G) All plaster work shall be cured for at least 7 days.

(H) Integral water proofing compound shall be mixed with cement in the proportion recommended by the manufacturer. Care shall be taken to ensure that the water proofing material gets well and integrally mixed with cement. All other operations are the same as for general plaster work.

(I) For Sand faced plaster under coat of cement plaster 1 : 4 (1 cement : 4 sand) of thickness not less than 12 mm shall be applied similar to one coat plaster work. Before the under coat hardens the surface shall be scored to provide key for the top coat. The top coat also of cement mortar 1 : 3 shall be applied to thickness not less than 8 mm and brought to an even surface with a wooden float. The surface shall

then the tapped gently with a wooden float lined with cork to retain a coarse surface texture. Care being taken that the tapping is even and uniform

5.6.19 **EARTHWORK**

Excavation

- (A) Contractor shall remove all excavated materials to soils heaps on site or transport for use in filling on the site or stack them for reuse.
- (B) Surface dressing shall be carried out on the entire area occupied by the buildings including plinth protection.
- (C) The site around all buildings and structures to a width of 3 metres beyond the edge of plinth protection, ramps, steps, etc. shall be dressed and sloped away from the buildings.
- (D) Unsuitable soils excavated shall not be used for filling in foundations and plinths of buildings or in other structures including manholes, septic tanks, etc.
- (E) In case of trenches exceeding 2 metres depth or where soil is soft or slushy, the sides of trenches shall be protected by timbering and shoring. The contractor shall be responsible to take all necessary steps to prevent the sides of trenches from caving in or collapsing.
- (F) The extent and type of timbering and shoring shall be as approved by the OWNER.
- (G) Where the excavation is to be carried out below the foundation level adjacent structure, the precautions are to be taken such as under pinning, shoring and strutting etc.
- (H) Specification for Earthwork shall also apply to excavation in rock in general. The excavation in rock shall be done such that extra excavation beyond the required width and depth is not made. If the excavation is done in depth greater than required / ordered, the contractor shall fill the extra excavation with concrete of grade M-7.5 as foundation concrete.
- (I) Contractor shall provide suitable draining arrangements to prevent surface water from entering the foundation pits.
- (J) The Contractor is forbidden to commence the construction of structures or to carry out concreting before the OWNER has inspected and accepted the excavation bottom.

Filling

- (A) Back-filling of excavations in trenches, foundations and elsewhere shall consist of one of the following materials approved by OWNER.
 - i) Soil
 - ii) Sand
 - iii) Mooram
 - iv) Stone / gravel

The OWNER shall approve all back-filling material.

- (B) Soil filling – Soil material shall be free from rubbish, roots, hard lumps and any other foreign organic material. In the Buildings' plinth only selected earth (non expansive) shall be used .
- (C) Filling shall be done in regular horizontal layers. Thickness of each layers should not exceed 15 cm with watering and shall be compacted to obtain 90% maximum dry density.
- (D) Back filling around pipes in the trench shall be done after hydro-testing is done.
- (E) Back filling around liquid retaining structures shall be done only after leakage testing is completed and approval of OWNER is obtained.
- (F) Sand filling under foundation concrete, and in plinth (minimum 500 mm thick), in and around foundations, etc. shall be fine or coarse, strong, clean free from dust, organic and deleterious matter, sand material shall be approved by OWNER. The sand filling under foundation shall be rammed with Mechanical compactor.
- (G) Moorum/Quarry dust for filling, where required, shall be obtained from approved pits and quarries which contain siliceous material and natural mixture of clay. Moorum/quarry dust shall not contain any admixture of ordinary earth. Size of moorum/quarry dust shall vary from dust to 10 mm.
- (H) Moorum/quarry dust filling shall be done in a manner similar to earth filling except that the thickness of individual layer shall not exceed 15 cm. The surface shall be flooded with water for at least 24 hours, surface allowed to dry and then compacted and dressed to the required level, grade or slope.

