

एसजेवीएन अरूण-3 पाँवर डवलपमेंट कंपनी प्रा. लि.
SJVN Arun-3 Power Development Company Pvt. Ltd.

(एसजेवीएन की पूर्ण स्वामित्व वाली अधीनस्थ कंपनी)

(A wholly owned subsidiary of SJVN)

900 मेगावाट अरूण-3 जलविद्युत परियोजना

900 MW Arun-3 Hydro Power Project

Regd. No.: 111808/69/070



PRESS NOTICE

Tender No.: DCB-P&C-AHEP-HM-C-6/2023-94

Date: 13.02.2023

SAPDC invites bids on **Open Tender Basis** from eligible Indian/Nepalese Bidders through E-portal <https://etender.sjvn.co.in/SRMLLogin/SRMLLogin.jsp> for construction of following Hydro-Mechanical Works:

Contract Package Number	Description of Work	Cost of Bid Document	Bid Security	Completion Period
C-6	Hydro-mechanical Works - TRT Gates and associated equipment for Arun-3 HEP and associated equipment for Lower Arun HEP in Sankhuwasabha Distt. of Nepal	NPR 10,000/- (For Nepalese bidders) or INR 7,000 equivalent to NPR 11,200/- (For Indian bidders)	INR 35,25,000/- (Indian Rupees Thirty Five Lakh and Twenty Five Thousand only) OR NPR 56,40,000/- (Nepalese Rupees Fifty Six Lakh and Forty Thousand only)	9 Months

Last date for submission of bids is **07.03.2023 upto 1500 hrs (IST)** and opening of bids is **09.03.2023 at 1600 Hrs (IST)**.

The Bidding Documents can be downloaded from websites: www.sapdc.com.np, www.sjvn.nic.in & www.eprocure.gov.in and shall be available **w.e.f. 13.02.2023**.

Further, Amendments/Corrigendum /Notification (if any) shall be issued only on above website.

Chief Engineer (P&C)

**SAPDC, Satluj Bhawan,
Tumlingtar, Distt. Sankhuwasabha, Nepal**

Ph. +977-29-575154, 9852099789

E-mail Address: pnc.sapdc@gmail.com

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NOTICE INVITING TENDER

SINGLE STAGE TWO ENVELOPE BIDDING

Ref. No.: DCB-P&C-AHEP-HM-C-6/2023-94

Date: 13.02.2023

1. SJVN Arun-3 Power Development Company (P) Ltd. (SAPDC), is a company promoted by SJVN Ltd. as a single shareholder company in Nepal having its office at Satluj Bhawan, Arun Sadan, Tumlingtar, Nepal (here-in-after referred to as “Employer”).
2. SAPDC invites bids for execution of Works/Facilities, as summarized herein below and described in Bid Document, hereinafter referred to as the “Works”. The bids shall be submitted offline as under:

Contract Package Number	Description of Work	Cost of Bid Document	Bid Security	Completion Period
C-6	Hydro-mechanical Works - TRT Gates and associated equipment for Arun-3 HEP and Intake Gates and associated equipment for Lower Arun HEP in Sankhuwasabha Distt. of Nepal	NPR 10,000/- (For Nepalese bidders) or INR 7,000 equivalent to NPR 11,200/- (For Indian bidders)	INR 35,25,000/- (Indian Rupees Thirty Five Lakh and Twenty Five Thousand only) OR NPR 56,40,000/- (Nepalese Rupees Fifty Six Lakh and Forty Thousand only)	9 Months

3. This invitation to bid is open to (i) all the bidders from India Or (ii) Joint Venture/Consortium of Indian firms Or (iii) Joint Venture/Consortium of Indian and Nepalese firms (with Indian firm as lead partner) who meet the minimum Qualification Criteria.
4. Bidders should not have been banned/ de-listed/ black listed/ debarred from business by Government of Nepal or any of its Government Department during last 03 (three) years on grounds of corrupt/fraudulent practices and/or due to non-performance and/or by Ministry of Power, Government of India / SJVN / SAPDC on any grounds.
5. The no. of JV partners allowed for bidding is two.
6. The minimum qualifying requirements are as under:

Technical Criteria

7.1 General Experience

Applicant (Prime contractor or as partner in a JV/Consortium or Sub-contractor approved by the respective employer) should have executed at least one Hydro-Mechanical work of contract value INR 12.50 Crore or more during the preceding twenty (20) years to be reckoned from the last day of month previous to the month in which applications are invited and which are in successful operation. In case of ongoing projects, the value of completed work shall be considered.

7.2 Technical Criteria (Specific Experience)

Applicant either itself or proposed Manufacturer(s), who have given authorization to the Applicant, should have experience in the design, procurement fabrication, shop assembly, painting, shop testing, supply, transportation, erection, testing and commissioning of the following Hydro-Mechanical works in a completed project during the preceding twenty (20) years to be reckoned from the last day of month previous to the month in which applications are invited.

a) Vertical Lift Gate

Design, fabrication, supply, erection, testing and commissioning of at least one number Vertical Lift Gate operated by hydraulic hoist/rope drum hoist having value of not less than $A \times H = 400 \text{ m}^3$.

Where:

“A” denotes an area (clear width by clear height) for one gate in m^2 .

“H” (for gates) denotes the normal design head at sill of the gate in meter.

b) Rope Drum Hoist

Rope Drum Hoist should be from manufacturer, who have designed, manufactured, & supplied Rope Drum Hoist of at least 40 T capacity for operation of hydraulic gate.

c) Hydraulic Cylinder

Hydraulic Cylinder should be from manufacturer, who have designed, manufactured, & supplied Hydraulic Cylinder of at least 40 T capacity, having minimum stroke of 5500mm with a minimum lifting speed of 1m/min for operation of hydraulic gate.

Notes:

- Experience of Supervision of erection, testing and commissioning of applicant shall also be considered at par with own erection, testing & commissioning of HM equipment works.
- The prime contractor or as partner in a JV or sub-contractor approved by the respective employer should have completed the works with specified criteria mentioned above in a single project or each one in different projects during the last twenty (20) years.

7.3 Financial Criteria:

- i) Submission of audited balance sheets or if not required by the law of Applicant's country, other financial statements acceptable to the Employer, for the last 5(five) financial years to demonstrate:
- (a) the current soundness of the applicant's financial position and its prospective long term profitability. The net worth shall be positive for the last three financial years which shall be calculated based on subscribed and paid up Share Capital plus Share Premium plus Free Reserves plus Unallocated Balance/ Surplus amount of Profit and Loss Account, less (a) Expenses not written off, (b) Accumulated losses in Profit and Loss Account, if not reduced from reserves and surplus. The Revaluation reserves, Capital Reserves and amount of intangible assets like goodwill etc. will not be taken into account while calculating Net Worth, and
 - (b) capacity to have a cash flow amount (working capital) of at least INR 8 Crore or equivalent as evident from the last audited annual report or banking reference(s) as the case may be.

Notes:

- a) Banking reference(s) should contain in clear terms the amount that the Bank will be in a position to lend for this work to the applicant/ member of the Joint Venture. In case the Net Working Capital (as seen from the Balance Sheet) is negative, only the Banking reference(s) will be considered, otherwise the aggregate of the Net Working Capital and submitted Banking reference(s) will be considered for working out the working capital.
 - b) The Banking reference(s) should be from a "A" Class Nepalese Bank/Scheduled Bank of India and it should not be more than 3 months old as on the date of submission of applications.
 - c) In case of JV- requirement of working capital/net cash flow is to be distributed between members as per their percentage participation and every member should satisfy the minimum requirement for his portion.
- ii) **Average Annual Turnover:** Minimum Average Annual Turnover* (MAAT) for best three Financial years out of last five financial years of the bidder should be INR 12.50 Crore or equivalent, calculated as total certified payments received for contracts in progress or completed.

Note: The average annual turnover of JV will be based on percentage participation of each member.

General Notes for Financial Situation:

- i. The number of partners in case of Joint Venture including lead partner shall not be more than Two (2). The lead partner must be Indian having minimum 51% participation in the JV/JVA and other partner shall have minimum 20% participation. Partner having less than 20% participation in the JV will be termed as non-substantial partner and will not be considered for evaluation of financial criteria which means that their financial soundness shall not be considered for evaluation of JV. In that case, the left out requirement shall be met out by the lead partner of JV in addition to

his own requirement specified in the QR and over all JV should meet the 100% requirement.

- ii. Sub-contractors turnover shall not be considered
- iii. Turnover of the applicant/partner from the related business shall only be taken into consideration for purpose of evaluation. In case Turnover from related business is not shown separately in the financial statements, a certificate from Chartered Accountant certifying Turnover from related business shall be submitted.
- iv. Annual Report along with audited Balance Sheets, Profit & Loss Accounts, the schedules and other Financial Statements of the immediately preceding 5(five) financial years of the Applicant should be furnished by the Applicant for checking and evaluating their Financial Capacity vis-à-vis the requirement stipulated hereinabove.

In case, if the Bidder has not submitted the above Annual Report along with the Bid, then a certificate from CEO/CFO of the Bidder shall be submitted along with Bid mentioning that the requirement of Annual Report as per governing law of country is not mandatory. In such cases duly notarized copies of Audited Printed Annual Financial Statement (Balance Sheet, Profit & Loss Statement, cash flow statement, Auditor's Report thereon including all relevant schedules/ annexure etc.) for the immediately preceding 5(five) financial years be submitted by the Bidder along with the Bid.

- v. In case where Audited financial results for the immediately preceding year are not available, then a statement of account as on the closing date of the immediately preceding financial year depicting the Turnover, Net Worth {calculated as per laid down criteria under para 9.3 (i) (a)} duly certified by their Statutory Auditor/ Certified Public Accountant carrying out the Statutory Audit shall be enclosed with the bid along with copy of appointment letter of the Statutory Auditor.
- vi. Wherever, the Annual Report/ duly notarized copies of Audited Printed Annual Financial Statement are in language other than English, then copy duly translated & printed in English language and certified by approved/ recognized English translator shall be submitted with the Bid.
- vii. For conversion from INR to NPR and vice versa, a factor of 1.6 will be considered.

7.4 Bid Capacity

The available Bid capacity of the Bidder at the time of submission of price bid, calculated as under should not be less than INR 25 Crore.

Available Bid capacity = $2.0 \times A \times N - B$

Where;

A= Maximum value of Works executed in any one year during last 3 years

N = Number of years prescribed for completion of the subject contract package

B = Value of existing commitments (as on bid submission date) and on-going works to be completed in next "N" years.

The Bidder shall submit documentary evidence together with a certificate from its statutory auditors in support of establishing 'A' and 'B' above, along with their Bid.

8. The Employer will award the contract to the Bidder, meeting the specified qualifying requirement and also whose Bid has been determined to be substantially responsive to the Bid Documents and who has offered the lowest bid price in pursuance to the bidding conditions.
9. Interested bidders have to register themselves on the e-portal i.e., <https://etender.sjvn.co.in/SRMLogin/SRMLogin.jsp>. The details of registration process & fee, bidding process etc. are available under the e-Tendering & Reverse auction portal & bidder Manual also available on <https://sjvnindia.com/UploadFiles/FileUploadManagement/SJVNeTenderingBidderManual.pdf> under Tender Management system section (where the e-Tendering & Reverse auction portal is also available). The interested Bidders can download the Bid Document from websites: www.sapdc.com.np, www.sjvn.nic.in & www.eprocure.gov.in. Further, Amendments/Corrigendum /Notification (if any) shall be issued only on above mentioned websites.
10. The key particulars/details and dates of this invitation are as under:

Sr. No.	Description	Particulars
10.1	Date and time for availability/downloading of Bid document on web site www.sapdc.com.np , www.sjvn.nic.in & www.eprocure.gov.in	13.02.2023 (1700 Hrs. IST) to 07.03.2023 (1500 Hrs IST).
10.2	Cost of Tender Document	<p>NPR 10,000/- (For Nepalese bidders) or INR 7,000 equivalent to NPR 11,200/- (For Indian bidders) in the form of Manager's cheque in favour of "SAPDC-NPR CONSTRUCTION ACCOUNT"</p> <p>Alternatively, payment against Cost of Tender Document may be made directly in the bank account of SAPDC as mentioned below: -</p> <p>NPR Account Details: Name of Bank: Everest Bank Limited, Nepal Name of beneficiary: "SAPDC-NPR CONSTRUCTION ACCOUNT" Acc. No. 00800105200477 Swift Code: EVBLNPKA</p> <p>*Bidder shall be responsible to ensure the receipt of net amount (excluding bank transfer charges) in the account before last date of submission of bid. Further, the bidder shall submit the documentary evidence/ proof of same</p>

		(swift statement/ transfer statement/ account statement) along with technical bid in Part-I (Envelope-I).
10.3	EMD/ Bid Security (Clause 18.0 of ITB)	<p>EMD to be deposited in the manner and form prescribed under Clause No. 18.0 of ITB:</p> <p>INR 35,25,000/- (Indian Rupees Thirty Five Lakh and Twenty Five Thousand only) OR NPR 56,40,000/- (Nepalese Rupees Fifty Six Lakh and Forty Thousand only)</p>
10.4	Last date for receiving request(s) for clarifications on bid documents from Bidders, if any, through email address pna.sapdc@gmail.com . Clarification on bid documents (if required).	<p>10 days prior to last date of bid submission mentioned in Sr. No. 10.4 of NIT.</p> <p>The clarification meeting (if required through video conferencing) may also be held, for which the separate notification shall be issued on websites www.sapdc.com.np, www.sjvn.nic.in & www.eprocure.gov.in</p>
10.5	Deadline for submission of bid & place of submission.	<p>Online & Offline Submission: up to 07.03.2023 (1500 Hrs. IST)</p> <p>O/o Chief Engineer (P&C), SAPDC, Satluj Bhawan, Tumlingtar, Distt. Sankhuwasabha, Nepal, Ph. +977-29-575154, 9852099789</p> <p>OR</p> <p>O/o Company Secretary, SJVN Arun- 3 Power Development Company (SAPDC), 3rd floor, Citizen Investment Trust (CIT) Building, New Baneshwor, Kathmandu, Nepal. Contact No: +977 9819822967</p>
10.7	Date & time for Bid opening	<p>Techno- Commercial Bid (Part--I): Online & offline Bid opening on 09.03.2023 at 1600 Hrs. (IST)</p> <p>Price Bid (Part--II): Online bid Opening-shall be notified later on, separately on following websites: www.sapdc.com.np, www.sjvn.nic.in/tender.htm, & www.eprocure.gov.in (Only i.r.o. the bidders meeting the specified qualifying criteria and also whose Techno-Commercial Bids are found responsive).</p>
10.8	Venue for opening of bid	O/o Chief Engineer (P&C) SAPDC, Satluj Bhawan, Tumlingtar, Distt. Sankhuwasabha, Nepal

11. For any enquiry with respect to project site, site visit etc. the Bidder may contact the following person:

Designation	Address	Phone No.
Chief Engineer (HM)	Hydro Mechanical Deptt., SAPDC Office Complex, Tumlingtar, Distt. Sankhuwasabha, Nepal.	MobNo.+977 9852099735, +977-9852058154

12. For any enquiry/clarification for registration, submission of Bids and any other information, the Bidder may contact the following person:

Designation	Address	Phone No.
Chief Engineer (P&C)	SAPDC, Satluj Bhawan, Tumlingtar, Distt. Sankhuwasabha, Nepal	Ph. +977-29-575154, +977-9852099789 E-mail Address: pnc.sapdc@gmail.com

13. For any enquiry/clarification for registration, e- tendering system linked with technical issue/support, the Bidder may contact the following person:

Name	Address	Phone No.
Mr. Digvijay Kamta	-	+91 9129989000
Mr. Sanjaya Bhatnagar	-	+91 9456119194

12. All correspondence with regard to the above shall be made at the following address:

Chief Engineer (P&C)
SAPDC, Satluj Bhawan,
Tumlingtar, Distt. Sankhuwasabha, Nepal
Ph. +977-29-575154, 9852099789

E-mail Address: pnc.sapdc@gmail.com

PROJECT PROFILE AND SCOPE OF WORK

1.0 LOCATION

Arun-3 HPP is located on River Arun, which is one of the main tributaries of River SaptKosi near Num village of Sankhuwasabha District in Nepal. The Project has been contemplated as a run-of-river scheme which envisages about 70 m high concrete gravity dam, underground Power House and TRT Outfall Plunge pool area.

The project is located at Latitude 27°30'N to 27°35'N and Longitude 87°12'E to 87°20'E. Jogbani, Distt. Bihar, India is the nearest rail head to the project. All rail freight for Nepal has to be unloaded there. From Jogbani, the road distance to the project sites via Biratnagar, Nepal is about 300 km. The dam site is located at about 60km from Tumlingtar, where exists an airstrip connected to Kathmandu/Biratnagar by half an hour journey by air.

2.0 BRIEF SCOPE OF WORKS

Generally, this contract comprises, but is not necessarily limited to works and responsibilities associated with the execution and performance by the contractor of the following principal features, all of which are described in details in the bidding documents but are summarized here in for convenience:

Design, procurement, fabrication, shop assembly, painting (including shop and field), transportation, supply, erection, testing and commissioning of the following equipment at site complete in all respects, for tandem operation of Arun-3 HEP and Lower Arun HEP, in accordance with these Technical Specifications and Specification Drawings. The materials, workmanship, technical requirements, equipment, accessories, supplies and services required, shall be as set forth in the Technical Specifications.

It shall also include the spares required for satisfactory operation and maintenance of the following equipment:

- a) TRT Gates, Hydraulic Hoists, Bulkhead for TRT Gates, EOT Cranes and their associated equipment for Arun-3 HEP.
- b) Intake steel gratings, Intake Gates, Rope Drum Hoists, Submersible Slurry Pump, Monorail Crane and their associated equipment for Lower Arun HEP.

for a period of five years from the date of commissioning of the equipment as set forth in the Technical Specifications and Specification Drawings. The description and quantity of spares have been appended with the Bidding Documents.

The scope of work also covers supervision of unloading, stacking, operation, storage and preservation of components of the following equipment:

- a) TRT Gates, Hydraulic Hoists, Bulkhead for TRT Gates, EOT Cranes and their associated equipment
- b) Intake steel gratings, Intake Gates, Rope Drum Hoists, Submersible Slurry Pump, Monorail and their associate equipment for Lower Arun HEP

in the stockyards of the Contractor at the project site before they are transported, installed, tested and commissioned at their respective sites.

3.0 TRANSPORTATION AND COMMUNICATION FACILITIES

The following information/data is being provided by SAPDC in good faith. Applicant/contractor should check for themselves during preparatory site visit as to the correctness of information/data.

3.1 Transportation

The project lies in the Sankhuwasabha District of Province-1 of Nepal. The Tail Race Pond & outfall, Intake structure and 100m HRT are located at village Pukhuwa on left bank of Arun River, a principal tributary of Sapt Koshi, near power house of under constriction Arun 3 HEP. At present access to site of above works lies through Jogbani-Biratnagar- Hile-Tumlingtar-Khandbari-Chaunkutty-Pukhwa route. Jogbani to Khandbari is connected by all-weather metaled road. Jogbani is a city in the state of Bihar (India) with Nepal border and is just 7.60 Km. from Biratnagar (a major industrial town of Nepal). The nearest airstrip near the project area exists at Tumlingtar which is connected to Kathmandu by half an hour journey. Tumlingtar is also connected with Kathmandu by 680 km long road.

Road conditions in different road segment en-route are as under:-

- i. Jogbani to Khandbari :- Khandbari is located at a distance of about 203 Km from Jogbani and the existing road up to Khandbari is black top road and in good condition.
- ii. Khandbari to Chainkutty: The road from Khandbari to Chainkutty (Koshi Highway) is about 17 km long. The road is unmetalled road.
- iii. Chainkutty to Work site: The road from Chainkutty to Project site is about 29 km leading to power house site of under construction Arun-3 HEP and Tail Race Pond & outfall, Intake structure site of Lower Arun HEP. The road from Chainkutty to Project Site is unmetalled road
- iv. Tumlingtar is also connected to Kathmandu by air around half an hour journey.

Generally, the district / state or national highway roads/ access roads get blocked temporarily due to landslides, slips, sinkage of ground etc. The blockade becomes more frequent during rainy season. Such constraints shall not be considered unforeseeable.

Note: Since this is the General information for the bidders regarding transportation, the bidders shall require to confirm present road conditions by conducting site visit at their own.

3.2 Communication

At present, communication signal (Mobile/landline) is available at site. The site is connected with mobile, landline and internet connectivity.

4.0 TOPOGRAPHY& PHYSIOGRAPHY

Most of the Tibetan part of the Arun River basin is formed by highland above elevation 4500 m and is surrounded by high mountains, characterized by glacial or periglacial landforms. It covers an area of about 26747 km². The Nepalese drainage area up to the dam site of Arun-3 HEP dam site is about 1440 km². The average bed slope is about 0.8% in the upper catchment of Tibet, and increases drastically to 3-4% towards the Tibetan-Nepalese border, and in Nepal. The activities for Tail Race Pond & outfall, Intake structure works mainly lie in between EL 650 m to EL 500 m above mean sea level

5.0 SEISMICITY:

The project lies in seismic zone V as per IS 1893:2002.

6.0 POWER EVACUATION ASPECTS

The power from Lower Arun HEP shall be evacuated by D/C LILO of under construction 400kV Quad Moose line between Arun-3 HEP and 400/220kV Dhalkebar substation.

7.0 ENVIRONMENT ASPECTS

Nepal has developed an extensive set of legislation for regulating the environmental and social aspects for developmental projects. Nepal's laws and relevant legislation on environment conservation and social aspects including major provisions for Nepal Environmental Policy and Action Plan (NEPAP), 1993, Soil and Watershed Conservation Act, 1982, Forest Policy, 1993, Forest Act, 1993, Forest Rules, 1995, Forest Produce Collection and Sales Distribution Guidelines, 2001, The Aquatic Animal Protection Act, 1961, National Parks and Wildlife Conservation Act, 1973 and Rules, Explosive Material Act (2018 BS), Land Acquisition Act, 1977, Guthi Corporation Act, 1976 (2033 BS), Land Acquisition Guidelines 1989 and Land Reform Act 1964 (2021 BS)

8.0 CONSTRUCTION POWER

The Contractor shall make all arrangements for the full anticipated requirement of construction power through relevant authorities or by installing diesel generating sets. No additional cost on account of this shall be paid to contractor.

The Contractor shall bid his price considering the above.

Permission from Government authorities, if required, for above construction power and operation thereof shall be arranged by the Contractor at his own cost.

9.0 OTHERS / MISCELLANEOUS

- i) **General Climatic Condition in the Project Area :** The climate of the area is monsoonal in nature, as about 70% of the annual precipitation is received in the months from June to September. Since, Arun river basin lies within Eastern Himalayan region, where the monsoon has a more extended regime, rainfall is received throughout the year.
- ii) **Port Facilities :** Nearest port at Kolkata, India (about 600km from Jogbani).
- iii) **Availability of Land to the Contractor :** Land for Infrastructure shall be arranged by the Contractor himself at his own cost.
- iv) **Drinking Water Arrangement:** Natural sources available.
- v) **Medical facilities :** District HQ of Sankhuwasabha at Khandbari
- vi) **Bank :** District HQ of Sankhuwasabha at Khandbari
- vii) **Inner line permit / pass required for contractors and his workmen:** As per Law of Land
- viii) **Availability of nearest fuel station :** Tumlingtar and District HQ of Sankhuwasabha at Khandbari
- ix) **Manpower :** Population is very thin. Total population of District Sankuwasabha is approx. 1,50,000 (Census 2011 of Nepal)

13.0 FACTORS INFLUENCING CONSTRUCTION

The following major constraints may be faced during the execution of the project for which employer shall assume no responsibility and shall be considered as foreseeable.

- a. Remote location of the project involving long road transport.
- b. Very high precipitation in the project region particularly during monsoon season which extends from June to September. The road network and other infrastructure are seriously affected (due to landslides, flood and breaching of roads) during monsoon season leading to disruption of normal activities.
- c. Frequent landslides and blockade of highway and other approach roads including restrictions on the bridges.
- d. Frequent power failures, voltage fluctuations and poor quality of power available.
- e. Poor quality of communication.
- f. Floods, cloud bursts etc.

Besides the above constraints which have been informed to the bidders in good faith, the bidders should ascertain for themselves during their preparatory site visit about the extent of the above constraints and other constraints/obstructions likely to be encountered.

14.0 CONSTRUCTION PERIOD

The entire works of this package is proposed to be completed within a time span of 9 (Nine) months from commencement date as per contract.

INSTRUCTIONS TO BIDDERS, BID DATA & QUALIFICATION FORMS

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A. GENERAL

1. SCOPE OF BID

- 1.1 SJVN Arun-3 Power Development Company (P) Ltd. (SAPDC), a company promoted by SJVN Ltd., as a single shareholder company in Nepal having its registered office at Lokanthali, Kathmandu, Nepal (here-in-after referred to as "Employer") has signed Project Development Agreement (hereinafter referred to as "PDA") with Government of Nepal to plan, promote, organize & execute Arun-3 Hydroelectric Project (900 MW) in Sankhwasabha District. of Nepal on Build, own, operate and transfer (BOOT) basis.
- 1.2 SAPDC hereby invites Item Rate bids in single stage two envelope bid system from the competent Bidders/Contractors for construction of Works, as described in this Bid Document and summarized in the Bid Data, here-in-after referred to as the "Works". The bids shall be submitted as per provisions laid under Clause 21 of ITB.
- 1.3 The successful bidder will be required to complete the 'Works' within the period stated in the Tender document/Bid Data, effective from the date of issue of the Letter of Acceptance of the Works.
- 1.4 Throughout these Bid Documents, the terms bid and tender and their derivatives (bidder/tenderer, bid/tender, bidding/ tendering etc.) are synonymous, day means calendar day. Singular also means plural, unless these are repugnant to the context.

2. SOURCE OF FUNDS

- 2.1 The Employer shall implement 4x225 MW Arun-3 Hydroelectric Project. The Project envisages a debt-equity ratio of 70:30.

3. ELIGIBLE BIDDERS

- 3.1 This invitation to bid is open to (i) all the bidders from India Or (ii) Joint Venture/Consortium of Indian firms Or (iii) Joint Venture/Consortium of Indian and Nepalese firms (with Indian firm as lead partner) who meet the Qualification Criteria as per Clause-5.5 hereunder.
- 3.2 Bidders should not have been banned/ de-listed/ black listed/ debarred from business by Government of Nepal or any of its Government Department during last 03 (three) years on grounds of corrupt/fraudulent practices and/or due to non-performance and/or by Ministry of Power, Government of India/SJVN Ltd./SAPDC on any grounds.

4. ELIGIBLE MATERIALS, PLANT, SUPPLIES, EQUIPMENT AND SERVICES

- 4.1 The materials, Plant or Contractor's Equipment (Equipment), other supplies, and services to be provided under the contract, shall have their origin in eligible source countries, defined under the Government of Nepal

Guidelines, and all expenditures made under the contract will be limited to such materials, Plant or Contractor's Equipment, other supplies, and services.

- 4.2 For purposes of Sub-clause 4.1 above, origin means the place where the materials, Plant, Equipment, and other supplies are mined, grown, produced, or manufactured, and from which the services are supplied.

5. QUALIFICATION OF THE BIDDER

5.1 Bidders shall, as part of their bid:

- i) Submit a written power of attorney (POA) as per sub-clause 21.0 of ITB authorizing the signatory of the bid to commit the bidder;
 - i) In case of a General Power of Attorney, a true copy of the POA shall be duly notarized by Notary Public along with a declaration from the Company Secretary /Corporate Secretary endorsing the validity of the Power of Attorney.
 - ii) In case of a specific Power of Attorney (as per format included in forms & procedures), the original POA along with a copy of the resolution of Board of Directors for the specific appointment. In case of delegation by a General POA holder, the documents as sought under (i) above shall be submitted along with the original specific POA.
- b) Submit/include in their bids the following information/documents:
 - (i) evidence of access to lines of credit and availability of other financial resources;
 - (ii) financial plan for the current year and two following years, including the effect of known commitments;
 - (iii) work commitments; and
 - (iv) availability of major Equipment.
- c) Each bidder shall duly fill in the prescribed Data sheets/ qualification particulars along-with relevant experience certificates, Annual reports and other information evidencing proof of their meeting the qualification criteria stipulated herein.
- d) Submit an offer which is clear, comprehensive, unambiguous and complete in all respects including all necessary technical, contractual and commercial information.
- e) Submit a Declaration, **as per Proforma given in Section-4** confirming that the bid submitted by the bidder is strictly in conformity with the documents issued by SAPDC.

- 5.2 Bid submitted by a joint venture/ consortium of not more than **two** firms/companies, as partners shall comply with the following requirements:
- a) The bid shall include all the information listed in Sub-Clause 5.1 above;
 - b) The legally authorized signatory having notarized Power of Attorney of the partners of Joint Venture shall authorize lead partner to carry out bidding process. An undertaking that the bidding process carried out by the person authorized by the lead partner as per clause 21.0 of ITB. In case of a successful bid, Integrity pact and Contract Agreement, shall be signed by all the partners so as to be legally binding on all partners;
 - c) One of the partners shall be authorized as the lead partner, who shall receive instructions and incur liabilities for and on behalf of the joint venture/consortium during pre-award and post-award (if awarded).
 - d) All discussions, bid clarifications and negotiations, if any, during pre-award stages shall be done with the lead partner along with other partners;
 - e) The payments against the Contract shall be made to the joint venture/ consortium;
 - f) All partners of the joint venture/consortium shall be liable jointly and severally for the Execution of the Contract in accordance with the contractual terms, and a statement to this effect shall be included in the bid and in the Agreement (in case of a successful bid).
- 5.3 Bids submitted by a Bidder with Manufacturer(s), shall comply with the following minimum requirements:
- (i) The Bidder and his Manufacturer(s) should submit separate undertakings (as per **Attachment-4(i)-Section-4** that the Bidder/Manufacturer(s) shall be responsible for Execution of that item of work for which they claim to have specific experience.
 - (ii) In order to ensure serious participation of the Manufacturer(s) for work proposed to be executed by the Manufacturer(s), a Joint Deed of Undertaking (as per **Attachment-4(ii)-Section-4** shall be required to be submitted by the Contractor and Manufacturer(s). Besides this, Manufacturer(s) shall submit an additional Performance Bank Guarantee equivalent to 3% of corresponding value of work sublet in addition to Performance Bank Guarantee for whole Contract submitted by the bidder on award of work.
- 5.4 Bids by Merged/Acquired/Subsidiary Company shall comply with the following minimum requirements:

- (i) Commitment by the parent/holding company to sign a separate agreement with Employer (as per format contained in **Attachment-5(i)**)-Section-4 confirming full support for the technical and financial requirements of the subsidiary company and commit to take up the work itself in case of non-performance by the subsidiary company in the event of award of the work to the subsidiary company.
- (ii) Parent/holding company shall submit an undertaking alongwith the bid (as per format contained in Attachment-5 (i) that in case Bidding Company(Subsidiary Company)gets qualified and awarded the work package on the strength of Parent/ holding Company, Parent/holding company shall furnish an additional performance bank guarantee of value equivalent to 3% three percent of the Contract Price or the portion of work (where the subsidiary company is Joint Venture Partner) as the case may be, in addition to normal Performance Bank Guarantee to be submitted by the Bidder to the Employer besides entering into a separate Agreement (as per **Attachment-5(ii) or 5(iii), as applicable**).

5.5 The minimum qualifying requirement for the eligible bidders is as under:

5.5.1 Technical Criteria

5.5.1.1 General Experience

Applicant (Prime contractor or as partner in a JV/Consortium or Sub-contractor approved by the respective employer) should have executed at least one Hydro-Mechanical work of contract value INR 12.50 Crore or more during the preceding twenty (20) years to be reckoned from the last day of month previous to the month in which applications are invited and which are in successful operation. In case of ongoing projects, the value of completed work shall be considered.

5.5.1.2 Technical Criteria (Specific Experience)

Applicant either itself or proposed Manufacturer(s), who have given authorization to the Applicant, should have experience in the design, procurement fabrication, shop assembly, painting, shop testing, supply, transportation, erection, testing and commissioning of the following Hydro-Mechanical works in a completed project during the preceding twenty (20) years to be reckoned from the last day of month previous to the month in which applications are invited.

a) **Vertical Lift Gate**

Design, fabrication, supply, erection, testing and commissioning of at least one number Vertical Lift Gate operated by hydraulic hoist/rope drum hoist having value of not less than $A \times H = 400 \text{ m}^3$.

Where:

“A” denotes an area (clear width by clear height) for one gate in m^2 .

“H” (for gates) denotes the normal design head at sill of the gate in meter.

b) Rope Drum Hoist

Rope Drum Hoist should be from manufacturer, who have designed, manufactured, & supplied Rope Drum Hoist of at least 40 T capacity for operation of hydraulic gate.

c) Hydraulic Cylinder

Hydraulic Cylinder should be from manufacturer, who have designed, manufactured, & supplied Hydraulic Cylinder of at least 40 T capacity, having minimum stroke of 5500mm with a minimum lifting speed of 1m/min for operation of hydraulic gate.

Notes:

- Experience of Supervision of erection, testing and commissioning of applicant shall also be considered at par with own erection, testing & commissioning of HM equipment works.
- The prime contractor or as partner in a JV or sub-contractor approved by the respective employer should have completed the works with specified criteria mentioned above in a single project or each one in different projects during the last twenty (20) years.

5.5.2 Financial Criteria:

i) Submission of audited balance sheets or if not required by the law of Applicant's country, other financial statements acceptable to the Employer, for the last 5(five) financial years to demonstrate:

(a) the current soundness of the applicant's financial position and its prospective long term profitability. The net worth shall be positive for the last three financial years which shall be calculated based on subscribed and paid up Share Capital plus Share Premium plus Free Reserves plus Unallocated Balance/ Surplus amount of Profit and Loss Account, less (a) Expenses not written off, (b) Accumulated losses in Profit and Loss Account, if not reduced from reserves and surplus. The Revaluation reserves, Capital Reserves and amount of intangible assets like goodwill etc. will not be taken into account while calculating Net Worth, and

(b) capacity to have a cash flow amount (working capital) of at least INR 8 Crore or equivalent as evident from the last audited annual report or banking reference(s) as the case may be.

Notes:

- a. Banking reference(s) should contain in clear terms the amount that the Bank will be in a position to lend for this work to the applicant/ member of the Joint Venture. In case the Net Working Capital (as seen from the Balance Sheet) is negative, only the Banking reference(s) will be considered, otherwise the aggregate of the Net

Working Capital and submitted Banking reference(s) will be considered for working out the working capital.

- b. The Banking reference(s) should be from a "A" Class Nepalese Bank/Scheduled Bank of India and it should not be more than 3 months old as on the date of submission of applications.
- c. In case of JV- requirement of working capital/net cash flow is to be distributed between members as per their percentage participation and every member should satisfy the minimum requirement for his portion.

ii) **Average Annual Turnover:** Minimum Average Annual Turnover* (MAAT) for best three Financial years out of last five financial years of the bidder should be INR 12.50 Crore or equivalent, calculated as total certified payments received for contracts in progress or completed.

Note: The average annual turnover of JV will be based on percentage participation of each member.

General Notes for Financial Situation:

- i. The number of partners in case of Joint Venture including lead partner shall not be more than Two (2). The lead partner must be Indian having minimum 51% participation in the JV/JVA and other partner shall have minimum 20% participation. Partner having less than 20% participation in the JV will be termed as non-substantial partner and will not be considered for evaluation of financial criteria which means that their financial soundness shall not be considered for evaluation of JV. In that case, the left out requirement shall be met out by the lead partner of JV in addition to his own requirement specified in the QR and over all JV should meet the 100% requirement.
- ii. Sub-contractors turnover shall not be considered.
- iii. Turnover of the applicant/partner from the related business shall only be taken into consideration for purpose of evaluation. In case Turnover from related business is not shown separately in the financial statements, a certificate from Chartered Accountant certifying Turnover from related business shall be submitted.
- iv. Annual Report along with audited Balance Sheets, Profit & Loss Accounts, the schedules and other Financial Statements of the immediately preceding 5(five) financial years of the Applicant should be furnished by the Applicant for checking and evaluating their Financial Capacity vis-à-vis the requirement stipulated hereinabove.

In case, if the Bidder has not submitted the above Annual Report along with the Bid, then a certificate from CEO/CFO of the Bidder shall be submitted along with Bid mentioning that the requirement of Annual Report as per governing law of country is not mandatory. In such cases

duly notarized copies of Audited Printed Annual Financial Statement (Balance Sheet, Profit & Loss Statement, cash flow statement, Auditor's Report thereon including all relevant schedules/ annexure etc.) for the immediately preceding 5(five) financial years be submitted by the Bidder along with the Bid.

- v. In case where Audited financial results for the immediately preceding year are not available, then a statement of account as on the closing date of the immediately preceding financial year depicting the Turnover, Net Worth {calculated as per laid down criteria under para 9.3 (i) (a)} duly certified by their Statutory Auditor/ Certified Public Accountant carrying out the Statutory Audit shall be enclosed with the bid along with copy of appointment letter of the Statutory Auditor.
- vi. Wherever, the Annual Report/ duly notarized copies of Audited Printed Annual Financial Statement are in language other than English, then copy duly translated & printed in English language and certified by approved/ recognized English translator shall be submitted with the Bid.
- vii. For conversion from INR to NPR and vice versa, a factor of 1.6 will be considered.

5.5.3 Bid Capacity

The available Bid capacity of the Bidder at the time of submission of price bid, calculated as under should not be less than INR 25 Crore.

$$\text{Available Bid capacity} = 2.0 \times A \times N - B$$

Where;

A= Maximum value of Works executed in any one year during last 3 years

N = Number of years prescribed for completion of the subject contract package

B = Value of existing commitments (as on bid submission date) and on-going works to be completed in next "N" years.

The Bidder shall submit documentary evidence together with a certificate from its statutory auditors in support of establishing 'A' and 'B' above, along with their Bid.

6.0 Nature of Bidders

The Bidder should either be a single entity or a JV/ consortium formed for participating in the tendering for this Project. Subject to sub-clause 6.2, the bidder (single entity) shall be allowed to associate Manufacturer(s) for certain components in which he does not have the requisite experience. *Each Bidder shall submit only one Bid, either individually or as a partner in a joint venture. A Bidder who submits or participates in more than one Bid (other than as a Manufacturer who can participate in more than one bid but only in that capacity) shall cause all the proposals with the Bidder's participation to be disqualified.*

For evaluation of specific experience of various Bidders, following criteria shall be considered: -

- (i) The evaluation of Bidder's specific experience for a work executed on JV basis shall be based on his role and scope of work in such joint ventures. To establish his role and scope of work in such Joint Venture contracts, the Bidders shall adduce documentary evidence to the extent of his claimed experience. In case the quantum of work as per experience certificate does not match with the scope of work as defined in the JV/consortium agreement, then the experience credentials shall be considered as per the experience certificate issued by the employer /client.
 - (ii) In case scope of work of individual partners is not clearly defined in the JV/consortium agreement then credential of Bidders being partner in a JV/consortium shall be decided in the following manner: -
 - a. Where specific experience certificate in respect of individual JV partners is available, the same shall be considered to the extent of work executed by such JV partner.
 - b. Where specific experience certificate is not available, or experience certificate is issued in the name of JV/consortium, the evaluation shall be done in the following manner: -
 - I. In case the participation / profit sharing percentage of Bidders as per JV agreement is at least 35%, full credit of the work executed by the JV/consortium shall be given to such Bidders.
 - II. In case the participation / profit sharing percentage of Bidders in JV agreement is less than 35%, no credit of work executed under such JV shall be given to such Bidders.
 - III. Notwithstanding (i) and (ii) above, in case of availability of specific experience certificate, (a) above shall apply.
- In case both participation share and profit sharing ratio are available in the JV Agreement, participation share shall prevail.
- (iii) For the portion of work executed through a Manufacturer(s), full experience for that portion of work can be claimed by the contractor as well as Manufacturer(s) for fulfilling criteria for evaluation of Bidder's specific experience.

6.1 Joint Venture/Consortium Bidders:

Joint Venture or Consortium shall comply with the following minimum qualifying requirements:

- The number of partners in the Joint Venture/ Consortium including the Lead Partner shall not exceed two (2).
- The Lead Partner to fully meet the following:
 - General Experience criteria specified in para 5.5.1.1.
 - Average annual turnover not less than 51% of criteria specified under Financial Criteria in para 5.5.2 (ii)
 - Working Capital Criteria shall be based on the % participation as specified under Financial Criteria in para 5.5.2(i)(b)
 - Specific experience criteria specified in para 5.5.1.2 (a)
- The other partner/member to individually meet the following:
 - Average annual turnover not less than 20% of criteria specified under Financial Criteria in para 5.5.2 (ii)
 - Working Capital Criteria shall be based on the % participation as specified under Financial Criteria in para 5.5.2 (i)(b)
 - One or more of the criteria of Specific Experience specified in para 5.5.1.2 (b), 5.5.1.2(c).
- The Specific Experience of each component structure to be met individually by the Lead partner and / or other partner as the case may be.
- All the partners of the Joint Venture/Consortium to individually fulfill the Net Worth criteria specified under Financial Capacity in para 5.5.2(i).
- The Joint Venture/Consortium shall collectively satisfy, as a whole the Financial as well as Technical Requirements.
- The Bid Capacity requirement shall be satisfied by individual partner of Joint Venture/Consortium in proportion to their participation share of works in Joint Venture
- The parties shall be required to form the Joint Venture/Consortium before applying for the tender which shall be evinced by submitting a copy of the Joint Venture/Consortium agreement already entered into for the purpose. The Joint Venture/Consortium agreement should contain the roles and responsibilities of each constituent, the proposed participation share of each partner along with the items of work to be executed by each partner. It shall also be brought out in the Joint Venture/Consortium agreement that in case the Contract is awarded to the Joint Venture/Consortium, each partner of the Joint Venture/Consortium shall be responsible for execution of that item of work for which he claims to have specific experience.
- Lead partner of the Joint Venture/Consortium should be an Indian firm with at least 51% share.

6.2 Bidders with Manufacturer(s):

In case the Bidder does not have all requisite specific experience and also does not wish to enter into a Joint Venture, he can associate manufacturer / Manufacturer(s) for specified activities as brought out below in para (iii) in which he does not have the relevant experience. The criteria to be met by such Bidders shall be as follows:

- (i) The Bidder himself to fully meet the following:
 - General Experience criteria specified in para 5.5.1.1.
 - All criteria mentioned under Financial capacity in para 5.5.2
 - Specific experience criteria specified in para 5.5.1.2 (a)
 - Bid Capacity as mentioned in Para 5.5.3
- (ii) The number of Manufacturer(s) not to exceed two (2) for meeting the specific experience criteria.
- (iii) The Bidders can propose the subcontractor(s)/Manufacturer(s) for 'Specific Experience', under para 5.5.1.2 (b) or 5.5.1.2 (c).
- (iv) The proposed Manufacturer(s) shall individually meet at least one or more of the Specified criteria of Specific Experience for components listed in para 5.5.1.2 (b) or 5.5.1.2 (c).
- (v) The Bidder and his proposed Manufacturer(s) should collectively satisfy, as a whole all the specified experience requirements.
- (vi) The Bidders and his Manufacturer(s) should submit separate undertakings that the Bidders/ Manufacturer(s) shall be responsible for execution of that item of work for which they claim to have specific experience.
- (vii) Manufacturer shall submit Performance Bank Guarantee equivalent to 3% of value of work sublet in addition to the performance Bank Guarantee for whole contract submitted by the bidders on award of work.

6.3 Bids by Merged/ Acquired/ Subsidiary Companies/Single Entity:

In case of a Bidder's Company/Entity, formed after merger and/ or acquisition of other companies, past experience and other antecedents of the merged/acquired companies will be considered for qualification of such Bidders Company/Entity provided such Bidders Company/Entity continues to own the requisite assets and resources of the merged/ acquired companies needed for Construction and successful implementation of the work package put to tender.

Similarly, if the Bidders Company/Entity is a subsidiary company and applies for qualification on the unconditional technical and financial strength

of the Parent/ Holding company, the same shall be considered provided the Parent/ Holding company commits to sign a separate agreement with the Employer (in the format included in the Forms and Procedures of these Bid Documents) evincing full support for the technical and financial requirements of the subsidiary company and commit to take up the work itself in case of non-performance by the subsidiary company in the event of award of the work to the subsidiary company. An undertaking by the Parent/Holding company to this effect shall be submitted alongwith the bid (in the Format provided in the Bid Document).

For the purpose stated herein above in this clause, 'Parent Company' shall mean the 'Holding Company' owning majority (more than 50%) shares of such Bidders (Subsidiary) Company. Similarly, by extensions of this interpretation, if "A" is owned by a 'Holding Company' "B" which in turn is owned by another Holding Company "C" then "C" is construed as the 'Parent Company' of "A" as well as and so on. An apex 'Parent Company' may own number of independent Subsidiary / Group Companies and if any of these Subsidiary/Group Company commits assured support and unhindered access to its assets and resources to another Subsidiary/Group Company (Bidders in this case) under the same apex 'Parent Company' then experience and other credentials of such Subsidiary/Group Company shall also be considered for qualification of the Bidders Subsidiary Company provided such commitment is evidenced /authorized and guaranteed by the apex 'Parent Company'.

In case Bidding Company (subsidiary company) gets qualified and awarded the work package, the Parent company/Holding Company will be required to furnish an additional performance bank guarantee of value equivalent to (3%) five percent of the Contract Price or portion of work (where subsidiary Company is Joint Venture Partner) as the case may be, in addition to normal Performance Security to be submitted by the Bidder to the Employer besides entering into a separate Agreement in the requisite Format provided in the Bid Document. The experience of subsidiary companies of the Parent/ Holding Company will be considered experience of the Parent/ Holding Company.

However, for fulfillment of financial criteria, financial evaluation vis-s-vis the requirement as stated above shall be done on the basis of consolidated printed annual report for the immediately preceding 5 (five) years of the Parent/ Apex Parent Company submitted by the bidder along with the bid.

7. COST OF BIDDING

- 7.1 The bidder shall bear all costs associated with the preparation and submission of its bid, and the Employer/SAPDC will in no case be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process.

8. SITE VISIT

- 8.1 The bidders in their own interest, should inspect and examine the site and its surroundings and satisfy themselves, before submitting their bid, in respect of the site conditions including but not restricted to the following which may influence or affect the Works or cost thereof under the Contract:
- a) Site conditions including access to the Site, existing and required roads and other means of transport/ communication for use by them in connection with the Works;
 - b) Requirement and availability of land and other facilities, for their enabling works, colonies, stores and workshops etc. Such land shall be arranged by the Contractor at his own cost,
 - c) Source and extent of availability of suitable materials including water, etc. and labour (skilled and un-skilled), required for Works and laws and regulations governing their use and employment;
 - d) The type of Equipment and facilities needed, preliminary to, for and in the performance of the Works; and
 - e) All other information pertaining to and needed for the Works including information as to the risks, contingencies and other circumstances which may influence or affect the work or the cost thereof under this Contract.
 - f) Environmental aspects.
 - g) All applicable taxes, duties, royalty, cess, octroi etc.
- 8.2 The bidders should note that information, if any, in regard to the site and local conditions, in these Bid Documents is indicative only and has been given merely to assist the bidders and is not exhaustive.
- 8.3 The bidders should note and keep in mind that the Employer/SAPDC shall bear no responsibility for former's lack of acquaintance of the Site and other conditions or any information relating thereto. The consequences of the lack of any knowledge, as aforesaid, on the part of the bidders shall be at their risk and cost and no charges or claims whatsoever consequent upon the lack of any information, knowledge or understanding shall be entertained or payable by the Employer.
- 8.4 The bidder and any of its personnel or agents will be granted permission by the Employer to enter upon its premises and lands for the purpose of such visit, but only upon the express condition that the bidder, its personnel, and agents, will release and indemnify the Employer and its personnel and agents from and against all liability in respect thereof, and will be responsible for death or personal injury, loss of or damage to property, and any other loss, damage, costs, and expenses incurred as a result of the inspection.
- 8.5 The bidders should note and bear in mind that the costs of visiting the Site shall be at the bidder's own expenses.

B. BID DOCUMENTS

9. CONTENT OF BID DOCUMENTS

9.1 The Bid Documents are those stated below, and should be read in conjunction with any Addenda/Corrigenda issued in accordance with Clause 11:

Volume-I	Section-1	Press Notice, NIT and Information for Bidders (IFB)
Volume-I	Section-2	Instructions to Bidders (ITB), Bid Data & Qualification forms
Volume-I	Section-3 Section-4	General Conditions Contract Forms <ul style="list-style-type: none"> • Letter of Tender along with Attachments • Form of Notification of Award • Form of Contract Agreement along with Appendix • Performance Security Form • Bank Guarantee Form for Advance Payment • Form of Completion Certificate • Form of Operational Acceptance Certificate • Change Order Procedure and Forms • Integrity Pact alongwith Annex-A & Undertaking
Volume-II	-	Price Schedule
Volume-III	-	Technical Specifications
Volume-IV	-	Tender Drawings
Volume-V	-	Data Sheets

10. CLARIFICATION

10.1 A prospective Bidder requiring any clarification may notify SAPDC through e-mail to pnc.sapdc@gmail.com. The SAPDC will respond to such requests through the Notification/Corrigendum/Addenda on the web portals: www.sapdc.com.np, www.sjvn.nic.in & www.eprocure.gov.in. The bidders can seek clarifications through e-mail, which shall be responded to and clarified as per clause 11.0 of ITB. The Employer/SAPDC shall not be obliged to respond to any request for clarification received later than the above period. Further, the mere request for clarification from the Bidders shall not be a ground for seeking extension in the deadline for submission of bids.

11. NOTIFICATION/AMENDMENT TO BID DOCUMENTS

11.1 At any time prior to the deadline for submission of Bids, SAPDC may, for any reason, whether at its own initiative, or in response to a clarification

requested by a prospective Bidder, amend the Bid Documents by issuing Addenda.

- 11.2 Any Addendum/corrigendum/Amendment thus issued shall be part of the Bid Documents pursuant to Sub- clause 9.1 and shall be communicated/notified only through the web portals www.sapdc.com.np, www.sjvn.nic.in & www.eprocure.gov.in. The amendments to the Bid Documents will be binding on the bidders and the notification of the amendment issued through web portal, shall be deemed to be construed that such amendment(s) to the Bid Documents have been taken into account by the Bidder in its bid.
- 11.3 To give prospective Bidders reasonable time in which to take an Addendum corrigendum/Amendment into account in preparing their Bids, SAPDC shall extend as necessary the deadline for submission of Bids, in accordance with Clause 22 and notify on web portals mentioned at Clause 11.0, all prospective bidders may see the extended deadline for submission of bids.

C. PREPARATION OF BIDS

12. LANGUAGE OF BID

- 12.1 The Bid, all correspondence and documents related to the Bid exchanged by the bidder and SAPDC shall be written in English. Supporting documents and printed literature furnished by the Bidder may be in another language provided they are accompanied with a certificate of the authorized translator certifying therein an accurate translation of the relevant passages in the above stated language, in which case, for the purposes of interpretation of the Bid, the translation shall prevail.

13. DOCUMENTS COMPRISING THE BID

- 13.1 The Bid submitted by the Bidder shall comprise the following documents:-
- a) Letter of Tender duly completed and signed by the Bidder, together with all Attachments identified in Sub-Clause 13.2 below.
 - b) Price Schedule duly completed by the Bidder.
 - c) Data related to Qualifying requirements (including Qualification Forms, data for establishing bid capacity, net worth, working capital and Data Sheets).
- 13.2 Each Bidder shall submit with its bid the following attachments (upload the soft/scanned copy on e-portal <https://etender.sjvn.co.in/SRMLLogin/SRMLLogin.jsp> and In Hard copy form as per clause no. 21 of ITB.
- (a) Attachment-1: Bid Security/EMD
A bid security furnished in accordance with Clause 18.
 - (b) Attachment-2: Power of Attorney

A power of attorney, as per Sub-clause 5.1 (a), indicating that the person(s) signing the Bid has the authority to sign the Bid and that the Bid is binding upon the Bidder during the full period of its validity in accordance with Clause 17.

(c) Attachment-3: Bidder's Eligibility and Qualifications

Bids submitted by a joint venture or a consortium of firms/companies as partners shall comply with the following requirements: -

- (i) The bid has to be signed as per sub-clause 5.2 (b), so as to be legally binding on all partners
- (ii) Authorization to carry out the bidding as per sub clause 5.2(b).
- (iii) The payments against the Contract shall be made to the joint venture/consortium.
- (iv) All partners of the joint venture shall be liable jointly and severally for the Construction of the contract in accordance with the contractual terms, and a statement to this effect shall be included in the authorization at (ii) above, as well as in the bid and in the Agreement (in case of a successful bid).
- (v) A declaration in respect of the submitted bid conforming to the requirement of Sub-clause 5.1 (e).

(d) Attachment 4: Bids with Manufacturer(s):

Bids submitted by a bidder with Manufacturer(s) shall comply with the following requirements:

- (i) Undertakings by the Bidder and his Manufacturer(s) that the Bidder / Manufacturer(s) shall be responsible for execution of that item of work for which they claim to have specific experience.
- (ii) A Joint Deed of Undertaking by the Bidder and his Manufacturer(s).

(e) Attachment 5: Bids by a Merged/Acquired/subsidiary company:

Bids submitted by a Merged/Acquired/subsidiary company shall comply with the following requirements:

Undertaking by the Parent/ Holding Company evincing full technical and financial support to the subsidiary and commitment by the parent / Holding company to take up the work itself in case of non-performance of the subsidiary company and to provide additional performance guarantee and also to enter into separate agreement with the Employer to that effect.

- (f) Attachment-6: - Integrity Pact alongwith Undertaking regarding blacklisting (Schedule-F) (in Original) in accordance with clause Sub-Clause-3.2 of ITB

The Integrity Pact duly signed on behalf of SAPDC is enclosed at Attachment-6 of the Bid Document. The Integrity Pact shall be downloaded, printed and signed by the bidder and the hard copy shall be submitted in Part-I (Envelope-I) as per Sub-Clause-3.2 of ITB

- (g) Attachment-7: Joint Venture/Consortium Agreement (attested by Notary Public) and signed between Lead Partner and the other Partner(s) of JV/C as per format included in Bid Document.
- (h) Attachment-8: Deviations

In order to facilitate evaluation of bids, deviations, if any except critical provisions from the requirements of the General conditions, Bid Data, Commercial conditions, Technical Specifications and Drawings along with withdrawal cost for the same shall be listed in Attachment -8 provided for the same in its bid. The deviations listed elsewhere in the bid shall not be given any cognizance and shall be treated as deemed to be withdrawn. The Bidder has to provide the additional price, for withdrawal of the deviations indicated therein.

In particular, Bids with deviations from, objections to or reservations on provision such as those concerning Bid Security/EMD, bid validity, Defects Liability, Indemnity and on provisions mentioned below, if any, will be treated as non-responsive.

Bids containing deviations from critical provisions relating to GC Clause 11.0 (Contract Price), 12.0 (Terms of Payment), 13.3 (Performance Security), 14 (Taxes and Duties), 27.0 (Defects Liability), 29.0 (Patent Indemnity), 30 (Limitation of Liability), 40 (Extension of Time for Completion), 45 & 46 (Claims, Disputes and Arbitration) and Appendix-2 (Price Adjustment) will be considered as non-responsive. The above list is illustrative only and not exhaustive.

However, the bidders wishing to propose deviations to any of the provisions other than those mentioned above, must provide in the Attachment-8(i) without cost of withdrawal and in Attachment-8 (ii) of the bid with cost of withdrawal of each of such deviations. If such deviations are not priced, cost of withdrawal of such deviations shall be treated as 'NIL'. The evaluated cost of the bid shall include the cost of withdrawal of the deviations from the above provisions to make the bid fully compliant with these provisions.

The deviations listed without any cost and not accepted by Employer shall have to be withdrawn by the bidder without any financial implications to Employer before opening of price bid. In case of non-withdrawal of such deviations, the bid shall be rejected being non responsive.

At the time of Award of Contract, if so desired by the Employer, the bidder shall withdraw these deviations listed in Attachment- 8(i) and Attachment-8 (ii) at the cost of withdrawal stated by him in the bid. In case the bidder does not withdraw the deviations proposed by

him, if any, at the cost of withdrawal stated by him in the bid, his bid will be rejected.

However, the attention of the bidders is drawn to the provisions of examination of bids regarding the rejection of bids that are not substantially responsive to the requirements of the bidding documents.

- (i) # (Any other Attachment, if required, shall be attached with letter of Tender)

14. LETTER OF TENDER AND PRICE SCHEDULE

14.1 The Bidder shall complete the Letter of Tender and the appropriate Price Schedule furnished in the Bid Documents as indicated therein and in the Sub-section "Letter of Tender" and "Price Schedule" of the Bid Documents, following the requirements of Clauses 15 and 16.

15 PRICE SCHEDULE

15.1 Unless stated otherwise in the Bid Documents, the Contract shall be for the whole Works as described in Scope of Bid, based on the unit rates and prices in the Price Schedule submitted by the bidder.

15.2 The bidder shall fill in rates and prices for all items of the Works described in the Price Schedule. Items against which no rate or price is entered by the Bidder will not be paid for by the Employer when executed and shall be deemed covered by the rates for other items and prices in the Price Schedule. The bidder shall offer rates in Main Price Schedules on portal <https://etender.sjvn.co.in/SRMLLogin/SRMLLogin.jsp>. However, the bidder shall fill the sub price schedules and upload the scanned copy of same in Part-II on above portal only. Any indication of Main price schedules or/and sub price schedules in Part-I of bid shall lead to outrightly rejection of bid.

15.3 There is no provision in the tender for offering of rebate/discount as the bid evaluation shall be carried out on the basis of e-tender/e-Reverse Auction (e-RA) process under clause 30.4.

15.4 All duties, taxes, and other levies payable by the Contractor under the Contract, shall subject to clause 15.5 herein be included in the rates and prices and the total Bid Price submitted by the bidder.

15.5 Unless otherwise provided in the Bid Data and General Conditions, the rates and prices are subject to adjustment during the performance of the contract in accordance with the relevant provisions of contract.

15.6 Bidders are required to quote the price for the commercial, contractual and technical obligations outlined in the Bid Documents. If a Bidder wishes to make a deviation, such deviation along with withdrawal cost for the same shall be listed in attachment provided for the same in its bid. The deviations listed elsewhere in the bid shall not be given any cognizance and shall be treated as deemed to be withdrawn.

- 15.7 **Price bid Under Envelope-II shall be submitted only through SJVN e-portal i.e <https://etender.sjvn.co.in/SRMLLogin/SRMLLogin.jsp> (by filling price part in electronic form/template & uploading soft/scanned copy of Dully filled, Signed & stamped of bid form & Schedules under Envelope-II) (Not in Hard copy), any other mode of submission of price bid part shall not be accepted.**

16.0 CURRENCIES OF BID

- 16.1 The unit rates and prices can be quoted by the bidders separately in the following currencies:
- a) In Nepalese Rupees for those inputs to the Works which the bidder expects to supply from within the Employer's country, and
 - b) In Indian Rupees for those inputs to the Works which the bidder expects to supply from outside the Employer's country. (referred to as "the foreign currency requirements").

For conversion from INR to NPR and vice versa, a factor of 1.6 will be considered.

17. BID VALIDITY

- 17.1 Bids shall remain valid for the period stipulated in the Bid Data from the date of opening of Technical Bid specified in Clause 25.
- 17.2 In exceptional circumstances, prior to expiry of the original bid validity period, the Employer/SAPDC may request the bidders to extend the period of bid validity for a specified additional period. The request and the responses thereto shall be made in writing or by e-mail. A bidder may refuse the request without forfeiting its bid security. A bidder agreeing to the request will not be required or permitted to modify its bid, but will be required to extend the validity of its bid security for the period of the extension, and in compliance with Clause 18 in all respects.

18 BID SECURITY/EMD

- 18.1 The bidder shall furnish, as part of its bid, a bid security for the amount stipulated in the Bid Data.
- 18.2 The bid security /EMD shall be required to be submitted with the bid in either of the form:
- i. Bank Draft/Manager Cheque/FDR (be issued by "A" class bank of Nepal only) in the name of "**SAPDC-NPR CONSTRUCTION ACCOUNT**". However, FDR should be duly pledged in favor SJVN Arun-3 Power Development Company Pvt. Ltd.
 - OR
 - ii. Bank Guarantee in favor of SJVN Arun-3 Power Development Company Pvt. Ltd. The said Bank Guarantee should be submitted along with the

bid in accordance with clause 21.1 of ITB.

Bank Guarantee from any "A" class Bank in Nepal for the amounts expressed in Nepalese Rupees (NPR). The Bank Guarantees in INR shall be acceptable only if these are issued by a Scheduled Bank of India duly counter guaranteed by any A class Bank in Nepal.

The format of the bank guarantee shall be in accordance with the form of bid security included in Section 4. Bid securities shall remain valid for a period of 90 days, beyond the original validity period of the bid or beyond any period of extension subsequently requested under sub-clause 17.2.

OR

- iii. Alternatively, payment against Bid Security/EMD may also be made directly in the following bank account of SJVN Arun-3 Power Development Company Pvt. Ltd. However, proof of same shall be submitted by the Firm/agency with the Proposal in Part-I (Envelope-I):

NPR Account Details:

Name of Bank: Everest Bank Limited, Nepal

Name of beneficiary: "SAPDC- NPR CONSTRUCTION ACCOUNT"

Acc. No. 00800105200477

Swift Code: EVBLNPKA

*Bidder shall be responsible to ensure the receipt of net amount (excluding bank transfer charges) in the account before last date of submission of bid. Further, the bidder shall submit the copy of receipt in Envelope/Cover (**Part -I**) of the bid.

18.3 Any Bid not accompanied by an acceptable Bid Security and Letter of Tender together with its attachments shall be rejected by the Employer as non-responsive. The bid security of a joint venture must be in the name of the individual partner of Joint Venture in proportion of its participation in joint venture submitting the bid.

18.4 The Bid Securities of all the unsuccessful bidders will be returned as below:

- a) The Bid Security of those Bidders who do not qualify in Techno-Commercial evaluation, shall be returned immediately after opening the Price Bids of Techno-Commercially responsive bidders.
- b) The Bid Security of the Bidders other than L-1 Bidder, shall be returned within 30 (thirty) days from the date of issue of 'Letter of Acceptance' to the successful Bidder.

No interest shall be payable on the amount of security.

18.5 The Bid Security of the successful Bidder will be returned when the Bidder has signed the Agreement and furnished the required performance security.

18.6 The Bid Security shall be forfeited if:

- a) the Bidder withdraws its Bid or varies any terms & conditions in regard thereto during period of bid validity or;
- b) if the Bidder adopts corrupt or collusive or coercive or fraudulent practices covered under ITB Clause-37 or defaults committed under Integrity pact clause-39 of ITB.
- c) in the case of a successful Bidder, if he fails within the specified time limit to;
 - (i) sign the Agreement, or
 - (ii) furnish the required performance security.

19. CLARIFICATION ON BID DOCUMENT

- 19.1 The bidders may seek the Clarifications on Bid Document (if required) through e-mail, which shall be responded to and clarified as per clause 11.0.
- 19.2 Any modifications of the Bid Documents listed in sub-clause 9.1, which may become necessary as a result of the clarifications issued, shall be made by the Employer/SAPDC exclusively through the issue of an Addendum/Corrigendum/Addenda pursuant to clause 11.0.
- 19.3 The Pre bid meeting (if required) may be held, for which the separate notification shall be issued on websites mentioned at Clause No.10.0

20. SIGNING OF BID

- 20.1 The Bidder shall prepare the documents comprising the Bid as described in Clause 13 of these Instructions to Bidders.
- 20.2 The Bid shall be signed (Digitally or Physically) by a person duly authorized to sign on behalf of the Bidder, pursuant to Sub-clause 5.1(a) or 5.2 (b), as the case may be.
- 20.3 The Bid shall contain no overwriting, alterations, omissions, or additions, unless such corrections are initialed by the person or persons signing the Bid. Corrections if any shall only be made by scoring out the cancelled portion, writing the correction, initialing and dating it by the person or persons signing the Bid.
- 20.4 The Bids shall be signed as under:
 - a) If the Bid is submitted by an individual, it shall be signed by the proprietor above his full name and name of the firm with its current business address.
 - b) If the Bid is submitted by a proprietary firm, it shall be signed by the proprietor.
 - c) If the Bid is submitted by a firm in partnership, it shall be signed by a partner holding the power of attorney. A certified copy of the partnership deed duly registered and current business address of all the partners of the firm shall also accompany the Bid.

- d) If the Bid is submitted by a limited company, it shall be signed by a duly authorized person holding the power of attorney together with a Board resolution in this regard for signing the Bid, in which case a certified copy of the power of attorney supported with resolution of BOD shall accompany the Bid. Such limited company may be required to furnish satisfactory evidence of its existence before the contract is awarded.
- e) All witnesses and sureties shall be persons of status and their full names, occupations and addresses shall be stated below their signatures.

D. PREPARATION & SUBMISSION OF BIDS

(A Single Stage Two Envelope Bidding Procedure will be adopted)

21. Documents comprising the bid and manner of Submission thereof:

The bid shall consist of two parts **(Part-I & II)** as under:

21.1 Part –I (Online as well as in a separate sealed Envelope/Cover-I)

- i) Cost of Tender Document and Bid Security/ EMD (in original)
- ii) Comprising Techno-commercial bid (**i.e. excluding price bid part-II**) (duly signed & stamped) shall be submitted in this part-I of the bid in soft/scanned copy of the following be uploaded on SJVN e-portal page <https://etender.sjvn.co.in/SRMLLogin/SRMLLogin.jsp> and also the Hard copy of same shall be submitted :
 - a) Bidding Forms and all Attachments mentioned in Clause 13.2 of ITB
 - b) Constitution and legal status of the Bidder, place of registration and principal place of business.
 - c) Photo copy of VAT/PAN/GST Registration.
 - d) Original Power of Attorney in favour of authorized signatory
 - e) Original Joint Venture agreement in case of JV
 - f) Bid Data Sheets duly completed except Data Sheet-5 & 6.
 - g) Integrity Pact alongwith Annex-A & Undertaking
 - h) All Other/any document(s) required to be submitted, as per ITB / Addenda/Corrigenda/Amendment and relevant to terms & conditions of NIT/ Tender Document.

The bidder shall sign and stamp each page of the documents forming part of the bid, on the left hand cover (bottom side).

***No price sensitive information is to be submitted in Part-I of bid.**

21.2 Part-II (i.e. Price bid):

Price bid Under Envelope-II (Price Schedule/ Bill of Quantities (BOQ) shall be submitted only through SJVN e-portal i.e., <https://etender.sjvn.co.in/SRMLLogin/SRMLLogin.jsp> (by filling price part in electronic form/template & uploading soft/scanned copy of Dully filled, Signed & stamped of bid form & Schedules under Envelope-II (i.e. Not in Hard copy). Any other mode of submission of price bid (part_II) shall not be accepted.

21.3 In the "Techno-Commercial" part-I of the bid, the bidder shall not give any indication about the bid price in any manner whatsoever. Non-compliance of this provision shall result in the rejection of bid.

21.4 The Part II of the bid shall be strictly in accordance with the e-forms provided to fill the Price(s) in the Bill of Quantities (BOQ). Non-compliance of this provision shall result in the rejection of bid.

21.5 The bidder shall not take any deviation from the bid conditions.

21.6 Techno-Commercial bid (Part –I) only, as per clause 21.1 shall be packed and submitted in the following manner:

- i. Part –I, of the bid shall be kept in a sealed envelope/cover duly super scribed with "Part-I - Bid security/EMD and Cost of Tender Document and Techno Commercial Bid" in Original.
- ii. The envelopes/covers containing complete Part-I of the bid shall then be kept in a single cover and be sealed. The outer most cover would bear the following identifications/:

On upper left hand corner.

- ◆ Bid for (Name of Work) & Tender No.
- ◆ Do not open before
- ◆ To be opened by tender committee only.

In the center of the cover.

- ◆ Name of the person/ officer and the office address to whom bid is addressed.

On the bottom left hand corner:

- ◆ Name and address of the bidder.

21.7 Beside submitted through online portal, the bidders shall submit the Part-I i.e., Techno-commercial bid only (except the Part- II- Price bid) either by post or physically in the office of Chief Engineer (P&C), SAPDC, Satluj Bhawan, Tumlingtar, Distt. Sankhuwasabha, Nepal, Ph. +977-29-575154, 9852099789 OR alternatively in office of Company Secretary, SAPDC- SJVN Arun- 3 Power

Development Company (SAPDC) at 3rd floor, Citizen Investment Trust (CIT) Building, New Baneshwor, Kathmandu, Nepal.

However, SAPDC shall not be responsible for any delay in receipt due to any reason whatsoever and/ or for loss of the bid in postal transit.

22.0 Dead line for Submission of Bids

22.1 The bid (in soft part by uploading on SJVN e-Portal <https://etender.sjvn.co.in/SRMLLogin/SRMLLogin.jsp>) and hard copy part shall be received by SAPDC not later than the time & date at the address specified in the NIT. In the event of the specified date for the submission of bids being declared a holiday for the Employer, the bid will be received up to the specified time on the next working day.

22.2 SAPDC also reserves the right to extend the deadline for submission of bids by issuing an amendment/corrigendum in accordance with clause 11.0 hereof, in which case all rights and obligations of the SAPDC and the bidders previously subject to the original deadline will then be subject to the new deadline.

22.3 Further the Employer/SAPDC also reserves the right to extend bid submission timeline or recall if e-procurement server (i.e SJVN e-portal) is down (i.e inaccessible/inoperative) the tender for a prolonged period of time within the last 24 hours of the bid submission due date.

23.0 Late/Delayed Bids

The bidder shall not be permitted to submit the Soft Copy Part of the bid after the deadline for submission prescribed by the Employer/SAPDC. Any bid received from a bidder in Envelope /Cover (i.e., Part-I) physically by the SAPDC after the deadline prescribed by the SAPDC in accordance with clause -22.0 hereof will remain unopened. SAPDC shall not be responsible for any postal delay in respect of submission of the bid, however the e-Procurement system would not allow any late submission of bids through the portal <https://etender.sjvn.co.in/SRMLLogin/SRMLLogin.jsp> after due date & time as specified.

In case Hard copy part of the bid i.e Techno- commercial bid under 1st Envelope-I is not received till the deadline for submission of the same as prescribed by the Employer/SAPDC, but the bidder has uploaded the soft/scanned copy of the technical part of bid (i.e., the bid under first envelope). The uploaded technical bid on the portal shall be opened and such bid may be rejected during preliminary examination.

The bid is received by the Employer/SAPDC after the deadline for submission as prescribed, the bid will be considered as late bid. In such a case, the bids will be rejected.

24.0 Modification and Withdrawal of Bids

- 24.1 As per provisions in the tender document /e-portal only, the bidder may modify or withdraw the bid after submission, provided that modification is done on the e-portal as well as notice is received by the Employer/SAPDC prior to the deadline prescribed for bid submission.
- 24.2 The Bidder's modifications shall be done and submitted as follows:
- (i) Modified Electronic form of the bid as per the provision of portal therein.
 - (ii) Soft copy of the entire bid if any modification is there.
- 24.3 No bid may be withdrawn in the interval between the bid submission deadline and the expiration of the bid validity period specified in ITB Clause 17. Withdrawal of a bid during this interval may result in the Bidder's forfeiture of its bid security, pursuant to ITB Sub-Clause 18.6.
- 24.4 The bidder's modification or notice of withdrawal shall be prepared, sealed, marked and delivered in accordance with the clause -20.0 & 21.0, with the inner envelopes additionally marked "Modification" or "Withdrawal" as appropriate.
- 24.5 No bid may be modified subsequent to the deadline for submission of bids.

E. BID OPENING AND EVALUATION

25. BID OPENING

- 25.1 The Employer/SAPDC will open the Techno Commercial Bids (Part-I) online & offline in the presence of Bidders' designated representatives who may choose to attend, at the time, date, and location stipulated in the Bid Data. The Bidder's representative who are present shall sign a register evidencing their attendance. No Bid shall be rejected at the Bid opening except for the late Bids pursuant to clause 23 hereof.

In case of non-submission of bid by the bidder in the portal (soft copy part of the bid) within the stipulated deadline, then even if the bidder has submitted the specific documents in hard copy part in original within the stipulated deadline pursuant to ITB 22.1, the said bid shall be considered as incomplete bid, which will be summarily rejected.

Similarly, in case of non-submission of Hard copy part of the bid, but the bidder has uploaded the soft copy part of the bid on e-portal as mentioned in tender document, the bid will be considered as incomplete bid. In such a case, the soft copy part of the first envelope bid uploaded on the portal shall be opened. Such bids will be rejected during preliminary examination.

The date of opening of Price Bids (Part-II) on online mode only shall be intimated/Notified to all the techno-commercially responsive bidders. Price

Bids shall be opened on due time, date and place as specified by the Employer. Price Bids of the Bidders whose Bids not found Techno-commercially responsive shall not be considered for opening and shall not be considered at all any further.

- 25.2 At the time of opening, all important information and any such other details as the Employer may consider appropriate, will be announced by the Employer. This shall include but may not be limited to the Bidders' names, the Bid Prices including deviations and the presence (or absence) of bid security.

26. PROCESS TO BE CONFIDENTIAL

- 26.1 Information relating to the examination, clarification, evaluation and comparison of bids, and recommendations for the award of a contract shall not be disclosed to bidders or any other persons not officially concerned with such process until the award to the successful bidder has been announced. Any effort by a bidder to influence the Employer's processing of Bids or award decisions may result in the rejection of the bidder's bid.

27. CLARIFICATION FROM THE BIDDER

- 27.1 To assist in the examination, evaluation, and comparison of bids, Employer may, at its discretion, ask any bidder for clarification of its Bid, including breakdowns of unit rates as per the format given in Data Sheet – 5, Vol-I of tender document. The request for clarification and the response shall be through e-mail but no change in the price or substance of the bid shall be sought, offered, or permitted except as required to confirm the correction of arithmetical errors discovered by the Employer in the evaluation of the Bids in accordance with Clause 28 hereof.

28. EXAMINATION OF BIDS AND DETERMINATION OF RESPONSIVENESS

- 28.1 The basis and methodology for evaluation of the Qualification Particulars and techno-commercial bids shall generally be as described in the supplement to Instructions to Bidders attached as **Annexure-A to these ITB**. The Employer will examine the bids to determine whether they are complete, whether any computational errors have been made, whether required securities and cost of Bid Document have been furnished, whether the documents have been properly signed, whether all the requisite declaration, undertakings have been furnished and whether the bids are generally in order.
- 28.2 The Price Bid duly filled in electronic form in conformity with the tender specification on the portal only. The Price Schedule is to be filled in for filling rates of the items to be filled in by the Bidder. The calculation of amount by multiplying the quantities with the rates filled in by the bidder, sub-totals, total etc. shall be done by formulae already provided in electronic form. In case of any discrepancy in the calculations, the rates shall be considered final and the amount calculated by using the same shall be corrected and considered as final. Where ever prices for items is left

blank, in the Price Schedule, it shall be deemed to have been included in other items.

- 28.3 The Employer may waive any minor informality, non-conformity or irregularity in a bid that does not constitute a material deviation and that does not prejudice or affect the relative ranking of any Bidder as a result of the evaluation of Bids, pursuant to these Clauses.
- 28.4 Prior to the detailed evaluation, the Employer will determine whether each Bid is of acceptable quality, is complete and is substantially responsive to the Bid Documents. For purposes of this determination, a substantially responsive Bid is one that conforms to all the terms, conditions and specifications of the Bid Documents without material deviations, objections, conditionalities or reservations. A material deviation, objection, conditionality or reservation is one (i) that affects in any substantial way the scope, quality or performance of the Contract; (ii) that limits in any substantial way, inconsistent with the Bid Documents, the Employer's rights or the successful Bidder's obligations under the Contract; or (iii) whose rectification would unfairly affect the competitive position of other Bidders who are presenting substantially responsive bids.

The Employer's determination of a Bid's responsiveness is to be based on the content of the Bid itself without recourse to extrinsic evidence.

- 28.5 If a Bid is not substantially responsive, it will be rejected by the Employer, and may not subsequently be made responsive by correction or withdrawal of the nonconforming deviation or reservation.
- 28.6 All the bidders shall be informed, about their status of qualification/disqualification/techno-commercial responsiveness, through a Notification on Websites mentioned at clause 11.

29 CONVERSION TO SINGLE CURRENCY FOR EVALUATION OF BIDS

- 29.1 For evaluating the price bids, the Employer will convert the amount quoted in various currencies in which the Bid Price is payable to the currency of the Employer's country using the exchange rate stated in the Bid data. For conversion from INR to NPR and vice versa, a factor of 1.6 will be considered.

30. EVALUATION AND COMPARISON OF BIDS

- 30.1 In evaluating the Price Bids, the Employer will determine for each Bid the Evaluated Bid Price by adjusting the Bid Price as follows:
- a) making any correction for errors pursuant to Sub-clause 28.2;
 - b) converting the amount to a single currency in accordance with Clause 29;
 - c) Loading of cost of withdrawal, if any pursuant to Clause 13.2 (h)

- 30.2 The effect of the price adjustment provisions of the Conditions of Contract, applied over the period of Construction of the contract, shall not be taken into account in bid evaluation.
- 30.3 Any adjustments in price that result from the above procedures shall be carried out, for purposes of comparative evaluation only, to arrive at an "Evaluated Bid Price."
- 30.4 After arriving at L1 evaluated bid price through e-tender, the qualified bidders shall participate in E-Reverse auction process as follows:
- a) Eligibility Criteria for participation in e-RA:
 - i. Only techno-commercially responsive bidders with valid digital signature certificate, who participate in the initial e-tendering process, will be eligible to participate in the subsequent e-RA.
 - ii. Where number of eligible bidders at Price bid stage is one, then work shall be awarded to sole bidder, if the price of sole bidder is found reasonable and acceptable to SJVN.
 - iii. Where number of eligible bidders at Price bid stage is two/three, then e-RA process will be conducted among all bidders.
 - iv. Under no circumstances, there shall be less than two bidders participating in e-RA after elimination.
 - v. In case of eligible bidders at Price bid stage is four or more than four then, the highest (H1) bidder shall not be eligible for e-RA and e-RA will be conducted among rest of the bidders.
 - b) e-RA will be done on total bid price and the unit rates of the successful bidder quoted in e-tender shall be reduced pro-rata to match with the e-RA bid price.
 - c) After technical evaluation of the bids & opening of price bids, the bidders, eligible for e-RA as per methodology above, will be intimated. Such qualified bidders shall be eligible to participate in the e-RA to be conducted by the e-procurement/e-RA service provider.
 - d) e-Procurement/e-RA service provider will guide the shortlisted bidders for this purpose and the Bidders shall abide by Business Rules for e-RA as specified hereinunder.
- 30.5 **Start/Base Price:** For e-RA, **L1** evaluated bid price through e-tendering shall be taken as start/base price.
- 30.6 e-RA will be conducted on scheduled date & time which shall be conveyed to the eligible bidders through e-mail.
- 30.7 The start/base price and the minimum bid decrement value shall be available to qualified bidders only on the e-procurement website, sixty minutes before the start of e-RA Process.
- 30.8 The first online bid for e-RA shall be lesser than the price by minimum one decrement (0.1% of L-1 evaluated price). The subsequent online bids will

be lesser than the first online bid by minimum one decrement value. The final bid shall prevail over the earlier bids.

- 30.9 The bidder will be able to view leading bid in the auction and/or his own rank, bid placed by him during the event, Opening Price and Decrement price on screen along with other necessary fields in the e-RA. Names of bidders shall be displayed as dummy names to maintain anonymity.
- 30.10 **e-RA duration:** The duration of e-RA shall be initially for a period of one hour. However, in case any bidder places a bid within the last 10 minutes before scheduled closing of the e-RA and if the bid gets accepted and happens to be lowest, the duration for e-RA shall be increased by a further period of 10 minutes beyond scheduled closing time.

Auto-extension: The auto-extension takes place only in the last 10 minutes and there will be no limits for number of auto-extensions. However, in case there is no bid in the last 10 minutes before the closing of e-RA, then e-RA shall get closed automatically.

- 30.11 Proxy Reverse Auction feature: It is a pro-bidder feature to safe guard bidder's interest against Internet failure or in case of bidders who don't wish to be present in entire e-RA duration but wish to quote a minimum price that is valid for them in entire e-RA duration. This feature allows bidders to place an automated bid against other bidders in the e-RA without having to enter revised bid again and again during the e-RA process. The proxy bid amount cannot be changed until the lowest bidding amount reaches the proxy bid amount, after which it can be lowered. Bids shall be submitted by the system on behalf of the proxy bidder in decrements i.e., decreasing bid amounts upto the proxy bid amount.
- 30.12 Bidders shall submit most competitive prices through e-tendering since these prices may be considered for final award in case e-RA event is not resorted to, due to reasons mentioned herein.
- 30.13 At the end of e-RA, the closing/final Price shall be available on screen. The ratio of closing/final price through e-RA and originally quoted price through e-tendering shall be applied on all elements of originally quoted price to arrive at the final price break up (i.e., unit rates) which shall be considered further for final award.
- 30.14 **Loading:** Techno-commercial cost loading (for non-compliance to Employer's terms and conditions as applicable), if any will be carried out/or the deviations taken by the bidder and to determine the lowest evaluated bid. It shall be intimated to bidders prior to e-RA event and it shall be added to the quoted prices of respective bidder. Accordingly, the bidder(s) during e-RA should submit prices inclusive of cost of withdrawal of their respective deviations and/or other loadings so evaluated and intimated by the Employer.

- After the completion of e-RA, the Closing Price (CR) shall be available. In case, any commercial loading is made to L1 bidder's price, it shall be de-loaded from the closing price of L1 bidder (CP) for further arriving at final breakup (i.e., Unit Prices) and thereafter processing for award.
- 30.15 **Cancellation:** During e-RA, if no bid is received within the specified time duration of the e-RA, Employer, at its sole discretion, may decide to reschedule/scrap the e-RA process or finalize the tender based on Price Bids received through e-tendering if Employer does not decide to cancel/annul the tendering process for any reason and if the price of lowest bidder is found reasonable and acceptable to the Employer.
- 30.16 On the basis of these terms and conditions, Employer, at any time before the placement of order on successful bidder, shall be at liberty to cancel, extend, reschedule the e-RA process or finalize the tender based on Price Bids submitted through e-tendering without assigning any reason.
- 30.17 **Award:** On the conclusion of e-RA successful bidder shall be the one whose e-RA price is lowest if considered reasonable at the sole discretion of Employer.
- 30.18 Employer's decision for award of Contract shall be final and binding on all the bidders.
- 30.19 **Limitation of Liability:** Employer or its e-procurement/e-RA service provider shall not be liable & responsible to bidders in any manner whatsoever for failure to access/interruption/delay & bid on the e-RA platform due to loss of internet connectivity, power failure, virus attack, problems with the PC, any other unforeseen circumstances etc. before or during the auction event. On account of this, the time for the auction shall not be extended and Employer shall not be responsible for such eventualities. Further, in such cases, the decision of Employer shall be binding on the bidders.
- 30.20 Employer reserves the right to modify/withdraw any of the Business rules, terms & conditions of e-RA at any point of time prior to commencement of e-RA. However, any modifications in Business rules, terms & conditions of e-RA shall be duly communicated to techno-commercially qualified bidders.
- 30.21 Employer will provide the calculation sheet to the bidders as applicable which will help them to arrive at the total cost to enable them to keep it ready during e-RA.
- 30.22 The e-RA would be carried out in Indian Rupees or foreign currency converted into equivalent Indian Rupees only, on the date mentioned in bid document.
- 30.23 **System Accessibility:** The login ID and password for participating in e-RA will be the same as the one given to bidders on registration on e-procurement portal.

30.24 In case of any issue w.r.t. e-RA not specifically dealt with in Business Rules, the decision of the Employer shall be final and binding on all concerned.

30.25 If the Bid, which results in the lowest Evaluated Bid Price pursuant to e-RA or otherwise, is front loaded in relation to the Employer's estimate of the items of work to be performed at early stage under the Contract, the Employer may require to furnish additional performance security, to cover front loading and valid up to completion of Works, set forth in Clause 35 hereof at the expense of the bidder to protect the Employer against financial loss in the event of default of the successful Bidder under the Contract.

F. AWARD OF CONTRACT

31. AWARD

31.1 Subject to Clause 32 hereunder, the Employer will award the contract to the Bidder, meeting the specified qualifying requirements and also whose Bid has been determined to be substantially responsive to the Bid Documents and who has offered the lowest evaluated bid price pursuant to Clause 30, provided that such Bidder has been determined to be eligible in accordance with the provisions of Clause 3 and 5 of ITB hereof and the Bidder has offered reasonable Bid Price compared to Employer's estimate.

32. EMPLOYER'S RIGHT TO ACCEPT ANY BID AND TO REJECT ANY OR ALL BIDS

32.1 The Employer reserves the right to accept or reject any Bid, or cancel/withdraw invitation to Bid for any reason including national defence and security considerations, and annul the bidding process and reject all Bids at any time prior to award of contract, without thereby incurring any liability to the affected Bidder(s).

33. NOTIFICATION OF AWARD

33.1 Prior to expiration of the period of Bid validity prescribed in the tender document, the Employer/SAPDC will notify the successful Bidder by email, fax and confirmed by registered letter or courier that its Bid has been accepted. This letter (hereinafter and in the Conditions of the Contract) shall be called the "Letter of Acceptance" as prescribed by the Contract.

33.2 The notification of award (Letter of Acceptance) will constitute the formation of the contract until the contract has been effected pursuant to clause 34 hereunder.

33.3 The unsuccessful bidders shall also be informed simultaneously about their status of Bids.

33.4 The award details shall also be posted on www.sapdc.com.np, www.sjvn.nic.in and www.eprocure.gov.in.

34. SIGNING OF INTEGRITY PACT AND CONTRACT AGREEMENT

- 34.1 After notifying the successful Bidder that its Bid has been accepted, the Employer/ SAPDC will prepare the Contract Agreement in the form provided in the Bid Documents, incorporating all agreements between the parties. The Integrity Pact be signed first, between Contractor & Employer/SAPDC then Contract Agreement shall be signed in two originals (one for Employer and one for Contractor). The Contractor shall provide to the Employer 7 (seven) photocopy sets of the Contract Agreement Document, in consultation with SAPDC i.e. with its volume wise binding, without any charges and after checking by the Employer, the Contractor shall also provide to the Employer one set of the Contract Document in the electronic form.
- 34.2 After issue of Letter of Acceptance, the Employer/SAPDC shall notify the Contractor about the readiness of the Agreement. The Employer and the successful Bidder shall sign the Agreement within 28 days from the date of issue of such notice to the contractor.
- 34.3 Upon issuance of Letter of Acceptance as per clause 33 hereof, Employer/SAPDC will notify the other Bidders that their Bids have been unsuccessful and their Bid Security/EMD will be returned.

35. PERFORMANCE SECURITY

- 35.1 Within 28 days from the date of issue of Letter of Acceptance, the successful bidder shall furnish to the Employer a Performance Bank Guarantee in the form stipulated in the Conditions of Contract with validity upto 60 days beyond the Defects Liability Period and additional Performance Security as per Clause 30.25
- 35.2 The bidders who are qualified on the strength of their Manufacturer(s) shall be required to furnish an additional Performance Bank Guarantee from their Manufacturer(s) as per Appendix to the Contract Agreement.
- 35.3 In case Bidding Company (subsidiary company) gets qualified and awarded the work package, the Parent company/Holding Company, within 28 days from the date of issue of Letter of Acceptance, will be required to furnish an additional performance bank guarantee, as per Appendix to the Contract Agreement, of value equivalent to 3% (three) percent of the Contract Price or portion of work (where subsidiary Company is Joint Venture Partner) as the case may be, in addition to normal Performance Bank Guarantee to be submitted by the Bidder to the Employer besides entering into a separate agreement in the requisite Format provided in the Bid Document.
- 35.4 The form of Performance Bank Guarantee provided in Section 4, of the Bid Documents may be used.
- 35.5 Failure of the successful bidder to comply with the requirements of Clause 34 or 35 hereof shall constitute a breach of Contract, cause for annulment

of the award, forfeiture of the Bid Security/EMD, and any such other remedy the Employer may take under the provisions of the Contract.

36. PERMANENT ACCOUNT NUMBER (PAN) and VAT Registration

Within 28 days from the date of issue of the Letter of Acceptance, the successful Bidder shall furnish to the Employer his Permanent Account Number issued by the income tax authorities in Nepal and VAT registration number. No payment shall be made to the Contractor unless he submits his Permanent Account Number and VAT registration number.

37. CORRUPT OR FRAUDULENT PRACTICES

37.1 It is expected from the Bidders that they will observe the high standard of ethics during the bidding process and Construction of such Contracts. In pursuance of this policy:

- (a) For the purpose of this provision, the terms set-forth below shall mean as under:
 - (i) "corrupt practice" means the offering, giving, receiving or soliciting of anything of value to influence the action of a public official in the procurement process or in Contract Construction.
 - (ii) "fraudulent practice" means a misrepresentation or omission of facts in order to influence a procurement process or the Construction of a Contract
 - (iii) "collusive Practice" means a scheme or arrangement between two or more bidders, with or without the knowledge of Client, designed to establish bid prices at artificial, non-competitive levels.
 - (iv) "coercive Practice" means harming or threatening to harm, directly or indirectly, person or their property to influence or affect the Construction of Contract.
- (b) A Bid shall be rejected by the Employer/SAPDC if it is determined at any stage that respective Bidder has engaged in corrupt or fraudulent or Collusive or Coercive practices in competing for or in executing the Contract in question and his Bid Security shall be forfeited. The Contractor shall not be entitled for any compensation whatsoever under this clause.
- (c) The Employer may declare a bidder ineligible, either indefinitely or for a stated period of time, to be awarded a Contract if it at any time determines that the bidder has engaged in corrupt or fraudulent or collusive or coercive practices in competing for, or in executing a Contract.

- (d) The documents/information submitted by Contractor may be verified by the officials of the Employer/SAPDC for its authenticity at any time and the Contractor shall provide all facilities/co-operation in this regard. If it is found that any of the documents/information submitted by the Contractor is not genuine, the Employer shall have full rights to cancel his Bid, forfeit the bid security and terminate the Contract, if awarded.

38. E-Payment

The Successful Bidder/Contractor shall have to furnish the following information for receiving payments in Nepal against the Work through e-payment system:

1. Name of Beneficiaries:
2. Name of the Bank:
3. Branch of the Bank:
4. Account No.:
5. Swift Code:
6. City/Town:
7. Fax No.:
8. Telephone No.:
9. E-mail address:

39. Integrity Pact alongwith Undertaking:-

- 39.1 To improve transparency and fairness in the tendering process the Employer is implementing Integrity Pact. Integrity Pact is deemed as part of the contract so that the prospective bidders are bound by its provisions.

The Integrity Pact, signed by all the prospective Bidders and the Employer, shall commit the persons/officials of both the parties, not to exercise any corrupt/fraudulent/collusive/coercive practices in the Tendering process and also during implementation of the Contract. Only those Bidders who have entered into Integrity Pact with the Employer shall be eligible to participate in the bidding process. Bidders signing Integrity Pact shall not approach the Courts while representing the matters to IEMs and he/she will await their decision in the matter.

Entering into Integrity Pact as per Performa (enclosed at **Attachment-6**) is a basic qualifying requirement. In case of JV, each partner of JV shall sign Integrity Pact with the Employer. In case of sub-contracting, the Principal contractor shall be responsible for adoption of Integrity Pact by the sub-contractor

To oversee the compliance of obligation under the Integrity Pact, a panel of Independent External Monitor(s) (IEMs) have been appointed by concerned

authority. The Contact address of IEMs are as under:

Sl. No.	Name of IEMs	Address of IEMs
1	Sh. S.P. Srivastava, IPS (Retd.)	1/125, Vineet Khand, Gomtinagar, Lucknow, UP-226010 Email: sps_ips@yahoo.com
2	Smt. Archana Pandey Tiwari, IRS (Retd.)	C-32, Nangal Dewat, Vasant Kunj, New Delhi-110070 Email: ampandey2001@yahoo.com

The Integrity Pact duly signed on behalf of SAPDC is enclosed at **Attachment-6** of the Bid Documents. The Integrity Pact shall be downloaded, printed and signed by the bidder and the hard copy shall be submitted in Part-I (Envelope-I) of Bid.

39.2 The successful bidder shall submit duly executed Integrity Pact on Plain Paper prior to signing of Contract Agreement.

1.0 Technical Evaluation:

Technical Evaluation shall be carried out on the basis of technical submission by the Bidder, which will include the information and data provided by Bidders as specified in the Data Sheets:

- Personnel capabilities; Personnel Candidate data (Data Sheet 1 and 1A).
- Proposed Site Organization (Data Sheet 2).
- Erection Programme (Data Sheet 3)
- Erection Methodology (Data Sheet 4)
- Quality control organization and procedures

2.0 In addition, the Bidders are expected to provide full details of Procedures for coordinating Works with other contractors and suppliers, as well as with the Employer in such a way as to avoid delays or other difficulties during the Execution of Works.

2.1 To facilitate completion of the technical evaluation in the limited time available, Bidders are advised:

- To submit their technical documentation and all other data in the form and order indicated in the data sheets and/or as instructed above, and to ensure that all specific points on which information has to be submitted, as detailed in the Instructions to Bidders and any addenda thereto, are fully covered.
- To ensure that the documentation submitted is complete in all respects but also concise.

2.2 As the Programme for Bid evaluation is short, the Employer/SAPDC cannot accept any obligation to request clarifications or substantiating information after bids have been submitted.

3.0 Even though the bidders meet the minimum qualifying criteria as per clause no 5.5(ITB), they are subject to be disqualified if they have:

- (i) made misleading or false representations in the forms, statements, declarations and attachments submitted in proof of the qualification requirements; and/or
- (ii) record of poor performance such as abandoning the works, not properly completing the contract, inordinate delays in completion, litigation history, or financial failures etc.

BID DATA

The following specific data for the Works to be procured shall complement, amend, or supplement the provisions in the Instructions to Bidders (ITB). Whenever there is a conflict, the provisions herein shall prevail over those in Instructions to Bidders.

Instructions to Bidders (ITB) Clause Reference	
1	Summary of Works: Hydro-mechanical Works - TRT Gates and associated equipment for Arun-3 HEP and associated equipment for Lower Arun HEP in Sankhuwasabha Distt. of Nepal
1.1	Name and Address of the Employer: SJVN Arun-3 Power Development Company (P) Ltd. (SAPDC), Satluj Bhawan, Tumlingtar, Nepal, having its registered office at Lokanthali, Kathmandu, Nepal.
1.2	Period of Completion: 9 Months
5.1	Qualifying Requirement: The Bidder who wishes to participate in the bid should satisfactorily meet the qualifying requirements stipulated in ITB Clause-5.5
15.5	The Contract is subject to price adjustment as provided in the Appendix to the Contract.
16	Country of the Employer: Nepal
16	Currency of the Employer's Country: Nepalese Rupees
17.1	Period of Bid Validity: 180 days
18.1	Amount of Bid Security/EMD: INR 35,25,000/- (Indian Rupees Thirty Five Lakh and Twenty Five Thousand only) OR NPR 56,40,000/- (Nepalese Rupees Fifty Six Lakh and Forty Thousand only)
19.1	Clarifications on bid document (if required): 10 days prior to last date of bid submission mentioned in Sr. No. 10.4 of NIT which shall be responded to and clarified as per clause 11.0 of ITB
21.7	SAPDC/Employer's address for offline submission of bids: O/o Chief Engineer (P&C), SAPDC, Satluj Bhawan, Arun Sadan, Tumlingtar, Distt. Sankhuwasabha, Nepal, Ph. +977-29-575154, 9852099789

	OR O/o Company Secretary, SJVN Arun- 3 Power Development Company (SAPDC) at 3rd floor, Citizen Investment Trust (CIT) Building, New Baneshwor, Kathmandu, Nepal. Contact No: +977 9819822967
22	Deadline for submission of bids: Online & Offline Submission: upto 07.03.2023 (1500 Hrs. IST)
25	Venue, time and date of bid opening: Venue: O/o Chief Engineer (P&C), SAPDC, Satluj Bhawan, Arun Sadan, Tumlingtar, Distt. Sankhuwasabha, Nepal. Techno- Commercial Bid (Part/Envelope-I): Online & Offline Bid opening on 09.03.2023 at 1600 Hrs. IST Price Bid (Part/Envelope-II) : Shall be notified later on, separately on following websites: www.sapdc.com.np , www.sjvn.nic.in/tender.htm , & www.eprocure.gov.in (Only i.r.o. the bidders meeting the specified qualifying criteria and also whose Techno-Commercial Bids are found responsive).

QUALIFICATION FORMS
(Refer ITB sub-clause 13.1 (c))

APPLICATION FORM - 1

PAGE ___ OF ___ PAGES

General Information

Applicants are requested to complete the information in this form.

1.	Name of firm	In case of joint venture/consortium/Manufacturer(s) <input type="checkbox"/> Lead Partner <input type="checkbox"/> Partner <input type="checkbox"/> Manufacturer(s)
2.	Head office address <i>Country:</i>	
3.	Telephone Fax Email	Contact Person(s) Name Title/Position
4.	Place of incorporation / registration Date	
5.	Legal status of firm	Field of specialty in business
6.	Nationality of majority of owners or share-holders	Number of management executives Persons
7.	Number of present permanent employees: Name of Country All other branches	(unit: persons) Other Non- Engineers Engrs. Engineering
8.	Quality assurance system in head office	Certified by:
9.	Representative Name Address Telephone Fax & Email	

Date _____

Signature _____

APPLICATION FORM - 2
General Experience Record

PAGE ___ OF ___ PAGES

Name of the Construction Company (Sole Applicant) or Partner/member of a Joint venture/Consortium

*Applicants are requested to complete the information in this form.
 Use a separate sheet for each Partner/member of a joint venture/consortium.*

1. Average Annual Turnover

The information supplied should be the annual turnover of the Applicant (separately for each partner of a joint venture/ each member of a consortium), in terms of the amounts paid by the clients for each year in the last best 3 (three) Financial years out of five (5) years. Unless specifically asked for, Applicants need not to enclose testimonials, certificates, and publicity material with their applications; they will not be taken into account in the evaluation of qualifications.

Fiscal Year	Turnover (in INR)
2017-18	
2018-19	
2019-20	
2020-21	
2021-22	
Average Annual Turnover	

2. General Experience

Experience of Hydro-Mechanical work in the last Twenty (20) years to demonstrate the Applicant's business experience should be listed in separate sheets in a form as shown below:

No.	Name of Project	Country	Applicant's own works done	Role of the Applicant (sole contractor, or partner in JV/Consortium)	Contract period m/yr to m/yr	Contract Value
1						
2						
3						
4						

Date _____

Signature _____

NB: To please attach detailed data sheet wherever possible.

APPLICATION FORM - 2A

PAGE ____ OF ____ PAGES

Joint Venture/Consortium Summary

In case of joint venture/consortium, this form is requested to be filled and attached to Form 2.

1. Members of Joint Venture/Consortium

Names of all Partners of a joint venture		Proposed participation	Proposed portion of work
1. Lead Partner		%	
2. Partner		%	

2. Summary of Average Annual Turnover

Total value of annual construction turnover, in terms of the amounts paid by the clients for each Financial year in the last five (5) years:

		Annual Turnover – Summary				
Partner	Form 2 page no.	Year 1	Year 2	Year 3	Year 4	Year 5
1. Lead Partner						
2. Partner						

Indicate responsibility in respect of planning, equipment, key personnel and execution of the work of the lead firm of the joint venture/consortium and of each of the joint venture/consortium partners.

Date _____

Signature _____
by Lead Partner

APPLICATION FORM-3

PAGE ____ OF ____ PAGES

Specific Experience Record

Name of Construction Company (Sole Applicant); Partner of a joint venture/consortium and/or Manufacturer(s):

On a separate page, using the format of Form-3A, each firm (Sole Applicant); Partner of a joint venture/consortium and/or Manufacturer(s) is requested to list all contracts of a similar nature undertaken and completed in past or ongoing, on the basis of which the Applicant wishes to qualify. The value should be based on the currencies of the contracts converted to INR, at the date of substantial completion. The Specific Experience should include the following:

a) Vertical Lift Gate

Design, fabrication, supply, erection, testing and commissioning of at least one number Vertical Lift Gate operated by hydraulic hoist/rope drum hoist having value of not less than $A \times H = 400 \text{ m}^3$.

Where:

“A” denotes an area (clear width by clear height) for one gate in m^2 .

“H” (for gates) denotes the normal design head at sill of the gate in meter.

b) Rope Drum Hoist

Rope Drum Hoist should be from manufacturer, who have designed, manufactured, & supplied Rope Drum Hoist of at least 40 T capacity for operation of hydraulic gate.

c) Hydraulic Cylinder

Hydraulic Cylinder should be from manufacturer, who have designed, manufactured, & supplied Hydraulic Cylinder of at least 40 T capacity, having minimum stroke of 5500mm with a minimum lifting speed of 1m/min for operation of hydraulic gate.

The information in Form-3A to be summarized in the table form as shown below.

Summary – Completed contracts of similar nature:

Name of Project (Reported on Form-3A)	Country	Name of	Contractor's (lead partner of JV/Consortium or otherwise)	Contract value in INR	Schedule Completion/actual Completion (month/year)

Arun-3 Hydro Electric Project, Package C-6
Volume-I Section-2: Instructions to Bidders (ITB), Bid Data & Qualification Forms

Date_____

Signature_____

- * i) Exchange rate as on date of award of Contract.
- ii) Mention exchange rate adopted.

NB: To please attach detailed data sheet wherever possible.

SUMMARY OF FULFILMENT OF TECHNICAL CRITERIA

(To be submitted by the Bidder)

S.No	Qualifying Criteria	Reference (Page No.)
	A. General Experience	
	Applicant (Prime contractor or as partner in a JV/Consortium or Sub-contractor approved by the respective employer) should have executed at least one Hydro-Mechanical work of contract value INR 12.50 Crore or more during the preceding twenty (20) years to be reckoned from the last day of month previous to the month in which applications are invited and which are in successful operation. In case of ongoing projects, the value of completed work shall be considered.	
	Technical Criteria (Specific Experience) Applicant either itself or proposed Manufacturer(s), who have given authorization to the Applicant, should have experience in the design, procurement fabrication, shop assembly, painting, shop testing, supply, transportation, erection, testing and commissioning of the following Hydro-Mechanical works in a completed project during the preceding twenty (20) years to be reckoned from the last day of month previous to the month in which applications are invited.	
	<p>a) Vertical Lift Gate</p> <p>Design, fabrication, supply, erection, testing and commissioning of at least one number Vertical Lift Gate operated by hydraulic hoist/rope drum hoist having value of not less than $A \times H = 400 \text{ m}^3$.</p> <p>Where:</p> <p>"A" denotes an area (clear width by clear height) for one gate in m^2.</p> <p>"H" (for gates) denotes the normal design head at sill of the gate in meter.</p>	
	<p>b) Rope Drum Hoist</p> <p>Rope Drum Hoist should be from manufacturer, who have designed, manufactured, & supplied Rope Drum Hoist of at least 40 T capacity for operation of hydraulic gate.</p>	

<p>c) Hydraulic Cylinder Hydraulic Cylinder should be from manufacturer, who have designed, manufactured, & supplied Hydraulic Cylinder of at least 40 T capacity, having minimum stroke of 5500mm with a minimum lifting speed of 1m/min for operation of hydraulic gate</p>	
--	--

Applicant

	<p>least one number Vertical Lift Gate operated by hydraulic hoist/rope drum hoist having value of not less than $A \times H = 400 \text{ m}^3$.</p> <p>Where:</p> <p>“A” denotes an area (clear width by clear height) for one gate in m^2.</p> <p>“H” (for gates) denotes the normal design head at sill of the gate in meter.</p> <p>b) Rope Drum Hoist Rope Drum Hoist should be from manufacturer, who have designed, manufactured, & supplied Rope Drum Hoist of at least 40 T capacity for operation of hydraulic gate.</p> <p>c) Hydraulic Cylinder Hydraulic Cylinder should be from manufacturer, who have designed, manufactured, & supplied Hydraulic Cylinder of at least 40 T capacity, having minimum stroke of 5500mm with a minimum lifting speed of 1m/min for operation of hydraulic gate.</p>
--	--

Date _____

Signature _____

NB: To please attach detailed data sheet wherever possible

APPLICATION FORM - 4

PAGE ____ OF ____ PAGES

Current Contract Commitments / Works in Progress

Name of Construction Company (Sole Bidder); Partner of a joint venture/Consortium and/or Manufacturer(s):

Bidder should provide information on their current commitments on all construction contracts that have been awarded, or for which a letter of intent or acceptance has been received, or for contracts approaching completion.

Name of contract	Description of works	Stipulated date of completion	Contract Value (equivalent INR)*	Value of outstanding work (equivalent INR)*	Estimated completion date
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					

- * i) Exchange rate as on date of award of Contract.
 ii) Mention exchange rate adopted.

Date _____

Volume -I, Section-3
General Conditions and
Contract Forms

Volume I, Section -3 General Conditions (GC)

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General Conditions

Contract and Interpretation

1. Definitions

1.1 The following words and expressions shall have the meanings hereby assigned to them:

"Contract" means the Contract Agreement entered into between the Employer and the Contractor, together with the Contract Documents referred to therein; they shall constitute the Contract, and the term "the Contract" shall in all such documents be construed accordingly.

"Contract Documents" means the documents listed in Article 1.1 (Contract Documents) of the Contract Agreement (including any amendments thereto).

"GC" means the General Conditions hereof.

"day" means calendar day .

"year" means 365 days.

"month" means calendar month.

"Party" means the Employer or the Contractor, as the context requires, and "Parties" means both of them.

"Letter Of Acceptance" means the letter of formal acceptance signed by the employer, of the letter of tender, including any annexed memoranda comprising agreements between and signed by both the parties.

"Employer" means SAPDC (SJVN Arun-3 Power Development Company (P) Ltd.) and includes the legal successors or permitted assigns of the Employer.

EIC means the person appointed by the Employer in the manner provided in GC Sub-Clause 17.1 EIC hereof to perform the duties delegated by the Employer.

"Contractor" means the person(s) whose bid to perform the Contract has been accepted by the Employer and is named as Contractor in the Contract Agreement, and includes the legal successors or permitted assigns of the Contractor.

"Contractor's Representative" means any person nominated by the Contractor and approved by the Employer in the manner provided in GC Sub-Clause

17.2 (Contractor's Representative and Construction Manager) hereof to perform the duties delegated by the Contractor.

"Construction Manager" means the person appointed by the Contractor's Representative in the manner provided in GC Sub-Clause 17.2.4.

"Subcontractor," including manufacturers/suppliers/Manufacturer(s), means any person to whom execution of any part of the Facilities, including preparation of any design or supply of any Plant, is sub-contracted directly or indirectly by the Contractor, and includes its legal successors or permitted assigns.

"Contract Price" means the sum specified in the Letter of Acceptance and under Article 2.1 (Contract Price) of the Contract Agreement, subject to such additions and adjustments thereto or deductions therefrom, as may be made pursuant to the Contract.

"Facilities" means the Plant to be supplied and installed, as well as all the Installation Services to be carried out by the Contractor under the Contract.

"Plant" means permanent plant, equipment, machinery, apparatus, materials, articles and things of all kinds to be provided and incorporated in the Facilities by the Contractor under the Contract (including the spare parts to be supplied by the Contractor under GC Sub-Clause 7.3 hereof), but does not include Contractor's Equipment.

"Installation Services" means all those services ancillary to the supply of the Plant for the Facilities, to be provided by the Contractor under the Contract, such as transportation and provision of marine or other similar insurance, inspection, expediting, site preparation works (including the provision and use of Contractor's Equipment and the supply of all construction materials required), installation, testing, pre-commissioning, commissioning, operations, maintenance, the provision of operations and maintenance manuals, training, etc. as the case may require.

"Contractor's Equipment" means all facilities, equipment, machinery, tools, apparatus, appliances or things of every kind required in or for installation, completion and maintenance of Facilities that are to

be provided by the Contractor, but does not include Plant, or other things intended to form or forming part of the Facilities.

“Country of Origin” means the countries and territories eligible under the rules of Govt. of Nepal.

‘Government’ or ‘GoN’ means the Government of Nepal.

“Site” means the land and other places upon which the Facilities are to be installed, and such other land or places as may be specified in the Contract as forming part of the Site.

“Effective Date” means the date of issuance of Letter of Acceptance, from which the Time for Completion shall be counted.

“Time for Completion” means the time within which Completion of the Facilities as a whole (or of a part of the Facilities where a separate Time for Completion of such part has been prescribed) is to be attained, as referred to in GC Clause 8 and in accordance with the relevant provisions of the Contract.

“Completion” means that the Facilities (or a specific part thereof where specific parts are specified in the Contract) have been completed operationally and structurally and put in a tight and clean condition, that all work in respect of Pre-commissioning of the Facilities or such specific part thereof has been completed, and that the Facilities or specific part thereof are ready for Commissioning as provided in GC Clause 24 (Completion) hereof.

“Pre-commissioning” means the testing, checking and other requirements specified in the Employer’s Requirements that are to be carried out by the Contractor in preparation for Commissioning as provided in GC Clause 24 (Completion) hereof.

“Commissioning” means operation of the Facilities or any part thereof by the Contractor following Completion, which operation is to be carried out by the Contractor as provided in GC Sub-Clause 25.1 (Commissioning) hereof, for the purpose of carrying out Guarantee Test(s).

“Guarantee Test(s)” means the test(s) specified in the

Employer's Requirements to be carried out to ascertain whether the Facilities or a specified part thereof is able to attain the Functional Guarantees specified in the Appendix to the Contract Agreement titled Functional Guarantees, in accordance with the provisions of GC Sub-Clause 25.2 (Guarantee Test) hereof.

"Operational Acceptance" means the acceptance by the Employer of the Facilities (or any part of the Facilities where the Contract provides for acceptance of the Facilities in parts), which certifies the Contractor's fulfillment of the Contract in respect of Functional Guarantees of the Facilities (or the relevant part thereof) in accordance with the provisions of GC Clause 28 (Functional Guarantees) hereof and shall include deemed acceptance in accordance with GC Clause 25 (Commissioning and Operational Acceptance) hereof.

"Defect Liability Period" means the period of validity of the warranties given by the Contractor commencing at Completion of the Facilities or a part thereof, during which the Contractor is responsible for defects with respect to the Facilities (or the relevant part thereof) as provided in GC Clause 27 (Defect Liability) hereof.

2. Contract Documents

- 2.1 The following documents shall constitute the Contract between the Employer and the Contractor, and each shall be read and constructed as an integral part of the Contract:
- (a) This Contract Agreement and the Appendices hereto
 - (b) Letter of Bid and Price Schedules submitted by the Contractor.
 - (c) General Conditions.
 - (d) Technical Specifications.
 - (e) Drawings.
 - (f) Other completed bidding forms submitted with the bid.
 - (g) Any other documents forming part of the Employer's Requirements.
 - (h) Any other documents shall be added here.

2.2 Order of Precedence

In the event of any ambiguity or conflict between the Contract Documents listed above, the order of precedence shall be the order in which the Contract Documents are listed in Subject to Article 2.1 (Contract Documents) above.

2.3 Definitions (Reference GC Clause 1)

Capitalized words and phrases used herein shall have the same meanings as are ascribed to them in the General Conditions.

3. Interpretation 3.1 In the Contract, except where the context requires otherwise:

- (a) words indicating one gender include all genders;
- (b) words indicating the singular also include the plural and words indicating the plural also include the singular;
- (c) provisions including the word "agree," "agreed," or "agreement" require the agreement to be recorded in writing;
- (d) the word "tender" is synonymous with "bid," "tenderer," with "bidder," and "tender documents" with "bidding documents," and
- (e) "written" or "in writing" means hand-written, type-written, printed or electronically made, and resulting in a permanent record.

The marginal words and other headings shall not be taken into consideration in the interpretation of these Conditions.

3.2 Incoterms

Unless inconsistent with any provision of the Contract, the meaning of any trade term and the rights and obligations of Parties thereunder shall be as prescribed by *Incoterms*.

Incoterms means international rules for interpreting trade terms published by the International Chamber of Commerce (latest edition), 38 Cours Albert 1^{er},

75008 Paris, France.

3.3 Entire Agreement

Subject to GC Sub-Clause 16.4 hereof, the Contract constitutes the entire agreement between the Employer and Contractor with respect to the subject matter of Contract and supersedes all communications, negotiations and agreements (whether written or oral) of Parties with respect thereto made prior to the date of Contract.

3.4 Amendment

No amendment or other variation of the Contract shall be effective unless it is in writing, is dated, expressly refers to the Contract, and is signed by a duly authorized representative of each Party hereto.

3.5 Independent Contractor

The Contractor shall be an independent contractor performing the Contract. The Contract does not create any agency, partnership, joint venture or other joint relationship between the Parties hereto. Subject to the provisions of the Contract, the Contractor shall be solely responsible for the manner in which the Contract is performed. All employees, representatives or Subcontractors engaged by the Contractor in connection with the performance of the Contract shall be under the complete control of the Contractor and shall not be deemed to be employees of the Employer, and nothing contained in the Contract or in any subcontract awarded by the Contractor shall be construed to create any contractual relationship between any such employees, representatives or Subcontractors and the Employer.

3.6 Non-Waiver

3.6.1 Subject to GC Sub-Clause 3.6.2 below, no relaxation, forbearance, delay or indulgence by either Party in enforcing any of the terms and conditions of the Contract or the granting of time by either Party to the other shall prejudice, affect or restrict the rights of that Party under the Contract, nor shall any waiver by either Party of any breach of Contract operate as waiver of any subsequent or continuing breach of Contract.

3.6.2 Any waiver of a Party's rights, powers or

remedies under the Contract must be in writing, must be dated and signed by an authorized representative of the Party granting such waiver, and must specify the right and the extent to which it is being waived.

3.7 Severability

If any provision or condition of the Contract is prohibited or rendered invalid or unenforceable, such prohibition, invalidity or unenforceability shall not affect the validity or enforceability of any other provisions and conditions of the Contract.

3.8 Country of Origin

"Origin" means the place where the plant and component parts thereof are mined, grown, produced or manufactured, and from which the services are provided. Plant components are produced when, through manufacturing, processing, or substantial or major assembling of components, a commercially recognized product results that is substantially in its basic characteristics or in purpose or utility from its components.

4. Communications

4.1 Wherever these Conditions provide for the giving or issuing of approvals, certificates, consents, determinations, notices, requests and discharges, these communications shall be:

- (a) in writing and delivered against receipt; and
- (b) delivered, sent or transmitted to the address for the recipient's communications as stated in the Contract Agreement.

When a certificate is issued to a Party, the certifier shall send a copy to the other Party. When a notice is issued to a Party, by the other Party or the EIC, a copy shall be sent to the EIC or the other Party, as the case may be.

5. Law and Language

- 5.1 The Contract shall be governed by and interpreted in accordance with laws of the Govt. of Nepal.
- 5.2 The ruling language of the Contract shall be English.
- 5.3 The language for communications shall be the ruling language of the Contract.

6. Fraud and

- 6.1 If the Employer determines that the Contractor

Corruption

and/or any of its personnel, or its agents, or its Subcontractors, sub-consultants, services providers, suppliers and/or their employees has engaged in corrupt, fraudulent, collusive coercive, or obstructive practices, in competing for or in executing the Contract, then the Employer may, after giving 14 days notice to the Contractor, terminate the Contractor's employment under the Contract and expel him from the Site, and the provisions of Clause 42 shall apply as if such expulsion had been made under Sub-Clause 42.2.1 (c).

For the purposes of this Sub-Clause,

- (i) "corrupt practice" is the offering, giving, receiving or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party
- (ii) "fraudulent practice" is any act or omission, including a misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain a financial or other benefit or to avoid an obligation
- (iii) "collusive practice" is an arrangement between two or more parties designed to achieve an improper purpose, including to influence improperly the actions of another party;
- (iv) "coercive practice" is impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party;
- (v) "obstructive practice" is
 - (a) deliberately destroying, falsifying, altering or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede an investigation into allegations of a corrupt, fraudulent, coercive or collusive practice; and/or threatening, harassing or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the

investigation, or

Subject Matter of Contract

7. Scope of Facilities

- 7.1 Unless otherwise expressly limited in the Employer's Requirements, the Contractor's obligations cover the provision of all Plant and the performance of all Installation Services required for the design, and the manufacture (including procurement, quality assurance, fabrication, installation Pre-commissioning and delivery) of the Plant, and the installation, completion and commissioning of the Facilities in accordance with the plans, procedures, specifications, drawings, codes and any other documents as specified in the Section, Employer's Requirements. Such specifications include, but are not limited to, the provision of supervision and engineering services; the supply of labor, materials, equipment, spare parts (as specified in GC Sub-Clause 7.3 below) and accessories; Contractor's Equipment; construction utilities and supplies; temporary materials, structures and facilities; transportation (including, without limitation, unloading and hauling to, from and at the Site); and storage, except for those supplies, works and services that will be provided or performed by the Employer, as set forth in the Appendix to the Contract Agreement titled Scope of Works and Supply by the Employer.
- 7.2 The Contractor shall, unless specifically excluded in the Contract, perform all such work and/or supply all such items and materials not specifically mentioned in the Contract but that can be reasonably inferred from the Contract as being required for attaining Completion of the Facilities as if such work and/or items and materials were expressly mentioned in the Contract.
- 7.3 In addition to the supply of Mandatory Spare Parts included in the Contract, the Contractor agrees to supply spare parts required for the operation and maintenance of the Facilities for the period of five years. However, the identity, specifications and quantities of such spare parts and the terms and conditions relating to the supply thereof are to be agreed between the Employer and the Contractor, and the price of such spare parts shall be that given in

Sub-Price Schedule No. 4-A and 4-B, which shall not be added to the Contract Price. The price of such spare parts shall include the purchase price therefor and other costs and expenses (including the Contractor's fees) relating to the supply of spare parts.

The Contractor shall carry sufficient inventories to ensure an ex-stock supply of consumable spares for the Plant. Other spare parts and components shall be supplied as promptly as possible, but at the most within six (6) months of placing the order. In addition, in the event of termination of the production of spare parts, advance notification will be made to the Employer of the pending termination, with 12 months time to permit the Employer to procure the required spare parts. Following such termination, the Contractor shall provide at no cost to the Employer the blueprints, drawings and specifications of the spare parts, if requested.

8. Time for Commencement and Completion

- 8.1 The Time for Commencement shall be the date of issue of Letter of Acceptance by the Employer and without prejudice to GC Sub-Clause 26.2 hereof, the Contractor shall thereafter proceed with the Facilities in accordance with the time schedule specified in the Appendix to the Contract Agreement titled Time Schedule.
- 8.2 The contractor shall attain Completion of the Facilities or of a part where a separate time for completion of such part is specified in the contract, within the time specified in the milestones or within such extended time to which contractor shall be entitled under GC clause 40 hereof.

9. Contractor's Responsibilities

- 9.1 The Contractor shall design, manufacture including associated purchases and/or subcontracting, install and complete the Facilities in accordance with the Contract. When completed, the Facilities should be fit for the purposes for which they are intended as defined in the Contract.
- 9.2 The Contractor confirms that it has entered into this Contract on the basis of a proper examination of the data relating to the Facilities including any data as to boring tests if provided by the Employer, and on the basis of information that the Contractor could have obtained from a visual inspection of the Site if access thereto was available and of other data readily

available to it relating to the Facilities as of the date twenty-eight (28) days prior to bid submission. The Contractor acknowledges that any failure to acquaint itself with all such data and information shall not relieve its responsibility for properly estimating the difficulty or cost of successfully performing the Facilities.

- 9.3 The Contractor shall acquire and pay for all permits, approvals and/or licenses from all local, state or national government authorities or public service undertakings in the country where the Site is located which such authorities or undertakings require the Contractor to obtain in its name and which are necessary for the performance of the Contract, including, without limitation, visas for the Contractor's and Subcontractor's personnel and entry permits for all imported Contractor's Equipment. The Contractor shall acquire all other permits, approvals and/or licenses that are not the responsibility of the Employer under GC Sub-Clause 10.3 hereof and that are necessary for the performance of the Contract.
- 9.4 The Contractor shall comply with all laws in force in the country where the Facilities are to be implemented. The Contractor shall comply with all applicable laws, ordinances, codes, approved standards, rules and regulations. The laws will include all local, state, national or other laws that affect the performance of the Contract and bind upon the Contractor. The Contractor shall indemnify and hold harmless the Employer from and against any and all liabilities, damages, claims, fines, penalties and expenses of whatever nature arising or resulting from the violation of such laws by the Contractor or its personnel, including the Subcontractors and their personnel, but without prejudice to GC Sub-Clause 10.1 hereof.
- 9.5 Any Plant and Installation Services that will be incorporated in or be required for the Facilities and other supplies shall have their origin as specified under GC Clause 1 (Country of Origin). Any subcontractors retained by the Contractor shall be from a country as specified in GC Clause 1 (Country of Origin).
- 9.6 If the Contractor is a joint venture, or association (JVA) of two, or consortium, all such persons shall be jointly and severally bound to the Employer for the

fulfillment of the provisions of the Contract, and shall designate one of such persons to act as a leader with authority to bind the JVA. The composition or the constitution of the JVA shall not be altered without the prior consent of the Employer.

10. Employer's Responsibilities

10.1 All information and/or data to be supplied by the Employer as described in the Appendix to the Contract Agreement titled Scope of Works and Supply by the Employer, shall be deemed to be accurate, except when the Employer expressly states otherwise.

10.2 The Employer shall be responsible for acquiring and providing legal and physical possession of the Site and access thereto, and for providing possession of and access to all other areas reasonably required for the proper execution of the Contract, including all requisite rights of way, as specified in the Appendix to the Contract Agreement titled Scope of Works and Supply by the Employer. The Employer shall give full possession of and accord all rights of access thereto on or before the date(s) specified in that Appendix.

10.3 The Employer shall acquire and pay for all permits, approvals and/or licenses from all local, state or national government authorities or public service undertakings in the country where the Site is located which (a) such authorities or undertakings require the Employer to obtain in the Employer's name, (b) are necessary for the execution of the Contract, including those required for the performance by both the Contractor and the Employer of their respective obligations under the Contract, and (c) are specified in the Appendix (Scope of Works and Supply by the Employer).

10.4 If requested by the Contractor, the Employer shall use its best endeavors to assist the Contractor in obtaining in a timely and expeditious manner all permits, approvals and/or licenses necessary for the execution of the Contract from all local, state or national government authorities or public service undertakings that such authorities or undertakings require the Contractor or Subcontractors or the personnel of the Contractor or Subcontractors, as the case may be, to obtain.

10.5 Unless otherwise specified in the Contract or agreed upon by the Employer and the Contractor, the

Employer shall provide sufficient, properly qualified operating and maintenance personnel; and shall perform all work and services of whatsoever nature, including those required by the Contractor to properly carry out Pre-commissioning, Commissioning and Guarantee Tests, all in accordance with the provisions of the Appendix to the Contract Agreement titled Scope of Works and Supply by the Employer, at or before the time specified in the program furnished by the Contractor under GC Sub-Clause 18.2 hereof and in the manner thereupon specified or as otherwise agreed upon by the Employer and the Contractor.

10.6 The Employer shall be responsible for the continued operation of the Facilities after Completion, in accordance with GC Sub-Clause 24.8, and shall be responsible for facilitating the Guarantee Test(s) for the Facilities, in accordance with GC Sub-Clause 25.2.

10.7 All costs and expenses involved in the performance of the obligations under this GC Clause 10 shall be the responsibility of the Employer, save those to be incurred by the Contractor with respect to the performance of Guarantee Tests, in accordance with GC Sub-Clause 25.2.

10.8 In the event that the Employer shall be in breach of any of his obligations under this Clause, the additional cost incurred by the Contractor in consequence thereof shall be determined by the EIC and added to the Contract Price.

Payment

11. Contract Price

11.1 The Contract Price shall be as specified in Article 2 (Contract Price and Terms of Payment) of the Contract Agreement.

11.2 The Contract Price shall be adjusted in accordance with the provisions of the Appendix to the Contract Agreement titled Price Adjustment, Subject to GC Sub-Clauses 9.2, 10.1 and 35 hereof, the Contractor shall be deemed to have satisfied itself as to the correctness and sufficiency of the Contract Price, which shall, except as otherwise provided for in the Contract, cover all its obligations under the Contract.

DEDUCTIONS FROM CONTRACT PRICES

- 11.3 All costs, claims, damages or expenses which the Employer may have paid for which under the Contract the Contractor is liable, may be deducted by the Employer from the proceeds of the Performance Guarantee or from any money due or which may become due to the Contractor under the Contract.
- 11.4 Any sum of money due and payable to the Contractor (including Performance Guarantee returnable to him) under this Contract may be appropriated by the Employer and set off against any claim of the Employer out of or under any Contract made by the Contractor with the Employer.
- 11.5 It is an agreed terms of the Contract that the sum of money so withheld if retained under this clause by the Employer shall be kept, withheld or retained as such by the Employer till the claims arising out of in the same Contract are either mutually settled or determined by the arbitrator, and the Contractor shall have no claim for interest or damage whatsoever on this account or any other ground in respect of any sum of money withheld or retained under this clause and duly notified as such to the Contractor.

12. Terms of Payment

12.1 The Contract Price shall be paid as specified in Article 2 (Contract Price and Terms of Payment) of the Contract Agreement and in the Appendix to the Contract Agreement titled Terms and Procedures of Payment, which also outlines the procedures to be followed in making application for and processing payments.

12.2 No payment made by the Employer herein shall be deemed to constitute acceptance by the Employer of the Facilities or any part(s) thereof.

12.3 Omissions on the part of the EIC to pay the amount due upon measurement or otherwise shall neither vitiate nor make the Contract void. Further, no claim for interest or damages will be entertained or payable by the Employer upon:

- i) any Bank Guarantee or
- ii) payments in arrears or

iii) any balance which may become due on final settlement / re-conciliation of the account or

iv) withheld by the Employer owing to any dispute or difference between the Parties.

Save as above, if the Contractor does not receive undisputed payment, the Contractor shall be entitled to receive simple interest as financing charges on the amount unpaid during

All the payments for the supplies and/or services (as applicable) rendered by Contractor under the contract shall be released within forty-five (45) days from the receipt of invoice/bills from the Contractor complete in all respects.

In case payments are not released as mentioned above, SAPDC shall pay the principal amount plus simple interest from the date immediately following the date agreed upon @ 8% p.a.

The Contractor shall be entitled to this payment without formal notice and without prejudice to any other right or remedy.

Further no interest will be paid on disputed claim amount.

12.4 The currency or currencies in which payments are made to the Contractor under this Contract shall be Nepalese Rupees only.

12.5 *The Contractor shall open a dedicated account in Nepal for the Facilities of the Project and all payments to Contractor shall be released to dedicated account only. The payment released to the Contractor against this Contract shall be solely utilized for the Facilities and shall not be diverted for other purpose. In case, the Contractor wants to utilize the payment for clearing his other liabilities, he may do so with the prior permission of EIC."*

The Due payments for Main Price Schedule – 1A (Supply Portion) in INR currency shall be released in a dedicated account opened by contractor in India directly or through LC. The payment released to the Contractor against this Contract shall solely be utilized for the Facilities and shall not be diverted for other purpose. In case, the contractor wants to utilize the payment for clearing his other liabilities, he may do so with the prior permission of EIC. Further, time taken on account of seeking approval from GON

Authorities for releasing payment to India directly or through LC will be on account of Contractor.

12.6 – Material Advance Payment:

1) If EIC is satisfied with the request of contractor, the employer will make payment of interest-bearing advance for specified Material upon submission of unconditional Bank Guarantee (120 % of advance amount):

a) If advance is requested for already purchased Specified Material, the contractor shall submit the copy of Purchase Order, Invoice and delivery challan and documents evidencing delivery of material etc;

b) If advance is requested for Specified Material to be purchased for the project requirement, the contractor shall submit i) Performa Invoice and copy of purchase order along with the application for advance. The contractor shall ensure to take delivery of material as per delivery schedule provided in the Performa Invoice.

For the purpose of this clause specified material means "Steel plate for Gates (E250, E410, SS304, SS420 and IS1030)" purchased or to be purchased from the approved vendors for the requirement of project.

The advance shall be released after verification of unconditional & acceptable Bank Guarantee provided by the contractor for an amount equal to 120% of the advance payment. The Bank guarantee for advance payment shall be in favour of SJVN Arun- 3 Power Development Company Pvt Ltd from a Bank Acceptable to the employer.

The Bank Guarantee shall be issued by any "A" class Bank in Nepal for the amounts expressed in Nepalese Rupees. The Bank Guarantee in INR shall be acceptable only if these are issued by a Scheduled Bank of India duly counter guaranteed by any "A" class bank in Nepal. Such Bank Guarantee shall remain effective until the advance amount along with

interest has been fully repaid.

2) The advance payment plus interest thereon shall be recovered from the amount due to the contractor for delivery of BoQ items acceptable to the Employer, for which the advance for material provided by the employer to the extent of material consumed in the manufacturing of such parts. The total interest amount due upto preceding month shall be recovered along with principal from each RA bill till the advance against is fully repaid.

Rate of Interest for the purpose of this clause shall be as provided in the Appendix I i.e., Terms and Procedure of Payment of the Contract Agreement. The interest shall be charged on monthly rest basis reckoned from the date of release thereof. If for any reason, the payment due is insufficient to recover the full interest and principal together, interest shall be credited/recovered first and the residual applied to the principal. However, in case, full interest itself cannot be recovered, the balance amount of unrecovered interest shall also carry the same interest rate as specified in Sr. no. (i) under "Appendix-1 for Terms and Procedures of payment.

However, EIC is entitled to recover the advance payment along with due interest from due payments of contractors or by encashment of bank guarantee in case, contractor fails to supply the material within the time limit provided in the Contract Agreement or Supplementary Agreement/s or fails to take delivery of material within the time allowed in the condition 1 b) above.

The Contractor shall always have the option to limit the drawl of advance to the extent desired and to have the recoveries commenced and/or completed earlier and/or have recoveries effected in instalments of higher amounts and also to repay part or whole of the advance by direct payment rather than through Interim Payment Certificates/RA bills.

3) Should there arise any occasion under the Contract due to which the periods of validities of Bank Guarantees as may have been furnished by the

Contractor from time to time, are required to be extended/renewed, the Contractor shall at his cost get the validity periods of such guarantees extended/renewed, and furnish these to the Engineer in charge one month before the expiry date of the aforesaid Guarantees originally furnished; failing which the existing Bank Guarantees shall be invoked by the Engineer in charge.

If the advance payment has not been repaid prior to the issue of the Operational Acceptance Certificate for the Works or prior to termination under GC Clause 42 [Termination], GC Clause 41[Suspension], GC Clause 37 [Force Majeure] or GC Clause 38 [War Risk] (as the case may be), the whole of the balance then outstanding shall immediately become due and payable by the Contractor to the Employer.

4) The responsibility to procure the material at reasonable rates rests with the contractor and the rates of material shall not have any reference or can not be used for any reference in respect to other contract provisions.

5) The Contractor shall open a Dedicated Bank account to be operated jointly by SAPDC and Contractor, for the Works of the Project and all payments to Contractor shall be released to said dedicated Bank account only. The payment released to the Contractor against this Contract shall be solely utilized for the Works and shall not be diverted for any other purpose. A certificate along with each bill shall be submitted by Contractor to the effect that the payment receipts from the Contract have been utilized for the project works alone.

Performa for Bank Guarantee as attached herewith-Annex-9

13. Securities 13.1 Issuance of Securities

The Contractor shall provide the securities specified below in favor of the Employer at the times, and in the

amount, manner and form specified below.

13.2 Advance Payment Security

13.2.1 The Contractor shall, within twenty-eight (28) days of the issuance of Letter of Acceptance, provide a security in an amount equal to 1.2 times the advance payment calculated in accordance with the Appendix to the Contract Agreement titled Terms and Procedures of Payment, and in the same currency.

13.2.2 The security shall be in the form provided in the bidding documents or in another form acceptable to the Employer. The amount of the security shall be reduced in proportion to the value of the Facilities executed by and paid to the Contractor from time to time, and shall automatically become null and void when the full amount of the advance payment has been recovered by the Employer. The security shall be returned to the Contractor immediately after its expiration.

13.3 Performance Security

13.3.1 The Contractor shall, within twenty-eight (28) days of the issuance of Letter of Acceptance, provide a security for the due performance of the Contract for an amount equivalent to 3% of the Contract Price in currency of the bid with validity upto 60 days beyond the Defects Liability Period.

13.3.2 The performance security shall be denominated in the currency or currencies of the Contract, or in a freely convertible currency acceptable to the Employer, and shall be in the form provided in Contract Forms, corresponding to the type of bank guarantee stipulated by the Employer, or in another form acceptable to the Employer. The Performance Security of a joint venture shall be in the name of individual partner of Joint Venture in proportion of its participation share. The performance bank guarantee shall be issued by any "A" class Bank in Nepal for the amounts expressed in Nepalese Rupees (NPR). The Bank Guarantees in INR shall be acceptable only if these are issued by a Scheduled Bank of India duly counter guaranteed by any A class Bank in Nepal.

Without limitation to the provisions of the preceding paragraph, whenever the EIC determines an addition to the Accepted Contract Amount as a result of a change in cost and/or legislation or as a result of a variation amounting to more than 25 percent of the Accepted Contract Amount, the Contractor, at the EIC's written request, shall promptly increase the value of the performance security by an equal percentage. In case of Joint Venture, the value of performance bank guarantee shall be got enhanced by individual partners of JV in the proportion of their participation share.

13.3.3 Unless otherwise specified, the security shall be reduced by half on the date of the Operational Acceptance. The Security shall become null and void, or shall be reduced pro rata to the Contract Price of a part of the Facilities for which a separate Time for Completion is provided, four hundred twenty five (425) days after Completion of the Facilities or three hundred and sixty five (365) days after Operational Acceptance of the Facilities, whichever occurs first; provided, however, that if the Defects Liability Period has been extended on any part of the Facilities pursuant to GC Sub-Clause 27.8 hereof, the Contractor shall issue an additional security in an amount proportionate to the Contract Price of that part. The security shall be returned to the Contractor immediately after its expiration, provided, however, that if the Contractor, pursuant to GC Sub-Clause 27.10, is liable for an extended defect liability obligation, the performance security shall be extended 60 days beyond the Defects Liability Period pursuant to GC Sub-Clause 27.10 and up to the amount 3%.

13.3.4 The Employer shall not make a claim under the Performance Security, except for amounts to which the Employer is entitled under the Contract. The Employer shall indemnify and hold the Contractor harmless against and from all damages, losses and expenses (including legal fees and expenses) resulting from a claim under the Performance Security to the extent to which

the Employer was not entitled to make the claim.

13.4 In case, the Contractor is a Subsidiary Company, the parent/holding company will be required to furnish an additional performance bank guarantee of value equivalent to 3% percent of the Contract Price or portion of work (where the subsidiary company is Joint Venture Partner) as the case may be in the types and proportions of currencies in which the Contract Price is payable, in addition to normal performance bank guarantee to be submitted by the Contractor to the Employer besides entering into a separate Agreement (in the requisite format included in Bid Document).

The Contractor within one hundred twenty (120) days of issue of Letter of Acceptance shall provide an additional security for Manufacturer's performance from his Manufacturer, on whose basis qualifying requirements have been met, if required, under the Contract. The Performance Security shall be in the form of a bank guarantee, as stipulated by the Employer in the Bidding Documents. The Performance Security shall be denominated in the types and proportions of currencies in which the Contract Price is payable. The performance bank guarantee for the amounts expressed in Nepalese Rupees shall be issued by any "A" class Bank in Nepal. The Bank Guarantees in INR shall be acceptable only if these are issued by a Scheduled Bank of India duly counter guaranteed by any A class Bank in Nepal.

The additional performance bank guarantee provided by parent company and/or Manufacturer shall be valid till completion of the part of the Facilities executed by the Manufacturer.

14. Taxes and Duties

14.1 The Contractor shall bear and pay all taxes, duties, levies and charges assessed on the Contractor, its Subcontractors or their employees by all municipal, state or national government authorities in connection with the Facilities in and outside of the country where the Site is located.

The quoted bid price (both Supply and Service portion) shall include all duties, taxes etc. The details of loading

of Taxes in the bid shall be provided under Data Sheet-6, to adjust the Change in Laws and regulations regarding taxes if required in future.

14.2 *Deleted without change in serial no.*

14.3 If any tax exemptions, reductions, allowances or privileges may be available to the Contractor in the country where the Site is located, the Employer shall use its best endeavors to enable the Contractor to benefit from any such tax savings to the maximum allowable extent.

14.4 For the purpose of the Contract, it is agreed that the Contract Price specified in Article 2 (Contract Price and Terms of Payment) of the Contract Agreement is based on the taxes, duties, levies and charges prevailing at the date twenty-eight (28) days prior to the date of bid submission in the country where the Site is located (hereinafter called "Tax" in this GC Sub-Clause 14.4). If any rates of Tax are increased or decreased, a new Tax is introduced, an existing Tax is abolished, or any change in interpretation or application of any Tax occurs in the course of the performance of Contract, which was or will be assessed on the Contractor, in connection with performance of the Contract, an equitable adjustment of the Contract Price shall be made to fully take into account any such change by addition to the Contract Price or deduction therefrom, as the case may be, in accordance with GC Clause 36 hereof.

Intellectual Property

15. License/Use of Technical Information

15.1 For the operation and maintenance of the Plant, the Contractor hereby grants a non-exclusive and non-transferable license (without the right to sub-license) to the Employer under the patents, utility models or other industrial property rights owned by the Contractor or by a third Party from whom the Contractor has received the right to grant licenses thereunder, and shall also grant to the Employer a non-exclusive and non-transferable right (without the right to sub-license) to use the know-how and other technical information disclosed to the Employer under the Contract. Nothing contained herein shall be

construed as transferring ownership of any patent, utility model, trademark, design, copyright, know-how or other intellectual property right from the Contractor or any third Party to the Employer.

15.2 The copyright in all drawings, documents and other materials containing data and information furnished to the Employer by the Contractor herein shall remain vested in the Contractor or, if they are furnished to the Employer directly or through the Contractor by any third Party, including suppliers of materials, the copyright in such materials shall remain vested in such third Party.

16. Confidential Information

16.1 The Employer and the Contractor shall keep confidential and shall not, without the written consent of the other Party hereto, divulge to any third Party any documents, data or other information furnished directly or indirectly by the other Party hereto in connection with the Contract, whether such information has been furnished prior to, during or following termination of the Contract. Notwithstanding the above, the Contractor may furnish to its Subcontractor(s) such documents, data and other information it receives from the Employer to the extent required for the Subcontractor(s) to perform its work under the Contract, in which event the Contractor shall obtain from such Subcontractor(s) an undertaking of confidentiality similar to that imposed on the Contractor under this GC Clause 16.

16.2 The Employer shall not use such documents, data and other information received from the Contractor for any purpose other than the operation and maintenance of the Facilities. Similarly, the Contractor shall not use such documents, data and other information received from the Employer for any purpose other than the design, procurement of Plant, construction or such other work and services as are required for the performance of the Contract.

16.3 The obligation of a Party under GC Sub-Clauses 16.1 and 16.2 above, however, shall not apply to

that information which

- (a) now or hereafter enters the public domain through no fault of that Party
- (b) can be proven to have been possessed by that Party at the time of disclosure and which was not previously obtained, directly or indirectly, from the other Party hereto
- (c) otherwise lawfully becomes available to that Party from a third Party that has no obligation of confidentiality.

16.4 The above provisions of this GC Clause 16 shall not in any way modify any undertaking of confidentiality given by either of the Parties hereto prior to the date of the Contract in respect of the Facilities or any part thereof.

16.5 The provisions of this GC Clause 16 shall survive termination, for whatever reason, of the Contract.

Execution of the Facilities

17. Representatives 17.1 EIC

If the EIC is not named in the Contract, then within fourteen (14) days of the Effective Date, the Employer shall appoint and notify the Contractor in writing of the name of the EIC. The Employer may from time to time appoint some other person as the EIC in place of the person previously so appointed, and shall give a notice of the name of such other person to the Contractor without delay. No such appointment shall be made at such a time or in such a manner as to impede the progress of work on the Facilities. Such appointment shall only take effect upon receipt of such notice by the Contractor. The EIC shall represent and act for the Employer at all times during the performance of the Contract. All notices, instructions, orders, certificates, approvals and all other communications under the Contract shall be given by the EIC, except as herein otherwise provided.

All notices, instructions, information and other communications given by the Contractor to the Employer under the Contract shall be given to the

EIC, except as herein otherwise provided.

17.2 Contractor's Representative & Construction Manager

17.2.1 If the Contractor's Representative is not named in the Contract, then within fourteen (14) days of the Effective Date, the Contractor shall appoint the Contractor's Representative and shall request the Employer in writing to approve the person so appointed. If the Employer makes no objection to the appointment within fourteen (14) days, the Contractor's Representative shall be deemed to have been approved. If the Employer objects to the appointment within fourteen (14) days giving the reason therefor, then the Contractor shall appoint a replacement within fourteen (14) days of such objection, and the foregoing provisions of this GC Sub-Clause 17.2.1 shall apply thereto.

17.2.2 The Contractor's Representative shall represent and act for the Contractor at all times during the performance of the Contract and shall give to the EIC all the Contractor's notices, instructions, information and all other communications under the Contract.

All notices, instructions, information and all other communications given by the Employer or the EIC to the Contractor under the Contract shall be given to the Contractor's Representative or, in its absence, its deputy, except as herein otherwise provided.

The Contractor shall not revoke the appointment of the Contractor's Representative without the Employer's prior written consent, which shall not be unreasonably withheld. If the Employer consents thereto, the Contractor shall appoint some other person as the Contractor's Representative, pursuant to the procedure set out in GC Sub-Clause 17.2.1.

17.2.3 The Contractor's Representative may, subject to the approval of the Employer which

shall not be unreasonably withheld, at any time delegate to any person any of the powers, functions and authorities vested in him or her. Any such delegation may be revoked at any time. Any such delegation or revocation shall be subject to a prior notice signed by the Contractor's Representative, and shall specify the powers, functions and authorities thereby delegated or revoked. No such delegation or revocation shall take effect unless and until a copy thereof has been delivered to the Employer and the EIC.

Any act or exercise by any person of powers, functions and authorities so delegated to him or her in accordance with this GC Sub-Clause 17.2.3 shall be deemed to be an act or exercise by the Contractor's Representative.

17.2.4 From the commencement of installation of the Facilities at the Site until Completion, the Contractor's Representative shall appoint a suitable person as the Construction Manager. The Construction Manager shall supervise all work done at the Site by the Contractor and shall be present at the Site throughout normal working hours except when on leave, sick or absent for reasons connected with the proper performance of the Contract. Whenever the Construction Manager is absent from the Site, a suitable person shall be appointed to act as the Construction Manager's deputy.

17.2.5 The Employer may by notice to the Contractor object to any representative or person employed by the Contractor in the execution of the Contract who, in the reasonable opinion of the Employer, may behave inappropriately, may be incompetent or negligent, or may commit a serious breach of the Site regulations provided under GC Sub-Clause 22.3. The Contractor shall remove such person from the Facilities upon such instructions being given by the Employer. 17.2.6 If any representative or person employed by the Contractor is removed in accordance with GC Sub-Clause 17.2.5, the Contractor shall, where required, promptly appoint a replacement.

18. Work Program 18.1 Contractor's Organization

The Contractor shall supply to the Employer and the EIC a chart showing the proposed organization to be established by the Contractor for carrying out work on the Facilities within twenty-one (21) days of the Effective Date. The chart shall include the identities of the key personnel and the curricula vitae of such key personnel to be employed shall be supplied together with the chart. The Contractor shall promptly inform the Employer and the EIC in writing of any revision or alteration of such an organization chart.

18.2 Program of Performance

Within twenty-eight (28) days after the Effective Date, the Contractor shall submit to the EIC a detailed program of performance of the Contract, made in a form acceptable to the EIC and showing the sequence in which it proposes to design, manufacture, transport, assemble, install and pre-commission the Facilities, as well as the date by which the Contractor reasonably requires that the Employer shall have fulfilled its obligations under the Contract so as to enable the Contractor to execute the Contract in accordance with the program and to achieve Completion, Commissioning and Acceptance of the Facilities in accordance with the Contract. The program so submitted by the Contractor shall accord with the Time Schedule included in the Appendix to the Contract Agreement titled Time Schedule, and any other dates and periods specified in the Contract. The Contractor shall update and revise the program as and when appropriate or when required by the EIC, but without modification in the Times for Completion and any extension granted in accordance with GC Clause 40, and shall submit all such revisions to the EIC.

18.3 Progress Report

The Contractor shall monitor progress of all the activities specified in the program referred to in GC Sub-Clause 18.2 above, and supply a progress report to the EIC before the 7th day of each calendar month.

The progress report shall be in a form acceptable to the EIC and shall indicate: (a) percentage

completion achieved compared with the planned percentage completion for each activity; and (b) where any activity is behind the program, giving comments and likely consequences and stating the corrective action being taken.

18.4 Progress of Performance

If at any time the Contractor's actual progress falls behind the program referred to in GC Sub-Clause 18.2, or it becomes apparent that it will so fall behind, the Contractor shall, at the request of the Employer or the EIC, prepare and submit to the EIC a revised program, taking into account the prevailing circumstances, and shall notify the EIC of the steps being taken to expedite progress so as to attain Completion of the Facilities within the Time for Completion under GC Sub-Clause 8.2, any extension thereof entitled under GC Sub-Clause 40.1, or any extended period as may otherwise be agreed upon between the Employer and the Contractor.

18.5 Procedures

The Contract shall be executed in accordance with the Contract Documents including the procedures given in the Forms and Procedures of the Employer's Requirements.

The Contractor may execute the Contract in accordance with its own standard project execution plans and procedures to the extent that they do not conflict with the provisions contained in the Contract.

19. Subcontracting

19.1 The Appendix to the Contract Agreement titled List of suppliers for Major Items of Plant Installation Services specifies major items of supply or services along with list of Subcontractors/manufacturers.

19.2 The Contractor shall select and employ its Subcontractors/manufacturers for such major items from those listed in the lists referred to in GC Sub-Clause 19.1.

19.3 For Make/supplier not specified in the Appendix-5, the Contractor may employ such Subcontractors/manufacturers in following

manner: -

The bidder may propose Make/supplier for major/minor items of Plant, installation services in the technical bid alongwith credentials, the same may be considered with the approval of Employer. Post award stage additional manufacturer(s) will be added with justification by the Contractor with the approval of Employer.

19.4 Each sub-contract shall include provisions which would entitle the Employer to require the sub-contract to be assigned to the Employer under GC 19.5 (if and when applicable), or in event of termination by the Employer under GC 42.2.

19.5 If a sub-contractor's obligations extend beyond the expiry date of the relevant Defects Liability Period and the EIC, prior to that date, instructs the Contractor to assign the benefits of such obligations to the Employer, then the Contractor shall do so.

20. Design and Engineering

20.1 Specifications and Drawings

20.1.1 The Contractor shall execute the basic and detailed design and the engineering work in compliance with the provisions of the Contract, or where not so specified, in accordance with good engineering practice.

The Contractor shall be responsible for any discrepancies, errors or omissions in the specifications, drawings and other technical documents that it has prepared, whether such specifications, drawings and other documents have been approved by the EIC or not, provided that such discrepancies, errors or omissions are not because of inaccurate information furnished in writing to the Contractor by or on behalf of the Employer.

20.1.2 The Contractor shall be entitled to disclaim responsibility for any design, data, drawing, specification or other document, or any modification thereof provided or designated by or on behalf of the Employer, by giving a notice of such disclaimer to the EIC.

20.2 Codes and Standards

Wherever references are made in the Contract to codes and standards in accordance with which the Contract shall be executed, the edition or the revised version of such codes and standards current at the date twenty-eight (28) days prior to date of bid submission shall apply unless otherwise specified. During Contract execution, any changes in such codes and standards shall be applied subject to approval by the Employer and shall be treated in accordance with GC Clause 39.

20.3 Review/Approval of Technical Documents by EIC

20.3.1 The Contractor shall prepare or cause its Subcontractors to prepare, and furnish to the EIC the documents listed in the Appendix to the Contract Agreement titled List of Documents for review, as specified and in accordance with the requirements of GC Sub-Clause 18.2 (Program of Performance).

Any part of the Facilities covered by or related to the documents to be reviewed by the EIC shall be executed only after the EIC's review thereof.

GC Sub-Clauses 20.3.2 through 20.3.7 shall apply to those documents requiring the EIC's review.

20.3.2 Within thirty (30) days after receipt by the EIC of any document requiring the EIC's approval in accordance with GC Sub-Clause 20.3.1, the EIC shall either return one copy thereof to the Contractor with its views endorsed thereon or shall notify the Contractor in writing of its disapproval thereof and the reasons therefor and the modifications that the EIC proposes.

Should the Employer not give its comments within the said period of thirty (30) days, Contractor shall serve notice on the Employer to this effect and the Employer shall give its comments within seven (07) days from receipt of such notice. In case such approval/comment is not communicated within seven (07) days,

submittals of the Contractor shall be deemed to have been approved.

20.3.3 The EIC shall not disapprove any document, except on the grounds that the document does not comply with the Contract or that it is contrary to good engineering practice.

20.3.4 If the EIC disapproves the document, the Contractor shall modify the document and resubmit it for the EIC's approval in accordance with GC Sub-Clause 20.3.2. If the EIC approves the document subject to modification(s), the Contractor shall make the required modification(s), whereupon the document shall be deemed to have been approved.

20.3.5 If any dispute or difference occurs between the Employer and the Contractor in connection with or arising out of the disapproval by the EIC of any document and/or any modification(s) thereto that cannot be settled between the Parties within a reasonable period, then such dispute or difference may be referred to Adjudicator in accordance with GC Sub-Clause 46.1 hereof. If such dispute or difference is referred to Adjudicator, the EIC shall give instructions as to whether and if so, how, performance of the Contract is to proceed. The Contractor shall proceed with the Contract in accordance with the EIC's instructions, provided that if the Adjudicator upholds the Contractor's view on the dispute and if the Employer has not given notice under GC Sub-Clause 46.3 hereof, then the Contractor shall be reimbursed by the Employer for any additional costs incurred by reason of such instructions and shall be relieved of such responsibility or liability in connection with the dispute and the execution of the instructions as the Adjudicator shall decide, and the Time for Completion shall be extended accordingly.

20.3.6 The EIC's approval, with or without

modification of the document furnished by the Contractor, shall not relieve the Contractor of any responsibility or liability imposed upon it by any provisions of the Contract.

20.3.7 The Contractor shall not depart from any approved document unless the Contractor has first submitted to the EIC an amended document and obtained the EIC's approval thereof, pursuant to the provisions of this GC Sub-Clause 20.3.

If the EIC requests any change in any already approved document and/or in any document based thereon, the provisions of GC Clause 39 shall apply to such request.

21. Procurement

21.1 Plant

Subject to GC Sub-Clause 14.2, the Contractor shall procure and transport all Plant in an expeditious and orderly manner to the Site.

21.2 Employer-Supplied Plant

If the Appendix to the Contract Agreement titled Scope of Works and Supply by the Employer, provides that the Employer shall furnish any specific items to the Contractor, the following provisions shall apply:

21.2.1 The Employer shall, at its own risk and expense, transport each item to the place on or near the Site as agreed upon by the Parties and make such item available to the Contractor at the time specified in the program furnished by the Contractor, pursuant to GC Sub-Clause 18.2, unless otherwise mutually agreed.

21.2.2 Upon receipt of such item, the Contractor shall inspect the same visually and notify the EIC of any detected shortage, defect or default. The Employer shall immediately remedy any shortage, defect or default, or the Contractor shall, if practicable and possible, at the request of the Employer, remedy such shortage, defect or default at the Employer's cost and expense. After inspection, such item shall fall under the care,

custody and control of the Contractor. The provision of this GC Sub-Clause 21.2.2 shall apply to any item supplied to remedy any such shortage or default or to substitute for any defective item, or shall apply to defective items that have been repaired.

21.2.3 The foregoing responsibilities of the Contractor and its obligations of care, custody and control shall not relieve the Employer of liability for any undetected shortage, defect or default, nor place the Contractor under any liability for any such shortage, defect or default whether under GC Clause 27 or under any other provision of Contract.

21.3 Transportation

21.3.1 The Contractor shall at its own risk and expense transport all the materials and the Contractor's Equipment to the Site by the mode of transport that the Contractor judges most suitable under all the circumstances.

21.3.2 Unless otherwise provided in the Contract, the Contractor shall be entitled to select any safe mode of transport operated by any person to carry the materials and the Contractor's Equipment.

21.3.3 Upon dispatch of each shipment of materials and the Contractor's Equipment, the Contractor shall notify the Employer by facsimile or electronic means, of the description of the materials and of the Contractor's Equipment, the point and means of dispatch, and the estimated time and point of arrival in the country where the Site is located, if applicable, and at the Site. The Contractor shall furnish the Employer with relevant shipping documents to be agreed upon between the Parties.

21.3.4 The Contractor shall be responsible for obtaining, if necessary, approvals from the authorities for transportation of the materials and the Contractor's Equipment to the Site. The Employer shall use its best endeavors in a timely and expeditious manner to assist

the Contractor in obtaining such approvals, if requested by the Contractor. The Contractor shall indemnify and hold harmless the Employer from and against any claim for damage to roads, bridges or any other traffic facilities that may be caused by the transport of the materials and the Contractor's Equipment to the Site.

21.4 Customs Clearance

The Contractor shall, at its own expense, handle all imported materials and Contractor's Equipment at the point(s) of import and shall handle any formalities for customs clearance, subject to the Employer's obligations under GC Sub-Clause 14.2, provided that if applicable laws or regulations require any application or act to be made by or in the name of the Employer, the Employer shall take all necessary steps to comply with such laws or regulations. In the event of delays in customs clearance that are not the fault of the Contractor, the Contractor shall be entitled to an extension in the Time for Completion, pursuant to GC Clause 40.

22. Installation

22.1 Setting Out/Supervision

22.1.1 Bench Mark: The Contractor shall be responsible for the true and proper setting-out of the Facilities in relation to bench marks, reference marks and lines provided to it in writing by or on behalf of the Employer.

If, at any time during the progress of installation of the Facilities, any error shall appear in the position, level or alignment of the Facilities, the Contractor shall forthwith notify the EIC of such error and, at its own expense, immediately rectify such error to the reasonable satisfaction of the EIC. If such error is based on incorrect data provided in writing by or on behalf of the Employer, the expense of rectifying the same shall be borne by the Employer.

22.1.2 Contractor's Supervision: The Contractor shall give or provide all necessary

superintendence during the installation of the Facilities, and the Construction Manager or its deputy shall be constantly on the Site to provide full-time superintendence of the installation. The Contractor shall provide and employ only technical personnel who are skilled and experienced in their respective callings and supervisory staff who are competent to adequately supervise the work at hand.

22.2 Labour:

22.2.1 Engagement of Staff and Labour

Except as otherwise stated in the Specification, the Contractor shall make arrangements for the engagement of all staff and labor, local or otherwise, and for their payment, housing, feeding and transport.

The Contractor shall provide and employ on the Site in the installation of the Facilities such skilled, semi-skilled and unskilled labor as is necessary for the proper and timely execution of the Contract. The Contractor is encouraged to use local labor that has the necessary skills.

The Contractor shall be responsible for obtaining all necessary permit(s) and/or visa(s) from the appropriate authorities for the entry of all labor and personnel to be employed on the Site into the country where the Site is located. The Employer will, if requested by the Contractor, use his best endeavors in a timely and expeditious manner to assist the Contractor in obtaining any local, state, national or government permission required for bringing in the Contractor's personnel.

The Contractor shall at its own expense provide the means of repatriation to all of its and its Subcontractor's personnel employed on the Contract at the Site to the place where they were recruited or to their domicile. It shall also provide suitable temporary maintenance of all such persons

from the cessation of their employment on the Contract to the date programmed for their departure. In the event that the Contractor defaults in providing such means of transportation and temporary maintenance, the Employer may provide the same to such personnel and recover the cost of doing so from the Contractor.

22.2.2 Persons in the Service of Employer

The Contractor shall not recruit, or attempt to recruit, staff and labour from amongst the Employer's Personnel.

22.2.3 Labour Laws

During continuance of the Contract, the Contractor and his sub-contractor(s) shall abide at all times by all existing labour enactments and rules made there under, regulations, notifications and bye laws of State or Central Government or local authority and any other labour law (including rules), regulations, bye laws that may be passed or notification that may be issued under any labour law in future either by the State or the Central Government or the local authority of the country where the Site is located. The Contractor shall also comply with the Laws relating to their employment, health, safety, welfare, immigration, and shall allow them all their legal rights of the country where the Site is located. The Contractor shall keep the Employer indemnified in case any action is taken against the Employer by the competent authority on account of contravention by the Contractor of any of the provisions of any Act or rules made thereunder, regulations or notifications including amendments. If the Employer is caused to pay or reimburse, such amounts as may be necessary to cause or observe, or for non-observance of the provisions stipulated in the notifications/bye laws/acts/rules/regulations including amendments, if any, on the part of the Contractor, the Employer shall also have right to recover from the Contractor any sum

required or estimated to be required for making good the loss or damage suffered by the Employer.

The employees of the Contractor and his sub-contractor in no case shall be treated as the employees of the Employer at any point of time.

Salient features of some of the major labour laws that are applicable to construction industry are given below.

Applicable laws of Nepal:

- a. The Labour Act, 2017 (2074)
- b. Human Right Commission Act, 1997 (2053)
- c. Contract Act, 2000 (2056)
- d. Trade Union Act (2049)
- e. Labour and employment policy (2062)
- f. Beema Act (2049)
- g. Bonus Act (2030)
- h. Labour Regulation, 2050

The compliance of all the above mentioned Acts shall be read alongwith the latest amendments of the respective Acts and the new Acts also.

The Contractor shall require his employees to obey all applicable Laws, including those concerning safety at work.

Provided always that the Contractor shall have no right to demand payments/claims whatsoever on account of his compliance with his obligations under this clause and Labour Regulation.

The Contractor shall at all times during the progress of the Contract use its best endeavors to prevent any unlawful, riotous or disorderly conduct or behavior by or amongst its employees and the labor of its Subcontractors.

The Contractor shall, in all dealings with its labour and the labour of its Subcontractors currently employed on or connected with the Contract, pay due regard to all recognized festivals, official holidays, religious or other customs and all local laws and regulations

pertaining to the employment of labor.

22.2.4 Rates of Wages and Conditions of Labor

The Contractor shall pay rates of wages, and observe conditions of labor, which are not lower than those established for the trade or industry where the work is carried out. If no established rates or conditions are applicable, the Contractor shall pay rates of wages and observe conditions which are not lower than the general level of wages and conditions observed locally by employers whose trade or industry is similar to that of the Contractor.

The Contractor shall inform the Contractor's Personnel about their liability to pay personal income taxes in the Country in respect of such of their salaries, wages and allowances as are chargeable under the Laws for the time being in force, and the Contractor shall perform such duties in regard to such deductions thereof as may be imposed on him by such Laws.

22.2.5 Working Hours

Subject to any provision to the contrary contained in the Contract, the Contractor shall have the option to work continuously by day and by night and on locally recognized holidays or days of rest, without any additional cost to the Employer.

22.2.6 Facilities for Staff and Labor

Except as otherwise stated in the Specification, the Contractor shall provide and maintain all necessary accommodation and welfare facilities for the Contractor's Personnel. The Contractor shall also provide facilities for the Employer's Personnel as stated in the Specification.

The Contractor shall not permit any of the Contractor's Personnel to maintain any temporary or permanent living quarters within the structures forming part of the

Permanent Works.

22.2.7 Health and Safety

The Contractor shall at all times take all reasonable precautions to maintain the health and safety of the Contractor's Personnel. In collaboration with local health authorities, the Contractor shall ensure that medical staff, first aid facilities, sick bay and ambulance service are available at all times at the Site and at any accommodation for Contractor's and Employer's Personnel, and that suitable arrangements are made for all necessary welfare and hygiene requirements and for the prevention of epidemics.

The Contractor shall appoint an accident prevention officer at the Site, responsible for maintaining safety and protection against accidents. This person shall be qualified for this responsibility, and shall have the authority to issue instructions and take protective measures to prevent accidents. Throughout the performance of the Contract, the Contractor shall provide whatever is required by this person to exercise this responsibility and authority.

The Contractor shall send to the EIC, details of any accident as soon as practicable after its occurrence. The Contractor shall maintain records and make reports concerning health, safety and welfare of persons, and damage to property, as the EIC may reasonably require.

The Contractor shall throughout the contract (including the Defects Notification Period): (i) conduct Information, Education and Consultation Communication (IEC) campaigns, at least every other month, addressed to all the Site staff and labor (including all the Contractor's employees, all Sub-Contractors and Employer's and EIC's employees, and all truck drivers and crew making deliveries to Site for construction activities) and to the immediate local communities, concerning the risks, dangers and impact, and appropriate avoidance

behavior with respect to of Sexually Transmitted Diseases (STD)—or Sexually Transmitted Infections (STI) in general and HIV/AIDS in particular; (ii) provide male or female condoms for all Site staff and labor as appropriate; and (iii) provide for STI and HIV/AIDS screening, diagnosis, counseling and referral to a dedicated national STI and HIV/AIDS program, (unless otherwise agreed) of all Site staff and labor.

The Contractor shall include in the program to be submitted for the execution of the Facilities under Sub-Clause 18.2 an alleviation program for Site staff and labor and their families in respect of Sexually Transmitted Infections (STI) and Sexually Transmitted Diseases (STD) including HIV/AIDS. The STI, STD and HIV/AIDS alleviation program shall indicate when, how and at what cost the Contractor plans to satisfy the requirements of this Sub-Clause and the related specification. For each component, the program shall detail the resources to be provided or utilized and any related sub-contracting proposed. The program shall also include provision of a detailed cost estimate with supporting documentation.

22.2.8 Funeral Arrangements

In the event of the death of any of the Contractor's personnel or accompanying members of their families, the Contractor shall be responsible for making the appropriate arrangements for their return or burial.

22.2.9 Records of Contractor's Personnel

The Contractor shall keep accurate records of the Contractor's personnel, including the number of each class of Contractor's Personnel on the Site and the names, ages, genders, hours worked and wages paid to all workers. These records shall be summarized on a monthly basis in a form approved by the EIC and shall be available for inspection by the EIC until the Contractor has

completed all work.

22.2.10 Supply of Foodstuffs

The Contractor shall arrange for the provision of a sufficient supply of suitable food as may be stated in the Specification at reasonable prices for the Contractor's Personnel for the purposes of or in connection with the Contract.

22.2.11 Supply of Water

The Contractor shall, having regard to local conditions, provide on the Site an adequate supply of drinking and other water for the use of the Contractor's Personnel.

22.2.12 Measures against Insect and Pest Nuisance

The Contractor shall at all times take the necessary precautions to protect the Contractor's Personnel employed on the Site from insect and pest nuisance, and to reduce their danger to health. The Contractor shall comply with all the regulations of the local health authorities, including use of appropriate insecticide.

22.2.13 Alcoholic Liquor or Drugs

The Contractor shall not, otherwise than in accordance with the Laws of the Country, import, sell, give barter or otherwise dispose of any alcoholic liquor or drugs, or permit or allow importation, sale, gift barter or disposal by Contractor's Personnel.

22.2.14 Arms and Ammunition

The Contractor shall not give, barter, or otherwise dispose of, to any person, any arms or ammunition of any kind, or allow Contractor's Personnel to do so.

22.2.15 Prohibition of All Forms of Forced or Compulsory Labor

The contractor shall not employ "forced or compulsory labor" in any form. "Forced or

compulsory labor” consists of all work or service, not voluntarily performed, that is extracted from an individual under threat of force or penalty.

22.2.16 Prohibition of Harmful Child Labor

The Contractor shall not employ any child to perform any work that is economically exploitative, or is likely to be hazardous to, or to interfere with, the child's education, or to be harmful to the child's health or physical, mental, spiritual, moral, or social development.

22.3 Contractor's Equipment

22.3.1 All Contractor's Equipment brought by the Contractor onto the Site shall be deemed to be intended to be used exclusively for the execution of the Contract. The Contractor shall not remove the same from the Site without the EIC's consent that such Contractor's Equipment is no longer required for the execution of the Contract.

22.3.2 Unless otherwise specified in the Contract, upon completion of the Facilities, the Contractor shall remove from the Site all Equipment brought by the Contractor onto the Site and any surplus materials remaining thereon.

22.3.3 The Employer will, if requested, use its best endeavors to assist the Contractor in obtaining any local, state or national government permission required by the Contractor for the export of the Contractor's Equipment imported by the Contractor for use in the execution of the Contract that is no longer required for the execution of the Contract.

22.4 Site Regulations and Safety

The Employer and the Contractor shall establish Site regulations setting out the rules to be observed in the execution of the Contract at the Site and shall comply therewith. The Contractor shall prepare and submit to the Employer, with a

copy to the EIC, proposed Site regulations for the Employer's approval, which approval shall not be unreasonably withheld.

Such Site regulations shall include, but shall not be limited to, rules in respect of security, safety of the Facilities, gate control, sanitation, medical care, and fire prevention.

22.5 Opportunities for Other Contractors

22.5.1 The Contractor shall, upon written request from the Employer or the EIC, give all reasonable opportunities for carrying out the work to any other contractors employed by the Employer on or near the Site.

22.5.2 If the Contractor, upon written request from the Employer or the EIC, makes available to other contractors any roads or ways the maintenance for which the Contractor is responsible, permits the use by such other contractors of the Contractor's Equipment, or provides any other service of whatsoever nature for such other contractors, the Employer shall fully compensate the Contractor for any loss or damage caused or occasioned by such other contractors in respect of any such use or service, and shall pay to the Contractor reasonable remuneration for the use of such equipment or the provision of such services.

22.5.3 The Contractor shall also so arrange to perform its work as to minimize, to the extent possible, interference with the work of other contractors. The EIC shall determine the resolution of any difference or conflict that may arise between the Contractor and other contractors and the workers of the Employer in regard to their work.

22.5.4 The Contractor shall notify the EIC promptly of any defects in the other contractors' work that come to its notice, and that could affect the Contractor's work. The EIC shall determine the corrective measures, if any, required to rectify the

situation after inspection of the Facilities. Decisions made by the EIC shall be binding on the Contractor.

22.6 Emergency Work

If, by reason of an emergency arising in connection with and during the execution of the Contract, any protective or remedial work is necessary as a matter of urgency to prevent damage to the Facilities, the Contractor shall immediately carry out such work.

If the Contractor is unable or unwilling to do such work immediately, the Employer may do or cause such work to be done as the Employer may determine is necessary in order to prevent damage to the Facilities. In such event the Employer shall, as soon as practicable after the occurrence of any such emergency, notify the Contractor in writing of such emergency, the work done and the reasons therefor. If the work done or caused to be done by the Employer is work that the Contractor was liable to do at its own expense under the Contract, the reasonable costs incurred by the Employer in connection therewith shall be paid by the Contractor to the Employer. Otherwise, the cost of such remedial work shall be borne by the Employer.

22.7 Site Clearance

22.7.1 Site Clearance in Course of Performance:

In the course of carrying out the Contract, the Contractor shall keep the Site reasonably free from all unnecessary obstruction, store or remove any surplus materials, clear away any wreckage, rubbish or temporary works from the Site, and remove any Contractor's Equipment no longer required for execution of the Contract.

22.7.2 Clearance of Site after Completion: After Completion of all parts of the Facilities, the Contractor shall clear away and remove all wreckage, rubbish and debris of any kind from the Site, and shall leave the Site and Facilities in a clean and safe condition.

22.8 Watching and Lighting

The Contractor shall provide and maintain at its own expense all lighting, fencing, and watching when and where necessary for the proper execution and the protection of the Facilities, or for the safety of the owners and occupiers of adjacent property and for the safety of the public.

23. Test and Inspection

23.1 The Contractor shall at its own expense carry out at the place of manufacture and/or on the Site all such tests and/or inspections of the Plant and any part of the Facilities as are specified in the Contract.

23.2 The Employer and the EIC or their designated representatives shall be entitled to attend the aforesaid test and/or inspection, provided that the Employer shall bear all costs and expenses incurred in connection with such attendance including, but not limited to, all traveling and board and lodging expenses.

23.3 Whenever the Contractor is ready to carry out any such test and/or inspection, the Contractor shall give at least twenty-one (21) days period advance notice of such test and/or inspection and of the place and time thereof to the EIC. The Contractor shall obtain from any relevant third Party or manufacturer any necessary permission or consent to enable the Employer and the EIC or their designated representatives to attend the test and/or inspection.

23.4 The Contractor shall provide the EIC with a certified report of the results of any such test and/or inspection.

If the Employer or EIC or their designated representatives fails to attend the test and/or inspection, or if it is agreed between the Parties that such persons shall not do so, then the Contractor may proceed with the test and/or inspection in the absence of such persons, and may provide the EIC with a certified report of the results thereof.

23.5 The EIC may require the Contractor to carry out any test and/or inspection not required by the Contract, provided that the Contractor's

reasonable costs and expenses incurred in the carrying out of such test and/or inspection shall be added to the Contract Price. Further, if such test and/or inspection impede the progress of work on the Facilities and/or the Contractor's performance of its other obligations under the Contract, due allowance will be made in respect of the Time for Completion and the other obligations so affected.

23.6 If any Plant or any part of the Facilities fails to pass any test and/or inspection, the Contractor shall either rectify or replace such Plant or part of the Facilities and shall repeat the test and/or inspection upon giving a notice under GC Sub-Clause 23.3.

23.7 If any dispute or difference of opinion shall arise between the Parties in connection with or arising out of the test and/or inspection of the Plant or part of the Facilities that cannot be settled between the Parties within a reasonable period of time, it may be referred to an Adjudicator for determination in accordance with GC Sub-Clause 46.1.

23.8 The Contractor shall afford the Employer and the EIC, at the Employer's expense, access at any reasonable time to any place where the Plant are being manufactured or the Facilities are being installed, in order to inspect the progress and the manner of manufacture or installation, provided that the EIC shall give the Contractor a reasonable prior notice.

23.9 The Contractor agrees that neither the execution of a test and/or inspection of Plant or any part of the Facilities, nor the attendance by the Employer or the EIC, nor the issue of any test certificate pursuant to GC Sub-Clause 23.4, shall release the Contractor from any other responsibilities under the Contract.

23.10 No part of the Facilities or foundations shall be covered up on the Site without the Contractor carrying out any test and/or inspection required under the Contract. The Contractor shall give a reasonable notice to the EIC whenever any such parts of the Facilities or foundations are ready or about to be ready for test and/or inspection; such

test and/or inspection and notice thereof shall be subject to the requirements of the Contract.

23.11 The Contractor shall uncover any part of the Facilities or foundations, or shall make openings in or through the same as the EIC may from time to time require at the Site, and shall reinstate and make good such part or parts.

If any parts of the Facilities or foundations have been covered up at the Site after compliance with the requirement of GC Sub-Clause 23.10 and are found to be executed in accordance with the Contract, the expenses of uncovering, making openings in or through, reinstating, and making good the same shall be borne by the Employer, and the Time for Completion shall be reasonably adjusted to the extent that the Contractor has thereby been delayed or impeded in the performance of any of its obligations under the Contract.

24. Completion of the Facilities

24.1 As soon as the Facilities or any part thereof has, in the opinion of the Contractor, been completed operationally and structurally and put in a tight and clean condition as specified in the Employer's Requirements, excluding minor items not materially affecting the operation or safety of the Facilities, the Contractor shall so notify the Employer in writing.

24.2 Within seven (7) days after receipt of the notice from the Contractor under GC Sub-Clause 24.1, the Employer shall supply the operating and maintenance personnel specified in the Appendix to the Contract Agreement titled Scope of Works and Supply by the Employer for supervising the Pre-commissioning of the Facilities or any part thereof.

24.3 As soon as reasonably practicable after the operating and maintenance personnel have been supplied by the Employer for supervision, the Contractor shall commence Pre-commissioning of the Facilities or the relevant part thereof in preparation for Commissioning, subject to GC Sub-Clause 25.5.

24.4 As soon as all works in respect of Pre-

commissioning are completed and, in the opinion of the Contractor, the Facilities or any part thereof is ready for Commissioning, the Contractor shall so notify the EIC in writing.

24.5 The EIC shall, within fourteen (14) days after receipt of the Contractor's notice under GC Sub-Clause 24.4, either issue a Completion Certificate in the form specified in the Employer's Requirements (Forms and Procedures), stating that the Facilities or that part thereof have reached Completion as of the date of the Contractor's notice under GC Sub-Clause 24.4, or notify the Contractor in writing of any defects and/or deficiencies.

If the EIC notifies the Contractor of any defects and/or deficiencies, the Contractor shall then correct such defects and/or deficiencies, and shall repeat the procedure described in GC Sub-Clause 24.4.

If the EIC is satisfied that the Facilities or that part thereof have reached Completion, the EIC shall, within seven (7) days after receipt of the Contractor's repeated notice, issue a Completion Certificate stating that the Facilities or that part thereof have reached Completion as of the date of the Contractor's repeated notice.

If the EIC is not so satisfied, then it shall notify the Contractor in writing of any defects and/or deficiencies within seven (7) days after receipt of the Contractor's repeated notice, and the above procedure shall be repeated.

24.6 If the EIC fails to issue the Completion Certificate and fails to inform the Contractor of any defects and/or deficiencies within fourteen (14) days after receipt of the Contractor's notice under GC Sub-Clause 24.4 or within seven (7) days after receipt of the Contractor's repeated notice under GC Sub-Clause 24.5, or if the Employer makes use of the Facilities or part thereof, then the Facilities or that part thereof shall be deemed to have reached Completion as of the date of the Contractor's notice or repeated notice, or as of the Employer's use of the Facilities, as the case may be.