Hardcore

- (A) Hardcore shall be of gravel stone of 90 mm and down size suitable for providing a dense and compact sub-grade. Stones shall be sound, free from flakes, dust and other impurities. Hardcore filling shall be spread and levelled in layers, 15 cm thick, watered and well compacted with ramming or with mechanical hand compacts or by road roller.
- (B) Stone filling shall be such that size of stone fragments shall not exceed 90 mm. The BIDDER shall fill in all gaps between blocks with graded granular material stone chips & sand only. The BIDDER shall spread the larger size rock fragments uniformly in the lower part of the fill and keep these with a size less than 10 cm for the upper layers.
- (C) The BIDDER shall carry out the fill embankments with smooth, finished slopes, with well-shaped and aligned edges. For this purpose he shall perform, during the execution and up to the time of handing over, the necessary refilling or cutting, trimming and grading of slopes and berms as required.
- (D) Consolidation of fill by water flooding or water jetting shall not be used unless specified written approval is obtained from the OWNER.

Handrails

Handrails shall be provided to all walkways, platforms and stairs. Top rail, Mid rail and upright shall be of 32 mm dia (N.B) GI pipe / MS tube. Height of railing shall be 1050 mm. Toe plate (100 mm x 5 mm) shall be provided for all handrailings. Spacing of uprights shall be 1500 MM maximum.

6.0 SUGGESTED LIST OF APPROVED MATERIALS AND SUPPLIERS

6.1 CIVIL AND ARCHITECTURAL

- 6.1.1 Cement ACC, L&T, Vikram, JK or any other brand having BIS mark.
Precast terrazo tiles "NITCO", GICO or approved local brand.
- 6.1.2 Handmade Ceramic Tiles -As specified in item/local availability
- 6.1.3 Ceramic Tiles : Kajaria/Spartek/Johnson/Somany/Orient
- 6.1.4 Roofing Tiles : "DYNA" concrete colored tiles (Terracota Colour) in 420 x 330 x 14-20 mm size of approved sample & weight or approved local brand.
- 6.1.5 Water proofing felt : STP or any other BIS mark.
- 6.1.6 Water proofing Compound : Aquo Shield, CICO or any other BIS mark

6.2 SANITATION

- 6.2.1 CI pipes and fittings : RIF or any other BIS mark
- 6.2.2 GI pipes : Jindal Hissar B Class/Tata, Swastik or any other BIS mark
- 6.2.3 GI fittings : Unik, R Brand or any other BIS mark
- 6.2.4 Sanitary fittings : Hindustan Sanitary ware/Neycer Sanitary ware/Pary ware/CERA
- 6.2.5 Plastic WC seats : Commander, Diplomat, Hindustan
- 6.2.6 CP Brass fittings & fixtures : Dripless, Parko, Essco, L&K, GEM, GMT as per BIS
- 6.2.7 Gunmetal Valves : Leader, Sant, Neta BIS Mark
- 6.2.8 Ball Valves with float : Prayag BIS mark
- 6.2.9 CI Manhole cover : RIF or any other approved Brand
- 6.2.10 Rainwater Pipe (PVC) : BIS Mark
- 6.2.11 RCC Pipe : BIS mark of approved quality

6.3 DOOR WINDOWS ETC.

- 6.3.1 Flush Doors : Sitapur or any other BIS Mark
- 6.3.2 Anodised Aluminium Hardware Fittings : Everite, Adarsh, Crown, Argent, Guard, Garnish, Diamond as per BIS mark
- 6.3.3 Block Board, Ply : National, Duro, Green, Kitply
- 6.3.4 Looking Glass : Gold Fish, Atul or any other approved make

6.4 PAINT & FITTINGS

- 6.4.1 Distemper, Acrylic Emulsion, Epoxy paint : ICI, Jenson & Nicolson, Asian, Berger, Nerolac, Shalimar.
- 6.4.2 Water proofing Cement paint : Super Snowcem plus of Killick Nixon.
- 6.4.3 Exterior acrylic emulsion paint & Primer :

The exterior acrylic emulsion paint shall be Weather Shield of M/s ICI or Weather Coat of M/s Berger Paints or Apex Weather Proof Exterior Emulsion of M/s Asian Paints or Xtra premium of M/s Shalimar Paints or Nerolac Excel of M/s Nerolac Paints or Safe Guard of M/s Jenson & Nicholson (I) Ltd.

The exterior primer shall be compatible with Weather Shield of M/s ICI or Weather Coat of M/s Berger Paints or Apex Weather Proof Exterior Emulsion of M/s Asian Paints or Xtra premium of M/s Shalimar Paints or Nerolac Excel of M/s Nerolac Paints or Jensonlin water thinnable exterior of M/s Jenson & Nicholson (I) Ltd .

All makes as specified shall be used in pursuance of this contract. However, if the approved brand is not available, prior approval, solely at the discretion of owner and consultant has to be obtained for the brand/make/vendor substitution for equivalent brand.

PART - 2

STRUCTURAL & ARCHITECTURAL

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1.0 SCOPE OF SUPPLY/WORKS

The scope of work of this package tender involves design, detail engineering, preparation of drawings, obtaining approval from CONSULTANT/ Owner and licensor, construction, fabrication, erection, installation, tie-up with main system, testing, painting, commissioning, trial runs, supply of all materials, items, equipment, transportation, labour, consumables, tools and tackles etc. required for completion of job as per specifications, standards, codes, data sheets, drawings & good engineering/ national/ international standards/ practice accepted by client and direction of Engineer-in-charge in all respect of all the General Civil works including taking approval from Statutory Bodies (like PESO,TAC,DGCA etc.)/Local Bodies and preparation of drawings/documents for approval from Statutory Bodies/Local Bodies for the Captive Power Plant unit and its associated facilities, Sub Station, Satellite Rack room (SRR),and GTG shed to cater to the requirements of facilities at KRIBHCO Hazira.

The scope of work mainly involves as described below, but not limited to the following.

- Disposal of surplus and unserviceable material to disposal yard within the complex boundary limit.
- Storm water drains within scope limit & connecting the same up to existing drains & storm
- water culverts below the approach road for crossing of storm water drains.
- RCC pavement shall be provided within power plant unit area for Operating & maintenance area
- Safety shower & eye wash or any other places required in the power plant block.
- Safety shower and eye wash.
- Design, engineering, construction, testing of fire protection system for entire power plant
- including sub station, , GTG etc. within scope limit including taking tapping from isolation valve as per scope drawing including hydrants/ monitors required to provide proper coverage. Fire water network shall be laid all around the Power Plant /HRSG area, as per OISD/ TAC norms.
- Automatic High Velocity Spray system shall be provided on transformers as per OISD-173.
- Medium velocity spray system shall be provided on cable galleries / cellars with smoke detectors and control shall be manual, local through push button and remote from control room.
- CO2 flooding system shall be provided for GTG enclosures.
- First aid fire fighting equipments shall be provided.
- All hydrocarbon storage tanks shall be provided semi fixed foam system and fixed water spray system as per OISD.
- Fire proofing as per OISD-164.
- Main roads, Approach roads, drains & culverts for the new facilities.
- ERC/ IRC (PVC pipes) below main and approach roads (The contractor shall keep provision of extra space in the road cable crossing, in the order of 50% for future).
- RCC trenches for electrical and instrumentation cables,
- RCC trenches for fire water pipes, cooling water pipes in paved areas etc.
- Temporary approaches, culverts, fencing as required.
- Crossing of Underground services below approach roads and main roads.
- Hard stand required for erection of heavy equipments.
- Strengthening of existing roads for crane movement, if required.

- Preparation of basic/ detailed engineering drawings for construction, and getting approval of the same from CONSULTANT/ Owner.
- Any temporary activities required to complete the work (including sanitary/plumbing and drinking water)
- Any change in specifications/ design must be got approved from CONSULTANT/ Owner.
- Micro grading & disposal of surplus and unserviceable material to debris disposal yard located inside plant premises after completion of construction activities shall be in the scope of contractor. Contractor to assess the lead by visiting the Plant site physically approval from statutory and local authorities.
- The plot for construction area/ fabrication yard/ field office/ construction stores has to be developed by the contractor of its own and the Client shall only identify the space on as in where is basis. All the infrastructure facilities which includes approaches, drainage system, pavements etc. shall be developed & provided by the contractor of its own.