24.7 As soon as possible after Completion, the Contractor shall complete all outstanding minor items so that the Facilities are fully in accordance with the requirements of the Contract, failing which the Employer will undertake such completion and deduct the costs thereof from any monies owing to the Contractor.

24.8 Upon Completion, the Employer shall be responsible for the care and custody of the Facilities or the relevant part thereof, together with the risk of loss or damage thereto, and shall thereafter take over the Facilities or the relevant part thereof.

25. Commissioning and Operational Acceptance

25.1 Commissioning

25.1.1 Commissioning of the Facilities or any part thereof shall be commenced by the Contractor immediately after issue of the Completion Certificate by the EIC, pursuant to GC Sub-Clause 24.5, or immediately after the date of the deemed Completion, under GC Sub-Clause 24.6.

25.1.2 *Deleted without change in Sr. No.*

25.1.3 In accordance with the requirements of the Contract, the Contractor's and EIC's advisory personnel shall attend the Commissioning, including the Guarantee Test, and shall advise and assist the Employer.

25.2 Guarantee Test

25.2.1 Subject to GC Sub-Clause 25.5, the Guarantee Test and repeats thereof shall be conducted by the Contractor during Commissioning of the Facilities or the relevant part thereof to ascertain whether the Facilities or the relevant part can attain the Functional Guarantees specified in the Appendix to the Contract Agreement titled Functional Guarantees. The Employer shall promptly provide the Contractor with such information as the Contractor may reasonably require in relation to the conduct and results of the Guarantee Test and any repeats thereof.

25.2.2 If for reasons not attributable to the Contractor, the Guarantee Test of the Facilities or the relevant part thereof could not be successfully completed within 30 days from the date of Completion or any other period agreed upon by the Employer and the Contractor, the Contractor shall serve notice on the Employer to this effect and in case no communication is received from the Employer within 15 days of receipt of such notice from Contractor in this regard, the Contractor shall be deemed to have fulfilled its obligations with respect to the Functional Guarantees, and GC Sub-Clauses 28.2 and 28.3 shall not apply.

25.3 Operational Acceptance

25.3.1 Subject to GC Sub-Clause 25.4 below, Operational Acceptance shall occur in respect of the Facilities or any part thereof when

- (a) the Guarantee Test has been successfully completed and the Functional Guarantees are met; or
- (b) the Guarantee Test has not been successfully completed or has not been carried out for reasons not attributable to the Contractor within the period from the date of Completion pursuant to GC Sub-Clause 25.2.2 above or any other period agreed upon by the Employer and the Contractor; or
- (c) the Contractor has paid the liquidated damages specified in GC Sub-Clause 28.3 hereof; and
- (d) any minor items mentioned in GC Sub-Clause 24.7 hereof relevant to the Facilities or that part thereof have been completed.

25.3.2 At any time after any of the events set out in GC Sub-Clause 25.3.1 have occurred, the Contractor may give a notice to the EIC requesting the issue of an Operational Acceptance Certificate in the form provided in the Employer's Requirements (Forms and Procedures) in respect of the Facilities or the part thereof specified in such notice as of the

date of such notice.

25.3.3 The EIC shall, after consultation with the Employer, and within twenty one (21) days after receipt of the Contractor's notice, issue an Operational Acceptance Certificate.

25.3.4 If within twenty one (21) days after receipt of the Contractor's notice, the EIC fails to issue the Operational Acceptance Certificate or fails to inform the Contractor in writing of the justifiable reasons why the EIC has not issued the Operational Acceptance Certificate, the Facilities or the relevant part thereof shall be deemed to have been accepted as of the date of the Contractor's said notice.

25.4 Partial Acceptance

25.4.1 If the Contract specifies that Completion and Commissioning shall be carried out in respect of parts of the Facilities, the provisions relating to Completion and Commissioning including the Guarantee Test shall apply to each such part of the Facilities individually, and the Operational Acceptance Certificate shall be issued accordingly for each such part of the Facilities.

25.4.2 If a part of the Facilities comprises facilities such as buildings, for which no Commissioning or Guarantee Test is required, then the EIC shall issue the Operational Acceptance Certificate for such facility when it attains Completion, provided that the Contractor shall thereafter complete any outstanding minor items that are listed in the Operational Acceptance Certificate.

25.5 Delayed Pre-commissioning and/or Guarantee Test

25.5.1 In the event that the Contractor is unable to proceed with the Pre-commissioning of the Facilities pursuant to Sub-Clause 24.3, or with the Guarantee Test pursuant to Sub-Clause 25.2, for reasons attributable to the Employer either on account of non availability of other facilities under the

responsibilities of other contractor(s), or for reasons beyond the Contractor's control, the provisions leading to "deemed" completion of activities such as Completion, pursuant to GC Sub-Clause 24.6, and Operational Acceptance, pursuant to GC Sub-Clause 25.3.4, and Contractor's obligations regarding Defect Liability Period, pursuant to GC Sub-Clause 27.2, Functional Guarantee, pursuant to GC Clause 28, and Care of Facilities, pursuant to GC Clause 32, and GC Clause 41.1, Suspension, shall not apply. In this case, the following provisions shall apply.

25.5.2 When the Contractor is notified by the EIC that he will be unable to proceed with the activities and obligations pursuant to above Sub-Clause 13.1, the Contractor shall be entitled to the following:

- (a) the Time of Completion shall be extended for the period of suspension without imposition of liquidated damages pursuant to GC Sub-Clause 26.2;
- (b) payments due to the Contractor in accordance with the provision specified in the Appendix to the Contract Agreement titled Terms and Procedures of Payment, which would not have been payable in normal circumstances due to non-completion of the subject activities, shall be released to the Contractor against submission of a security in the form of a bank guarantee of equivalent amount acceptable to the Employer, and which shall become null and void when the Contractor will have complied with its obligations regarding those payments, subject to the provision of Sub-Clause 25.5.3 below;
- (c) the expenses towards the above security and extension of other securities under the contract, of which validity needs to be extended, shall be reimbursed to the Contractor by the

Employer;

- (d) the additional charges towards the care of the Facilities pursuant to GC Sub-Clause 32.1 shall be reimbursed to the Contractor by the Employer for the period between the notification mentioned above and the notification mentioned in Sub-Clause 25.5.4 below. The provision of GC Sub-Clause 33.2 shall apply to the Facilities during the same period.

25.5.3 In the event that the period of suspension under above Sub-Clause 25.5.1 actually exceeds one hundred eighty (180) days, the Employer and Contractor shall mutually agree to any additional compensation payable to the Contractor.

25.5.4 When the Contractor is notified by the EIC that the plant is ready for Pre-commissioning, the Contractor shall proceed without delay in performing Pre-commissioning in accordance with Clause 24.

Guarantees and Liabilities

26. Completion Time Guarantee

26.1 The Contractor guarantees that it shall attain Completion of the Facilities (or a part for which a separate time for completion is specified) within the Time for Completion specified in the Contract pursuant to GC Sub-Clause 8.2, or within such extended time to which the Contractor shall be entitled under GC Clause 40 hereof.

26.2 If the Contractor fails to attain Completion of the Facilities or any part thereof within the Time for Completion or any extension thereof under GC Clause 40, the Contractor shall pay to the Employer liquidated damages in the amount **computed @ 0.05% of the Contract Price per day of delay per milestone**. The aggregate amount of such liquidated damages shall in no event exceed ten percent (10%) of the Contract Price.

Such payment shall completely satisfy the Contractor's obligation to attain Completion of the

Facilities or the relevant part thereof within the Time for Completion or any extension thereof under GC Clause 40. The Contractor shall have no further liability whatsoever to the Employer in respect thereof.

However, the payment of liquidated damages shall not in any way relieve the Contractor from any of its obligations to complete the Facilities or from any other obligations and liabilities of the Contractor under the Contract.

Save for liquidated damages payable under this GC Sub-Clause 26.2, the failure by the Contractor to attain any milestone or other act, matter or thing by any date specified in the Appendix to the Contract Agreement titled Time Schedule, and/or other program of work prepared pursuant to GC Sub-Clause 18.2 shall not render the Contractor liable for any loss or damage thereby suffered by the Employer.

26.3 No bonus shall be payable to the Contractor for any Completion of the Facilities or part thereof before the time prescribed.

27. Defect Liability

27.1 The Contractor warrants that the Facilities or any part thereof shall be free from defects in the design, engineering, materials and workmanship of the Plant supplied and of the work executed.

27.2 The Defect Liability Period shall be four hundred twenty five (425) days from the date of Completion of the Facilities (or any part thereof) or one year from the date of Operational Acceptance of the Facilities (or any part thereof), whichever first occurs, pursuant to GC Sub-Clause 27.10.

If during the Defect Liability Period any defect should be found in the design, engineering, materials and workmanship of the Plant supplied or of the work executed by the Contractor, the Contractor shall promptly, in consultation and agreement with the Employer regarding appropriate remedying of the defects, and at its cost, repair, replace or otherwise make good as the Contractor shall determine at its discretion, such defect as well as any damage to the Facilities caused by such defect. The Contractor shall not be

responsible for the repair, replacement or making good of any defect or of any damage to the Facilities arising out of or resulting from any of the following causes:

- (a) improper operation or maintenance of the Facilities by the Employer;
- (b) operation of the Facilities outside specifications provided in the Contract; or
- (c) normal wear and tear.

27.3 The Contractor's obligations under this GC Clause 27 shall not apply to:

- (a) any materials that are supplied by the Employer under GC Sub-Clause 21.2, are normally consumed in operation, or have a normal life shorter than the Defect Liability Period stated herein;
- (b) any designs, specifications or other data designed, supplied or specified by or on behalf of the Employer or any matters for which the Contractor has disclaimed responsibility herein; or
- (c) any other materials supplied or any other work executed by or on behalf of the Employer, except for the work executed by the Employer under GC Sub-Clause 27.7.

27.4 The Employer shall give the Contractor a notice stating the nature of any such defect together with all available evidence thereof, promptly following the discovery thereof. The Employer shall afford all reasonable opportunity for the Contractor to inspect any such defect.

27.5 The Employer shall afford the Contractor all necessary access to the Facilities and the Site to enable the Contractor to perform its obligations under this GC Clause 27.

The Contractor may, with the consent of the Employer, remove from the Site any Plant or any part of the Facilities that are defective if the nature of the defect, and/or any damage to the Facilities caused by the defect, is such that repairs cannot

be expeditiously carried out at the Site.

27.6 If the repair, replacement or making good is of such a character that it may affect the efficiency of the Facilities or any part thereof, the Employer may give to the Contractor a notice requiring that tests of the defective part of the Facilities shall be made by the Contractor immediately upon completion of such remedial work, whereupon the Contractor shall carry out such tests.

If such part fails the tests, the Contractor shall carry out further repair, replacement or making good, as the case may be, until that part of the Facilities passes such tests. The standard of such tests shall in no case be less than those for the original Equipment/ part of the Facilities.

27.7 If the Contractor fails to commence the work necessary to remedy such defect or any damage to the Facilities caused by such defect within a reasonable time (which shall in no event be considered to be less than fifteen (15) days), the Employer may, following notice to the Contractor, proceed to do such work, and the reasonable costs incurred by the Employer in connection therewith shall be paid to the Employer by the Contractor or may be appropriated by the Employer from any monies due to the Contractor or claimed under the Performance Security.

27.8 If the Facilities or any part thereof cannot be used by reason of such defect and/or making good of such defect, the Defect Liability Period of the Facilities or such part, as the case may be, shall be extended by a period equal to the period during which the Facilities or such part cannot be used by the Employer because of any of the aforesaid reasons.

27.9 Except as provided in GC Clauses 27 and 33, the Contractor shall be under no liability whatsoever and howsoever arising, and whether under the Contract or at law, in respect of defects in the Facilities or any part thereof, the Plant, design or engineering or work executed that appear after Completion of the Facilities or any part thereof, except where such defects are the result of the gross negligence, fraud, or criminal or willful action

of the Contractor.

27.10 In addition, any such component of the Facilities, and during the period of time, shall be subject to an extended defect liability period. Such obligation of the Contractor shall be in addition to the defect liability period specified under GC Sub-Clause 27.2.

28. Functional Guarantees

28.1 The Contractor guarantees that during the Guarantee Test, the Facilities and all parts thereof shall attain the Functional Guarantees specified in the Appendix to the Contract Agreement titled Functional Guarantees, subject to and upon the conditions therein specified.

28.2 If, for reasons attributable to the Contractor, the minimum level of the Functional Guarantees specified in the Appendix to the Contract Agreement titled Functional Guarantees, are not met either in whole or in part, the Contractor shall at its cost and expense make such changes, modifications and/or additions to the Plant or any part thereof as may be necessary to meet at least the minimum level of such Guarantees. The Contractor shall notify the Employer upon completion of the necessary changes, modifications and/or additions, and shall request the Employer to repeat the Guarantee Test until the minimum level of the Guarantees has been met. If the Contractor eventually fails to meet the minimum level of Functional Guarantees, the Employer may consider termination of the Contract, pursuant to GC Sub-Clause 42.2.2.

28.3 If, for reasons attributable to the Contractor, the Functional Guarantees specified in the Appendix to the Contract Agreement titled Functional Guarantees, are not attained either in whole or in part, but the minimum level of the Functional Guarantees specified in the said Appendix to the Contract Agreement is met, the Contractor shall, at the Contractor's option, either

a) make such changes, modifications and/or additions to the Facilities or any part thereof that are necessary to attain the Functional Guarantees at its cost and expense, and shall request the Employer to repeat the Guarantee Test or

- b) Failure to attain the Functional Guarantees, the employer shall have option to accept it after recovering the losses arising out of aforesaid non compliance.

**29. Patent
Indemnity**

29.1 The Contractor shall, subject to the Employer's compliance with GC Sub-Clause 29.2, indemnify and hold harmless the Employer and its employees and officers from and against any and all suits, actions or administrative proceedings, claims, demands, losses, damages, costs, and expenses of whatsoever nature, including attorney's fees and expenses, which the Employer may suffer as a result of any infringement or alleged infringement of any patent, utility model, registered design, trademark, copyright or other intellectual property right registered or otherwise existing at the date of the Contract by reason of: (a) the installation of the Facilities by the Contractor or the use of the Facilities in the country where the Site is located; and (b) the sale of the products produced by the Facilities in any country.

Such indemnity shall not cover any use of the Facilities or any part thereof other than for the purpose indicated by or to be reasonably inferred from the Contract, any infringement resulting from the use of the Facilities or any part thereof, or any products produced thereby in association or combination with any other equipment, plant or materials not supplied by the Contractor, pursuant to the Contract Agreement.

29.2 If any proceedings are brought or any claim is made against the Employer arising out of the matters referred to in GC Sub-Clause 29.1, the Employer shall promptly give the Contractor a notice thereof, and the Contractor may at its own expense and in the Employer's name conduct such proceedings or claim and any negotiations for the settlement of any such proceedings or claim.

If the Contractor fails to notify the Employer within twenty-eight (28) days after receipt of such notice that it intends to conduct any such proceedings or claim, then the Employer shall be free to conduct the same on its own behalf. Unless the Contractor has so failed to notify the Employer within the twenty-eight (28) day period, the Employer shall

make no admission that may be prejudicial to the defense of any such proceedings or claim.

The Employer shall, at the Contractor's request, afford all available assistance to the Contractor in conducting such proceedings or claim, and shall be reimbursed by the Contractor for all reasonable expenses incurred in so doing.

29.3 The Employer shall indemnify and hold harmless the Contractor and its employees, officers and Subcontractors from and against any and all suits, actions or administrative proceedings, claims, demands, losses, damages, costs, and expenses of whatsoever nature, including attorney's fees and expenses, which the Contractor may suffer as a result of any infringement or alleged infringement of any patent, utility model, registered design, trademark, copyright or other intellectual property right registered or otherwise existing at the date of the Contract arising out of or in connection with any design, data, drawing, specification, or other documents or materials provided or designed by or on behalf of the Employer.

30. Limitation of Liability

30.1 Except in cases of criminal negligence or willful misconduct,

- (a) neither Party shall be liable to the other Party, whether in contract, tort, or otherwise, for any indirect or consequential loss or damage, loss of use, loss of production, or loss of profits or interest costs, which may be suffered by the other Party in connection with the Contract, other than specifically provided as any obligation of the Party in the Contract, and
- (b) the aggregate liability of the Contractor to the Employer, whether under the Contract, in tort or otherwise, shall not exceed the total Contract Price, provided that this limitation shall not apply to the cost of repairing or replacing defective equipment, or to any obligation of the Contractor to indemnify the Employer with respect to patent infringement.

Risk Distribution

31. Transfer of

31.1 Ownership of the Plant (including spare parts) to

Ownership

be imported into the country where the Site is located shall be transferred to the Employer upon loading on to the mode of transport to be used to convey the Plant from the country of origin to that country and upon endorsement of the dispatch documents in favour of the Employer.

31.2 Ownership of the Plant (including spare parts) procured in the country where the Site is located shall be transferred to the Employer upon loading on to the mode of transport to be used to carry the Plant and Equipment from the works to the site and upon endorsement of the dispatch documents in favour of the Employer.

31.3 Ownership of the Contractor's Equipment used by the Contractor and its Subcontractors in connection with the Contract shall remain with the Contractor or its Subcontractors.

31.4 Ownership of any Plant in excess of the requirements for the Facilities shall revert to the Contractor upon Completion of the Facilities or at such earlier time when the Employer and the Contractor agree that the Plant in question are no longer required for the Facilities.

31.5 Notwithstanding the transfer of ownership of the Plant, the responsibility for care and custody thereof together with the risk of loss or damage thereto shall remain with the Contractor pursuant to GC Clause 32 (Care of Facilities) hereof until Completion of the Facilities or the part thereof in which such Plant are incorporated.

32. Care of Facilities

32.1 The Contractor shall be responsible for the care and custody of the Facilities or any part thereof until the date of issuance of Operational Acceptance Certificate pursuant to GC Clause 25, and shall make good at its own cost any loss or damage that may occur to the Facilities or the relevant part thereof from any cause whatsoever during such period. The Contractor shall also be responsible for any loss or damage to the Facilities caused by the Contractor or its Subcontractors in the course of any work carried out, pursuant to GC Clause 27. Notwithstanding the foregoing, the Contractor shall not be liable for any loss or damage to the Facilities or that part thereof caused by reason of any of the matters specified or referred to in paragraphs (a), (b) and (c) of GC Sub-

Clauses 32.2 and 38.1.

32.2 If any loss or damage occurs to the Facilities or any part thereof or to the Contractor's temporary facilities by reason of

- (a) insofar as they relate to the country where the Site is located, nuclear reaction, nuclear radiation, radioactive contamination, pressure wave caused by aircraft or other aerial objects, or any other occurrences that an experienced contractor could not reasonably foresee, or if reasonably foreseeable could not reasonably make provision for or insure against, insofar as such risks are not normally insurable on the insurance market and are mentioned in the general exclusions of the policy of insurance, including War Risks, taken out under GC Clause 34 hereof; or
- (b) any use or occupation by the Employer or any third Party other than a Subcontractor, authorized by the Employer of any part of the Facilities; or
- (c) any use of or reliance upon any design, data or specification provided or designated by or on behalf of the Employer,

The Employer shall pay to the Contractor all sums payable in respect of the Facilities executed, notwithstanding that the same be lost, destroyed or damaged, and will pay to the Contractor the replacement value of all temporary facilities and all parts thereof lost, destroyed or damaged. If the Employer requests the Contractor in writing to make good any loss or damage to the Facilities thereby occasioned, the Contractor shall make good the same at the cost of the Employer in accordance with GC Clause 39. If the Employer does not request the Contractor in writing to make good any loss or damage to the Facilities thereby occasioned, the Employer shall either request a change in accordance with GC Clause 39, excluding the performance of that part of the Facilities thereby lost, destroyed or damaged, or, where the loss or damage affects a substantial part of the Facilities, the Employer shall terminate the

Contract pursuant to GC Sub-Clause 42.1 hereof.

32.3 The Contractor shall be liable for any loss of or damage to any Contractor's Equipment, or any other property of the Contractor used or intended to be used for purposes of the Facilities, except (i) as mentioned in GC Sub-Clause 32.2 with respect to the Contractor's temporary facilities, and (ii) where such loss or damage arises by reason of any of the matters specified in GC Sub-Clauses 32.2 (b) and (c) and 38.1.

32.4 With respect to any loss or damage caused to the Facilities or any part thereof or to the Contractor's Equipment by reason of any of the matters specified in GC Sub-Clause 38.1, the provisions of GC Sub-Clause 38.3 shall apply.

**33. Loss of or
Damage to
Property; Accident
or Injury to
Workers;
Indemnification**

33.1 Subject to GC Sub-Clause 33.3, the Contractor shall indemnify and hold harmless the Employer and its employees and officers from and against any and all suits, actions or administrative proceedings, claims, demands, losses, damages, costs, and expenses of whatsoever nature, including attorney's fees and expenses, in respect of the death or injury of any person or loss of or damage to any property other than the Facilities whether accepted or not, arising in connection with the supply and installation of the Facilities and by reason of the negligence of the Contractor or its Subcontractors, or their employees, officers or agents, except any injury, death or property damage caused by the negligence of the Employer, its contractors, employees, officers or agents.

33.2 If any proceedings are brought or any claim is made against the Employer that might subject the Contractor to liability under GC Sub-Clause 33.1, the Employer shall promptly give the Contractor a notice thereof and the Contractor may at its own expense and in the Employer's name conduct such proceedings or claim and any negotiations for the settlement of any such proceedings or claim.

If the Contractor fails to notify the Employer within twenty-eight (28) days after receipt of such notice that it intends to conduct any such proceedings or claim, then the Employer shall be free to conduct the same on its own behalf. Unless the Contractor

has so failed to notify the Employer within the twenty-eight (28) day period, the Employer shall make no admission that may be prejudicial to the defense of any such proceedings or claim.

The Employer shall, at the Contractor's request, afford all available assistance to the Contractor in conducting such proceedings or claim, and shall be reimbursed by the Contractor for all reasonable expenses incurred in so doing.

33.3 The Employer shall indemnify and hold harmless the Contractor and its employees, officers and Subcontractors from any liability for loss of or damage to property of the Employer, other than the Facilities not yet taken over, that is caused by fire, explosion or any other perils, in excess of the amount recoverable from insurances procured under GC Clause 34, provided that such fire, explosion or other perils were not caused by any act or failure of the Contractor.

33.4 The Party entitled to the benefit of an indemnity under this GC Clause 33 shall take all reasonable measures to mitigate any loss or damage which has occurred. If the Party fails to take such measures, the other Party's liabilities shall be correspondingly reduced.

34. Insurance

34.1 To the extent specified in the Appendix 3 to the Contract Agreement titled Insurance Requirements, the Contractor shall at its expense take out and maintain in effect, or cause to be taken out and maintained in effect, during the performance of the Contract, the insurances set forth below in the sums and with the deductibles and other conditions specified in the said Appendix 3. Contractor shall have option either to have a single comprehensive insurance in one cover or separate insurances. The identity of the insurers and the form of the policies shall be subject to the approval of the Employer, who should not unreasonably withhold such approval. The insurance under this Contract shall be effected with Government / Public Sector insurance companies of Nepalese or Indian origin only.

(a) Cargo Insurance During Transport

Covering loss or damage occurring while in transit from the Contractor's or Subcontractor's works or stores until arrival at

the Site, to the Plant (including spare parts therefor) and to the Contractor's Equipment.

(b) Installation All Risks Insurance

Covering physical loss or damage to the Facilities at the Site, occurring prior to Completion of the Facilities, with extended maintenance coverage for the Contractor's liability in respect of any loss or damage occurring during the Defect Liability Period while the Contractor is on the Site for the purpose of performing its obligations during the Defect Liability Period.

(c) Third Party Liability Insurance

Covering bodily injury or death suffered by third Parties including the Employer's personnel, and loss of or damage to property occurring in connection with the supply and installation of the Facilities.

34.2 The Employer shall be named as co-insured under all insurance policies taken out by the Contractor pursuant to GC Sub-Clause 34.1, except for the Third Party Liability and Employer's Liability Insurances, and the Contractor's Subcontractors shall be named as co-insureds under all insurance policies taken out by the Contractor pursuant to GC Sub-Clause 34.1 except for the Cargo Insurance During Transport, and Employer's Liability Insurances. All insurer's rights of subrogation against such co-insurers for losses or claims arising out of the performance of the Contract shall be waived under such policies.

34.3 The Contractor shall, in accordance with the provisions of the Appendix to the Contract Agreement titled Insurance Requirements, deliver to the Employer certificates of insurance or copies of the insurance policies as evidence that the required policies are in full force and effect. The certificates shall provide that no less than twenty-one (21) days' notice shall be given to the Employer by insurers prior to cancellation or material modification of a policy.

34.4 The Contractor shall ensure that, where applicable, its Subcontractor(s) shall take out and maintain in

effect adequate insurance policies for their personnel and for work executed by them under the Contract, unless such Subcontractors are covered by the policies taken out by the Contractor.

34.5 The Employer shall at its expense take out and maintain in effect during the performance of the Contract those insurances specified in the Appendix to the Contract Agreement titled Insurance Requirements, in the sums and with the deductibles and other conditions specified in the said Appendix. The Contractor and the Contractor's Subcontractors shall be named as co-insurers under all such policies. All insurers' rights of subrogation against such co-insurers for losses or claims arising out of the performance of the Contract shall be waived under such policies. The Employer shall deliver to the Contractor satisfactory evidence that the required insurances are in full force and effect. The policies shall provide that not less than twenty-one (21) days' notice shall be given to the Contractor by all insurers prior to any cancellation or material modification of the policies. If so requested by the Contractor, the Employer shall provide copies of the policies taken out by the Employer under this GC Sub-Clause 34.5.

34.6 If the Contractor fails to take out and/or maintain in effect the insurances referred to in GC Sub-Clause 34.1, the Employer may take out and maintain in effect any such insurances and may from time to time deduct from any amount due the Contractor under the Contract any premium that the Employer shall have paid to the insurer, or may otherwise recover such amount as a debt due from the Contractor. If the Employer fails to take out and/or maintain in effect the insurances referred to in GC 34.5, the Contractor may take out and maintain in effect any such insurances and may from time to time deduct from any amount due the Employer under the Contract any premium that the Contractor shall have paid to the insurer, or may otherwise recover such amount as a debt due from the Employer. If the Contractor fails to or is unable to take out and maintain in effect any such insurances, the Contractor shall nevertheless have

no liability or responsibility towards the Employer, and the Contractor shall have full recourse against the Employer for any and all liabilities of the Employer herein.

34.7 Unless otherwise provided in the Contract, the Contractor shall prepare and conduct all and any claims made under the policies effected by it pursuant to this GC Clause 34, and all monies payable by any insurers shall be paid to the Contractor. The Employer shall give to the Contractor all such reasonable assistance as may be required by the Contractor. With respect to insurance claims in which the Employer's interest is involved, the Contractor shall not give any release or make any compromise with the insurer without the prior written consent of the Employer. With respect to insurance claims in which the Contractor's interest is involved, the Employer shall not give any release or make any compromise with the insurer without the prior written consent of the Contractor.

**35. Unforeseen
Conditions**

35.1 If, during the execution of the Contract, the Contractor shall encounter on the Site any physical conditions other than climatic conditions, or artificial obstructions that could not have been reasonably foreseen prior to the date of the Contract Agreement by an experienced contractor on the basis of reasonable examination of the data relating to the Facilities including any data as to boring tests, provided by the Employer, and on the basis of information that it could have obtained from a visual inspection of the Site if access thereto was available, or other data readily available to it relating to the Facilities, and if the Contractor determines that it will in consequence of such conditions or obstructions incur additional cost and expense or require additional time to perform its obligations under the Contract that would not have been required if such physical conditions or artificial obstructions had not been encountered, the Contractor shall promptly, and before performing additional work or using additional Plant or Contractor's Equipment, notify the EIC in writing of

(a) the physical conditions or artificial obstructions

on the Site that could not have been reasonably foreseen;

- (b) the additional work and/or Plant and/or Contractor's Equipment required, including the steps which the Contractor will or proposes to take to overcome such conditions or obstructions;
- (c) the extent of the anticipated delay; and
- (d) the additional cost and expense that the Contractor is likely to incur.

On receiving any notice from the Contractor under this GC Sub-Clause 35.1, the EIC shall promptly consult with the Employer and Contractor and decide upon the actions to be taken to overcome the physical conditions or artificial obstructions encountered. Following such consultations, the EIC shall instruct the Contractor, with a copy to the Employer, of the actions to be taken.

35.2 Any reasonable additional cost and expense incurred by the Contractor in following the instructions from the EIC to overcome such physical conditions or artificial obstructions referred to in GC Sub-Clause 35.1 shall be paid by the Employer to the Contractor as an addition to the Contract Price.

If the Contractor is delayed or impeded in the performance of the Contract because of any such physical conditions or artificial obstructions referred to in GC Sub-Clause 35.1, the Time for Completion shall be extended in accordance with GC Clause 40.

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- 36. Change in Laws and Regulations** 36.1 If, after the date twenty-eight (28) days prior to the date of Bid submission, in the country where the Site is located, any law, regulation, ordinance, order or by-law having the force of law is enacted, promulgated, abrogated or changed which shall be deemed to include any change in interpretation or application by the competent authorities, that subsequently affects the costs and expenses of the Contractor and/or the Time for Completion, the Contract Price shall be correspondingly increased or decreased, and/or the Time for Completion shall be reasonably adjusted to the extent that the Contractor has thereby been affected in the performance of any of its obligations under the Contract. Notwithstanding the foregoing, such additional or reduced costs shall not be separately paid or credited if the same has already been accounted for in the price adjustment provisions where applicable, pursuant to GC Sub-Clause 11.2.
- 37. Force Majeure** 37.1 "Force Majeure" shall mean any event beyond the reasonable control of the Employer or of the Contractor, as the case may be, and which is unavoidable notwithstanding the reasonable care of the Party affected, and shall include, without limitation, the following:
- (a) war, hostilities or warlike operations whether a state of war be declared or not, invasion, act of foreign enemy and civil war
 - (b) rebellion, revolution, insurrection, mutiny, usurpation of civil or military government, conspiracy, riot, civil commotion and terrorist acts
 - (c) confiscation, nationalization, mobilization, commandeering or requisition by or under the order of any government or de jure or de facto authority or ruler or any other act or failure to act of any local state or national government authority
 - (d) strike, sabotage, lockout, embargo, import restriction, port congestion, lack of usual means of public transportation and communication, industrial dispute, shipwreck, shortage or restriction of power supply,

epidemics, quarantine and plague

- (e) earthquake, landslide, volcanic activity, fire, flood or inundation, tidal wave, typhoon or cyclone, hurricane, storm, lightning, or other inclement weather condition, nuclear and pressure waves or other natural or physical disaster
- (f) shortage of labor, materials or utilities where caused by circumstances that are themselves Force Majeure.

37.2 If either Party is prevented, hindered or delayed from or in performing any of its obligations under the Contract by an event of Force Majeure, then it shall notify the other in writing of the occurrence of such event and the circumstances thereof within fourteen (14) days after the occurrence of such event.

37.3 The Party who has given such notice shall be excused from the performance or punctual performance of its obligations under the Contract for so long as the relevant event of Force Majeure continues and to the extent that such Party's performance is prevented, hindered or delayed. The Time for Completion shall be extended in accordance with GC Clause 40.

37.4 The Party or Parties affected by the event of Force Majeure shall use reasonable efforts to mitigate the effect thereof upon its or their performance of the Contract and to fulfill its or their obligations under the Contract, but without prejudice to either Party's right to terminate the Contract under GC Sub-Clauses 37.6 and 38.5.

37.5 No delay or nonperformance by either Party hereto caused by the occurrence of any event of Force Majeure shall

- (a) constitute a default or breach of the Contract, or
- (b) give rise to any claim for damages or additional cost or expense occasioned thereby, subject to GC Sub-Clauses 32.2, 38.3 and 38.4

if and to the extent that such delay or nonperformance is caused by the occurrence of an event of Force Majeure.

37.6 If the performance of the Contract is substantially prevented, hindered or delayed for a single period of more than sixty (60) days or an aggregate period of more than one hundred and twenty (120) days on account of one or more events of Force Majeure during the currency of the Contract, the Parties will attempt to develop a mutually satisfactory solution, failing which either Party may terminate the Contract by giving a notice to the other, but without prejudice to either Party's right to terminate the Contract under GC Sub-Clause 38.5.

37.7 In the event of termination pursuant to GC Sub-Clause 37.6, the rights and obligations of the Employer and the Contractor shall be as specified in GC Sub-Clauses 42.1.2 and 42.1.3.

37.8 Notwithstanding GC Sub-Clause 37.5, Force Majeure shall not apply to any obligation of the Employer to make payments to the Contractor herein.

38. War Risks

38.1 "War Risks" shall mean any event specified in paragraphs (a) and (b) of GC Sub-Clause 37.1 and any explosion or impact of any mine, bomb, shell, grenade or other projectile, missile, munitions or explosive of war, occurring or existing in or near the country (or countries) where the Site is located.

38.2 Notwithstanding anything contained in the Contract, the Contractor shall have no liability whatsoever for or with respect to

- (a) destruction of or damage to Facilities, Plant, or any part thereof;
- (b) destruction of or damage to property of the Employer or any third Party; or
- (c) injury or loss of life

if such destruction, damage, injury or loss of life is caused by any War Risks, and the Employer shall indemnify and hold the Contractor harmless from

and against any and all claims, liabilities, actions, lawsuits, damages, costs, charges or expenses arising in consequence of or in connection with the same.

38.3 If the Facilities or any Plant or Contractor's Equipment or any other property of the Contractor used or intended to be used for the purposes of the Facilities shall sustain destruction or damage by reason of any War Risks, the Employer shall pay the Contractor for

(a) any part of the Facilities or the Plant so destroyed or damaged to the extent not already paid for by the Employer

and so far as may be required by the Employer, and as may be necessary for completion of the Facilities

(b) replacing or making good any Contractor's Equipment or other property of the Contractor so destroyed or damaged

(c) replacing or making good any such destruction or damage to the Facilities or the Plant or any part thereof.

If the Employer does not require the Contractor to replace or make good any such destruction or damage to the Facilities, the Employer shall either request a change in accordance with GC Clause 39, excluding the performance of that part of the Facilities thereby destroyed or damaged or, where the loss, destruction or damage affects a substantial part of the Facilities, shall terminate the Contract, pursuant to GC Sub-Clause 42.1.

If the Employer requires the Contractor to replace or make good on any such destruction or damage to the Facilities, the Time for Completion shall be extended in accordance with GC 40.

38.4 Notwithstanding anything contained in the Contract, the Employer shall pay the Contractor for any increased costs or incidentals to the execution of the Contract that are in any way attributable to, consequent on, resulting from, or in any way connected with any War Risks, provided that the Contractor shall as soon as practicable notify the

Employer in writing of any such increased cost.

38.5 If during the performance of the Contract any War Risks shall occur that financially or otherwise materially affect the execution of the Contract by the Contractor, the Contractor shall use its reasonable efforts to execute the Contract with due and proper consideration given to the safety of its and its Subcontractors' personnel engaged in the work on the Facilities, provided, however, that if the execution of the work on the Facilities becomes impossible or is substantially prevented for a single period of more than sixty (60) days or an aggregate period of more than one hundred and twenty (120) days on account of any War Risks, the Parties will attempt to develop a mutually satisfactory solution, failing which either Party may terminate the Contract by giving a notice to the other.

38.6 In the event of termination pursuant to GC Sub-Clauses 38.3 or 38.5, the rights and obligations of the Employer and the Contractor shall be specified in GC Sub-Clauses 42.1.2 and 42.1.3.

Change in Contract Elements

39. Change in the Facilities

39.1 Introducing a Change

39.1.1 Subject to GC Sub-Clauses 39.2.5 and 39.2.7, the Employer shall have the right to propose, and subsequently require, that the EIC order the Contractor from time to time during the performance of the Contract to make any change, modification, addition or deletion to, in or from the Facilities hereinafter called "Change", provided that such Change falls within the general scope of the Facilities and does not constitute unrelated work and that it is technically practicable, taking into account both the state of advancement of the Facilities and the technical compatibility of the Change envisaged with the nature of the Facilities as specified in the Contract.

39.1.2 The Contractor may from time to time during its performance of the Contract propose to the Employer with a copy to the EIC, any Change that the Contractor considers

necessary or desirable to improve the quality, efficiency or safety of the Facilities. The Employer may at its discretion approve or reject any Change proposed by the Contractor, provided that the Employer shall approve any Change proposed by the Contractor to ensure the safety of the Facilities.

39.1.3 Notwithstanding GC Sub-Clauses 39.1.1 and 39.1.2, no change made necessary because of any default of the Contractor in the performance of its obligations under the Contract shall be deemed to be a Change, and such change shall not result in any adjustment of the Contract Price or the Time for Completion.

39.1.4 The procedure on how to proceed with and execute Changes is specified in GC Sub-Clauses 39.2 and 39.3, and further details and forms are provided in the Employer's Requirements (Forms and Procedures).

39.2 Changes Originating from Employer

39.2.1 If the Employer proposes a Change pursuant to GC Sub-Clause 39.1.1, it shall send to the Contractor a "Request for Change Proposal," requiring the Contractor to prepare and furnish to the EIC as soon as reasonably practicable a "Change Proposal," which shall include the following:

- (a) brief description of the Change
- (b) effect on the Time for Completion
- (c) estimated cost of the Change
- (d) effect on Functional Guarantees (if any)
- (e) effect on the Facilities
- (f) effect on any other provisions of the Contract.

39.2.2 Prior to preparing and submitting the "Change Proposal," the Contractor shall submit to the EIC an "Estimate for Change Proposal," which shall be an estimate of the cost of preparing and submitting the Change Proposal.

Upon receipt of the Contractor's Estimate for

Change Proposal, the Employer shall do one of the following:

- (a) accept the Contractor's estimate with instructions to the Contractor to proceed with the preparation of the Change Proposal
- (b) advise the Contractor of any part of its Estimate for Change Proposal that is unacceptable and request the Contractor to review its estimate
- (c) advise the Contractor that the Employer does not intend to proceed with the Change.

39.2.3 Upon receipt of the Employer's instruction to proceed under GC Sub-Clause 39.2.2 (a), the Contractor shall, with proper expedition, proceed with the preparation of the Change Proposal, in accordance with GC Sub-Clause 39.2.1.

39.2.4 The pricing of any Change shall, as far as practicable, be calculated in accordance with the rates and prices included in the Contract. If such rates and prices are inequitable, the Parties thereto shall agree on specific rates for the valuation of the Change.

39.2.5 If before or during the preparation of the Change Proposal it becomes apparent that the aggregate effect of compliance therewith and with all other Change Orders that have already become binding upon the Contractor under this GC Clause 39 would be to increase or decrease the Contract Price as originally set forth in Article 2 (Contract Price) of the Contract Agreement by more than fifteen percent (15%), the Contractor may give a written notice of objection thereto prior to furnishing the Change Proposal as aforesaid. If the Employer accepts the Contractor's objection, the Employer shall withdraw the proposed Change and shall notify the Contractor in writing thereof.

The Contractor's failure to so object shall neither affect its right to object to any

subsequent requested Changes or Change Orders herein, nor affect its right to take into account, when making such subsequent objection, the percentage increase or decrease in the Contract Price that any Change not objected to by the Contractor represents.

39.2.6 Upon receipt of the Change Proposal, the Employer and the Contractor shall mutually agree upon all matters therein contained. Within fourteen (14) days after such agreement, the Employer shall, if it intends to proceed with the Change, issue the Contractor with a Change Order.

If the Employer is unable to reach a decision within fourteen (14) days, it shall notify the Contractor with details of when the Contractor can expect a decision.

If the Employer decides not to proceed with the Change for whatever reason, it shall, within the said period of fourteen (14) days, notify the Contractor accordingly. Under such circumstances, the Contractor shall be entitled to reimbursement of all costs reasonably incurred by it in the preparation of the Change Proposal, provided that these do not exceed the amount given by the Contractor in its Estimate for Change Proposal submitted in accordance with GC Sub-Clause 39.2.2.

39.2.7 If the Employer and the Contractor cannot reach agreement on the price for the Change, an equitable adjustment to the Time for Completion, or any other matters identified in the Change Proposal, the Employer may nevertheless instruct the Contractor to proceed with the Change by issue of a "Pending Agreement Change Order."

Upon receipt of a Pending Agreement Change Order, the Contractor shall immediately proceed with effecting the Changes covered by such Order. The Parties shall thereafter attempt to reach agreement on the outstanding issues under the Change

Proposal.

If the Parties cannot reach agreement within sixty (60) days from the date of issue of the Pending Agreement Change Order, then the matter may be referred to Adjudicator in accordance with the provisions of GC Sub-Clause 46.1.

39.3 Changes Originating from Contractor

39.3.1 If the Contractor proposes a Change pursuant to GC Sub-Clause 39.1.2, the Contractor shall submit to the EIC a written "Application for Change Proposal," giving reasons for the proposed Change and including the information specified in GC Sub-Clause 39.2.1.

Upon receipt of the Application for Change Proposal, the Parties shall follow the procedures outlined in GC Sub-Clauses 39.2.6 and 39.2.7. However, should the Employer choose not to proceed, the Contractor shall not be entitled to recover the costs of preparing the Application for Change Proposal.

40. Extension of Time for Completion

40.1 The Time(s) for Completion specified pursuant to GC Sub-Clause 8.2 shall be extended if the Contractor is delayed or impeded in the performance of any of its obligations under the Contract by reason of any of the following:

- (a) any Change in the Facilities as provided in GC Clause 39
- (b) any occurrence of Force Majeure as provided in GC Clause 37, unforeseen conditions as provided in GC Clause 35, or other occurrence of any of the matters specified or referred to in paragraphs (a), (b) and (c) of GC Sub-Clause 32.2
- (c) any suspension order given by the Employer under GC Clause 41 hereof or reduction in the rate of progress pursuant to GC Sub-Clause 41.2 or
- (d) any changes in laws and regulations as

provided in GC Clause 36 or

- (e) any default or breach of the Contract by the Employer, Appendix to the Contract Agreement titled, or any activity, act or omission of the Employer, or the EIC, or any other contractors employed by the Employer, or
- (f) any delay on the part of a sub-contractor, provided such delay is due to a cause for which the Contractor himself would have been entitled to an extension of time under this sub-clause, or
- (g) delays attributable to the Employer or caused by customs, or
- (h) any other matter specifically mentioned in the Contract

by such period as shall be fair and reasonable in all the circumstances and as shall fairly reflect the delay or impediment sustained by the Contractor.

40.2 Except where otherwise specifically provided in the Contract, the Contractor shall submit to the EIC a notice of a claim for an extension of the Time for Completion, together with particulars of the event or circumstance justifying such extension as soon as reasonably practicable after the commencement of such event or circumstance. As soon as reasonably practicable after receipt of such notice and supporting particulars of the claim, the Employer and the Contractor shall agree upon the period of such extension. In the event that the Contractor does not accept the Employer's estimate of a fair and reasonable time extension, the Contractor shall be entitled to refer the matter to Adjudicator, pursuant to GC Sub-Clause 46.1.

The Contractor shall at all times use its reasonable efforts to minimize any delay in the performance of its obligations under the Contract. In all cases where the Contractor has given a notice of a claim for an extension of time under GC 40.2, the Contractor shall consult with the EIC in order to determine the steps (if any) which can be taken to overcome or minimize the actual or anticipated delay. The Contractor shall there after comply with

all reasonable instructions which the EIC shall give in order to minimize such delay. If compliance with such instructions shall cause the Contractor to incur extra costs and the Contractor is entitled to an extension of time under GC 40.1, the amount of such extra costs shall be added to the Contract Price. If the Contractor has failed to give early warning of a delay or has failed to cooperate in dealing with a delay, the delays due to such failures shall not be considered in assessing the time extension

In the event of extension of Time for Completion granted pursuant to GC 40.1 (c) and (e) under the Contract, the Contractor shall be entitled of cost towards idling of Contractor's resources as per the **Appendix-9: Valuation of Idling Time cost claims**

- 41. Suspension** 41.1 The Employer may request the EIC, by notice to the Contractor, to order the Contractor to suspend performance of any or all of its obligations under the Contract. Such notice shall specify the obligation of which performance is to be suspended, the effective date of the suspension and the reasons therefor. The Contractor shall thereupon suspend performance of such obligation, except those obligations necessary for the care or preservation of the Facilities, until ordered in writing to resume such performance by the EIC.

If, by virtue of a suspension order given by the EIC, other than by reason of the Contractor's default or breach of the Contract, the Contractor's performance of any of its obligations is suspended for an aggregate period of more than ninety (90) days, then at any time thereafter and provided that at that time such performance is still suspended, the Contractor may give a notice to the EIC requiring that the Employer shall, within twenty-eight (28) days of receipt of the notice, order the resumption of such performance or request and subsequently order a change in accordance with GC Clause 39, excluding the performance of the suspended obligations from the Contract.

If the Employer fails to do so within such period, the Contractor may, by a further notice to the EIC, elect to treat the suspension, where it affects a

part only of the Facilities, as a deletion of such part in accordance with GC Clause 39 or, where it affects the whole of the Facilities, as termination of the Contract under GC Sub-Clause 42.1.

41.2 If

(a) the Employer has failed to pay the Contractor any sum due under the Contract within the specified period, has failed to approve any invoice or supporting documents without just cause pursuant to the Appendix to the Contract Agreement titled Terms and Procedures of Payment, or commits a substantial breach of the Contract, the Contractor may give a notice to the Employer that requires payment of such sum, with interest thereon as stipulated in GC Sub-Clause 12.3, requires approval of such invoice or supporting documents, or specifies the breach and requires the Employer to remedy the same, as the case may be. If the Employer fails to pay such sum together with such interest, fails to approve such invoice or supporting documents or give its reasons for withholding such approval, or fails to remedy the breach or take steps to remedy the breach within fourteen (14) days after receipt of the Contractor's notice or

(b) the Contractor is unable to carry out any of its obligations under the Contract for any reason attributable to the Employer, including but not limited to the Employer's failure to provide possession of or access to the Site or other areas in accordance with GC Sub-Clause 10.2, or failure to obtain any governmental permit necessary for the execution and/or completion of the Facilities,

then the Contractor may by fourteen (14) days' notice to the Employer suspend performance of all or any of its obligations under the Contract, or reduce the rate of progress.

41.3 If the Contractor's performance of its obligations is suspended or the rate of progress is reduced pursuant to this GC Clause 41, then the Time for

Completion shall be extended in accordance with GC Sub-Clause 40.1, and any and all additional costs or expenses incurred by the Contractor as a result of such suspension or reduction shall be paid by the Employer to the Contractor in addition to the Contract Price, except in the case of suspension order or reduction in the rate of progress by reason of the Contractor's default or breach of the Contract.

41.4 During the period of suspension, the Contractor shall not remove from the Site any Plant, any part of the Facilities or any Contractor's Equipment, without the prior written consent of the Employer.

42. Termination

42.1 Termination for Employer's Convenience

42.1.1 The Employer may at any time terminate the Contract for any reason by giving the Contractor a notice of termination that refers to this GC Sub-Clause 42.1.

42.1.2 Upon receipt of the notice of termination under GC Sub-Clause 42.1.1, the Contractor shall either immediately or upon the date specified in the notice of termination

- (a) cease all further work, except for such work as the Employer may specify in the notice of termination for the sole purpose of protecting that part of the Facilities already executed, or any work required to leave the Site in a clean and safe condition
- (b) terminate all subcontracts, except those to be assigned to the Employer pursuant to paragraph (d) (ii) below
- (c) remove all Contractor's Equipment from the Site, repatriate the Contractor's and its Subcontractors' personnel from the Site, remove from the Site any wreckage, rubbish and debris of any kind, and leave the whole of the Site in a clean and safe condition, and
- (d) subject to the payment specified in GC

Sub-Clause 42.1.3,

- (i) deliver to the Employer the parts of the Facilities executed by the Contractor up to the date of termination
- (ii) to the extent legally possible, assign to the Employer all right, title and benefit of the Contractor to the Facilities and to the Plant as of the date of termination, and, as may be required by the Employer, in any subcontracts concluded between the Contractor and its Subcontractors; and
- (iii) deliver to the Employer all non-proprietary drawings, specifications and other documents prepared by the Contractor or its Subcontractors as at the date of termination in connection with the Facilities.

42.1.3 In the event of termination of the Contract under GC Sub-Clause 42.1.1, the Employer shall pay to the Contractor the following amounts:

- (a) the Contract Price, proportionately attributable to the parts of the Facilities executed by the Contractor as of the date of termination
- (b) the costs reasonably incurred by the Contractor in the removal of the Contractor's Equipment from the Site and in the repatriation of the Contractor's and its Subcontractors' personnel
- (c) any amounts to be paid by the Contractor to its Subcontractors in connection with the termination of any subcontracts, including any cancellation charges
- (d) costs incurred by the Contractor in protecting the Facilities and leaving the Site in a clean and safe condition pursuant to paragraph (a) of GC Sub-

Clause 42.1.2

- (e) the cost of satisfying all other obligations, commitments and claims that the Contractor may in good faith have undertaken with third Parties in connection with the Contract and that are not covered by paragraphs (a) through (d) above.

42.2 Termination for Contractor's Default

42.2.1 The Employer, without prejudice to any other rights or remedies it may possess, may terminate the Contract forthwith in the following circumstances by giving a notice of termination and its reasons therefor to the Contractor, referring to this GC Sub-Clause 42.2:

- (a) if the Contractor becomes bankrupt or insolvent, has a receiving order issued against it, compounds with its creditors, or, if the Contractor is a corporation, a resolution is passed or order is made for its winding up, other than a voluntary liquidation for the purposes of amalgamation or reconstruction, a receiver is appointed over any part of its undertaking or assets, or if the Contractor takes or suffers any other analogous action in consequence of debt
- (b) if the Contractor assigns or transfers the Contract or any right or interest therein in violation of the provision of GC Clause 43.
- (c) if the Contractor, in the judgment of the Employer has engaged in corrupt, collusive, coercive, or fraudulent practices, as defined in GC Clause 6, in competing for or in executing the Contract.

42.2.2 If the Contractor

- (a) has abandoned or repudiated the Contract
- (b) has without valid reason failed to

commence work on the Facilities promptly or has suspended, other than pursuant to GC Sub-Clause 41.2, the progress of Contract performance for more than twenty-eight (28) days after receiving a written instruction from the Employer to proceed

- (c) persistently fails to execute the Contract in accordance with the Contract or neglects to carry out its obligations under the Contract without just cause
- (d) refuses or is unable to provide sufficient materials, services or labor to execute and complete the Facilities in the manner specified in the program furnished under GC Sub-Clause 18.2 at rates of progress that give reasonable assurance to the Employer that the Contractor can attain Completion of the Facilities by the Time for Completion as extended,

then the Employer may, without prejudice to any other rights it may possess under the Contract, give a notice to the Contractor stating the nature of the default and requiring the Contractor to remedy the same. If the Contractor fails to remedy or to take steps to remedy the same within fourteen (14) days of its receipt of such notice, then the Employer may terminate the Contract forthwith by giving a notice of termination to the Contractor that refers to this GC Sub-Clause 42.2.

42.2.3 Upon receipt of the notice of termination under GC Sub-Clauses 42.2.1 or 42.2.2, the Contractor shall, either immediately or upon such date as is specified in the notice of termination,

- (a) cease all further work, except for such work as the Employer may specify in the notice of termination for the sole purpose of protecting that part of the Facilities already executed, or any work required to leave the Site in a clean and safe

condition

- (b) terminate all subcontracts, except those to be assigned to the Employer pursuant to paragraph (d) below
- (c) deliver to the Employer the parts of the Facilities executed by the Contractor up to the date of termination
- (d) to the extent legally possible, assign to the Employer all right, title and benefit of the Contractor to the Facilities and to the Plant as of the date of termination, and, as may be required by the Employer, in any subcontracts concluded between the Contractor and its Subcontractors
- (e) deliver to the Employer all drawings, specifications and other documents prepared by the Contractor or its Subcontractors as of the date of termination in connection with the Facilities.

42.2.4 The Employer may enter upon the Site, expel the Contractor, and complete the Facilities itself or by employing any third Party. The Employer may, to the exclusion of any right of the Contractor over the same, take over and use with the payment of a fair rental rate to the Contractor, with all the maintenance costs to the account of the Employer and with an indemnification by the Employer for all liability including damage or injury to persons arising out of the Employer's use of such equipment, any Contractor's Equipment owned by the Contractor and on the Site in connection with the Facilities for such reasonable period as the Employer considers expedient for the supply and installation of the Facilities.

Upon completion of the Facilities or at such earlier date as the Employer thinks appropriate, the Employer shall give notice to the Contractor that such Contractor's Equipment will be returned to the Contractor at or near the Site and shall return such

Contractor's Equipment to the Contractor in accordance with such notice. The Contractor shall thereafter without delay and at its cost remove or arrange removal of the same from the Site.

42.2.5 Subject to GC Sub-Clause 42.2.6, the Contractor shall be entitled to be paid the Contract Price attributable to the Facilities executed as of the date of termination, the value of any unused or partially used Plant on the Site, and the costs, if any, incurred in protecting the Facilities and in leaving the Site in a clean and safe condition pursuant to paragraph (a) of GC Sub-Clause 42.2.3. Any sums due the Employer from the Contractor accruing prior to the date of termination shall be deducted from the amount to be paid to the Contractor under this Contract.

42.2.6 If the Employer completes the Facilities, the cost of completing the Facilities shall be determined by the Employer.

If the sum that the Contractor is entitled to be paid, pursuant to GC Sub-Clause 42.2.5, plus the reasonable costs incurred by the Employer in completing the Facilities, exceeds the Contract Price, the Contractor shall be liable for such excess.

If such excess is greater than the sums due the Contractor under GC Sub-Clause 42.2.5, the Contractor shall pay the balance to the Employer.

42.3 Termination by the Contractor

42.3.1 If

- (a) the Employer has failed to pay the Contractor any sum due under the Contract within the specified period, has failed to approve any invoice or supporting documents without just cause pursuant to the Appendix to the Contract Agreement titled Terms and Procedures of Payment, or commits a substantial breach of the Contract, the Contractor may give a notice to the

Employer that requires payment of such sum, with interest thereon as stipulated in GC Sub-Clause 12.3, requires approval of such invoice or supporting documents, or specifies the breach and requires the Employer to remedy the same, as the case may be. If the Employer fails to pay such sum together with such interest, fails to approve such invoice or supporting documents or give its reasons for withholding such approval, fails to remedy the breach or take steps to remedy the breach within fourteen (14) days after receipt of the Contractor's notice, or

- (b) the Contractor is unable to carry out any of its obligations under the Contract for any reason attributable to the Employer, including but not limited to the Employer's failure to provide possession of or access to the Site or other areas or failure to obtain any governmental permit necessary for the execution and/or completion of the Facilities,

then the Contractor may give a notice to the Employer thereof, and if the Employer has failed to pay the outstanding sum, to approve the invoice or supporting documents, to give its reasons for withholding such approval, or to remedy the breach within twenty-eight (28) days of such notice, or if the Contractor is still unable to carry out any of its obligations under the Contract for any reason attributable to the Employer within twenty-eight (28) days of the said notice, the Contractor may by a further notice to the Employer referring to this GC Sub-Clause 42.3.1, forthwith terminate the Contract.

42.3.2 The Contractor may terminate the Contract forthwith by giving a notice to the Employer to that effect, referring to this GC Sub-Clause 42.3.2, if the Employer becomes bankrupt or insolvent, has a receiving order issued against

it, compounds with its creditors, or, being a corporation, if a resolution is passed or order is made for its winding up (other than a voluntary liquidation for the purposes of amalgamation or reconstruction), a receiver is appointed over any part of its undertaking or assets, or if the Employer takes or suffers any other analogous action in consequence of debt.

42.3.3 If the Contract is terminated under GC Sub-Clauses 42.3.1 or 42.3.2, then the Contractor shall immediately

- (a) cease all further work, except for such work as may be necessary for the purpose of protecting that part of the Facilities already executed, or any work required to leave the Site in a clean and safe condition
- (b) terminate all subcontracts, except those to be assigned to the Employer pursuant to paragraph (d) (ii)
- (c) remove all Contractor's Equipment from the Site and repatriate the Contractor's and its Subcontractors' personnel from the Site, and
- (d) subject to the payment specified in GC Sub-Clause 42.3.4,
 - (i) deliver to the Employer the parts of the Facilities executed by the Contractor up to the date of termination
 - (ii) to the extent legally possible, assign to the Employer all right, title and benefit of the Contractor to the Facilities and to the Plant as of the date of termination, and, as may be required by the Employer, in any subcontracts concluded between the Contractor and its Subcontractors, and
 - (iii) deliver to the Employer all drawings, specifications and other documents

prepared by the Contractor or its Subcontractors as of the date of termination in connection with the Facilities.

42.3.4 If the Contract is terminated under GC Sub-Clauses 42.3.1 or 42.3.2, the Employer shall pay to the Contractor all payments specified in GC Sub-Clause 42.1.3, and reasonable compensation as determined by Employer for all loss, except for loss of profit, or damage sustained by the Contractor arising out of, in connection with or in consequence of such termination. Provided that, the determination by the Employer in this regard shall be final and binding upon the Contractor.

42.3.5 Termination by the Contractor pursuant to this GC Sub-Clause 42.3 is without prejudice to any other rights or remedies of the Contractor that may be exercised in lieu of or in addition to rights conferred by GC Sub-Clause 42.3.

42.4 In this GC Clause 42, the expression "Facilities executed" shall include all work executed, Installation Services provided, and all Plant acquired, or subject to a legally binding obligation to purchase, by the Contractor and used or intended to be used for the purpose of the Facilities, up to and including the date of termination.

42.5 In this GC Clause 42, in calculating any monies due from the Employer to the Contractor, account shall be taken of any sum previously paid by the Employer to the Contractor under the Contract, including any advance payment paid pursuant to the Appendix to the Contract Agreement titled Terms and Procedures of Payment.

43. Assignment

43.1 Neither the Employer nor the Contractor shall, without the express prior written consent of the other Party, which consent shall not be unreasonably withheld, assign to any third Party the Contract or any part thereof, or any right, benefit, obligation or interest therein or thereunder, except that the Contractor shall be entitled to assign either absolutely or by way of

charge any monies due and payable to it or that may become due and payable to it under the Contract.

44. Export Restrictions

44.1 Notwithstanding any obligation under the Contract to complete all export formalities, any export restrictions attributable to the Employer, to the country of the Employer or to the use of the Plant and Installation Services to be supplied which arise from trade regulations from a country supplying those Plant and Installation Services, and which substantially impede the Contractor from meeting its obligations under the Contract, shall release the Contractor from the obligation to provide deliveries or services, always provided, however, that the Contractor can demonstrate to the satisfaction of the Employer that it has completed all formalities in a timely manner, including applying for permits, authorizations and licenses necessary for the export of the Plant and Installation Services under the terms of the Contract. Termination of the Contract on this basis shall be for the Employer's convenience pursuant to Sub-Clause 42.1.

Claims, Disputes and Arbitration

45. Contractor's Claims

45.1 If the Contractor considers himself to be entitled to any extension of the Time for Completion and/or any additional payment, under any Clause of these Conditions or otherwise in connection with the Contract, the Contractor shall submit a notice to the EIC, describing the event or circumstance giving rise to the claim. The notice shall be given as soon as practicable, and not later than 28 days after the Contractor became aware, or should have become aware, of the event or circumstance.

If the Contractor fails to give notice of a claim within such period of 28 days, the Time for Completion shall not be extended, the Contractor shall not be entitled to additional payment, and the Employer shall be discharged from all liability in connection with the claim. Otherwise, the following provisions of this Sub-Clause shall apply.

The Contractor shall also submit any other notices which are required by the Contract, and supporting particulars for the claim, all as relevant

to such event or circumstance.

The Contractor shall keep such contemporary records as may be necessary to substantiate any claim, either on the Site or at another location acceptable to the EIC. Without admitting the Employer's liability, the EIC may, after receiving any notice under this Sub-Clause, monitor the record-keeping and/or instruct the Contractor to keep further contemporary records. The Contractor shall permit the EIC to inspect all these records, and shall (if instructed) submit copies to the EIC.

Within 42 days after the Contractor became aware (or should have become aware) of the event or circumstance giving rise to the claim, or within such other period as may be proposed by the Contractor and approved by the EIC, the Contractor shall send to the EIC a fully detailed claim which includes full supporting particulars of the basis of the claim and of the extension of time and/or additional payment claimed. If the event or circumstance giving rise to the claim has a continuing effect:

- (a) this fully detailed claim shall be considered as interim;
- (b) the Contractor shall send further interim claims at monthly intervals, giving the accumulated delay and/or amount claimed, and such further particulars as the EIC may reasonably require; and
- (c) the Contractor shall send a final claim within 28 days after the end of the effects resulting from the event or circumstance, or within such other period as may be proposed by the Contractor and approved by the EIC.

Within 42 days after receiving a claim or any further particulars supporting a previous claim, or within such other period as may be proposed by the EIC and approved by the Contractor, the EIC shall respond with approval, or with disapproval and detailed comments. He may also request any necessary further particulars, but shall nevertheless give his response on the principles of

the claim within such time.

Each Payment Certificate shall include such amounts for any claim as have been reasonably substantiated as due under the relevant provision of the Contract. Unless and until the particulars supplied are sufficient to substantiate the whole of the claim, the Contractor shall only be entitled to payment for such part of the claim as he has been able to substantiate.

The EIC shall agree with the Contractor or estimate: (i) the extension (if any) of the Time for Completion (before or after its expiry) in accordance with GC Clause 40, and/or (ii) the additional payment (if any) to which the Contractor is entitled under the Contract.

The requirements of this Sub-Clause are in addition to those of any other Sub-Clause which may apply to a claim. If the Contractor fails to comply with this or another Sub-Clause in relation to any claim, any extension of time and/or additional payment shall take account of the extent (if any) to which the failure has prevented or prejudiced proper investigation of the claim, unless the claim is excluded under the second paragraph of this Sub-Clause.

46. Dispute & Arbitration

In the event that the Contractor and the Employer cannot agree on any matter relating to a claim, either Party may refer the matter to the Independent Engineer(IE) pursuant to GC 46.1 and thereafter to Conciliation Committee of Independent Experts (CCIE) pursuant to GC 46.2 hereof, however No interest shall be paid by the Employer on the disputed/ claimed amount for the period upto determination and notification of the same to the Contractor by the Engineer/announcement of the reasoned award by the IE/CCIE.

46.1 Independent Engineer

"Independent Engineer" or "IE" means the person so named in the Contract, or appointed under Sub-Clause 20.2 [Appointment of the Independent Engineer] or Sub-Clause 20.3 [Failure to Agree Independent Engineer] in terms of MOP's OM no. 15-18/2020-HYDEL-II(MoP) dated 27.09.2021 with an objective to reduce the conversion of initial disagreements over

issues into full-fledged disputes and for expeditious elimination of disagreements in a just and fair manner. The contractor will propose the panel of 3(three) independent engineers from the approved list of MOP Government of India. The employer shall communicate its decision to contractor for appointment of independent engineer.

46.2 "Conciliation Committee of Independent Experts (CCIE) for Contractual Disputes in Projects implemented by CPSUs/Statutory Bodies under administrative control of Ministry of Power will address the disputes in terms of MOP's F.No. 11/22/2021-Th.II dated 29.12.2021

The contract shall be governed by law of country & place of jurisdiction of courts where the parties are to submit their disputes arising out of or in connection with contract is Chainpur, District Sankuwasabha, Nepal.

47. Protection of the Environment

The Contractor shall take all responsible steps to protect the environment (both on and off the Site) and to limit damage and nuisance to people and property resulting from pollution, noise and other results of his operations.

The Contractor shall ensure that emissions, surface discharges and effluent from the Contractor's activities shall not exceed the values indicated in the Specification, and shall not exceed the values prescribed by applicable Laws.

The Contractor shall be required to ensure that there shall be no felling of trees by him or his labourers or their family members and he will be solely responsible for their acts in this regard. The Contractor shall try to maintain ecological balance by preventing deforestation, water pollution and defacing of natural landscape in the vicinity of work areas. The Contractor shall so conduct his construction operations as to prevent an unnecessary destruction of, scarring or defacing the natural surroundings in the vicinity of the work area. In order to maintain the ecological balance, the Contractor shall specifically observe the following instructions:

-
- a)** Where unnecessary destruction, scarring, damage or defacing may occur as a result of the Contractor's operation, the same shall be repaired, replanted or otherwise corrected at the Contractor's expense. The Contractor will prevent scattering of rocks and other debris outside the work areas. All work areas shall be smoothed and graded in a manner to conform to the natural appearance of the landscape as directed by the EIC.
 - b)** All trees and shrubs which are not specifically required to be cleared or removed for construction purposes shall be preserved and protected from any damage that may be caused by the Contractor's construction operation and Equipment. The removal of trees or shrubs will be permitted only after prior approval by the EIC. Special care shall be exercised where trees or shrubs are exposed to injuries by Construction Equipment, blasting, excavating, dumping, chemical damage or other operation and the Contractor shall adequately protect such trees by use of protective barriers or other methods approved by the EIC. Trees shall not be used for anchorage.
 - c)** The Contractor's construction activities shall be performed by methods that will prevent entrance or accidental spillage of solid matter contaminants, debris and other objectionable pollutants and wastage into the river. Pollutants and wastes shall be disposed of in a manner and at sites approved by the EIC. The Contractor shall fully comply with Environment Rules and Regulations as applicable in Nepal.
 - d)** In the conduct of construction activities and operation of Construction Equipment, the Contractor shall utilize such practicable methods and devices as are reasonably available to control, prevent and otherwise minimize air pollution. The Contractor shall fully comply with Environment Protection Act, 2053 (1997 A.D.), Nepal.
 - e)** Burning of materials resulting from clearing of tree, bush, combustible construction materials and rubbish shall be avoided.

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- f)** Contractor (including its Sub-contractor) shall provide alternative fuel arrangement i.e. cooking gas/ kerosene oil, electricity free of cost to all its canteen /mess, labourers and staff working in the Project during the whole period of construction activity to avoid felling of trees for use as firewood. In case alternative fuels supply i.e. kerosene, gas, electricity is not available in the project area, the Contractor shall approach the forest department/forest corporation, GoN to open fuel depot in the project area for meeting the demand of fuel wood.
 - g)** No wood shall be used for scaffolding, shuttering or centering in the construction of Works.
 - h)** Wood, if required, shall have to be purchased from the Forest Department, GoN.
 - i)** The Contractor shall be required to prevent flowing of debris and muck in to the river. Necessary retaining structures like walls/crates etc. shall be constructed (as per Final EIA/EMP report of the project) for the purpose. The Contractor shall also stabilize the muck fully i.e. consolidation and compaction of the muck shall be carried out in the muck dump sites, also the restoration of muck dumping sites (as per Final EIA/EMP report of project) before handing it over to the Employer at the end of construction period.
 - j)** Medical facilities as well the recreational facilities shall also be provided to the labourers.
 - k)** All labourers to be engaged for the construction work shall be thoroughly examined by health personnel and adequately treated before they are deployed in the work.
 - l)** Contractor shall employ maximum number of local people in not only un-skilled category but also in semi-skilled and skilled categories by imparting skills through training to selected locals. Detailed plan regarding this should be submitted by the Contractor within two months

from the Commencement Date.

- m)** All the Construction Equipment which are likely to generate high noise levels are to be fully equipped (with noise reduction measures) to meet the ambient noise control standards.
- n)** The Employer shall facilitate/assist Contractors in obtaining necessary permits from District Authorities. The Contractor shall not allow any of its employee / labourers employed by it to settle in the forest area even temporarily.

If any provision(s) is not complied with, within a reasonable time even after issue of a notice in this respect, the necessary operations would be carried out by the EIC at the cost of the Contractor.

The Contractor shall indemnify and hold the Employer harmless against and from all claims, damages, losses and expenses (including legal fees and expenses) resulting from the consequences of any failure by the Contractor to comply with the provisions of this Sub-Clause.

The Contractor shall obtain Consent to Establish for construction activities and permission for establishment of Crusher from concerned government and regulatory authorities.

The Contractor shall also comply with all applicable rules enacted under The Environment (Protection) Act of GoN.

The Contractor shall also be liable to implement the various provisions related to construction sites, workshops and job facilities, etc. mentioned in the Final EIA/EMP report of the project.

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Section 4 - Contract Forms

Section 4 - Contract Forms

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1. LETTER OF TENDER

{Refer ITB Clause-13.1, 14 & 21}

Name of Contract.....

To: (Name and Address of Employer)

Sir,

1.0 Having examined the Bid Documents, including Addenda Nos. *(Insert Numbers)*, the receipt of which is hereby acknowledged, we the undersigned, offer to construct and install such Works and remedy the defects therein in conformity with the Conditions of Contract, Specifications, Drawings, Bill of Quantities, Appendix to Bid and addenda (if any) for the sum as specified in the Appendix to Bid or such other sums as may be determined in accordance with the terms and conditions of the Contract.

2.0 Attachments to the Letter of Tender:

In line with the requirement of the Bid Documents we enclose herewith the following Attachments to the Letter of Tender:

- (a) **Attachment 1:** Bid Security in the form of Bank Guarantee (in original) No.----- dated----- issued by -----[Name and address of the Bank] for a sum of *(Name of currency and amounts in words & figures)* valid upto and including [date 90 days after the period of bid validity] or NSIC Certificate.
- (b) **Attachment 2:** A power of attorney complying with the requirement of ITB Clause No. 5.1(a) indicating that the person(s) signing the bid have the authority to sign the bid and thus that the bid is binding upon us during the full period of its validity in accordance with the ITB Clause 17.
- (c) **Attachment 3:** The documentary evidence establishing in accordance with ITB Clause 3 that we are eligible to bid and in terms of ITB Clause 5.1(e) are qualified to perform the contract if our bid is accepted.
- (d) **Attachment 4:** Bids with Manufacturer(s):

Bids submitted by a bidder with sub-contractor/Manufacturer(s) shall comply with the following requirements:

- (i) Undertakings by the Bidder and his sub-contractor(s) / Manufacturer(s) that the Bidder /sub-contractors/Manufacturer shall be responsible for execution of that item of work for which they claim to have specific construction experience.
- (ii) A Joint Deed of Undertaking by the Bidder and his sub-contractor(s) / Manufacturer(s).

(e) **Attachment 5:** Bids by Merged/Acquired/subsidiary company:

Bids submitted by a subsidiary company shall comply with the following requirements:-

- (i) Undertaking by the Parent/holding Company evincing full technical and financial support to the subsidiary and commitment by the parent/holding company to take up the work itself in case of non- performance of the subsidiary company and to provide additional performance guarantee and also to enter into separate agreement with the Employer to that effect.

(f) **Attachment-6:** - Undertaking regarding blacklisting.

Undertaking regarding blacklisting in accordance with Sub-Clause-3.2 of ITB.

(g) **Attachment-7:** Joint Venture/Consortium Agreement (attested by Notary Public) and signed between Lead Partner and the other Partner(s) of JV/C as per Sub-Clause-13.2 (i).

(h) **Attachment-8:** Deviations

Attachment-8(i) without cost of withdrawal and Attachment-8 (ii) with cost of withdrawal of such deviations. [As per ITB 13.2 (h)]

#.....
.....

(Any other Attachment, if required, shall be added here)

3.0 Bill of Quantities:

- 3.1 In line with the requirements of the Bid Documents, we enclose herewith the Bill of Quantities, duly filled-in as per your proforma. Any other Schedule if required, shall be added here.
- 3.2 We are aware that the Bill of Quantities do not generally give a full description of the work to be performed under each item and we shall be deemed to have read the Technical Specifications and other Bid Documents and Drawings to ascertain the full scope of work included in each item while filling-in rates and prices. We agree that entered rates and prices shall be deemed to include for the full scope as aforesaid, including applicable taxes, duties, Cess & levies etc. and overhead and profit.
- 3.3 We declare that as specified in General Condition of Contract, the rates of Bill of Quantities shall be subject to adjustment. Our prices are inclusive of all the applicable taxes, duties, levies, Cess, royalties and octroi for the performance of the Contract.
- 3.4 We confirm that we have examined and are aware of the conditions and adequacy of infrastructural facilities, Construction Equipment and related spares, services lines, partially completed works etc. to be handed over by the Employer for performance of Contract.
- 4.0 We confirm that we shall get registered with the concerned VAT/Taxation Authorities, in Nepal, where the project is located. We also confirm that we shall produce the Permanent Account Number issued by Nepalese Income Tax Authorities to the EIC, within 28 days from the date of issue of Letter of Acceptance, if the work is awarded to us.
- 4.1 We confirm that no VAT/Entry tax/custom duty/Levies in any form shall be payable by you for the bought out items which are dispatched directly by us/our Assignee to the project site.
- 5.0 We undertake, if our bid is accepted, to commence the work immediately upon your Letter of Acceptance to us, and to achieve Completion of Works within the time stated in the Bid Documents.

6.0 If our bid is accepted, we undertake to provide a Performance Security in the form and amounts, and within the time specified in the Bid Documents.

7.0 We agree to abide by this bid for a period of 180 days from the date fixed for submission of bids as stipulated in the Bid Documents, and it shall remain binding upon us and may be accepted by you at any time before the expiration of that period.

8.0 Commissions or gratuities, if any, paid or to be paid by us to agents relating to this Bid, and to contract execution if we are awarded the contract, are listed below:

Name and Purpose of Commission address of agent gratuity	Amount and Currency	or
----- ---		
----- ---		
.....

(if none, state "none")".

9.0 Until a formal Contract is prepared and executed between us, this bid, together with your written acceptance thereof in the form of your Letter of Acceptance shall constitute a binding contract between us.

10.0 We understand that you are not bound to accept the lowest or any bid you may receive. We acknowledge the right of the Employer to reject our Bid without assigning any reason or otherwise and hereby waive our right to challenge the same on any account whatsoever.

11.0 All information provided in my/our Bid and attachments thereof is true and correct and all documents copies of which are attached with our Bid as attachments are true copies of their respective originals.

12.0 I/ We hereby certify that I/we / any of the Joint Venture/Consortium Members (the "JV Members") have not been banned /de-listed/black listed/debarred from business by Government of Nepal /any PSU/any Government Department during last 03 (three) years on grounds of corrupt/fraudulent practices and/or due to non-performance and/or by Ministry of Power, Government of India/SJVN/SAPDC on any grounds.

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- 13.0 I/We hereby declare that only the persons or firms interested in this proposal as principals are named in our Bid and that no other person or firm or company other than those mentioned in our Bid has any interest in this bid submission or in the Contract to be entered into and in good faith, without collusion or fraud, if our Bid is accepted as evidenced by issue of Letter of Acceptance to us.
- 14.0 We understand that you may annul the bidding process and reject all bids or accept or reject any of the bids at any time and that you are neither bound to accept any bid that you may receive nor to invite the Bidders to bid for Works, without incurring any liability to all or any of the Bidders.
- 15.0 We believe that we/our Joint Venture/Consortium continue to satisfy (ies) the eligibility criteria and meet(s) the requirements as specified in the Bid Documents and are/is qualified to submit a Bid in accordance therewith.
- 16.0 We declare that we/any Member of our Joint Venture/Consortium are/is not a Member of any other Joint Venture/Consortium submitting a Bid for the Works pursuant to the Bid Document.
- 17.0 We have studied all the Bid Documents carefully and understood all local and site conditions affecting the execution of the Works. We understand that except to the extent as expressly set forth in the Contract, we shall have no claim, right or title arising out of any documents or information provided to us by the Employer or in respect of any matter arising out of or concerning or relating to the bidding process including the award of Works to the selected bidder.
- 18.0 We acknowledge and confirm that upon issue of Letter of Acceptance to us consequent to acceptance of our Bid, a binding contract for execution of the Works shall come into existence on the terms set forth in our Bid together with your Letter of Acceptance. We undertake to commence the work upon issue of your said Letter of Acceptance, and to achieve Completion within the time stipulated in the Bid Documents.
- 19.0 We agree and understand that the Bid is subject to the provisions of the Bid Documents. In no case, we shall have any claim or right of whatsoever nature if the Works is not awarded to us or our Bid is not opened.

20. We, hereby, declare that only the persons or firms interested in this proposal as principals are named here and that no other persons or firms other than those mentioned herein have any interest in this proposal or in the Contract to be entered into, if the award is made on us, that this proposal is made without any connection with any other person, firm or party likewise submitting a proposal is in all respects for and in good faith, without corrupt/fraudulent/collusive/coercive practice .

Dated this.....day of.....2016

Thanking you, we remain,

Yours faithfully,

(Signature)
(Printed Name)
(Designation)
(Common Seal)

Date :

Place :

Business Address:

Country of Incorporation:

(State or Province to be indicated)

Name & Address of the Principal Officer:

ATTACHMENT - 1
{Refer ITB Clause-18}

(To be executed on Non-Judicial Stamp Paper of Appropriate value, as applicable)

Bid Security Form

Bank Guarantee

Date: _____

(Name of Contract)

To: (Name and address of Employer)

WHEREAS (name of Bidder) (hereinafter called "the Bidder") has submitted its Bid dated (date of bid) for the performance of the above-named Contract (hereinafter called "the Bid")

KNOW ALL PERSONS by these present that WE (name of Bank) of (address of bank) (hereinafter called "the Bank"), are bound unto (name of Employer) (hereinafter called "the Employer") for the sum of: (amount), for which payment well and truly to be made to the said Employer, the Bank binds itself, its successors and assigns by these presents.

THE CONDITIONS of this obligation are as follows:

1. If the Bidder withdraws its Bid during the period of bid validity specified by the Bidder in the Letter of Tender, or adopts corrupt or collusive or coercive or fraudulent practices.
2. If the Bidder, having been notified of the acceptance of its Bid by the Employer during the period of bid validity.
 - a) fails or refuses to sign the Contract Agreement when required, or
 - b) fails or refuses to submit the performance security in accordance with the Bid Documents.

WE undertake to pay to the Employer up to the above amount upon receipt of its first written demand, without the Employer having to substantiate its demand, provided that in its demand the Employer will mention that the amount claimed by it is due, owing to the occurrence of one or both of the two above-named CONDITIONS, and specifying the occurred condition or conditions.

(**)

This guarantee will remain in force up to and including (date 90 days after the period of bid validity), and any demand in respect thereof must reach the Bank not later than the above date.

For and on behalf of the Bank

-

in the capacity of

Common Seal of the Bank

Note: 1. (**) Employer may also present any of his demands at the counters of the(Name and address of the branch of the Bank in India).....for further relay to us.
(To be inserted in case of a foreign currency bank guarantee issued by an overseas bank outside India)

INSTRUCTIONS FOR EXECUTION OF BANK GUARANTEE FOR BID SECURITY

1. For the purpose of Stamp Duty on the Bank Guarantee, the law prevalent in the country of execution of Bank Guarantee shall prevail.
2. The executing officers of the Bank Guarantee for Earnest Money/Bid Security shall clearly indicate in (block letters) his name, designation, Power of Attorney No. / Signing Power No. as well as telephone/ fax numbers with full correspondence address of the issuing Guarantee etc.
3. Each page of the Bank guarantee for Earnest Money Deposit shall be duly signed/initialed by the executing officers and the last page shall be signed in full, indicating the particulars as aforesaid (sub-para 2) under the seal of the Bank.

Bank Guarantee in NPR should be executed on letter head of the "A" class commercial Bank. The issuing Bank shall be requested independently for verification/confirmation of the Bank Guarantee issued, non confirmation of which may lead to rejection of 'Bid Security. The Bank Guarantees in INR shall be acceptable only if these are issued by a Scheduled Bank of India duly counter-guaranteed by any 'A' class bank in Nepal.

6. Bank Guarantee for Bid security in original shall be submitted alongwith the Bid. However, the issuing Bank shall submit an unstamped duplicate copy of Bank Guarantee directly by registered post (A.D.) to the Employer (authority inviting tenders) with a forwarding letter.

***ATTACHMENT-2 (i)**

{Refer ITB Sub- Clause-5.1 a)}

(a typical sample Format to be adopted suitably)

POWER OF ATTORNEY

(On Non-Judicial Stamp Paper of Appropriate value / letter head of firm, as applicable under laws of country where POA is executed)

KNOW ALL MEN BY THESE PRESENTS THAT WE M/S
 A COMPANY
 ORGANISED AND EXISTING UNDER THE LAWS OF (NAME OF COUNTRY
) AND HAVING ITS REGISTERED/PRINCIPAL
 OFFICE /PLACE OF BUSINESS
 AT..... REPRESENTED BY (NAME OF
 PERSONS) (THE "EXECUTANT") DO HEREBY NOMINATE, CONSTITUTE,
 AUTHORIZE AND APPOINT MR. [.....*Name of Attorney*.....] , SON
 OF [.....], RESIDENT OF [.....]
 AND PRESENTLY EMPLOYED WITH], A COMPANY/ CORPORATION
 ORGANISED AND EXISTING UNDER THE LAWS OF
 (NAME OF THE COUNTRY) AND HAVING
 ITS REGISTERED OFFICE/PRINCIPAL PLACE OF BUSINESS AT
 AS OUR TRUE AND LAWFUL ATTORNEY (THE
 "ATTORNEY") TO DO IN OUR NAME AND ON OUR BEHALF ALL OR ANY
 OF THE FOLLOWING ACTS, DEEDS AND THINGS IN CONNECTION
 WITH OR IN RESPECT OF OR RELATING TO THE NOTICE INVITING
 TENDER NO. DATED (THE "NIT") ISSUED BY SJVN Arun-
 3Power Development Company (P) Ltd. (SAPDC), A COMPANY
 ORGANISED AND EXISTING UNDER THE LAWS OF NEPAL AND HAVING
 ITS REGISTERED OFFICE/PRINCIPAL PLACE OF BUSINESS (AT
 (THE "EMPLOYER") FOR THE EXECUTION,
 CONSTRUCTION AND DEVELOPMENT OF THE WORKS DESCRIBED IN
 THE NOTICE INVITING TENDER (NIT) (THE "WORKS") THAT IS TO
 SAY:

1. TO PREPARE, OFFER, SIGN, SUBMIT AND DELIVER TO THE EMPLOYER THE EXECUTANT'S BID FOR THE WORKS PURSUANT TO THE NIT (THE "BID") INCLUDING TO MAKE, SIGN (JV/Consortium Agreement), SUBMIT, DELIVER, EXECUTE, AND ACCEPT ALL DOCUMENTS, INCLUDING JOINT VENTURE/CONSORTIUM AGREEMENT, INFORMATION, APPLICATIONS AND OTHER WRITINGS NECESSARY FOR OR INCIDENTAL TO THE SIGNING, SUBMISSION AND DELIVERY OF THE BID TO THE EMPLOYER;

2. TO NEGOTIATE, ENTER INTO, SIGN AND EXECUTE, ACCEPT AND DELIVER ALL CONTRACTS UNDERTAKINGS, ACCEPTANCES AND OTHER WRITINGS CONSEQUENT UPON ACCEPTANCE OF THE EXECUTANT’S BID;
3. PARTICIPATE IN BIDDERS’ AND OTHER CONFERENCES AND PROVIDE ALL INFORMATION REQUIRED BY THE EMPLOYER AND TO FURNISH/SEEK CLARIFICATIONS ARISING OUT OF OR RELATING TO THE NIT AND, UPON AWARD OF THE CONTRACT CONSEQUENT TO THE ACCEPTANCE OF THE EXECUTANT’S BID BY THE EMPLOYER;
4. TO REPRESENT AND ACT ON BEHALF OF THE EXECUTANT IN RESPECT OF ALL MATTERS BEFORE THE EMPLOYER RELATING TO THE EXECUTANT TO BID AND UPON THE ACCEPTANCE OF THE EXECUTANT’S BID BY THE EMPLOYER INCLUDING THE RESULTANT CONTRAT ON SUCH THE ACCEPTANCE OF THE EXECUTANT’S BID (THE “CONTRACT”) IN RESPECT OF ALL MATTERS RELATING TO OR ARISING OUT OF OR CONCERNING THE CONTRACT AND TO GENERALLY DEAL WITH THE EMPLOYER ON BEHALF OF THE EXECUTANT IN ALL MATTERS ARISING OUT OF OR IN CONNECTION WITH OR RELATING TO OR ARISING OUT OF THE EXECUTANT’S BID. THE NIT AND THE CONTRACT IN THE EVENT OF ACCEPTANCE OF THE EXECUTANT’S BID BY THE EMPLOYER;
5. AND GENERALLY TO DO ANY AND ALL OTHER AND FURTHER ACTS, DEEDS AND THINGS WHICH ARE NECESSARY FOR OR INCIDENTAL TO OR DEEMED APPROPRIATE FOR MORE EFFECTUAL EXERCISE OF THE POWERS HEREBY CONFERRED.

AND We, the Executant above named do hereby agree and undertake to ratify and confirm and do hereby ratify and confirm all acts, deeds and things lawfully done or caused to be done by our said Attorney pursuant to and in exercise of the powers hereby conferred and all acts, deeds and things done or caused to be done by our said Attorney pursuant hereto shall always be deemed to be the acts, deeds and things done by the Company itself.

IN WITNESS WHEREOF, THIS POWER OF ATTORNEY ON THIS [.....] DAY OF [.....], [20.....].....

..... has been executed under the common seal of the Company, at -----(name of place).

For [Name of the Executant]

By

(Name of Officer)

Title

WITNESSES

1.

2.

[Notarized]

Notes:

- ◆ The mode of execution of the Power of Attorney should be in accordance with the procedure, if any, laid down by the applicable law and the charter documents of the executant(s) and when it is so required, the same should be under common seal affixed in accordance with the required procedure.
- ◆ The Bidder should submit for verification the extract of the charter documents and documents such as a resolution of its Board of Director/ power of attorney in favour of the person executing this Power of Attorney for delegation of power hereunder on behalf of the Bidder.

* Strike out the form, if not applicable for the bidder.

***ATTACHMENT-2 (ii)**

(a typical sample Format to be adopted suitably)

**POWER OF ATTORNEY OF LEAD MEMBER OF THE
CONSORTIUM/JOINT VENTURE**

Whereas the [Name and Address of the Employer] (the "Employer") has by its Notice Inviting Tender (NIT) No. dated (the "NIT") invited bids for construction of the works described therein (the "Works"); and

Whereas, _____, _____ and _____ (collectively the "Joint Venture" or "Consortium") being Members of the Joint Venture with _____ as its leader (the "Lead Member") are interested in bidding for the Works in accordance with the terms and conditions of the "Bid Documents", and

Whereas it is necessary for the Members of the Joint Venture to vest the Lead Member with all necessary power and authority to do for and on behalf of the Joint Venture, all acts, deeds and things as may be necessary in connection with the Joint Venture's bid for the Works and its execution.