1.1 DETAILED SCOPE OF WORK

1.1.1 MICRO GRADING AND STORM WATER DRAINS

a) MICRO GRADING

Graded site shall be handed over to the contractor. However, micro grading shall be done by the EPC contractor up to required levels. Micro grading after completion of construction activities shall be in the scope of contractor. Grading shall be done as per specifications/ standards. Filling/ Cutting required to bring the site up to the finished levels is in the scope of Contractor. Extra earth required to make up to paved levels shall be arranged by the contractor at his own cost from the approved borrow areas. Unserviceable material / debris shall be disposed off to disposal yard within the Fertilizer complex.

b) STORM WATER DRAINS

Storm water drains on either side of roads shall be provided for collection of surface drainage within scope limit. Pipe culvert / Box culverts shall be provided on the drain crossing of the roads. and hook up with main drainage system.

Additional culverts shall also be provided across the newly constructed roads for approaches within scope limit on the already existing and new storm water drains. All culverts shall be designed to suit crane movement. Strengthening of culverts on the existing roads to suit crane movement and provision of new culvert on the existing roads shall be in the scope of contractor.

Pre cast covers on the drains shall be provided for approaching fire hydrants, monitors, footpaths etc. Any modifications required at the hook up connection between the CPP drains & Main road side drains shall also be the scope of the contractor.

c) RCC PAVING

Design and construction of RCC pavement with in battery limit shall be as per standards and specification. Thickness shown in the standards enclosed with tender are minimum. However, contractor to provide RCC pavement as per actual loading condition. In Power Plant area only Operating & maintenance area shall be provided with RCC pavement.

1.1.2 DRINKING WATER SYSTEM

Contractor shall lay the drinking water lines underground directly buried or above ground with suitable insulation. A minimum dia 2" (exact size of pipes to be ascertained by contractor), drinking water header to safety shower & eye wash units, drinking water post in power plant unit and drinking water & sanitary system in Control room building, shall be provided. The same shall be hooked upto main drinking water header along with isolation valve in valve pit as per scope drawing.

1.1.3 SANITARY AND PLUMBING SYSTEM

All plumbing and sanitary works within buildings and disposal of sanitary waste upto Septic Tank and hook up with nearest existing disposal system/manhole shall be in the scope of this tender. All the sanitary fixtures and fittings shall be as per Architectural drawings/ specifications and relevant Indian/ International Standards.

1.1.4 SAFETY SHOWER & EYE WASH

Contractor shall provide combined safety shower (SS) and eyewash (EW) units. as per attached specifications at various places within scope limit where either caustic or other chemicals are handled or toxic chemicals may be present. Safety Shower & Eye wash units shall meet the requirements of IS: 10592. Number of SS & EW to be provided for units shall be as per process hazard/safety requirements. Minimum two numbers of safety shower and eyewash shall be provided as per the design and execution specification. Water shall be fed from drinking water line. If drinking water lines are laid Above Ground (A/G), it should be insulated in such a way that temperature of water should not exceed 20°C.

1.1.5 FIRE PROTECTION SYSTEM

Contractor shall provide fire protection system inside the entire power plant and hook up with main Fertiliser Plant system considering the following and as per codes, specifications and standard. Fire protection system shall be provided as per OISD requirement and requirements of TAC/ NFPA for entire power plant including sub station, Rack room, tank farm area, taking tapping from isolation valve as per scope drawing including hydrants/ monitors required on fire water network to provide proper coverage including cutting and repair of roads. If any modifications are required to be done in the fire water network within the scope limit, the same shall have to be done by the contractor. The complete area within contractor's scope shall be protected to satisfy the requirements of OISD/TAC and NFPA-850. The following fire protection systems are envisaged:

- Fire water header with hydrants & monitors around the power plant within scope limit including RCC trench with RCC pre-cast slab. Gaps between the pre-cast cover slabs & the RCC trench shall be filled with joint sealing compound.
- Internal hydrant system (including hydrants and monitors).
- Landing valves and hose reels
- Hose reel protection around unit
- Booster pumps for spray/ hydrant system at higher elevation, if required
- Hose cabinets with hoses and accessories
- Water spray system on pumps as per OISD requirement .
- Medium velocity water spray system for cable cellars of sub station shall be provided as per OISD /TAC/ NFPA with smoke detectors. The control shall be manual, local and remote from control room.

- Automatic fixed high velocity water spray system (emulsifier) for oil filled transformers
- as per TAC / OISD.
- Providing semi-fixed foam system and manual medium velocity water spray system on hydrocarbon storage tanks as per OISD.
- Protecting fuel oil, light cycle oil and fresh hot oil tanks with low expansion foam system.
- Contractor shall provide electronically operated, fully automatic CO2 flooding system for Gas Turbine enclosures with alarms & trip interlocks.
- First Aid Fire protection (Portable Fire extinguishers) as per TAC / OISD / NFPA.
- Any other specific protection as identified during detailed engineering.
- Approval from TAC accredited agency or any other agency appointed by owner/ insurance company.
- Hydrants and monitors shall be provided by contractor on roadsides on the firewater headers.
- However for full coverage of the power plant unit, internal double-headed hydrants & monitors shall be provided by contractor. Landing valves (double headed) shall be provided on each staircase landing of technological structures supporting elevated equipments etc. Tapping for the riser shall be taken from header outside the battery limit with an isolation valve.
- Hose reels shall be provided along with every landing valve and additional hose reels within and around unit as per OISD requirement. Hose reels shall be hooked up to fire water header outside the Unit with an isolation valve. Hose reel shall be provided as per specifications/ standards enclosed.
- Hose cabinets along with hoses and accessories shall be provided at every alternate hydrant location/ every landing valve location.

1.1.6.2 Contractor shall provide manually operated fixed water spray system on:-

- Water spray system for hazardous locations for areas as per OISD –116 requirements.
- In case it is required to provide boosting arrangement, the same shall be provided by EPCC contractor.
- Any other equipment identified during detailed engineering/ process licensor's requirement/ OISD requirements.

1.1.6.3 Portable fire extinguishers as per TAC/ OISD/NFPA.

1.1.6.4 Contractor shall provide electronically operated, fully automatic CO2 flooding system for Gas Turbine enclosures with alarms & trip interlocks. Fire detection, alarm and auto actuation shall also be in Contractor's scope of work.

1.1.6.5 The firewater header and branch lines shall be laid above ground on independent leepers for offsite and utilities areas. For road crossings and crane / vehicle movement area the same shall be laid underground with sleeve. Encasing shall be provided as applicable. All firewater headers around units shall be kept underground with suitable corrosion protection. All firewater headers and branch lines in RCC paved areas shall be laid in RCC trenches with sand filling and removable pre-cast cover with sealing. Headers should be laid in such a manner that it should not touch the bed level of the RCC trench. Under ground piping shall be protected from corrosion as per specification enclosed with this package. Above ground fire water piping shall be painted with fire red paint conforming to shade no. 536 of IS:5. Painting shall be as per specs. enclosed else where in the contract document. The trench and the pre cast covers shall be designed to withstand crane loading in crane movement area Crane capacity envisaged for erection/ maintenance. In other areas trench & its cover shall be designed for 10T hydra movement.

- 1.1.6.6 The entire fire protection system shall be got approved from TAC accredited professionals or any other agency appointed by by owner / insurance company. All the comments, modifications etc. suggested by TAC accredited professionals shall have to be incorporated by the contractor without any extra cost to the owner. OISD requirements shall be satisfied in addition to the requirements mentioned in the above scope of work.
- 1.1.6.7 All the equipments connected with fire water system shall either be TAC approved and BIS marked and from companies which carry ISO certification or FM/UL listed.
- 1.1.6.8 The contractor shall meet the requirements of TAC/OISD/NFPA/ recommendations, over and above the requirements, which are mentioned above.
- 1.1.6.9 The system shall be designed for maximum insurance rebate.

1.1.7 RADIOGRAPHY

At least 10% of all welded joints shall be radio graphically tested and shall be found in order as per TAC requirements. At least 50% of welded joints selected for radiography shall be field joints.

- 1.1.8 A minimum clear cover of 1.0 M shall be provided in open areas for buried firewater lines and 1.5 m under roads.
- 1.1.9 All firewater piping shall be hydro tested to a pressure of 22.5 kg/cm²g.
- 1.1.10 First Aid Fire Fighting Equipments as per TAC/ OISD/NFPA

1.1.6 FIRE PROOFING

As per OISD specification and as defined elsewhere in the contract.