NOW THEREFORE KNOW ALL MEN BY THESE PRESENTS WE

- (i) [.....], a company organized and existing under the laws of [.....] and having its registered office at [.....] represented by (name of Person) and
- (ii) _____, a company organized and existing under the laws of [.....] and having its registered office at [.....] represented by (name of Person) (Collectively the "JV Members") do hereby irrevocably designate, constitute, nominate, appoint and authorize the Lead Member _____, a company organized and existing under the laws of _____ and having its Registered Office at _____ as the Leader of the Joint Venture and our duly constituted true and lawful Attorney (hereinafter called the 'Attorney') to do for and in respect of or relating to proposed Bid of the Joint Venture for the Works in response to the NIT dated ---- (the "JV Bid") and in the event of acceptance of JV Bid in our name and on our behalf all or any of the following acts, deeds and things that is to say:
1. To represent the Joint Venture and each of the JV Members in all dealings with the Employer in relation to the JV Bid

and upon acceptance of the JV Bid and consequent award of the contract to the Joint Venture (the "Contract") with respect to all matter arising out of or relating or incidental to the Contract;

2. To prepare, sign, submit and deliver to the EMPLOYER the JV Bid for the works pursuant to the above NIT including to sign, submit and deliver, execute, accept and deliver all documents, information, applications and other writings necessary for or incidental to the signing, submission and delivery of the Bid.
3. To negotiate, enter into, sign and execute, accept and deliver the Contract and all other undertakings, acceptances and writings consequent upon acceptance of the JV Bid by the Employer;
4. Participate in Bidders and other conferences and provide all information required by the EMPLOYER and to furnish/seek clarifications arising out of or relating to the Bid Document and the JV Bid and the Contract in the event of acceptance of the JV Bid by the EMPLOYER;
5. To represent and act on behalf of the Joint Venture and the JV Members in respect of all matters before the EMPLOYER relating to the Joint Venture, the JV Bid and, upon the acceptance of the JV Bid by the EMPLOYER including the resultant Contract on such the acceptance of the JV Bid, in respect of all matters relating to or arising out of or concerning the Contract and to generally deal with the EMPLOYER on behalf of the Joint Venture and the JV Members in all matters arising out of or in connection with or relating to or arising out of the Bid Document, the JV Bid and the Contract in the event of acceptance of the JV Bid by the EMPLOYER;
6. To sub-delegate all or any of the powers hereby conferred to such person or persons including any employees of the Attorney and/or of all or any of the JV Members as the Attorney may in its sole discretion deem appropriate;
7. And generally to do any and all other and further acts, deeds and things which are necessary for or incidental to or deemed appropriate for more effectual exercise of the powers hereby conferred.

AND nothing contained herein shall derogate from the Attorney’s responsibility as leader of the Joint Venture to ensure performance of the Contract including performance of their respective portion of the Contract by the JV Members. Provided however all the JV Members shall be jointly and severally liable for performance of the Contract and failure of one or more of the JV Members to perform their respective portions of the Contract shall be deemed to be a default by all the JV Members.

AND we the above named JV Members do hereby declare that this power of Attorney shall remain valid, binding and irrevocable till the earlier of the completion of the Defect Notification Period in terms of the Contract(s) if the JV Bid is accepted by the Employer, or the award of the Works under the NIT dated ----- to any other bidder.

AND we the above named JV Members do hereby agree and undertake to ratify and confirm and do hereby ratify and confirm all acts, deeds and things lawfully done or caused to be done by our said Attorney pursuant to and in exercise of the powers hereby conferred and all acts, deeds and things done or caused to be done by our said Attorney in exercise of the power hereby conferred shall always be deemed to be the acts, deeds and things done by the Joint Venture Company.

In witness whereof we the JV Members above named have executed this Power of Attorney on this day of under their respective common seal(s), at ----- (name of place).

COMMON SEAL

(1) For
[.....]
By _____

[(Signature of authorized representative)]
Name:
Designation: Director.

The common Seal of [.....] has been affixed, pursuant to the resolution passed by its Board of Directors at their meeting held on [.....], in the presence of Mr. [.....], Director who has affixed his signatures hereinabove in confirmation thereof.

(2) For [-----]
By _____

(Signature of authorized representative)

Name:

Designation: Director.

The common Seal of [.....] has been affixed, pursuant to the resolution passed by its Board of Directors at their meeting held on [.....], in the presence of Mr. [.....], Director who has affixed his signatures hereinabove in confirmation thereof.

Note:

- ◆ The mode of execution of the Power of Attorney should be in accordance with the procedure, if any, laid down by the applicable law and the charter documents of the executants and when it is so required, the same should be under common seal affixed in accordance with the required procedure, and
- ◆ Shall be signed by the authorized representatives of each Member of the Joint Venture / Consortium.
- ◆ Copy of charter documents and documents such as resolution/other Authorization in favour of executants of Power of Attorney is attached hereto for verification.

* Strike out the form, if not applicable for the bidder.

ATTACHMENT - 3

Form of Declaration

(Refer ITB Sub-clause 5.1.e)

A DECLARATION IN RESPECT OF THE SUBMITTED BID DOCUMENTS/ PROPOSALS

Subject: In respect of National Competitive Bidding for Execution of **Package - _____ of _____ Hydroelectric Project.** It is declared without any reservation whatsoever that:

- 1) the submitted Techno-Commercial/Price Bid proposals are strictly in conformity with the documents issued by the Employer.
- 2) We are familiar with all the requirements of the Contract and has not been influenced by any statement or promise of any person of the Employer.
- 3) We are experienced and competent Bidder to perform the Contract to the satisfaction of Employer and are familiar with all general and special laws, acts, ordinances, rules and regulations of the Municipalities, District, State and Central Government of Nepal that may affect the work, its performance or personnels employed therein.
- 4) We hereby authorize the Employer to seek reference from our bankers for its financial position and undertake to abide by all labour welfare legislations.
- 5) The above statement submitted by us is true and correct to our best knowledge.

(To be Jointly Signed by all the authorized representatives of each of the Members of the Joint Venture or Consortium)

.....

N.B: WITHOUT THIS CERTIFICATE BID IS LIABLE TO BE REJECTED.

***ATTACHMENT- 4 (i)**
{Refer ITB Clause-5.3(i)}

UNDERTAKING FROM SUB-CONTRACTOR/ MANUFACTURER

{Refer ITB Clause-5.3(i)}

No:
.....

Date:

To,

_____.

Dear Sirs,

We, M/s..... having registered office atdo hereby undertake that in case work(Name of work) is awarded to M/s (Name of the Bidder), we shall execute the work of “_____” (the components of the work for which the Bidder has proposed to associate the sub-contractor/Manufacturer), as sub-contractor to M/s..... (Name of the Bidder) and we shall be responsible for successful completion of the job covered under our scope for which we shall submit a joint Deed of Undertaking as per approved format of Employer included in the Bid Document and also agree to provide an additional Performance Bank Guarantee of 3%(three percent) of value of sub-let portion of works in addition to normal Performance Bank Guarantee, as per the format included in the Bid Document.

We do hereby also confirm that we are not participating either as a sole Bidder or as a partner of a Joint Venture/consortium Bidder against the above Notice Inviting Tender.

Yours faithfully,

For & on behalf of M/s.
(Name & Address of the Manufacturer/Sub-Contractor)

(Office Seal)

Station:
Date:

Note: i) This letter of Authorization should be on the letterhead of the sub-contractor and should be signed by a person competent and having the Power of attorney to bind the sub-Contractor.

Power of Attorney in favour of this person to do so may be enclosed with this Letter of Undertaking.

ii) In case a bidder/JV has been qualified for any of the work on the credential of a proposed Manufacturer/sub-contractor of the bidder/JV partner, he shall be required to submit a joint deed of undertaking (as per agreed format) from the proposed Manufacturer/subcontractor and contractor for joint and several responsibility of execution of Work sub-contracted to the sub-contractor/Manufacturer.

* Strike out the form, if not applicable by the bidder.

ATTACHMENT- 4 (ii)*PROFORMA OF JOINT DEED OF UNDERTAKING BY THE SUB-CONTRACTOR/*Manufacturer* AND THE BIDDER/CONTRACTOR {Refer ITB Clause-5.3(ii)}****(ON NON-JUDICIAL STAMP PAPER OF APPROPRIATE VALUE)**

THIS DEED OF UNDERTAKING executed this day of..... Two Thousand and by M/s., a Company incorporated under the laws of and having its Registered Office at (hereinafter called the "Sub-Contractor/*Manufacturer*" which expression shall include its successors, executors and permitted assigns), and M/s....., a Company incorporated under the laws of having its Registered Office at (hereinafter called the "Bidder" which expression shall include its successors, executors and permitted/ assigns) in favour of SJVN Arun-3 Power Development Company (P) Ltd., Khandbari, Nepal (hereinafter called the "Employer" which expression shall include its successors, executors and permitted assigns)

WHEREAS the "Employer" invited Bids vide its Invitation No. for Construction of

AND WHEREAS ITB Clause No. 5.3(iii) of, Vol.-0 forming part of the Bid Documents inter-alia stipulates that in order to ensure serious participation of the Sub-contractor(s)/*Manufacturer* for work proposed to be executed by the Sub-contractor(s)/*Manufacturer*, a Joint Deed of Undertaking shall be required to be submitted by the Contractor and Sub-contractor(s) /*Manufacturer*

AND WHEREAS the Bidder has submitted its Bid to the Employer vide Reference No. dated based on the association of the Sub-Contractor.

NOW THEREFORE THIS UNDERTAKING WITNESSETH as under:

- 1.0 In consideration of the award of Contract by the Employer to the Bidder (hereinafter referred to as the "Contractor") we, the Sub-Contractor and the Bidder/Contractor do hereby declare that we shall be jointly and severally bound to the Employer, for the successful performance of the * (proposed sub-let works) in accordance with the Contract.
- 2.0 Without in any way affecting the generality and total responsibility in terms of this Deed of Undertaking, the Sub-

Contractor in particular hereby agrees to deploy and depute its technical personnel, equipment, manpower and/or other resources on continual basis throughout the construction period of the proposed sub-let works until its completion to discharge the obligations of the Contractor under the Contract.

- 3.0 This Deed of Undertaking shall be construed and interpreted in accordance with the laws of Nepal and the Courts Chainpur, district Sankhuwasabha, Nepal shall have exclusive jurisdiction in all matters arising under the Undertaking.
- 4.0 Apart from the Contractor’s Performance Guarantee, the Sub-Contractor/**Manufacturer** shall furnish as security, a Contract Performance Guarantee from its Bank in favour of the Employer in a form acceptable to the Employer. The value of such guarantee shall be equivalent to 3% (three percent) of value of the proposed sub-let works as identified in the Contract awarded by the Employer to the Bidder/Contractor and it shall be an additional guarantee for faithful performance/compliance of this Deed of Undertaking in terms of the Contract. The guarantee shall be unconditional, irrevocable and valid till the completion of the part of the Works executed by the Sub-Contractor. The Bank Guarantee amount shall be payable to the Employer on demand without any reservation or demur.
- 5.0 We, the Sub-Contractor/**Manufacturer** and the Bidder/Contractor agree that this Undertaking shall be irrevocable and shall form an integral part of the Contract and further agree that this Undertaking shall continue to be enforceable till it is discharged by the Employer. It shall become operative from the Commencement Date of the Contract.

IN WITNESS WHEREOF, the Sub-Contractor and the Bidder/Contractor have through their Authorized Representatives executed these presents and affixed Common seals of their respective Companies, on the day, month and year first above mentioned, at -----
(name of place).

WITNESS

For Sub-Contractor/Manufacturer

1.
(Signature)

Signature of Authorized
(Representative)

(Name in Block Letter)
(Office Address)

Name
Common Seal of

Company

.....

	For Bidder/Contractor
2. (Signature)	Signature of Authorized (Representative)
(Name in Block Letter)	Name.....
(Office Address)	Common Seal of
Company

This Joint Undertaking is to be given if the Contractor qualifies on the strength of Sub-Contractor.

(To be Notarized by Notary Public)

ATTACHMENT 5 (i)*UNDERTAKING BY THE PARENT/HOLDING COMPANY
{Refer ITB Clause-5.4 (i)}**

(On letter head of Parent/Holding Company)

No:

Date:.....

To,

(Name and Address of Employer)

Sub: Invitation for Bidding for Package _____ - of
_____ **HE Project,**
_____.

Dear Sirs,

We, M/s (Name of the Parent/Holding Company) having registered office at(Address of the Parent/Holding Company).....do hereby undertake that in case work of Construction of Package –C-3 of Arun-3 HEP is awarded to M/s (Name of the Bidder), who is participating in your subject Tender as a Sole Bidder/constituent of JV/Consortium partner, which is our subsidiary company, we on our strength/strength of -----(name of group company(ies)) under our control shall provide the full support for technical and financial requirements for the work "-----" (the scope of work of subsidiary company) and we shall be responsible for successful completion of the job covered under the scope of M/s(Name of Subsidiary company).

In case the Bidder, M/s(Name of Subsidiary company) gets qualified/techno-commercially responsive and awarded the work, We do hereby undertake;

- (i) to enter into a separate agreement with the Employer as per the Employer's approved format included in the Bid documents.
- (ii) to furnish an additional performance Bank guarantee of value equivalent to three (3%) percent of the Contract Price/three (3%) percent of the portion of work (where the Subsidiary Company is a Joint Venture Partner/Consortium Bidder) as the case may be, if the subsidiary Company is qualified on the strength of Parent Company or group company(ies) under the control of Parent/Holding Company.

We do hereby also confirm that we are not participating either as a sole Bidder or as a sub-contractor against the above Invitation.

Yours faithfully,

For & on behalf of M/s.
(Name & Address of the Parent/holding Company)

(Office Seal)

Station:

Date:

Note: This letter of authorization should be on the letterhead of the Parent/Holding Company and should be signed by a person competent and having the Power of attorney to bind the Parent/Holding Company. Power of Attorney in favour of this person to do so be enclosed with this Letter of Undertaking.

* : undertaking to be given by the parent/holding company if Subsidiary company was prequalified on the strength of parent/holding company.

ATTACHMENT-5 (ii)*PARENT/HOLDING COMPANY AGREEMENT**

(To be executed on non-judicial Stamp paper of appropriate value)
{Refer ITB Clause-5.4 (ii)}

(For sole Bidder)

THIS AGREEMENT IS MADE on this the..... day of between the SJVN Arun-3 Power Development Company (P) Ltd., Tumlingtar, Nepal (hereinafter referred to as the 'Employer' which expression shall unless repugnant to the subject or context or meaning thereof include its successors, administrators, executors and assigns) of the one part; and(name of Parent/holding Company) a company organized and existing under the laws of..... and having its Principal Office at (Hereinafter referred to as the "Parent/holding Company" which expression shall unless repugnant to the subject or context or meaning thereof include its successors, administrators, executors and assigns) of the other part;

WHEREAS on the Parent/holding Company's commitment to provide full support for technical and financial requirements and be responsible and liable for successful completion of the works being awarded to M/s..... (name of Subsidiary Company) and further agreeing to enter into a separate agreement with the Employer besides furnishing an additional Performance Bank Guarantee of value equivalent to 3% of the Contract Price, the Employer has entered into a Contract with M/s (hereinafter referred to as the "Bidder" which expression shall unless repugnant to the subject or context or meaning thereof include its successors, administrators, executors and permitted assigns) for the execution of Package - _____, _____ H.E. Project. (hereinafter referred to as the "Contract").

And whereas, in consideration of the aforesaid commitment, the Parent/holding Company hereby enters into this agreement with the Employer for providing full support for technical and financial requirements to the Bidder and be responsible and liable for successful performance and completion of the works described in the said Contract on the following terms and conditions:

NOW THEREFORE THE PARTIES HERETO HEREBY AGREE AND THIS AGREEMENT WITNESSETH AS FOLLOWS:

1. In this Agreement except where the context otherwise requires, the following expressions shall have the meaning hereinafter respectively assigned to them:

-
2. "Contract" shall mean the Contract dated entered into between the Employer and the Bidder for the execution of the Work described therein for Package - _____, _____ H.E. Project
- 3.(a) The Parent/holding Company hereby agrees to the Employer to ensure due and faithful performance of the obligations and liabilities by the Bidder under the Contract and remain responsible to irrevocably and unconditionally provide full technical and financial support to the Bidder for completion of the works covered under the Contract. The provisions of Contract shall mutatis-mutandis apply to the Parent/holding Company.
3. (b) In the event of breach and/ or failure on the part of the Bidder to perform or fulfill any of its obligations and liabilities under the Contract, the Employer may at its discretion call upon the Parent/holding Company and the Parent/holding Company shall be obliged to execute and perform or cause to be executed and performed and to satisfy the obligations and liabilities of the Bidder under the Contract in accordance with the terms and conditions thereof without prejudice to any other right or remedy, besides encashing the Bank guarantee(s).
- 3(c) The Parent/holding Company shall indemnify and keep indemnified and harmless the Employer at all times against any loss, damage, cost charge and expense whatsoever that may be suffered or incurred by or caused to the Employer on account of such breach.
- 3(d) It shall not be necessary for the Employer to proceed against the Bidder before proceeding against the Parent/holding Company and the Parent/holding Company shall be liable to fulfill its obligations and liabilities hereunder notwithstanding the Employer having undertaken any proceedings and/or obtaining any security from the Bidder for the performance of its obligations under the Contract. In order to give affect to this Agreement, the Employer may at its option be entitled to act as if the Parent/holding Company was the Bidder for successful completion of the works.

In the event, qualification of the Bidder/Subsidiary Company is considered on the credentials of another Subsidiary/Group Company under the same Apex 'Parent/holding Company' and due to any reason whatsoever, 'Parent/holding Company' or any other Group Company wants to divest its investment in the direct or indirect subsidiary (ies) as a result of which any

of these companies may not remain subsidiary (ies) of the 'Parent/holding Company' then the 'Parent/holding Company' undertakes to ensure the performance of the works by arranging the required inputs in case of failure of Subsidiary Company.

- 3(e) However, where the Bidder disputes the occurrence of a breach under the Contract and if such dispute is referred to arbitration in terms of Conditions of the Contract, the Bidder is obliged to carry on the works under the Contract. In case, during the pendency of the dispute in arbitration, the Bidder does not carry on the work satisfactorily, the Employer by notice to the Parent/holding Company shall be entitled to invoke this Agreement, as if a breach had occurred for the purpose of Clause 3(b) hereinabove.
4. It is agreed that the obligations undertaken by the Parent/holding Company hereunder shall be performed by it notwithstanding any difference or dispute between the Employer and the Bidder pending before any court, tribunal, arbitration or any other authority or forum.
5. This Agreement shall come into force and effect upon the Commencement Date of the Contract/issuance of 'Letter of Acceptance' and shall remain in force and effective till the date of expiry of the Defects Notification Period by the Employer pursuant to the Conditions for the Contract.
6. This guarantee is in addition to and without prejudice to the securities offered by and on behalf of Bidder to the Employer and all rights and remedies in respect thereof be reserved. This guarantee shall be a continuing guarantee and be in force notwithstanding discharge of Bidder by operation of any law or insolvency /bankruptcy /winding up/dissolution of the Bidder.
7. The Employer shall have the full liberty from time to time to vary any of the terms and conditions of the Contract by mutual agreement between the Employer and the Bidder and to extend time for performance thereunder by the Bidder or any other party thereto in accordance with the terms of the Contract and / or to postpone for any time and from time to time any of the powers exercisable by the Employer against the Bidder and either to enforce or forebear from enforcing any of the terms and conditions of the Contract and/or the securities available to the Employer

from the Bidder and the Parent/holding Company shall not be released from its obligations and liabilities under this Agreement in any manner whatsoever by any exercise by the Employer of the liberty and / or the rights with reference to the matters as aforesaid or by reason of time being given to the Bidder or any other act of forbearance, waiver or omission on the part of Employer or any indulgence by the Employer to the Bidder or of any other matter or thing whatsoever which under the law relating to sureties would but for this provision have the effect of releasing the Parent/holding Company from its obligations and liabilities hereunder.

8. Nothing contained in this Agreement shall be construed or interpreted in any way as modifying or amending or relieving in any manner whatsoever the Bidder from their obligations under the Contract.
9. This Agreement shall be interpreted and be governed under the Law of Nepal.
10. Any dispute or difference which may arise between the parties out of or in connection with this Agreement and which the Parties are unable to settle amicably shall be settled by reference to arbitration as per General/Particular Conditions of Contract. The venue of arbitration shall be _____ and the arbitration shall be conducted in accordance with Nepal Arbitration Act – 2055 (1999). The courts of _____ shall have exclusive jurisdiction provided however that any award made in such arbitration shall be enforceable in any court of competent jurisdiction.

IN WITNESS WHEREOF THE PARTIES HERETO HAVE PUT THEIR HANDS HEREUNTO ON THE..... DAY MONTH ANDYEAR FIRST ABOVE WRITTEN AT

For and on behalf of the Employer
(through _____ authorized representative)

For and on behalf of the Parent/holding Company
(through _____ duly authorized representative)

Witnesses:
1. _____(Signatures)
(Name & Address)
2. _____(Signatures)

Witnesses:
1. _____(Signatures)
(Name & Address)
2. _____(Signatures)

(Name & Address)

(Name & Address)

* Strike out the form, if not applicable by the bidder.

(Notarized by Notary Public)

***ATTACHMENT- 5 (iii)**

(To be executed on non-judicial Stamp paper of appropriate value)

PARENT/HOLDING COMPANY AGREEMENT**{Refer ITB Clause-5.4 (iii)}**

(For Joint Venture/Consortium)

THIS AGREEMENT IS MADE on this the..... day of between the SJVN Arun-3 Power Development Company (P) Ltd., Khandbari, Nepal (hereinafter referred to as the 'Employer' which expression shall unless repugnant to the subject or context or meaning thereof include its successors, administrators, executors and assigns) of the one part; and(name of Parent/holding Company) a company organized and existing under the laws of..... and having its Principal Office at (Hereinafter referred to as the "Parent/holding Company" of the Joint Venture Partner M/swhich expression shall unless repugnant to the subject or context or meaning thereof include its respective successors, administrators, executors and assigns) of the other part;

WHEREAS on the Parent/holding Company's commitment to provide full support for technical and financial requirements and be responsible and liable for successful completion of the scope of works of M/s(name of Subsidiary Company) being awarded to Joint Venture of M/s..... (name of Joint Venture) and further agreeing to enter into a separate agreement with the Employer besides furnishing an additional Performance Bank Guarantee of value equivalent to 3% of the Contract Price to the portion of work of M/s of Joint Venture, the Employer has entered into a Contract with the Joint Venture comprising M/s and M/s(hereinafter referred to as the "Bidder" which expression shall unless repugnant to the subject or context or meaning thereof include their successors, administrators, executors and permitted assigns) for the execution of Package - _____, _____ H.E. Project. (hereinafter referred to as the "Contract").

And whereas, in consideration of the aforesaid commitment, the Parent/holding Company hereby enters into this agreement with the Employer for providing full support for technical and financial requirements to its Subsidiary M/s and be responsible and liable for successful performance and completion of the works described in the said Contract on the following terms and conditions:

NOW THEREFORE THE PARTIES HERETO HEREBY AGREE AND THIS AGREEMENT WITNESSETH AS FOLLOWS:

1. In this Agreement except where the context otherwise requires, the following expressions shall have the meaning hereinafter respectively assigned to them:
2. "Contract" shall mean the Contract dated entered into between the Employer and the Bidder for the execution of the Work described therein for Package - _____, _____ H.E. Project.
- 3.(a) The Parent/holding Company hereby agrees to the Employer to ensure due and faithful performance of the obligations and liabilities by M/s (name of Subsidiary Company) under the Contract and remain responsible to irrevocably and unconditionally provide full technical and financial support to M/s (name of Subsidiary Company) for completion of the works covered under the Contract. The provisions of Contract shall mutatis-mutandis apply to the Parent/holding Company.
3. (b) In the event of breach and/ or failure on the part of M/s (name of Subsidiary Company) to perform or fulfill any of its obligations and liabilities under the Contract, the Employer may at its discretion call upon the Parent/holding Company and the Parent/holding Company shall be obliged to execute and perform or cause to be executed and performed and to satisfy the obligations and liabilities of the Bidder under the Contract in accordance with the terms and conditions thereof without prejudice to any other right or remedy, besides encausing the Bank guarantee(s).
- 3(c) The Parent/holding Company shall indemnify and keep indemnified and harmless the Employer at all times against any loss, damage, cost charge and expense whatsoever that may be suffered or incurred by or caused to the Employer on account of such breach.
- 3(d) It shall not be necessary for the Employer to proceed against the Bidder before proceeding against the Parent/holding Company and the Parent/holding Company shall be liable to fulfill its obligations and liabilities hereunder notwithstanding the Employer having undertaken any proceedings and/or obtaining any security from the Bidder for the performance of its obligations under the Contract. In order to give affect to this Agreement, the Employer may at its option be entitled to act as if the Parent/holding Company was the Bidder for successful completion of the works.

In the event, qualification of the Bidder/Subsidiary Company is considered on the credentials of another Subsidiary/Group Company under the same Apex 'Parent/holding Company' and due to any reason whatsoever, 'Parent/holding Company' or any other Group Company wants to divest its investment in the direct or indirect subsidiary (ies) as a result of which any of these companies may not remain subsidiary (ies) of the 'Parent/holding Company' then the 'Parent/holding Company' undertakes to ensure the performance of the works by arranging the required inputs in case of failure of Subsidiary Company.

- 3(e) However, where the Bidder disputes the occurrence of a breach under the Contract and if such dispute is referred to arbitration in terms of Conditions for the Contract, the Bidder is obliged to carry on the works under the Contract. In case, during the pendency of the dispute in arbitration, the Bidder does not carry on the work satisfactorily, the Employer by notice to the Parent/holding Company shall be entitled to invoke this Agreement, as if a breach had occurred for the purpose of Clause 3(b) hereinabove.
4. It is agreed that the obligations undertaken by the Parent/holding Company hereunder shall be performed by it notwithstanding any difference or dispute between the Employer and the Bidder pending before any court, tribunal, arbitration or any other authority or forum.
5. This Agreement shall come into force and effect upon the Commencement Date of the Contract/issuance of 'Letter of Acceptance' and shall remain in force and effective till the date of expiry of the Defects Notification Period by the Employer pursuant to the Conditions for the Contract.
6. This guarantee is in addition to and without prejudice to the securities offered by and on behalf of Bidder to the Employer and all rights and remedies in respect thereof be reserved. This guarantee shall be a continuing guarantee and be in force notwithstanding discharge of Bidder by operation of any law or insolvency /bankruptcy /winding up/dissolution of the Bidder.
7. The Employer shall have the full liberty from time to time to vary any of the terms and conditions of the Contract by mutual agreement between the Employer and the Bidder and to extend time for performance thereunder by the Bidder or

any other party thereto in accordance with the terms of the Contract and / or to postpone for any time and from time to time any of the powers exercisable by the Employer against the Bidder and either to enforce or forebear from enforcing any of the terms and conditions of the Contract and/or the securities available to the Employer from the Bidder and the Parent/holding Company shall not be released from its obligations and liabilities under this Agreement in any manner whatsoever by any exercise by the Employer of the liberty and / or the rights with reference to the matters as aforesaid or by reason of time being given to the Bidder or any other act of forbearance, waiver or omission on the part of Employer or any indulgence by the Employer to the Bidder or of any other matter or thing whatsoever which under the law relating to sureties would but for this provision have the effect of releasing the Parent/holding Company from its obligations and liabilities hereunder.

8. Nothing contained in this Agreement shall be construed or interpreted in any way as modifying or amending or relieving in any manner whatsoever the Bidder from their obligations under the Contract.
9. This Agreement shall be interpreted and be governed under the Law of Nepal.
10. Any dispute or difference which may arise between the parties out of or in connection with this Agreement and which the Parties are unable to settle amicably shall be settled by reference to arbitration as per General/Particular Conditions of Contract. The venue of arbitration shall be _____ and the arbitration shall be conducted in accordance with the Nepal Arbitration Act – 2055 (1999).. The courts of _____ shall have exclusive jurisdiction provided however that any award made in such arbitration shall be enforceable in any court of competent jurisdiction.

IN WITNESS WHEREOF THE PARTIES HERETO HAVE PUT THEIR HANDS
HEREUNTO ON THE..... DAY MONTH ANDYEAR FIRST ABOVE
WRITTEN AT

For and on behalf of the
Employer
(through _____ authorized
representative)

For and on behalf of the
Parent/holding Company
(through _____ duly authorized
representative)

Witnesses:

Witnesses:

1. _____
(Signatures)

(Name & Address)

2. _____
(Signatures)

(Name & Address)

1. _____
(Signatures)

(Name & Address)

2. _____
(Signatures)

(Name & Address)

* Strike out the form, if not applicable for the bidder

ATTACHMENT- 6**Integrity Pact****Between**

SJVN Arun-3 Power Development Company (P) Ltd. (SAPDC), a company incorporated under the Companies Act 2063 and having its registered office at Lokanthali, Kathmandu, Nepal, hereinafter referred to as “The Employer” which expression shall mean and include, unless the context otherwise requires, his successors in office and assigns of the **First Part.**

And

M/s....., a company/ firm/ individual (status of the company) constituted in accordance with the relevant law in the matter and having its registered office at represented by Sh.Prop. hereinafter referred to as “The Bidder/Contractor” which expression shall mean and include, unless the context otherwise requires, his successors and permitted assigns of the **Second Part.**

WHEREAS the Employer proposes to procure under laid down organizational procedures, contract for “Hydro-mechanical Works - TRT Gates and associated equipment for Arun-3 HEP and associated equipment for Lower Arun HEP in Sankhuwasabha Distt. of Nepal” and the Bidder/contractor is willing to offer against TENDER NO/REF.: ICB-P&C-AHEP-HM-C-6/2023-94 dated 13.02.2023.

NOW, THEREFORE,

To avoid all forms of corruption by following a system that is fair, transparent and free from any influence/prejudiced dealings prior to, during and subsequent to the currency of the contract to be entered into with a view to:-

Enabling the Employer to obtain the desired said (work/ goods/ services) at a competitive price in conformity with the defined specifications by avoiding the high cost and the distortionary impact of corruption on public procurement, and

Enabling the Bidder(s)/Contractor(s) to abstain from bribing or indulging in any corrupt practice in order to secure the contract by providing assurance to them that their competitors will also abstain from bribing and other corrupt practices and the Employer will commit to prevent corruption, in any form, by its officials by following transparent procedures.



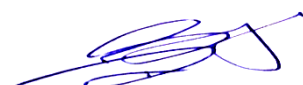
1.0 Commitments of the Employer

- 1.1 The Employer undertakes that no official of the Employer, connected directly or indirectly with the contract, will demand, take a promise for or accept, directly or through intermediaries, any bribe, consideration, gift, reward, favour or any material or immaterial benefit or any other advantage from the Bidder/Contractor, either for themselves or for any person, organization or third party related to the contract in exchange for an advantage in the bidding process, bid evaluation, contracting or implementation process related to the contract.
- 1.2 The Employer will, during the pre-contract stage, treat all the Bidders/Contractors alike, and will provide to all the Bidders/Contractors the same information and will not provide any such information to any particular Bidder/Contractor which could afford an advantage to that particular Bidder/Contractor in comparison to other Bidders/Contractors.
- 1.3 All the officials of the Employer will report to the appropriate Authority any attempted or completed breaches of the above commitments as well as any substantial suspicion of such a breach.
- 1.4 In case any such preceding misconduct on the part of such official(s) is reported by the Bidder to the Employer with full and verifiable facts and the same is prima facie found to be correct by the Employer, necessary disciplinary proceedings, or any other action as deemed fit, including criminal proceedings may be initiated by the Employer or Independent External Monitor and such a person shall be debarred from further dealings related to the contract process. In such a case while an enquiry is being conducted by the Employer the proceedings under the contract would not be stalled.

2.0 Commitments of the Bidder(s)/Contractor(s)

The Bidder(s)/Contractor(s) commits itself to take all measures necessary to prevent corrupt practices, unfair means and illegal activities during any stage of its bid or during any pre-contract or post-contract stage in order to secure the contract or in furtherance to secure it and in particular commit itself to the following :-

- 2.1 The Bidder(s)/Contractor(s) will not offer, directly or through intermediaries, any bribe, gift, consideration, reward, favour, any material or immaterial benefit or other advantage, commission, fees, brokerage or inducement to any official of the Employer, connected directly or indirectly with the bidding process, or to any person, organization or third party related to the contract in exchange for any advantage in the bidding, evaluation, contracting and implementation of the contract.
- 2.2 The Bidder/Contractor further undertakes that it has not given, offered or promised to give, directly or indirectly any bribe, gift consideration, reward, favour, any material or immaterial benefit or other advantage, commission, fees, brokerage or



inducement to any official of the Employer or otherwise in procuring the Contract or forbearing to do or having done any act in relation to the obtaining or execution of the contract or any other contract with Employer for showing or forbearing to show favour or disfavour to any person in relation to the contract or any other contract with Employer.

- 2.3 The Bidder(s)/Contractor(s) shall disclose the name and address of agents and representatives and Indian Bidder(s)/Contractor(s) shall disclose their foreign principals or associates.
- 2.4 The Bidder(s)/Contractor(s) shall disclose the payments to be made by them to agents/brokers or any other intermediary, in connection with this bid/contract
- 2.5 The Bidder, either while presenting the bid or during pre-contract negotiations or before signing the contract, shall disclose any payments he has made, is committed to or intends to make to officials of the Employer or their family members, agents, brokers or any other intermediaries in connection with the contract and the details of services agreed upon for such payments.
- 2.6 The Bidder/Contractor will not collude with other parties interested in the contract to impair the transparency, fairness and progress of the bidding process, bid evaluation, contracting and implementation of the contract.
- 2.7 The Bidder/Contractor will not accept any advantage in exchange for any corrupt practice, unfair means and illegal activities.
- 2.8 The Bidder/Contractor shall not use improperly, for purposes of competition or personal gain, or pass on to others, any information provided by the Employer as part of the business relationship, regarding plans, technical proposals and business details, including information contained in electronic data carrier. The Bidder/Contractor also undertakes to exercise due and adequate care lest any such information is divulged.
- 2.9 The Bidder(s)/Contractor(s) commits to refrain from giving any complaint directly or through any other manner without supporting it with full and verifiable facts.
- 2.10 The Bidder(s)/Contractor(s) shall not instigate or cause to instigate any third person to commit any of the actions mentioned above.
- 2.11 If the Bidder/Contractor or any employee of the Bidder/Contractor or any person acting on behalf of the Bidder/Contractor, either directly or indirectly, is a relative of any of the officers of the Employer, or alternatively, if any relative of an officer of the Employer has financial interest/stake in the Bidder(s)/Contractor(s) firm (excluding Public Ltd. Company listed on Stock Exchange), the same shall be disclosed by the Bidder/Contractor at the time of filling of tender.



The term ‘relative’ for this purpose would be as defined in Section 2(77) of the Companies Act, 2013 (India).

2.12 The Bidder(s)/Contractor(s) shall not lend to or borrow any money from or enter into any monetary dealings or transactions, directly or indirectly, with any employee of the Employer.

2.13 The Bidder/supplier shall follow all rules and regulations of **India and/or Nepal**.

3.0 Previous Transgression

3.1 The Bidder(s)/Contractor(s) declares that no previous transgression occurred in the last three years immediately before signing of this Integrity Pact, with any other company in any country in respect on any corrupt practices envisaged hereunder or with any Public Sector Enterprise / Government Department in India and in Nepal (*Employer’s country*).

3.2 The Bidder agrees that if it makes incorrect statement on this subject, Bidder can be disqualified from the tender process or the contract, if already awarded, can be terminated for such reason.

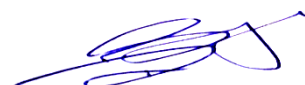
4.0 Earnest Money (Security Deposit)

The provision regarding Earnest Money/Security Deposit as detailed in the Notice Invitation Tender (NIT)/Instruction to Bidders (ITB) of the tender document is to be referred.

5.0 Sanctions for Violations

5.1 Any breach of the aforesaid provisions by the Bidder/Contractor or any one employed by it or acting on its behalf shall entitle the Employer to take action as per the procedure mentioned in the “**Guidelines on Banning of Business Dealings**” attached as **Annex-A** and initiate all or any one of the following actions, wherever required:-

- (i) To immediately call off the pre contract negotiations without assigning any reason or giving any compensation to the Bidder/Contractor. However, the proceedings with the other Bidder(s)/Contractor(s) would continue.
- (ii) The Earnest Money Deposit (in pre-contract stage) and/or Security Deposit/Performance Bond (after the contract is Signed) shall stand forfeited either fully or partially, as decided by the Employer and the Employer shall not be required to assign any reason thereof.
- (iii) To immediately cancel the contract, if already signed, without giving any compensation to the Contractor. The Bidder/Contractor shall be liable to pay compensation for any loss or damage to the Employer resulting from such cancellation/rescission and the Employer shall be entitled to deduct the amount



- so payable from the money(s) due to the Bidder/Contractor.
- (iv) To encash the Bank guarantee, in order to recover the dues if any by the Employer, along with interest as per the provision of contract.
 - (v) To debar the Bidder/Contractor from participating in future bidding processes of Employer, as per provisions of “Guidelines on Banning of Business Dealings” (**Annex-A**), which may be further extended at the discretion of the Employer.
 - (vi) To recover all sums paid in violation of this Pact by Bidder(s)/Contractor(s) to any middleman or agent or broker with a view to securing the contract.
 - (vii) In cases where irrevocable Letters of Credit have been received in respect of any contract signed by the Employer with the Bidder/ Contractor, the same shall not be opened/operated.
 - (viii) Forfeiture of Performance Security in case of a decision by the Employer to forfeit the same without assigning any reason for imposing sanction for violation of this Pact.

- 5.2 The Employer will be entitled to take all or any of the actions mentioned at para 6.1 (i) to (viii) of this Pact also on the Commission by the Bidder/Contractor or any one employed by it or acting on its behalf (whether with or without the knowledge of the Bidder/Contractor), of an offence as defined in Chapter IX of the Indian Penal Code, 1860 or Prevention of Corruption Act, 1988 or any other statute enacted for prevention of corruption in Employer’s country.
- 5.3 The decision of the Employer to the effect that a breach of the provisions of this Pact has been committed by the Bidder/Contractor shall be final and conclusive on the Bidder/Contractor. However, the Bidder/Contractor can approach the Independent External Monitor(s) appointed for the purposes of this Pact.

6.0 Independent External Monitor(s)

- 6.1 The Employer has appointed Independent External Monitor(s) (hereinafter referred to as Monitors) for this Pact.
- 6.2 The task of the Monitors shall be to review independently and objectively, whether and to what extent the parties comply with the obligations under this Pact.
- 6.3 The Monitors shall not be subject to instructions by the representatives of the parties and perform their functions neutrally and independently.
- 6.4 Both the parties accept that the Monitors have the right to access all the documents relating to the project/procurement, including minutes of meetings. The right to access records should only be limited to the extent absolutely necessary to investigate the issue related to the subject tender/contract.
- 6.5 As soon as the Monitor notices, or has reason to believe, a violation of this Pact, he will so inform CMD/CEO/MD of Employer and request Employer to discontinue

or take corrective action, or to take other relevant action. The Monitor can in this regard submit non-binding recommendations. Beyond this the Monitor has no right to demand from the parties that they act in a specific manner, refrain from action or tolerate action.

- 6.6 The Bidder(s)/Contractor(s) accepts that the Monitor has the right to access without restriction, to all Project documentation of the Employer including that provided by the Bidder/Contractor. The Bidder/Contractor will also grant the Monitor, upon his request and demonstration of a valid interest, unrestricted and unconditional access to his project documentation. The same is applicable to Subcontractor(s). The Monitor shall be under contractual obligation to treat the information and documents of the Bidder/Contractor/Subcontractor(s) with confidentiality.
- 6.7 The Employer will provide to the Monitor sufficient information about all meetings among the parties related to the project provided such meetings could have an impact on the contractual relations between the parties. The parties will offer to the Monitor the option to participate in such meetings as and when required.
- 6.8 The Monitor will submit a written report to the CMD/CEO/MD of Employer within 10 days from the date of reference or intimation to him by the Employer/Bidder and should the occasion arise, submit proposals for correcting problematic situations.
- 6.9 The word ‘Monitor’ would include both singular and plural.

7.0 Facilitation of Investigation

In case of any allegation of violation of any provisions of this Pact or payment of commission, the Employer or its agencies shall be entitled to examine all the documents including the Books of Accounts of the Bidder/Contractor and the Bidder/Contractor shall provide necessary information and documents in English and shall extend all possible help for the purpose of such examination.

8.0 Law and Place of Jurisdiction

This Pact is subject to Nepal’s Law. The place of performance and jurisdiction is the Registered Office of the Employer. The arbitration clause provided in the tender document/contract shall not be applicable for any issue/dispute arising under Integrity Pact.

9.0 Other Legal Actions


- 9.1 The actions stipulated in this Integrity Pact are without prejudice to any other legal action that may follow in accordance with the provisions of the extant law in force relating to any civil or criminal proceedings.
- 9.2 Changes and supplements as well as termination notice need to be made in writing.
- 9.3 If the Contractor is a partnership or a consortium or a joint venture, this pact must be signed by all partners of the consortium/joint venture.



10.0 Validity

- 10.1 The validity of this Integrity Pact shall be from date of its signing and extend upto 5 years or the complete execution of the contract to the satisfaction of both the Employer and the Bidder/Contractor/Seller, including warranty period, whichever is later. In case BIDDER is unsuccessful, this Integrity Pact shall expire after six months from the date of the signing of the contract or six months from the date of opening of price bids, whichever is earlier.
- 10.2 Should one or several provisions of this Pact turn out to be invalid, the remainder of this Pact shall remain valid. In this case, the parties will strive to come to an agreement to their original intention.

11.0 The Parties hereby sign this Integrity Pact at _____ on _____.

Employer 

Name of the Officer: **Rakesh Singh**

Designation: **CE (P&C)**

Place: Tumlingtar, nepal

Date-----

Witness1. _____

Bidder

(Authorised Person)

(Name of the Person)

Designation

Place-----

Date-----

Witness1. _____

(Name and address)

2. _____

(Name and address)

(Name and address)

2. _____

(Name and address)

Annex-A (with Integrity Pact)

GUIDELINES ON BANNING OF BUSINESS DEALINGS

1.0 Introduction

- 1.1 Employer deals with Agencies viz. parties/ contractors/ suppliers/ bidders, who are expected to adopt ethics of highest standards and a very high degree of integrity, commitments and sincerity towards the work undertaken. It is not in the interest of Employer to deal with Agencies who commit deception, fraud or other misconduct in the tendering process.
- 1.2 Since banning of business dealings involves civil consequences for an Agency concerned, it is incumbent that adequate opportunity of hearing is provided and the explanation, if tendered, is considered before passing any order in this regard keeping in view the facts and circumstances of the case.

2.0 Scope

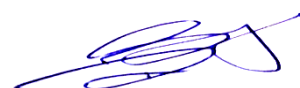
- 2.1 The Information for Bidders/ Instruction to Bidders/Notice Inviting Tender/Notice Inviting Quotations and even the General Conditions of Contract (GCC) of Employer generally provide that Employer shall have the rights to remove from list of approved suppliers / contractors or to ban business dealings if any Agency has been found to have committed misconduct or fraud or anything unethical not expected from a reputed contractor.
- 2.2 The procedure of (i) Removal of Agency from the List of approved suppliers / contractors; (ii) Suspension and (iii) Banning of Business Dealing with Agencies, has been laid down in these guidelines.
- 2.3 These guidelines shall apply to all the Projects/ Power Stations/ Regional Offices/ Liaison Offices of SJVN including its subsidiaries/JVs.
- 2.4 It is clarified that these guidelines do not deal with the poor performance of the contractors/ Agencies.
- 2.5 The banning shall be with prospective effect, i.e. future business dealings.

3.0 Definitions

In these Guidelines, unless the context otherwise requires:

- i) **“Party / Contractor / Supplier / Bidders”** shall mean and include a public limited company or a private limited company, a joint Venture, Consortium, HUF, a firm whether registered or not, an individual, cooperative society or an association or a group of persons engaged in any commerce, trade, industry, etc. “Party / Contractor/ Supplier / Bidder’ in the context of these guidelines is indicated as ‘Agency’.
- ii) **“Unit” shall** mean the Project/ Power Station/ Regional Office/ Liaison Office.
- iii) **“Competent Authority” and ‘Appellate Authority’** shall mean the following:

The concerned Director shall be the ‘Competent Authority’ for the purpose of



these guidelines.

CMD, SJVN shall be the ‘Appellate Authority’ in respect of such cases.

- iv) **“Investigating Committee”** shall mean any Officer/Committee appointed by Competent Authority to conduct investigation.
- v) **“List of approved Agencies viz Parties / Contractors / Suppliers/Bidders”** shall mean and include list of Parties/ Contractors / Suppliers / Bidders etc if registered with Employer.

4.0 Initiation of Banning / Suspension

Action for banning /suspension business dealings with any Agency shall be initiated by the department responsible for invitation of bids after noticing the irregularities or misconduct on the part of Agency concerned. Besides the concerned department, Vigilance Department of each Unit/ Corporate Vigilance may also be competent to initiate such action.

5.0 Suspension of Business Dealings.

- 5.1 If the conduct of any Agency dealing with Employer is under investigation, the Competent Authority may consider whether the allegations (under investigation) are of a serious nature and whether pending investigation, it would be advisable to continue business dealing with the Agency. If the Competent Authority, after consideration of the matter including the recommendation of the Investigating Committee, if any, decides that it would not be in the interest to continue business dealings pending investigation, it may suspend business dealings with the Agency. The order of suspension would operate for a period not more than six months and may be communicated to the Agency as also to the Investigating Committee. The Investigating Committee may ensure that their investigation is completed and whole process of final order is over within such period. However, if investigations are not completed in six months time, the Competent Authority may extend the period of suspension by another three months, during which period the investigations must be completed.
- 5.2 The order of suspension shall be communicated to all Departmental Heads of SJVN including its subsidiaries and JVs and Heads of the Units. During the period of suspension, no business dealing may be held with the Agency.
- 5.3 As far as possible, the existing contract(s) with the Agency may continue unless the Competent Authority, having regard to the circumstances of the case, decides otherwise.
- 5.4 If the Agency concerned asks for detailed reasons of suspension, the Agency may be informed that its conduct is under investigation. It is not necessary to enter into correspondence or argument with the Agency at this stage.
- 5.5 It is not necessary to give any show-cause notice or personal hearing to the Agency before issuing the order of suspension.

6.0 Ground on which Banning of Business Dealings can be initiated:

- 6.1 If the security consideration, including questions of loyalty of the Agency to

Employer so warrants;

- 6.2 If the director /owner of the Agency, proprietor or partner of the firm, is convicted by a Court of Law for offences involving moral turpitude in relation to its business dealings with the Government or any other public sector enterprises, during the last three years.
- 6.3 If business dealings with the Agency have been banned by the Department of Power, Government of India and/or Ministry of Energy, Water Resources and Irrigation, Government of Nepal.
- 6.4 If the Agency has resorted to corrupt, fraudulent practices including misrepresentation of facts;
- 6.5 If the Agency uses intimidation / threatening or brings undue outside pressure on Employer or its official for acceptance / performances of the job under the contract;
- 6.6 If the Agency misuses the premises or facilities of Employer, forcefully occupies or damages Employer's properties including land, water resources, forests / trees or tampers with documents/records etc. (Note: The examples given above are only illustrative and not exhaustive. The Competent Authority may decide to ban business dealing for any good and sufficient reason).

7.0 Banning of Business Dealings

- 7.1 A decision to ban business dealings with any Agency shall apply throughout SJVN including its subsidiaries/JVs.
- 7.2 There will be an Investigating Committee consisting of officers not below the rank of AGM/DGM from Indenting Division, Finance, Law and Contracts. Member from department responsible for invitation of bids shall be the convener of the committee. The functions of the committee shall, inter-alia include:
- i) To study the report of the unit/division responsible for invitation of bids and decide if a prima-facie case for banning exists, if not, send back the case to the Competent Authority.
 - ii) To recommend for issue of show-cause notice to the Agency by the concerned unit/division as per clause 9.1.
 - iii) To examine the reply to show-cause notice and call the Agency for personal hearing, if required.
 - iv) To submit final recommendations to the Competent Authority for banning or otherwise.

8.0 Removal from List of Approved Agencies - Suppliers/ Contractors, etc.

- 8.1 If the Competent Authority decides that the charge against the Agency is of a minor nature, it may issue a show-cause notice as to why the name of the Agency should not be removed from the list of approved Agencies - Suppliers / Contractors, etc.
- 8.2 The effect of such an order would be that the Agency would not be qualified for competing in Open Tender Enquiries or Limited Tender Enquiries till the period



mentioned in the order.

- 8.3 Past performance of the Agency may be taken into account while processing approval of the Competent Authority for award of the contract.

9.0 Show-cause Notice

- 9.1 In case where the Competent Authority decides that action against an Agency is called for, a show-cause notice has to be issued to the Agency, Statement containing the imputation of misconduct or misbehavior may be appended to the show-cause notice and the Agency should be asked to submit within 15 days a written statement in its defense.

- 9.2 If the Agency requests for inspection of any relevant document in possession of Employer, necessary facility for inspection of documents may be provided.

- 9.3 The Competent Authority may consider and pass an appropriate speaking order:
- a) For exonerating the Agency if the charges are not established;
 - b) For removing the Agency from the list of approved Suppliers / Contactors, etc.
 - c) For banning the business dealing with the Agency.

- 9.4 If it decides to ban business dealings, the period for which the ban would be operative may be mentioned.

10.0 Appeal against the Decision of the Competent Authority

- 10.1 The Agency may file an appeal against the order of the Competent Authority banning business dealing etc. The appeal shall be filed to Appellate Authority. Such an appeal shall be preferred within one month from the date of receipt of the order banning business dealing, etc.

- 10.2 Appellate Authority would consider the appeal and pass appropriate order which shall be communicated to the Agency as well as the Competent Authority.

11.0 Circulation of the names of Agencies with whom Business Dealings have been banned

- i) The concerned unit shall forward the name and details of the Agency(ies) banned to IT&C Division of SJVN's Corporate Office for displaying the same on SJVN website.
- ii) Corporate Contracts Department, SJVN shall also forward the name and details of the Agency(ies) banned to the Ministry of Power, GoI besides forwarding the name and details to the contracts/procurement group of all CPSUs of power sector.



FORM OF DECLARATION OF ELIGIBILITY
UNDERTAKING (With Integrity Pact)

We, M/s
.....hereby
certify that we have not been banned/de-listed/ black listed / debarred from business by
any PSU / Govt. Department during last 03 (three) years on the grounds mentioned in
para 6 of Guidelines on banning of Business dealing.

(Seal & signature of the Authority Signatory of bidder / Contractor)

***ATTACHMENT-7**

(Refer Sub-clause 13.2 (i) of ITB)

FORM OF JOINT VENTURE/CONSORTIUM AGREEMENT

(To be executed on Non Judicial stamp paper of appropriate value)

This Joint Venture/Consortium Agreement made and entered into on this ----- day of -----, -----.

BY AND BETWEEN

-----**(Name of the Lead Partner)** a Company incorporated under the laws of ----- **(Name of the Country)** with its Head/registered office at ----- **(Address of the Head/Registered Office)*** and a place of business in ----- **(Address of place of business)** hereinafter referred to as **"The Lead Partner"** which expression unless otherwise repugnant hereto includes its successors, administrators, and permitted assigns thereof, represented by **Mr. ----- (Name of Authorized signatory(ies)).**

AND

-----**(Name of the other Partner)** a Company incorporated under the laws of ----- **(Name of the Country)** with its Head/registered office at ----- **(Address of the Head/Registered Office)*** and a place of business in ----- **(Address of place of business)** hereinafter referred to as **Partner-1** which expression unless otherwise repugnant hereto includes its successors, administrators, and permitted assigns thereof, represented by **Mr. ----- (Name of Authorized signatory (ies)).**

All and/or each of them hereinafter referred to as "the Parties".

WITNESSETH

WHEREAS SAPDC (hereinafter referred to as "The Employer") has issued a Invitation vide NIT No. ----- dated -----

for the execution of Package no. _____ of _____ H.E. Project **(hereinafter referred to as "the works")**. The Employer intends to invite bids from eligible Bidders for National Competitive Bidding (NCB) in respect of the above works.

WHEREAS the Parties are interested in jointly preparing and submitting a Bid to qualify, for the Project as a loose knit Joint venture/Consortium.

Article 1.0 PURPOSE OF THIS AGREEMENT

1.1 The purpose of this Agreement is to define the principles of collaboration among the Parties to:

*** *Strike out which is not applicable.***

- Submit a Bid jointly to qualify for the execution of Package no. _____ of _____ H.E. Project as a loose-knit Joint venture/Consortium.
- Prepare and submit technical and commercial proposals to the Employer, if invited by Employer.
- Negotiate and sign Contract in case of award.
- Provide and perform the Works in accordance with the Contract.

1.2 NAME

For the purpose of participating in the Bid, the name of the Consortium/Joint Venture shall be "_____".

Article 2.0 LEGAL RELATIONSHIP OF THE MEMBERS

2.1 This Agreement shall not be construed as establishing or giving effect to any legal entity such as, but not limited to, a company, a partnership, etc. It shall relate solely towards the Employer for Package no. _____ of _____ H.E. Project and related execution works to be performed pursuant to the Contract and shall not extend to any other activities.

2.2 The Parties shall be jointly and severally responsible and bound towards the Employer for the performance of the works in accordance with the terms and conditions of the Bid document and/or Contract.

Article 3.0 LEADERSHIP

----- **(Name of the Lead Partner)** shall act as Leader of the Joint Venture/Consortium. As

such, it shall act as the coordinator of the Party’s combined activities and shall carry out the following functions:

- 3.1 To ensure the technical, commercial and administrative co-ordination of the Project.
- 3.2 To lead the contract negotiations of the Works with the Employer.
- 3.3 The Lead partner is authorized to receive instructions and incur liabilities for and on behalf of any or all Parties.
- 3.4 In case of an award, act as channel of communication between the Employer and the Parties to execute the Contract
- 3.5 Responsible for overall performance of the contract.

Article 4.0 SCOPE OF WORKS AND SERVICES OF EACH PARTY

The Scope of works to be performed by each Party shall be as herein below:

4.1 Scope of Works and Services:

The Scope of Work and services for each Party shall be defined as follows:

4.1.1 (**Name of Lead Partner**) shall be responsible for the following (Define the scope of works):-

-
-
-

4.1.2 (**Name of Other Partner**) shall be responsible for the following (Define the scope of works):-

-
-
-

4.2 Participation Share of each Partner

Lead Partner %
Other Partner %

4.3 Capital Contribution to be made by each Party for the Works

Lead Partner %
Other Partner %

4.4 Financial Commitment of each Party in terms of Contract Price

Lead Partner %
Other Partner %

4.5 Sharing of Profit and Loss by each Party

Lead Partner %
Other Partner %

The payments shall be made in the name of _____ (Name of Joint Venture/ Consortium as appearing in Article 1.2 above).

(Strike out whichever is not applicable)

Article 5.0 SECURITIES

Securities in the form of Bank Guarantees, required under the Bid document and/or Contract shall be provided in the name of individual partner of Joint Venture/Consortium in proportion of its participation share. In case of IndianJV partner or Indian contractor, the Bank Guarantee shall be acceptable only if these are issued by Scheduled Bank of India to be duly counter guaranteed by Class A bank in Nepal.

Article 6.0 LIABILITY

6.1 LIABILITY OF THE PARTIES WITH RESPECT TO CLAIMS OF THE EMPLOYER

The Parties shall be jointly and severally liable to the Employer for the Performance of the work under the terms of the Contract.

6.2 In case there is dispute between the parties to the Joint Venture; the same shall not affect the work of the Employer.

Article 7.0 DURATION OF THE AGREEMENT

7.1 This Agreement is valid until end of Defect Notification Period of the Contract and full and final settlement of all

accounts and disputes, if any, between the Parties and the Employer, except

- a) if the Employer has decided previously not to award the Contract to the Parties, or
- b) if one of the parties is declared bankrupt,

in which case the Parties are free from any obligation under this Agreement.

7.2The Joint Venture Agreement shall not be terminated by the parties without the written consent of the Employer.

IN WITNESS WHEREOF, this agreement executed on the _____ day of _____ (month) 20____ by the duly authorized representatives of the parties hereto.

For and on behalf of M/s _____
(Lead Partner)

Name:

Seal:

For and on behalf of M/s _____
(Partner-1)

Name:

Seal:

For and on behalf of M/s _____
(Partner-2)

Name:

Seal:



* Joint Venture/Consortium Agreement (attested by Notary Public) and signed between the Partner(s) of JV/C as per above format shall be submitted alongwith the Bids of the Bidders.

ATTACHMENT-8(i)
(Name of the Project)
List of Deviations without Cost of Withdrawal
(To be furnished by the Bidders)

(Bidder's Name & Address):

To :.....
 (Name of the Employer)

Dear Sir,
 Following are the deviations proposed by us as per ITB Clause 13.2 :

S.No.	Clause No. Remarks/Justifications	Deviation

Note :

1. We hereby confirm that all the deviations specified as above in Attachment – 8 (i) are the same which have been mentioned in Attachment – 8(ii) along with its cost of withdrawal and as provided in price bid.
2. We hereby confirm our acceptance and compliance to the critical provisions of GC clauses listed in ITB clause 13.2.

Date : (Signature).....

Place : (Printed Name).....

(Designation).....

(CommonSeal).....

ATTACHMENT –8(ii)
(Name of the Project)
List of Deviations with Cost of Withdrawal
 (to be submitted with Price Bid)

(Bidder's Name & Address):

To :.....
 (Employer's Name & Address)

Dear Sir,

Following are the deviations proposed by us as per ITB Clause 13.2 We are also furnishing below the cost of withdrawal for the deviations proposed by us in Attachment 8 (i). We confirm that we shall withdraw the deviations proposed by us at the cost of withdrawal indicated in this attachment failing which our bid will be rejected .

Deviations:

S.No.	Clause No.	Deviation	Cost of Withdrawal
1.	2.	3.	4.
.....			

.....

In case no specific cost of withdrawal is mentioned against any item in column no. 4, cost of withdrawal of such deviations shall be treated as 'NIL'.

Date : (Signature).....

Place : (Printed Name).....

(Designation).....

(CommonSeal).....

2. Notification of Award - Letter of Acceptance

To: _____

This is to notify you that your Bid dated _____ for execution of the _____ for the Contract Price in the aggregate of _____, as corrected and modified in accordance with the Instructions to Bidders is hereby accepted by the Employer.

You are requested to furnish the Performance Security within 28 days in accordance with the Conditions of Contract, using for that purpose one of the Performance Security Forms included in Section IX, - Contract Forms, of the Bidding Document

Authorized Signature: _____

Name and Title of Signatory: _____

Name of Employer: _____

3. Contract Agreement

THIS AGREEMENT is made the _____ day of _____,

BETWEEN

(1) _____, a corporation incorporated under the laws of _____ and having its principal place of business at _____ (hereinafter called "the Employer"), and (2) _____, a corporation incorporated under the laws of _____ and having its principal place of business at _____ (hereinafter called "the Contractor").

WHEREAS the Employer desires to engage the Contractor to design, manufacture, test, deliver, install, complete and commission certain Facilities, viz. _____ ("the Facilities"), and the Contractor has agreed to such engagement upon and subject to the terms and conditions hereinafter appearing.

NOW IT IS HEREBY AGREED as follows:

**Article 1.
Contract Documents**

1.1 Contract Documents (Reference GC Clause 2)

The following documents shall constitute the Contract between the Employer and the Contractor, and each shall be read and construed as an integral part of the Contract:

- (a) This Contract Agreement and the Appendices hereto
- (b) Letter of Bid and Price Schedules submitted by the Contractor
- (c) General Conditions
- (d) Specification
- (e) Drawings
- (f) Other completed bidding forms submitted with the Bid
- (g) Any other documents forming part of the Employer's Requirements
- (h) Any other documents shall be added here

1.2 Order of Precedence (Reference GC Clause 2)

In the event of any ambiguity or conflict between

the Contract Documents listed above, the order of precedence shall be the order in which the Contract Documents are listed in Article 1.1 (Contract Documents) above.

1.3 Definitions (Reference GC Clause 1)

Capitalized words and phrases used herein shall have the same meanings as are ascribed to them in the General Conditions.

**Article 2.
Contract Price
and Terms of
Payment**

2.1 Contract Price (Reference GC Clause 11)

The Employer hereby agrees to pay to the Contractor the Contract Price in consideration of the performance by the Contractor of its obligations hereunder. The Contract Price shall be the aggregate of: _____, _____ as specified in Price Schedule No. 5 (Grand Summary), and _____, _____, or such other sums as may be determined in accordance with the terms and conditions of the Contract.

2.2 Terms of Payment (Reference GC Clause 12)

The terms and procedures of payment according to which the Employer will reimburse the Contractor are given in the Appendix (Terms and Procedures of Payment) hereto.

**Article 3.
Effective Date**

3.1 Effective Date (Reference GC Clause 1)

The Effective Date from which the Time for Completion of the Facilities shall be counted is the date of issuance of Letter of Acceptance.

**Article 4.
Communications**

4.1 The address of the Employer for notice purposes, pursuant to GC 4.1 is: _____.

4.2 The address of the Contractor for notice purposes, pursuant to GC 4.1 is: _____.

**Article 5.
Appendices**

5.1 The Appendices listed in the attached List of Appendices shall be deemed to form an integral part of this Contract Agreement.

5.2 Reference in the Contract to any Appendix shall mean the Appendices attached hereto, and the Contract shall be read and construed accordingly.

IN WITNESS WHEREOF the Employer and the Contractor have caused this Agreement to be duly executed by their duly authorized representatives the day and year first above written.

Signed by, for and on behalf of the Employer

[Signature]

[Title]

in the presence of _____

Signed by, for and on behalf of the Contractor

[Signature]

[Title]

in the presence of _____

APPENDICES

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Appendix 1

Terms and Procedures of Payment

In accordance with the provisions of GC Clause 12 (Terms of Payment), the Employer shall pay the Contractor in the following manner and at the following times, on the basis of the Price Breakdown given in the section on Price Schedules. Payments will be made in the currencies quoted by the Bidder unless otherwise agreed between the Parties.

i) Advance

10% of the Contract Price shall be paid within thirty (30) days of the signing of agreement on presentation of commercial invoices, performance security as per clause 13.3 and an irrevocable bank guarantee equivalent to 120% of advance, valid up to the date of issue of Operational acceptance certificate. The bank Guarantee, to be produced on the Performa acceptable to SAPDC.

The bank Guarantee for the advance payment shall be in favour of the SAPDC from a Bank acceptable to the Employer. The advance shall bear a simple interest at the rate: **-For NPR & Foreign Currency (INR); 10.40 % based on SBI India, MCLR published on 15.01.2023 which includes 200 points on MCLR and as further amended by SBI time to time.**

a) The advance payments plus interest accrued thereupon shall be recovered through pro-rata deductions from Interim Payment Certificate/ RA bill certified by Engineer in Charge as per following:

The recovery of principal shall commence in the next Interim Payment Certificate/ RA Bills following that in which the total of all gross value of Interim Payment Certificates has reached 20 (twenty) percent of the Accepted Contract Amount and shall be made on pro-rata basis of advance released from the gross payment of all Interim Payment Certificates /RA Bills until such time as the advance payment has been repaid. Always provided that the advance payment shall be completely repaid prior to the time when 80 percent of the Accepted Contract Amount has been certified for payment. The gross payment shall mean and include the payment towards scheduled items, extra items, deviated items, along with substituted items including price adjustments for the purpose of this Sub Clause only.

The interest shall be calculated on the outstanding amount of principal at the close of each month. The recovery of the interest

shall commence in the next Interim Payment Certificate/RA bill following that in which the total of all gross Interim Payment Certificates/RA bills has reached 10% of the Accepted Contract Amount. Interest as accrued/accruing till the time total gross payment reaches 20 % of the Accepted Contract Amount shall be recovered from the monthly Interim Payment Certificate/RA bill in suitable instalments in such a way that the above said interest is fully recovered by the time the Contractor receives a total gross payment equivalent to 20% of the Accepted Contract Amount and thereafter, the interest as may be due on 1st day of each month will be recovered from the Interim Payment Certificates/RA Bills of the Contractor to be paid during that month. If for any reason, the payment due is insufficient to recover the full interest and principal together, interest shall be credited/recovered first and the residual applied to the principal. However, in case, full interest itself cannot be recovered, the balance amount of unrecovered interest shall also carry the same interest rate as specified in Sr. no. (i) under "Appendix-1

The Contractor shall always have the option to limit the drawl of advance to the extent desired and to have the recoveries commenced and/or completed earlier and/or have recoveries effected in instalments of higher amounts and also to repay part or whole of the advance by direct payment rather than through Interim Payment Certificates/RA bills.

b)Should there arise any occasion under the Contract due to which the periods of validities of Bank Guarantees as may have been furnished by the Contractor from time to time, are required to be extended/renewed, the Contractor shall at his cost get the validity periods of such guarantees extended/renewed, and furnish these to the Engineer in charge one month before the expiry date of the aforesaid Guarantees originally furnished; failing which the existing Bank Guarantees shall be invoked by the Engineer in charge.

c)If the advance payment has not been repaid prior to the issue of the Operational Acceptance Certificate for the Works or prior to termination under GC Clause 42 [Termination], GC Clause 41[Suspension], GC Clause 37 [Force Majeure] or GC Clause 38 [War Risk] (as the case may be), the whole of the balance then outstanding shall immediately become due and payable by the Contractor to the Employer.

ii)a Supply Portion -On despatch of Plant from Manufacturer's works:-

Up to eighty percent 80% of the contract price of Ex-works component of Plant for each identified equipment upon dispatch of equipment from manufacture's works on pro-rata basis shall be paid as progressive payment within thirty (30) days on production of the following in bound folders:

- 1) Application for payment in the standard format of the Employer.
- 2) Submission of documentary evidence towards Despatch of Plant.
- 3) Supplier invoice showing item description, quantity, unit rate and total amount.
- 4) Packing list identifying contents of each package.
- 5) Material dispatch clearance certificate (MDCC) issued by the employer prior to effecting dispatch or its waiver by employer.
- 6) Factory Inspection Report.
- 7) Submission of Insurance cover for one hundred ten percent (110%) CIF value of BoQ item dispatched duly endorsed by the insurance company.
- 8) Manufacturer guarantee certificate.
- 9) Certificate from the contractor that storage and presentation arrangement at project site are made readily will be made by the time material will arrive at project site.
- 10) Indemnity bond on employer's approved format.

ii)b Supply portion:

The 10 % payment of Supply portion shall be paid after successful erection within thirty (30) days on production of the following in bound folder:

1. Application for payment in the standard format of the Employer
2. Site Inspection Report
3. Manufacturer guarantee certificate
4. Commercial Invoice

iii) Erection Testing and Commissioning (Services Portion).

Up to ninety percent 90% of the Contract Price of transportation,

Insurance etc. on receipt of Plant at site shall be paid as progressive payment within thirty (30) days. Insofar as erection and commissioning are concerned 80% of the corresponding contract price shall be paid in monthly instalment against pro-rata contract price of the work completed and certified by the EIC.

iv) On Operational acceptance

The balance payment of contract price shall be paid after successful erection, testing and commissioning and within 60 days after the issue of Operational Acceptance certificate by the EIC.

Appendix 2

Price Adjustment

1.0.0 Price Adjustment

Prices payable to the Contractor, in accordance with the Contract, shall be subject to adjustment during performance of the Contract to reflect changes in the cost of labour and material components, in accordance with the following principles and procedure:-

- a) Price adjustment shall apply for work carried out within the stipulated time or extension granted by the SAPDC for delay attributable to SAPDC and shall not apply to work carried out beyond the stipulated time.
- b) Price adjustment shall be applied only if the resulting increase or decrease is more than 3% (three percent) of the contract price and the total adjustment under this clause shall be subject to a ceiling plus or minus 20% (twenty percent) of the contract price.
- c) No price adjustment shall be payable on the portion of the
Contract price paid to the Contractor as an advance payment.
- d) The price adjustment shall be determined during each quarter in accordance with the formulae as detailed herein after:

1.1.0 Formulae for Price adjustment

1.1.1 For Supply portion

$$HM_t = HM_0 \left\{ F + s \times \frac{S_t}{S_0} + l \times \frac{L_t}{L_0} \right\} - HM_0$$

HM_t = Adjustment price component expressed in the currency of the contract payable to the contractor for each shipment/dispatch.

HM_0 = Ninety Percent (90%) of Contract price (in case no advance is taken by the contractor) for the equipment/materials of the Contract shipment/dispatch wise.

HM_0 = Eighty Percent (80%) of Contract price (in case 10% advance is taken by the contractor) for the equipment/materials of the Contract shipment/dispatch wise.

'F' = Fixed portion of the contract price which will not be subjected to any adjustment.

‘s’ = Coefficient weightage of Steel content in the cost of work.

‘l’ = Coefficient weightage of labour content in the cost of work.

‘S’ = Index for Steel

Index Numbers of Wholesale prices in India - by Groups & Sub-Groups (Base: 2011-12=100) Published by Economic Advisor, Ministry of Industry/ Govt. of India under the head ‘(N). MANUFACTURE OF BASIC METALS’ and Sub- head ‘e. Mild Steel - Flat products’.

‘L’ = Labour Index (depending upon the country of origin)

Consumer Price Index Numbers for Industrial workers - All - India (Base: 2011-12=100) Published by Labour Bureau, Ministry of Labour, Govt. of India.

OR

Consumer Price Index Numbers for Industrial Workers – *National salary & wage index for construction labours (Base: 2004/05 = 100) issued by Nepal Rastra Bank.*

Sub-Script:

‘0’ = Refers to index as on 28 days prior to last date for submission of price bids.

“1” = Refers to index as applicable to the date of adjustment.

The date of adjustment shall be the mid-point of the period of manufacture of Plant, as per the agreed Programme.

1.1.2 For Services portion

The price component for any erection portion of installation work comprises a fixed portion and variable portion linked with the index of labour (description and co-efficient as enumerated).

The monthly price adjustment amount for the erection portion of installation price component of the Contract Price will be computed to expatriate supervision/labour as per the formula given below:

$$HMS = HMS_1 - HMS_0$$

Where HMS_1 will be computed as follows:

$$HMS_1 = HMS_0 \left\{ F + l \times \frac{L_1}{L_0} \right\}$$

Where:

HMS = Adjustment to Erection portion of installation component of contract price payable to the contractor for each billing.

HMS₁ = Adjusted amount payable to the Contractor of Erection portion of Installation component of Contract Price.

HMS₀ = Value of the Erection work done in the billing period, which shall be calculated as under:

For the purpose of computing HMS₀, each erection bill (which is excluding initial Advance and amount payable on completion of the Facilities and on successful completion of guarantee Test) during the Erection period upto the ‘Completion of the Facilities’ shall be divided by a factor as indicated below :

$$\left\{ \begin{array}{l} \text{Erection Portion of} \\ \text{installation} \\ \text{component of the Contract Price} \end{array} \right\} - \left\{ \begin{array}{l} \text{(Initial Advance amount + Erection} \\ \text{Portion of Installation component} \\ \text{of the Contract price payable on} \\ \text{completion of the Facilities +} \\ \text{Erection Portion of Installation} \\ \text{component of the Contract Price} \\ \text{payable on successful completion} \\ \text{of guarantee test} \end{array} \right\}$$

Erection Portion of Installation component of the Contract Price

The payment of price adjustment amount so computed shall be made against a separate invoice, linking the corresponding invoice for Erection Portion of Installation payment after retaining the pro-rata amount due on completion of the Facilities and on Completion of the Guarantee Test. The amounts so retained shall be paid on completion of the Facilities and on successful completion of Guarantee Test respectively.

‘F’ = Fixed portion of the contract price which will not be subjected to any adjustment.

‘I’ = Coefficient weightage of labour content in the cost of work.

‘L’ = Labour Index

Consumer Price Index Numbers for Industrial Workers – *National salary & wage index for construction labours*(Base: 2004/05 = 100) issued by Nepal Rastra Bank.

Sub-Script:

‘0’ = Refers to index as on 28 *days* prior to last date for submission of price bids.

“1” = Refers to index as applicable to the date of adjustment.

The date of adjustment shall be the mid-point of the period of erection/installation of Plant, as per the agreed Programme.

At the end of each quarter defined by the months March, June, September and December of each year, the contractor shall submit to the EIC, a claim, if any, on account of price adjustment for the completed quarter in accordance with the provisions of contract.

1.1.3 Weightages for Price Adjustment Formula

Components	Fixed	Steel	Labour (Skilled)
	F	s	I
HM supply	0.15	0.50	0.35
HM erection and other Services	0.15	--	0.85

Appendix 3

Insurance Requirements

Insurances to be Taken Out by the Contractor

In accordance with the provisions of GC Clause 34, the Contractor shall at its expense take out and maintain in effect, or cause to be taken out and maintained in effect, during the performance of the Contract, the insurances set forth below in the sums and with the deductibles and other conditions specified. The identity of the insurers and the form of the policies shall be subject to the approval of the Employer, such approval not to be unreasonably withheld.

(a) Cargo Insurance

Covering loss or damage occurring while in transit from the supplier's or manufacturer's works or stores until arrival at the Site, to the Facilities (including spare parts therefor) and to the construction equipment to be provided by the Contractor or its Subcontractors. The contractor shall ensure the endorsement of dispatched facility/equipment from the Insurance company.

(b) Installation All Risks Insurance

Covering physical loss or damage to the Facilities at the Site, occurring prior to completion of the Facilities, with extended maintenance coverage for the Contractor's liability in respect of any loss or damage occurring during the defect liability period while the Contractor is on the Site for the purpose of performing its obligations during the defect liability period.

Amount	Deductible limits	Parties insured	From	To
	0.5 % of sum insured subject to minimum of INR 6,00,000.	SAPDC, Contractor & Sub-contractor/Manufacturer if any.		

The contractor shall ensure to submit the draft of the policy for acceptance of the EIC and any clause in insurance policy which is considered necessary for the works/facility shall be included in the policy.

Further, EIC may also request for inclusion of name of Lender as beneficiary in case claim is arises in the said policy. The wording of the same shall be "Loss payee is made in favour of M/s State Bank of India. In the event the claims being made under the policy, a form of discharge signed by an authorized representative of M/s SBI, acting as facility agent for the benefit of various lenders shall be accepted as valid discharge on behalf of other parties interested in the insurance

policy. All amount agreed in a settlement of such claims shall be routed through a separate account advised by M/s State Bank of India acting as facility agent for the benefit of various lenders. For this clause, M/s State Bank of India as facility agent shall be treated as having a first charge on insurance contracts.

(c) Third Party Liability Insurance

Covering bodily injury or death suffered by third parties (including the Employer's personnel) and loss of or damage to property (including the Employer's property and any parts of the Facilities that have been accepted by the Employer) occurring in connection with the supply and installation of the Facilities. Such Insurance shall be effected for an amount equivalent to at least INR 15 (Fifteen) Million for any one loss on reinstatement basis but in total not exceeding INR 90 (Ninety) Million.

The Employer shall be named as co-insured under all insurance policies taken out by the Contractor pursuant to GC Sub-Clause 34.1, except for the Third Party Liability and the Contractor's Subcontractors shall be named as co-insureds under all insurance policies taken out by the Contractor pursuant to GC Sub-Clause 34.1, except for the Cargo and Employer's Liability Insurances. All insurer's rights of subrogation against such co-insureds for losses or claims arising out of the performance of the Contract shall be waived under such policies.

Insurances To Be Taken Out By The Employer: NIL

Appendix 4

TIME SCHEDULE & LD MILESTONES**Time Schedule**

The Time for Completion of Contract is 9 (nine) months reckoned from commencement date.

LD Milestones

Sr. No.	Description	Milestone
1	TRT Outfall Gates of Arun-3 HEP	Erection of TRT Outfall Gates of Arun-3 HEP after handing over by Civil Contractor within 3 months in each bay.
2	Intake Gates of Lower Arun HEP	Erection of Intake Gates of Lower Arun HEP after handing over by Civil Contractor within 3 months in each bay.

Appendix 5

List of Major Manufacturers for Major Items of Plant, Installation Services		
S.No.	Item of facilities	Make
1.	Reduction Unit	1. David Brown 2. Elecon 3. New Allenberry 4. Allroyd 5. Allen-max 6. Shanthi
2.	Motors	1. Siemens 2. Kirloskar 3. Crompton Greaves 4. Marathon 5. Bharat Bijlee
3.	Brakes	1. Electromag 2. Strom Kraft 3. SOC 4. Elmar 5. AEC 6. Sterling control
4.	Bearings	1. SKF 2. Deva glide (Federal Mogul) 3. FAG, 4. NSK, 5. NTN, 6. KOYA, 7. NBC 8. NACHI
5.	Hydraulic Cylinder	1. Rexroth 2. Montan 3. Nuova Oleodinamica Bonvicini 4. Hunger 5. Eaton Hydraulics 6. Ruhfus Hydraulics
6.	Hydraulic Power Packs	1. Rexroth 2. Montan 3. Vickers 4. Eaton Hydraulics 5. Ruhfus Hydraulics 6. Denley
7.	Module & software for Remote Control System	1 Siemens 2. Rittmeyer 3. ABB 4. Schneider Electric 5. Allen Bradley

Appendix 6

Scope of Works and Supply by the Employer

Scope of Works is as specified in Technical Specifications & Employer shall provide sufficient, properly qualified operating and maintenance personnel and other assistance as delineated under GC clause 10 and 24. Unless otherwise indicated, all personnel and assistance mentioned above will be provided free of charge to the Contractor.

Appendix 7

List of Documents for Review

Pursuant to GCC Sub-Clause 20.3.1, the Contractor shall prepare, or cause its Subcontractor to prepare, and present to the EIC in accordance with the requirements of GCC Sub-Clause 18.2 (Program of Performance) for review of Employer/EIC, the following documents for:-

Sr. No.	Documents
1.	Design calculations/ drawings
2.	Safety procedure
3.	Machinery imposed loads.
4.	Working Schedules
5.	Method statements for manufacturing and installations
6.	Quality Assurance Programme for workshop and construction site.
7.	Detailed specifications for bought out items
8.	Logistics for heavy, voluminous and critical components
9.	Erection, testing and commissioning procedures
10.	Painting systems
11.	Deleted without change in Sr. No.
12.	Formats for inspection, tests and test results.
13.	Operation and maintenance manuals.
14.	List of special tools, tackles and testing instruments.
15.	As-Built Drawings.
16.	Catalogue of bought out items.
17.	Progress Reports.
18.	Final Inspection Reports at workshop and construction site
19.	Workshop Test Schedules.
20.	Site Test Schedules
21.	Spare Parts List
22.	Copy of relevant softwares/programmes
23.	Commissioning documents
24.	Manufacturing history records (MHR)

The above list of document is not exhaustive, however the bidder shall have to submit the documents as per relevant clauses of bid documents and as advised by the Employer.

Appendix 8

Functional Guarantees

1. General

This Appendix sets out

- a) the functional guarantees referred to in GC Clause 28 (Functional Guarantees)
- b) the minimum level of the functional guarantees

2. Functional Guarantees

2.1 Dry Test for Gates/ Stoplogs

Operational test in dry conditions shall be carried out after completion of the facilities. The tests shall include atleast two complete traverses from the maximum raised position to the full closed/ seating position and it shall be ensured that there is no obstruction during the operation, the movements are smooth without any jerks and no undue effort is required for operation. Contact between gate/stoplogs seal and seal seats shall be checked and pre compression ensured by viewing the contact surface against the light source. The operation of the hoist/crane shall be smooth without any undue noise/excessive friction and without excessive vibration in the gate/stoplogs and supporting structure. Any dry testing movements should have rubber seal and seal faces lubricated with water (Do not use grease/oil). For metal to metal sealing/ bearing faces grease to be used. All adjustments, clearances, brakes etc. shall be checked for proper operation of the equipments

2.2 Test for Rope Drum Hoists/hydraulic hoist and Cranes

2.2.1 General

After the Hoist/crane has been erected, adjusted, lubricated and otherwise made ready for operation, it will be operated through cycles of placing and removing of the gate/stoplogs. The hoist/crane shall raise, lower, held in any position the Gate/stoplogs at rated speed. Before conducting any field trial or tests, complete procedure for the tests shall be drawn and submitted by the contractor to the Employer for his approval.

2.2.2 Insulation Tests

After erection but before the hoists/cranes are connected to the supply, the insulation of the electrical equipment shall be tested by a suitable instrument and any defects revealed shall be rectified. The voltage required for the insulation resistance test shall be D.C. voltage not less than twice the rated voltage.

Any reading less than 0.5 megaohm obtained with an insulation resistance tester of the unregulated type shall be disregarded and the wiring under test shall be sub-divided until a reading higher than 0.5 megaohm is obtained. Failure to obtain a higher reading shows an unsatisfactory state of insulation.

If an installation has been sub-divided for test purposes, each sub-division shall meet the requirement.

The insulation resistance of each wiring circuit exclusive of connected apparatus shall be not less than 2 megaohm, if necessary, it shall be permissible to disconnect individual item of equipment while making this test.

2.3 Wet Test

These tests should simulate the actual operating conditions. Atleast two complete traverses will be made from the fully closed position to the normal raised position as follows:

- a) When Gates/stoplogs is closed, Gates/ stoplogs is raised to their normally open position in steps and observe the performance including vibration etc.
- b) Lower the Gates/stoplogs/ to the fully closed position in steps and observe the performance of the Gates/stoplogs including vibrations etc.
- c) Check for proper operation of the filling valves.
- d) Checkup of proper operation of limit switches.

2.4 Leakage Tests

Leakage tests shall be carried out with the Gates/stoplogs closed. Before measuring the leakage, the Gates/stoplogs shall be raised and lowered several times by a few inches or so in order to dislodge any debris that may have lodged in the seal seats. The leakage shall then be measured and recorded. The maximum permissible leakage shall not exceed 5 liters per min. per metre length of periphery of sealing surface.

Appendix-9

Determination of Idling Time cost Claims

The idling time cost claims resulting from extension of Time for Completion under GC 40.1 (c) and (e) shall be determined as under:-

1. Cost of owned/ hired/ leased Equipment

Cost of owned/ hired/ leased equipment will comprise of the following elements:-

i. Depreciation Cost.

Annual Depreciation = $0.9 \times \text{Book Value} / \text{Life in years}$.
(Based on life in years)

Depreciation cost = $\{(\text{Idle period in days} / 365) \times 0.5 \times \text{Annual Depreciation}\}$.

However, if the equipment, as considered above, have completed their scheduled life in years in that case the depreciation shall be considered as zero.

ii. Interest on capital Investment: $(\text{Rate of Interest} \# / 100) \times \text{Average Annual Cost}$

The average annual cost is to be determined as follows:-

Average Annual Cost = $\text{Book value of Equipment} \times (n+1) / 2n$

Where:

- “n” refer for number in years of life of equipment (as per the latest guidelines of Central Water Commission India)
- Book value = purchase price plus freight, insurance, all taxes and duties, port clearance charges, erection and commissioning charges and other incidental charges.

the interest rate shall be at the rate of **10%** per annum.

2. Cost of Labour

The labour directly engaged for the works at Site by the Contractor or through sub-contractor, will be reimbursed for idle period in case contractor produces proof that idle labour has been paid wages during the period of idling. Cost of equipment related labour, will be worked out as per CWC norms limited to actual whichever is lower.

The above cost will be considered for payment based on the supporting details such as attendance sheet, receipt of deposit of Employees provident fund/ Employee Social Security fund duly certified by the Contractor.

In addition to actual cost of labour, indirect charges shall be considered. The indirect charges (other than salary) shall be 55% for skilled and unskilled labour. Indirect charges shall be applicable on the basic wages. Basic wages means component of wages on which statutory deductions like Employee Provident Fund is deposited to the statutory authority.

3. Bank Guarantees and Insurance charges

These charges shall be paid beyond Scheduled completion period on authorized extension of completion period upon production of documentary evidence.

4. Expenses on additional storage / preservation / transportation / double handling

Against submission of documentary evidence as per actual.

5. Overhead

Overhead costs include but not limited to Office and share of head office expenses charges, General establishment, Watch and Ward, Local convey Travelling e Social welfare, salaries of Managerial and clerical staff etc. and Publicity etc.

Overhead Charges	=	2% of Contract price × authorized Time Extension
		entitling cost claim/ Contractual Construction Period

The lump-sum component of overhead as 2% shall cover all other charges included expressly in any of the items of claim at Sl. 1 to 4 as above.

6. The taxes applicable on cost claims

The applicable taxes on the above elements of cost claims shall be reimbursed to the Contractor as per actual based on documentary evidence.

4. Performance Security Form – *Bank Guarantee*¹

Beneficiary: _____

Date: _____

PERFORMANCE GUARANTEE No.: _____

We have been informed that _____ (hereinafter called "the Contractor") has entered into Contract No. _____ dated _____ with you, for the execution of _____ (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, a performance guarantee is required.

At the request of the Contractor, we _____ hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of _____ (____)², upon receipt by us of your first demand in writing accompanied by a written statement stating that the Contractor is in breach of its obligation(s) under the Contract, without your needing to prove or to show grounds for your demand or the sum specified therein.

This guarantee shall be reduced by half upon our receipt of:

- (a) a copy of the Operational Acceptance Certificate; or
- (b) a registered letter from the Contractor (i) attaching a copy of its notice requesting issuance of the Operational Acceptance Certificate and (ii) stating that the EIC has failed to issue such Certificate within the time required or provide in writing justifiable reasons why such Certificate has not been issued, so that Operational Acceptance is deemed to have occurred.

This guarantee shall expire no later than the earlier of:³

¹ The Employer should insert either the Bank Guarantee (4.1) or the Conditional Guarantee (4.2).

² The Guarantor shall insert an amount representing the percentage of the Contract Price specified in the Contract and denominated either in the currency(ies) of the Contract or a freely convertible currency acceptable to the Employer.

³ This text shall be revised as and where necessary to take into account (i) partial acceptance of the Facilities in accordance with Sub-Clause 25.4 of the GCC; and (ii) extension of the performance

-
- (a) twelve months after our receipt of either (a) or (b) above;
or
 - (b) eighteen months after our receipt of:
 - (i) a copy of the Completion Certificate; or
 - (ii) a registered letter from the Contractor, attaching a copy of the notice to the EIC that the Facilities are ready for commissioning, and stating that fourteen days have elapsed from receipt of such notice (or seven days have elapsed if the notice was a repeated notice) and the EIC has failed to issue a Completion Certificate or inform the Contractor in writing of any defects or deficiencies; or
 - (iii) a registered letter from the Contractor stating that no Completion Certificate has been issued but the Employer is making use of the Facilities; or
 - (c) the ____ day of _____, 2____.⁴

Consequently, any demand for payment under this guarantee must be received by us at this office on or before that date.

This guarantee is subject to the Uniform Rules for Demand Guarantees, ICC Publication No. 458, except that subparagraph (ii) of Sub-article 20(a) is hereby excluded.

[signature(s)]

security when the Contractor is liable for an extended warranty obligation pursuant to Sub-Clause 27.10 of the GCC (although in this latter case the *Employer* might want to consider an extended warranty security in lieu of the extension of the performance security).

⁴ Insert the date twenty-eight days after the expected expiration date of the Defect Liability Period. The Employer should note that in the event of an extension of the time for completion of the Contract, the Employer would need to request an extension of this guarantee from the Guarantor. Such request must be in writing and must be made prior to the expiration date established in the guarantee. In preparing this guarantee, the Employer might consider adding the following text to the form, at the end of the penultimate paragraph: “The Guarantor agrees to a one-time extension of this guarantee for a period not to exceed [six months][one year], in response to the Employer’s written request for such extension, such request to be presented to the Guarantor before the expiry of the guarantee.”