1.1.7 MAIN ROADS, APPROACH ROADS, STORM WATER DRAINS & CULVERTS

New main roads, approach roads for sub station & Rack room and all roads in tank farm and other areas within scope limit footpaths (as applicable) for maintenance and operational requirement of plant shall be provided by contractor to be shown in the drawing, equipment layout and as per detailed engineering requirement. Any additional approach roads around unit and other areas to facilitate crane movement or any other vehicle movement during construction shall be in contractor's scope of work. Crossings for all services shall be in the scope of contractor. Additional WBM layer and premix carpeting of damaged road during construction shall be in the scope of contractor. All roads around each facility shall be made good while handing over after completion of construction activity. Any culverts, pipe way bridges, cable crossings, electric road crossings, cooling water lines, fire water lines, drinking water lines, etc. coming below the main roads and approach roads shall be in Contractor's scope of work and shall be designed for crane loads. Any strengthening/ widening of existing main roads for crane movement for erection shall be in the scope of the contractor.

1.4 CABLE CROSSING

For all electrical/ instrument cables crossing the main/approach roads, suitable road crossings either by PVC pipes encased in concrete or RCC ducts/ culverts shall be provided as per electrical/ Instrumentation requirements. Crossings shall be designed to withstand the load of crane movement envisaged for erection / maintenance.

1.5 RCC TRENCHES

a) Cable trenches

RCC Electrical/ Inst. cable trenches with pre-cast RCC covers shall be provided as per structural standards and electrical/ instrumentation requirements. Trenches and covers in crane movement area shall be designed to withstand the load of crane movement envisaged for erection / maintenance. Cable trenches within scope limit shall be filled with sand before placing of pre-cast cover.

b) Pipe trenches

RCC trenches sand filled with pre-cast RCC cover shall be provided for all U/G cooling water and firewater headers in paved areas. Trenches and their covers in crane movement area shall be designed to withstand the load of crane movement envisaged for erection / maintenance.

1.6 HARD STAND

Based on soil data, the hard stand required for erection of heavy equipments to be designed and provided as per equipment erection philosophy/type of cranes to be used inside and outside the battery limit of units. Dismantling of hardstand if required, as per directions of Engineer-in-Charge / representative of Owner, disposal of unserviceable material to disposal yard within Fertilizer complex as per direction of Engineer-in-Charge.

1.7 DRAWINGS/ DOCUMENTS REQUIRED FROM CONTRACTOR

1.8.1 AFTER AWARD OF THE CONTRACT

The list of drawings/documents as required to be reviewed by CONSULTANT is enclosed in the tender document.

1.8.2 APPROVALS

Approval of the facilities within contract scope limit from , Tariff Advisory Committee (TAC) accredited professionals or any other agency appointed by Owner/ insurance company for approval of fire protection system, & DGCA (Director General & Civil Aviation), Factory Inspector shall be obtained by the package contractor.

Contractor to comply with the requirement of these authorities irrespective if it is mentioned or not in the bid package & shall form part of contractor's scope of work including preparation of required drawings/ documents. Contractor shall comply with the requirement of local bodies including preparation of required drawings/ documents.

2.0 SCOPE OF SUPPLY

2.1 OWNER'S SCOPE OF SUPPLY

Nil

2.2 CONTRACTOR'S SCOPE OF SUPPLY

- All items consumables/non consumables required to complete the job
- All tools tackles, plant machinery etc to complete the job.

3.0 SITE DATA AND INFORMATION**3.1 Reference documents**

- 3.1.1 Survey of India maps
- 3.1.2 Meteorological data for the last 20 years of nearest place to site
- 3.1.3 Survey report by Soil
- 3.1.4 Existing Fertilizer Complex details

3.2 Site location

- 3.2.1 State where located Gujarat
- 3.2.2 Nearest important town and distance Surat 25 kms
- 3.2.3 Nearest railway station and distance Surat 25 kms
- 3.2.4 Proposed railway approach – Existing plant connected to Railway line
- 3.2.5 Nearest port and distance Hazira 05 Kms
- 3.2.6 Nearest airport and distance Surat 25 Kms
- 3.2.7 Nearest Highway milestone and distance 01 Km
- 3.2.8 Approach road - Existing

3.3 Geographical data

- 3.3.1 Height above mean sea level - 05 M
- 3.3.2 Overhead power lines, if any Yes
- 3.3.3 Underground lines obstructions, if any Nil