5. Bank Guarantee Form for Advance Payment

Beneficiary: _____

Date: _____

ADVANCE PAYMENT GUARANTEE No.: _____

We have been informed that _____ (hereinafter called "the Contractor") has entered into Contract No. _____ dated _____ with you, for the execution of _____ (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, an advance payment in the sum of _____ (_____) is to be made against an advance payment guarantee.

At the request of the Contractor, we _____ hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of _____ (_____) upon receipt by us of your first demand in writing accompanied by a written statement stating that the Contractor is in breach of its obligation under the Contract because the Contractor used the advance payment for purposes other than toward the execution of the Works.

It is a condition for any claim and payment under this guarantee to be made that the advance payment referred to above must have been received by the Contractor on his account number _____ at _____.

The maximum amount of this guarantee is valid shall be progressively reduced in proportion to the value of each part-shipment or part-delivery of plant and equipment to the site, as indicated in copies of the relevant shipping and delivery documents that shall be presented to us. This guarantee shall expire, at the latest, upon our receipt of documentation indicating full repayment by the Contractor of the amount of the advance payment, or on the ___ day of _____, 2____, whichever is earlier.⁵ Consequently, any demand for payment under

⁵ Insert the expected expiration date of the Time for Completion. The *Employer* should note that in the event of an extension of the time for completion of the Contract, the *Employer* would need to request an extension of this guarantee from the Guarantor. Such request must be in writing and must be made prior to the expiration date established in the guarantee. In preparing this guarantee, the *Employer*

this guarantee must be received by us at this office on or before that date.

This guarantee is subject to the Uniform Rules for Demand Guarantees, ICC Publication No. 458.

[signature(s) name of bank or financial institution]

might consider adding the following text to the form, at the end of the penultimate paragraph: “The Guarantor agrees to a one-time extension of this guarantee for a period not to exceed [six months][one year], in response to the *Employer*’s written request for such extension, such request to be presented to the Guarantor before the expiry of the guarantee.”

6. Form of Completion Certificate

Date: _____

DCB No.: _____

[Name of Contract]

To: *[Name and address of Contractor]*

Dear Ladies and/or Gentlemen,

Pursuant to GC Clause 24 (Completion of the Facilities) of the General Conditions of the Contract entered into between yourselves and the *Employer* dated *[date]*, relating to the *[brief description of the Facilities]*, we hereby notify you that the following part(s) of the Facilities was (were) complete on the date specified below.

1. Description of the Facilities or part thereof: *[description]*
2. Date of Completion: *[date]*

However, you are required to complete the outstanding items listed in the attachment hereto as soon as practicable.

This letter does not relieve you of your obligation to complete the execution of the Facilities in accordance with the Contract nor of your obligations during the Defect Liability Period.

Very truly yours,

Title
(EIC)

7. Form of Operational Acceptance Certificate

Date: _____

NCB No.: _____

[Name of Contract]

To: *[Name and address of Contractor]*

Dear Ladies and/or Gentlemen,

Pursuant to GC Sub-Clause 25.3 (Operational Acceptance) of the General Conditions of the Contract entered into between yourselves and the *Employer* dated *[date]*, relating to the *[brief description of the Facilities]*, we hereby notify you that the Functional Guarantees of the following part(s) of the Facilities were satisfactorily attained on the date specified below, and that, in accordance with the terms of the Contract, the *Employer* hereby takes over the said part(s) of the Facilities, together with the responsibility for care and custody and the risk of loss thereof on the date mentioned below.

1. Description of the Facilities or part thereof: *[description]*
2. Date of Operational Acceptance: *[date]*

This letter does not relieve you of your obligation to complete the execution of the Facilities in accordance with the Contract nor of your obligations during the Defect Liability Period.

Very truly yours,

Title
(EIC)

8. Change Order Procedure and Forms

Date: _____

NCB No.: _____

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ANNEXES

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Change Order Procedure

1. General

This section provides samples of procedures and forms for implementing changes in the Facilities during the performance of the Contract in accordance with GC Clause 39 (Change in the Facilities) of the General Conditions.

2. Change Order Log

The Contractor shall keep an up-to-date Change Order Log to show the current status of Requests for Change and Changes authorized or pending, as Annex 8. Entries of the Changes in the Change Order Log shall be made to ensure that the log is up-to-date. The Contractor shall attach a copy of the current Change Order Log in the monthly progress report to be submitted to the *Employer*.

3. References for Changes

- (1) Request for Change as referred to in GC Clause 39 shall be serially numbered CR-X-nnn.
- (2) Estimate for Change Proposal as referred to in GC Clause 39 shall be serially numbered CN-X-nnn.
- (3) Acceptance of Estimate as referred to in GC Clause 39 shall be serially numbered CA-X-nnn.
- (4) Change Proposal as referred to in GC Clause 39 shall be serially numbered CP-X-nnn.
- (5) Change Order as referred to in GC Clause 39 shall be serially numbered CO-X-nnn.

Note: (a) Requests for Change issued from the *Employer's* Home Office and the Site representatives of the *Employer* shall have the following respective references:

Home Office	CR-H-nnn
Site	CR-S-nnn

- (b) The above number "nnn" is the same for Request for Change, Estimate for Change Proposal, Acceptance of Estimate, Change Proposal and Change Order.

Annex 1. Request for Change Proposal

(Employer's Letterhead)

To: *[Contractor's name and address]*

Date: _____

Attention: *[Name and title]*

Contract Name: *[Contract name]*

Contract Number: *[Contract number]*

Dear Ladies and/or Gentlemen:

With reference to the captioned Contract, you are requested to prepare and submit a Change Proposal for the Change noted below in accordance with the following instructions within *[number]* days of the date of this letter *[or on or before (date)]*.

1. Title of Change: *[Title]*
2. Change Request No./Rev.: *[Number]*
3. Originator of Change: *Employer: [Name]*
 Contractor (by Application for Change Proposal
 No. *[Number]*)⁶:
4. Brief Description of Change: *[Description]*
5. Facilities and/or Item No. of equipment related to the requested Change: *[Description]*
6. Reference drawings and/or technical documents for the request of Change:

<u>Drawing No./Document No.</u>	<u>Description</u>
7. Detailed conditions or special requirements on the requested Change: *[Description]*
8. General Terms and Conditions:

-
- (a) Please submit your estimate to us showing what effect the requested Change will have on the Contract Price.
 - (b) Your estimate shall include your claim for the additional time, if any, for completion of the requested Change.
 - (c) If you have any opinion negative to the adoption of the requested Change in connection with the conformability to the other provisions of the Contract or the safety of the Plant or Facilities, please inform us of your opinion in your proposal of revised provisions.
 - (d) Any increase or decrease in the work of the Contractor relating to the services of its personnel shall be calculated.
 - (e) You shall not proceed with the execution of the work for the requested Change until we have accepted and confirmed the amount and nature in writing.

(Employer's Name)

(Signature)

(Name of signatory)

(Title of signatory)

Annex 2. Estimate for Change Proposal

(Contractor's Letterhead)

To: *[Employer's name and address]*

Date: _____

Attention: *[Name and title]*

Contract Name: *[Contract name]*

Contract Number: *[Contract number]*

Dear Ladies and/or Gentlemen:

With reference to your Request for Change Proposal, we are pleased to notify you of the approximate cost of preparing the below-referenced Change Proposal in accordance with GC Sub-Clause 39.2.1 of the General Conditions. We acknowledge that your agreement to the cost of preparing the Change Proposal, in accordance with GC Sub-Clause 39.2.2, is required before estimating the cost for change work.

1. Title of Change: *[Title]*
2. Change Request No./Rev.: *[Number]*
3. Brief Description of Change: *[Description]*
4. Scheduled Impact of Change: *[Description]*
5. Cost for Preparation of Change Proposal: *[Cost]*⁷

(a) Engineering	(Amount)
(i) Engineer _____ hrs x _____ rate/hr = _____	
(ii) Draftsperson _____ hrs x _____ rate/hr = _____	
Sub-total _____ hrs	_____
Total Engineering Cost	_____
(b) Other Cost	_____
Total Cost (a) + (b)	_____

⁷ Costs shall be in the currencies of the Contract.

(Contractor's Name)

(Signature)

(Name of signatory)

(Title of signatory)

Annex 3. Acceptance of Estimate

(Employer's Letterhead)

To: *[Contractor's name and address]*

Date: _____

Attention: *[Name and title]*

Contract Name: *[Contract name]*

Contract Number: *[Contract number]*

Dear Ladies and/or Gentlemen:

We hereby accept your Estimate for Change Proposal and agree that you should proceed with the preparation of the Change Proposal.

1. Title of Change: *[Title]*
2. Change Request No./Rev.: *[Request number/revision]*
3. Estimate for Change Proposal No./Rev.: *[Proposal number/revision]*
4. Acceptance of Estimate No./Rev.: *[Estimate number/revision]*
5. Brief Description of Change: *[Description]*
6. Other Terms and Conditions: In the event that we decide not to order the Change accepted, you shall be entitled to compensation for the cost of preparation of Change Proposal described in your Estimate for Change Proposal mentioned in para. 3 above in accordance with GC Clause 39 of the General Conditions.

(Employer's Name)

(Signature)

(Name and Title of signatory)

-
- (b) Major construction equipment _____
- (c) Direct field labor (Total hrs) _____
- (d) Subcontracts _____
- (e) Indirect material and labor _____
- (f) Site supervision _____
- (g) Head office technical staff salaries

Process engineer	_____ hrs @ _____ rate/hr	_____
Project engineer	_____ hrs @ _____ rate/hr	_____
Equipment engineer	_____ hrs @ _____ rate/hr	_____
<hr/>		
Procurement	_____ hrs @ _____ rate/hr	_____
Draftsperson	_____ hrs @ _____ rate/hr	_____
Total	_____ hrs	_____

- (h) Extraordinary costs (computer, travel, etc.) _____
- (i) Fee for general administration, _____ % of Items

- (j) Taxes and customs duties _____

Total lump sum cost of Change Proposal _____
[Sum of items (a) to (j)]

Cost to prepare Estimate for Change Proposal _____
[Amount payable if Change is not accepted]

9. Additional time for Completion required due to Change Proposal
10. Effect on the Functional Guarantees
11. Effect on the other terms and conditions of the Contract
12. Validity of this Proposal: within [Number] days after receipt of this Proposal by the *Employer*
13. Other terms and conditions of this Change Proposal:
- (a) You are requested to notify us of your acceptance, comments or rejection of this detailed Change Proposal within [Number] days from your receipt of this Proposal.

- (b) The amount of any increase and/or decrease shall be taken into account in the adjustment of the Contract Price.

- (c) Contractor's cost for preparation of this Change Proposal:²
(Note) *This cost shall be reimbursed by the Employer in case of Employer's withdrawal or rejection of this Change Proposal without default of the Contractor in accordance with GC Clause 39 of the General Conditions.*

(Contractor's Name)

(Signature)

(Name of signatory)

(Title of signatory)

² Specify where necessary.

Annex 5. Change Order

(Employer's Letterhead)

To: *[Contractor's name and address]*

Date: _____

Attention: *[Name and title]*

Contract Name: *[Contract name]*

Contract Number: *[Contract number]*

Dear Ladies and/or Gentlemen:

We approve the Change Order for the work specified in the Change Proposal (No. *[Number]*), and agree to adjust the Contract Price, Time for Completion and/or other conditions of the Contract in accordance with GC Clause 39 of the General Conditions.

1. Title of Change: *[Name]*
2. Change Request No./Rev.: *[Request number/revision]*
3. Change Order No./Rev.: *[Order number/revision]*
4. Originator of Change: Employer: *[Name]*
 Contractor: *[Name]*
5. Authorized Price:

Ref. No.: *[Number]*

Date: *[Date]*

Foreign currency portion *[Amount]* plus Local currency portion
[Amount]

6. Adjustment of Time for Completion

None
days

Increase *[Number]* days

Decrease *[Number]*

7. Other effects, if any

Authorized by: _____
 (*Employer*)

Date: _____

Accepted by: _____
 (*Contractor*)

Date: _____

Annex 6. Pending Agreement Change Order

(Employer's Letterhead)

To: [Contractor's name and address]

Date: _____

Attention: [Name and title]

Contract Name: [Contract name]

Contract Number: [Contract number]

Dear Ladies and/or Gentlemen:

We instruct you to carry out the work in the Change Order detailed below in accordance with GC Clause 39 of the General Conditions.

1. Title of Change: [Name]
2. Employer's Request for Change Proposal No./Rev.: [Number/revision] dated: [Date]
3. Contractor's Change Proposal No./Rev.: [Number/revision] dated: [Date]
4. Brief Description of Change: [Description]
5. Facilities and/or Item No. of equipment related to the requested Change: [Facilities]
6. Reference Drawings and/or technical documents for the requested Change:

<u>Drawing/Document No.</u>	<u>Description</u>
-----------------------------	--------------------

7. Adjustment of Time for Completion:
8. Other change in the Contract terms:
9. Other terms and conditions:

(Employer's Name)

(Signature)

(Name of signatory)

(Title of signatory)

Annex 7. Application for Change Proposal

(Contractor's Letterhead)

To: *[Employer's name and address]*

Date: _____

Attention: *[Name and title]*

Contract Name: *[Contract name]*

Contract Number: *[Contract number]*

Dear Ladies and/or Gentlemen:

We hereby propose that the below-mentioned work be treated as a Change in the Facilities.

1. Title of Change: *[Name]*
2. Application for Change Proposal No./Rev.: *[Number/revision]*
dated:
[Date]
3. Brief Description of Change: *[Description]*
4. Reasons for Change:
5. Order of Magnitude Estimation (in the currencies of the Contract):
6. Scheduled Impact of Change:
7. Effect on Functional Guarantees, if any:
8. Appendix:

(Contractor's Name)

(Signature)

(Name of signatory)

(Title of signatory)

Annex-8**BANK GUARANTEE FORMAT FOR MATERIAL ADVANCE PAYMENT**

(To be executed on letter head of the Bank)

(To be stamped in accordance with Stamp Act if any, of the Country of the Issuing Bank)

Bank Guarantee

No.....

Date.....

To,

[Employer's Name & Address]

Dear Sir,

In consideration of the *[Employer's Name]*..... (hereinafter referred to as the 'Employer',

which expression shall, unless repugnant to the context or meaning thereof include its successors, administrators and assigns) having awarded to M/s.....*[Contractor's*

Name] with its Registered/Head Office at (hereinafter referred to as the 'Contractor' which expression shall unless repugnant to the context or meaning thereof, include its successors, administrators, executors and assigns), a Contract,

by issue of Employer's Letter of Acceptance No. dated and the same having been acknowledged by the Contractor, resulting into a Contract bearing No.....dated.....valued at.....

for*[Name of Contractor]*.....(hereinafter called the

'Contract') and the Employer having agreed to make an advance payment to the Contractor

for performance of the above Contract amounting (in words and figures)

as an Advance against Bank Guarantee to be furnished by the Contractor.

We.....*[Name and address of the Bank]*..... having its Head Office

at..... (hereinafter referred to as the 'Bank', which expression

shall, unless repugnant to the context or meaning thereof, include its successors, administrators, executors and assigns) do hereby guarantee and undertake to pay the

Employer, immediately on demand any or, all monies payable by the Contractor to the extent of [advance amount].....

.....as aforesaid at any time

upto.....(@)..... without any demur, reservation, contest, recourse

or protest and/ or without any reference to the Contractor. Any such demand made by the Employer on the Bank shall be conclusive and binding notwithstanding any difference between the Employer and the Contractor or any dispute pending before any Court, Tribunal, Arbitrator or any other authority. We agree that the guarantee herein contained shall be irrevocable and shall continue to be enforceable till the Employer discharges this guarantee. This guarantee may be progressively reduced by amount repaid by the contractor.

(**)

The Employer shall have the fullest liberty without affecting in any way the liability of the Bank under this guarantee, from time to time to vary the advance or to extend the time for performance of the Contract by the Contractor. The Employer shall have the fullest liberty without affecting this guarantee, to postpone from time to time the exercise of any powers vested in them or of any right which they might have against the Contractor, and to exercise the same at any time in any manner, and either to enforce or to forbear to enforce any covenants, contained or implied, in the Contract between the Employer and the Contractor or any other course or remedy or security available to the Employer. The Bank shall not be released of its obligations under these presents by any exercise by the Employer of its liberty with reference to the matters aforesaid or any of them or by reason of any other act or forbearance or other acts of omission or commission on the part of the Employer or any other indulgence shown by the Employer or by any other matter or thing whatsoever which under law would but for this provision have the effect of relieving the Bank.

The Bank also agrees that the Employer at its option shall be entitled to enforce this Guarantee against the Bank as a principal debtor, in the first instance without proceeding against the Contractor and notwithstanding any security or other guarantee that the Employer may have in relation to the Contractor’s liabilities.

Notwithstanding anything contained herein:

- i) Our liability under this Bank Guarantee shall not exceed._____.
- ii) This Bank Guarantee shall be valid upto _____.
- iii) We are liable to pay the guaranteed amount or any part thereof under this Bank Guarantee only and only if Employer serve upon Bank a written claim or demand on or before (@)_____

Dated this day of(month).....(year)..... at

WITNESS (Signature).....	(Signature) (Name) (Name).....
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..... (Name) (Name)..... (Official Address) (Official Address) (Designation with Bank Stamp)/Staff Authority No. Complete Address of the Bank with Tele-Fax Dated.....

Notes: 1. (@) This date shall be ninety (90) days beyond the date of Completion of the Works.

(**) Employer may also present any of his demands at the counters of the.....(Name and branch of the Bank in Nepal)for further relay to us.

2. The name of the purchaser should appear at the back side of stamp paper in the Vendors Stamp. Bank guarantee should contain rubber stamp of the authorized signatory of the bank indicating the name, designation and signature/ power of attorney number as well as telephone/ fax numbers with full correspondence address of the Bank.

Bank Guarantee in NPR should be executed on letter head of the “A” class commercial Bank. The issuing Bank shall be requested independently for verification/confirmation of the Bank Guarantee issued, non confirmation of which may lead to rejection of ‘Bid Security. The Bank Guarantees in INR shall be acceptable only if these are issued by a Scheduled Bank of India duly counter guaranteed by any A class bank in Nepal.

3. Bank Guarantee is required to be submitted directly to the Employer by the issuing bank (on behalf of Contractor) under registered post (A.D.). The Contractor can submit an advance copy of Bank Guarantee to the Engineer .

4. The issuing bank shall write the name of bank’s controlling branch/ Head Office along with contact details like telephone/ fax and full correspondence address in order to get the confirmation of BG from that branch/ Head office, if so required.

SJVN ARUN-3 POWER DEVELOPMENT COMPANY PVT. LTD.

(A Subsidiary of SJVN Ltd. Registered in Nepal)



ARUN-3 HYDRO ELECTRIC PROJECT (900MW)

NEPAL

BIDDING DOCUMENTS

FOR

HYDRO-MECHANICAL WORKS - TRT GATES AND ASSOCIATED EQUIPMENT FOR ARUN-3 HEP AND ASSOCIATED EQUIPMENT FOR LOWER ARUN HEP IN SANKHUWASABHA DISTT. OF NEPAL

VOLUME II

PRICE SCHEDULE (BOQ)

PREAMBLE

The contractor shall indicate the prices of equipment in the Price Schedule, which form part of the tender specifications. The quantities mentioned in the price schedule are the quantities of work to be done by the contractor. The unit price in the price schedule will form the basis for payments for such works.

The prices in the price schedule shall, except where otherwise provided in the contract, cover all the contractor's obligations under the contract and all items necessary for the proper execution of the work, as envisaged in the contract documents. The description of work covered under different items is merely to identify the location and the nature of the work whereas, the exact nature and extent of the works is to be ascertained from the Specification Drawings and Technical specifications and conditions of contract read in conjunction with the method of measurement i.e., Measurement is to be made in terms of the units mentioned in the price schedule and the payment will be made for quantities of work done against each item.

All the columns in the main price schedule & sub-price schedules must be filled up by the contractor.

In case of discrepancies in main price schedule and sub-price schedules, the rates indicated in the sub-price schedule shall be considered and the main price schedule shall be corrected accordingly.

Set, as mentioned in column 6 of unit in various formats of price schedule, means number of items sufficient for the equipment.

Unit Price (INR) or Unit Price (NPR) in various formats of Price Schedules, means unit rate inclusive of all taxes, duties etc.

Only the price quoted in the price schedule shall be payable to the contractor even if there is increase in weights and hoist capacities during detailed design, from the weights & hoist capacities quoted in the bid. The prices shall be on item rate basis.

In case of Intake steel gratings and their embedments, the payment for procurement, fabrications, shop assembly, painting, supply, insurance, erection & testing etc. will be made at the unit rates per MT entered in the price schedule.

1.0 Main Price Schedule- 1A (Supply Portion) (TRT Gates, Hydraulic Hoists, Bulkhead for TRT Gates, EOT Cranes, Intake Gates of Lower Arun HEP, Rope Drum Hoists, Steel Grating Panels, Submersible Slurry Pump, Monorail Crane and their associated Equipment)

Sr. No.	Main Head	Sub Head	Articles or Services	Qty/No.	Unit (Sets/Nos.)	Total Weight/Capacity (MT)	Unit Price (INR)	Unit Price (NPR)	Total Amount (INR)	Total Amount (NPR)
1	TRT Gates, Hydraulic Hoists and Hoist Supporting Structure at Outfall of Arun-3 HEP	1st Stage Embedded Parts	Design, procurement, fabrication, shop assembly, painting (including shop and field) and supply of 1st stage embedded parts, consisting of J-anchor/U-anchor and kerb angle for grating etc. complete in all respects in accordance with the Technical Specifications and Specification Drawings.	3	Sets					
2	TRT Gates, Hydraulic Hoists and Hoist Supporting Structure at Outfall of Arun-3 HEP	2nd Stage Embedded Parts	Design, procurement, fabrication, shop assembly, painting (including shop and field) and supply of 2nd stage embedded parts and anchorages consisting of stainless steel wheel track with track base on downstream side, stainless steel slide track with track base on upstream side, w.r.t. flow from pond side, stainless steel side seal seats with base, stainless steel top seal seat with base, sill beam with stainless steel bottom seal seat, side guide track, embedments for latching/dogging in gate groove etc. all fitted with anchor bolts/studs, double nuts and washers etc., complete in all respects in accordance with the Technical Specifications and Specification Drawings.	3	Sets					
3	TRT Gates and Hydraulic Hoists for Arun-3 HEP	TRT Outfall Gates	Design, procurement, fabrication, shop assembly, painting (including shop and field) and supply of vertical lift wheeled cum slide type gates, suitable for opening of size 8500mm x 5500mm (w x h). The gates shall consist of upstream skin plate (min. 25 mm thick) w.r.t. flow from pond side, main horizontal girders, end vertical girders, vertical stiffeners, Al. Bronze thrust bearing pads with base & stainless steel CSK screws, wheel assemblies with stainless steel self-aligned spherical roller bearings, wheel cut-out arrangement, wheel axle/pins, PTFE clad music note type rubber seals for both side sealing with seal bases for side, top and bottom, nylon ferrules for seals, seal clamp plates with stainless steel fixing CSK screws, guide shoes/rollers, lifting arrangement, latching/dogging arrangement etc., complete in all respects in accordance with the Technical Specifications and Specification Drawings.	3	Sets					
4	TRT Gates and Hydraulic Hoists for Arun-3 HEP	TRT Outfall Gates	Mandatory spare parts as per list indicated in Sub-price schedule 2A.	1	Set					
5	TRT Gates and Hydraulic Hoists for Arun-3 HEP	Hydraulic Hoist Cylinder	Design, procurement, fabrication, shop assembly, painting (including shop and field) and supply of single cylinder double acting hydraulic hoists of minimum 55T capacity, min. 6850mm working stroke for operation of TRT gates including all the accessories such as hoist suspension, cylinder shell, piston rod and their mountings on gate, seals, stainless steel connected piping, gate position indicator (digital as well as analog) and limit switches for operation of TRT gates for an operational speed of 1 m/min. One no. local electrical control panel for each gate and one no. automatic gate control panel interconnected to all local control panels shall be supplied. Control scheme of gate shall be built in PLC having communication connectivity to third party on MODBUS/OPC/IEC-60870-104 (to be decided during detailed engineering) complete in all respects in accordance with the Technical Specifications and Specification Drawings.	3	Sets					
6	TRT Gates and Hydraulic Hoists for Arun-3 HEP	Hydraulic Hoist Cylinder	Mandatory spare parts as per list indicated in Sub-price schedule 2A.	1	Set					
7	TRT Gates, Hydraulic Hoists and Hoist Supporting Structure at Outfall of Arun-3 HEP	Hoist Supporting Structure and Embedded Parts	Design, procurement, fabrication, shop assembly, painting (including shop and field) and supply of cylinder assembly mounting and support structure complete with structural components and embedded parts complete in all respects in accordance with the Technical Specifications and Specification Drawings.	3	Sets					
8	TRT Gates, Hydraulic Hoists and Hoist Supporting Structure at Outfall of Arun-3 HEP	Supporting Structure and Embedded Parts for spare cylinder	Design, procurement, fabrication, shop assembly, painting (including shop and field) and supply of cylinder assembly mounting and support structure complete with structural components and embedded parts for storage of spare hydraulic cylinder in vertical position complete in all respects.	1	Set					
9	TRT Gates, Hydraulic Hoists and Hoist Supporting Structure at Outfall of Arun-3 HEP	Hydraulic Power Unit (HPU) Assembly	Design, procurement, fabrication, shop assembly, painting (including shop and field) and supply of independent hydraulic power unit (HPU) assembly and each set consist of stainless steel hydraulic reservoir, electric motor driven hydraulic pump(s), pressure relief valves, check valves, flow control valves, directional control valves, pressure and temperature gauges, fluid level switches, filters, strainers, hydraulic oil, stainless steel hydraulic piping, in-built in the hydraulic circuit hydraulic oil dehydration and particle cleaning system for removal of moisture, humidity and oil impurities in the oil reservoir of power pack units, electrical control panels and suitable terminals in the electrical control cabinet for its connection to the remote control as well as from the centralized/computerized automatic control for operation of above gates etc., complete in all respects. Also, the hydraulic & electric control and its related power component shall be suitably interconnected to enable the operation of the hoist cylinder of one gate with the hydraulic power unit of any other gate complete in all respects in accordance with the Technical Specifications and Specification Drawings.	3	Sets					
10	TRT Gates, Hydraulic Hoists and Hoist Supporting Structure at Outfall of Arun-3 HEP	Hydraulic Power Unit (HPU) Assembly	Mandatory spare parts as per list indicated in Sub-price schedule 2A.	1	Set					
11	Bulkhead for TRT Gates at Outfall of Arun-3 HEP	1st Stage Embedded Parts	Design, procurement, fabrication, shop assembly, painting (including shop and field) and supply of 1st stage embedded parts, consisting of J-anchor/U-anchor and kerb angle for grating etc. complete in all respects in accordance with the Technical Specifications and Specification Drawings.	3	Sets					
12	Bulkhead for TRT Gates at Outfall of Arun-3 HEP	2nd Stage Embedded Parts	Design, procurement, fabrication, shop assembly, painting (including shop and field) and supply of 2nd stage embedded parts and anchorages consisting of stainless steel slide track with track base (both side i.e. u/s as well as d/s), stainless steel side seal seats with base, stainless steel top seal seat with base, sill beam with stainless steel bottom seal seat, side guide track, embedments for latching/dogging in gate groove etc. all fitted with anchor bolts/studs, double nuts and washers etc., complete in all respects in accordance with the Technical Specifications and Specification Drawings.	3	Sets					
13	Bulkhead for TRT Gates at Outfall of Arun-3 HEP	Bulkhead Gate	Design, procurement, fabrication, shop assembly, painting (including shop and field) and supply of vertical lift slide type bulkhead gate suitable for a clear vent opening of size 8500 mm x 5500 mm (w x h) consisting of downstream skin plate w.r.t. flow from pond side, main horizontal girders, end vertical girders, vertical stiffeners, filling valves arrangement, Al. bronze thrust bearing pads with base (both side i.e. u/s as well as d/s) with stainless steel CSK screw, ferrules, PTFE clad rubber seals with both sides sealing arrangement with seal bases for top, side and bottom, seal clamp plates with stainless steel fixing CSK bolts, guide shoes, lifting arrangement suitable for operation of bulkhead with min. 50T EOT crane with the help of lifting beam and spreader beam, latching/dogging arrangement, gratings etc., complete in all respects in accordance with the Technical Specifications and Specification Drawings.	1	Set					
14	Bulkhead for TRT Gates at Outfall of Arun-3 HEP	Bulkhead Gate	Mandatory spare parts as per list indicated in Sub-price schedule 2A.	1	Set					
15	Bulkhead for TRT Gates at Outfall of Arun-3 HEP	Air Vent Pipes, instrumentation & instrumentation pipes	Design, procurement, fabrication, shop assembly, painting (including shop and field) and supply of air vent pipes min 150 mm dia., 10 mm thick & instrumentation pipe min. 150 mm dia., 10mm thick for instruments showing balanced water head conditions, including all fixtures, clamps, embedments, wires, cabling etc., complete in all respects in accordance with the Technical Specifications and Specification Drawings.	3	Sets					
16	50T EOT Crane and Lifting Beam with Spreader Beam	50 T EOT Crane	Design, procurement, fabrication, shop assembly, painting (including shop and field) and supply of 50 T (min.) capacity EOT Crane alongwith columns, embedded parts, crane supporting structure, rails (min. 52 kg/m), stainless steel hand rails, stair cases, covers, chequered plates etc. for handling of TRT gates / Bulkhead for TRT & hydraulic hoists suitable for outdoor duty for the initial erection, testing & commissioning of the TRT gates, bulkhead gate & hydraulic hoists and subsequently for their maintenance during operation of the project complete in all respects in accordance with the Technical Specifications and Specification Drawings.	1	Set					

17	50T EOT Crane and Lifting Beam with Spreader Beam	50 T EOT Crane	Mandatory spare parts as per list indicated in Sub-price schedule 2A.	1	Set					
18	50T EOT Crane and Lifting Beam with Spreader Beam	Lifting Beam with Spreader Beam	Design, procurement, fabrication, shop assembly, painting (including shop and field) and supply of automatic engaging and disengaging type lifting beam with spreader beam for the operation of Bulkhead for TRT gates with hooks, sheaves/pulleys, links, guide rollers, stoppers etc. complete in all respects in accordance with the Technical Specifications and Specification Drawings.	1	Set					
19	5 T EOT Crane	5 T EOT Crane	Design, procurement, fabrication, shop assembly, painting (including shop and field) and supply of 5T (min.) capacity EOT Crane alongwith crane supporting structure, rails (min. 45 kg/m), embedded parts, stainless steel hand rails, stair cases, covers, chequered plates etc. for handling of hydraulic power unit suitable for indoor duty, for the initial erection, testing & commissioning of the hydraulic power units in the control room and subsequently for their maintenance during operation of the project complete in all respects in accordance with the Technical Specifications and Specification Drawings.	1	Set					
20	5 T EOT Crane	5 T EOT Crane	Mandatory spare parts as per list indicated in Sub-price schedule 2A.	1	Set					
21	Steel Gratings in front of Intake Structure of Lower Arun HEP	Embedded Parts	Procurement, fabrication, shop assembly, painting (including shop and field) and supply of embedments for steel gratings in front of intake structure of Lower Arun HEP consisting of built-up channels along with groove lining to full height of each groove, stiffeners, anchors and holding down bolts etc., complete in all respects as per technical specification and fabrication drawings.	4	Sets					
22	Steel Gratings in front of Intake Structure of Lower Arun HEP	Steel Grating Panels	Procurement, fabrication, shop assembly, painting (including shop and field) and supply of steel grating panels of size 3010mm x 2880mm (w x h) consisting of channels, bars, I-section, angles, lifting arrangement, dowel bars etc. complete in all respects as per technical specification and fabrication drawings.	44	Nos.					
23	Intake Gates and Rope Drum Hoists for Lower Arun HEP	1st Stage Embedded Parts	Design, procurement, fabrication, shop assembly, painting (including shop and field) and supply of 1st stage embedded parts, consisting of J-anchor/U-anchor and kerb angle for grating etc. complete in all respects in accordance with the Technical Specifications and Specification Drawings.	2	Sets					
24	Intake Gates and Rope Drum Hoists for Lower Arun HEP	2nd Stage Embedded Parts	Design, procurement, fabrication, shop assembly, painting (including shop and field) and supply of 2nd stage embedded parts and anchorages consisting of stainless steel wheel track with track base, stainless steel side seal seats with base, stainless steel top seal seat with base, sill beam with stainless steel bottom seal seat, side guide track, embedments for latching/dogging in gate groove etc. all fitted with anchor bolts/studs, double nuts and washers etc., complete in all respects in accordance with the Technical Specifications and Specification Drawings.	2	Sets					
25	Intake Gates and Rope Drum Hoists for Lower Arun HEP	Intake Gates	Design, procurement, fabrication, shop assembly, painting (including shop and field) and supply of vertical lift wheeled gate, suitable for opening of size 6000mm x 7000mm (w x h). The gate shall consist of upstream skin plate (min. 25mm thick), main horizontal girders, end vertical girders, vertical stiffeners, filling valves arrangement, wheel assemblies with self-aligned stainless steel spherical roller bearings, wheel cut-out arrangement, wheel axle/pins, PTFE clad rubber seals with seal bases for side, top and bottom, ferrules, seal clamp plates with stainless steel fixing CSK screws, guide shoes/rollers, lifting arrangement, latching arrangement, ballast (if required) etc., complete in all respects in accordance with the Technical Specifications and Specification Drawings.	2	Sets					
26	Intake Gates and Rope Drum Hoists for Lower Arun HEP	Intake Gates	Mandatory spare parts as per list indicated in Sub-price schedule 2A.	1	Set					
27	Intake Gates and Rope Drum Hoists for Lower Arun HEP	Rope Drum Hoists	Design, procurement, fabrication, shop assembly, painting (including shop and field) and supply of Rope Drum Hoist of minimum 60T capacity for operation of main intake gate, complete with all the mechanical components such as open gears, gear reduction unit, rope drums, plunger blocks for supporting the shafts, wire ropes, brakes (EM as well as EHT), shafts, sheaves, couplings, gate position indicator (both analogue and digital), rope sockets etc., and all the electrical items such as motors, switches, cables, control panel (with a provision of 1 no. 15A and 1 no. 5A switch and socket), overload sensing mechanism, limit switches, suitable lighting arrangement (minimum 500W) above and below the hoist platform etc., covers (stainless steel) for gear assembly, rope drum, motors, polycarbonate roof of min. 2.5m high with supporting frame & gutters etc. for hoist platform etc. complete in all respects in accordance with the Technical Specifications and Specification Drawings.	2	Sets					
28	Intake Gates and Rope Drum Hoists for Lower Arun HEP	Rope Drum Hoists	Mandatory spare parts as per list indicated in Sub-price schedule 2A.	1	Set					
29	Intake Gates and Rope Drum Hoists for Lower Arun HEP	Hoist Supporting Structure	Design, procurement, fabrication, shop assembly, painting (including shop and field) and supply of hoist supporting structure to support the hoist consisting of horizontal girders, cross girders, columns/trestles with latching arrangement, bracings on all sides, chequered plates for flooring, hand railing, platform for latching arrangement, staircase, interconnecting walkways for hoist platforms, embedded parts such as base plates, foundation bolts etc., complete in all respects in accordance with the Technical Specifications and Specification Drawings.	2	Sets					
30	Submersible Slurry Pump and Monorail Crane	Submersible Slurry Pump	Design, procurement, fabrication, shop assembly, painting (including shop and field) and supply of 01 (One) sets of portable type submersible slurry pump IP66 rating, 35m (min.) operating head for dredging of silt from an underground sump/reservoir and surface discharge etc., min. 40% solid content handling, min. 50 m ³ /hr flow rate inclusive of flexible hose pipe, supporting frame for pump, lifting arrangement compatible with monorail, LT panel for outdoor duty type and cables (power & control) suitable for the operation of pump complete in all respects in accordance with the Technical Specifications and Specification Drawings.	1	Set					
31	Submersible Slurry Pump and Monorail Crane	Submersible Slurry Pump	Mandatory spare parts as per list indicated in Sub-price schedule 2A.	1	Set					
32	Submersible Slurry Pump and Monorail Crane	Monorail Crane	Design, procurement, fabrication, shop assembly, painting (including shop and field) and supply of Min. 5T monorail crane with supporting structure, LT panel for outdoor duty type and cables (power & control) suitable for operation of portable type submersible slurry pump into the intake shafts downstream of gate grooves of Lower Arun HEP complete in all respects in accordance with the Technical Specifications and Specification Drawings.	1	Set					
33	Submersible Slurry Pump and Monorail Crane	Monorail Crane	Mandatory spare parts as per list indicated in Sub-price schedule 2A.	1	Set					
34	Instruments	Instruments for gate	Design, procurement, fabrication, shop assembly, painting (including shop and field) and supply of Gate position indicators comprising of electronic position indication (one for giving digital signal and one mechanical gate position indication) for the TRT gates for giving gate movement indication in the Arun-3 HEP and Lower Arun HEP Powerhouses (digital signal only), additional position indicator fixed to the hydraulic cylinder operated by a push/ pull rod connected to the TRT gate, visual mechanical linear display to indicate local gate position, two proximity switches wired to the control & indication circuits to indicate fully open or fully closed gate position, position monitor assembly providing a 4-20mA signal in 5mm steps of gate movement, signal feeding into the control PLC to automatically restore the gate to its previous position etc. complete in all respects in accordance with the Technical Specifications and Specification Drawings.	3	Sets					
35	Instruments	Water Level Measuring Transmitter	Design, procurement, fabrication, shop assembly, painting (including shop and field) and supply of Reservoir water level measuring transmitter with all the necessary sensors, transducers, instruments, terminals, contacts, cabling etc for providing signal to automatic gate control panel for automatic operation of TRT gates complete in all respects in accordance with the Technical Specifications and Specification Drawings.	1	Set					
36			Mandatory tools & tackles as per list indicated in Sub-Price Schedule 3A.	1	Set					

2.0 Sub Price Schedule- 1 (Supply Portion) (Break up of unit price shall be furnished under the following heads)

Sr. No.	Main Head	Sub Head	Articles or Services	Qty/No.	Unit (Sets/Nos.)	Total Weight/Capacity (MT)	Unit Price (INR)	Unit Price (NPR)	Total Amount (INR)	Total Amount (NPR)
1	TRT Gates and Hydraulic Hoists for Arun-3 HEP	1st Stage Embedded Parts	Design Cost	3	Sets					
2	TRT Gates and Hydraulic Hoists for Arun-3 HEP	1st Stage Embedded Parts	Cost of materials	3	Sets					
3	TRT Gates and Hydraulic Hoists for Arun-3 HEP	1st Stage Embedded Parts	Manufacturing Cost	3	Sets					
4	TRT Gates and Hydraulic Hoists for Arun-3 HEP	1st Stage Embedded Parts	Cost of shop and field painting	3	Sets					
5	TRT Gates and Hydraulic Hoists for Arun-3 HEP	2nd Stage Embedded Parts	Design Cost	3	Sets					
6	TRT Gates and Hydraulic Hoists for Arun-3 HEP	2nd Stage Embedded Parts	Cost of materials	3	Sets					
7	TRT Gates and Hydraulic Hoists for Arun-3 HEP	2nd Stage Embedded Parts	Manufacturing Cost	3	Sets					
8	TRT Gates and Hydraulic Hoists for Arun-3 HEP	2nd Stage Embedded Parts	Cost of shop and field painting	3	Sets					
9	TRT Gates and Hydraulic Hoists for Arun-3 HEP	TRT Outfall Gates	Design Cost	3	Sets					
10	TRT Gates and Hydraulic Hoists for Arun-3 HEP	TRT Outfall Gates	Cost of materials	3	Sets					
11	TRT Gates and Hydraulic Hoists for Arun-3 HEP	TRT Outfall Gates	Manufacturing Cost	3	Sets					
12	TRT Gates and Hydraulic Hoists for Arun-3 HEP	TRT Outfall Gates	Cost of shop and field painting	3	Sets					
13	TRT Gates and Hydraulic Hoists for Arun-3 HEP	Hydraulic Hoist Cylinder	Design Cost	3	Sets					
14	TRT Gates and Hydraulic Hoists for Arun-3 HEP	Hydraulic Hoist Cylinder	Cost of materials	3	Sets					
15	TRT Gates and Hydraulic Hoists for Arun-3 HEP	Hydraulic Hoist Cylinder	Manufacturing Cost	3	Sets					
16	TRT Gates and Hydraulic Hoists for Arun-3 HEP	Hydraulic Hoist Cylinder	Cost of shop and field painting	3	Sets					

17	TRT Gates and Hydraulic Hoists for Arun-3 HEP	Hoist Supporting Structure and Embedded Parts	Design Cost	3	Sets					
18	TRT Gates and Hydraulic Hoists for Arun-3 HEP	Hoist Supporting Structure and Embedded Parts	Cost of materials	3	Sets					
19	TRT Gates and Hydraulic Hoists for Arun-3 HEP	Hoist Supporting Structure and Embedded Parts	Manufacturing Cost	3	Sets					
20	TRT Gates and Hydraulic Hoists for Arun-3 HEP	Hoist Supporting Structure and Embedded Parts	Cost of shop and field painting	3	Sets					
21	TRT Gates and Hydraulic Hoists for Arun-3 HEP	Supporting Structure and Embedded Parts for spare cylinder	Design Cost	1	Set					
22	TRT Gates and Hydraulic Hoists for Arun-3 HEP	Supporting Structure and Embedded Parts for spare cylinder	Cost of materials	1	Set					
23	TRT Gates and Hydraulic Hoists for Arun-3 HEP	Supporting Structure and Embedded Parts for spare cylinder	Manufacturing Cost	1	Set					
24	TRT Gates and Hydraulic Hoists for Arun-3 HEP	Supporting Structure and Embedded Parts for spare cylinder	Cost of shop and field painting	1	Set					
25	TRT Gates and Hydraulic Hoists for Arun-3 HEP	Hydraulic Power Unit (HPU) Assembly	Design Cost	3	Sets					
26	TRT Gates and Hydraulic Hoists for Arun-3 HEP	Hydraulic Power Unit (HPU) Assembly	Cost of materials	3	Sets					
27	TRT Gates and Hydraulic Hoists for Arun-3 HEP	Hydraulic Power Unit (HPU) Assembly	Manufacturing Cost	3	Sets					
28	TRT Gates and Hydraulic Hoists for Arun-3 HEP	Hydraulic Power Unit (HPU) Assembly	Cost of shop and field painting	3	Sets					
29	Bulkhead for TRT Gates of Arun-3 HEP	1st Stage Embedded Parts	Design Cost	3	Sets					
30	Bulkhead for TRT Gates of Arun-3 HEP	1st Stage Embedded Parts	Cost of materials	3	Sets					
31	Bulkhead for TRT Gates of Arun-3 HEP	1st Stage Embedded Parts	Manufacturing Cost	3	Sets					
32	Bulkhead for TRT Gates of Arun-3 HEP	1st Stage Embedded Parts	Cost of shop and field painting	3	Sets					
33	Bulkhead for TRT Gates of Arun-3 HEP	2nd Stage Embedded Parts	Design Cost	3	Sets					

34	Bulkhead for TRT Gates of Arun-3 HEP	2nd Stage Embedded Parts	Cost of materials	3	Sets					
35	Bulkhead for TRT Gates of Arun-3 HEP	2nd Stage Embedded Parts	Manufacturing Cost	3	Sets					
36	Bulkhead for TRT Gates of Arun-3 HEP	2nd Stage Embedded Parts	Cost of shop and field painting	3	Sets					
37	Bulkhead for TRT Gates of Arun-3 HEP	Bulkhead Gate	Design Cost	1	Set					
38	Bulkhead for TRT Gates of Arun-3 HEP	Bulkhead Gate	Cost of materials	1	Set					
39	Bulkhead for TRT Gates of Arun-3 HEP	Bulkhead Gate	Manufacturing Cost	1	Set					
40	Bulkhead for TRT Gates of Arun-3 HEP	Bulkhead Gate	Cost of shop and field painting	1	Set					
41	Bulkhead for TRT Gates of Arun-3 HEP	Air Vent Pipes, instrumentation & instrumentation pipes	Design Cost	3	Sets					
42	Bulkhead for TRT Gates of Arun-3 HEP	Air Vent Pipes, instrumentation & instrumentation pipes	Cost of materials	3	Sets					
43	Bulkhead for TRT Gates of Arun-3 HEP	Air Vent Pipes, instrumentation & instrumentation pipes	Manufacturing Cost	3	Sets					
44	Bulkhead for TRT Gates of Arun-3 HEP	Air Vent Pipes, instrumentation & instrumentation pipes	Cost of shop and field painting	3	Sets					
45	50T EOT Crane and Lifting Beam with Spreader Beam	50 T EOT Crane	Design Cost	1	Set					
46	50T EOT Crane and Lifting Beam with Spreader Beam	50 T EOT Crane	Cost of materials	1	Set					
47	50T EOT Crane and Lifting Beam with Spreader Beam	50 T EOT Crane	Manufacturing Cost	1	Set					
48	50T EOT Crane and Lifting Beam with Spreader Beam	50 T EOT Crane	Cost of shop and field painting	1	Set					
49	50T EOT Crane and Lifting Beam with Spreader Beam	Lifting Beam with Spreader Beam	Design Cost	1	Set					
50	50T EOT Crane and Lifting Beam with Spreader Beam	Lifting Beam with Spreader Beam	Cost of materials	1	Set					

51	50T EOT Crane and Lifting Beam with Spreader Beam	Lifting Beam with Spreader Beam	Manufacturing Cost	1	Set					
52	50T EOT Crane and Lifting Beam with Spreader Beam	Lifting Beam with Spreader Beam	Cost of shop and field painting	1	Set					
53	5 T EOT Crane	5 T EOT Crane	Design Cost	1	Set					
54	5 T EOT Crane	5 T EOT Crane	Cost of materials	1	Set					
55	5 T EOT Crane	5 T EOT Crane	Manufacturing Cost	1	Set					
56	5 T EOT Crane	5 T EOT Crane	Cost of shop and field painting	1	Set					
57	Steel Gratings in front of Intake Structure of Lower Arun HEP	Embedded Parts	Cost of materials	4	Sets					
58	Steel Gratings in front of Intake Structure of Lower Arun HEP	Embedded Parts	Manufacturing Cost	4	Sets					
59	Steel Gratings in front of Intake Structure of Lower Arun HEP	Embedded Parts	Cost of shop and field painting	4	Sets					
60	Steel Gratings in front of Intake Structure of Lower Arun HEP	Steel Grating Panels	Cost of materials	44	Nos.					
61	Steel Gratings in front of Intake Structure of Lower Arun HEP	Steel Grating Panels	Manufacturing Cost	44	Nos.					
62	Steel Gratings in front of Intake Structure of Lower Arun HEP	Steel Grating Panels	Cost of shop and field painting	44	Nos.					
63	Intake Gates and Rope Drum Hoists for Lower Arun HEP	1st Stage Embedded Parts	Design Cost	2	Sets					
64	Intake Gates and Rope Drum Hoists for Lower Arun HEP	1st Stage Embedded Parts	Cost of materials	2	Sets					
65	Intake Gates and Rope Drum Hoists for Lower Arun HEP	1st Stage Embedded Parts	Manufacturing Cost	2	Sets					
66	Intake Gates and Rope Drum Hoists for Lower Arun HEP	1st Stage Embedded Parts	Cost of shop and field painting	2	Sets					
67	Intake Gates and Rope Drum Hoists for Lower Arun HEP	2nd Stage Embedded Parts	Design Cost	2	Sets					

68	Intake Gates and Rope Drum Hoists for Lower Arun HEP	2nd Stage Embedded Parts	Cost of materials	2	Sets					
69	Intake Gates and Rope Drum Hoists for Lower Arun HEP	2nd Stage Embedded Parts	Manufacturing Cost	2	Sets					
70	Intake Gates and Rope Drum Hoists for Lower Arun HEP	2nd Stage Embedded Parts	Cost of shop and field painting	2	Sets					
71	Intake Gates and Rope Drum Hoists for Lower Arun HEP	Intake Gates	Design Cost	2	Sets					
72	Intake Gates and Rope Drum Hoists for Lower Arun HEP	Intake Gates	Cost of materials	2	Sets					
73	Intake Gates and Rope Drum Hoists for Lower Arun HEP	Intake Gates	Manufacturing Cost	2	Sets					
74	Intake Gates and Rope Drum Hoists for Lower Arun HEP	Intake Gates	Cost of shop and field painting	2	Sets					
75	Intake Gates and Rope Drum Hoists for Lower Arun HEP	Rope Drum Hoists	Design Cost	2	Sets					
76	Intake Gates and Rope Drum Hoists for Lower Arun HEP	Rope Drum Hoists	Cost of materials	2	Sets					
77	Intake Gates and Rope Drum Hoists for Lower Arun HEP	Rope Drum Hoists	Manufacturing Cost	2	Sets					
78	Intake Gates and Rope Drum Hoists for Lower Arun HEP	Rope Drum Hoists	Cost of shop and field painting	2	Sets					
79	Intake Gates and Rope Drum Hoists for Lower Arun HEP	Hoist Supporting Structure	Design Cost	2	Sets					
80	Intake Gates and Rope Drum Hoists for Lower Arun HEP	Hoist Supporting Structure	Cost of materials	2	Sets					
81	Intake Gates and Rope Drum Hoists for Lower Arun HEP	Hoist Supporting Structure	Manufacturing Cost	2	Sets					
82	Intake Gates and Rope Drum Hoists for Lower Arun HEP	Hoist Supporting Structure	Cost of shop and field painting	2	Sets					
83	Submersible Slurry Pump and Monorail Crane	Submersible Slurry Pump	Design Cost	1	Set					
84	Submersible Slurry Pump and Monorail Crane	Submersible Slurry Pump	Cost of materials	1	Set					

85	Submersible Slurry Pump and Monorail Crane	Submersible Slurry Pump	Manufacturing Cost	1	Set					
86	Submersible Slurry Pump and Monorail Crane	Submersible Slurry Pump	Cost of shop and field painting	1	Set					
87	Submersible Slurry Pump and Monorail Crane	Monorail Crane	Design Cost	1	Set					
88	Submersible Slurry Pump and Monorail Crane	Monorail Crane	Cost of materials	1	Set					
89	Submersible Slurry Pump and Monorail Crane	Monorail Crane	Manufacturing Cost	1	Set					
90	Submersible Slurry Pump and Monorail Crane	Monorail Crane	Cost of shop and field painting	1	Set					
91	Instruments	Instruments for gate	Design Cost	3	Sets					
92	Instruments	Instruments for gate	Cost of materials	3	Sets					
93	Instruments	Instruments for gate	Manufacturing Cost	3	Sets					
94	Instruments	Instruments for gate	Cost of shop and field painting	3	Sets					
95	Instruments	Water Level Measuring Transmitter	Design Cost	1	Set					
96	Instruments	Water Level Measuring Transmitter	Cost of materials	1	Set					
97	Instruments	Water Level Measuring Transmitter	Manufacturing Cost	1	Set					
98	Instruments	Water Level Measuring Transmitter	Cost of shop and field painting	1	Set					

3.0.0 Sub-Price Schedule- 2A (Supply Portion) for Mandatory Spare Parts for Gates, Hoists, Cranes and their Associated Equipment.

Sr. No.	Main Head	Sub Head	Articles or Services	Qty/No.	Unit (Sets/ Nos.)	Unit Price (INR)	Unit Price NPR	Total Amount (INR)	Total Amount (NPR)
1	TRT Gates and Hydraulic Hoists for Arun-3 HEP	TRT Gates	Rubber seals with fixing CSK screws, ferrules, clamp flats etc. sufficient for one gate	3	Sets				
2	TRT Gates and Hydraulic Hoists for Arun-3 HEP	TRT Gates	Wheel assembly complete in all respects	3	Sets				
3	TRT Gates and Hydraulic Hoists for Arun-3 HEP	TRT Gates	Slide pads with fixing CSK screws etc., sufficient for one gate	3	Sets				
4	TRT Gates and Hydraulic Hoists for Arun-3 HEP	Hydraulic Cylinder	Cylinder assembly complete in all respects	1	No.				
5	TRT Gates and Hydraulic Hoists for Arun-3 HEP	Hydraulic Cylinder	Piston rings	1	Set				
6	TRT Gates and Hydraulic Hoists for Arun-3 HEP	Hydraulic Cylinder	Gate Position Indicator	1	Set				
7	TRT Gates and Hydraulic Hoists for Arun-3 HEP	Hydraulic Cylinder	Limit Switches (complete for one gate)	1	Set				
8	TRT Gates and Hydraulic Hoists for Arun-3 HEP	Hydraulic Cylinder	Gaskets, packing & seals for hoist cylinder, piston rings	1	Set				
9	TRT Gates and Hydraulic Hoists for Arun-3 HEP	Hydraulic Power Unit (HPU) Assembly	Filters of all types	3	Sets				
10	TRT Gates and Hydraulic Hoists for Arun-3 HEP	Hydraulic Power Unit (HPU) Assembly	Isolation valves electric control	2	Sets				
11	TRT Gates and Hydraulic Hoists for Arun-3 HEP	Hydraulic Power Unit (HPU) Assembly	Drain Valves, manually operated	2	Sets				
12	TRT Gates and Hydraulic Hoists for Arun-3 HEP	Hydraulic Power Unit (HPU) Assembly	Non return valves (check valves)	2	Sets				
13	TRT Gates and Hydraulic Hoists for Arun-3 HEP	Hydraulic Power Unit (HPU) Assembly	Pressure gauges	2	Sets				
14	TRT Gates and Hydraulic Hoists for Arun-3 HEP	Hydraulic Power Unit (HPU) Assembly	Pressure control valves (Relief valve)	2	Sets				
15	TRT Gates and Hydraulic Hoists for Arun-3 HEP	Hydraulic Power Unit (HPU) Assembly	Pressure switch	2	Sets				
16	TRT Gates and Hydraulic Hoists for Arun-3 HEP	Hydraulic Power Unit (HPU) Assembly	Flow control valves (Restriction)	2	Sets				
17	TRT Gates and Hydraulic Hoists for Arun-3 HEP	Hydraulic Power Unit (HPU) Assembly	Four way solenoid control valves	2	Sets				
18	TRT Gates and Hydraulic Hoists for Arun-3 HEP	Hydraulic Power Unit (HPU) Assembly	Two way solenoid control valves	2	Sets				

19	TRT Gates and Hydraulic Hoists for Arun-3 HEP	Hydraulic Power Unit (HPU) Assembly	Hydraulic pump of sufficient capacity to operate hydraulic circuits (complete pump & motor assembly unit)	1	Set				
20	TRT Gates and Hydraulic Hoists for Arun-3 HEP	Hydraulic Power Unit (HPU) Assembly	Tool kit for maintenance of above equipment	1	Set				
21	TRT Gates and Hydraulic Hoists for Arun-3 HEP	Hydraulic Power Unit (HPU) Assembly (Control Equipment)	Miniature circuit breaker	2	Sets				
22	TRT Gates and Hydraulic Hoists for Arun-3 HEP	Hydraulic Power Unit (HPU) Assembly (Control Equipment)	Overload relay	2	Sets				
23	TRT Gates and Hydraulic Hoists for Arun-3 HEP	Hydraulic Power Unit (HPU) Assembly (Control Equipment)	Circuit breaker	2	Sets				
24	TRT Gates and Hydraulic Hoists for Arun-3 HEP	Hydraulic Power Unit (HPU) Assembly (Control Equipment)	Operating coil for power	2	Sets				
25	TRT Gates and Hydraulic Hoists for Arun-3 HEP	Hydraulic Power Unit (HPU) Assembly (Control Equipment)	Contact relay	2	Sets				
26	TRT Gates and Hydraulic Hoists for Arun-3 HEP	Hydraulic Power Unit (HPU) Assembly (Control Equipment)	240V AC Coil for above relays	2	Sets				
27	TRT Gates and Hydraulic Hoists for Arun-3 HEP	Hydraulic Power Unit (HPU) Assembly (Control Equipment)	Time relay	2	Sets				
28	TRT Gates and Hydraulic Hoists for Arun-3 HEP	Hydraulic Power Unit (HPU) Assembly (Control Equipment)	Flasher relay	2	Sets				
29	TRT Gates and Hydraulic Hoists for Arun-3 HEP	Hydraulic Power Unit (HPU) Assembly (Control Equipment)	Actuator for push button	2	Sets				
30	TRT Gates and Hydraulic Hoists for Arun-3 HEP	Hydraulic Power Unit (HPU) Assembly (Control Equipment)	Fuses & indicating lamps	3	Sets				
31	TRT Gates and Hydraulic Hoists for Arun-3 HEP	Hydraulic Power Unit (HPU) Assembly (Control Equipment)	Control switch	3	Sets				
32	TRT Gates and Hydraulic Hoists for Arun-3 HEP	Hydraulic Power Unit (HPU) Assembly (Control Equipment)	ON/OFF switch	3	Sets				
33	TRT Gates and Hydraulic Hoists for Arun-3 HEP	Hydraulic Power Unit (HPU) Assembly (Control Equipment)	Solenoid valve- rated 24V dc	3	Sets				
34	Bulkhead for TRT Gates of Arun-3 HEP	Bulkhead Gate	Rubber seals with fixing CSK screws, ferrules, seal clamps etc. sufficient for one bulkhead gate	1	Set				
35	Bulkhead for TRT Gates of Arun-3 HEP	Bulkhead Gate	Slide pads with fixing CSK screws etc., sufficient for one gate	1	Set				
36	50T EOT Crane and Lifting Beam with Spreader Beam	50 T EOT Crane	Brake linings, brake shoes, coil & contacts for each contactor	1	Set				
37	50T EOT Crane and Lifting Beam with Spreader Beam	50 T EOT Crane	Fuses and indicating lamps of all types	2	Sets				

38	50T EOT Crane and Lifting Beam with Spreader Beam	50 T EOT Crane	Auxiliary relay, control switch, master switch, resistor & limit switch used in various circuits	1	Set				
39	50T EOT Crane and Lifting Beam with Spreader Beam	50 T EOT Crane	Electric Motors of all types	1	Set				
40	50T EOT Crane and Lifting Beam with Spreader Beam	50 T EOT Crane	Complete set of bearings and bushes required for one hoist	1	Set				
41	5 T EOT Crane	5 T EOT Crane	Brake linings, brake shoes, coil & contacts for each contactor	1	Sets				
42	5 T EOT Crane	5 T EOT Crane	Fuses and indicating lamps of all type	2	Sets				
43	5 T EOT Crane	5 T EOT Crane	Auxiliary relay, control switch, master switch, resistor & limit switch used in various circuits	1	Set				
44	5 T EOT Crane	5 T EOT Crane	Electric Motors of all types	1	Set				
45	5 T EOT Crane	5 T EOT Crane	Complete set of bearings and bushes required for one hoist	1	Set				
46	Intake Gates and Rope Drum Hoists for Lower Arun HEP	Intake Gates	Rubber seals with fixing CSK screws, ferrules, seal clamps etc. sufficient for one bulkhead gate	2	Set				
47	Intake Gates and Rope Drum Hoists for Lower Arun HEP	Intake Gates	Wheel assembly complete in all respects	2	Set				
48	Intake Gates and Rope Drum Hoists for Lower Arun HEP	Rope Drum Hoists	Brake linings, brake shoes, coil & contacts for each contactor.	2	Sets				
49	Intake Gates and Rope Drum Hoists for Lower Arun HEP	Rope Drum Hoists	Fuses & indicating lamps	2	Sets				
50	Intake Gates and Rope Drum Hoists for Lower Arun HEP	Rope Drum Hoists	Auxiliary relays, control switches, master switch, resistor, component used in circuit for each type.	2	Sets				
51	Intake Gates and Rope Drum Hoists for Lower Arun HEP	Rope Drum Hoists	Carbon bushes for Electric Motor	2	Sets				
52	Intake Gates and Rope Drum Hoists for Lower Arun HEP	Rope Drum Hoists	Complete set of bearings and bushes required for one hoist.	2	Sets				
53	Submersible Slurry Pump and Monorail Crane	Pump	Impeller	1	No.				
54	Submersible Slurry Pump and Monorail Crane	Pump	Agitator	1	No.				
55	Submersible Slurry Pump and Monorail Crane	Pump	Shaft	1	No.				
56	Submersible Slurry Pump and Monorail Crane	Pump	Shaft sleeve	1	No.				

57	Submersible Slurry Pump and Monorail Crane	LT Control Panel for Pump	Indicating lamps	1	Set				
58	Submersible Slurry Pump and Monorail Crane	LT Control Panel for Pump	Ammeter	1	No.				
59	Submersible Slurry Pump and Monorail Crane	LT Control Panel for Pump	Voltmeter	1	No.				
60	Submersible Slurry Pump and Monorail Crane	LT Control Panel for Pump	Selector switch	1	Set				
61	Submersible Slurry Pump and Monorail Crane	LT Control Panel for Pump	Fuses(one no. of each type)	1	Set				
62	Submersible Slurry Pump and Monorail Crane	LT Control Panel for Pump	Power contactor	1	Set				
63	Submersible Slurry Pump and Monorail Crane	LT Control Panel for Pump	Relay(one no. of each type)	1	Set				
64	Submersible Slurry Pump and Monorail Crane	LT Control Panel for Pump	Start Stop push button	1	No.				
65	Submersible Slurry Pump and Monorail Crane	Monorail Crane	Fuses and indicating lamps of all types	1	Set				
66	Submersible Slurry Pump and Monorail Crane	Monorail Crane	Auxiliary relay, control switch, master switch, resistor & limit switch used in various circuits	1	Set				

65	Submersible Slurry Pump and Monorail Crane	Monorail Crane	Fuses and indicating lamps of all types	1	Set								
66	Submersible Slurry Pump and Monorail Crane	Monorail Crane	Auxiliary relay, control switch, master switch, resistor & limit switch used in various circuits	1	Set								

4.0 4.0 Sub-Price Schedule- 3A (Supply Portion) for Mandatory Tools and Tackles for Gates, Hoists, Cranes and associated Equipment

Sr. No.	Main Head	Sub Head	Articles or Services	Qty/No.	Unit (Sets/Nos.)	Unit Price (INR)	Unit Price (NPR)	Total Amount (INR)	Total Amount (NPR)
1	Mandatory Tools and Tackles	Portable Hydraulic Jack	Hydraulic Jack kit, comprising hand pump, 5T wedge type ram, various extensions etc., boxed	1	Nos.				
2	Mandatory Tools and Tackles	Portable Hydraulic Jack	Hydraulic Jack kit, comprising pump & cylinder set (20T/60mm stroke/120 retracted height) with gauge, adopter, hose etc.	1	Nos.				
3	Mandatory Tools and Tackles	Portable Hydraulic Jack	Hydraulic Jack kit, comprising pump & cylinder set (50T/100mm stroke/150 retracted height) with gauge, adopter, hose etc.	1	Nos.				
4	Mandatory Tools and Tackles	Set of Pullers	Bearing, bushes and wheels pullers set, triple legged (long reach, 3 jaw, industrial reversible/adjustable): 300mm spread, 250mm reach	1	Nos.				
5	Mandatory Tools and Tackles	Torque Wrench	3/4 inch Torque Wrench, 150-800Nm	1	Sets				
6	Mandatory Tools and Tackles	Torque Wrench	Torque Multiplier, 5:1 torque multiplication, input 3/4 inch sq drive, output 1 inch sq drive, torque range 2700Nm	1	Sets				
7	Mandatory Tools and Tackles	Socket, Extension Bars & Ratchet	Screw driver socket, 3/4 inch square drive	1	Sets				
8	Mandatory Tools and Tackles	Socket, Extension Bars & Ratchet	Socket set, 3/4 inch drive, 22 pieces, 22-60mm sockets + accessories	1	Sets				
9	Mandatory Tools and Tackles	Socket, Extension Bars & Ratchet	Impact socket, standard metric, 1 inch drive, 46mm	1	Nos.				
10	Mandatory Tools and Tackles	Socket, Extension Bars & Ratchet	Impact socket, standard metric, 1 inch drive, 55mm	1	Nos.				
11	Mandatory Tools and Tackles	Socket, Extension Bars & Ratchet	Impact socket, standard metric, 1" drive, 65mm	1	Nos.				
12	Mandatory Tools and Tackles	Socket, Extension Bars & Ratchet	Square drive reducer, (impact Quality) 3/4" Female x 1" Male	1	Nos.				
13	Mandatory Tools and Tackles	Socket, Extension Bars & Ratchet	Extensions, 3/4 inch drive, 22 pieces, 22-60mm + accessories	1	Sets				
14	Mandatory Tools and Tackles	Open Ended/ Box Type/ Double Ended Spanners	Combination Spanners, chrome/vanadium, 19mm, 24mm, 30mm & 36mm	1	Sets				
15	Mandatory Tools and Tackles	Open Ended/ Box Type/ Double Ended Spanners	Double Ended box spanner set, zinc plated steel, 7 piece 6x7, 8x9, 10x11, 12x13, 14x15, 16x17, 18x19	1	Sets				
16	Mandatory Tools and Tackles	Open Ended/ Box Type/ Double Ended Spanners	Double Ended Open spanner, chrome/ vanadium with black oxidized finish, 19mmx24mm & 30mmx36mm	1	Sets				
17	Mandatory Tools and Tackles	Open Ended/ Box Type/ Double Ended Spanners	Single Ended Open spanner, chrome/ vanadium with black oxidized finish, 46mm, 55mm & 65mm	1	Sets				
18	Mandatory Tools and Tackles	Screw Drivers (Insulated)	4 inches parallel & crosspoint	1	Sets				
19	Mandatory Tools and Tackles	Screw Drivers (Insulated)	6 inches parallel & crosspoint	1	Sets				
20	Mandatory Tools and Tackles	Screw Drivers (Insulated)	8 inches parallel & crosspoint	1	Sets				
21	Mandatory Tools and Tackles	Screw Drivers (Insulated)	12 inches parallel & crosspoint	1	Sets				
22	Mandatory Tools and Tackles	Screw Drivers (Insulated)	15 inches parallel & crosspoint	1	Sets				
23	Mandatory Tools and Tackles	Pipe Wrench	12 inches Pipe Wrench (43mm capacity)	1	Nos.				
24	Mandatory Tools and Tackles	Pipe Wrench	24 inches Pipe Wrench (76mm capacity)	1	Nos.				
25	Mandatory Tools and Tackles	Cutting Pliers (Insulated)	7 inches Heavy Duty universal type 1000V insulated combination pliers with single cutter	1	Nos.				
26	Mandatory Tools and Tackles	Cutting Pliers (Insulated)	6 3/8 inches Heavy Duty Diagonal cutting Nippers, 1000V insulated	1	Nos.				

27	Mandatory Tools and Tackles	Spirit Levels	24 inches Girder Section Spirit Level (aluminium, 0.75mm/m accuracy)	1	Nos.				
28	Mandatory Tools and Tackles	Spirit Levels	40 inches Girder Section Spirit Level (aluminium, 0.75mm/m accuracy)	1	Nos.				
29	Mandatory Tools and Tackles	Grease Gun	120cc Grease Gun, 9 inches/230mm flexible rubber hose 11mm bore, hook on-type hydraulic connector for grease gun, 1/8 inch BSPP (attached to upper end of rubber hose)	1	Sets				
30	Mandatory Tools and Tackles	Hammers with Handle	1lb Ball Pein Hammer with wooden handle	1	Nos.				
31	Mandatory Tools and Tackles	Hammers with Handle	2lb Ball Pein Hammer with wooden handle	1	Nos.				
32	Mandatory Tools and Tackles	Hammers with Handle	5lb Hammer with wooden handle	1	Nos.				
33	Mandatory Tools and Tackles	Hammers with Handle	Plastic Hammer	1	Nos.				
34	Mandatory Tools and Tackles	Hammers with Handle	Wooden Hammer (Mallet)	1	Nos.				
35	Mandatory Tools and Tackles	Oil Can with Funnel	Metal Oil Can, 500cc, Force feed pump (c/w rigid metal and flexible nylon threaded spouts)	1	Sets				
36	Mandatory Tools and Tackles	Oil Can with Funnel	200mm plastic funnel with anti-splash rim	1	Sets				
37	Mandatory Tools and Tackles	Taps & Dies	Tap(Second), M12x1.75, HSS Ground Thread	1	Nos.				
38	Mandatory Tools and Tackles	Taps & Dies	Tap(Second), M16x2.0, HSS Ground Thread	1	Nos.				
39	Mandatory Tools and Tackles	Taps & Dies	Tap(Second), M20x2.5, HSS Ground Thread	1	Nos.				
40	Mandatory Tools and Tackles	Taps & Dies	Tap(Second), M24x3.0, HSS Ground Thread	1	Nos.				
41	Mandatory Tools and Tackles	Taps & Dies	Set of Tap Wrenches, 1/16"-1/4" and 1/4"-3/4"	1	Sets				
42	Mandatory Tools and Tackles	Taps & Dies	Die, M12x1.75x1.5/16" OD, HSS	1	Nos.				
43	Mandatory Tools and Tackles	Taps & Dies	Die, M16x2.0x2" OD, HSS	1	Nos.				
44	Mandatory Tools and Tackles	Taps & Dies	Die, M20x2.5x2" OD, HSS	1	Nos.				
45	Mandatory Tools and Tackles	Taps & Dies	Die, M24x3.0x2" OD, HSS	1	Nos.				
46	Mandatory Tools and Tackles	Taps & Dies	Distock, for 1.5/16" Die	1	Nos.				
47	Mandatory Tools and Tackles	Taps & Dies	Distock, for 2" Die	1	Nos.				
48	Mandatory Tools and Tackles	Allen Keys	Hexagon key set (Walleted), 9 piece, 1.5mm-10mm (Long arm)	1	Sets				
49	Mandatory Tools and Tackles	Adjustable Spanners	Adjustable wrench, Phosphate finish, 150mm (6 inches)	1	Nos.				
50	Mandatory Tools and Tackles	Adjustable Spanners	Adjustable wrench, Phosphate finish, 300mm (12 inches)	1	Nos.				
51	Mandatory Tools and Tackles	Pliers	Lineman's plier 8 inches	1	Nos.				
52	Mandatory Tools and Tackles	Pliers	Nose Plier 150mm	1	Nos.				
53	Mandatory Tools and Tackles	Pliers	Heavy Duty insulated pliers	1	Nos.				
54	Mandatory Tools and Tackles	Pliers	Combination plier 200mm	1	Nos.				
55	Mandatory Tools and Tackles	Pliers	Circlip removing plier 200mm	1	Nos.				

56	Mandatory Tools and Tackles	Soldering Iron	Soldering Iron 15W	1	Nos.				
57	Mandatory Tools and Tackles	Soldering Iron	Wire Stripper cum Crimping Tool	1	Nos.				
58	Mandatory Tools and Tackles	Feeler Gauge	Feeler gauge 4 inches long consisting of many strips	1	Nos.				
59	Mandatory Tools and Tackles	Hand Drilling Machine	Electrical Hand Drilling Machine c/w Drill Bits for steel and different grades of concrete	1	No.				
60	Mandatory Tools and Tackles	Distance Measuring Instrument	Distance measuring instrument with easily visible laser spot	1	Nos.				
61	Mandatory Tools and Tackles	Measuring Tape	Standard measuring tape, 5m	1	Nos.				
62	Mandatory Tools and Tackles	Measuring Tape	Standard measuring tape, 10m	1	Nos.				
63	Mandatory Tools and Tackles	Measuring Tape	Standard measuring tape, 15m	1	Nos.				
64	Mandatory Tools and Tackles	Measuring Tape	Standard measuring tape, 30m	1	Nos.				
65	Mandatory Tools and Tackles	Spanners	Half moon spanner 3/8" x5/8"	1	Nos.				
66	Mandatory Tools and Tackles	Spanners	D.E. spanner set 6mm to 32mm	1	Nos.				
67	Mandatory Tools and Tackles	Spanners	Ring spanner set 6mm to 32mm	1	Nos.				
68	Mandatory Tools and Tackles	Spanners	Socket spanner set 8mm to 32mm	1	Nos.				
69	Mandatory Tools and Tackles	Spanners	Spanner Box with Handle	1	No.				
70	Mandatory Tools and Tackles	Multimeter	Digital Multimeter, 700VAC/1000VDC/10A (AC/DC)/ 200MOhm	1	Nos.				
71	Mandatory Tools and Tackles	Micrometer	Digital Micrometer, Max. Range 0-450 mm & Waterproof	1	Nos.				
72	Mandatory Tools and Tackles	Depth Gauge	Digital Depth Gauge, Max. Range 0-450 mm & Waterproof	1	Nos.				
73	Mandatory Tools and Tackles	Calliper	Digital Calliper, Max. Range 0-450 mm & Waterproof	1	Nos.				
74	Mandatory Tools and Tackles	Clamp Meter	Digital Clamp Meter, 600VAC/ 600VDC/ 600A(AC), includes inrush current capture, true RMS	1	Nos.				
75	Mandatory Tools and Tackles	D Shackle	D Shackle 1T capacity	2	Nos.				
76	Mandatory Tools and Tackles	D Shackle	D shackle 2T capacity	2	Nos.				
77	Mandatory Tools and Tackles	Chain Pulley Block	Chain Pulley Block 2T capacity	1	No.				
78	Mandatory Tools and Tackles	Chain Pulley Block	Chain Pulley Block 5T capacity	1	No.				
79	Mandatory Tools and Tackles	Paint Thickness Measuring Instrument	Digital Paint Thickness Measuring Instrument	1	No.				
80	Mandatory Tools and Tackles	Surface Finish Measuring Instrument	Digital Surface Finish Measuring Instrument	1	No.				
81	Mandatory Tools and Tackles	Tool Chest	Roller cabinet with 3 drawers plus one bottom compartment suitable for keeping above items and shall be of good quality	1	Nos.				

70	Mandatory Tools and Tackles	Multimeter	Digital Multimeter, 700VAC/1000VDC/10A (AC/DC)/ 200MOhm	1	Nos.								
71	Mandatory Tools and Tackles	Micrometer	Digital Micrometer, Max. Range 0-450 mm & Waterproof	1	Nos.								
72	Mandatory Tools and Tackles	Depth Gauge	Digital Depth Gauge, Max. Range 0-450 mm & Waterproof	1	Nos.								
73	Mandatory Tools and Tackles	Calliper	Digital Calliper, Max. Range 0-450 mm & Waterproof	1	Nos.								
74	Mandatory Tools and Tackles	Clamp Meter	Digital Clamp Meter, 600VAC/ 600VDC/ 600A(AC), includes inrush current capture, true RMS	1	Nos.								
75	Mandatory Tools and Tackles	D Shackle	D Shackle 1T capacity	2	Nos.								
76	Mandatory Tools and Tackles	D Shackle	D shackle 2T capacity	2	Nos.								
77	Mandatory Tools and Tackles	Chain Pulley Block	Chain Pulley Block 2T capacity	1	No.								
78	Mandatory Tools and Tackles	Chain Pulley Block	Chain Pulley Block 5T capacity	1	No.								
79	Mandatory Tools and Tackles	Paint Thickness Measuring Instrument	Digital Paint Thickness Measuring Instrument	1	No.								
80	Mandatory Tools and Tackles	Surface Finish Measuring Instrument	Digital Surface Finish Measuring Instrument	1	No.								
81	Mandatory Tools and Tackles	Tool Chest	Roller cabinet with 3 drawers plus one bottom compartment suitable for keeping above items and shall be of good quality	1	Nos.								

5.0 Sub Price Schedule-4A (Supply Portion) of Additional Spares Recommended by the Bidder

Sr. No.	Articles or Services	Qty/No.	Unit (Sets/Nos.)	Unit Price (INR)	Unit Price (NPR)	Total Amount (INR)	Total Amount (NPR)
1.							
2.							
3.							
4.							
5.							
6.							
7.							
8.							
9.							
10.							

6.0 Sub Price Schedule-5A (Supply Portion) of Additional Tools & Tackles Recommended by the Bidder

Sr. No.	Articles or Services	Qty/No.	Unit (Sets/Nos.)	Unit Price (INR)	Unit Price (NPR)	Total Amount (INR)	Total Amount (NPR)
1.							
2.							
3.							
4.							
5.							
6.							
7.							
8.							
9.							
10.							

SJVN ARUN-3 POWER DEVELOPMENT COMPANY PVT. LTD.

(A Subsidiary of SJVN Ltd. Registered in Nepal)



ARUN-3 HYDRO ELECTRIC PROJECT (900MW) NEPAL

BIDDING DOCUMENTS

FOR

**HYDRO-MECHANICAL WORKS - TRT GATES AND
ASSOCIATED EQUIPMENT FOR ARUN-3 HEP AND
ASSOCIATED EQUIPMENT FOR LOWER ARUN HEP IN
SANKHUWASABHA DISTT. OF NEPAL**

VOLUME-III

TECHNICAL SPECIFICATIONS

Tumlingtar

Feb., 2023

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Abbreviations

Abbreviations Used

ANSI	American National Standard Institute
Approx.	Approximate
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AC	Alternate Current
BHN	Brinell Hardness Number
B.I.S.	Bureau of Indian Standards
Brg Slv	Bearing Sleeve
B.D.T	Break Down Torque
C/C	Centre to Centre
C/L	Centre Line
Clr Sft	Collar shaft
Col.	Column
deg.c	Degree Celcius
dia	Diameter
db	Decibel
Del.	Delivery
DIN	Deutsches Institute fur Normung
Δ	Difference
El.	Elevation
Engrs	Engineers
E.O.T	Electric Overhead Travelling
Ex-F	Ex-Factory
Ere	Erection
FRL	Full Reservoir level
h	Head
H	Total Head
HFL	Highest Flood Level
HZ	Hertz
IS	Indian Standard
kg.	Kilogram
KV	Kilovolts
KW	Kilowatts
FC	Foreign Currency
IS	Indian Standard
LC	Local Currency
mm	Millimetre
m	Metre.
MWL	Maximum water level
Max.	Maximum
Min.	Minimum
min.	Minute
m ³ /Hr.	Cubic Metre per Hour
M.S	Mild Steel
M.T	Metric Tonne
mpm	Metre per Minute
No.	Number
η	Efficiency
NEMA	National Electrical Manufacturers Association
P.O.T	Pullout Torque
PPM	Parts Per Million
Qty.	Quantity.

rpm	revolutions per Minute
SAIL	Steel Authority of India Limited
Sq.m	Square metre
Sec.	Second
TEFC	Totally enclosed fan Cooled
t	Metric tonne
U.T.S	Ultimate Tensile Stress
γ	Specific Weight
wxh	Width x Height
Y.P.	Yield Point

PART 1

Technical Specifications

CHAPTER-I

Intent of Technical Specifications and Scope of work

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1.0.0 Intent of Technical Specifications and Scope of Work

1.1.0 Intent of Technical Specifications

1.1.1 General

- a) These specifications are part of the requirement for various items related to the work, which are to be provided according to the stipulations of the Contract. Hence, the instructions given herein form an integral part of and are applicable to the Bidding Documents issued for the Works. Addenda to these Specifications may be issued, as required, during bidding and construction phases.
- b) These specifications shall be read in conjunction with the Conditions of Contract, the Specification Drawings and the Schedule of Prices and the Bidder shall comply with all provisions contained within the Bidding Documents and instructions of the Employer.
- c) Certain performance requirements, materials, features and design requirements are specified herein. It is not the intention in these specifications to specify in complete detail of the various components of the equipment. This is left to the experience and practice of Manufacturer who shall furnish equipment, which shall meet, in all respects, the specified requirement in regard to performance, durability and satisfactory operation. However, only certain features, materials and design requirements are specified and intended to establish minimum standards for the work and to enable the bidder to submit a well-planned bid.
- d) It is the intent of these specifications to establish acceptable standards of quality. Deviations from these specifications shall be considered for acceptance provided that, in the opinion of the Employer, the proposed substitutions are equal or superior in quality to those specified therein and no extra cost shall be claimed by the bidder.
- e) All works shall be executed according to the Technical Specifications, Specification Drawings, fabrication drawings and requirements issued for construction, in a professional and diligent manner and all supplies and



works shall comply with the quality requirements as defined in the relevant Chapters of these Specifications and other Bidding Documents. The Bidder shall endeavour to provide all such necessary efforts to comply with the intent of these Specifications to the satisfaction of the Employer.

1.1.2 Submittals

The Contractor shall provide to the Employer atleast four copies or as otherwise specified, of all submittals as requested for in these Specifications and other Bidding Documents. Although their extent shall be to the discretion of the Contractor, these shall be complete enough to illustrate adequately the problem of the aspect concerned for the understanding of the Employer.

At any time, the Employer may call either for additional information, completion of the submittals or may request the Contractor not to submit some of them.

The Contractor shall submit these documents to the Employer, so that, even if not specifically expressed, reasonable time will be given to the Employer to comment or approve the submittals.

1.1.3 Standards and Codes

a) General

All works and supplies shall conform to the Indian Standards (IS). Authoritative Standards and Codes other than IS or those specified in the Bidding Documents, which ensure an equal or higher quality, may also be acceptable.

All Standards and Codes referred therein shall be the latest current issues.

In case of the discrepancies between these specifications and National or International Standards and Codes, these Specifications being part of Bidding Documents shall govern, unless otherwise directed by the Employer in each particular case.

The contractor shall submit a copy of all applicable Indian/International Standard Codes, Laws, and



Regulations, which find mention in the design/drawing submission by the contractor in the first instance.

b) National Standards, Codes, Laws and Regulations

Throughout duration of the contract, the materials, equipment, services, design and workmanship shall conform to the applicable National Codes, Standards, Laws and Regulations in force in India, if not otherwise specified.

It is the Contractor's duty to acquaint himself with all National Codes, Standards, Laws and Regulations related to the works in any way and he shall procure and keep at his works at the site a copy of each of such applicable documents.

c) International Standards and Codes

The International Standards/Codes may be adopted provided that:

- The Standards/Codes proposed are atleast as stringent as the equivalent National ones relevant to the works, or if there is no applicable National Standard/Code for the specific item concerned.
- The Contractor shall state, prior to starting the works, the International Standard/Codes he proposes to apply, giving full identification of each of them. These proposals are subject to the approval by the Employer.
- The contractor shall clearly mention the equivalent Indian standard (if exists) for the International standard, which the contractor proposes to refer in the design stage in the first instance and shall supply the copy of same.

Where reference is made in the Bidding Documents to the Standards/Codes of the country of origin for a supply item, it shall be a recognized National Standard/Code of the country where the specific supply item is manufactured. To be acceptable under these Specifications, such Standards/Codes must comply in all respects with the quality requirements of above-mentioned International



Standards/Codes and must be approved by the Employer.

1.1.4 System of Units

The SI system of units has been used throughout in these specifications and this system of units shall be used consequently throughout the duration of contract for all technical or contractual purposes.

Following abbreviations/symbols shall be used in these specifications and other related contract documents.

Derived Quantity	Name	Symbols
Length	millimeter	mm
	centimeter	cm
	meter	m
Area	square millimeter	mm ²
	square centimeter	cm ²
	square meter	m ²
Volume	cubic meter	m ³
Mass	kilogram	kg
	Tonne/Ton	T
	metric ton	MT
Density	ton per cubic meter	t/m ³
Speed	meter per minute	m/min
Stress	Newton per square millimeter	N/mm ²
	Kilo-Newton per square millimeter	kN/mm ²
Pressure	bar	Bar
	Pascal	Pa
	Mega-Pascal	MPa



Time	second	s
	hour	Hr
Temperature	degree Celsius	°C

1.2.0 Scope of Work

1.2.1 General

These specifications cover the requirement of design, procurement, fabrication, shop assembly, painting (including shop and field), transportation, supply, erection, testing and commissioning of the following equipment at site complete in all respects, for tandem operation of Arun-3 HEP and Lower Arun HEP, in accordance with these Technical Specifications and Specification Drawings. The materials, workmanship, technical requirements, equipment, accessories, supplies and services required, shall be as set forth in these Technical Specifications.

It shall also include the spares required for satisfactory operation and maintenance of the following equipment:

- a) TRT Gates, Hydraulic Hoists, Bulkhead for TRT Gates, EOT Cranes and their associated equipment for Arun-3 HEP.
- b) Intake steel gratings, Intake Gates, Rope Drum Hoists, Submersible Slurry Pump, Monorail Crane and their associated equipment for Lower Arun HEP.

for a period of five years from the date of commissioning of the equipment as set forth in these Technical Specifications and Specification Drawings. The description and quantity of spares have been appended with the Bidding Documents.

The scope of work also covers supervision of unloading, stacking, operation, storage and preservation of components of the following equipment:

- a) TRT Gates, Hydraulic Hoists, Bulkhead for TRT Gates, EOT Cranes and their associated equipment
- b) Intake steel gratings, Intake Gates, Rope Drum Hoists, Submersible Slurry Pump, Monorail and their

associate equipment for Lower Arun HEP

in the stockyards of the Contractor at the project site before they are transported, installed, tested and commissioned at their respective sites.

1.2.2 TRT Gates, Hydraulic Hoists and Hoist Supporting Structure at Outfall of Arun-3 HEP

- i) 03 (Three) sets of 1st stage embedded parts, consisting of J-anchor/U-anchor and kerb angle for grating etc. complete in all respects.
- ii) 03 (Three) sets of 2nd stage embedded parts and anchorages consisting of stainless steel wheel track with track base on downstream side, stainless steel slide track with track base on upstream side, w.r.t. flow from pond side, stainless steel side seal seats with base, stainless steel top seal seat with base, sill beam with stainless steel bottom seal seat, side guide track, embedments for latching/dogging in gate groove etc. all fitted with anchor bolts/studs, double nuts and washers etc., complete in all respects.
- iii) 03 (Three) sets of vertical lift wheeled cum slide type gates, suitable for opening of size 8500mm x 5500mm (w x h). The gates shall consist of upstream skin plate (min. 25 mm thick) w.r.t. flow from pond side, main horizontal girders, end vertical girders, vertical stiffeners, Al. Bronze thrust bearing pads with base & stainless steel CSK screws, wheel assemblies with stainless steel self-aligned spherical roller bearings, wheel cut-out arrangement, wheel axle/pins, PTFE clad music note type rubber seals for both side sealing with seal bases for side, top and bottom, nylon ferrules for seals, seal clamp plates with stainless steel fixing CSK screws, guide shoes/rollers, lifting arrangement, latching/dogging arrangement etc., complete in all respects.
- iv) 03 (Three) sets of single cylinder double acting hydraulic hoists of minimum 55T capacity, min. 6850mm working stroke for operation of TRT gates including all the accessories such as hoist suspension, cylinder shell, piston rod and their mountings on gate, seals, stainless steel connected piping, gate position indicator (digital as well as

analog) and limit switches for operation of TRT gates as in 1.2.2(iii) above for an operational speed of 1 m/min. One no. local electrical control panel for each gate and one no. automatic gate control panel interconnected to all local control panels shall be supplied. Control scheme of gate shall be built in PLC having communication connectivity to third party on MODBUS/OPC/IEC-60870-104 (to be decided during detailed engineering). All PLCs used shall be of same make.

The gates shall be lowered & raised under flowing water (unbalanced head) condition. However, the contractor may examine for the adequacy of hoist capacity intended for the above-mentioned job. In case the hoist of higher capacity is required, he will indicate the same in his Bid. No extra cost will be paid if during detailed design hoist capacity comes out to be higher than the capacity indicated in the bid.

- v) 3 (Three) sets of cylinder assembly mounting and support structure complete with structural components and embedded parts complete in all respects.
- vi) 1 (One) set of cylinder assembly mounting and support structure complete with structural components and embedded parts for storage of spare hydraulic cylinder in vertical position complete in all respects.
- vii) 3 (Three) sets of independent hydraulic power unit (HPU) assembly and each set consist of stainless steel hydraulic reservoir, electric motor driven hydraulic pump(s), pressure relief valves, check valves, flow control valves, directional control valves, pressure and temperature gauges, fluid level switches, filters, strainers, hydraulic oil, stainless steel hydraulic piping, in-built in the hydraulic circuit hydraulic oil dehydration and particle cleaning system for removal of moisture, humidity and oil impurities in the oil reservoir of power pack units, electrical control panels and suitable terminals in the electrical control cabinet for its connection to the remote control as well as from the centralized/computerized automatic control for operation of above gates etc., complete in all respects. Also, the hydraulic & electric control and its related power component shall be suitably interconnected to enable the

operation of the hoist cylinder of one gate with the hydraulic power unit of any other gate.

- viii) Mandatory spares (As per the sub-price schedule -2) for TRT Gates, Hydraulic Hoists and their associated equipment.

1.2.3

Bulkhead for TRT Gates at Outfall of Arun-3 HEP

- i) 03 (Three) sets of 1st stage embedded parts, consisting of, J-anchor/U-anchor and kerb angle for grating etc. complete in all respects.
- ii) 03 (Three) sets of 2nd stage embedded parts and anchorages consisting of stainless steel slide track with track base (both side i.e. u/s as well as d/s), stainless steel side seal seats with base, stainless steel top seal seat with base, sill beam with stainless steel bottom seal seat, side guide track, embedments for latching/dogging in gate groove etc. all fitted with anchor bolts/studs, double nuts and washers etc., complete in all respects.
- iii) 01 (One) set of vertical lift slide type bulkhead gate suitable for a clear vent opening of size 8500 mm x 5500 mm (w x h) consisting of downstream skin plate w.r.t. flow from pond side, main horizontal girders, end vertical girders, vertical stiffeners, filling valves arrangement, Al. bronze thrust bearing pads with base (both side i.e. u/s as well as d/s) with stainless steel CSK screw, ferrules, PTFE clad rubber seals with both sides sealing arrangement with seal bases for top, side and bottom, seal clamp plates with stainless steel fixing CSK bolts, guide shoes, lifting arrangement suitable for operation of bulkhead with min. 50T EOT crane with the help of lifting beam and spreader beam, latching/dogging arrangement, gratings etc., complete in all respects.
- iv) 03 (Three) sets of air vent pipes min 150 mm dia., 10 mm thick & instrumentation pipe min. 150 mm dia., 10mm thick for instruments showing balanced water head conditions, including all fixtures, clamps, embedments, wires, cabling etc., complete in all respects.

- v) Mandatory spares (As per the sub-price schedule -2) for Bulkhead for TRT Gates.

1.2.4 EOT Cranes

- i) 01 (One) no. 50 T (min.) capacity EOT Crane alongwith columns, embedded parts, crane supporting structure, rails (min. 52 kg/m), stainless steel hand rails, stair cases, covers, chequered plates etc. for handling of TRT gates/ bulkhead for TRT & hydraulic hoists suitable for outdoor duty complete in all respects. This crane shall be used for the initial erection, testing & commissioning of the TRT gates, bulkhead gate & hydraulic hoists and subsequently for their maintenance during operation of the project.
- ii) 01 (One) set of automatic engaging and disengaging type lifting beam with spreader beam for the operation of Bulkhead for TRT gates with hooks, sheaves/pulleys, links, guide rollers, stoppers etc. complete in all respects.
- iii) 01 (One) no. 5T (min.) capacity EOT Crane alongwith crane supporting structure, rails (min. 45kg/m), embedded parts, stainless steel hand rails, stair cases, covers, chequered plates etc. for handling of hydraulic power unit suitable for indoor duty. This crane shall be used for the initial erection, testing & commissioning of the hydraulic power units in the control room and subsequently for their maintenance during operation of the project.
- iv) Mandatory spares (As per the sub-price schedule -2) for EOT Cranes.

1.2.5 Steel Gratings in front of Intake Structure of Lower Arun HEP

- i) 04 (Four) sets of embedments for steel gratings in front of intake structure of Lower Arun HEP consisting of built-up channels along with groove lining to full height of each groove, stiffeners, anchors and holding down bolts etc., complete in all respects.
- ii) 04 (Four) sets of steel gratings each consisting of 10 (Ten) panels of size 3010mm x 2880mm (w x h) and additional 4 no. of spare grating panels consisting of channels, bars, I-section, angles, lifting arrangement, dowel bars etc.

complete in all respects.

Note: Fabrication drawings are appended with the bid documents, as such no design & drawings shall be submitted by contractor.

1.2.6 Intake Gates, Rope Drum Hoists and Hoist Supporting Structure for Lower Arun HEP

- i) 02 (Two) sets of 1st stage embedded parts, consisting of J-anchor/U-anchor and kerb angle for grating etc. complete in all respects.
- ii) 02 (Two) sets of 2nd stage embedded parts and anchorages consisting of stainless steel wheel track with track base, stainless steel side seal seats with base, stainless steel top seal seat with base, sill beam with stainless steel bottom seal seat, side guide track, embedments for latching/dogging in gate groove etc. all fitted with anchor bolts/studs, double nuts and washers etc., complete in all respects.
- iii) 02 (Two) sets of vertical lift wheeled gate, suitable for opening of size 6000mm x 7000mm (w x h). The gate shall consist of upstream skin plate (min. 25mm thick), main horizontal girders, end vertical girders, vertical stiffeners, filling valves arrangement, wheel assemblies with self-aligned stainless steel spherical roller bearings, wheel cut-out arrangement, wheel axle/pins, PTFE clad rubber seals with seal bases for side, top and bottom, ferrules, seal clamp plates with stainless steel fixing CSK screws, guide shoes/rollers, lifting arrangement, latching arrangement, ballast (if required) etc., complete in all respects.
- iv) 02 (Two) sets of Rope Drum Hoist of minimum 60T capacity for operation of main intake gate, complete with all the mechanical components such as open gears, gear reduction unit, rope drums, plumper blocks for supporting the shafts, wire ropes, brakes (EM as well as EHT), shafts, sheaves, couplings, gate position indicator (both analogue and digital), rope sockets etc., and all the electrical items such as motors, switches, cables, control panel (with a provision of 1 no. 15A and 1 no. 5A switch and socket), overload sensing mechanism, limit switches, suitable

lighting arrangement (minimum 500W) above and below the hoist platform etc., covers (stainless steel) for gear assembly, rope drum, motors, polycarbonate roof of min. 2.5m high with supporting frame & gutters etc. for hoist platform etc. complete in all respects.

- v) 02 (Two) sets of hoist supporting structure to support the hoist consisting of horizontal girders, cross girders, columns/trestles with latching arrangement, bracings on all sides, chequered plates for flooring, hand railing, platform for latching arrangement, staircase, interconnecting walkways for hoist platforms, embedded parts such as base plates, foundation bolts etc., complete in all respects.
- vi) Mandatory spares (As per the sub-price schedule -2) for Main Intake Gate and Rope Drum Hoist.

1.2.7 Submersible Slurry Pump and Monorail Crane for Intake of Lower Arun HEP

- i) 01 (One) set of portable type submersible slurry pump, IP66 rating, 35m (min.) operating head for dredging of silt in the vicinity of Intake gate groove and surface discharge etc., min. 40 percent solid content handling, min. 50m³/hr flow rate inclusive of flexible hose pipe, supporting frame for pump, lifting arrangement compatible with monorail, LT panel for outdoor duty type and cables (power & control) suitable for the operation of pump complete in all respects.
- ii) Min. 5T monorail crane with supporting structure, LT panel for outdoor duty type and cables (power & control) suitable for operation of portable type submersible slurry pump into the intake shafts downstream of gate grooves of Lower Arun HEP complete in all respects.
- iii) Mandatory spares (As per the sub-price schedule -2) for submersible slurry pump and monorail crane and their associated equipment.

1.2.8 Instruments

- i) Three (3) sets of Gate position indicators comprising of electronic position indication (one for giving digital signal

and one mechanical gate position indication) for the TRT gates for giving gate movement indication in the Arun-3 HEP and Lower Arun HEP Powerhouses (digital signal only).

In addition, a position indicator fixed to the hydraulic cylinder operated by a push/ pull rod connected to the TRT gate shall also be provided. A visual mechanical linear display shall indicate local gate position. Two proximity switches wired to the control & indication circuits to indicate fully open or fully closed gate position. A position monitor assembly shall provide a 4-20mA signal in 5mm steps of gate movement. This signal shall be fed into the control PLC to automatically restore the gate to its previous position. The above is a typical arrangement and gate contractor can provide other equivalent/ better position indication arrangement.

- ii) Reservoir water level measuring transmitter for providing signal to automatic gate control panel for automatic operation of TRT gates complete in all respects.
- iii) All the necessary sensors, transducers, instruments, terminals, contacts, cabling etc. for the above at various locations shall be provided and incorporated in the control system.

1.2.9 Tools and Tackles

01 (One) set of tools and tackles including special tools for each TRT Gates, Bulkhead for TRT Gates, Main Intake Gate of Lower Arun HEP, Intake steel gratings, Hydraulic Hoists, Rope Drum Hoist, EOT Cranes, Submersible slurry pump, Monorail and their associated equipment required for maintenance, assembly and disassembly as per the list enclosed in sub-price schedule-3 of bid document.

1.2.10 Installation, Operation and Maintenance Manuals

4 (Four) sets (2 hard copies and 2 soft copies) of installation, operation and maintenance manuals containing drawings, catalogues and brochures, service manuals for each bought out item, handling procedure for assembly & subassemblies of all TRT Gates, Bulkhead for TRT, Main Intake Gate of Lower Arun HEP, Intake steel gratings, Hydraulic Hoists, Rope Drum Hoist, EOT Cranes,

Submersible slurry pump, Monorail and their associated equipment covered under the scope of work suitable for carrying out the operation & maintenance of the equipment subsequently.

1.2.11 Manufacture History Record (MHR)

04 (Four) sets (2 hard copies and 2 soft copies) of abridged manufacture history records and inspection & test records for all equipment to be supplied under the scope of work.

1.2.12 Erection & Commissioning Documents

04 (Four) sets (2 hard copies and 2 soft copies) of erection & commissioning documents for TRT Gates, Bulkhead for TRT, Main Intake Gate of Lower Arun HEP, Intake steel gratings, Hydraulic Hoists, Rope Drum Hoist, EOT Cranes, Submersible slurry pump, Monorail and their associated equipment.

1.2.13 Training

Training shall be imparted as detailed in these specifications.

1.2.14 Instruction Plates

Suitable instruction plates indicating main technical data, important operating and maintenance instructions alongwith warning instructions for each gate, hoist, EOT cranes, pump, monorail and their associated equipment.

1.3.0 Notes

- i) The 1st stage (including dowel bars/shear rebars) as well as 2nd stage concreting and grouting is not included in the scope of this works as this shall be done by the employer through the contractor for civil works.
- ii) The contractor shall examine the adequacy of hoist capacity intended for the above-mentioned job. In case, the hoist capacity of higher capacity is required, he will indicate same in the bid. No extra cost will be paid if during detailed design hoist capacity comes out to be higher than the capacity indicated in the bid.



- iii) The employer shall provide the land for site office, storage of the material, equipment etc. at no cost to the contractor.
- iv) The works, materials and services not called for explicitly in these specifications or in the drawings, but which are necessary for the complete manufacturing, installation, testing and operation of the TRT Gates, Bulkhead for TRT, Main Intake Gate of Lower Arun HEP, Intake steel gratings, Hydraulic Hoists, Rope Drum Hoist, EOT Cranes, Submersible slurry pump, Monorail and their associated equipment covered in these specifications shall be furnished by the contractor at no extra cost to the Employer.
- v) Shop as well as field painting is included in the scope of supply.
- vi) Dry as well as wet tests are to be carried out by the contractor. Any defect noticed during testing or during the guarantee period (not less than 24 months) is to be removed by the contractor free of cost.
- vii) The wastage of steel sections, received from main producers, shall not be compensated to the contractor. The net weight of the TRT Gates, Bulkhead for TRT, Main Intake Gate of Lower Arun HEP, Intake Steel Gratings, Hydraulic Hoists, Rope Drum Hoist, EOT Cranes, Submersible slurry pump, Monorail and their associated equipment etc. based on the sectional unit weight as per the table of standard sections (supplied by Steel Authority of India Limited (SAIL) or others) and used in the gates and their associated equipment. The weight of nuts, bolts, rivets, welding, etc. will not be considered in the net weight of gates. All the wastage of steel sections supplied by the main producer will be at contractor's account and the contractor should consider this aspect while quoting the rates.
- viii) The contractor shall provide all tools, tackles and equipment to be used for erection, testing and maintenance of the equipment covered in these specifications.



- ix) In general, the contractor for this package shall design the shear reinforcement for Gates blockouts wherever required and supply the relevant drawings, on the basis of which the same shall be provided by the employer through civil contractor.
- x) All the submissions and documents shall be submitted in plastic coated hard board index folder. Loose, spiral/spico folders shall not be accepted.

1.4.0 Inspection & Quality Assurance Plans

All supplies shall be subject to inspection and tests by the Employer to the extent practicable at all times and places. Shop tests shall also be subject to inspection and tests by the Employer and the Employer shall depute his Engineers for witnessing shop tests. Inspection shall be carried out in accordance with relevant Indian Standards or equivalent International Standards where Indian Standards are not available or as described elsewhere in these specifications. The cost of carrying out tests/inspection shall be borne by the contractor and shall be inbuilt in the price bid.

1.5.0 General Requirements

- i) The Bidder shall carefully study the Technical Specifications and Specification Drawings and shall intimate the Employer in case any error/omission is noticed. As a result of such interaction, if some corrections/modifications are required, the Employer shall bring the same to the notice of all the Bidders before the date of submission of the Bids.
- ii) The contractor shall co-operate with other contractors in the exchange of drawings, dimensions, data and all other information required to ensure proper co-ordination of the work. All documents to be supplied shall be submitted in accordance with the agreed programme so that any comment and change requested by the Employer can be taken into account before starting of the manufacture in the workshop and/or erection or installation at the site.
- iii) If the contractor fails to submit such documents, then the later execution of changes requested by the Employer and the resulting additional cost and/or delays shall be the



contractor's liability. The contractor shall not be released/relieved of his responsibility and guarantee for satisfactory operation of the equipment after drawings and computations have been approved by the Employer.

- iv) The contractor without the written authorization of the Employer shall not subcontract the preparation of drawings, computations or other technical documents. In such a case of subcontracting, the contractor shall be fully responsible for such drawings, design computations and other technical documents.
- v) Each item appearing on any document (Drawing, diagram, list etc.) shall clearly be designated. The abbreviation mark used for an individual device shall be identical throughout the complete documentation so as to avoid confusion. All documents shall have a uniform title-block as outlined in the specification. Beginning with the very first submittal to the Employer, the contractor's drawings shall bear a serial number.
- vi) Revised technical documents replacing previously submitted documents should be marked accordingly and revision note added. Also, the revised part in the documents and drawings itself shall be marked clearly.
- vii) All parts of works shall be suitable in every respect for continuous operation at maximum output under the climatic conditions and operating conditions prevailing at the site.
- viii) Special attention shall be given to works, parts of which are delivered by different manufacturers. Problems arising in this conjunction shall be solved by the contractor and be defined in writing.
- ix) All live, moving and rotating parts shall be adequately secured in order to avoid danger to the operating staff. All electrical components shall be electrically earthed as per the latest practice.
- x) Contractor shall take appropriate measure to prevent the ingress of dust, silt etc. in to any works/components (such as bearings, relays, controls and measuring equipment etc.), which may be endangered thereby.



- xi) Suitable lifting eyes and backing out bolts shall be provided wherever required or where they will be useful while erection and dismantling.
- xii) Pockets and depressions likely to hold water shall be avoided, and if not avoidable, they shall be properly drained. Parts of works principally intended for standby purposes shall be protected from corrosion by careful choice of material and if necessary by additional means these should not reduce their continuous readiness.
- xiii) It is entirely the responsibility of the Bidder to see that the designs and drawings are got approved in time. To ensure timely approval of the design and drawings these should be submitted strictly as per schedule, in proper sequence and in accordance with the requirements of the technical specifications duly supported by technical documents, literature etc., as required in three lots viz. 1st and 2nd stage drawings and complete Gates design alongwith general arrangement and end assemblies drawings in first lot, Gates leaf drawings in 2nd lot, design and drawings relating to Hoists, in 3rd lot after complete scrutiny and checking at his end, so that, the comments from Employer and number of resubmissions are kept to a minimum. Bidder should also ensure that his designers are deputed immediately for discussions wherever there is a request from Employer or his representative. Time period incurred in furnishing comments and resubmission by the contractor on account of incomplete submission without supporting data/ documents, supporting computer software programme, submission in improper sequence, proposed component details not fulfilling all the requirements of the technical specifications etc. shall not in any way qualify for delay in approval of drawings, extension of delivery period or any other contractual obligation. However, delay in submission of the above shall be to the contractor's account and the Employer shall be at liberty to claim liquidated damages for such delays.



1.6.0

Drawings and Data to be furnished along with the Technical Bid by the Bidder

- i) Basic design, estimated weight, Hoist capacity calculations and general arrangement drawings for each of the equipment covered under the scope of the work. List of Documents to be submitted by the bidder along with Bid on Annex.-I appended with the Technical Specifications.
- ii) Item wise Schedule of submission of design calculations, for TRT Gates, Hydraulic Hoists, Bulkhead for TRT Gates, EOT Cranes, Main Intake Gates of Lower Arun HEP, Rope Drum Hoists, Intake steel gratings, Submersible slurry pump, Monorail and their associated equipment covered in the scope of the work to match with the delivery period as appended with the document as Annex.-II.
- iii) The contractor shall also submit along with his Bid a detailed programme based on the dates indicated in the tender document or alternatively his own time schedule giving shorter delivery/ erection period. The schedule will be in the form of a detailed PERT network on Primavera/MS Project software program within the time frame agreed above, consisting of adequate number of activities covering various key phases of the works such as designs, drawings, procurement, manufacturing, shop assembly, painting, transportation, field erection and testing activities. This network shall also indicate the interface facilities to be provided by the Employer, if any, and the dates by which such facilities are needed.
- v) In case the Bidder proposes to make major changes in the design arrangement of the equipment to be furnished under these specifications, then he shall also submit alongwith his Bid, the drawings and the design calculations of his alternate arrangements/ proposals (on Annex-III appended with the technical specifications). Such drawings shall be complete and give all proposed changes in details. Acceptance of the alternate arrangements/ proposals of the Bidder shall not be binding on the part of Employer.
- vi) Erection methodology including dry and wet testing of the equipment giving minimum time period of each activity.



- vii) List of erection equipment including material handling machines/cranes at site alongwith their capacities, make, year of manufacture and personnel etc.
- viii) Details of the sub vendors on Annex.-IV.
- ix) Quality Assurance system and detailed Quality Assurance Plans both for manufacture and field/site.

1.7.0

While furnishing the data, the bidder may keep in mind the following

- i) Any item not specifically mentioned or shown in the bid documents but necessary to complete the job, shall be considered included in the scope of work by the contractor.
- ii) The manufacturer shall include any other drawings, catalogues, descriptions and photographs necessary to present clear picture of the type and class of the equipment proposed to be supplied.
- iii) The drawings, data and information shall be elaborate enough to enable the Employer to comprehend and assess the vital details, features, capabilities and functioning of the equipment and their arrangements.
- iv) Any item or services, which the Bidder desires to be supplied/ provided by the Employer, shall be specifically mentioned failing which it shall be presumed that such items/ services are included in the scope of supplies/ work by the Bidder. However, the supply of these services or other items shall be at the discretion of the Employer and in case the same are not arranged/ supplied by the Employer, the contractor shall have to make his own arrangement and not depend on the employer.
- v) The technical specifications and specification drawings indicate only the basic arrangement for TRT Gates, Hydraulic Hoists, Bulkhead for TRT Gates, EOT Cranes, Main Intake Gate of Lower Arun HEP, Rope Drum Hoists, Steel gratings in front of Intake structure of Lower Arun HEP, Submersible slurry pump, Monorail and their associated equipment.



- vi) It is manufacturer's responsibility to perform the complete design of all the work/plant, structures and fabrication within the parameters as laid down in these specifications and according to the design procedures therein. Manufacturer may propose changes in design procedure or details of components to suit requirements for fabrication, manufacturing, assembly, and installation or to produce a better or more economical design.
- vii) All such proposed changes shall be submitted to Employer for approval before being carried out. Manufacturer shall submit full details of changes outlining nature of change and reasons for the same.

1.8.0

Submission of detailed design and drawings by contractor after the award of contract

- i) All drawings shall be drawn in accordance with the Indian Standards to scale, and shall be legible. Wording on drawings shall be in English and shall be at least 3 mm high in block capitals. All drawings shall bear the mutually agreed title block, and drawing number as per the coding and pattern available with the Employer. All symbols shall be in accordance with Indian Standards. The contractor shall submit to the Employer for approval, not less than four sets of detailed computations and drawings, which shall have sufficient details to show. The contractor shall also submit two sets of soft copies of the design (in .xls format) and drawings (in .dwg format) and other documents on good quality DVD/Pendrive suitable for editing and printing.
- ii) The contractor shall have to provide training to Employer's design engineers in respect of TRT Gates, Bulkhead for TRT, Main Intake Gate of Lower Arun HEP, Intake Steel Gratings, Hydraulic Hoists, Rope Drum Hoist, EOT Cranes, Submersible slurry pump, Monorail and their associated equipment alongwith the use of various engineering software packages and programs. The scope of work of training shall be as under at the works of the contractor for which the contractor shall provide all the facilities.
 - a) Training in works & Design office Minimum 4 Engineers for 1 week (total 4



Engineers week with 2
round trips)

- iii) Qualified designers who are engineers or other professionals and have experience and capability necessary for the design shall prepare design. The Contractor undertakes that the designers shall be available to attend discussions with the Engineers at all reasonable times until the date of relevant Defect notification period.
- iv) Design calculations for all components and parts in accordance with design criteria and specifications to prove their adequacy supported by catalogues/technical literature of all bought out components with selection criteria and characteristics. The contractor shall have to supply the documents for the approval of employer.
- v) The drawings shall broadly cover following items and it is essential that independent drawings drawn as per best drawing practice prevailing shall be supplied. Drawings should be conveniently sized as per relevant Indian Standards.
 - a) Detailed dimensions, blockout details, location of 1st stage anchors, 2nd stage anchors/studs, concrete outline of 1st stage & 2nd stage concrete, bill of materials covering item no., description of item, sizes, quantities, weight, material with relevant standard, remarks (if any) etc.
 - b) Weld details, surface finishes, assembly tolerances/fits, machinery imposed on load on concrete structure etc.
 - c) Handling attachments for handling, site assembly/erection etc.
 - d) Painting system including cleaning and application procedures, primer and final coats.
 - e) Diagrams:
 - The circuit diagrams shall show the power circuits in all phases with the main apparatus as well as the pilot circuits (measuring and

control circuits). It shall show in full the functioning of parts or all installations, works or circuits with all required technical information. This shall show all terminal blocks, control cubicle, cable details, cable tracks etc.

- Electrical wiring diagrams of hoist, cable layout drawings, performance curves, specifications and catalogue numbers of all motor control centers, control panels, motors and accessories.
 - Automatic or manual lubrication system, controls, control panels, motors and accessories.
 - Control & indicators.
 - Piping layout diagram.
- vi) The Design, Drawings, software's, programmes, pen drive/DVD's etc. submitted by the contractor will form a part of contract and shall become the property of Employer at no extra cost. The Employer shall be free to refer them to other agencies for advice.
- vii) All drawings shall be carefully checked by contractor for accuracy, completeness and clarity before submission to Engineer for approval. Contractor shall be responsible for correctness and adequacy of the design in relationship to the specifications.
- viii) Minor changes involved in the layout plans of Gates, Hoists, EOT Cranes and associated equipment shall not involve any extra cost whatsoever notwithstanding the particular of equipments furnished in the bid.
- ix) Approval by the Employer for the contractor's design and drawings shall not be held to relieve the contractor for any part of the contractor's obligation to meet all the requirements of the specifications or of the responsibility for the correctness of the contractor's drawings and designs.



- x) The requirements of any alterations requested by Employer shall not be construed to mean that the drawings have been checked in detail, accepted as justification for an extension of time and shall not relieve the manufacturer from responsibility for the adequacy of the designs and correctness of the drawings.
- xi) The design of all equipment shall be such that installation, replacements and general maintenance may be undertaken with the minimum time and expense.
- xii) The thickness and section to be adopted for various components of TRT Gates, Bulkhead for TRT, Main Intake Gate of Lower Arun HEP, Intake Steel Gratings, Hydraulic Hoists, Rope Drum Hoist, EOT Cranes, Submersible slurry pump, Monorail and their associated equipment etc. shall not be less than the minimum requirement specified in the technical specifications and shall be subjected to the approval of Employer. Any increase in hoist capacity or increase in weight of gate component to match with the requirement set out in the technical specifications and drawings shall be carried out at no extra cost to Employer and shall be subject to approval of Employer.
- xiii) The contractor shall also submit the method statements and techniques of manufacture, painting, transportation, testing and commissioning of TRT Gates, Bulkhead for TRT, Main Intake Gate of Lower Arun HEP, Intake Steel Gratings, Hydraulic Hoists, Rope Drum Hoist, EOT Cranes, Submersible slurry pump, Monorail and their associated equipment immediately within 30 days after approval of design and drawings.
- xiv) All drawings submitted will form a part of the contract. The sequence of submission of drawings will also form a part of the contract. The sequence of submission of all the drawings shall be such that complete information is available for checking of each drawing, when it is received.
- xv) The Employer will return a copy of each drawing to the contractor marked either 'Approved' or 'Approved as noted' or 'Returned for corrections/modifications'. The notation 'Approved' or 'approved as noted' shall authorise the contractor to proceed with the manufacture of the

equipment covered by such drawings subject to the corrections, if any, noted thereon. When the design computation/ prints of drawings has been returned for corrections/ modifications, the contractor shall revise/modify the design/drawings as necessary and shall resubmit fresh design computation/drawings for approval in the same routine as before. Any fabrication work performed prior to the approval of drawings, will be at the contractor's risk. The Employer shall have the right to ask the contractor to make changes in the design, which may be necessary in the opinion of the Employer to make the equipment to conform to the stated provisions and intent of the specifications, without any additional cost. After designs and drawings are completed and approved, the contractor shall supply to the Employer 4 no. prints of each of the approved drawings, out of which 2 no. prints shall be duly laminated whereas in respect of finally approved design computations only four sets shall be supplied. However, prior to completion of contract, contractor shall supply 2 no. prints of all approved as built drawings.

- xvi) Drawings shall be submitted to the Employer for approval 20 days prior to the date on which they will require such drawings to ensure that the work is carried out in accordance with approved schedule of work.
- xvii) The contractor shall submit the manufacturing methodology, painting procedure, erection methodology of Gates, Hoists, cranes, Submersible slurry pump, Monorail and their associated equipments immediately within 15 days after approval of design and drawings.
- xviii) All design details and layout matters shall be discussed in periodic meetings with the Employer's Design Engineers. The first design meeting between Contractor and the Employer's Design Engineers shall take place within 15 days after the award of the contract. Further design meetings shall take place as advised by the Employer until the design work is completed.



- xix) For all larger parts of equipment which, due to their dimensions and/or weight and transport limitations, will require special means for their transportation, the contractor shall submit loading drawings indicating dimensions, weight etc. of the respective item of equipment and the necessary trailer for its transportation to the site.

1.9.0 Approval/Review of Technical Documents (design & drawings, Quality/inspection plans, erection methodology etc.) by the Employer

Within 30 days after the receipt of complete submission along with supporting documents, data literature, codes etc. etc., the Employer shall return one copy thereof to the contractor, duly “approved” or “approved as noted” or “returned for modification/corrections”. The contractor shall resubmit the documents within fifteen days after receipt of the comments/observations of the Employer. The no. of submissions shall be kept to the minimum.

1.10.0 Minimum No. of Drawings to be submitted by the Contractor

The tentative lists of the main drawings for TRT Gates, Bulkhead for TRT Gates, Bulkhead for TRT, Main Intake Gate of Lower Arun HEP, Intake Steel Gratings, Hydraulic Hoists, Rope Drum Hoist, EOT Cranes, Submersible slurry pump, monorail and their associated equipment are broadly indicated below. However, contractor shall be required to submit additional drawings, if required, to completely illustrate, the construction details of various parts and components of the Gates, Hoists and their associated equipment and accessories to enable the Employer to check / scrutinize the same.

A. TRT Gates

Sr. No.	Description	No. of drgs.
1.	General arrangement of Gate and Hoist	1
2.	1st stage Embedded parts and their	1



	installation	
3.	2nd stage Embedded parts and their installation	3
4.	Gate Leaf Assembly	2
5.	Gate Leaf Details	3
6.	Seal Assembly & Details	1
7.	Wheel assembly & Details	2
8.	Thrust/slide Pad & Details	1
9.	Lifting Attachment Details	1
10.	Latch Assembly & Kerb angles Details	1
11.	Guide arrangement & its details	1
12.	Grating details	1

B. Bulkhead for TRT Gates

Sr. No.	Description	No. of drgs.
1.	General arrangement of Bulkhead	1
2.	1st stage Embedded parts and their installation	1
3.	2nd stage Embedded parts and their installation	3
4.	Gate Leaf Assembly	2
5.	Gate Leaf Details	3
6.	Seal Assembly & Details	1
7.	Thrust/slide Pad & Details	1
8.	Lifting Attachment Details	1
9.	Latch Assembly & Kerb angles Details	1
10.	Guide arrangement & its details	1
11.	Grating details	1



C. Main Intake Gate of Lower Arun HEP

Sr. No.	Description	No. of drgs.
1.	General arrangement of Gate and Hoist	1
2.	1st stage Embedded parts and their installation	1
3.	2nd stage Embedded parts and their installation	3
4.	Gate Leaf Assembly	2
5.	Gate Leaf Details	3
6.	Seal Assembly & Details	1
7.	Wheel assembly & Details	2
8.	Lifting Attachment Details	1
9.	Latch Assembly & Kerb angles Details	1
10.	Guide arrangement & its details	1
11.	Grating details	1

D. Intake Steel Gratings

Sr. No.	Description	No. of drgs.
1.	General Assembly Drawing of Steel gratings for intake	1
2.	Embedded parts and their installation	1
3.	Details of steel grating panels	1

E. Hydraulic Hoists

Sr.No.	Description	Nos. of drgs.
1.	Hoist -General Arrangement	1
2.	Supporting structure- details	3
3.	Mechanical components details	5



- | | | |
|----|-------------------------------------|---|
| 4. | Electrical circuit diagram | 5 |
| 5. | HPU and Hydraulic circuit & details | 4 |

F. Rope Drum Hoist

Sr.No.	Description	Nos. of drgs.
1.	Hoist -General Arrangement	1
2.	Supporting structure- details	5
3.	Mechanical components details	5
4.	Electrical circuit diagram	5

G. EOT Cranes

Sr.No.	Description	Nos. of drgs.
1.	EOT Crane-General Arrangement	1
2.	Embedded parts and their installation details	3
3.	Supporting structure- details	4
4.	Mechanical components details	5
5.	General Assembly of Lifting beam with spreader beam & details	2
6.	Electrical circuit diagram	5

F. Submersible Slurry Pump & Monorail Crane

Sr.No.	Description	Nos. of drgs.
1.	General Arrangement & Part details	2
2.	Supporting structure & embedded parts detail	1

1.11.0 Installation, Operation & Maintenance Manual

For guidance during the installation of the work and subsequently for guidance of the plant operating and maintenance staff, contractor shall prepare manuals.

The manuals shall include a separate and complete section describing the following:-

- Safety at Work
- Technical data
- Description of work & equipment.
- Operating principles & characteristics.
- Installation Procedures
- Operating instructions (for normal and emergency operation).
- Testing & adjustments.
- Maintenance instructions.
- As built drawings.
- List of spare parts including the list of their vendors/manufacturers alongwith their contact numbers/email ids.
- Catalogues of bought out items.

The manuals shall describe and illustrate the procedure for assembling, adjusting, operating and dismantling of each component and control system. The maintenance of each component shall be described, including the recommended frequency of inspection and lubrication.

Manuals shall also describe and illustrate procedures for installation, storage, handling, unloading, reloading, unpacking and upkeep of each component of the equipment.

04 (Four) copies of the manuals shall be submitted in English in draft form for approval of Employer within 1 (one) months after the final approval of the equipment. 4 (four) sets (2 set of hard copies and 2 set of soft copies) shall be provided to Employer not later than 30 days after



receipt of approval.

If revision of the manuals becomes necessary, as a result of information gained during installation and initial operation, manufacturer shall make the necessary revisions and furnish 4 (four) copies of the revised sections.

The manuals shall include a complete list of all drawings prepared by manufacturer, a list of spare parts and a list of parts for each component or item of equipment. The parts list shall include manufacturer's name and their contact numbers/email -ids.

Contractor shall ensure that his installation supervisor has a copy of all approved drawings and the manuals at his site office.

1.12.0 Schedule and Progress

- i) Immediately after the receipt of approval of drawings, the contractor shall submit to the Employer for his approval the schedule of fabrication and transportation of the equipment so as to ensure its delivery within the specified period. The schedule shall clearly state all the stages of fabrication to enable the Employer to plan his inspection accordingly as stated in these specifications.
- ii) The contractor shall, before the seventh (7th) day of each calendar month, (during the course of design & fabrication) submit 04 (four) copies of monthly progress report in a format acceptable to the Employer, detailing the progress of the work during the preceding month along with photographs of fabrications done, to the Employer apprising him of the progress of equipment. The report shall contain (but not limited to) the following information:-
 - A general description of works performed during the reporting period on each main activity.
 - Overall percentages of the work completed, with reference to the CPM programme.
 - The percentage of each main work activity completed during the reported month with

reference versus the scheduled programme.

- A list of all activities of scheduled and actual progress during the reporting period including actual starting dates versus scheduled starting dates and actual completion dates versus scheduled completion dates for each activity.
 - A list of activities scheduled to be started within the next period of 02 (two) months, with expected starting and completion dates. Any notable problems, differences, comments with reference to the schedule may be supported with appropriate documents.
- iii) During erection, the Contractor shall, before the seventh (7th) day of each calendar month, submit monthly progress reports in a format acceptable to the Employer, detailing the progress of the work during the preceding month. The report shall contain (but not limited to) the following information: -
- A general description of erection works performed during the reporting period on each main activity.
 - Overall percentages of the erection work completed, with reference to the CPM programme.
 - The percentage of each main erection work activity completed during the reported month versus the scheduled programme.
 - A list of all activities of scheduled and actual progress during the reporting period including actual starting dates versus scheduled starting dates and actual completion dates versus scheduled completion dates for each activity.
 - A list of activities scheduled to be started within the next period of 2 (two) months, with expected starting and completion dates. If the expected starting and/or completion dates are different from those shown on the CPM program, an explanation shall be given.
 - Contractor shall briefly report the manpower



strength and expatriate personnel employed (if any), equipment etc. deployed during the reporting period.

- A statement concerning potential problems and recommendations on how they could be resolved.
- iv) The time and the date of completion of works as stipulated in the bid document shall be the essence of the contract. However, the bidder, keeping in view the programme of the erection front availability but without effecting the completion date, can suggest certain alterations.
- v) The contractor shall so organize his resources and perform his work as to complete it not later than the date agreed to by him. The time for completion of the works contracted for shall be reckoned from the date of issue of the letter of award by the Employer. During the performance of the contract, if in the opinion of the Employer, proper progress is not maintained; suitable changes shall be made in the contractor's operation to ensure proper progress.
- vi) From time to time during manufacture and installation, manufacturer shall photographs (still and video) the equipment to depict the actual progress by supplying minimum 3 views per location per month and as covered elsewhere in these specifications or as advised by Employer.

1.13.0 Delivery Period

The period of completion for the entire contract will be as given in the conditions of the contract. Delivery schedule for items/sub-items in respect of TRT Gates, Bulkhead for TRT Gates, Main Intake Gate of Lower Arun HEP, Intake Steel Gratings, Hydraulic Hoists, Rope Drum Hoist, EOT Cranes, Submersible slurry pump, monorail and their associated equipment shall be agreed during the pre-award discussions.

1.14.0 Spares

All spares shall be interchangeable and of the same material, workmanship & characteristics as the



corresponding part of the original equipment to the extent possible. All spare parts shall be protected against corrosion and shall be marked with identification labels in the Ruling Language. The identification shall be in accordance with the agreed Works Identification System. All spare parts shall be delivered in marked boxes of sufficient sturdy construction to withstand long-term storage. The spares shall be supplied preferably within two months of the respective issuance of Taking Over Certificates (TOC).

Spare parts list shall detail for all parts included in the scope of supply: -

- Item and code number
- Description
- Quantity
- Weight
- Gross storage requirement (separate for open-air, indoor, air-conditioned) for individual component sets.

The spares have been classified into two categories as given below:

1.14.1 Mandatory Spares

The Employer has identified certain spares, which are considered essential for the operation and maintenance of the equipment for a period of five years from the date of commissioning of the Project. The Bidder shall quote the prices of these spares in the Sub Price Schedule for mandatory spares. The component wise requirement of mandatory spares required for TRT Gates, Bulkhead for TRT Gates, Main Intake Gate of Lower Arun HEP, Intake Steel Gratings, Hydraulic Hoists, Rope Drum Hoist, EOT Cranes and their associated equipment have been included in Price Schedule of Bid documents.

1.14.2 Additional Spares

In addition to the mandatory spares, the contractor shall also submit a list of spares, which he feels shall be required for proper operation/maintenance of the equipment for a period of five years from the date of commissioning of the Project. The cost of these additional spares may be given in a separate schedule. The cost of these additional spares shall not be considered for evaluation of this Bid. The items and quantity of the additional items to be purchased shall be entirely at the discretion of the Employer and the contractor shall not be entitled for any variation in rates on this account.

1.15.0 Tools and Tackles

The scope of work shall include all tools and tackles necessary for total assembly and disassembly (if required) of all parts of the supplied works. All tools and tackles shall be protected against corrosion and shall be marked with identification labels in the Ruling Language. The identification shall be in accordance with the agreed Works Identification System. All tools and tackles shall be delivered in marked boxes of sufficient sturdy construction to withstand long-term storage.

Tools and tackles list shall detail for all tools and appliances included in the scope of supply: -

- Item and code number
- Description
- Quantity
- Weight
- Gross storage requirement (separate for open-air, indoor, air-conditioned) for individual component sets.

The tools and tackles have been classified into two categories as given below:



1.15.1 Mandatory Tools and Tackles

The Employer has identified certain tools and tackles, which are considered essential for the operation and maintenance of the equipment. The Bidder shall quote the prices of these tools and tackles in the Sub Price Schedule for mandatory tools and tackles. The cost of these tools and tackles shall be considered for evaluation of bid.

1.15.2 Additional Tools and Tackles

In addition to the mandatory tools and tackles, the contractor shall also submit a list of tools and tackles, which he feels shall be required for proper operation/maintenance of the equipment. The cost of these additional tools and tackles may be given in a separate schedule. The cost of these additional tools and tackles shall not be considered for evaluation of this Bid. The items and quantity of the additional items to be purchased shall be entirely at the discretion of the Employer and the contractor shall not be entitled for any variation in rates on this account.

1.16.0 Standardization of Works

Every effort shall be made to standardize parts and minimize costs throughout the works in order to facilitate replacement, interchangeability, keeping stocks, maintenance etc. Wherever possible, all similar parts shall be made to gauge and shall be made interchangeable so as to enable substitution or replacement from spare parts to be easily and quickly made in case of wear or other failure. In particular, all bearings, bushing, sleeves, pins, sheaves, seals, fasteners, contactors, fuses, motor protection switches, control devices, instruments, meters, relays, lights, bulbs, plugs, sockets etc., where practicable, shall be made interchangeable.

1.17.0 Works Identification System

An approved, uniform Works Identification System shall be applied for all mechanical, electrical and instrumentation and control works to be agreed upon during detailed design.



1.18.0 Drawings

The following drawings are appended in the bid documents:-

1.18.1 General Drawings

The following drawings shall make the contractor familiar with the location, topography & other geographical features of the Project site as well as the Symbols & Abbreviations used in specification drawings:

Sr.No.	Title of Drawing	Drawing No.
1.	Symbols & Abbreviations	LA-HM-SA-01

1.18.2 Specification Drawings

The overall arrangement of the equipment covered under the scope of supply is broadly shown in the following drawings:

1.	Arun-3 HEP- TRT Outfall Structure- General Layout & Plan	AH-HM-TRT-S30
2.	Arun-3 HEP- TRT Outfall Structure- General Arrangement of Bulkhead & TRT Outfall Gate (Sheet 1 of 2)	AH-HM-TRT-S31
3.	Arun-3 HEP-TRT Outfall Structure- General Arrangement of Bulkhead & TRT Outfall Gate (Sheet 2 of 2)	AH-HM-TRT-S32
4.	Lower Arun Intake Structure- Intake Steel Gratings-General Arrangement	LA-HM-ISG-S02
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The above drawings as indicated under Para 1.18.0 shall be treated as a part of these Technical Specifications, unless otherwise specifically mentioned in the schedule or Specifications or Specification Drawings. The contractor shall furnish all the materials, accessories and appurtenant parts called for in the specifications or shown on the drawings. Any item shown in the drawings and not mentioned in the specifications or the item called for in the specifications and not shown on the drawings or any item neither shown in the drawing nor mentioned in the specification but which is necessary for the complete manufacturing, installation, testing and operation of the Gate, Hoist and other associated equipment shall have to be supplied by the contractor at no extra cost.

1.19.0 Responsibilities of Contractor

The contractor shall be responsible for:

- i) The quality of materials and workmanship in all the items of work.
- ii) Strict adherence to the dimensions of parts shown on approved drawings unless deviations are specifically authorized in writing by the Employer.
- iii) Strength of all parts of TRT Gates, Bulkhead for TRT Gates, Main Intake Gate of Lower Arun HEP, Intake Steel Gratings, Hydraulic Hoists, Rope Drum Hoist, EOT Cranes, Submersible slurry pump, monorail and their associated equipment when operated under the worst conditions of load and under conditions of closure during periods of maximum flow/discharge as applicable.
- iv) It is contractor's responsibility to ensure that all components supplied in accordance with these specifications shall fit correctly to each other. In the event of any field modifications being required due to errors in shop fabrication, contractor shall bear the full cost of such modifications. Any such changes shall be shown on the drawings and approved by Employer, before being made

by contractor.

- v) Satisfactory performance of the entire work under all operating conditions without signs of undue strain, and without damage, breakdown or deterioration of any of the parts due to faulty or incorrect or unallowable material, workmanship or design.
- vi) Freedom from vibrations of any part or parts under the most severe operating conditions beyond permissible limits.
- vii) The water tightness of the Gates seals, bearings and controls.
- viii) The strength, accuracy and adequacy in all respects.
- ix) The contract documents and specifications do not specify in complete detail the various components of the equipment. The contractor shall supply and erect all equipment in a complete shape, which will meet the requirements regarding performance, durability and satisfactory operation.
- x) The principal parts of the equipment are mentioned in these specifications, which outline the general features to be adopted in design. Any deviations from the specified requirements shall be done only with the approval of the Employer.
- xi) The contractor shall be fully and finally responsible for adequacy, stability and safety of all the site operations and methods of executions of various activities to be performed under the scope of contract.

CHAPTER-II

Description and Design Criteria

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2.0.0 Description and Design Criteria

2.1.0 TRT Gates, Hydraulic Hoists and Hoist Supporting Structure at Outfall of Arun-3 HEP

2.1.1 TRT Gates

Three (03) number vertical lift wheeled cum slide type gates suitable for vent opening each of size 8500mmx5500mm (w x h), shall be provided at the Tailrace Tunnel Outfall Structure of Arun-3 HEP to stop the flow from the river side into the Tailrace Tunnel during high flood and to regulate the discharge from pond side suitable for tandem operation of Arun-3 HEP and Lower Arun HEP. These gates are required to be designed to suit the design criteria as specified in the subsequent paras. These gates shall consist of structural steel work comprising of skin plate, horizontal girders, end vertical girders and vertical stiffeners etc. These gates shall have upstream skin plate and sealing arrangement with reference to the flow from pond side and dummy skin plate on river side. Horizontal girders shall support the skin plate at suitable intervals. Both horizontal and vertical stiffeners shall be provided, however, the vertical stiffeners shall be full depth with flange. End vertical girders shall have wheels and thrust bearing pads as shown in specification drawings. Solid bulb music note type PTFE rubber seals for sides & top and wedge type plain rubber seal at the bottom shall be provided. The sealing shall be a double sealing type to seal the water both from the pond side and river side as shown in the specification drawings. The hoist capacity shall be calculated considering plain rubber seals as the PTFE cladding shall worn out in silted water. The lowering & raising of the gate shall be under flowing water (unbalanced water head conditions) and shall be of regulating type. These gates shall be operated by single cylinder double acting hydraulic hoists. The hoist cylinder shall be installed on hoist mounting bracket and piston rod (with suitable size links) shall be attached with top horizontal girder of the gate. The gate shall be kept at min. 1350mm above the top of opening, clear from lintel beam for its inspection & maintenance and accordingly the

hoist cylinder shall be designed. Each gate shall be complete with latching arrangements and lifting attachments and fittings as necessary for operation of the gate. The gate maintenance is proposed at maintenance platform at El. 539.20m & EL. 545 as and when required. The design of gate and its components shall conform to IS: 4622 & 5620 (Latest Edition).

A suitable capacity EOT crane (min. 50T capacity) shall be provided on the top of the deck structure at El. 545m to carryout initial erection and subsequent repair and maintenance of gates & hoists and operation of bulkhead for TRT gate. The EOT crane shall be installed on steel columns to be fixed on the deck slab with the help of suitable anchors.

2.1.2

Embedded Parts

The embedded parts for each gate shall comprise of the following components:

- i) Corrosion resistant steel wheel track with base from sill level upto one full gate height above lintel (two assemblies per bay)
- ii) Corrosion resistant steel slide track with base from sill level upto one full gate height above lintel (two assemblies per bay)
- iii) Stainless steel side seal with base (two assemblies per bay)
- iv) Stainless steel seal seat with sill beam (one assembly per bay)
- v) Top seal seat assembly with seal seat base and stainless steel seal seat (one assembly per bay)
- vi) Structural steel plate or rail section, anchored in concrete, shall be used as guide and shall be provided from sill upto top of structure. The guide shall be tapered at top for easy entry of gate.
- vii) First stage inserts (J or U anchors with plates) to be embedded in first stage concrete for proper alignment and for providing suitable reference surface for erection of 2nd

stage embedded parts.

- viii) Suitable embedments/ blockouts for hoist supporting structure.

First stage inserts (J or U anchors with plates) to be embedded in first stage concrete at a spacing not exceeding 500mm centre to centre leaving suitable blockout openings for second stage embedments. The size of the 1st stage anchors shall not be less than 16mm in dia. and 300mm in length. The 2nd stage anchors/studs with double nut and washers attached to 2nd stage embedded parts shall than be welded all around to 1st stage anchor plates for providing suitable reference for proper alignment for erection of 2nd stage embedded parts.

Design of all embedments shall conform to IS: 5620 (latest revision) & IS: 4622 (latest revision). Minimum sizes and tolerances of all components as specified in IS: 5620 (latest revision) & IS: 4622 (latest revision) shall be adhered to. The concreting in the blockouts shall be done after erecting the embedded parts, aligning and checking them and ensuring their correct position. Suitable struts, supports etc. as required shall be provided by the contractor to prevent disturbance in the parts during concreting. The contractor shall be responsible for correctness of erection of the embedded parts in position and maintaining the dimensional accuracies as per approved drawings.

2.1.3 Design data for TRT Gates

- | | | |
|-------|-------------------------------|---|
| i). | Type of Gate. | Wheeled cum Slide type with upstream skin plate (w.r.t. flow from pond side) and sealing from both sides. Dummy skinplate shall be provided towards river side. |
| ii). | Clear Width of opening | 8500 mm |
| iii). | Clear height of opening. | 5500 mm |
| iv). | C/C of side seals (Pond side) | 8620 mm \pm 3 |

v).	C/C of side seals (River side)	8950 mm \pm 3
vi).	Center to center distance of slide tracks (Pond Side)	9200 mm \pm 3
vii).	Center to center distance of wheel tracks (River Side)	9200 mm \pm 3
viii).	Elevation of C/L of top seal seat.	El. 538.440 m (River side) El. 538.275 m (Pond side)
ix).	Sill Level	El. 532.7 m
x).	H.F.L. of River	El. 540.0 m
xi).	Maximum Water Level (Pond side) for the design of gate and embedded parts	El. 545.0 m
xii).	Maximum Water Level (Pond side) for consideration of hydraulic hoist capacity and for which gate shall be regulating type/ operating level	El. 544.0 m
xiii).	Design Head	12.3m (for gate & embedded parts)
xiv).	Operation	Under unbalanced water head conditions (Regulating type)
xv).	Min. thickness of skinplate	25mm
xvi).	Type of Hoist	Single cylinder double acting hydraulic hoist
xvii).	Type of seals	Single solid bulb music note type PTFE seal for sides and top (two separate sets for sealing from both sides i.e. pond side & river side), wedge type plain rubber seal for bottom

xviii).	No. of gate (s)	3 (Three)
xix).	Governing Indian Standard.	IS:4622 & 5620 (Latest Edition)
xx).	Permissible stresses :	Permissible stresses in structural components for gate and embedded parts shall be in accordance with Annex- B of IS: 4622 (Latest Revision) and IS: 5620 (Latest Edition)
xxi).	Permissible stresses for gate	Wet & inaccessible
xxii).	Permissible stresses for embedded parts	Wet & inaccessible
xxiii).	The seismic coefficients of the project are as follows :	
xxiv).	Horizontal seismic coefficient	$\alpha_H = 0.24g$
xxv).	Vertical seismic coefficient	$\alpha_V = 0.16g$
xxvi).	Permissible deflection of gate	<ul style="list-style-type: none"> • Span(L)/800 • Maximum deflection of gate at top seal shall not be more than 80% of the initial interference of the seal
xxvii).	Permissible bearing and shearing stress in Concrete	As per IS-456 (Latest edition)
xxviii).	Grade of concrete to be used	
	a) 1st stage concrete	M20/M25
	b) 2nd stage concrete	One grade higher than that of 1st stage concrete and not less than M25 grade
xxix).	Material for fabrication	As detailed in Chapter 3.0.0

2.1.4 Control Philosophy

The operation of these TRT gates shall be in accordance with the command and control of a separate tandem operation system controller being provided by Employer in the electromechanical package. The contractor for this work shall design the control philosophy for operation of these TRT gates in-line with the same. The tandem operation system controller is presently under finalization with Employer and the relevant details shall be provided to the gate contractor during detailed engineering. To achieve the required control philosophy any additional hardware/ equipment and software shall be deemed to be included in this scope of work and no extra cost shall be payable. However, the following provisions may also be kept.

- i) The TRT gates shall be operated through manual, automatic and remote functions. For remote operation, the control/ signal/ power cabling shall also be provided by the contractor of this work. The cabling shall be from the control panels of hydraulic power unit to the nearest RTU (Remote Control Unit) installed by the employer in the vicinity of the TRT gates. Input signal shall be provided through optical fiber cables/copper cable as per the system requirement. The control equipment shall be designed accordingly keeping in view the same. The PLC shall directly accept fiber optic signal with one connection as redundant.
- ii) In Normal operation i.e. gate controls under Tandem operation system, each gate control panel shall follow the command from Tandem controller.

However, in case of failure of Tandem control system, in control room, there shall be an automatic gate control panel for high water level in the pond side and this automatic gate control panel shall be interconnected to all the three local control panels. Inputs into the automatic gate control panel shall be from a suitable pond reservoir water level instrument. The necessary logic for safe gate control (closing or opening), sequencing etc. shall be worked out during detailed engineering.

2.1.5 Hydraulic Hoists and Supporting Structure

- i) All aspects of hydraulic hoists, which are not covered in the specifications, shall conform to the applicable requirements of IS or any equivalent national/international standards (latest revision) for industrial hydraulics.
- ii) All hydraulic hoists components, such as seals, gaskets, pumps, valves and hoses that are normally in contact with hydraulic fluid shall be compatible. All hydraulic hoists parts and components that are permanently or occasionally submerges in water shall be adequate to resist without damage. It shall be ensured that cylinders and piping are permanently and completely full of hydraulic fluid under normal working conditions at all times, to avoid internal corrosion effects of moisture.
- iii) All the three hydraulic power units shall be interconnected to facilitate operation of hydraulic cylinders of any one gate with the hydraulic power unit of any other gate. The Hydraulic piping, valves etc. and other hydraulic circuit shall be designed keeping this aspect in mind.
- iv) The contractor to the extent possible shall indicate the equivalent local Indian components of the corresponding components imported from other countries/supplied from foreign vendors for easy availability of these components during future operation and maintenance.
- v) Shut off valves shall be provided at all hose connections and other suitable locations in the hydraulic system to enable convenience of hose replacement.

2.1.5.1 Description of Hydraulic Hoists

All parts, components, and accessories that are specified herein, or that are required for the intended function of the hoists except those which are specifically indicated to be supplied by others, shall be furnished by the contractor, even if they are not described herein. The items to be supplied by the contractor shall include all pipe hangers and supports to the terminal box of the hoist components installed for remote control and indication. Each hydraulic hoist shall include one or more of the following major

subassemblies, materials, equipment etc. described in the subsequent paragraphs of this section:

- hydraulic cylinder assemblies.
- cylinder assemblies mountings and hoists support structures.
- connecting piping.
- hoist control module including hydraulic power unit, electrical control cabinet , frame, housing , accessories and appurtenances; and
- hydraulic fluids.

2.1.5.2

Hydraulic Cylinder Assembly

i) General

A hydraulic cylinder assembly shall include a cylinder tube, cylinder heads, piston, piston rod, seals, accessories, and appurtenances.

ii) Design Stroke

Hydraulic cylinder assemblies shall be designed so that when the gate and hoist assembly are erected exactly to the nominal design geometry, the piston rod shall have an available over stroke in addition to the stroke required for complete rod extension to lower the gate fully. The over stroke measured along the piston rod travel be not less than 40mm. Similarly when the gate is completely raised to the dogging/maintenance position the hoist will have an available over stroke of minimum 25mm. Actual extent of over stroke shall take into consideration all manufacturing and erection tolerances and other factors like clamping bottom seal compression for gates and gate travel beyond the opening, wearing of the gate sill seal seat etc. Hydraulic damping shall be taken into consideration while designing the hoist stroke.

iii) Standards

In addition to other required specifications, hydraulic cylinder assemblies shall conform to all applicable

requirements of IS:2825 (Latest Revision), IS: 10210 (Latest Revision), DIN 19704 or section VIII, Division I of ASME code. The cylinder shall be fabricated by a manufacturer who is in the cylinder manufacturing business for minimum 10 years.

iv) **Cylinder Body**

Construction: All cylinders shall be of boiler quality steel plate. Cylinder body (cylinder tube) shall be manufactured from a single piece of material and then machined in one piece. The cylinder shall be straight and true and shall be of sufficient wall thickness to resist the maximum operating pressure and various forces that could be imposed upon it. The design, fabrication, welding and stress relieving of the hoist cylinder and flanges shall be in accordance with latest issue of ASME boiler and pressure vessel code. The stress relieving of the cylinder shall be done by heating the cylinder as a whole in an enclosed furnace. After welding & stress relieving of the cylinder the entire length of each welded joint shall be examined throughout its length by suitable NDT methods. The end portion of the cylinder bore shall be given a suitable circumferential tapering from the end for convenient setting of the piston in the cylinder. The design pressure for the hydraulic cylinder shall be 200 bars. The cylinders shall be flanged at top and bottom.

- a) Interior surface finish: Interior surface of the cylinder tube that comes in contact with piston seal shall be continuous and without detectable offsets. Surface shall be uniformly honed to a surface finish commensurate with the specified maximum leakage limit and long life of the seal. In any case, the finish shall not be coarser than 0.33 microns.
- b) Exterior surface finish: Outer surface of cylinder shall be grit/ sand blasted and preserved in accordance with standard practice for surface protection.
- c) Ports: Ports shall preferably be located in the cylinder heads. If located on the cylinder tube, their edges shall be kept at least 6mm away from the piston seal contact line

in all positions of the piston.

v) **Cylinder Heads**

- a) Each cylinder assembly shall have a blind end cap and a rod end head, each fastened to the cylinder tube by bolted connection. Cylinder head shall have machined contact surfaces for resisting the thrust of the piston and rod assembly without exceeding the normal allowable stresses, in the event of a failure of limit switch or other malfunction.
- b) A gland shall be provided in the rod-end head. The gland shall include a piston rod guide bushing, piston rod seal, and a heavy duty scrapper/wiper ring, which shall prevent the entry of foreign material into the cylinder. Guide bushing shall be fibre-reinforced phenolic material.
- c) Design of the rod end head shall permit the servicing of the piston rod seal (s) without disassembling the cylinder, while the cylinder shall remain in its normal working position.
- d) Lifting lugs shall be provided for taking up the load of the hoist cylinder filled with oil.
- e) Water exclusion seals shall be provided as necessary to prevent the entry of water into the cylinder.

vi) **Piston**

- a) Piston shall be of steel, forged or cast in one piece and shall be equipped with seals and guide rings. It shall be nickel chrome plated. It shall have grooves for the piston rings and provision for fixing suitable seals. Guide rings shall be of bronze and/fibre-reinforced phenolic material. Design of the piston shall permit easy replacement of seals and guide rings. The seals and rings shall not be less than two each.
- b) Suitable seals shall be provided to prevent leakage of oil through the stem threading at lower end and upper portion engaging the hanger stud.

vii) **Piston Rings**

Piston rings shall be in a single piece of bronze material conforming to the latest edition of IS:305 or IS:318. The rings shall be suitable for hydraulic service at the normal working pressure. The piston ring joint shall be angled or overlapped type allowing the minimum leakage through the joint and provide an effective seal.

viii) **Piston Rod**

- a) The material for piston rod shall be selected from one of the following:
 - 1) Solid bar of corrosion-resistant stainless steel (X30Cr13) of IS: 1570 (latest Revision) or DIN 17440 or its equivalent.
 - 2) The stainless steel stems shall be straight and be of uniform diameter and surface shall be polished.
- b) Outer surface of the stainless steel piston rod shall be hard chromium plated with the minimum plating thickness of 50 microns after machining. The chrome plating shall be done in atleast two stages. The thickness for each stage shall not exceed 0.05mm.
- c) Outer surface of the piston rod, which contacts the piston rod guide bushing and seals shall be ground and polished to a uniformly concentric finish having surface roughness equal to, or better than 0.2 microns.
- d) Connection of the piston rod to the piston shall be a rigid attachment and shall permit disassembly for maintenance.
- e) Piston rod eye, when used, shall be in one piece and shall have a bushed hole for pin connection to the gate. The eye shall be of rolled or forged steel, rigidly attached to the piston rod by threaded or bolted connection. Guide surfaces and shoulder shall be provided for proper alignment of the eye with the rod.
- f) Connecting pin where used, shall be of corrosion-resistant steel conforming to IS: 1570 (latest revision) or ASTM A Type 316 or its equivalent. The pin shall be positively secured against axial movement by either a shoulder on

one end and washer and retaining pin on the other end, or by a washer and retaining pin on both ends, or by bolted retaining plates. Use of snap-type retaining rings will not be permitted.

- g) For unsupported lengths of the articulates stems, suitable holding brackets/spider assembly shall also be provided along the gate shafts. The contractor shall design the holding brackets/spider assembly keeping in mind the various buckling, bending forces etc.
- h) The contractor for this work shall also supply all the necessary jigs, fixtures, tools for the disassembly and re-assembly of the hoist cylinder, articulated stems with the gate leaf.

ix) **Seals**

Piston seals and piston rod shall be of the chevron type packing seals for piston and for piston rod, mechanically locked in place. The seals shall have atleast three grooves. Seals shall resist roll, turn and extrusion. On hoist cylinders designed for fluid pressure acting from either side, a separate set of piston seals shall be provided on each side.

x) **Hanger Stud**

The hanger stud or stem locking device shall be of mild steel. The upper end shall be screwed into and locked with the piston. It shall be in accordance with provisions in IS:10210 (Latest edition). Suitable wrench facing shall be provided on the stud near the minimum cross section.

xi) **Packing**

Packing or static seals such as rings shall be provided between all connected parts where leak-tight joints are required, such as between cylinder tube and heads or between piston and piston rod.

xii) **Speed limiting orifice**

Cylinder shall have a permanently mounted speed limiting orifice to limit the downward speed of the gate to

1m/min in case of rupture in the connecting pipes.

xiii) **Bosses, Drains, Vents and Test Connection**

- Bosses: If bosses are provided at the hydraulic cylinder ports, they shall be welded.
- Drains: All necessary drains shall be provided.
- Air Bleed Valves: Cylinder shall be furnished with atleast 2 air bleed valves for complete removal of trapped air. All air bleed valves shall be of stainless steel.
- Test Connections: Cylinder shall be furnished with one test connection in each of the fluid ports for attaching a pressure gauge or transducer. Additional test connections shall be provided with corrosion resistant steel connectors equipped with check valves; no shut off valves shall be used.

xiv) **Cylinder Mounted Components**

Except for pipe connectors, pipe supports, air bleed valves, test connections, plugs and the necessary pressure piping, no other components shall be mounted on the hydraulic cylinder. However, from safety consideration, a control plate with atleast one shut off valve, lock valve and pressure release valve may be flanged on to the cylinder directly.

xv) **Handling Eyes**

Each cylinder shall be equipped with handling eyes to facilitate easy handling during transportation and erection.

xvi) **Proximity Switches**

Each cylinder shall be equipped with proximity switches, one at each end to switch off the power unit at the end positions of the gate. Connection between the proximity switches and control wiring shall be weatherproof. Also the conduit supplied by the seller (including flexible conduit) up to the terminal board shall be weatherproof.

xvii) **Coupling**

For connecting the stem between the gate and hoist, clevis type of coupling of adequate strength shall be provided. Couplings shall be matched in pairs and examined carefully for evidence of cracks and defects. The male and female parts of clevis shall be connected by corrosion resistant stainless steel pin. The pin shall be designed for adequate factor of safety against shear and bending.

xviii) **Position Transducer**

Each gate cylinder shall be equipped with an electronic position transducer to measure the position of the gate. The transducer shall be suitable for accurately measuring 50-Hz quantities. Transducer outputs shall be a D.C. current signal ranging from 4 to 20mA full scale suitable for termination in a load, resistance up to 500 ohms. The piston rod shall be drilled as necessary to accommodate the lower transducer body. In case of any practical problem an alternative type/ arrangement of transducer shall also be acceptable.

Unless specified otherwise, the maximum allowable error shall not exceed plus/minus 0.25% of full scale at 25 degree C, and the error resulting from a temperature variation between - 20 degree C. and 60 degree C. shall not exceed plus/minus 0.5% of full scale. AC output ripple shall not exceed 1%. The units shall be provided with a 10% full scale calibration adjustment, and the response time shall be 400ms or better from 0 to 99%. There shall be electrical isolation between input, output, external power supply. The transducers shall satisfy the requirements of ANSI C37.90a and shall have a dielectric test voltage rating of 1500 V AC rms for one minute.

Transducer components shall be totally enclosed in steel cases with integral brackets for surface panel mounting. External electrical connections shall be made using screw type barrier terminal blocks. A separate terminal connection shall be provided for grounding the output cable shield.

xix) **Wiper Scrapper**

Wiper scrapper shall consist of a corrosion resisting metal scrapper and a rubber wiping member assembled in tandem position and securely clamped and enclosed in a steel shell. The scrapper shall have a snug fit on piston stem and have sufficient play within the shell to permit alignment under normal tolerances. It shall be fixed in the lower cylinder head gland by simple press fit for removing foreign materials sticking to the stem. It shall be effective in the upward stroke only and wiping member shall remove any particles that passes the scrapper.

2.1.5.3 Cylinder Assembly Mounting & Support Structure

- i) The contractor for this work shall design and install the hoist supporting structure, mountings etc. in the civil structure at TRT outfall. The hoist supporting structure shall be designed for both uplift & down thrust forces.
- ii) Cylinder mounting and support structure shall not interfere with servicing of hoist cylinder. Support structure should have adequate clearances.
- iii) Where the mounting is attached, the cylinder tube shall be provided with reinforcing flanges and/ or braces to minimize cylinder deformations under load. All reinforcing flanges and/ or braces shall be welded to the cylinder tube before final machining of inside diameter.
- iv) The support structure or its parts shall necessarily be removable as to allow removal of all parts of the hoist or gate equipment.
- v) Location of removable components of support structures shall be fixed by position lugs or dowels which shall position the removable components on the embedded or permanently installed parts. All anchors to be fully or partially embedded in concrete shall be furnished by the contractor.

2.1.5.4 Connecting Piping

- i) **General**



- a) All piping on the hoist control module and between the control module and the hydraulic cylinder as well as on the hoist cylinder shall be of the stainless steel and conform to the requirements specified in subsequent paragraphs. Insulators shall be used to isolate all dissimilar metals at the connection points. Preferably the pressure fluid velocities in the piping must not exceed 3.0m/sec in pressure lines and 0.6m/sec in suction lines.
 - b) The piping and appurtenances shall conform to the applicable requirements of ANSI-B31.1 or equivalent standard.
 - c) All piping in the hoist control module shall be completely installed in the shop before shop testing and shipping. The piping between the hoist control module and hoist cylinder shall be finished in the shop to obtain transportable (in no case longer than 6m) lengths with all bolting flanges or couplings welded to the sections. All the pipes must be supplied with end caps. Piping sections where dimensions may require adjustment at field installations shall be prepared in the shop without welding the flange or coupling on one or both ends of the piping section and cutting the pipe to 200mm over length at each of these ends.
 - d) All pipe sections to be connected in the field shall be flanged using shop or field welded flanges or shall be designed for connection in the field with the socket welded couplings. Pipe section shall not be design for butt welding in the field.
 - e) All pipe welding shall be TIG welding. While welding stainless steel, the corrosion effect shall be taken care of by purging and or other methods etc.
- ii) **Piping Arrangement**
- a) All the piping shall be installed on a suitable stainless steel brackets. Preferably all electric cabling and hydraulic piping shall be installed on the same stainless steel brackets for compactness.
 - b) The general arrangement of all piping shall be in

accordance with the space and clearances available from gate and operation control room.

- c) The piping shall allow easy removal and reinstallation of the hydraulic cylinders and hoist control module. For this purpose, all hydraulic lines connecting the hydraulic cylinders to the hoist control modules shall be provided with flexible connections at the cylinders and if necessary at the control modules. Both ends of all flexible connections shall be connected with corrosion resistant steel shut off valves so that the piping, cylinder, and hydraulic power unit can be shut off when the connections are removed.
 - d) Manual vent valves shall be provided at all high points and wherever else required in the system for the complete removal of trapped air. The valves shall have threaded female ends and shall be of corrosion resistant steel or bronze. The outlet ports of all vent valves shall be plugged with threaded bronze plugs.
 - e) Rigid piping installed on the cylinders shall be kept to an absolute minimum and shall be of stainless steel and shall not be welded to the cylinder. Also no compression fitting shall be used. All connections shall be screwed connections.
 - f) Piping shall not be designed for embedment in concrete. Suitable trench for positioning of piping shall be provided.
 - g) Piping in the hoist control module shall be laid out such that it shall not obstruct access to, or removal of hydraulic components for maintenance or inspection.
 - h) Piping shall be adequately sized to permit fluid flow and functioning of the system without significant pressure drop between the power unit and the farthest cylinder. The minimum size of the piping for pressure and return piping shall be 16mm inside diameter. The detailed calculations for pipe sizing shall be submitted by the contractor.
- iii) **Fittings and Flanges**

- a) All pipe fittings shall be of the socket welding type conforming to the applicable requirements of ANSI B 16.11 or equivalent.
- b) All pipe flanges shall be of the weld neck type conforming to the applicable requirements of ANSI B 165 or equivalent.

iv) **Flexible Connections**

a) **General**

The flexible connections shall allow reconnection of the hydraulic power unit or hoist cylinder without realignment and shall also permit the necessary freedom of movement of the hoist cylinder in its mounting.

b) **Flexible Hoses**

- 1) All flexible hoses shall be corrugated flexible metal hoses. If not available, steel reinforced hose with female swivel screwed ends or any other hoses suitable for the application may be used.
- 2) All flexible hoses shall be furnished with factory installed fittings which shall be of corrosion resistant materials.

v) **Pipe Supports**

All pipe supports such as pipe hangers, anchors, guides, clamps etc. shall conform to the applicable requirements of ANSI B31.1. The supporting brackets shall be of stainless steel. The maximum spacing between pipe clips shall not exceed 1.5m. The laying of pipes on top of one another shall not be allowed.

2.1.5.5 Hoist Control Module

i) **General**

- a) The hoist control module shall be furnished complete in all appurtenances to provide pressurized hydraulic fluid for the operation and control of the hydraulic hoist cylinders.

- b) The hoist control module shall include a hydraulic power unit and an electric control cabinet. These parts shall form a single integrated equipment package mounted on a common frame and installed in a single housing. The hoist control module shall also include all interconnecting wiring between these two sub-assemblies, the required housing and all other appurtenances.
- c) The hoist control module shall be provided with separate sets of hydraulic control and power components for each gate arranged on a common hydraulic fluid reservoir and separate sets of electric components for each built in a separate electric control cabinet. The hydraulic and electrical control and power components shall be suitably interconnected to enable the operation of the hoist cylinders of one gate by the pump of other gate.
- d) The control module shall be housed in the gate control room provided by the employer. Sufficient space (atleast 600mm) shall be provided all around the control module to facilitate operation and maintenance. The location of control module shall not interfere with the free movement of the men and material through operation chamber.

ii) **Hydraulic Power Unit**

The hydraulic power unit shall include a hydraulic fluid reservoir, electric motor driven pump, manual pump, automatic controls, pressure relief, check, flow control and directional control valves, pressure and temperature gauges, fluid level switch, filters and strainers, piping etc. etc., and all accessories, appurtenances and wiring required to provide an operational fluid power system for the operation of the hoist according to the requirement of these specifications. 100% standby electric motor driven pump shall also be provided. All of the components shall be mounted on the hydraulic fluid reservoir. Manhole of dia. 600mm min. shall be provided for the maintenance of HPU. All valves to be CETOP standard and manifold mounted wherever possible. The hydraulic circuit diagram shall be submitted during detailed design stage for approval.

iii) **Hydraulic System Layout**

- a) Motor driven Pumps: Independent electric motor driven pumps for each hydraulic hoist shall be provided. It shall be possible to change motor and pumps without dismantling any other items of equipment.
- b) Manual Pump: One manual pump shall be provided for the hoist. The manual pump shall be arranged in parallel with the motor driven pump.
- c) Suction Strainers: Suction strainer shall not be preferred. However, if suction strainer is provided, then it shall be possible to easily remove the same in case of clogging. A suitable indication regarding clogging of suction strainer shall be provided.
- d) Pressure Filters: All hydraulic fluid being discharged from each pump shall pass through its own pressure filter before entering the rest of the hydraulic system. The nominal flow rating of the filters must be such that there is at least 100% spare capacity at the maximum possible flow rate. One way filter cartridges must be used. A blockage indicator providing a local visual reading and having an electrical connection must be fitted and also a filter by pass with a check valve be provided.
- e) Return Line Filters: All hydraulic fluid returning from the system to the hydraulic reservoir shall pass through a return line filter. A separate return line filter shall be provided for each gate. The nominal flow rating of the filters must be such that there is at least 100% spare capacity at the maximum possible flow rate. One way filter cartridges must be used. A blockage indicator providing a local visual reading and having an electrical connection must be fitted and also a filter by pass with a check valve be provided.
- f) Check Valves: one check valve shall be provided in the pressure line of each pump between the pressure line filter and the rest of the system to prevent back pressure on the pumps when they are not in operation. Other check valves shall be arranged in the hydraulic system as

required.

- g) Pressure Relief Valves: Temper proof relief valves must be provided for all parts of the system. Pressure relief valves must be set to provide safe and reliable operation of the system with an adequate pressure difference from the required operating pressure. The pressure difference shall be based on a minimum of 5% of the operating pressure.
 - 1) One pressure relief valve, sized to pass the full discharge of one motor-driven pump, shall be arranged in the pressure line of each motor driven pump.
 - 2) Pressure relief valves to limit pressure due to heat expansion or to limit hoist capacity in one direction shall be provided as required.
- h) Surge Suppressors: Surge suppressors (hydraulic accumulators used as shock dampers) shall be provided in the cylinder pressure line(s) and elsewhere as required to dampen pulsations, surges, and pressure shocks in the hydraulic system resulting from valve operation and from hydrodynamic forces on the gate.
- i) Pressure Gauges: One pressure gauge shall be provided on the common pressure line of one or more pumps and on the hoist cylinder pressure and return line between the hoist cylinder and hydraulic control components within the hydraulic power unit. Additional pressure gauges shall be provided as per standard practice or as otherwise required. Pressure gauge shall have a minimum diameter of 100mm and be fitted with an isolating valve.
- j) Test connections: Test connections shall be provided suitably.
- k) Pressure Switches: This shall be of the type suitable to operate a mercury switch having a rating of at least 5 amps at 230 volts A.C. The switch shall have independent adjustments with locking devices for setting the cut-in and cut-out pressure and with pressure settings indicated on a dial. It shall have suitable provisions at the back for

pressure connection and electrical conduit connection. The switch shall have a capacity to withstand a pressure of at least two times the maximum operating pressure in the control system. One pressure switch for extreme open position of the gate be also provided for safety. One low pressure switch in the system may be provided.

- l) Pressure switches and pressure gauges may not be connected by means of flexible hoses. Any dampening of pressure peaks found necessary must be provided by other means (eg. Resistors, spiral pipes etc.).
- m) Oil pressure:

The maximum oil pressure verify for an individual loading situation shall not exceed the permissible oil pressure given in table 7 of DIN 19704. At least 5% margin shall be kept from the maximum permissible oil pressure for reliable operation of the pressure limiting valve and another 5% margin for reliable operation of pressure switch. The pressure switch shall have a switching accuracy of $\pm 1\%$ of the setting pressure.

iv) **Fluid Reservoir**

The stainless steel hydraulic fluid reservoir shall conform to IS: 10210 (latest revision) and shall be independent for each gate. Each compartment shall be provided with baffle plates and an access opening at each end for cleanout. The reservoir shall be equipped with a sight fluid level gauge, minimum oil level indicating device, dial type thermometer to indicate fluid temperature, a combined oil level/ oil temperature switch, valve drain connection, a magnetic plug-type drain arranged to permit complete drainage, a filler pipe provided with a strainer, a desiccant-filled breather cap with filter, and pipe connections to a fluid purification device. The desiccant breather cap shall be of the silica-gel type and shall be mounted directly on the hydraulic fluid reservoir. The breather shall function as an air filter to eliminate moisture and particulate contamination with in the reservoir. The reservoir shall be provided with lifting and jacking lugs as required for its handling.

- a) Hydraulic fluid reservoir shall have sufficient capacity for 4 times the maximum volume that can be pumped in one minute plus the oscillating volume of the connected cylinders plus the capacity of the piston rod space of the cylinders and the capacity of the relevant pipe work or satisfying the conditions given in IS:10210 whichever is more. Magnetic drain plug for emptying the tank shall be provided. Large opening for cleaning the oil tank shall also be provided. First filling shall be via a filter with atleast 10 micron ratings.
- b) The minimum fluid level must be atleast 10cm above the bottom of the reservoir.
- c) Fluid reservoir must have an inclined bottom with a large cleaning door.
- d) The minimum fluid level in the reservoir shall be monitored by means of float switches. The float switches shall be arranged so that they can be removed without dismantling any other items of the equipment.
- e) Fluid reservoir shall only breathe through dehydrating breather having a transparent bowl, check valve and filter with a bottom air intake. The size of the transparent bowl must be sufficient to allow atleast 3 months of operations under unfavoured conditions before the contents need to be changed.
- f) Breathing must take place through a separate spring line check valve with a downward pipe bend. The valve must not suffer from sticking due to the hydraulic medium or its vapours.
- g) Ends of the suction and return lines must be as far as possible from each other. They must also remain fully submerged when the fluid level is at its lowest. The inlet to the suction pipe must be shaped for good flow (atleast cut at an angle).
- h) There must be no valves or fittings inside the fluid reservoir.
- i) Hydraulic power unit must stand in catch plane with at least sufficient capacity for the fluid content of the

connected cylinder.

- j) Unpressurized circulation of the hydraulic medium should be possible throughout the system (for flushing purposes).
- k) Filler holes must have air tight caps and a pouring filter. Fluid reservoir must be filled through a filter of less than 10 μ (micron).
- v) **Motor driven pumps**

The motor driven hydraulic pumps shall be of the self-priming positive and constant displacement type. The pumps shall be driven by direct coupled electric motors and shall be equipped with individual “Manual/ auto” switches and “Start”, “Stop” push buttons for operating the pump in the manual mode. Preferably, the maximum pump & motor speed shall be 1000 rpm. The noise level shall be less than 80 db (A) from a distance of 1m.

- vi) **Motor driven pumps**

A flexible coupling must be fitted between motor and the pump changing over of the flexible coupling assembly should be as easy as possible. The flexible coupling between the motor and the pump shall be an all-metal type suitable for accommodating radial and angular misalignment. The coupling shall be of adequate capacity to drive the pump and shall be accurately bored.

Suitable keyway shall be provided to ensure proper fitment on motor and pump shaft and permit minor adjustments for alignment purpose.

- vii) **Manual Pump**

The manual pump shall be of the lever operated piston type. The pump shall be mounted on the front of the hydraulic fluid reservoir, shall be operated from a standing position, and shall not require more than 14 kg. of force on the pump lever to reach nominal design system pressure.

- viii) **Hydraulic control panel**

The hydraulic control panel shall be mounted on the top of the hydraulic fluid reservoir in the plane of the front face of the reservoir. All hydraulic components which need to be accessible for manual operation and all gauges shall be mounted on the hydraulic control panel. Strainers and filters shall also be easily accessible for maintenance; their location shall be such that the draining oil during change of the filter elements shall not spoil the instrumentation including pressure gauges and pressure switches and other critical items. All components shall be arranged in an orderly and functional manner and they shall be removable without removing the surrounding components and piping.

- a) All components of the hydraulic system including the measuring connection must be identified on the hydraulic circuit diagram and on the components themselves by means of items nos. When hydraulic components also have an electrical connection, the electrical devices must also be identified.
- b) The following operating instructions and notices in plain text shall be affixed.
 - On directional control valves changeover valves etc.: Functions and direction of operation.
 - On indicator devices: Function
 - On motor, pumps etc.: Direction of Rotation
 - Any other important operating and maintenance instructions.

viii) **Hydraulic valves**

a) **General**

All valves shall have JIC or equivalent pressure ratings not less than the maximum system pressure. All pressure relief and control valves shall be preset in the shop to their operational setting. All electrically operated valves shall be furnished with suitable provision for standby manual operation. Each valve shall be furnished with a corrosion resistant tag suitably engraved or stamped to

identify the valve according to its designation on the hydraulic circuit drawing and according to its function in the system. Shut off valves must be fitted upstream and downstream of hose connection if the nearest isolating point is more than 5m away.

b) Shut-off valves

All shut-off valves shall be ball valves. Shut off valves must be galvanized on the exterior (the body) and the external (stem, ball, cone etc.) must be of stainless steel.

c) Check valves

All check valves shall be spring loaded for closure with minimum shock unless otherwise specified. Pilot operated check valves shall be provided where the check valve has to open against pressure.

d) Directional control valves

All directional control valves shall be of standard manufacture and nominally rated for zero leakage.

e) Pressure relief valves

All pressure relief valves shall be of the hydraulically operated type. The valves shall be adjustable and shall maintain the pressure within +5% of the preset value.

f) Flow control valves

All flow control valves shall be of the adjustable pressure and temperature compensated type with an integral check valve for free return. All valves shall be shop tested to pass the required flow within +5%.

g) Pressure switches and pressure relief valves must have facility for sealing.

h) Electrically operated control devices must have plug connectors.

i) With the exception of proportional control valve, electrically operated directional control valves must have integral plug LED's to indicate the switching positions.

- j) Directional control valves must be equipped with an easily accessible and lockable emergency manual operating mechanism.
- k) Control devices must be combined into blocks whenever possible and actuator ports should be directly connected to the control blocks.
- l) Pressure switches must have a switching accuracy (repeatability) of at least $\pm 1\%$ of the set pressure. They must be fitted on adjustable scale.
- m) Pressure measuring connectors must be provided at all important points of the system.
- n) Vent cocks must be provided at the highest point on each cylinder. The vent connections should be combined with the pressure measuring connection, if possible.
- ix) **Filters and strainers**
 - a) Filter shall be of the disposable, cleanable, replaceable element type. Elements of all filters and strainers shall be stainless steel or Monel woven or wound wire.
 - b) All filters shall be constructed and installed to permit servicing of the filter elements without disturbing the piping and without draining the hydraulic system and the fluid reservoir. Shut off valves shall be provided where necessary.
 - c) Each filters shall be furnished with a bypass valve which shall open to pass the flow when the pressure drop across the filter element exceeds the allowable limit.
 - d) Each filter shall be provided with means to indicate the condition of the filter element by visual inspection.
 - e) Each filter and strainer shall be furnished with a differential pressure or minimum pressure switch to energize a warning light when the pressure drop across the filter or strainer reaches a predetermined value.
 - f) Filter elements shall be screw-on type and shall be furnished with the following absolute ratings:

Low pressure line strainers: 160 microns

Pressure filters: 10 microns

Return line filters: 40 microns

g) Pressure drop requirements: The maximum pressure drop across any clean filter or strainer at normal flow shall not exceed the flowing values in the normal operating temperature range; 0.0703kg/cm² (1 PSI) for low pressure line strainers. 0.3515 kg/cm² (5 PSI) for pressure filters.

h) By-pass valves: The filters shall be provided with by-pass valves which shall be set to open when the pressure drop across the filter element exceeds 1.0545 kg/cm² (15 PSI).

x) **Pressure Gauges**

All pressure gauges shall be of the Bourdon tube type with glycerin filled housing. The accuracy of pressure gauges shall conform to Grade A of ANSI B40.1. All pressure gauge dials shall be atleast 100mm diameter and shall have dial graduation equal to their accuracy. The total measuring range of the gauge shall be between 110 and 200% of the maximum pressure expected. All pressure gauges shall be provided with corrosion resistant shut off valves and snubbers.

xi) **Test Connections**

The power unit shall be furnished with test connection at appropriate locations for attaching a pressure gauge or transducer. Each test connection shall be provided with a corrosion resistant steel minimus type connector equipped with check valves; no shut off valves shall be used.

xii) **Control room**

A suitable control room shall be constructed near the TRT outfall structure. The relevant civil structure shall be constructed by the civil contractor. However, the gate contractor shall provide all the relevant details viz. anchor details, loads trench layout etc for installation of the

hydraulic power units.

2.1.5.6 Electrical Connections

- a) All electrical wiring and equipments, unless otherwise called for in these specifications or in the drawings shall conform to the latest Indian standard specifications and all electrical works shall be carried out conforming to latest rules under Indian Electricity Act or other applicable legislations. All internal wiring required for the electrical equipment of the hydraulic power unit shall be provided. All wiring shall be installed in conduits. Wiring and conduits shall be installed so as not to interfere with access and maintenance of any part of the power unit. All electrical cabling shall be installed on stainless steel brackets.
- b) The equipment is to be designed for the power supply 400/440 Volts 50 cycles 3 phase AC and 230/250 Volts 50 cycles single phase AC. All control circuits are to be designed for 230/250 Volts 50 cycles supply.
- c) Electrical items such as Motor, Starter, Relays, Circuit Breakers etc. likely to be subjected to arcing shall be kept separately for elimination of fire hazards.
- d) The hydraulic power unit and the electrical control cabinet shall be completely wired to terminals in the shop for field interconnection to other.
- e) **Electric Motors**

The electric motors shall be directly coupled to the oil pumps and shall be of sufficient capacity to carry continuously the maximum load likely to develop under all conditions of operation of gate and shall have nominal speed to match the requirements of the oil pump.

The motor shall be totally enclosed, fan cooled squirrel cage induction motor continuous duty type with class B insulation and suitable for 400/440 Volts, 3 phase 50 cycles AC, non-reversing type with high starting torque characteristics, and shall conform to IS:12615 (Latest Edition). The maximum RPM of the motor shall not exceed 1000 RPM. The electrical insulation shall be moisture

resistant for use with motor which may be either continuously running or may be idle for long periods under highly humid conditions. All the motor bearings shall be self-lubricating and shall be either ball or roller type, properly sealed against loss of lubricant or entrance of dust.

To prevent condensation, the electric motor shall be equipped with suitable arrangement like a heater element mounted as an integral part of motor or 230/250 volts single phase heater mounted in or on the frame. The leads of the electric motor and the anti-condensation heater shall be brought out in a terminal box on the motor having suitable cable entry lugs.

The motor shall be suitable for outdoor type duty and the breakdown torque shall not be less than 200% of normal running torque. The motor shall be of standard make approved by the employer and horizontal foot mounted construction. The motor operation shall be intermittent periodic duty with starting, duty type S-4.

f) **Wiring**

All wiring of power control cabinets shall be single conductor, tinned annealed copper wire with PVC insulation and shall be neatly installed, connected and securely anchored in plates in a workman like manner. Electric connections shall be neat, mechanically tight and secure and shall be made at appropriate terminals and terminal blocks. Terminals for field connection shall be accessible easily. The contractor shall submit a complete wiring network alongwith different colour codes of the wires and cables to be shown on the network.

The insulation of control wiring shall be polyvinyl chloride or similar synthetic insulation of 1100 volts grade and oil vapour proof. All wiring shall be water proof and suitable for tropical climate and for highly humid atmosphere. Wherever necessary the wiring shall be carried in heavy gauge hot dip galvanized metal conduits. Conduits shall conform to Indian Standard 'Rigid Steel Conduits (with amendment No. 1) IS: 9537 (Part-II, Latest Edition) and Indian Standard 'Rigid Plain Conduits of Insulating

Materials' ID:9537 (Part-III, Latest Edition).

g) **Circuit Breakers/MCCBs**

One air insulated triple pole breaker shall be provided for the control of each oil pump motor. It shall be suitable for use as backup protection against short circuit current and in accordance with Indian Standard Specifications for Alternating Current Circuit Breakers/MCCBs, Requirements and Tests, Section-I, Voltages not exceeding 1000V AC or 1200V DC (First Revision) (with Amendment No. 1) IS:2516 (Part-1 & II/ Sec-1, Latest Edition).