3.4 Meteorological data

- 3.4.1 Climate of area – Moderate
- 3.4.2 Air temperature
 - Design 50⁰C
 - Max. 46⁰C
 - Min. 3⁰C
- 3.4.3 Rainfall
 - Annual average rainfall 1000
 - Average rainfall in one month 325 mm
 - Heaviest rainfall in a day 270 mm
 - Maximum rainfall within one hour 100 mm
- 3.4.4 Rainy season (Monsoon) June– September
- 3.4.5 Relative humidity
 - Maximum 87 %
 - Minimum 18 %
- 3.4.6 Wind velocity 61 kmph
- 3.4.7 Earthquake design As per IS:1893 Zone-III

3.5 **Site grading**

3.5.1 Borrow area location/ details Graded site will be made available

3.6 **Water supply**

3.6.1 Source of water River water

3.6.3 Construction water supply source – provided from existing plant

3.7 **Railway**

3.7.1 Railway station for connection Surat

3.7.2 Gauge of railway B.G.

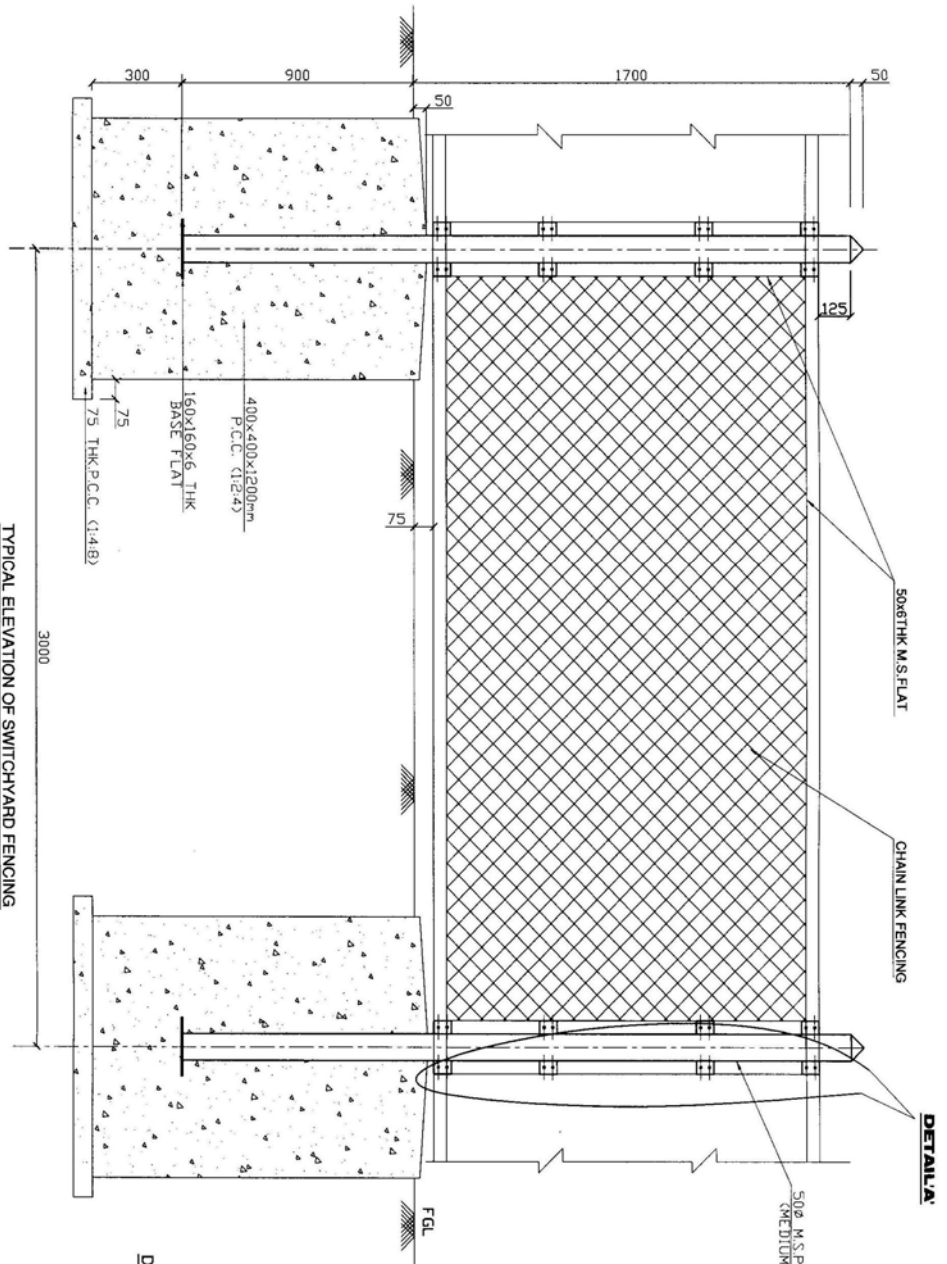
3.8 **Power supply**

3.8.1 Main power source

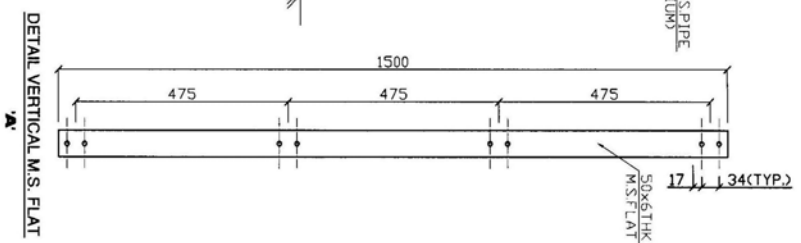
Existing

3.8.2 Construction power source