The circuit breaker/MCCB etc. shall be provided with thermal overload release. The breaker interrupting capacity shall not be less than that specified in relevant Indian standards. Provision shall exist on the circuit breaker for the adjustment of triple setting to suit the requirements of electric motor.

h) **Automatic operation**

Provision shall be made for automatic operation of the gates by no-float control or level relay system when the control switch is set on Auto.

i) **Automatic gate drift restore system**

Provision shall be made in the hydraulic circuit to restore the gate drift automatically. Indication shall be available in the control panel to indicate that a gate has drifted by more than the specified limit and the automatic restore systems have not restored the gate to its original position and thereby an alarm signal shall be raised.

Typically e.g. when the gate is left in any position for a long time and creeps up to 150mm under the weight of parts due to oil from the rod end side of piston leaking past the piston to the top, the gate shall move up and restore to the original position. If it is not possible to restore the original position and the gate creeps to an extent of 175mm and more an alarm shall be sounded.

It should be arranged that the gate moves up only when

the relevant push button is pressed & will be left in an intermediate position when once the push button is not pressed.

Counterbalance valves shall be provided in the hydraulic circuit as necessary.

j) Hoist Electric control cabinet

- i) One control cabinet shall serve each gate. The electrical control cabinet shall contain all relays, time delay relays, motor starters, disconnecting switches, control transformer contactors convenience outlet and lighting receptacles, and any additional electrical equipment required to provide proper and safe operation of the hoists. The convenience outlet shall be installed outside the cabinet, on the side wall. All other electrical control components shall be mounted inside the control cabinet. A main disconnect switch shall be mounted in each control cabinet. The controls shall be electronic programmable logic controller type (PLC Type).
- ii) The control cabinet shall have 3 doors. Local control panel, for the gate shall be arranged on the outside of the doors of the electrical control cabinet. The control panel for each gate shall be arranged on a separate door. The control panel for gate shall be separate and clearly segregated and identified.
- iii) From the suitable terminals in the electric control cabinet connections shall be made for direct connection to the remote terminal unit (RTU) for a centralized/computerized automatic control for the operation of the gates. The RTU shall be installed near the vicinity of these gates.
- iv) The gates shall be controlled by means of momentary push buttons. Gates shall operate in the opening or closing direction continuously until stopped by either the stop push button or applicable limit switch. A gate failure logic shall be supplied.
- v) The control cabinet shall be fully wired in the shop. The only wiring required in the field shall be the wiring

between the cabinet terminal blocks and the components located outside the cabinet.

- vi) The enclosure of the local control cabinet shall be NEMA type 4 IP55 or equivalent cabinet constructed of heavy gauge steel not less than 3mm. thick. This cabinet shall be provided with hinged and gasket doors on the front for full access to the equipment. Tamperproof locks shall be provided on the doors of the enclosure.

The control cabinets shall be provided with spaces for conduits entering from below or as required.

- vii) Normal audio alarms shall be provided for the attention of the operation/ maintenance staff to take necessary corrective action for the following situations:
 - Gate fully open
 - Gate fully closed
 - Reservoir level rising above MWL
 - Reservoir level receding below MWL
 - Power supply failure
 - Hoist motor overload
 - Hoist motor overheat
 - Gate malfunctioning/ jammed
 - Filter jammed

A provision of the above is to be kept in the Control Panel.

k) Control module base frame and housing

- i) The base frame shall have the strength and rigidity necessary to support the weight of the equipment when lifted as a unit by cable slings.
- ii) The base frame shall be furnished complete with all bolts, nuts, washers, anchor bolts, embedded anchor rails or frames and other necessary accessories and appurtenances as required.

iii) Suitable lifting beams, slings and spreaders shall also be furnished for use in handling each hoist control module as an unit during transportation and installation.

l) **Control Switch**

For raising and lowering a gate spring loaded control switch of self-resetting type shall be provided. The switch shall provide momentary contact when its handle is operated to positions corresponding to raising and lowering the gate. The control switch shall be of heavy duty type having silver plated contacts and suitable for flush mounting on a panel. The rating shall be 5 amperes, 230/250 volts and 50 hertz. AC.

m) **Push Button**

The push buttons shall be of spring loaded oil tight, heavy duty type, having silver plated contacts and suitable for flush mounting on the panel. The push button shall have normally closed contacts. The rating shall be 5 amperes, 230/250 volts, 50 cycles, AC supply. However, the details shall be finalized during detailed design.

n) **Indicating Lamps**

Indicating lamps shall be provided at least for the following provisions:

- | | |
|---------------------------------------|---------------------------|
| i) Low oil level/High oil temperature | ii) Gate drift fault |
| iii) Pressure Filter Clogged | iv) Gate jam |
| v) Return filter clogged | vi) Gate raised |
| vii) Motor Operation | viii) Gate part open |
| ix) Power On | x) Gate Lowered |
| xi) Emergency stop | xii) Local/Control/Remote |
| xiii) Gate stop | xiv) Spare Lamp |

The indicating lamps shall be water tight, heavy duty type rated for 230/250 volts, AC and suitable for flush mounting on a control panel. While the gate starts

opening or closing, the amber lamp will be lighted and shall remain lighted during gate movement. Provision shall also be made for red lamp or green lamp to flicker to indicate the direction of movement of the gates. Once the gate is moved to fully open or closed position the red or green light as the case may be, shall become stable and stop flickering and amber light shall switch off automatically.

o) Heater Switch

Single pole disconnecting heater switch rated for 5 amperes, 230/250 volts, 50 cycles, AC supply shall be provided for the heater in each electric motor and in the control cabinet. The switch shall be oil tight and suitable for flush mounting on a panel.

p) Control relay

For overload and single phasing protection of the motor, a 3 phase control relay shall be provided. The overload device shall be set or adjusted to trip the starter between 115 to 120% of the rated normal, full load running current of the motor. The relays shall be capable of resetting manually.

q) Limit Switches

Limit switches are to be provided to take the gate to its position in the event of its creeping down. When the gate is left in any position for a long time and creeps up to 150mm under the weight of parts and due to oil leakage from the rod end side of piston leaking past the piston to the top, one of the limit switches shall be operated to move the gate up and restore to the original position. If it is not possible to restore the original position and the gate creeps to an extent of 175mm and more, another limit switch shall be operated to sound an alarm.

It should be arranged that the gate moves up only when the relevant push button is pressed & will be left in an intermediate position when once the push button is not pressed.

r) **Battery Backups**

Any battery backup required for the electric equipment required for the satisfactory operation of the gates shall be included in the scope of this contractor.

2.1.5.7 Hydraulic Fluids

i) **Hydraulic working fluid**

Petroleum based hydraulic oil (ISO standards – VG 32) may be used in the system. Oil shall be clean and free from contamination. In order to insure peak performance and extended operating life of the equipment, it is recommended that an ISO cleanliness code of 16/14/11, be maintained regardless of system pressure. System operating temperature of oil shall be restricted to below 65°C for satisfactory performance. Oil used in flushing should not be used to fill the hydraulic system.

ii) **Flushing fluids**

Flushing fluid shall be supplied separate from the hydraulic working fluid to flush and clean the complete hydraulic system of each hoist. The flushing fluid shall be compatible with the hydraulic working fluid.

2.1.5.8 Dehydration and Oil cleaning machines

The contractor for this work shall also supply the following equipment to constantly clean and dehumidify the oil from water:

i) Three nos. dehydration machines.

ii) Three nos. oil particle cleaning machines.

The type of dehydration machines and oil cleaning machine shall be decided during detailed design. In this regard, the suitability of low vacuum dehydration machine & electrostatic oil particle cleaning machine is to be seen by the contractor.

2.1.5.9 System Cleanliness

a) **General**

Before filling the system with hydraulic fluid the system cleanliness shall conform to NAS 1638, class 8 or equivalent.

b) Piping

The piping supplied for field installation shall be cleaned at the source of its fabrication and then sealed to prevent accumulation of foreign matter during transportation to the site. The supplier's installation instruction shall state that the piping shall remain sealed during storage at the site, that the seal shall be removed just prior to installation, and that after installation has been completed, the entire system shall be free of chips of wood, dirt, grit, waste and other foreign matter.

c) Others

The cylinders, hydraulic power units, and manifold shall be clean and free of all foreign matter which occurs as result of manufacture, assembly, and transportation to and storage at site.

2.1.5.10

Flushing

a) General

Procedure for flushing the hydraulic system (including the list of equipment to be supplied for this purpose and method to ensure cleanliness) shall be submitted as part of the installation instructions. The instruction shall conform to ASME LOS-5CI and shall include the criteria specified below.

b) Flushing Hydraulic Cylinders

Hydraulic cylinders need not to be flushed at site. They shall be delivered to job site filled with hydraulic oil in a faultless and clean condition. Oil shall be new and conform to the requirement of relevant specifications to be approved by employer. The cylinders must not be connected to the hydraulic system until the employer is satisfied that the cylinders have been cleaned of foreign matter. Oil used in flushing must not be used to fill the hydraulic system.

c) Flushing Piping

Before installation of hydraulic power unit, cylinders and manifolds, all hydraulic piping must be flushed. By-pass loops of piping must be installed in place of cylinders, manifolds, and the power units. Hydraulic oil must be circulated through each and every pipe until returning oil meets NAS 1638, Class 8 requirements or equivalent.

d) Flushing Hydraulic Power Unit

After cleaning and prior to shipment, each hydraulic power unit shall be flushed in the supplier shops. The hydraulic tank shall be filled with hydraulic oil as specified and the oil filtration system actuated with 10 micron element in filter. The oil shall be circulated and filters changed as they become clogged. The power unit shall be flushed until the filter stays clean. After flushing of the fluid in the tank is complete, a by-pass loop with filter shall be installed on the pressure and tank lines of unit and the pump shall be run alternatively until the return oil line has no foreign particles greater than 10 microns in size.

e) Flushing Valve Manifolds

After cleaning and prior to installation, each valve manifolds must be flushed by circulating hydraulic oil through all ports until the cleanliness of the return meets NAS 1638, class 8 requirements.

2.1.5.11

Control Cabinet Lighting and Outlets

- a) Lighting: The control cabinet shall be provided with lighting to facilitate operation and maintenance. The lighting circuit shall include an ON-OFF switch.
- b) Outlets: One duplex convenience outlet shall be provided with each control cabinet for maintenance tools. They shall be rated 15-A, 2 pole, 3 wire. The outlet shall be installed, completely outside the cabinet, mounted on the side wall of the cabinet.
- c) Lighting and outlet circuits shall be obtained from separately fused circuits derived from the common

control transformer.

- d) Common Control Transformer: A control transformer shall be provided in each of the control modules. The control transformer shall have sufficient volt-ampere capacity to continuously carry the control circuit load required for the control module plus the load for space heaters lighting and outlets. A fuse shall be provided in each ungrounded leg of the control transformer secondary and primary. The minimum control transformer rating shall be of 2500 VA.
- e) Grounding: Control assemblies shall include a 6mm x 50mm (wxh) copper ground bus. The housing framework and other noncurrent carrying metallic parts of all equipment shall be securely connected to the ground bus. Holes shall be suitably drilled at each end of the bus.
- f) Instruments: Instruments shall be calibrated in the SI customary system of units.

2.1.5.12

Name Plates and Wire Identification

- a) The control panel for each gate shall be furnished with a large permanent main name plate affixed to the control cabinet in a conspicuous location, showing the Employer's identification number and designation of the hoist and the year of manufacture.
- b) Additional name plates shall be provided to indicate main operating instructions, caution or warning for personnel, and operational safety. In addition, each panel-mounted instrument, pressure gauge, position indicator, push button, switch, light, and other device related to the gate operation shall be identified by a permanently affixed name plate shall describe the control functions. Each item of the control panel and each pump, motor, relief valve, flow and directional control valve, check valve, and so on shall be assigned a designation (to be shown on the supplier's control panel drawing) and labeled accordingly, clearly identifying the gate to which it belongs. Electrical wiring and instruments including relays shall also be labeled corresponding to the numbers assigned on the electrical schematic drawings.

- c) Each major and auxiliary component of the control system shall have a name plate permanently affixed thereto showing in a legible and durable manner the serial number, name and address of the manufacturer, rated capacity, speed, setting, electrical characteristics and other significant information, as applicable. Name plates of distributing agents will not be acceptable.
- d) In addition to the hoists, other items of the gate equipment shall also be provided with name plates containing operating instructions, warnings or other information essential for proper use of equipment.
- e) The above general name plate requirements are also for use in preparing name plate lists and drawings to be submitted for review. Drawings for name plates, as they will appear on the finished equipment shall be submitted for review.
- f) All name plates shall be both in English and Hindi language and shall be suitably engraved in Aluminium and shall be weather resistant. All name plates shall be permanently attached to the respective parts, components, or equipment items in clearly visible locations. Name plates for control equipment shall be screw mounted laminated plastic, white with black cores, with engraved capital letters of 6mm minimum height.
- g) Cable and wire markers shall be identical with adhesive, self-laminating type markers. The markers shall be printed with the cable designation or with the conductor designation shown on the drawings. The clear laminate shall overlap the Lee-end and shall be resistant to oils, adhesion, and high temperatures.

2.1.5.13

Cylinder Mounting Structure

a) Cylinder Connection with Gate

The hoist cylinder shall be installed on hoist mounting bracket at top of structure at El. 545.0 m and attached to top horizontal girders of the gate with suitable size articulated links. The contractor shall suitably design the hoist mounting bracket as per the site conditions and

hoist cylinder placed on it. The bracket shall be fabricated using structural steel plates (IS 2062). The hoist cylinder bottom Clevis eye has self-aligned spherical bearing shall be connected to this bracket by a suitable size stainless steel pin with spacers and lock plate. The cylinder piston rod eye also has self-aligned spherical bearing shall be connected to the gate. However, the arrangement shall be finalized during detailed design stage suitable for this equipment.

2.1.5.14 Design data for Hydraulic hoists

i) Type of hoist cylinder	Single cylinder double acting
ii) Capacity of hoist	Min. 55T
iii) Working stroke	6850mm (min.)
iv) Number of cylinders per gate	One
v) Operation of hoist	Independent HPU
vi) Design pressure	200 Kg/cm ² (plus various margins)
vii) Test pressure	150% of design pressure
viii) Creep operation	150 mm
ix) Cushioning (gate closing)	100 mm
x) Operating Criteria	Unbalanced water head (Regulating type)
x) Speed	1.0 m/min

2.2.0 Bulkhead for TRT Gates of Arun-3 HEP

2.2.1 Bulkhead

One (1) no. slide type bulkhead gate suitable for clear vent opening of size 8500mm x 5500mm is proposed on upstream of the TRT gates to permit repair and maintenance of the TRT gates.

Placement of the bulkhead gate in vertical slots is carried by EOT crane provided for the erection, future

maintenance of TRT gates and hydraulic hoists with the help of suitable lifting beam cum spreader beam.

The general arrangement of the gate with EOT crane is shown in the specification drawing.

Bulkhead for TRT Gates shall be fabricated from structural steel comprising of skin plate, horizontal girders, vertical stiffeners and end vertical girders etc. The skin plate shall be supported by horizontal girders at suitable intervals, which shall be supported by end vertical girders, which in turn shall support slide pads. The total water load shall be transmitted to concrete structure through the bearing pads mounted on end vertical girders to the stainless steel track fixed on M.S. track base embedded in concrete. The bearing pads shall be self-lubricating aluminium bronze. The bulkhead shall have downstream skin plate w.r.t pond and sealing on both sides to isolate the pond & river, when the TRT gate shall be in maintenance. The seals shall be fixed by means of seal clamps and stainless steel counter sunk screws. The bulkhead shall be lowered under balanced water head conditions and raised under balanced head conditions achieved through 2 Nos. filling valves. The bulkhead shall be operated by a EOT crane of min. 50T capacity. Drain holes shall be provided on all the horizontal girder webs and horizontal stiffeners.

Two numbers of guide shoe assembly on each side of bulkhead shall be provided to check the side and lateral movement of the bulkhead and to restrain the same within specified limits.

The bulkhead shall have wedge type rubber bottom seal and solid double bulb PTFE clad side & top seals respectively. The thickness of bottom seals shall not be less than 20 mm. Care should be taken that side seals bear evenly and with uniform pressure throughout the length on the side seal seats. The bottom seal should also bear uniformly on the bottom seal seat. Seals should have perfect leak proof joint. The seal bases shall be machined after welding to the gate leaf. The seal clamps shall be shaped suitably to prevent any cutting or

damage to the seals.

Air vent pipes shall be provided for air escaping requirement for creating balanced water head conditions during raising of the bulkhead. Suitable pipes for instrumentation shall also be provided.

The Contractor shall timely provide to the Engineer-in-charge:

- a) All required information about blockouts and positioning of parts to be embedded in first stage concrete.
- b) Data about the forces to be taken by the civil structure.

2.2.2

Embedded Parts

The embedded parts for each opening shall comprise of the following components:

- i) Corrosion resistant steel slide track (u/s) with base from sill level upto one full gate height above lintel (Two assemblies per bay).
- ii) Corrosion resistant steel slide track (d/s) from sill level upto one full gate height above lintel (Two assemblies per bay).
- iii) Side seal seat assembly including the mild steel side seal seat base and stainless steel seal seats (Two assemblies per bay).
- iv) Bottom sill beam assembly with stainless steel seal seat with mild steel base. (one assembly per bay).
- v) Top seal seat assembly with mild steel seal seat base and stainless steel seal seat (One assembly per bay).
- vi) Side guide assembly in gate grooves. Structural steel plate or rail section, anchored in concrete, shall be used as guide and shall be provided upto top of the structure. The guides shall be tapered at top for easy entry of gate.
- vii) Anchors/ studs with double nuts and washers for aligning the 2nd stage embedded parts.
- viii) First stage inserts (anchors with plates) to be embedded

in first stage concrete for providing suitable reference surface for erection of 2nd stage embedded parts.

Anchors with plates shall be embedded in first stage concrete at a spacing not exceeding 500mm centre to centre leaving suitable blockout openings for second stage embedments. The second stage anchors with double nuts and washers attached to second stage embedded parts shall then be welded all-around to these inserts and shall be used for proper alignment of the embedded parts. The size of the anchors shall not be less than 16mm in dia. and 300mm in length.

The surface of the bottom sill beam shall be made flush with surrounding concrete. They shall be designed to suit the blockouts and first stage anchors. Design of all embedments shall conform to IS: 4622 (latest revision). Minimum sizes and tolerances of all components as specified in IS: 4622 (latest revision) shall be adhered to. The concreting in the blockouts shall be done after erecting the embedded parts, aligning and checking them and ensuring their correct position. Suitable struts, supports etc. as required shall be provided by the contractor to prevent disturbance in the parts during concreting. They shall be designed to suit the blockouts and first stage anchors. The contractor shall be responsible for correctness of erection of the embedded parts in position and maintaining the dimensional accuracies as per approved drawings.

2.2.3

Design Criteria of Bulkhead for TRT Gate

The design requirements for the bulkhead gate are mentioned as here under:

- | | |
|------------------------------|---|
| i) Type of gate | Vertical slide type gate with d/s skin plate (w.r.t. flow from pond side) and sealing from both sides |
| ii) Clear width of opening | 8500mm |
| iii) Clear height of opening | 5500mm |



iv)	Number of span	3 (three)
v)	Number of bulkhead	1 (one)
vi)	Maximum Water Level (Pond side) for the design of bulkhead and embedded parts	El. 545.0 m
viii)	C/C of side seals (river side)	8620 mm \pm 3
	C/C of side seals (pond side)	8950 mm \pm 3
ix)	Center to center distance of slide tracks (Pond Side)	9200 mm \pm 3
	Center to center distance of slide tracks (River Side)	9200 mm \pm 3
	Elevation of C/L of top seal seat.	El. 538.440 m (Pond side) El. 538.275 m (river side)
x)	Sill Elevation	El. 532.7 m
xi)	Top of Deck	El. 545.0 m
xii)	Top of track	El. 543.7m
xiv)	Design head	12.3m
xv)	Type of rubber seals	Double solid bulb PTFE cladded (min thickness of cladding 1.2 mm) for sides and top and Wedge type rubber seal for bottom (for sealing from both sides i.e. pond side and river side) corresponding to IS:11855 (Latest Revision).
xvii)	Type of hoist	EOT Crane with suitable lifting beam cum spreader beam arrangement

xxviii)	No. of sets of embedded parts	3 sets
xix)	Minimum thickness of skin plate	20 mm
xx)	Min. thickness of stainless steel seal seats	12mm (after machining)
xxi)	Min. thickness of stainless steel for bottom seal seat	16mm (after machining)
xxiii)	Min. thickness of stainless steel slide tracks (u/s & d/s)	16mm (after machining)
xxiv)	Operation	<p>Lowering:</p> <p>Closing under balanced water head conditions.</p> <p>Raising:</p> <p>Opening under balanced water head conditions achieved through two no. filling valves.</p>
xxv)	Governing Indian Standard	IS: 5620 (Latest Revision)
xxvi)	Permissible stresses	Permissible stresses in structural components for gate and embedded parts shall be in accordance with Annexure B of IS: 5620 (latest revision).
xxvii)	Permissible stresses for bulkhead gate	Dry & accessible
xxviii)	Permissible stresses for embedded parts	Wet & inaccessible
xxix)	Permissible deflection	L/800 (L = C/C of slide pads)
xxx)	Permissible bearing & shearing stresses in	As per IS 456 (Latest

	concrete	Revision)
xxxi)	Seismic Coefficients (horizontal & vertical)	$\alpha_h = 0.24g$ & $\alpha_v = 0.16g$
xxxii)	Grade of 1 st stage concrete to be used	M20/ M25
xxxiii)	Grade of 2nd stage concrete to be used	One Grade higher than that of 1 st Stage Concrete and shall not be less than M-25 grade

2.3.0

EOT Crane 50 T (min.) capacity and Lifting Beam cum Spreader Beam

The EOT Crane shall be used for handling the gates and hydraulic hoists for their erection and subsequently for repair and maintenance and for operation of bulkhead for TRT Gate with the help of lifting beam cum spreader beam. The design of various components of the crane shall be done in accordance with the provisions of IS:3177 (Latest Revision) and IS:807 (Latest Revision) and these specifications. All components shall be totally enclosed and suitably protected for outside duty.

The design of the EOT crane shall be suitable for outdoor duty and as per the requirement of site conditions. The contractor shall see the site conditions before designing the EOT crane. The EOT crane shall move on rails supported on suitable steel beam and steel beam in turn shall be supported on steel columns. The location of steel column as shown in the specification drawings is tentative only and the contractor shall finalize the same during detailed design. The steel column shall be placed on the main piers of TRT outfall structure for proper load distribution. The EOT crane shall be cabin operated. Stainless steel cover shall be provided to cover the EOT crane machinery viz. motor, gear etc. etc.

2.3.1 Operating Requirements

2.3.1.1 Raising

When the hook is in lower position, momentarily pressing the 'Raise' push button shall cause the hoist to raise the hook until the hoist is stopped momentarily pressing the 'Stop' push button, or by operation of limit switch for the extreme raised position.

2.3.1.2 Lowering

When the hook is in raised position momentarily pressing the 'Lower' push button shall cause the hoist to lower the hook to its lowest position. It shall be possible to stop the closing operation by momentarily pressing the 'stop' push button and to restart the hoist in the lowering direction by momentarily pressing the 'Lower' push button.

2.3.1.3 Traveling

Pressing the 'Forward' push button shall advance the Crane in the service bay cross travel direction and pressing the 'Reverse' push button shall move the crane in the opposite direction. It shall be possible to interrupt the operations at any time by releasing the 'Stop' push button. Limit switches shall also be provided.

2.3.2 Detailed Requirements

2.3.2.1 Crane Travel Device

The crane travel motor shall be mounted on the hoist frame and connected to atleast one driving wheel on each side through gearing and shafting. Flexible coupling shall be provided at each end of the gear reducer and before the drive pinion. The travel drive shall be equipped with a spring set, electric release shoe type brake having a capacity not less than 150% of the full load torque on the travel drive motor. The crane shall not skid or drift as a result of non-vertical pull and it should be stable under the worst combination of loads. The crane shall also be provided with suitable means for anchoring it when it is left unattended. This may be done by means of a rail dip or screw Jack of chain anchor on each track.

2.3.2.2

Hoist Mechanism

The hoist mechanism shall be a wire rope hoist consisting of motor, suitable gear reductions, hoist drum plus the necessary hoist brake, sheaves, bearings and ropes as required for a complete installation. The various mechanical components shall meet the requirements given in these specifications. The hoist mechanism shall be provided with an automatic spring set electric release brake. The brakes shall have capacity equal to 150% of the full load torque of the hoist motor.

The gearbox shall be working on a free floating principle, compact with low weight/ output ratio, low noise, high efficiency, lubricated for life. Load shall be equally distributed on each planet gear for high reliability. Mechanical and electrical load detectors shall be provided and operation of the crane shall be through load detectors. Rope guide shall be made of tough flexible, low friction, impact resistant with low wear quality. Hardened pressure rollers shall be mounted on ball bearings.

The crane shall have a facility for creep lifting.

Rope shall reliably seat on the drum and the fleet angle shall be limited to $\pm 4^\circ$.

Rope drum shall be of structural steel, centrally driven by a multi-splined connecting shaft. Rope drum shall be provided with low maintenance bearing with sealed roller bearing.

2.3.2.3

Electric Features

The electrical equipment for the E.O.T. Crane shall consist of the following:

a) Motors

Motors shall meet the requirement of clause 12 of IS: 3177(Latest Revision). The motor shall be intermittent periodic duty with duty type S4. It shall be possible for a safe braking when switched off or in the event of a power failure.

b) **Brakes**

The brakes shall meet the requirements of clause 13 of IS-3177(Latest Revision).

c) **Limit switches**

Precision limit switches (preferably geared) shall be provided for reliable motor output at the top and bottom hook positions. Additional limit switches shall be provided as per the requirement. Limit switches shall meet the requirements of clause 19 of IS: 3177(Latest Revision). All limit switches shall be electrically independent with current carrying and interrupting rating adequate for the duty performed. The switches shall be so arranged that no damage will result from over travel in either direction.

d) **Crane control cabinet and Equipment**

The control shall include the following equipment:

- Three heavy duty push buttons marked 'Raise' 'Lower' and 'stop'.
- Two heavy duty push buttons marked ' Forward' and 'Reverse' for both Long and Cross Travel.
- A lighting control switch.
- A 3-pole unfused disconnect switch for the main power supply to the crane. The switch shall be arranged so that the cabinet door cannot be closed or opened with power in.

e) **Electrical Protective Gear**

The protective gear shall be located in the moving trolley of the Crane and shall consist of following:

- One triple pole electrically operated in circuit breaker of suitable rating.
- Two time lag overload relays in each motor circuit and one in common return line.
- Pilot lamp
- Portable hand lamp with suitable length of flexible

cable.

- Switches and fuses for lighting and equipment.
- Emergency push button switch.

Electrical interlocking shall be provided to prevent the circuit breaker from being closed, unless all controllers are in 'off' position. A durable copy of the protective panel connection diagram shall be fixed inside the panel. Complete wiring diagram shall also be supplied. The protective gear shall meet the requirements of clause 15, IS: 3177 (Latest Revision).

f) **Collector Gear**

Complete collector gear shall be supplied with the crane in accordance with the clause 22 of IS: 3177 (Latest Revision).

iv) **Cable Reel**

The E.O.T crane shall be equipped with an automatic spring or counterweight actuated take up cable reel. The cable reel shall be designed as per the site conditions and shall be supplied by the contractor. It shall be provided with a limit switch arranged to cut off power supply of the travel motor when all but 3 metres of cable is unreeled.

v) **Lifting Hook**

The lifting hooks for the crane shall be of forged steel or standard type and shall be mounted on antifriction bearings. It shall be tested for twice the safe working load. The lifting hook shall have a mechanism such that the rope/ sling in the hook does not come out unless released.

vi) **Buffers**

Suitable buffer stops shall be provided at both ends of the E.O.T. Crane. They shall be capable of bringing the crane to a gradual stop when traveling at rated speed with full load and power cut off without excessive stresses in the structure or equipment.

vii) **Rails**

Standard runway rails with base plates and rail fittings for the crane travel shall be furnished by the contractor. The weight of the flat bottom crane rails shall not be less than 52 kilograms per meter unless otherwise approved by Employer. The contractor shall be responsible for the adequacy of the design of the track and wheel arrangement. The rails shall be supported on the base plate of minimum 20mm flat plate.

viii) **Drip pan and covers**

EOT crane shall be provided with stainless steel cover plates for protection against rains, dust etc. as this crane is installed in outdoor duty. Suitable drip pans shall be provided to collect oil and grease which may drip from operating parts. It is essential that every precaution be taken to meet this requirement. All drip pans shall be provided with means for cleaning and draining where their removal for this purpose would require dismantling. Dust covers shall be provided, where necessary, to protect sliding and rotating and to prevent dust from mixing with the lubricants.

A suitable grease gun and a complete set of wrenches and tools in pressed steel tool box shall be furnished for the crane. A sufficient quantity and variety of tools shall be furnished to cover all ordinary maintenance work in connection with the crane.

ix) **Operational Instructions**

Operating instructions in a suitable metal frame covered with glass shall be mounted at a convenient location.

2.3.3

Design Data

- | | |
|--------------------|---|
| i) No. of cranes | 1 (one) |
| ii) Class of crane | M5 (Class-2), as per classification in IS: 807 (Latest Revision) with Electrically operated rope drum hoist on a moving trolley & motor |

		operated longitudinal travel arrangement.
iii) Rated capacity		Minimum 50 ton capacity. However, the contractor may examine the adequacy of the capacity of the crane suitable for the job.
iv) Minimum lift of hook		21.5m (Tentative)
v) Distance between centers on track rails		8.0m (Tentative)
vi) Length of rail track		45.0m (Tentative)
vii) Rail Track		52Kg./metre (Tentative)
viii) Vertical clearance below top beam		12.50m (Tentative)
ix) Wind load		As per relevant code
x) Hoisting speed		1m/min. with inching movements facility
xi) Longitudinal Travel speed		5m/min. with inching movements facility
xii) Cross traveling speed		1m/min. with inching movements facility
xiii) Power Supply		400 to 440 volts, 3 Phase, 50 cycles, A.C. Supply
xiv) Controls	i)	Cabin control
	ii)	Remote (cordless type control from the floor)

2.3.4

Lifting Beam cum Spreader Beam

Automatic lifting beam with spreader beam shall be provided for operation (both for raising & lowering) of bulkhead for TRT gates with the help of 50T (min.) capacity EOT crane. The criteria for design of lifting beam in general shall be as per IS: 13591 (latest revision) & IS:

800 (latest revision).

a) **General**

Automatic lifting beam with spreader beam shall mainly comprise of the following components, details of which are given as under:-

Two side guide rollers shall be provided on each side of the lifting beam to align the beam within opening. Guide rollers on the same side shall be adequately separated from each other to prevent any tilt of the lifting beam during operation. The centre to centre distance of side guide rollers shall not be less than one tenth of the length of the lifting beam or 500mm whichever is more.

The lifting points of the lifting beam shall be fitted with stainless steel pins retained by keep plate, to enable the connection of the spreader beam. The spreader beam shall provide a straight lift and connects to the EOT crane Ramshorn hook.

The two galvanized mild steel profile hooks shall be provided and assembled immediately below the lift pins. The profile hooks shall be assembled to the frame on the stainless steel hook pins retained by keep plates and shall be secured with hexagonal headed screws and spring washers. The profile hooks shall be free to pivot and engage via "lead-in" boxes on the bulkhead unit to grapple.

Both hooks shall be connected to the central pivot arm by adjustable tie rods with plain clevis ends. The central pivot arm shall be assembled to the frame on a stainless steel pivot pin with thrust washers between the frame boss and pivot arm. The pivot pin shall be retained by the keep plate. The central pivot arm shall be free to pivot around its pivot pin, moving the profile hooks inboard to "Grapple" or outboard to "Ungrapple".

A counterweight assembly complete with positioning handles and mounted on the central pivot arm beam shall be provided and shall be free to travel on a roller pin to either extreme of the beam. The locking handle shall be

provided to retain the counterweight assembly at either extreme to travel and prevents any further movement. The counterweight assembly shall be labeled “GRAPLLE” with the directional arrow and “UNGRAPPLE” with an arrow in the opposite direction.

The central pivot arm shall also incorporate a profile lug which engages with a probe latch mechanism. The probe latch shall be assembled to a probe latch pin and shall be secured with stainless steel pins. The probe latch pin shall incorporate a handle which shall enable the operator to select the position required. The probe latch shall be labeled as “GRAPPLE” and “UNGRAPPLE”.

Seating brackets shall be provided to store the lifting beam on the floor without damaging the hook. The bracket shall be retractable when required to avoid interference with gate equipment when lifting beam is in operation.

b) **Mandatory Features**

General features indicated in the specification drawings shall be adopted without change or substitution. Alternative arrangement and alternative features for those indicated on specification drawings shall be accepted only if in the opinion of the employer, the same are superior to the arrangement and details indicated in the specification drawings. Mandatory features shall be as under:-

- i) All features referred to in these specifications and as shown in the specification drawings.
- ii) All elevations.
- iii) General layout and arrangement of the equipment to be handled and the dimensions defining the location of equipment relative to civil work.
- iv) Dimensions, clearances, measurements etc. designated by "Maximum" & "minimum" to be applied as upper or lower limit for design. All tolerances mentioned in the drawing/related Indian Standards and as recommended

by the employer.

- v) All machining involved and designation of surface finish qualities.
- vi) All indications referring to manufacturing processes (such as "Machine after welding" or "Drill during shop assembly") as contained in specification drawings and related Indian Standards.
- vii) All applicable Indian Standards shall be as specified by the employer.
- viii) While computing the lifting beam deflection, it should be ensured that due to the deflection of beam, side guide rollers do not develop excessive gap between guide tracks. This check has to be ensured and rigidity of the beam shall cater for this also alongwith that of beam itself.

c) **Design Loading**

i) General

The lifting beam shall be designed to comply with the specified structural and mechanical requirement when subjected to each one of the loading conditions listed in the subsequent paras.

Calculations may be limited to critical loading cases if it is evident that only those cases are critical. If the selection of critical cases is not evident or if so requested by the employer, the manufacturer shall furnish the technical demonstration to justify its selection.

All load combinations shall be made as specified in these specifications and related Indian Standards. Whenever any particular load specification is not specified, the method of calculations shall be submitted to employer for his approval. The overall design loading shall be such that with unfavorable load combinations, greater factor of safety is achieved in design.

ii) Design Load

The lifting beam with spreader beam shall be designed to

comply with the specified structural and mechanical requirements. The lifting beam, and their connections with EOT Crane and bulkhead gate shall be designed for following conditions:-

- 1) Hook loading arrived from appropriate Crane capacity with impact factor of 1.32 under the normal conditions.
 - 2) Breakdown Torque conditions of EOT Crane motor as revealed from rope tensions due to EOT Crane hoist breakdown, impact factor need not be considered here.
 - 3) Loading caused by the guiding system shall be calculated and accounted for in (1 & 2) above as under:-
 - i) When bulkhead gate is not submerged, the effort required to counteract bulkhead gate swinging shall be considered as higher of either 5% of the weight of bulkhead or surface loading of 20 kg/sq.m. Bulkhead gate area to be considered in either direction, shall be projected area of bulkhead outline.
 - ii) Water turbulence shall be considered as force acting on projected area of the lifting beam of the intensity of 200 kg/sq.m
 - 4) Additional friction and/or blocking forces originating in the guiding devices and seals of the gate when the hoist exerts a force equal to the rated hoist capacity, instead of the normal hoisting force.
 - 5) Dead weight of the lifting beam with spreader beam alongwith its hooks, guide rollers, links etc. shall be combined with all operating loading conditions.
- iii) Structural Design

The structural design of the lifting beam with spreader beam shall conform to IS:13591 (Latest Revision) (Criteria for Design of Lifting Beams) and IS:800 (Latest Revision). Various provisions as mentioned in IS: 13591 (Latest

Revision) and IS: 800 for structural components shall be met with allowable stresses as specified in these specifications. Whenever specific value of stress or design factor is not specified, decision of employer or his representative or his authorised consultant shall be final.

iv) Allowable Stresses

The allowable stresses shall be adopted as mentioned hereunder:

S.No	Type of stress	Normal loading
1.	Direct compression and compression in bending	0.55 YP of material
2.	Direct tension and tension in bending	0.55 YP of material
3.	Shear stress	0.40 YP of material.
4.	Bearing stress	0.75 YP of material
5.	Bearing stress for bronze	0.040 U.T.S.

Note: For overload conditions, allowable stresses as given for normal loading may be increased by 33% except that bearing stress at S. No. (iv) shall not exceed 85% of yield point stress. Equivalent stress resulting from combination of biaxial or triaxial stresses may be 25% higher than allowable monoaxial stresses subject to maximum of 0.8 YP.

In allowable stresses, appropriate duty factor of the crane should be accounted for. Anti-friction bearings shall be provided suitable for the appropriate load conditions. Static capacity of bearing shall provide a minimum safety margin of 25% over B.D.T. loading on the lifting beam.

2.4.0

EOT Crane 5 T (min.) capacity

The EOT Crane shall be used for handling the Hydraulic power units in the control room for their erection and subsequently for repair and maintenance. The design of various components of the crane shall be done in accordance with the provisions of IS:3177 (Latest

Revision) and IS:807 (Latest Revision) and these specifications.

The design of the EOT crane shall be suitable for indoor duty and as per the requirement of site conditions. The contractor shall see the site conditions before designing the EOT crane. The EOT crane shall move on rails supported on suitable steel beam and steel beam in turn shall be supported on the concrete/steel columns of control room. The location of columns shall be finalized during detailed design. Stainless steel cover shall be provided to cover the EOT crane machinery viz. motor, gear etc. etc.

2.4.1 Operating Requirements

2.4.1.1 Raising

When the hook is in lower position, momentarily pressing the 'Raise' push button shall cause the hoist to raise the hook until the hoist is stopped momentarily pressing the stop push button, or by operation of limit switch for the extreme raised position.

2.4.1.2 Lowering

When the hook is in raised position momentarily pressing the 'Lower' push button shall cause the hoist to lower the hook to its lowest position. It shall be possible to stop the closing operation by momentarily pressing the 'stop' push button and to restart the hoist in the lowering direction by momentarily pressing the 'Lower' push button.

2.4.1.3 Traveling

Pressing the 'Forward' push button shall advance the Crane in the service bay cross travel direction and pressing the 'Reverse' push button shall move the crane in the opposite direction. It shall be possible to interrupt the operations at any time by releasing the push button. Limit switches shall also be provided.

2.4.2 Detailed Requirements

2.4.2.1 Crane Travel Device

The crane travel motor shall be mounted on the hoist frame and connected to atleast one driving wheel on each side through gearing and shafting. Flexible coupling shall be provided at each end of the gear reducer and before the drive pinion. The travel drive shall be equipped with a spring set, electric release shoe type brake having a capacity not less than 150% of the full load torque on the travel drive motor. The crane shall not skid or drift as a result of non-vertical pull and it should be stable under the worst combination of loads. The crane shall also be provided with suitable means for anchoring it when it is left unattended. This may be done by means of a rail dip or screw Jack of chain anchor on each track.

2.4.2.2 Hoist Mechanism

The hoist mechanism shall be a wire rope hoist consisting of motor, suitable gear reductions, hoist drum plus the necessary hoist brake, sheaves, bearings and ropes as required for a complete installation. The various mechanical components shall meet the requirements given in these specifications. The hoist mechanism shall be provided with an automatic spring set electric release brake. The brakes shall have capacity equal to 150% of the full load torque of the hoist motor.

The gearbox shall be working on a free floating principle, compact with low weight/ output ratio, low noise, high efficiency, lubricated for life. Load shall be equally distributed on each planet gear for high reliability. Mechanical and electrical load detectors shall be provided and operation of the crane shall be through load detectors. Rope guide shall be made of tough flexible, low friction, impact resistant with low wear quality. Hardened pressure rollers shall be mounted on ball bearings.

The crane shall have a facility for creep lifting.

Rope shall reliably seat on the drum and the fleet angle shall be limited to $\pm 4^\circ$.

Rope drum shall be of structural steel, centrally driven by a multi-splined connecting shaft. Rope drum shall be provided with low maintenance bearing with sealed roller bearing.

2.4.3 **Electric Features**

The electrical equipment for the E.O.T. Crane shall consist of the following:

a) **Motors**

Motors shall meet the requirement of clause 12 of IS: 3177(Latest Revision). The motor shall be intermittent periodic duty with duty type S4. It shall be possible for a safe braking when switched off or in the event of a power failure.

b) **Brakes**

The brakes shall meet the requirements of clause 13 of IS-3177(Latest Revision).

c) **Limit switches**

Precision limit switches (preferably geared) shall be provided for reliable motor output at the top and bottom hook positions. Additional limit switches shall be provided as per the requirement. Limit switches shall meet the requirements of clause 19 of IS: 3177(Latest Revision). All limit switches shall be electrically independent with current carrying and interrupting rating adequate for the duty performed. The switches shall be so arranged that no damage will result from over travel in either direction.

d) **Crane control cabinet and Equipment**

The control shall include the following equipment:

- Three heavy duty push buttons marked 'Raise' 'Lower' and 'stop'.
- Two heavy duty push buttons marked ' Forward' and 'Reverse' for both long and cross travel.
- A lighting control switch.

- A 3-pole unfused disconnect switch for the main power supply to the crane. The switch shall be arranged so that the cabinet door cannot be closed or opened with power in.

e) **Electrical Protective Gear**

The protective gear shall be located in the moving trolley of the Crane and shall consist of following:

- One triple pole electrically operated in circuit breaker of suitable rating.
- Two time lag overload relays in each motor circuit and one in common return line.
- Pilot lamp
- Portable hand lamp with suitable length of flexible cable.
- Switches and fuses for lighting and equipment.
- Emergency push button switch.

Electrical interlocking shall be provided to prevent the circuit breaker from being closed, unless all controllers are in 'off' position. A durable copy of the protective panel connection diagram shall be fixed inside the panel. Complete wiring diagram shall also be supplied. The protective gear shall meet the requirements of clause 15, IS: 3177 (Latest Revision).

f) **Collector Gear**

Complete collector gear shall be supplied with the crane in accordance with the clause 22 of IS: 3177 (Latest Revision).

iv) **Cable Reel**

The E.O.T crane shall be equipped with an automatic spring or counterweight actuated take up cable reel. The cable reel shall be designed as per the site conditions and shall be supplied by the contractor. It shall be provided with a limit switch arranged to cut off power supply of the

travel motor when all but 3 metres of cable is unreeled.

v) **Lifting Hook**

The lifting hooks for the crane shall be of forged steel or standard type and shall be mounted on antifriction bearings. It shall be tested for twice the safe working load. The lifting hook shall have a mechanism such that the rope/ sling in the hook does not come out unless released.

vi) **Buffers**

Suitable buffer stops shall be provided at both ends of the E.O.T. Crane. They shall be capable of bringing the crane to a gradual stop when traveling at rated speed with full load and power cut off without excessive stresses in the structure or equipments.

vii) **Rails**

Standard runway rails with base plates and rail fittings for the crane travel shall be furnished by the contractor. The weight of the flat bottom crane rails shall not be less than 45- kilograms per meter unless otherwise approved by Employer. The contractor shall be responsible for the adequacy of the design of the track and wheel arrangement. The rails shall be supported on the base plate of minimum 20mm flat plate.

viii) **Drip pan and covers**

Suitable drip pans shall be provided to collect oil and grease which may drip from operating parts. It is essential that every precaution be taken to meet this requirement. All drip pans shall be provided with means for cleaning and draining where their removal for this purpose would require dismantling. Dust covers shall be provided, where necessary, to protect sliding and rotating and to prevent dust from mixing with the lubricants.

A suitable grease gun and a complete set of wrenches and tools in pressed steel tool box shall be furnished for the crane. A sufficient quantity and variety of tools shall be furnished to cover all ordinary maintenance work in

connection with the crane.

ix) **Operational Instructions**

Operating instructions in a suitable metal frame covered with glass shall be mounted at a convenient location.

2.4.4

Design Data

(The following design data is tentative only and shall be finalized during detailed design and during finalization of the control room).

i) No. of cranes	1 (one)
ii) Class of crane	M5(Class-2), as per classification in IS: 807 (Latest Revision) with Electrically operated rope drum hoist on a moving trolley & motor operated longitudinal travel arrangement.
iii) Rated capacity	Minimum 5 ton capacity. However, the contractor may examine the adequacy of the capacity of the crane suitable for the job.
iv) Minimum lift of hook	7.0m (Tentative)
v) Distance between centers on track rails	4m (Tentative)
vi) Length of rail track	20.0m (Tentative)
vii) Rail Track	45Kg./metre (Tentative)
viii) Hoisting speed	0.5m/min. with inching movements facility
ix) Longitudinal Travel speed	1m/min. with inching movements facility
x) Cross traveling speed	1m/min. with inching movements facility

- xi) Power Supply 400 to 440 volts, 3 Phase, 50 cycles, A.C. Supply
- xii) Controls
 - i) Floor Pendant Push Button control
 - ii) Remote (cordless type control from the floor)

2.5.0 **Steel Gratings in front of Intake Structure of Lower Arun HEP**

Straight type steel gratings are proposed at the entrance of intake prevent the entry of floating debris and large size solids into the HRT. The arrangement of embedded parts and steel grating panel is shown in the specification drawings. The minimum thicknesses shown in the specification drawing shall be adhered to.

2.5.1 **Embedded parts**

The embedded parts consisting of channel shaped should be provided for all the grooves up to the top of deck slab El. 545.0m. It should be embedded in the first stage concrete itself with suitable anchor rods in all three sides.

2.5.2 **Steel grating panels**

Steel grating panels shall be installed in vertical position. To simplify site erection, the grating panels should be identical. The structural arrangement of gratings shall generally consist of equally spaced vertical bars supported on horizontal members connected to end vertical members which sit in the grooves of piers. The size of each unit should be proportioned from consideration of hoisting/ lifting capacity. The panels shall be fabricated from structural steel conforming to IS:2062 (Latest Revision).

Four sets of steel gratings for four intake bays consisting of interchangeable panels suitable for handling shall be designed, supplied and installed in the structure. The clear span of each bay is 2.750m. Each bay shall consist

of 10 interchangeable elements each of size 3010mm x 2880mm.

The grating bars shall be fabricated from flats with rounded edge.

The bars of any panel should be directly in line with the corresponding bar above or below. For proper seating of one panel above the other, pilot shoes and pilot pins shall be provided.

Lifting lugs shall be provided in each panel to enable lifting of panels with the help of mobile crane, whenever necessary for maintenance/ cleaning/painting.

2.5.3

Design data for Steel Gratings

i)	Clear span	2750mm
ii)	Vertical height for steel gratings	29000 mm (approx.)
iii)	Number of Openings/Bays	04
iv)	Steel grating panel size	3010mm (w) x 2880mm (h)
v)	Proposed number of panels (Interchangeable)	10 panels/ bay (40Nos.) + 4 No. spare = 44 Nos.
vi)	Position of gratings	Vertical
vii)	Sill level (for gratings)	El. 516m
viii)	Deck level	El. 545.0m
ix)	Governing Indian Standard	IS: 11388 (Latest Revision)
x)	Minimum thickness of bar	12mm

2.6.0 Lower Arun Intake Gates, Rope Drum Hoists and Hoist Supporting Structure

2.6.1 Intake Gates

Two (2) Nos. vertical fixed wheel type gates suitable for clear vent opening of size 6000mm x 7000mm (w x h) are proposed at Intake. The intake gate shall facilitate initial filling of the HRT of Lower Arun HEP, when the upstream Arun-3 HEP shall be in operation. The intake gates shall be required to be held in any position for the filling of HRT and shall be of regulating type. Additionally, two nos. filling valves shall be provided in the gate and shall facilitate initial filling of water conductor when the discharge requirement is very low. These gates shall be fabricated from structural steel comprising of skin plate, stiffened by horizontal girders, vertical stiffeners, slide pad, wheels and end vertical girders and all other accessories required for proper functioning of the gate complete in all respects as per these specifications and specification drawings. The gates shall have upstream skin plate and sealing w.r.t TRT pond. The skin plate shall be supported by horizontal girders at suitable intervals. The horizontal girders shall be supported by end vertical girders, which in turn shall support the wheels at downstream side as shown in the general arrangement drawing. Wheels shall transfer the load to concrete through an embedded stainless steel bearing track fixed on mild steel track base. Provision shall also be kept to crack open the gate by 100mm to facilitate requirement during initial filling of water conductor system. The gate then shall be lowered to provide pause as required for HRT filling before crack opening again for subsequent filling of HRT.

The gates shall be operated by individual rope drum hoists mounted on hoist supporting structures supported by steel trestles. Gate maintenance is proposed in trestle. Suitable latching/dogging arrangement alongwith ladders, platforms etc. shall be provided in trestle to facilitate this requirement. Suitable lifting arrangement shall be provided at the top of each gate. Suitable grating with supporting angles etc., complete in all respects shall be

provided at top of gate shaft. The Gate and their components shall conform to IS: 4622 (latest revision).

Suitable drain holes shall be provided on all horizontal girder webs and horizontal stiffeners. Ballast if required shall be provided to achieve the required seating pressure. The gate units will be assembled at site by using bolts. The bottom of the gates shall be shaped so as to have the best hydraulic performance.

Two numbers of guide shoe assembly on each side of each gate shall be provided to check the side and lateral movement of the gate and to restrain the same within specified limits. They shall travel on side guides embedded in piers.

All the gates shall have wedge type rubber bottom seal and PTFE clad double bulb rubber seals shall be provided on sides and top. The thickness of bottom seals shall not be less than 20 mm. The seal clamps shall be shaped suitably to prevent any cutting or damage to the seals.

These gates shall remain in open position till the commissioning of Lower Arun HEP and deposition/accumulation of silt in the gate groove, on the bottom seal seats shall make the sitting of gate on the sill beam difficult. To overcome this problem, one number submersible slurry pump to be operated in the vicinity of gate grooves/shafts with the help of monorail is proposed for the removal of silt from the vicinity of Lower Arun intake gate grooves till the commissioning of the Lower Arun HEP. An additional shaft downstream of gate shaft shall be provided for suspending the submersible slurry pump, which shall also meet the air requirements.

The Contractor shall timely provide to the Engineer-in-charge:

- a) All required information about blockouts and positioning of parts to be embedded in first stage concrete.
- b) Data about the forces to be taken by the civil structure.

2.6.2

Embedded Parts

The embedded parts for each gate shall comprise of the following components:

- i) Corrosion resistant steel wheel track with base from sill level upto one full gate height above lintel (Two assemblies per bay).
- ii) Stainless steel side seal seat with base (Two assemblies per bay).
- iii) Stainless steel seal seat with sill beam (One assembly per bay).
- iv) Top seal seat assembly with seal seat base and stainless steel seal seat(One assembly per bay).
- v) Structural steel plate or rail section, anchored in concrete, shall be used as guide and shall be provided from sill upto top of the structure. The guides shall be tapered at top for easy entry of gate.
- vi) First stage inserts (J or U anchors with plates) to be embedded in first stage concrete and for proper alignment for providing suitable reference surface for erection of 2nd stage embedded parts.
- vii) Suitable embedments/ blockouts for hoist supporting structure.
- ix) First stage inserts (J or U anchors with plates) to be embedded in first stage concrete at a spacing not exceeding 500 mm centre to centre leaving suitable blackout openings for second stage embedments. The size of the 1st stage anchors shall not be less than 16mm in dia. and 300mm in length. The 2nd stage anchors/studs with double nut and washers attached to 2nd stage embedded parts shall than be welded all around to 1st stage anchor plates for providing suitable reference for proper alignment for erection of 2nd stage embedded parts.

Design of all embedments shall conform to IS: 4622 (latest revision). Minimum sizes and tolerances of all components as specified in IS: 4622 (latest revision) shall

be adhered to. The concreting in the blockouts shall be done after erecting the embedded parts, aligning and checking them and ensuring their correct position. Suitable struts, supports etc. as required shall be provided by the contractor to prevent disturbance in the parts during concreting. The contractor shall be responsible for correctness of erection of the embedded parts in position and maintaining the dimensional accuracies as per approved drawings.

2.6.3

Design Criteria for Intake Gates

Intake gates shall be normally operated under unbalanced water head conditions. The gates shall have upstream skin plate and sealing.

The design requirements for the gate are mentioned as here under:

i)	Type	Vertical lift wheeled gate with u/s skin plate and u/s sealing.
ii)	Clear width of opening	6000mm
iii)	Clear height of opening	7000mm
iv)	Center to center distance of side seal seats	6120 mm \pm 3
v)	Center to center distance of wheel tracks	6700 mm \pm 3
vi)	Sill Elevation	El. 516.0 m
vii)	Top of track	El. 530.0 m
viii)	Top of Deck	El. 545.0 m
ix)	Full reservoir level	El. 544.0 m
x)	Design head	28.0m
xi)	Operation	The gates shall be regulating type to be operated under unbalanced water head conditions for filling of HRT

		with u/s project in generation. However, two no. filling valves shall be provided for initial filling of water conductor system.
xii)	Type of Rubber seals	PTFE cladded (min thickness of cladding 1.2 mm) music note J-type rubber seals for sides & top and wedge type plain rubber seal for bottom
xiii)	Type of hoist	Independent Rope Drum Hoist (min. 60T capacity)
xiv)	Minimum thickness of skin Plate	25mm
xv)	Minimum thickness of stainless steel wheel track plate	20mm (after machining)
xvi)	Minimum thickness of stainless steel side seal and top seal seats	12mm (after machining)
xvii)	Minimum thickness of Stainless Steel Bottom Seal Seat	16mm (after machining)
xviii)	Type of wheel assembly	Wheel with stainless steel self-aligned spherical roller bearing mounted on pin. The wheels shall have line contact with track.
xix)	No. of gate	2 Nos.
xx)	No. of sets of embedded Parts	2 sets
xxi)	Governing Standard	Indian IS: 4622 (latest revision)
xxii)	Permissible deflection	<ul style="list-style-type: none"> • $L/800$ (L = C/C of wheels)

- Maximum deflection of gate at the top seal shall not be more than 80% of the initial interference of the seal
- xxiii) Permissible stresses : Permissible stresses in structural components for gate and embedded parts shall be in accordance with Annex- B of IS: 4622 (Latest Revision)
- Permissible stresses for gate Dry & accessible
- Permissible stresses for embedded parts Wet & inaccessible
- xxiv) Seismic coefficients for underground structure of the project are:
- a) Seismic Horizontal coefficient $\alpha_h = 0.24 \text{ g}$
- b) Seismic Vertical Coefficient $\alpha_v = 0.16 \text{ g}$
- xxv) Permissible bearing and shearing stresses in concrete As per IS:456(latest revision).
- xxvi) Grades of concrete to be used
- a) 1st stage concrete M 20/ M 25
- b) 2nd stage concrete One Grade higher than that of 1st Stage Concrete and shall not be less than M-25 Grade

2.6.4

Rope Drum Hoist for Intake Gates

The hoist equipment to be furnished by the contractor will be used to operate the Intake Gates. The Hoist mechanism shall include a driving motor, a gear reducer,

rope drums, plummer blocks for supporting the rope drum shaft and other shafts, ropes, shafts, gears, couplings, brakes, emergency manual arrangements, limit switches, gate position indicator (both analogue and digital), covers etc., all mounted on a fabricated steel frame including anchor bolts, plates and base plate etc. Electrical controls and all necessary electrical and mechanical accessories shall be provided for the satisfactory operation of the hoist. The hoist shall be capable of fully opening/closing the gate and shall conform to design criteria mentioned in subsequent paras. Sufficient space shall be provided around the hoist components for repair/maintenance.

2.6.4.1

Central Drive Unit

- a) Motor: Totally Enclosed Fan Cooling (T.E.F.C) reversible squirrel cage, IP-66, operating on 415 V +/- 6% , 3 phase, 50 Hz A.C. power supply with a provision of inbuilt heater and in-built disc brake arrangement of reputed make such as GEC, Siemens, Kirloskar, NGEF, Bharat Bijlee, Crompton. The shaft of the motor shall be of extended type on both sides to accommodate arrangements for manual drive. The rated speed of motor shall not be more than 1000 rpm. The motor shall conform to Indian Standard.

The motor shall have high starting torque, low starting current and shall be suitable for operation in highly humid atmosphere. The breakdown torque shall not be less than 200% of the rated torque of the motor. The central drive unit shall be mounted on portable frame.

- b) Brakes: Three phase, shoe type, Electro-Magnetic as well as Electro-Hydraulic Thruster operated brakes (each having rated torque of 1.5 times the output torque of motor) of reputed make such as Electromag, Stromkraft or of any other Indian standard makes. The brakes shall be of robust construction. The shoes and base shall be made of close grained cast iron of ample strength for the duties specified. Fulcrum pins shall be of manganese bronze. All steel parts shall be plated to prevent rusting. The lowering of the gate by releasing the brake is not

preferable.

- c) Worm reducer: Reversible, self-locking, of reputed make such as Radicon, Allenoyd, Allen Berry, Elecon, premium or of any other Indian standard quality. The reducer shall match with rating of motor. The reduction assembly shall be totally enclosed type. The reduction unit shall comprise of worm and wheel set. A provision shall be kept for lubrication with oil by gears dipping in the sumps. The reduction unit shall be provided with oil level dip stick, sight glass, drain plugs and oil filter/ ventilator.

The worm reducer shall be selected in such a manner that the power is transmitted to drum using single open reduction only.

2.6.4.2 Manual drive

The equipment shall comprise of a gear box with a handle and a two way ratchet fitted to the input shaft. A manually operated claw coupling shall connect the gearbox to the non-drive end of the worm box input shaft. A limit switch shall be fitted to provide electrical interlock to prevent operation by electrical power when the manual drive is engaged. Efforts per person shall not be more than 10Kgf. at a crank radius of 400mm operating at a speed of 24 rpm. The high speed brake and motor brake shall need to be released via the manual lever's to enable the manual drive to be operated. Pawl and ratchet arrangement shall also be provided to prevent the lowering of the gate by its own weight.

2.6.4.3 Drum Assembly

Each drum shall be fabricated in one piece from mild steel or machined cast steel and shall be spiral grooved to suite right hand (RH) and left hand (LH) coiling. The loose ends of the rope shall be secured to the gear wheels by rope clamps as shown in the specification drawings. The spur wheels shall be manufactured in one piece and shall be secured to the drums with screws and drive dowels. The drum shaft shall be manufactured from high tensile steel and is keyed to the drum.

2.6.4.4

Bearings

The drum shaft bearings and pinion bearings shall be Plummer Block Housing with spherical roller bearings. The drum shaft drive-end bearings shall be fixed type and the non-drive end bearings shall be expansion type. The pinion bearings shall also be fixed and expansion type.

2.6.4.5

Bed Frame

The hoist main frame shall be manufactured from rolled steel sections and plates with a galvanized chequered plate to form a composite support structure. The various components of the hoist equipments shall be mounted on mild steel sub-frames which shall be bolted/welded to the upper faces of the main frame. Shimming allowance shall be included at critical positions for final alignment of couplings and gears etc.

2.6.4.6

High Speed Brake Coupling

A transmission pin type flexible brake coupling shall be provided and keyed to the motor shaft and worm box input shaft.

2.6.4.7

Rope & Sockets

The ropes of the hoist shall be galvanized fiber core conforming to IS:2266 (latest revision), 6x36 construction. The ropes shall be supplied permanent markings at suitable distances from centerline of the socket pin to provide alignment facility with the drum. The fused and taper ends of the rope shall be clamped to the spur gear wheels with minimum four clamps.

2.6.4.8

Hoist Pulleys

Hoist pulley shall be provided to ensure equal rope loads and shall be provided with straps to retain the ropes in the groove. The pulleys shall be supported by non-rotating stainless steel pins and shall be fitted with high tensile strength aluminium bronze bushing for grease lubrication.

2.6.4.9 Load Pin and Electronic Unit

The load pin transducer is fitted in the rope socket connection to provide hoist overload protection (set at 110% S.W.L.) and to detect slack rope condition (no load)

2.6.4.10 Rope Retention Devices

Rope guide brackets shall be installed on the hoist mainframe to limit movement of the equalizing rope/socket to approx.200mm, if mis-coiling takes place or unequal loading of the ropes takes place due to snagging of the gate in the guides.

Anti-rotation Brackets shall be incorporated in the rope guide Bracket to prevent excessive movement of the rope sockets. The rope socket guard shall also be provided.

2.6.4.11 Spacer Gear Coupling

Spacer type Gear coupling shall be fitted between output shaft of the worm reduction unit and the pinion shaft. Coupling shall be protected with a special surface treatment or coating to improve corrosion resistance.

2.6.4.12 Depth Indicator Dial

The Depth Indicator Dial shall be of Brass metal of minimum 300mm diameter. The marking/write up shall be suitably engraved and painted after due calibration. Least count/ minimum accuracy for the analogue gate position indicator shall be 10mm. In addition to the analog depth indicator dial, digital depth indicator in the control panel shall also be provided with least count/ minimum accuracy for the digital gate position indicator shall be 1mm.

2.6.4.13 Covers

All hoist machinery covers shall be of light weight material with stainless steel handles.

2.6.4.14 Control panel and protective devices

Circuit breakers, fuses, thermal protected relays etc., of suitable rating shall be provided in the motor circuit and circuit breaker, limit switches (for lowest and highest

positions of gate) of suitable ratings compatible with the equipment shall be provided in the control circuit. All the contactors relays, push buttons etc., shall be of adequate ratings of standard make and of tested quality and shall be provided for brake contactor, slack rope, maintenance position, gate open limit, gate close limit, rope overload, brake overload, emergency stop etc. etc. Sufficient spare relays shall also be provided. Limit switches shall also be provided to ensure that the motors do not start while the gates are being operated manually. A provision shall be made in the control panel for thermostatically controlled heater of suitable capacity.

A provision shall be kept for a multi socket with switch 5A & 15A for future operation & maintenance.

All the components of hoists shall be checked for the breakdown torque of motor selected. Actual breakdown torque (BDT) or pull out torque (POT) as indicated in the motor catalogue has to be adopted. Limiting of BDT/POT of motor by using a torque limiter or by effecting any local change in the motor circuit will not be permitted.

2.6.4.15

Design data for rope drum hoists

- | | |
|--|--|
| i) Capacity of Hoist | 60T minimum. However, the Contractor may examine for the adequacy of Hoist capacity intended for the above-mentioned job. In case the higher Hoist capacity is required, he will indicate the same in his Bid. |
| ii) No. of hoists and hoists supporting structures | 2 (Two) |
| iii) Lift of Gate | 30m |
| iv) Operating Speed | 0.5m/min. \pm 10% |
| v) Number of Drums | 2 (Two) |
| vi) EL of bottom of trestles | El.545.0 m |

- vii) Material for fabrication As detailed in chapter 3.0.0
- viii) Governing Indian Standard IS:6938 (Latest revision)

2.6.5 Hoist Supporting Structure and Platform

The hoist supporting structure shall be designed for the worst combinations of the following:-

- i) Load on the structure:
 - a) Load transmitted through the hoist under normal operating conditions.
 - b) Impact load
 - c) Live load of 500Kg./sq.m.area
 - d) Dead weight of the members
 - e) Seismic load
 - f) Wind load
- ii) Permissible stresses : As per IS:800 (latest revision)
As per IS:807 (latest revision)
- iii) Breakdown condition: Hoist supporting structure shall be checked for actual breakdown torque of motor selected.
- iv) Limiting deflection: L/800
- v) Minimum clear walkways of 600mm width shall be provided.
- vi) Galvanized Hand railing of not less than 40mm diameter pipe and 1200mm height shall be provided all around the hoist supporting structure/ machinery complete with elbow connector & steel balls and with minimum 3 rows of railing.
- vii) Ladder with safety rungs shall also be provided to approach the platform for latching arrangement and hoist platform from the floor.

- viii) Flooring: Reinforced chequered plate of minimum 6mm thickness shall be provided.

2.7.0 Submersible Slurry Pump and Monorail Crane & Associated Equipment for Lower Arun Intakes

2.7.1 Submersible Slurry Pump & Associated Equipment

One set of portable Submersible Slurry Pump having a capacity of 50 m³/hr (min.), min. 40 percent solid content handling shall be provided at the Intake of Lower Arun HEP for dredging of silt from the vicinity of intake gate grooves. The pump shall be suitable for vertical installation with no foundation, hence the pump manufacturer shall design the pump set accordingly complete in all respects alongwith its associated equipment viz. flexible hose, cable, cable reeling drum etc. The pump shall be operated into the respective shafts downstream of gate shafts by 5T monorail crane as shown in the Specification Drawings. The pump shall be electrically driven by 400/415V, 3 Phase, 50 HZ, 'H' class insulated motor. The pump set should be thick walled Volute (preferably twin volute to minimize pump oscillation during starting) casing pump with slurry type impeller integrally mounted to the extended shaft of the submersible motor. The pump should be able to pass solids i.e. river silt & pebbles of min. 25mm without choking. The pump common shaft shall be capable of taking pump radial/axial loads etc. The pump design should be of wear resistant type. The mechanical seals shall be bi-directional. **The pump's external dimensions should be such that it should be able to be lowered and lifted in a 700mm wide x 6000mm long opening/well.**

The design of pump and the selection of material shall be carefully made to take care the effects of electrolytic action as well as abrasion due to silt since the water would contain fine and coarse silt. The pump shall be designed to withstand a minimum water head of 25m in case of submergence.

The pump shall have the following construction features:

2.7.1.1 Pump Casing

The pump casing should be of min. hardness of 500BHN to withstand heavy stresses imposed due to hanging, dragging etc.

2.7.1.2 Motor Sealing

The motor sealing at all joints like cable gland, mechanical seals, static flanged joints, etc. should be able to withstand min. 25m depth of submergence. The elastomers used for sealing shall preferably be fluorinated rubber (Viton) with hardness of 70° IRH or of Nitrile rubber with hardness of 75° IRH.

2.7.1.3 Characteristics

Pump set shall have continuously rising and stable head capacity characteristic continuously rising towards shut off with the highest head at shut off. Flat, unstable or cusp in the performance characteristic curve at any point from shut off to run out condition of the pump will not be acceptable. The pump shall operate throughout the range of operation without cavitation, noise, or undue vibration etc.

Tenderer shall also note that the characteristic curve obtained during performance testing of the pump shall not deviate from the guaranteed characteristic curve furnished with the Tender.

2.7.1.4 Impeller

Impeller shall be both statically and dynamically balanced and shall be fastened to the shafts in such a manner that the connections will withstand the maximum torque and thrust that will occur under all operating conditions.

2.7.1.5 Cavitation

Cavitation shall not take place at the operating conditions. The design and construction of the pump shall be such as to minimize cavitation and ensure long and trouble free service.

2.7.1.6 Discharge Flange

The discharge flange shall be corresponding to the capacity of the pump and shall be suitably selected so that the silt is flushed out and there is no choking of the discharge pipes.

2.7.1.7 Pump Bearings

The bearing in the pump shall be anti-friction. It shall be sized for 20 percent higher margin over the thrust/load occurring at shut off conditions. The bearing shall be designed for a minimum life of 40,000 working hours.

2.7.1.8 Losses

The contractor shall design the pump taking into account various losses to arrive at the total head. The losses in delivery shall be calculated to workout total dynamic head. However, the pump shall be designed with a minimum water head of 35 m + losses.

2.7.1.9 Accessories

Various accessories required for the 1 No. Submersible Slurry Pump and its associated equipment shall be supplied by the contractor. The contractor shall supply the list of such accessories at the time of tendering.

2.7.2 Pump Drive:

Pump drives shall have the following features:

- a) The pump shall be driven by 3 phase, 50 Hz, class-H insulation, induction motor of suitable capacity.
- b) The motor shall not get overloaded at any point of operation of the pump on its characteristic curve from shut off to run out condition. The motor shall have a reserve margin of at least 1.2 above the maximum pump input considering silted water so that in the event of silt clogging the motor shall not be overloaded.
- c) The motor characteristic shall be such that when put on the line with seventy (70) percent of normal voltage, it shall be capable of developing torque sufficient to bring the pump to full speed and full load without over heating

or tripping of the motor.

2.7.3 Motor

- a) Motor should be of class “H” insulation.
- b) Motor shall withstand 25m water submergence.
- c) The Impeller shall be keyed/ splined onto the shaft to prevent its unscrewing by accidental reverse rotation.

2.7.4 Design Criteria

The design requirements of 1 No. Submersible Slurry Pump and its associated equipment are broadly specified as follows:

2.7.4.1 Pump

Sr. No.	Description	Detail
1.	Type of Pump	Portable submersible type slurry pump.
2.	Pump Capacity	Min. 50 m ³ /hr
3.	Max. level of reservoir/ sump	El. 544.00 m
4.	Bottom level of Sill	El. 516.00 m
5.	Elevation of the delivery pipe at discharge outlet.	El. 545.00 m
6.	Total dynamic head	35m + Losses
7.	Cable length	50m
8.	Flexible discharge hose	60m (Approx.)
9.	Lowering/ raising of Pump	Through 5T crane monorail crane
10.	Sp. gravity	Min. 2.0

2.7.4.2 Motor

Sr. No.	Description	Detail
1.	Type	Three Phase Motor with minimum 10 starts per

		hour suitable for a submergence head of 25m.
2.	Voltage	400/415 V ($\pm 10\%$)
3.	Insulation	Class H
2.7.4.3	Control Panel	Suitable for operation of above Pump

2.7.5 Monorail Crane and Supporting Structure

Electrically operated monorail crane of min. 5 T capacity shall be used for the operation of submersible slurry pump in the additional intake shafts downstream of gate grooves. The submersible slurry pump shall be operated in the both the intake shafts at regular intervals till the commissioning of Lower Arun HEP.

- i) Provisions of limit switches for lower most and upper most position of hooks and end travel of hoist shall be made.
- ii) Pendant push button control shall have the provision of fair buttons marked 'Raise' 'Lower' 'stop'. It shall meet the requirements of IS-3177 (Latest Edition). Length of cable for pendant push button control shall be sufficient to suit the operator walking at El. 545m. It shall also have suitable locking arrangements to prevent unauthorized use. Cordless type remote control for operation from floor level shall be provided.
- iii) The length of power cable (Insulated trailing cable) shall be sufficient for travel over the complete span and shall be suspended by suitable wire and trolley for smooth trouble free operation of the crane.
- iv) The structural design shall meet the requirements of provisions of the Latest Edition of IS: 807 and IS-3177. The crane travel mechanism shall be provided with an automatic electromagnetic brake capable of bringing fully loaded crane at its top speed to rest within shortest possible time and with least shock. The hoist mechanism shall also be provided with an electromagnetic brake to

bring safely to rest the fully loaded hoisting hook in least possible time and without any shock. The brakes shall be automatically in 'ON' position when the crane is parked or when power breakdown occurs. The brake shall have minimum full load torque of 150% of full load torque of motor. The hook and crane travel shall be powered by electric motors of suitable capacities. All gears in power operated motions shall be machine cut.

- v) The lifting hook shall be standard shank type suitable for handling the slurry pump as well as other allied construction materials. The hook shall be tested for 200% rated load.
- vi) The main supply shall be 400/440V, 50 CIS, 3 phase Ac. The motor shall be of suitable capacity, reversible type. The pullout torque shall be limited to 225% of rated torque. In case trailing cable is supplied, it should get automatically wound/unwound during crane travel from one end to other.
- vii) Totally enclosed cable of being reset automatically, limit switches shall be provided to limit travel of the hook and crane in either direction.
- viii) The crane structure, motor frames and metal cases of all electrical equipments including metal conduits or cable guards, shall be effectively connected to earth complying with Indian Electricity Rules.
- ix) The monorail supports, trestles and their attachment shall be designed in accordance with the provisions of the Latest Edition of IS:800 and IS: 807.
- x) The crane structure shall be equipped with a permanent 230 V lighting system to illuminate the area under the crane.
- xi) Suitable interlocks for providing hoist travel drives to operate simultaneously and prevent travel drives unless the hook is in highest position.
- xii) The material specifications and permissible stresses shall conform to the requirement of Latest Edition of IS:807,



IS:3177 and IS:800.

- xiii) Cordless remote control for the operation of Monorail Crane in addition to the pendant control shall also be provided by the contractor.

2.7.5.1

Design Data

- | | |
|--------------------------|--|
| i) No. of monorail crane | 1 (one) |
| ii) Class of crane | M5(Class- 2), suitable for outdoor duty |
| iii) Rated capacity | 5T (min.) |
| iv) Minimum lift of hook | 35m |
| v) Length of travel | 15m (approx.) |
| vi) Hoisting speed | 1m/min |
| vii) Longitudinal travel | 5m/min. with inching movements facility |
| viii) Power Supply | 400 to 450 volts, 3 phase, 50 cycles, A.C, Supply |
| ix) Controls | Pendant Control as well as Remote (cordless type control from floor) |

CHAPTER-III

Materials

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3.0.0. Materials

All the materials shall be of tested quality, new, unused, free from defects and of the grade/ classification envisaged in the designs and shall conform to latest relevant Indian Standards or equivalent standard/make. The contractor shall furnish the test certificates for each lot of material, if so required by the Employer. Plates with laminations discovered during welding or during inspection shall be rejected. Materials not supplied according to the approved designs/drawings shall be rejected, removed and replaced. Approval of Employer shall not relieve the manufacturer from the responsibility of supply of suitable materials.

Recommended materials for the components of TRT Outfall Gates, Hydraulic Hoists, Bulkhead for TRT gates, EOT Cranes, Steel grating panels, Intake gates, Rope drum hoists and their associated equipment are given below :-

3.1.0 TRT Outfall Gates & Bulkhead

Sr. No.	Component/Part	Recommended Materials	Reference
1.	All structural members of the gate, track bases, thrust bearing pad bases, seal seat bases, guide track, seal clamps, guide shoe/roller, lifting brackets, latching/dogging arrangement, anchor plates etc.	Structural Steel	IS: 2062/ equivalent
2.	Anchor bolts/studs	Carbon steel	SAE 1018
3.	Wheel	Cast steel/ Forged steel	IS:1030 IS:2004
4.	Bearings in wheels	Stainless steel self-aligned spherical roller	Conforming to Indian Standard/ standard make



		bearings	
5.	Wheel pin/ lifting pins/ guide roller pin	Corrosion resistant stainless steel	IS: 1570 (Part V)
6.	Thrust bearing Pad	Al. Bronze	IS: 305, Gr AB 2/or equivalent
7.	Wheel track/slide track	Corrosion resistant stainless steel	IS: 1570 (Part V) (20Cr13/AISI 420)
8.	Seal seats	Corrosion resistant stainless steel	IS: 1570 (Part V) (04Cr19 Ni9/ AISI 304)
9.	Seals	PTFE cladde, Natural or synthetic rubber	IS: 11855 and IS: 15466/ or equivalent
10.	Screws/Bolts for seals	Stainless Steel	IS: 1570 (Part V)
11.	CSK Screws for thrust bearing pads	Stainless Steel	IS: 1570 (Part V)

3.2.0 Hydraulic Hoist

1.	Hoist cylinder	Boiler quality plate forged steel	IS: 2002 Gr. 2A, IS: 2004/ or equivalent
2.	Upper & Lower cylinder head	Boiler quality plate cast steel	IS: 2002 Gr. 2A, IS: 1030/ or equivalent
3.	Piston	Forged steel/cast steel	IS: 2004, IS:1875, IS: 1030/ or equivalent
4.	Piston rod & articulated stems	Solid bar of corrosion resistant stainless	IS: 1570 (X30Cr13) or equivalent



		steel	
5.	Piston rings	Lead Tin Bronze	IS: 318
6.	Piston glands	Cast Manganese bronze	
7.	Clevis Pin	Corrosion resistant stainless steel	IS: 1570 or ASTM A-276 Type 316 or ASTM A-564 Type 630
8.	Piston seals & Piston rod seals	Chevron Type packing seals	
9.	Bearings for cylinder mountings	Self lubricating bushing on corrosion resistant pins	Reputed make
10.	Bush bearings	Lead Tin Bronze	IS: 318
11.	Shafts	Carbon Steel	IS: 1570 C-40
12.	Studs, bolts, nuts & washers	Carbon steel	IS: 1367 IS: 1570
13.	Support frame	Structural steel	IS: 2062, IS: 808/ or equivalent
14.	Pipe flanges & fittings	Stainless steel	DIN-17440/8 DIN-17458 BS-3604
15.	Seals	Synthetic	Buna-N (NITRILE)
16.	Piping	Seamless stainless steel tubes	
17.	Steel pipe flanges and flanged fittings	Stainless steel	DIN-17440/8, DIN-17458, DIN-2462, BS-3604
18.	Epoxy Grout		Reputed make
19.	Seal washers		Seal washers of cadmium-plated steel



			with nitrile sealing element
20.	Lubricating Grease		Reputed make
21.	Lubricating Oil		Reputed make
22.	Hydraulic oil tank	Stainless steel	IS:1570 (Part V)
23.	Hydraulic Oil		ISO VG-32
3.3.0	EOT Cranes/Rope Drum Hoists		
1.	Base plates, anchors, beams, columns, stiffeners, bracings, lugs, girders etc.	Structural steel	IS: 2062/ or equivalent
2.	Threaded fasteners		IS: 1363 IS: 1367
3.	Wire Ropes	6x37 Construction galvanised improved plough steel, with fibre core or steel core	IS:2266/ or equivalent
4.	Shafts	Forged steel Carbon steel	IS: 2004 IS: 1570
5.	Keys	Forged steel	IS:2048 IS:2291 IS:2292
6.	Pins	Stainless Steel	IS: 1570 (Part V)
7.	Bushing	Aluminium Bronze	IS: 305 Gr. AB2
8.	Drums	Structural steel	IS: 2062 or equivalent
9.	Gears	Cast steel	IS: 1030 IS: 3681 IS: 4058 IS: 4460 IS: 4702



10.	Pinions	Forged steel	IS: 2004
		Carbon steel	IS: 1570
11.	Ball and roller bearings	Stainless Steel	SKF or equivalent standard make
12.	Wheels	Forged steel	IS: 2004
		Cast steel	IS: 1030
13.	Sheaves and pulleys	Cast steel	IS: 1030
14.	Motors	Reputed make	IS: 12615
15.	Cables and conductors	Reputed make	IS:9968 IS:8130
16.	Conduits	Reputed make	IS: 9537
17.	Switch gear	Reputed make	IS: 2147 IS: 4237 IS: 12729
18.	Walkway	Chequered plates	IS:2062
19.	Handrails & posts	Stainless steel	IS:1570
20.	Rail track		Rail of suitable size but not less than 52 Kg/m (for 50 T EOT crane) and 45 Kg/m (for 5 T EOT crane)
21.	Electrical equipment		Reputed make

3.4.0 Intake Steel Grating panels

Sr. No.	Component/Part	Recommended Materials	Reference
1.	All structural members of the steel grating panels etc.	Structural Steel	IS:2062



3.5.0 Intake Gate for Lower Arun HEP

Sr. No.	Component/Part	Recommended Materials	Reference
1.	Skinplate, horizontal girders, vertical stiffeners, end vertical girders, lifting brackets, track bases, seal seat bases, splice plates, guide track, seal clamps, guide shoe/roller , latching arrangement, etc.	Structural Steel	IS:2062
2.	Anchor plates/ anchor bolts/studs etc.	Structural Steel	IS:2062
3.	Wheel	Cast steel/ forged steel	IS: 1030 IS: 2004
4.	Bearings in wheels	Stainless steel self-aligned spherical roller bearing	Conforming to Indian Standard or Standard make
5.	Wheel pin/Lifting pins/guide roller pin	Corrosion resistant stainless steel	IS: 1570 Part-V
6.	Wheel track	Corrosion resistant stainless steel	IS: 1570 (Part V) (20Cr13/AISI 420)
7.	Seal seats	Corrosion resistant stainless steel	IS: 1570 (Part V) (04Cr19 Ni9/ AISI 304)



8.	Side & Top Seals	PTFE clad rubber seals	IS: 11855
9.	Bottom Seal	Wedge type natural or synthetic rubber	IS: 11855
10.	Fasteners for seals	Stainless Steel	IS: 1570/1367 & 1364
11.	CSK Screws	Stainless Steel	IS: 1570/1367 & 1364
12.	Steel liner	Corrosion and abrasion resistant steel (BHN 350-420)	Hardox/ Dillidur/Abrex or equivalent
13.	Filling valves		
	a) Spring	Spring steel(Stainless steel)	IS: 1570
	b) Seal	Bronze/rubber seating on stainless steel	
	c) Stem	Stainless Steel	IS: 1570
	d) Piping	Structural Steel	IS: 2062/3589
14.	Air vent /instrumentation pipes and their embedments	Structural steel	IS:2062/3589

3.6.0 Notes: The details covered in Para 3.1.0 to 3.3.0 shall be read in conjunction with the following notes:-

- i. In all the references cited above, the latest revised edition of Indian Standards or equivalent shall be followed. In case the contractor proposes to use material different from those mentioned above, he should mention the same in his tender and indicate the exact extent to which he proposes to use, furnishing necessary details for approval of the Employer. Materials conforming to International Standards like ASTM, DIN which are equivalent to those mentioned above can be used with the approval of the Employer.



- ii. The sizes, ratings, capacities and dimensions of the various standard equipment items listed in the Contract Documents are based on currently available standard products. Reasonable deviations will be allowed to permit supply of standard equipment. In no case shall the capacity furnished be less than that specified, unless approved.
- iii. Threaded fasteners, pipes, anti-friction bearings and gears:-

All bolts, nuts, screws, rivets, threads, pipes, ball and roller bearing, gauges and gears shall conform to US/BIS/DIN standards. Screw threads for screws, bolts, nuts and other threaded hardware shall conform to relevant Indian Standards.
- iv. Asbestos: Equipment and materials shall contain no asbestos products e.g. (gaskets, packing, brake pads etc.).

3.7.0 List of some reputed manufacturers of mechanical and electrical equipment to be used in Hydromechanical installation for reference.

- | | |
|---------------------------------|--|
| i) Reduction Unit | David Brown, Elecon, New Allenberry, Allen-max, Allmax- Shanti, Allroyd etc. |
| ii) Bearings | SKF,FAG, NSK, NTN, KOYA, NBC and NACHI |
| iii) Flexible coupling | New Allenberry |
| iv) Motors | Siemens, Kirloskar NGEF, GEC, Crompton Greaves, Bharat Bijlee etc. |
| v) Brakes | Electromag, Strom Kraft, Elmar, AEC, Sterling control |
| vi) All Electrical Equipment | Reputed make |
| vii) Electrical control cabinet | Rittal or its equivalent |

CHAPTER-IV

Manufacture

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4.0.0 Manufacture

All the works shall be performed and completed in a thorough workman like manner as per the best modern practice in the manufacture and fabrication of materials of the types covered by these specifications. The work shall in all cases be of high grade and carefully performed to the satisfaction of the authorized representative of the Employer. The contractor shall warrant all materials and workmanship furnished by him to be free from injurious and defective materials or defective workmanship and shall bear all cost of the repair in case of any error for which he is responsible. Workmanship shall conform to the relevant standards laid down by the Bureau of Indian Standards. All sharp corners, which can damage the matching parts, shall be rounded and chamfered.

4.1.0 Tolerances and Clearances

Where tolerance or fits are not specified on the drawings, the contractor shall follow the best modern shop practice for apparatus of the type covered by these specifications and drawings, due considerations being given to the special nature of function of the parts and to the corresponding accuracy required to secure proper operation.

4.1.1 Fabrication Tolerances

All components shall be fabricated in accordance with the relevant latest Indian Standards on Gates, Lifting Beam , Hoists and cranes except as noted below:

- i) All dimensions under 400mm shall be $\pm 0.8\text{mm}$ unless otherwise specified and non-cumulative. All other dimensions shall be $\pm 1.5\text{mm}$.
- ii) The machined sealing surface of the sill, lintel and side seal seats shall be straight within $\pm 0.5\text{mm}$ and level within $\pm 1.0\text{mm}$ over the whole length with a straight edge.
- iii) The wheel/slide track below the lintel shall be straight within 0.4 mm in any 3.0 m length and within 0.8 mm over the whole length and shall not deviate from a vertical line in any



direction by more than 1.0 mm. Wheel/slide track faces for the same gate shall be in same plane within 1.0 mm.

- iv) The wheel/slide tracks above the lintel shall not deviate from a vertical line in any direction by more than 2.0 mm and shall be straight within 2.0 mm over the full length.
- v) The side guide track shall be straight within 1.0 mm in any 3.0 m length and within 2.0 mm over the full length. The side guide track shall not deviate from a vertical line in any direction by more than 2.0 mm.
- vi) The distance between the side guide and wheel/slide track shall not vary by more than 3.0 mm.
- vii) The bearing surfaces of wheel treads on an assembled gate section shall be straight within 0.1 mm over the full height of the section.
- viii) Wheel treads, seal bases (top and side), bearing faces and seal faces (side and top) on an assembled gate should be in a true plane.

4.1.2 Installation Tolerances

Installation tolerances shall not exceed 1.5 times the corresponding fabrication tolerances or the tolerances specified in relevant Indian Standards on Gates, Lifting Beam, Hoists and cranes whichever is more stringent. Design and fabrication of the Gates, Lifting Beam and Embedded parts shall be suitable for the achievement of such tolerances during installation.

4.2.0 Surface Finish

4.2.1 Finished Surfaces

Where finished surfaces are not indicated or specified on the drawing, the type of finish shall be that type which is most suitable for the surface to which it applies and shall be consistent with the class of fit required.

A smooth finish (two delta, i.e. 1.6 to 6.3 microns) will be required for all surfaces in sliding or rolling contact and for



surfaces in permanent contact, where a tight joint is required. A finish (Single delta, i.e. >6.3 microns) shall be given to all other machined surfaces where selective assembly for matching parts is specified on the drawings or otherwise required. The parts shall be ground, if necessary, to obtain the limiting tolerances.

Surface finish shall be indicated on the fabrication drawings by symbols. Compliance with the specified surface shall be determined by the sense of feel and by visual inspection of the work compared to applicable "Standard Roughness Specimens" or with roughness feeler gauge/digital indicator instruments. Both "Standard Roughness Specimens" or with roughness feeler gauge instruments shall be provided by the Contractor at the request of the Employer or his authorized representative during the inspection.

4.2.2 Unfinished Surfaces

As far as practicable, all work shall be laid out to secure proper matching of adjoining unfinished surfaces. Where there is a large discrepancy between adjoining unfinished surfaces, they shall be chipped and ground smooth, or machined to secure proper alignment. Unfinished surfaces shall be true to the lines and dimensions shown on the drawings and shall be chipped or ground free of all projections and rough spots. Depressions or holes not affecting the strength or usefulness of the parts shall be filled in a manner approved by the Employer or his authorized representative during the inspection.

4.2.3 Protection of Finished Surfaces

Finished surfaces shall be thoroughly cleaned of foreign matter. Finished surfaces shall be protected with wooden pads or other suitable means. Unassembled pins or bolts shall be oiled or greased and wrapped with moisture-resistant paper or protected by other approved means.