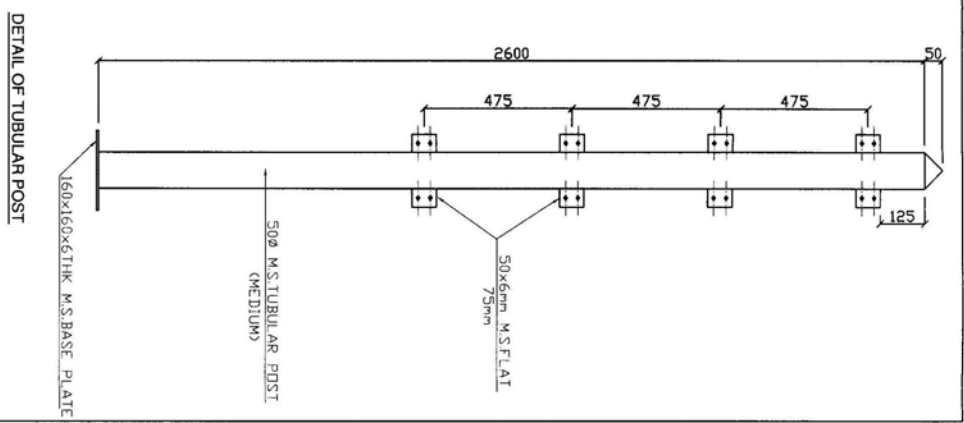
Provided from existing facility at a cost.



TYPICAL ELEVATION OF SWITCHYARD FENCING



DETAIL VERTICAL M.S. FLAT



DETAIL OF TUBULAR POST

- NOTES:**
- ±000 SHALL DENOTE SWITCHYARD FINISHED FORMATION LEVEL
 - CHAIN LINK FENCING SHALL HAVE 315 mm DIAMETER WIRE AS PER IS 2721 WITH 75x75 mm MESH SIZE AND PAINTED
 - TUBULAR POST SHALL BE PLACED @ 30m CENTRE TO CENTRE AND SHALL REST IN WELL COMPACTED EARTH
 - CORNER TUBULAR POST SHALL BE PROVIDED CLEATS IN FOUR SIDES SUITING TO REQUIREMENT
 - TUBES/PIPES OF POST SHALL BE GALVANIZED
 - CONCRETE GRADE FOR P.C.C. SHALL CONFORM IS 456; LATEST
 - EXPOSED SURFACE OF CONCRETE PAD (P.C.C.) SHALL BE PLASTERED WITH 12mm THICK CEMENT PLASTER (1:6)

RELEASED FOR TENDER

Pray Electrical
BHARAT HEAVY ELECTRICALS LIMITED
 TRANSMISSION BUSINESS GROUP

PROJECT : 66 KV Substation Extn. at Kribhco, Hazira.

TITLE : DETAILS FOR SWITCH YARD
 CHAIN LINK FENCING

SCALE : MTS
 DRAWING NO. : TB-3-352-607-613
 REV : R-0