4.3.0 Castings

All castings shall be true to pattern, of workman like finish and of uniform quality and condition, free from injurious blow



holes, porosity, hard spots, shrinkage defects, cracks or other defects as determined by visual inspection and shall be satisfactorily cleaned for their intended purpose and the thickness of metal shall not vary at any point by more than 5mm from that shown on the drawings. The surfaces of castings which do not undergo machining, particularly those in contact with water, shall be dressed smooth with all joints blended into adjacent surfaces and shall be free from foundry irregularities such as projections, ridges, hollows, honeycombing, pock marks or chip marks, etc. etc. so that they will not require surface smoothing operations prior to painting.

All defects shall be fully explored and casting shall not be repaired, plugged or welded without permission from the Employer. Such permission will be given only when the defects are small and do not adversely affect the strength, use or machinability of the castings.

All joints shall be machined, all bolt heads and nut locations shall be spot or back faced. Castings shall be machined on all surfaces which act as bearing surfaces.

No major welding shall be carried out after the casting is finally annealed. No defect shall be removed and the paint or oil be applied to the surface of any casting until it has been inspected by the Employer or his authorized representative. An excessive segregation of impurities or alloys in a casting may be the cause for its rejection. Large fillets compatible with the design shall be incorporated whenever change in section occurs. The casting mould and casting practice shall be designed to minimize the occurrence of hot tears or shrinkage cavities. Casting moulds shall be designed to allow free contraction upon cooling to minimize the occurrence of high stresses caused by the mould or chills. Casting repair welds shall be carried out in accordance with relevant Indian Standards.

Test coupons from which test specimens are prepared shall be attached to all castings weighing 250 Kg or more. The number, size and location of the test coupons shall meet with

the Employer's approval. Heat numbers shall be stamped permanently on the casting.

Repair welding on steel castings, if approved, other than repair welding of minor defects, shall be done by the metallic arc process followed by thermal stress relieving. Repair welding on iron casting will not be permitted.

4.4.0

Forging

Forging, unless otherwise specified, shall be in accordance with IS: 2004 (Latest Revision). The ingots from which the forging are made shall be cast in metal moulds. The workmanship shall be first class in every respect and the forging shall be free from all defects affecting strength and durability, including seams, pipes, flaws, cracks, scales, fins, porosity, hard spots, excessive nonmetallic inclusions and segregation etc.

All forging shall be given such uniform heat treatment as required to produce materials conforming to the requirements of these specifications and shall be annealed or normalized and tempered as final heat treatment. In the case of shafts forged solid, which are required to be bored, the final heat treatment shall be performed after the forging has been rough bored.

In each heat treatment, the forging shall be held at the desired temperature for a sufficient length of time to ensure penetration of the heat and proper grain refinement throughout the whole forging. Records of the heat treatment to which the forging have been submitted, shall be supplied to Employer.

The largest fillets compatible with the design shall be incorporated wherever a change in section occurs. Tool marks or tearing of the metal by the finishing tool will not be acceptable on the surface of fillets. Such marks, if they occur, shall be removed by grinding or polishing. All finished surfaces of forging shall be smooth and free from tool marks.

All important forging for Gates like Wheels, Wheel pins, Gears, Hoist/Crane Wheels etc. shall be ultrasonically tested.



The acceptance limit of ultrasonic testing of forging shall be as per SA 388 of ASME Section -5.

4.5.0

Rubber Seals

Rubber seals shall be of the moulded type only. The materials used for rubber seals shall be a compound of natural rubber or a co-polymer of butadiene and styrene, or a blend of both, and shall contain reinforcing carbon black, zinc oxide, accelerators, anti-oxidants, vulcanizing agents and plasticizers. The contractor shall provide all seals with adequate temperature and age resistant properties, which will provide, in the moulded form, suitable sealing properties.

Seal shall have the following physical properties when tested in accordance with the ASTM/Indian Standards:

Properties	Limit
Durometer hardness (Shore A)	65±5
Ultimate tensile strength	14.5 N/mm ²
Water absorption	The rubber compound shall not absorb more than 10% by mass of water in 7 days test.
Ultimate elongation	450%

The tensile strength of the test specimen, after being subjected to an accelerated ageing test of 48 hours in oxygen at 70°C and 2.1 N/mm² pressure, shall not be less than 80% of the strength of the test specimen before ageing.

All corners shall be premoulded and have a suitable radius on the inside edge. All joints, both shop and field, shall be located at a reasonable distance from the corners and shall meet the following requirements:

- i) All shop joints shall be vulcanized. Joint geometry shall be such as to avoid feather edges on the sealing surfaces.
- ii) Field joints shall be kept to a minimum and shall be accurately machine cut and carefully butted during assembly

to an interference fit. The field joints shall be held with at least double fasteners on each side of the joint.

- iii) Vulcanized joints shall not break or tear when bent 180 degrees around a mandrel of a diameter equal to the maximum cross section thickness of the seal.
- iv) The longitudinal strength in tension of vulcanized joints shall be not less than 71.4 Kg/cm² as verified by tests on a tensile specimen prepared from one joint in accordance with ASTM D15 part C. The joint tested shall be located at the midpoint of the test specimen and its strength determined in accordance with ASTM D 412.
- v) The joints in the rubber seal shall be vulcanized butt joints and at right angle to the rubber seal. Oblique joints at the corner shall not be permitted in the rubber seal. Vertically placed strips of rubber seals shall be formed in one piece and no joints of any sort shall be permitted in them.
- vi) Sufficient quantity of seal jointing compound shall be supplied alongwith rubber seals for site requirement.

Additional Requirements for Cladded seals

- i) Cladded Rubber seals are fluorocarbon or teflon cladded to reduce frictional forces. The fluorocarbon/teflon is introduced into the mould along with the raw un-vulcanized rubber compound and gets moulded or vulcanized simultaneously with the rubber so that the film is inserted or recessed into the rubber. The normal thickness of cladding should not be less than 1.2mm.
- ii) The cladded seal should not fail in adhesion between the rubber and the cladding. The test should ensure adhesion bond of 176 N/cm width of a seal for a separation rate of 2.5 cm/min.

4.6.0

Fabrication of Steel Works

Structural steel work shall conform to the requirement hereinafter specified, unless otherwise called for in these specifications or on the drawings. Finished members shall be



free from twists, bends and open joints. Compression joints depending upon contact bearing shall have surfaces truly faced so as to have full contact bearing when aligned and riveted or bolted. The thickness of the materials shall be sufficient to carry the loads to which they are submitted, taking into account permissible stresses according to the applicable standards and/or as specified in these specifications. Nevertheless, the minimum permissible thickness of certain components shall conform to the requirements indicated below:

Gates: (Web and Flange of horizontal and vertical girder)	16mm (min.)
Stiffeners	10mm (min.)
Embedded parts (Track base, web alongwith Flange)	12mm (min.)
All other sections	10mm (min.)

4.6.1 Straightening of Materials

Before being laid off or worked, rolled material shall be straight and shall be cleaned of all rust and dirt. If straightening is necessary, it shall be done by methods that will not be cause for rejection of the material.

4.6.2 Shearing and Cutting

Shearing and cutting by torch shall be performed carefully and in all work which will be exposed to view after completing shall be finished neatly.

4.6.3 Holes

Holes in structural steel members carrying calculated stresses shall be sub punched to 3mm less than the nominal diameter of the rivet and reamed to full size or drilled after assembly. All other members may be punched to full size. Main members shall be assembled in the shop prior to reaming or drilling holes for field connection.

4.6.4 Punching

For sub-punching and for punching to full size, the diameter of the punch shall be 5mm smaller and 1.6mm larger respectively than the nominal diameter of the rivet. The diameter of the rivet shall not be more than 2.5mm larger than the diameter of the punch. All holes shall be clean cut and will be without torn or ragged edges. If any hole must be enlarged to admit the rivet, it shall be reamed.

4.6.5 Accuracy of Punched Holes

Holes shall be punched so accurately that after assembling the component parts of a member, a cylindrical pin 3mm smaller in diameter than the nominal diameter of the punched hole may be entered perpendicular to the face of the member, without drifting in not less than 75 percent of any group of continuous holes in the same plane. All holes shall punch a pin 5mm smaller in diameter than the nominal diameter of the holes.

4.6.6 Reaming

Reamed holes shall be cylindrical, perpendicular to the member and not less than 1.5mm and not more than 2.5mm to the nominal diameter of the rivets. Built up members shall be assembled and firmly bolted together before any reaming is done. Reamed parts shall not be interchanged. Burrs and shavings from reaming shall be removed and if necessary, reamed pieces shall be taken apart before being riveted and the shavings removed.

4.6.7 Drilling

Drilled holes shall be cylindrical, perpendicular to the member and 1.5mm larger than the nominal diameter of the rivet.

4.6.8 Accuracy of Reamed and Drilled Holes

Holes shall be drilled and reamed so accurately after assembly that not less than 85% of any group of continuous holes in the same plane shall show no offset greater than

0.8mm between adjacent thickness of metal.

4.6.9 Removal of Burrs

Burrs resulting from reaming or drilling shall be removed with a tool making a 1.5mm level.

4.6.10 Rounding, Chamfers, Edges

The edges of surfaces to be painted shall be rounded (minimum radius 2 mm) or chamfered accordingly. This requirement must be stated in all the fabrication drawings for the relevant parts.

4.7.0 Welding

4.7.1 Welding Technique

Members to be joined by welding shall be cut accurately to size, and where required, shall be rolled or pressed to proper curvature in accordance with the approved drawings. The dimensions and shape of edges to be joined shall be such as to allow thorough fusion and complete penetration and plates shall be planed if necessary, to accomplish this result. Members to be welded together shall be in sufficient intimate contact at the time of welding so that members will not be forced more closely together with the cooling of the weld, thus, setting up additional strains and distortions in the weld and parent metal.

The cut surfaces shall be free from all visible defects such as laminations, surface defects due to shearing or cutting or flame cutting operations. The surfaces of plates to be welded shall be free from dust, grease and scale for a distance of 12mm back from the welding edge at the time of welding. Flame cutting may be used in the preparation of the various members, provided the operation is performed carefully, and the edges so cut are cleaned thoroughly after being cut, so as to expose clean metal. Any contour irregularities at points of critical stress shall be removed by grinding.

Care shall be taken in designs that the welds, when being made, are well accessible. Overhead welding is to be



avoided, if possible and flat position is to be striven for. Drawings should clearly indicate the joint position, shop or field welding, kind of welding, method of welding, welding sizes, type of NDT and other required points. The location of joints to be tested shall also be indicated on the drawings. Symbols to be shown on the drawings should conform to relevant Indian Standards.

All welding shall be done by electric arc method by a process which will exclude the atmosphere from the molten metal, except where otherwise specifically permitted. The welding electrodes required shall be furnished by the contractor. Correct selection of electrodes shall be done taking due care of welding method and base metals. The welding electrodes shall be of the heavily coated type designed for all position welding. The make, type and size of all welding electrodes shall be subjected to the approval of the Employer.

In assembling and during welding of the component, parts of built up members shall be held in place by sufficient clamps or other adequate means to keep all parts in proper position. The surface to be welded shall be cleared of scale, slag, rust, paint and other foreign matter, except that thin coat of linseed oil need not be removed before welding. Where weld metal is deposited in two or more layers, each layer shall be brushed with a wire brush or otherwise cleaned before the subsequent layer is deposited. In welding, precautions shall be taken to minimize stresses due to heat by using the proper sequence in welding.

Upon completion, the welds shall be brushed with wire brush and shall show uniform section and smoothness of weld metal. Edges and ends of fillets and butt joint welds shall indicate good fusion and penetration into base metals. Specific requirements for butt joints and fillet joints are given below:-

All shop and field welding performed on the work shall be subject to inspection by Employer when welding plates, of which one or both exceed 25mm in thickness, continuous areas of plates around the welding operation shall be



preheated to not less than 70°C and kept at a substantially uniform temperature throughout the process. The temperature shall be measured by Tempsticks or other approved means. Low hydrogen electrodes shall be used wherever necessary, particularly if the temperatures are below 10°C. Peening of multiple pass welds to control distortion or to minimize residual stresses may be carried out with light blows from a power hammer using an elongated round nosed tool. Peening shall be done after the weld has cooled to a temperature warm to the hand. Care shall be exercised to prevent scaling, flaking or rupturing of weld and base metal from over peening. Neither the first nor the last pass of a multiple pass weld shall be peened.

All welds on stress carrying members shall be done in Manufacturer's shop unless otherwise agreed by Employer. In general, only non-load carrying seal welds will be permitted in the field. All field welding shall have prior agreement of Employer. Tack welds shall be permitted only as a temporary welds required for assembly purpose.

The welding sequence shall be planned to control and minimize distortion and where necessary shall include stress relief to minimize residual stresses. Minimum stress-relieving requirements are specified in the appropriate sections of these specifications.

Welded components subject to vibrations and stress reversals shall be fabricated with full penetration welds.

4.7.2

Butt Joints

In principle, butt joints should be made with back-run. Where, it is not possible to do the back run, either a backing strip should be placed and welding should be so made that the melted metal fully penetrates to the backing strip or the side butt welding should be executed so that the melted metal reaches the back of the groove and a full penetration is achieved. Dye-penetration test shall be carried out after each pass of the weld.

4.7.3 Fillet Joints

All fillet welds shall be continuous. For the main members, no fillet welding should be made on members whose thicknesses differ substantially. Fillet weld at 'T' Joints should be made, as a rule, on each side of the joint, unless it is otherwise agreed due to some practical reasons. They shall be tested ultrasonically or by dye-penetration test for soundness.

4.7.4 Qualification of Welding Process

A specification of the welding process, that is proposed to be used, shall be established & recorded and a copy of such specification together with a certified copy of report of results of tests made in accordance with the process and specifications shall be furnished.

The qualification of the welding process shall be atleast equal to that required by 'Standard Qualification Procedure' of the Indian Standards and the minimum requirement of the tests shall be atleast as stated in the said 'Standard Qualification Procedure'. The Contractor shall submit the WATR(Welder approval test Record), WPS(Weld procedure specifications) and WPR(Weld procedure records) to the Employer for approval before the start of the activity, complete in all respects alongwith relevant standards, supporting documents etc.

The contractor shall be responsible for the quality of the work performed by his welding staff. All welders assigned to the work shall have passed qualification tests for welders. If at any time the work of any welder appears questionable, the welder shall be required to pass additional qualification tests to determine his ability to perform the type of work on which he is engaged.

4.8.0 Stress Relieving

Stress relieving of welded parts shall be done, where required, after all the welding is completed. Machined surfaces of parts requiring stress relief shall be machined to final dimensions after the parts have been stress relieved. Localized stress relieving will not be permitted for shop

welded parts. The procedure for stress relief shall conform to IS: 10801, IS: 10234, IS: 2825. All plates to be welded above the thickness of 36 mm shall be stress relieved.

4.9.0 Fabrication of Gates

4.9.1 Vertical Lift Fixed Wheel/Slide Gates

The gates shall be of welded steel fabrication with skin plate, horizontal girders, vertical stiffeners and reinforcing plates with dimensions as shown in drawings. All parts of the gate shall be fabricated in strict accordance with the Standards as per specification. Special care shall be taken in fabrication of parts affecting the strength, rigidity or water tightness of the gate. Caulking of rolled edge plates will not be permitted. All pockets or depressions shall be provided with suitable drain holes to prevent collection of water.

The structural members of gates shall be securely connected by welding or by fit bolts. Important joints and connections which will be heavily stressed under load shall be made without flaw. These joints shall include the connection between horizontal girders and end girder box, splicing joints in gates. For welding of such connection only, the best qualified welders shall be assigned. The splicing arrangement shall be designed to allow flexibility in the gate assembly to facilitate installation, however, there shall be flexible joint in case fixed wheel gates and rigid joint in case of slide type gates after final assembly at site. The lengths of the members shall be selected to keep splice joints to a minimum subject to transportation limitations. All splices shall be designed with watertight sealing arrangement. All welded connections shall be fully welded.

Care shall be taken that the side seals of gate bear evenly and with uniform pressure throughout their length on the side seal seats embedded in the faces of the piers and that the bottom seals bear evenly on the bottom seal seat (sill) embedded in concrete. The wheel pin supports and lifting attachments shall be accurately line bored so that the axis of all such holes be perpendicular to the vertical centre line of the gate and shall lie in a common plane which shall be

parallel to the finished surfaces of the seal bases. The bolt holes for guide rollers/shoes shall be accurately bored only after the gate has been completely assembled.

4.9.2 Embedded Parts

All structures, parts of the gate frames and the anchorages shall be straight and free from twist. The bottom sill beam, seal seats etc., shall be fabricated as steel plates, structural section and shall be provided with suitable anchorage.

Both faces of the track base flanges carrying the track shall be truly perpendicular to the web. The flange face shall be finished to provide a truly plane surface for the track. The faces of the seal seats shall be finished so as to lie in one plane within permitted tolerances. The tack shall lie in a true vertical plane. The splice length for embedded parts such as seal seats, track paths, guide etc. shall not be less than 6.0 m. Bolted joints shall be provided for joining of splices at site.

Suitable bolted connections shall be provided for connecting side seal members to the sill member and top seal member to the side seal members.

4.9.3 Miscellaneous Parts

Except where otherwise indicated elsewhere in the Technical Specifications, the Contractor shall supply the following as advised by the Employer:

All platforms, ladders, guards and handrails necessary for easy and safe access to Works shall be treated as included in the contract. Handrails shall be of tubular steel construction except that the top rail shall be of flat bar, fitted with a formed plastic covering.

The use of ladders shall be kept to a practicable minimum. Where ladders are approved for use they shall be of steel, have an inclination of 70° to the horizontal and a minimum width of 450 mm with a back safety guards.

Safety guards at each point shall be provided where normal access provision would permit personnel to come within



reach of any moving equipment.

All covers for pipe and cable trenches, required for completing the floors around and over works supplied under the Contract will be supplied and installed by the main contractor. Unless otherwise approved, floor plates shall be of an angular pattern.

Covers and curbing for dismantling hatches in main floors will be provided by the main contractor.

4.10.0

Electrical Works

4.10.1

General

The electrical items of works of any electrical or mechanical installation to be provided under this contract shall be according to the Technical Specifications and if not stated otherwise shall fulfill the complete requirements of the work.

All components shall be of reputed and reliable design. The maximum extent of uniformity and interchangeability shall be considered while designing the equipment. The design shall facilitate easy maintenance and repair of the components.

The works shall be pre-assembled to the maximum possible extent in the Contractor or Sub-contractor workshop, complete with all devices and wired up to common terminal blocks.

Unless otherwise agreed, rating of main electric works as selected or proposed by the Contractor, whether originally specified or not, shall generally include a safety margin of 10% under consideration of the worst case to be met in service. Prior to approval of such basic characteristics, the Contractor shall submit all relevant information such as consumer lists, short circuit calculations, de-rating factors etc.

Short-circuit calculations shall be evaluated giving full evidence that every electric component can withstand the maximum stresses under fault conditions, for fault levels and

durations obtained under the worst conditions, e.g. upon failure of the corresponding main protection device and time delayed fault clearing by the back-up protection device.

All works shall be suitable for the prevailing climatic conditions at site.

Outdoor installations shall be protected against solar radiations by means of adequate covers, where required.

The Contractor shall ensure that all the supplied works is insensitive to any signals by wireless communication equipment.

4.10.2 Local Control Panel

The local control panel shall be an indoor/outdoor type (degree of protection of enclosure type IP-55) made of steel sheet of thickness not less than 2.5 mm, containing all necessary Works/plant for the control, protection/safety and supervisory elements as required and shall be completely painted and wired. The panel frame structure shall be self-supporting, free standing on floor or suitable for wall/vertical post mounting.

Cubicles and panels shall be vermin proof. Removable gland plates shall be supplied and located to provide adequate working clearance for the terminals of the cables. Under no circumstances shall the floor/roof plate be used as a gland plate. The cables and wiring shall enter from bottom or top as approved by Employer.

The cubicles and panels shall be adequately ventilated, if required, by vents or louvers and shall be so placed as not to detract from the appearance. All ventilating openings shall be provided with corrosion resistance metal screens or a suitable filter to prevent entrance of insects or vermin. Space heating elements with thermostatic control shall be included in each panel.

Cubical/panel will be of sufficient size so as to neatly and methodically accommodate all the electrical power and control equipment, indicating lamps, push buttons, all the



necessary relays, starters, fuses, limit switches, selector switches, terminal blocks, circuit breakers, contactors, current transformers, protection gears, interlocks, alarms, measuring instruments including all wiring and all other accessories necessary for safety, control and operation for the hoists/cranes.

The controls, indicating lamps, push buttons, selector switches, etc. shall be installed flush mounted on the outside door of the control panel so as to give clear view of all the indicating lights, measuring instruments, position indicators so that the gate and hoist can be operated with the cabinet door closed. The remaining equipment will be installed inside the cabinet being accessible when door is opened.

The panel door shall have close fitting, gasketed, hinged, swing off construction, capable of being opened through 180°. The doors shall be provided with integral lock and master key. A mechanical interlock shall be provided so as to ensure de-energisation of the panel as soon as the door is opened. Suitable provision may, however, be made to bypass the above interlock under extraordinary requirements when manual energisation of panel is necessary under open condition. Panel shall be provided with door switch operated illumination.

All terminals will be of block type. Wiring inside the control panel is made at least with 650V/11000V (wherever applicable as per system requirement) insulation grade, 1.0 mm², 1.5mm² and 2.5mm² Control cable and required size of power cable. All cable shall be brought at terminal blocks mounted inside the control panels to facilitate connection with the external cables. All the metallic parts of the switchboards and all earth wires of the circuits shall be connected with the Earthing bus of not less than 25 mm² copper conductors. All control cables and components will be marked in a systematic manner on the drawings accordingly tagged cables and components in the control panel. All necessary auxiliary devices for connection to limit switch shall also be provided. The control equipment shall generally meet the requirement of Clause 6.6 of IS: 6938 (Latest



Revision).

4.10.3 Standards

The design, manufacture and testing of all works and installations shall strictly comply with the latest revision of the relevant IEC standards (International Electrotechnical Commission Standards).

4.10.4 Colour Code

The manufacturer's painting systems shall be used to the maximum possible extent, but shall by all means be subject to the approval of the Employer. Final coats of paint shall be matched with adjacent installation, where required.

4.10.5 Electrical Motors

All motors shall be of reputed make and shall comply with the requirements of the work. Motors of the same type and size shall be fully interchangeable and shall comply with Indian Standard and to IEC Standard motor dimensions.

The general construction shall be stiff and rigid, no light metal alloy casings will be accepted. All precautions shall be taken to avoid any type of corrosion.

All motors shall be fitted with approved types of lifting hooks or eye bolts as suitable.

a) Rating

The rating of the motors shall be adequate to meet with the requirements of the works. The service factor, being the ratio of the installed motor output to the required power at the shaft of the driven machine at its expected maximum power demand, shall be applied as follows:

Power Demand of Driven Machine:	Service Factor
Up to 5kW	1.2
More than 5kw	1.1



AC motors shall be capable of operating continuously under rated output conditions at any frequency between 95% and 105% of the rated frequency and or with any voltage variation between 90% and 110% of the normal voltage. A transient over voltage of 130% of the normal voltage shall as well be sustained.

Further, the motors shall be capable of maintaining stable operation when running at 70% nominal voltage for a period of 10 second. The pull-out torque for motors shall not be less than 200% of the rated torque.

b) Starting

AC motors shall be designed for direct on-line/Star-delta starting (as per the system requirement). If DOL is selected, then it shall be capable of being switched on without damage to an infinite bus bar at 110% of the nominal voltage with an inherent residual voltage of 100% even in phase opposition. For starting the motors from the individual main and auxiliary bus bars, a momentum voltage drop of 10-15% referred to nominal voltage should be taken into consideration. With 85% of the nominal voltage applied to the motors terminals, each motor shall be capable of accelerating its associated load to full speed with a minimum accelerating torque of 5% of full load torque.

The maximum starting currents (without any tolerance) shall not exceed value 5 times of rated current for motors.

Motors for frequent automatic starting shall have an adequate rating.

c) Windings and Insulation Class

The insulation of motors shall be of class F but maintain in operation the temperature limits of class B materials. It shall be suitable for operation in damp and humid atmosphere, for occasional contact with corrosive gases and vapours and for considerable fluctuations in temperature.

The stator winding shall be suitably braced to withstand the forces due to direct-on-line starting and transfer conditions

as mentioned before. The winding envelopment and tails shall be non-hygroscopic. The stator winding shall withstand the maximum fault current for the period determined by the associated protective devices.

The rotor winding (if applicable) shall be designed to give trouble-free continuous service including repeated direct-on-line starting. The rotor shall be subjected to a 120% over speed test for 2 minutes without showing any winding dislocation.

d) Ventilation and Type of Enclosure

All motors shall be of the totally enclosed fan-cooled type, protection class IP 54 according to IEC Recommendation 144. Cable terminal boxes shall be of class IP 55.

They shall have a closed internal cooling air circuit re-cooled by an external cooling air circuit drawn from the opposite side of the driving end.

Where motors are installed outdoors, a weather-proof design shall be chosen. Above shall be equipped with automatically controlled space heating elements for protection against internal condensation of moisture during stand-still period.

Motors installed outdoors and directly subjected to solar radiation shall be rated such as not to exceed a maximum metal temperature of 85°C. Where necessary, such motors shall be provided with sun shields.

Vertical motors shall be provided with a top cover to prevent the ingress of dirt etc.

e) Bearings

As far as possible, the motors shall have sealed ball or roller bearings lubricated for life. All other motors with ratings of about 1kW and above shall be equipped with lubricators permitting greasing while the motors is running and preventing over-lubrication. Additionally, the bearings shall be fitted with grease nipples permitting the use of a universal grease gun. Vertical motors shall have approved thrust

bearings.

All bearings shall be easily controllable during operation or stand-still without dismantling the bearings. The bearings shall further be protected and sealed against dust penetration and oil leakage.

In case of independent bearings, motor and bearing pedestals shall be fitted on a common base plate.

For the transport of motors equipped with ball or roller bearings, special bearing inserts shall be provided to prevent transport damage.

f) Shafts and Couplings

The motors shall be provided with a free shaft extension of cylindrical shape with key and keyway according to IEC Recommendation 72-1 and with the motor side-coupling which shall be pressed on the motor shaft and be balanced together with it. A coupling guard shall be provided.

g) Terminal Boxes and Earthing

The terminal leads, terminal boxes and associated equipment shall be suitable for terminating the respective type of cables as specified in these Technical Specifications.

The terminal boxes shall be of ample size to enable connections to be made in a satisfactory manner. Supports shall be provided at terminal boxes as required for proper guidance and fixing of the incoming cable.

The terminal boxes with the cables installed shall be suitable for connection to supply systems with the short-circuit current and the fault clearance time determined by the motor protective devices.

A permanently attached connection diagram shall be mounted inside the terminal box cover. If motors are provided for only one direction of rotation, this shall be clearly indicated.

Terminal boxes shall be totally enclosed and designed to



prevent the ingress of moisture and dust. All joints shall be flanged with gaskets of neoprene or similar material. For motors above 1kW, the terminal box shall be sealed from the internal air circuit of the motor.

Depending on the size, the terminal box of L.V. motors shall be fitted either with an approved cable sealing-end or with a gland plate drilled as required and provided with suitable fittings for cable fixing and sealing. Such openings shall be temporarily plugged or sealed during transportation.

Terminal boxes of M.V. motors shall be fitted with an approved cable sealing end and a pressure relief diaphragm suitably located. For plastic insulated and sheathed cables filling with compound is not required.

The three neutral end of the windings of M.V. motors shall be brought out to a separate terminal box.

For Earthing purposes, each motor shall have adequately sized bolts with washers at the lower part of the frame. In addition, each terminal box shall contain one Earthing screw.

h) Noise-Level and Vibrations

Under all operating conditions, the noise level of motors shall not exceed 80 dB(A).

In order to prevent undue and harmful vibrations, all motors shall be statically and dynamically balanced. Vibration displacements or velocity shall be measured in accordance with DIN 45 665 for IEC motor sizes 80 to 315. The results for all motors shall be within the "R" (reduced) limits.

4.10.6

Auxiliary Works

a) Auxiliary Switches

Where appropriate, each item of Works shall be equipped with all necessary auxiliary switches, contactors and devices for indication, protection, metering, control, interlocking, supervision and other services. All auxiliary switches shall be wired up to terminal blocks on the fixed portion of the works.

All auxiliary switches and mechanisms shall be mounted in approved accessible positions clear of the operating mechanism and are to be protected in an approved manner. The contacts of all auxiliary switches shall be strong and shall have a positive wiping action when closing.

b) Control Switches

Control switches for electrically operated circuit breakers shall be of the pistol grip or discrepancy type. They shall operate clockwise when closing the circuit breakers and anti-clockwise when opening them. The control switches shall be so designed as to prevent them from being operated inadvertently, and where switches of the discrepancy type are used they shall require two independent movements to effect operation. Control switches shall be so designed that when released by the operator, they return automatically to the neutral position after having been turned to the “closed” position and shall at the same time interrupt the control voltage supply to the operating mechanism of the circuit breaker.

Switches for other apparatus shall be operated by shrouded push buttons or have handles of the spade type, the pistol grip type shall be used for circuit breaker operation only.

Control, reversing, selector and test switches shall be so mounted, constructed and wired so as to facilitate the maintenance of contacts without the necessity for disconnecting wiring.

c) Anti-Condensation Heaters

Each individual enclosure accommodating electrical Works which is liable to suffer from internal condensation due to atmospheric or load variations shall be fitted with heating devices suitable for electrical operation at the specified standard AC Voltage, being of sufficient capacities to raise the internal temperature suitably above the ambient temperature. Heaters in motors and similar devices shall be switched on automatically upon opening of the motor starter, and vice-versa. Heaters in switchgear/MCC cubicles, control

cubicles, panels, desks etc., shall be controlled automatically by adjustable hydrostats (setting range about 50 – 100% relative humidity). The electrical apparatus so protected shall be of such design that the maximum permitted temperature is not exceeded if the heaters are energized while the apparatus is in operation.

Heaters shall be equipped with a suitable terminal box. All Works, whether fitted with a heating device or not, shall be provided with suitable drainage and be free from pockets in which moisture can collect.

d) Protection Devices

The main parts of the Works shall be protected and interlocked so as to prevent malfunctions and other fault occurrences, and to maintain safety during all operation phases.

Electric protection relays shall be of reputed make. They shall be of the static or mechanic/magnetic, tropicalized type and be mounted in suitable dust proof and shock-absorbing casings. They shall not be affected by external magnetic fields or any other influence (radio, computer, signals, impulses etc.) consistent with the place or method of mounting. Electro-magnetic relays shall have a transparent cover with appropriate seals.

The protection relays shall be equipped with all necessary auxiliaries such as tripping unit, time relays, external resetting device (hand reset flag with seal-in operation). The relays shall provide easy access for testing and setting purposes.

Pre-warning alarms shall be initiated as early as possible before the protection system trips, in order to enable the operators to take precautions. Tripping of a protection system as well as the sources of the protective action shall be indicated and recorded as an alarm. Unless otherwise required for special purposes, protection relays shall remain in the tripped position until the operator resets the relay manually. The protection and auxiliary relays shall be

grouped and mounted on plug-in modules or stationary – mounted on swing frame with separate plugs and sockets to feature easy replacement and testing. The construction shall be sturdy and such that all parts are easily accessible for adjustment. Relay installed in switchboards shall be arranged in compartments separated from the switchgear.

Besides the mechanical-operated flag type indicator, all relays shall have sufficient contacts and/or auxiliary relay contacts to perform all the tripping, intertripping, interlocking, indication and alarm functions required. Spare contacts (1 N.O. 1 N. C.) shall be provided for later use. The contacts shall be silver – plated or of the seal-in type with the main contacts adjustable. The relay contact rating shall be for the specified standard voltage and for 200% of the nominal passing current. The relay coil shall be able to operate properly at voltage variations of –25% to + 15%.

Relays shall be capable of withstanding at least one million operations without any defect.

Testing of the individual relays shall either be effected by stationary-mounted or portable testing devices.

e) Terminal Points

The Contractor shall supply and install all terminals, control boxes and cables in sufficient capacity, conduits, fittings etc. from terminal points for the distribution of electric power supply to the electrical Works/Plant and its controls including lighting to be supplied under this contract. The power supply cables shall be designed so that the voltage drop between the terminal points and the respective Works/Plant shall be limited to within 2.5% of the rated voltage.

The contractor shall supply and install the lighting fixtures to provide sufficient illumination over and under all the hoist equipment/gantry crane etc. to enable the operator and O&M crew to work on the Works/Plant being supplied at any time during 24 hours.

4.10.7 Cables

The Contractor shall provide the relevant design of the relevant cable systems, prepare the cable installation schedules, drawings with cable routing, connection diagrams and cable lists, details etc and submitted to the Employer for approval.

The power cable and control cables shall be of copper as per Indian Standards or IEC publications and the power cables shall be of minimum size of 16mm² and control cables shall be of minimum size 1.5mm².

All cables and accessories shall be suitable for installation under site conditions.

The contractor shall select the cable routes and raceways ensuring a minimum of interference with other installations.

a) Colour Code

Live parts of electrical connections shall be colour coded as follows:

Conductor Designation	Coding Alphanumeric	Symbol	Colour
A.C Network	Phase – 1	L1	Red
	Phase – 2	L2	Yellow
	Phase – 3	L3	Blue
	Neutral	N	Black
D.C. Network	Positive	L+	+White
	Negative	L-	-Black
	Neutral	M	Blue
Protective earthed	Neutral	PE/N	Green/yellow
Earth		E	Grey

Colour Coding for Mimic Diagrams

Mimic diagrams to be arranged on switchgear cubicles, control panels/desks etc. shall be colour coded as below:

220V D.C.	White
110V D.C.	Violet

b) Earthing System

All electrical system shall be properly earthed as per the latest ruling practice for the safety of the equipment, operating staff as well as the system. Contractor shall provide equipment earthing i.e. earthing of all the equipment supplied by contractor and connection upto the grounding risers in TRT deck to be provided by SAPDC/Employer (system grounding like earthing pit including risers will be designed/ supplied/erected by SAPDC).

4.10.8

Labels and Plates

Labels and data plates shall be provided in accordance with applicable standards and as detailed hereunder.

The proposed material of the labels, size, exact label lettering and proposals for the arrangement of the labels shall be submitted to the Employer for approval.

Designations in the Hindi shall appear above or to the right of the designation in the Contract language. The translations into and writings in the local language shall be submitted for approval.

a) Works/Plant Labels and Instruction Plates

Labels written in the Contract language shall be provided for all instruments, relays, control switches, push-buttons, indication lights, breakers etc. In case of instruments, instrument switches and control switches, where the function is indicated on the device, no label is required.

The label shall be fixed close to the devices in such a way that easy identification is possible. Fixing on the dial glass of instruments will not be accepted. The wording shall conform

to the wording used in engineering documents.

Easy separate construction unit (cubicle, panel, desk, box etc.) shall be identified by its Works identification number. Cubicles and similar units shall also bear this identification number on the rear side if rear access is possible. The overall designation of each unit shall be given in the Contract language and - if required – also in Hindi. These labels shall be made of anodized aluminium with black engraved inscriptions, arranged at the top section of the units. Manufacturer's trade labels shall – if desired – appear in the bottom section of the units.

All works inside cubicles, panels, boxes etc. shall be properly labeled with their item number. This number shall be the same as indicated in the pertaining documents (wiring diagrams, works list etc.).

Instruction plates sequence diagrams or instructions for maintenance shall be fitted on the inside of the front door of the electrical switchboards. These shall be in the contract language and in Hindi.

b) Warning Labels

Warning labels shall be made of synthetic resin with letters engraved in the Contract language and in Hindi.

For indoor circuit-breakers, starters etc. transparent plastic material with suitably contrasting colours and engraved lettering would be acceptable.

c) Labels for Conduits etc.

The material shall be non-corrosive and the description be done with 4mm high letters / figures.

d) Labels for Cables

Each cable when completely installed shall have permanently attached to each end and at intermediate positions as may be considered necessary by the Employer, non-corrosive labels detailing identification number of the cable, voltage



and conductor size.

The cables identification numbers shall comply with those of the cable list.

All cables in cable pits and at the entry to buildings shall be labeled utilizing the aforementioned type of label.

e) Rating Plates

Works (hoists, machines, transformers etc.) rating plates and other technical data/ informative plates shall either be of the enameled type or be of stainless steel suitably protected after engraving with a transparent paint resistant to aggressive atmosphere and solar radiation.

4.10.9

Identification Plates

Each important part to be delivered under this Contact shall be equipped with permanent identification plates in readily visible locations. Whether a part shall be considered as important in this respect shall be decided by the Employer.

The identification plates shall be protected during erection and especially during painting. Damaged or illegible identification plates shall be replaced by new ones. The identification plates of non-corroding, non-disintegrating material (except manufacturer's nameplates of small standardized components) shall be inscribed in the Contractual language.

The inscription shall be printed, stenciled or handwritten, but in any case waterproof, oil-proof and wear-resistant. Works (machines, transformers etc.) name plates shall be either of the enameled type or be of stainless steel covered after stamping with a transparent paint. Wording, size and material of all labels and plates shall be subjected to the Employer's approval.

a) Manufacturer's Nameplates

All Works/Plant shall be provided by a securely fastened name plate showing the maker's name, model, serial numbers, year of manufacture, main characteristics, date of

the respective Works/Plant and further relevant information specified in the applicable standards or necessary for the proper identification of the Works/Plant involved.

b) Instruction Plates

All plates showing designations or instructions for operation, safety, lubrication etc. shall have a uniform design. Instruction plates, sequence diagrams or instruction to operating staff shall be displayed on the inside of the front door of the control panel/switch board. All works inside cubicles, panels, boxes etc. shall be properly labeled with their item numbers. This number shall be the same as indicated in the wiring diagrams works lists, operation and maintenance manual.

All instruction plates displayed on the sub-assemblies shall show operation parameters, safety lubrication etc. which shall have a uniform format.

c) Warning Plates

Warning labels for safety of Works/Plant as well as operating staff shall be provided and shall be of synthetic resin with letters engraved in the contract language.

4.11.0 Painting and Surface Coating

a) General

All paints, painting materials and accessories for painting shall be supplied by the contractor and shall be included in the price bid. The paints proposed by the contractor must be approved by the Employer or his Authorized representative before application of the same. The analysis in respect of paint properties, paint composition and performance requirements of the paints shall be submitted by the contractor for examination and approval. The painting and surface preparation shall also conform to IS:14177(Guidelines for Painting system for Hydraulic Gate and Hoists) or any other relevant Indian Standards. Decision of Employer for the recommendation of such standard shall be final and binding



on the contractor.

b) Preparation of Surfaces

The preparation of surfaces prior to painting or coating shall be done as outlined below :

- i) Weld spatter or any surface irregularities shall be removed by suitable means before cleaning.
- ii) All oils, grease and dirt shall be removed from the surfaces by the use of clean mineral spirits, xylol, white gasoline (lead free) and clean wiping materials.
- iii) Following solvent cleaning, the surfaces to be painted shall be cleaned of all rust, mill scale or other lightly adhering foreign objectionable substances by sand blasting or grit blasting to uniform bright base metal. Size & type of the short blasting gun should be such that it can reach intricate & inaccessible locations. Any grit or dust remaining after the cleaning operation shall be completely removed from the surface by wire brushing, air blowing, suction or other effective means.
- iv) Surfaces of stainless steel, bronze, nickel and machined surfaces adjacent to the metal work being painted or cleaned shall be protected by masking or other suitable means during the cleaning and painting operation.
- v) Primer shall be applied as soon as surface preparation is completed and prior to the development of surface rust. The time gap between the application of primer and surface preparation shall normally not exceed six hours. In case there is considerable time gap, the surface should be reblasted prior to priming.

c) Shop Painting

- i) Stainless steel and bronze surfaces should only be cleaned and not painted.
- ii) All surfaces of the embedded parts which are to come in contact with concrete shall be cleaned as mentioned above and given two coats of cement latex to prevent rusting



during shipment/transportation and while awaiting installation.

- iii) Two coats of zinc rich primer shall be applied to all unfinished surfaces of the embedded parts and Gate to be exposed to atmosphere or water to obtain a dry film thickness of 75 microns, which shall be followed by two coats of coal tar blend epoxy resin paint to get dry film thickness of 150 microns in each coat. Total dry film thickness of paint shall not be less than 350 microns. Over and above aluminum epoxy paint of dry film thickness of 30 microns shall be provided for surfaces of the leaf exposed to sun. Time interval between the coats shall be 24 hours.
 - iv) All finished surfaces of ferrous metal including bolts, screws, threads etc., that will be exposed during shipment or while awaiting installation shall be cleaned and given a heavy uniform coating of gasoline soluble rust preventive compound or equivalent.
 - v) The structural components of Hoists, Gantry Crane, EOT Crane, Lifting beam shall be given two coats of zinc phosphate primer to obtain a dry film thickness of 45 micron per coat followed by one finishing coat of alkyd based micaceous iron oxide paint to obtain a dry film thickness of 70 microns followed by two coats of synthetic enamel paint conforming to IS: 2932 to give dry film thickness of 25 microns per coat of synthetic enamel paint. The total dry film thickness of all the coats shall not be less than 175 microns.
 - vi) Except machined surfaces all the surfaces of the machinery of the Hoists including gearing housing, shafting, bearing pedestal etc. etc. shall be given one coat of zinc phosphate priming paint to give a minimum dry film thickness of 50 microns. Motors and other bought out items shall also be painted. This will be followed by three coats of aluminum paint conforming to IS:2339 or synthetic enamel conforming to IS: 2932 to give a dry film thickness of 25 microns per coat.
- d) Field Painting



The painted metal work shall be handled with care so as to preserve the shop coats. The area of the shop paint, which has been damaged during transportation shall be cleared to base metal and repainted. Paint applied to such areas shall be of the same type as used originally in shop painting. All exposed unfinished surface of embedded parts and Gate shall be given a finishing paint of Aluminium epoxy paint so as to obtain shining surface of pleasing colour. This finishing coat should be able to reflect light and limit the heat absorption when exposed to sun.

e) Painting for Electrical equipment

Rust and scale shall be removed by sprinkling with dilute acid followed by the washing in running water followed by rinsing in slightly alkaline hot water and drying.

Oil, grease and dirt shall be thoroughly cleaned by emulsion cleaning.

All steel sheets shall be phosphated in accordance with IS 6005 'code of practice for Phosphating iron and steel'.

After Phosphating, thorough rinsing shall be carried out with clean water followed by final rinsing with dilute dichromate solution and oven drying.

The Phosphate coating shall be sealed with application of two coats of ready mixed stoving type Zinc chromate Primer. The first coat may be flushed dried, while the second coat shall be stoved.

Adequate thickness of powder coating with high voltage electrostatic appliance shall be applied. Final colour of the panels shall be pebble grey as per RAL – 7032 or equivalent as per the colour code IS –5.

Relay and instruments: EGG Shell/Bright Black Circuit Level: White letter on Black level.

f) Measures during Painting

i) Any bare spots or holidays shall be recoated with additional



application of primer.

- ii) All runs, sags, floods or dips shall be removed by scrapping and cleaning. The cleaned area should be retouched or all such defects shall be remedied by reblasting or repriming.
- iii) Special attention should be given to good coverage on rivets, welds, sharp edges and covers.
- iv) Suitable measures shall be taken to protect the applied primer from contact with rain, fog, mist, dust or other foreign matter until completely hardened and next coat being applied.
- v) The air temperature at the time of application must not be below 10°C and relative humidity must not be above 90%.
- vi) The components during or after painting shall be handled carefully so that no damage to the paint occurs.
- g) Application Procedure

All paints and coating materials shall be in a homogeneously mixed condition at the time of application and shall not be thinned except as hereinafter specifically provided. Warming of the paint shall be performed by means of hot water bath.

All surface to which paint shall be applied immediately after cleaning, and except otherwise specifically provided, shall be applied by either brushing or by airless spray. When paint is applied by spraying, a mechanical agitator type of paint pot shall be used. Means shall be provided for removing all free oil and moisture from the air supply line of all spraying equipment. Each coat of paint shall completely cover the surfaces and shall be free from runs, sags, pinholes and holidays. Each coat of paint shall be allowed to dry or harden thoroughly before the succeeding coat is applied.

All paints shall be applied by skilled workers in a workman like manner. Paint shall not be applied during damp weather and on the surfaces which are not entirely free from moisture. Rust preventive compound shall be applied by any convenient method to ensure complete coverage of heavy

coating. After the final application, the paint film shall be allowed to cure atleast for 7 days.

4.12.0 **Transport and Storage**

Shipping, transportation, loading and storage shall be done under the supervision of the Contractor. An appropriate period for transportation shall be considered.

The general co-ordination of storage and erection work as well as the civil engineering work on site will be done by the Employer to the possible extent.

The delivery dates, transportation and erection periods indicated in the Contract Documents shall be strictly adhered to.

From the time of manufacturing until commissioning, all parts of the plant shall be protected against damage of any kind. Parts, which are damaged during transport shall be fully replaced at the Contractor's expense.

The contractor shall provide the Employer with complete packing lists of each performed shipment.

a) Packing

After the workshop assembly and shop inspection and tests including witness inspection by the Employer or his authorized representative wherever specified and prior to dismantling for shipment to the Site, all items shall be carefully marked to facilitate site erection. Wherever applicable, these markings shall be punched or painted so they are clearly visible.

Dismantling shall be done into convenient sections, so that the weights and sizes are suitable for transport to site and for handling on the site under the site conditions of the Project.

All individual pieces shall be marked with the correct designation shown on the Contractor's detailed drawings and other documents (packing lists, spare part list, in Operating & maintenance Instruction etc.)



Marking shall be done preferably by punching the marks into the metal before painting, galvanizing etc. and shall be clearly legible after painting, galvanizing etc. In labeling, the Contractor shall endeavor to use as few designations as possible and each part of identical size and detail shall have the same designation, regardless of its final position in the plant.

All parts of the Works shall be packed at the place of manufacture. The packing shall be suitable for shipment by sea and for all special requirements/ limitations of the transportation to Site. Where necessary, double packing shall be used in order to prevent damage and corrosion during transportation, unloading, reloading or during intermediate storage.

All parts including electrical parts shall be suitably protected against corrosion, water, sand, heat, atmospheric conditions, shocks, impact, vibrations etc. by packing them into high pressure polyethylene foil.

The Employer reserves the right to inspect and approve the packing before the items are dispatched but the Contractor shall be entirely responsible for ensuring that the packing is suitable for transit and such inspection will not exonerate the Contractor from any loss of damage due to faulty packing.

All packing costs shall be included in the scope of Work.

The packing shall be provided with suitable handles so that slings for handling may be attached readily while these are to be moved. Where it is unsafe to attach slings to the box, parts shall be packed with slings attached to the part and slings shall project through the box or crate so that attachment can be made easily. All parts shall be properly secured and packed to withstand handling during transportation. All packing shall allow for easy removal and checking at sites. Special precautions shall be taken to prevent rusting of steel and iron parts during transit.

Suitable methods proposed to be adopted for protection



against moisture shall be subject to the prior approval of the Employer. Each bale or package is to contain packing note quoting number and date of contractor's order and the name of office placing the order.

After delivery of material at site, all packing material shall become property of the Employer. Notwithstanding anything stated in this clause, the contractor shall be entirely responsible for loss, damage or depreciation to the stores due to faulty and insecure packing. The Works/Plant shall be insured for loss or damage during transit at the cost of the contractor.

b) Marking

The contractor shall mark all containers with the implementing document number pertinent to the shipment. Each shipping container shall also be clearly marked on at least two sides as follow:

- Consignee
- Contract No.
- Port of Destination
- Item number (if applicable) Packing number, in sequence and quantity per package.
- Description of Work
- Net & gross weight, volume

c) Storage

The Contractor shall inform himself fully as to all relevant transport facilities and requirements, loading gauges and other limitations, road, bridge limitations up to the site and shall ensure that the Works/Plant as prepared for transport shall conform to such limitations. The Contractor shall also be responsible for obtaining from the railway or highway authorities any permit that may be required for the transport



of loads exceeding the normal gauges.

The contractor shall be responsible for all Custom clearance of the consignments from the Indian port if by sea and or from airport if shipped as air cargo, local storage and further transportation to site.

The contractor shall provide means for all unloading and reloading for all consignments of the plant, during transport to Site. Unloading on the Site will be provided by the Contractor. Consignments shall be unloaded immediately on arrival at Site and the Employer shall be immediately informed about the arrival of the consignment. The contractor is required to take the necessary steps in order to provide the carriage, special supporting structures for heavy loads etc.

The contractor shall develop necessary storage facility for proper and safe storage of all the materials. The warehouses shall be waterproof, well ventilated and of designated floor etc.

If large parts are stored in the open air, they shall be provided with weather resistant and fire-resistant covers. Electrical parts which are not packed in heavy duty polyethylene foil and those so packed but whose packing has been damaged shall be kept in suitable places from the moment of storage to the moment of installation.

All insulation materials which will be taken from the warehouse for installation and which are stored temporarily in the station shall be protected from weather or humidity.

4.13.0

Handling Works/Plant

Handling Works/Plant for maintenance of the following components shall also be supplied by the manufacturer.

- i) Gates and embedded parts
- ii) Gates seals
- iii) Gates wheels and bearings



iv) Hoists

Manufacturer shall supply a list of all special tools required for gates assembly, dismantling and alignment.

Handling Works/Plant required for installation of gates and embedded parts shall also be arranged by the manufacturer.

4.13.1

Weights

Before dispatch, the contractor shall determine (by the most accurate means available) the net weight of each piece of assembly that is to be shipped/transported as a unit exclusive of boxes, crates or kits. The copies listing the net weight shall be painted on the respective pieces of assemblies or stated on the tags attached thereto.

4.13.2

Mechanical Instruments

All mechanical parts of instruments shall be suitably protected against shocks and vibrations, heat, humidity and splash water etc.

Pressures gauges shall be provided with a damping liquid, e.g. glycerin to compensate vibrations. Pressure gauges without damping means are not permitted, unless approved by the Employer.

CHAPTER-V

Quality Assurance, Inspection and Workshop Testing

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5.0.0 Quality Assurance, Inspection and Workshop Testing

5.1.0 Quality Assurance Programme

a) The Bidder shall follow Quality Assurance Programme to ensure that the equipment and services under the scope of contract whether manufactured or performed at the Bidder's works or at his sub-vendor's premises or at the SAPDC's site or at any other place of work are in accordance with the technical specifications. Such programme shall be outlined by the Bidder and be submitted along with the bid. The QA programme shall be generally in line with IS/ISO- 9001 and generally cover the following:

- Organisation structure for the management and implementation of the proposed quality assurance programme
- Quality System Manual
- Design Control Systems
- Documentation and Data Control Systems
- Qualification/Experience of Bidder's key personnel.
- Procedure for purchase of material, parts, components and selection of sub-vendor's services including vendor analysis, source inspection, incoming raw-material inspection, verification of materials purchased, etc.
- System for shop manufacturing and site erection controls including process, fabrication and assembly.
- Control of non-conforming items and system for corrective actions and resolution of deviations.
- Control of calibration and testing of measuring / testing equipment.
- System for Quality Audits.
- System for identification and appraisal of inspection status.
- System for authorising release of manufactured product to the Purchaser.
- System for transportation /delivery, handling, storage and preservation.
- System for maintenance of records.

5.2.0 General Requirements - Quality Assurance

i) All materials, components and equipment covered under scope and its technical specifications shall be



- procured, manufactured, erected, commissioned and tested at all the stages, as per a comprehensive Quality Assurance Programme agreed mutually
- ii) Minimum Quality Assurance Test Requirement (QATR) to be followed during Manufacturing and Field erection indicating requirement of various tests / inspections, on major equipment / items, to be carried out as stipulated in technical specification and standards mentioned therein, are attached hereto and are part of bidding documents. Clarification, if any, on these quality assurance test requirement, raised by bidder shall be discussed and resolved during pre-bid meeting.
 - iii) After the award of contract, the contractor shall submit the detailed Manufacturing & Field Quality Assurance Plans for complete equipment / material during detailed engineering in the format attached hereto (format of quality plan F-060-02 issue 2.0 rev. 01, Total 1 Page) for approval and acceptance by SAPDC/Consultant in line with technical specification, Quality Assurance– General & Test Requirements and detailed engineering.
 - iv) Manufacturing Quality Assurance Plans shall detail out for all the components and equipment & various tests/inspection, to be carried out in conformity with relevant latest IEC/IS/ISO etc, quality practices and procedures to be followed by Contractor's / Sub-vendor's Quality Control Organization, the relevant reference documents, standards and acceptance norms etc. during all stages of material procurement, manufacture, assembly and final testing / factory acceptance tests.
 - v) The Field Quality Assurance Plans shall detail out the various tests/inspection to be carried out in conformity with relevant latest IEC/IS/ISO, quality practices and procedures etc. to be followed by the contractor's / sub-contractor's site Quality Control Organisation during various stages of site activities from receipt of material/equipment at site till final commissioning/ acceptance/handover.
 - vi) All major items/ equipment/ components to be manufactured in house as well as procured from sub-vendors (Bought out Items, BOI) to be listed in the bid. Bidder shall submit Quality Assurance Plan submission schedule in the bid for above listed items in attached Format (duly filled in the format F-060-05 Issue 2.0 Rev. 00, Total 1 Page)(appended with bid documents) in line



with L2 Schedule.

- vii) For components / equipment / Bought out Items procured by the contractor for the purpose of the contract, the Contractor's purchase specifications and inquiries shall call for quality plans to be submitted by the sub-vendors.

The quality plans called for from the sub-vendors shall detail out, during the various stages of manufacture and installation, the quality practices and procedures followed by the sub-vendor's quality control organisation, the relevant reference documents/standards used, acceptance level, inspection of documentation raised, etc. Such quality plans of the successful sub-vendors shall be finalized with the SAPDC/Consultant in line with requirement mentioned at clause no. III above and such approved Quality Plans shall form a part of the purchase order/contract between the contractor and his sub-vendor.

Within three weeks of the release of the purchase orders /contracts for such bought out items /components, a copy of the same without price details but together with the detailed purchase specifications and other related documents such as data sheet, drawings, quality plans and delivery conditions shall be furnished to the SAPDC/Consultant by contractor along with a report of the Purchase Orders placed, on the monthly basis, so far for the contract.

- viii) The Quality Plans shall be submitted on electronic media e.g. CD or E-mail in addition to hard copy for review and approval of SAPDC/Consultant. After approval, the same shall be submitted in compiled form on CD-ROM by contractor.
- ix) For all spares, replacement items and additional similar items, the quality requirements/Quality Plans as agreed for the main equipment supply shall be applicable.
- x) All material of construction shall be as per technical specification / approved drawings.
- xi) Contractor's Plant internal standards must be traceable to acceptable International / National standards & salient points of difference (if any) shall be clearly stated with submission of plant standards. The contractor shall furnish copies of reference documents,



plant standards, acceptance norms, test and inspection procedure etc. as referred in Quality Plans along with Quality Plan to SAPDC/Consultant. These Quality Plans and reference documents/standards etc. will be subject to approval of SAPDC without which manufacturer shall not proceed. These documents shall form a part of the contract.

Tests on components and sub-assemblies shall be carried out at various stages of manufacturing, till the product undergoes the final tests in conformity with the relevant standards.

- xii) The Customer Hold Points (CHPs), identified in approved quality plan, i.e. testing checks which shall be carried out in the presence of the SAPDC, beyond which the work will not proceed without written consent of SAPDC's authorized representative.
- xiii) The contractor / sub-vendor shall carry out routine test on 100% items at his works. The quantum of check / test for routine and acceptance test by SAPDC/Consultant shall be generally as per criteria / sampling plan defined in referred standards. Wherever standards have not been mentioned, quantum of check / test for routine / acceptance test shall be as agreed during detailed engineering.

The quantum of check when specified in percentage (%) / sampling basis shall be treated as per lot per sub-vendor. When the quantum of check is indicated to in whole no., then same quantum of check shall be applicable to each sub-vendor supplying the same equipment.

- xiv) For sub-vendors identified during pre-award stage for submission of vendor details / credentials (category "DR"), contractor shall submit documents in format F-060-01 after placement of award in the manner as specified in Clause no. XVII prior to any procurement and within a month after placement of award or a period as agreed at the time of pre-award discussions.

The proposed sub-vendors should be registered vendors of the bidder and must have proven experience for successful operation for similar equipment / items / processes as mentioned elsewhere in technical specification.

- xv) Before assigning any portion of work to the sub-vendor,



other than one specified and duly accepted in the contract, the contractor will take prior approval of SAPDC.

- xvi) While sub-contracting any portion of work, it shall be mandatory to include these quality assurance – general & test requirements along with vendor qualification criteria, if indicated elsewhere in the technical specification, as a part of their bidding document.
- xvii) Normally no request for change of sub-vendors or inclusion shall be entertained by SAPDC. But in exceptional circumstances, if the request for change of sub-vendors or inclusion is found reasonable and justified, then the same shall be entertained and the decision of SAPDC in this respect shall be final and binding. The time consumed for the change / inclusion of sub-vendors shall not be excluded from the stipulated time of the completion of the contract. This change shall not relieve the contractor from the responsibility to complete the work within stipulated time in any manner.
- xviii) The contractor's proposal shall include sub-vendor's facilities established at the respective works, the process capability, process stabilization, Q.C. system followed, experience list etc. along with his own technical evaluation of sub-vendor. (Format F-060-01 issue 2.0 rev. 01, Supplier / Sub-vendor Assessment Sheet, Total 14 pages). However, whenever felt necessary, sub-vendor assessment will also be carried out by SAPDC/Consultant in accordance with the above procedure and by factory visits; for existing/proposed vendors/sub-vendors. This approval shall not relieve the contractor from any obligation, duty or responsibility under the contract & SAPDC shall not be responsible for any complications arising between the contractor and his sub-contractor(s) / sub-vendor (s) and / or any other liabilities.
- xix) SAPDC/Consultant reserves the right to carry out quality audit and quality surveillance of the system and procedures of the contractor / or their sub-vendor. The contractor shall provide all necessary assistance to enable SAPDC/Consultant to carry out such details & surveillance including Quality Manuals, if required by SAPDC/Consultant.
- xx) All welding and brazing shall be carried out as per



procedure drawn and qualified in accordance with requirement of ASME section-VIII/IX or other International equivalent standard acceptable to SAPDC/Consultant. All welding/brazing procedures shall be submitted to SAPDC/Consultant for review / verification prior to carrying out the welding/brazing. However, wherever required by the SAPDC/Consultant, tests shall be conducted in presence of SAPDC's authorized representative.

- xxi) All Brazers, Welders and welding operators employed on any part of the contract either in Contractor/his sub-vendor's works or at site or elsewhere shall be qualified as per ASME section-VIII/IX or other equivalent International Standards acceptable to SAPDC/Consultant.
- xxii) Unless otherwise proven and specifically agreed with SAPDC/Consultant, welding of dissimilar material and high alloy materials shall be carried out at shop only.
- xxiii) All non-destructive examination shall be performed in accordance with written procedures as per International Standards. The NDT operator shall be qualified as per SNT-TC-IA (of the American or Indian Society of non-destructive examination). NDT shall be recorded in a report, which include detail of methods and equipment used, result/evaluation, job data and identification of personnel employed and details of co-relation of the test report with the job.
- xxiv) All material used for equipment manufacture including castings and forgings, etc. shall be of tested quality as per relevant codes/standards. Details of results of the tests conducted to determine the mechanical properties; chemical analysis and details of heat treatment procedure recommended and actually followed shall be recorded on certificates and time temperature chart. Tests shall be carried out as per applicable material standards and/or agreed details.
- xxv) Contractor shall submit Field Welding Schedule for field welding activities like field welding location, numbers, welding procedure to be used, requirements, codes and NDT requirement along with all supporting documents, like welding procedures, heat treatment procedures, NDT procedures, etc. to SAPDC/Consultant for review at least ninety days before schedule start of erection work at site.



- xxvi) Any other statutory requirements as applicable for the equipment / systems shall also be complied with.
- xxvii) The inspection calls (duly filled in the format F-060-06 Issue 2.0 Rev. 00, total 1 Page) shall be placed at least 06 weeks in advance for overseas inspections excluding India and 15 days in advance for inspections within India and Nepal.
- xxviii) Before submitting the inspection call to SAPDC for witnessing the Customer Hold Points (CHP's) and/or requesting SAPDC for issuance of Material Dispatch Clearance Certificate (MDCC) based on Test Certificate (TC) review / Certificate of Conformance (COC), the contractor shall ensure that all Drawings / documents / GTP / technical data sheet, relevant to respective CHP / MDCC requirement, has been duly approved / accepted / noted by SAPDC.
- xxix) Contractor shall ensure readiness of offered equipment by all means, before raising such call to SAPDC to attend CHP inspections. In case, SAPDC engineer (s) on reaching at a place of inspection found that material is not ready for inspection due to whatsoever reason, the complete inspection expenditure of SAPDC engineer(s) as per actual shall be chargeable to the contractor.
- xxx) Only calibrated testing & measuring instruments shall be used while performing tests during manufacturing and erection, testing & commissioning at site by the contractor. Copy of the calibration certificates will be submitted to SAPDC/Consultant by the contractor during inspection as an evidence.
- xxxi) Non-conformities observed during manufacturing, shop testing, handling, packaging, transportation, storage, preservation, erection, testing & commissioning are required to be intimated by the contractor (Format for reporting, F-060-04 issue 2.0 rev 01, Total 5 pages). The acceptance/rejection of the non-conformities will be at the discretion of SAPDC.

Repair/rectification procedures to be adopted to make the job acceptable shall be subject to the acceptance of SAPDC. Action taken in accordance with decision of disposal of non-conformity for repair / rework / modification of the item / equipment and to prevent re-occurrence. The corrective and preventive action may



involve modification of item / equipment, change in procedure and system etc. to achieve quality improvement at all stages and levels.

- xxxii) Quality audit/surveillance/approval of the results of the tests and inspection will not, however, prejudice the right of the SAPDC to reject the equipment if it does not comply with the specification when erected or does not give complete satisfaction in service and the above shall in no way limit the liabilities and responsibilities of the Contractor in ensuring complete conformance of the materials/equipment supplied to relevant specification, standard, data sheets, drawings etc.
- xxxiii) No material shall be dispatched from the manufacturer's works before the same is duly accepted, subsequent to pre dispatch/final inspection including verification of records of all previous tests/inspection by SAPDC and duly authorised for Dispatch by issuance of Material Dispatch Clearance Certificate (MDCC).
- xxxiv) The test reports of type tests conducted as per contract, in line with requirement stipulated in the technical specification / quality plan should be got accepted from SAPDC/Consultant before final inspection / issuance of MDCC.
- xxxv) All materials used or supplied shall be accompanied by valid and approved material certificates and tests and inspection reports. These certificates and reports shall indicate the heat numbers or other such acceptable identification numbers of the material. The material certified shall also have the identification details stamped on it to ensure physical correlation and traceability of material vis-a-vis test certificate. Such identification no. shall remain same and verifiable for all stages of manufacturing and installation.

5.3.0

QA Documentation

- i) The contractor shall be required to submit the QA Documentation in two hard copies and two CD ROMs, as identified in respective quality plan.
- ii) Each QA Documentation shall have a project specific Cover Sheet bearing name and identification number of equipment including index of its contents with page control on each document. The QA Documentation file shall be progressively completed by the Contractor/sub-vendor to allow regular reviews by all parties during the



manufacturing. The final quality document will be compiled and issued at the final assembly place of equipment before dispatch. However CD-ROM may be issued not later than three weeks.

- iii) Before dispatch / commissioning of any equipment, the Contractor shall make sure that the corresponding quality document or in the case of protracted phased deliveries, the applicable section of the quality document file is completed. The Contractor will then notify the Inspector regarding the readiness of the quality document (or applicable section) for review.
- iv) The contractor shall be required to submit copies of the following quality assurance documents in original duly reviewed and accepted by contractor along with the request letter for issuance of MDCC (Material Dispatch Clearance Certificate):
 - Quality Plan check list.
 - Material mill test reports on components as specified in Quality Plan.
 - Sketches and drawings used for indicating the method of traceability of the radiographs to the location on the equipment.
 - Non-destructive examination results reports including interpretation reports.
 - Calibration certificate of all meters & measuring instruments proposed to be supplied as part of relevant Billing Breakup item.
 - Routine test reports for testing required as per applicable codes and standards referred in the Specifications.
 - Inspection reports duly signed by authorized representative of SAPDC and contractor for the agreed Customer Hold Points.
 - All the accepted deviations shall be included with complete technical details.
 - List of balance points if any.
 - Certificates in respect of Calibration, Welders & Brazers Qualification etc.
 - Copy of all reference drawings and reference technical documents
 - Acceptance of Type Test Reports by SAPDC.
- v) Similarly, the Contractor shall be required to submit two sets (two hard copies and two CD ROMs), containing QA Documentation pertaining to field activities as per Approved Field Quality Plans and other agreed

manuals/procedures, within 2 weeks after commissioning of individual system.

- vi) On release of QA Documentation by Inspector, one set of quality document shall be forwarded to Corporate Quality Assurance Department and other set to Project Site. For the particular case of phased deliveries, the complete quality document to the SAPDC shall be issued not later than 3 weeks after the date of the last delivery of equipment.

5.4.0 Inspection, Testing & Maintenance

The guidelines/recommendations for inspection, testing and maintenance of Gates, Rope Drum Hoists/cranes/ hydraulic hoist as contained in the relevant Indian Standards viz. IS-7718, IS-10096, IS-3177 and IS- 13053 (Latest Revision) etc. but not limited to, shall be applicable at different stages of the work viz. at the manufacturing stage, at the time of erection as well as after the erection.

5.5.0 Inspection and Tests

The inspection and test by the Employer of any supplies or lots thereof does not relieve the contractor from any responsibility regarding defects or other failure to meet the contract requirements which may be discovered prior to the acceptance. Except as otherwise provided in the contract, acceptance shall be conclusive except as regards latent defects, fraud or such gross mistakes as amounting to fraud.

5.5.1 Workshop Assembly, Inspection and Tests

The sub-assemblies and parts shall be assembled and tested in shop to ensure that parts are correctly fabricated and properly aligned. Prior to shop assembly and testing, the contractor shall submit for review an outline of the procedures and tests which are planned to be performed to demonstrate the fulfillment of the requirement of these specifications. The cost of carrying out the test (including the cost of inspection by the Employer's personnel) shall be borne by the contractor and shall be included in the lump sum price bid in the price schedule. However, shop assembly testing and test of bought out items would be carried out at the instruction and discretion of the Employer or his authorised representative without any extra cost.



In the event it is not possible to complete the assembly of Gate leaf or such other components in the shop, they will be accurately assembled in the shop using temporary connections and various critical dimensions shall be verified.

5.5.1.1 Checking of Dimensions

The dimensions, especially clearances and fit, (ISO 286), which are essential for operation and efficiency shall be carefully checked in an approved manner, as for example:-

- Run out and roundness tolerances of shafts, etc. to be measured on single parts as well as (wherever possible) on the assembled components.
- Fits and clearances of gates, bearings, guiding, etc.
- Accuracy, surface roughness and shape of sliding and guiding surfaces of seals, bearings, etc.
- Dimensions of couplings or connections for assembly with other deliveries from the Contractor, Sub-contractors or other contractors.

5.5.2 Fixed Wheel, Sliding Gates & Bulkheads

Each Gate shall be completely assembled in the shop for inspection and to ensure that all parts fit properly and that dimensions, clearances and tolerances required in the specifications and drawings have been achieved. The Gates shall be assembled in a vertical position and holes for field connections carefully drilled or reamed. Connections which have to be disassembled for shipment/transportation shall be made by the use of erection pins, one size less in diameter than the designed size or temporary machine bolts. The shop assembly must also be checked for correctness in all respect, such as quality or workmanship, freedom from defects, free rotation of roller etc. The surfaces of seals on sides and top shall be in same vertical plane.

5.5.2.1 Embedded Parts

The assembly of each wheel tracks, side guide tracks, seal seat and sill beam assemblies should be made for full length. The dimensions, finish and accuracy of



machining shall be checked in the shops. The side seal seat assemblies and top seal seat assembly shall be assembled to ensure that the seal seats are in plane as required and conforms to the designed dimensions, fits, tolerances, surface finishes, clearances etc.

5.5.3 Rope Drum Hoists

The contractor shall assemble the Hoist completely and shall conduct tests in his workshops to ensure that all parts fit and function properly and the dimensions and tolerances are as per the approved drawings for the parts and assemblies for its proper performance . The Hoist shall be completely assembled and run under no load in shop to ensure that all parts fit accurately at site when erected. The Hoist under such tests shall run smoothly, without vibration, noise, chatter or undue friction.

5.5.4 Hydraulic Hoist

The contractor shall assemble the hoist completely and shall conduct tests in his workshops to ensure that all parts fit and function properly and the dimensions and tolerances are as per the approved drawings for the parts and assemblies for its proper performance. The hoist shall be tested for a pressure 150% of the design pressure, by applying the oil pressure to move the piston.

5.5.4.1 Hydraulic Testing of Components

Each hoist cylinder before it is machined finally and appurtenant piping, all valves and other parts subjected to oil pressure shall be subjected to a hydrostatic pressure test, for a pressure equal to at least 1.5 times the design pressure. The pressure shall be applied gradually and maintained for sufficiently long time to permit inspection of all parts and joints. A leakage through the joints in the cylinder can be repaired by rewelding, at the discretion of and in a manner acceptable to the employer based on standard practices and specifications as mentioned in IS: 2825 (Standard for unfired pressure vessels). The contractor shall carry out stress relieving and radiographic examination of the cylinder after it is repaired as per the instructions of the employer. Other parts found to be defective or not functioning satisfactorily during the test are to be replaced.



All equipment required for testing shall be furnished by the contractor and these will remain his property after completion of the tests.

5.5.5 EOT Cranes

The cranes shall be completely assembled, inspected, operated and tested in shop. The tracks shall be centered & supported by two parallel & level rails to form the run way after accurately aligning all shaft couplings, bearing & gears. They shall be dowelled with pin & straightened by shear blocks if necessary. The hoist and EOT drive shall be operated by power to check the operation of the gearing. The hoist shall be operated for 15 to 30 min. in slowest speed to demonstrate that the equipment has been designed for continuous duty. The crane shall be made to travel for a distance of about 20 meters, if space permits. Alternatively, driving wheel shall be rotated under power to demonstrate satisfactory operation. Concentricity of each wheel of crane shall be checked by dial gauge.

- Overall inspection of crane, dimensions, spans.
- All motions of the crane.
- The deflection test shall be carried out with the safe working load at rest. The measurement shall not be taken on the first application of the load.

5.5.6 Overload Test in Shop

After the above tests but before the Rope Drum Hoists/Hydraulic hoist/Gantry crane/EOT crane are put into service, these shall, with overload relays appropriately set, be tested to lift and sustain a minimum tests load of 125 percent of the working load.

In case of cranes, during overload test each motion in turn shall be maneuvered in both directions and the crane shall sustain the load under full control. The specified speeds need not be attained but the crane shall show itself capable of dealing with the overload without difficulty.



5.5.7

Test for Lifting Beam

During load testing following should apply:

- Proof load certificate needs to be issued.
- The lifting beam assembly shall be load tested.
- The load shall be 1.25 times of the working load.
- A string line should be put across the top of lifting beam (across the top of guide up stands at either end of the beam) and the distance from string to the top of beam itself measured before, during and after the lift to determine any deflection during the load test and any permanent set. These figures should be recorded.
- The measurement shall not be taken on the first application of the load.
- The load should be lifted and held for minimum of ten minutes.
- After the load test, all load bearing welds should be 100% examined by using Magnetic Particle Inspection.

5.5.8

Hydrostatic Testing

Hydrostatic shop testing shall be conducted in shop. Details of the testing procedures and test beds to be used shall be furnished.

Cylinder assembly, hydraulic pipes etc. shall be in general subjected to the test pressure equal to 150% of the design pressure or a test pressure producing stress not exceeding 90% of yield stress in shell.

In case of extra high tensile steel liner using ASTM-517 Gr. 'F' or equivalent, a test pressure shall be equal to $\frac{1}{2}$ the minimum UTS of the materials or $\frac{3}{4}$ yield point of the materials, whichever is less, shall be adopted.

During testing, each piece item shall be subjected to a test pressure.

The test pressure shall not be applied until the items being subjected to test and its contents reach the same temperature which shall preferably, be not less than 15 degree C.

Before applying pressure, the equipment shall be inspected to see that all joints are leak proof and to ensure that all low pressure filling lines and other



appurtenances that shall not be subjected to the test pressure, are disconnected.

After being completely filled with water, the pressure in steel liner & bonnet assembly etc. to be tested shall be increased slowly and uniformly until the specified test pressure is reached.

Times successively increasing and decreasing at uniform rate but not lowering the pressure below 0.75 times the operating pressure and shall then be held at the specified test pressure for such a time as is considered sufficient for inspection of plates, all welded joints and connections and all regions around openings but the period shall in no case be less than ten minutes.

All deflective welded seams and all defects in steel plates discovered during the hydrostatic pressure test shall be marked and after draining out the water they shall be satisfactorily repaired.

After repair and radiography, all sections shall again be subjected to a hydrostatic pressure test. This procedure shall be repeated till satisfactory results are obtained throughout.

5.6.0

Witnessing Shop Tests, Inspection and Training

The Employer will depute his representative(s) for witnessing tests and carrying out inspection during manufacturing stage and final complete assembly/testing of Gates and Hoists.

The Employer will depute Engineers for the following purposes:

- | | |
|--|---|
| i) Witnessing Shop
Inspection & Tests | Min 2 Engineers for 3
weeks (Total 6 Engineers
week with 6 round trips) |
|--|---|

Contractor shall make necessary arrangement of stay and local transport for Employer's Inspectors/ Engineers at or near the place of work, if so requested by Employer.

The Employer or his representative shall have free access to the software(s) used or being utilized by the contractor for Planning and Design of Gates and Hoists, cranes and lifting beam etc., both at his office



premises and also at his shop premises. The Employer or his representative shall be free to check the design and drawings etc. on his software at any time.

The contractor shall have to impart training to Employer's Engineers and workmen to familiarize them with the operation and maintenance of the Works/Plant covered in these specification to the extent that thereafter, the duties can be assigned to the Employer's trained personnel and the certificate in this regard shall be given by the contractor and shall be appended in the commissioning documents. The period and training manual shall be approved by the Employer. The cost on account of this training shall be in-built in the price bid.

5.7.0 Non-Destructive Tests

The non-destructive tests shall be carried out as specified in SNT-TC-IA "Recommended practice for non-destructive testing, personnel qualifications and certification" of the American Society for non-destructive Tests or other similar International Standards.

5.7.1 Radiographic and Ultrasonic Inspection

5.7.1.1 Radiographic Examination

- i) The radiographic examination of atleast 10 percent of total length of butt welds for plates of thickness greater than 6mm but not exceeding 20mm for the Gates and structural components of hoist shall be carried out by the manufacturer. The selection of the 10 percent of total length of butt welds for radiographic examination shall be done at random and shall represent each welder's work. The radiographic examination of 100 percent length of all butt welds for plates exceeding 20mm in thickness for the Gates shall be carried out by the manufacturer. The radiographic examination shall also be done for all castings. All radiographic examination shall be carried out by the manufacturer as directed by and to the satisfaction of the Employer at no extra cost. The radiographic examination shall conform to Indian Standards "Code of practice for Radiographic Testing (Latest Revision)" IS:2595 (Latest Revision), "Code for Unfired Pressure Vessels (with Amendments No. 1 to 4)" and IS:2825 (Latest Revision). The quality of butt welds brought out by the radiographic examination shall obtain a minimum of 5 marks corresponding to International Institute of Welding (IIW), Black Colour in accordance with IS: 2825 (Latest Revision). Isolated



films getting lower marks may however, be accepted with the approval of the Employer in each individual case. In addition, the Employer may demand radiographic test checking of any of the important butt weld joints to check the soundness of joint of weld. This shall be carried out by the manufacturer without any extra cost to the Employer. Any retake of radiography after rectification of defects, shall also be free of charge to the Employer

- ii) Whenever dissimilar materials are butt welded together, atleast one X-ray radiographic examination for each component of sub-assembly shall be carried out at the selected points. The number of points to be taken shall depend upon the results obtained after the first series of test are carried out. Prior to making radiographs of butt welds, the manufacturer shall place suitable identification markers adjacent to the welds. Each marker shall be so designed and located that the image will appear in the radiographs. The markers shall be painted, stamped or fastened as directed by the Employer and shall not be removed until all welds have been accepted. The radiographic test shall be carried out by the qualified technician and at such time as decided by the Employer. The technician's interpretation reports on the radiographic examination shall be furnished by the manufacturer to the Employer. All precautions shall be taken to minimize radiation hazards.
- iii) All radiographs of welded joints shall become property of the Employer.

5.7.1.2

Ultrasonic Examination

- i) Ultrasonic examination shall be performed in accordance with the Article -5 of ASME code on Boiler and Pressure Vessels, Section- V. The relevant references from ASTM specification E164-74 shall also be taken. The ultrasonic examination shall be performed and supervised by experienced and qualified personnel. If found necessary special type of transducers and/or higher test frequency etc. shall be adopted to improve the reliability of the test. The Works/Plant with recording facility shall be used for ultrasonic examination. The records in such case shall be furnished and the same shall become the property of Employer.
- ii) All indications which produce a response greater than



20 % of the reference level shall be investigated to the extent that the operator can determine the shape, identity and location of all such reflectors and evaluate them in terms of the acceptance standard given below:-

- Discontinuities shall be unacceptable if the amplitude exceeds the reference level and also the discontinuities having length which exceeds $1/3 t$ where 't' is the thickness of the weld being examined.
 - Where discontinuities are interpreted to be crack, lack of fusion or incomplete penetration, they shall be unacceptable regardless of discontinuity or signal amplitude.
- iii) The marker shall not be removed until all the welds have been accepted.
- iv) Defective welds shall be air gouged or chipped out, rewelded, re-X-rayed and the cycle repeated until satisfactory results are obtained.

5.7.1.3

Magnetic Particle Inspection

All fillet welds joining diaphragm plates, rings, lugs, etc. shall have smooth transitions into the sides of plates with toes of the welds, made before depositing the major bead. The surfaces shall be ground to merge smoothly into the plate surfaces. The fillet joints shall be subjected to magnetic particle testing. The procedure of carrying out the above test shall be as per relevant Indian or equivalent Standards. Where magnetic particle testing is not possible, dye penetration test shall be undertaken as per appendix-8 of ASME code section-VIII with the approval of the Employer.

5.7.1.4

Additional Examination

- i) The Employer may direct the use of visual, dye-penetrant, magnetic flux and ultrasonic methods and Works/Plant to supplement the radiographic examination. The additional methods will be used to ensure that welds do not contain unacceptable defects. The same shall be at no extra cost to the Employer.
- ii) The contractor shall make available continuously throughout the contract, the technicians and all necessary Works/Plants for ultrasonic examination of the welds.

CHAPTER-VI

Erection, Site Testing, Commissioning and Final Acceptance

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6.0.0 Erection, Site Testing, Commissioning and Operational Acceptance

The Equipment covered by these Specifications and Specification Drawings shall be furnished and erected by the contractor completely at the project site. The contractor shall be required to furnish all erection drawings. The contractor shall prepare a complete erection procedure, which shall describe the sequence of operations to be carried out, the method to be used, the measurements to be taken and the tolerances to be met within the erection and alignment of the Equipment. Such procedure shall have the approval of the Employer, prior to the commencement of erection, when approved shall form a part of the specifications furnished by the contractor.

6.1.0 Erection of First Stage Embedded Parts

The erection of first stage parts shall be carried out by the employer through civil contractor under supervision of contractor for this work. However, the first stage embedded parts shall be supplied by the contractor for this work as per the approved drawings. The extreme care shall be taken to ensure that their surfaces be in a true plane and within the tolerance limits throughout their entire length.

In exigencies of work the employer will be free to provide the 1st stage embeddings if required due to the project schedule and/or to delete this item from the scope of this works. No payment for 1st stage embeddings shall be made to the contractor, if these are provided by the employer. The 1st stage embedded parts will be provided/erected as per the drawings supplied by the employer. In that case contractor shall have to design the 2nd stage embeddings to suit the 1st stage anchors provided/erected by the employer. However, the contractor should be prepared to accept reasonable inaccuracy in the location of first stage anchors, in case provided by the employer without asking for compensation.



6.2.0 Erection of Second Stage Embedded Parts/liner

Gate frames, guides, tracks and seal seats, stoplogs frames, radial gate anchorages, liner etc. as applicable shall be assembled and installed, brought to line, grade and plumb within the erection tolerances and secured in place by anchorages as shown on the drawings or otherwise according to the best method in practice and as may be necessary for successful functioning of these units. The erection tolerances for the frames and guides shall be as indicated on the drawings or as per latest revision of relevant Indian Standards. Extreme care shall be taken to ensure that their surfaces be in a true plane and within the tolerance limits throughout their entire length. The second stage anchorages shall be strong enough to hold the frames and guides securely in position while the concrete is being placed.

After the erection of the second stage embedded parts/liner, there is time gap during which the embedded parts/liner remain un-concreted and have a tendency to get displaced/misaligned due to some of the work activities going on in the vicinity of the embedded parts. It is, therefore, the responsibility of the contractor to ensure that the alignment of the embedded parts remain intact and does not get dislodged/displaced due to any activity in the surroundings. To ensure this, the contractor may suitably brace the embedded parts by providing additional steel members, if necessary. The cost of all labour, materials and use of tools and Equipment for ensuring the same shall be included in the item rates of second stage embedded parts in the price schedule.

Concreting and grouting shall be done by the employer through the civil contractor and the contractor for this work shall give a detailed programme of erection of the embedded parts to the employer for this purpose. Any change in agreed programme shall be communicated by the contractor for this work to the employer well in advance. Before placing the concrete in any one lift and between placement of successive lifts, alignment and tolerances shall be checked and remedial action taken by



the contractor for this work, if any displacement has occurred.

6.3.0 Installation of Gates, Rope Drum Hoists, Hydraulic Hoist, EOT Cranes and Lifting Beam

All the components of the Gates and their operating equipment shall be erected perfectly giving due cognizance to the units and match marks on the components. All components shall be designed and assembled to fit snugly and shall be made water tight. In case these Gates are exposed to floods, it is desirable to avoid the flood period to perform erection of Gates. Should it be necessary to do so, due precautions should be taken for measures against floods, since the Gates may be submerged in water sustaining damages or the half erected Gates may disturb the water flow causing damages to the civil structure. One of the measures may be that the Hoists should be erected first and when the flood forecast is made, the half executed Gates should be hoisted above the flooding water.

6.4.0 Guidelines for Site Erection

- a) The Works/Plant shall be erected by the manufacturer in accordance with these specifications to the satisfaction of the Employer using most modern techniques under the directions of the supervisory erection personnel to be provided by the manufacturer and agreed to by the Employer.
- b) Any required tool or Works/Plant which is not normally available at the work site as well as any jigs and fixtures required for proper erection shall be furnished by the manufacturer. A list of such tools shall be supplied by the manufacturer / contractor.
- c) Erection tolerances shall conform to Indian Standards and as per approved drawings.
- d) Erection bolts, nuts, washers and other fasteners shall be furnished to the amount of 15 percent or ten bolts, nuts, washers and other fasteners whichever is greater, in



excess of the nominal numbers of each size and length required for complete installation of the Works/Plant.

- e) Bolts in tension shall have a net section at root of thread 15 percent in excess of the net section required in tension.

6.5.0 Erection Personnel

Skilled as well as unskilled personnel shall be arranged by the contractor for erection of the Works/Plant covered in these specifications.

6.6.0 Erection Limitation

The manufacturer should visualize the accessibility for erection from civil data/drawings provided in these Technical Specifications/ Specification Drawings and should ensure that all Gates, Hoists and associated equipment can be transported through the access tunnels available at various locations. The contractor shall be responsible for provision of site jointing to suit access restrictions and provide for all requirements of transportation through the access tunnels.

6.7.0 Notification

The Employer will notify the contractor within thirty (30) days prior to date on which erection and installation of the Works/Plant is to commence.

6.8.0 Site Tests and Commissioning

6.8.1 Functional Tests

During erection, commissioning & trial operation, the Contractor shall organize at suitable intervals all inspections and tests in the presence of the employer in order to provide the orderly execution of the works in accordance with the Contract.

Unless otherwise specified, all costs for testing at site and of the works and charges associated with it shall be borne by the Contractor. This includes the measuring devices, properly calibrated and any pertinent accessories, which shall be made available by the contractor for the entire



duration of the tests. The Contractor shall delegate his experts to supervise the test at site.

The test, checks, examinations at site shall comprise but not be limited to: -

- i) Checks and examinations of site welds.
- ii) Hydrostatic Pressure Test (if any).
- iii) Dielectric Tests.
- iv) Functional Checks (on all operating mechanism, on protective devices, automatic and manual controls, monitoring, supervisory equipment etc.)
- v) Running Tests (gates with hoists).
- vi) Performance tests & determination of characteristic data.

All such tests and checks shall be performed in the presence of the Employer's Representative. If not satisfied with the performance of the tests and checks, the Employer's Representative shall have the liberty to ask for additional tests or repetition of same.

The testing at Site shall be complete in every respect to prove the successful performance and operation of all the works and Works supplied and erected under the Contract.

6.8.2 Pre-Commissioning Tests

Pre-commissioning Tests shall include the appropriate inspections and functional tests to demonstrate that each item of Works/Plant can safely undertake the next stage.

6.8.2.1 Inspection at Site

- i) Requirements of IS: 7718, IS:3177, IS: 13053 & IS: 10096 shall be covered. Inspection of embedded parts duly assembled/erected at site, fully aligned and adjusted including installation of sill beam, side guide members, lintel members, sill seats/tracks/ bearing pads and hoist supporting structure, rails etc. This inspection involves measurement of critical dimensions, verticality, co-



planerness of sealing/bearing surfaces and dimensional accuracy within permissible erection tolerances.

- ii) Prior to concreting, it shall be ensured that the embedded parts, which have been erected/aligned and inspected are supported by additional bracing etc. so that they do not get disturbed during concreting.
- iii) After concreting, critical dimensions of embedded parts shall again be inspected for clearance of any excess concreting requiring chipping etc.
- iv) Inspection of Gate at site after its complete assembly and checking of dimensional accuracy, critical dimensions, co-planerness of skin plate and bearing/sealing faces.
- v) Inspection of structural components of hoist support, their dimensional accuracy, correct location and rigidity.
- vi) Inspection of Hoist/crane for exact location of hook/ pulley block over the lifting point of the Gate and for proper matching and connections.

6.8.2.2 Gates/ Stoplogs

- i) Dry Test

Operational tests in dry conditions shall be carried out as soon as possible after completion of erection when all controls and permanent power supply have been connected. The tests shall include atleast two complete traverses from the maximum raised position to the full closed/ seating position and it shall be ensured that there is no obstruction during the operation, the movements are smooth without any jerks and no undue effort is required for operation. Contact between gate seal and seal seats shall be checked and pre compression ensured by viewing the contact surface against the light source. The operation of the hoist shall be smooth without any undue noise/excessive friction and without excessive vibration in the gate and supporting structure. Any dry testing movements should have rubber seal an seal faces lubricated with water (Do not use grease/oil). For metal to metal sealing/ bearing faces grease to be used. All



adjustments, clearances, brakes etc. shall be checked for proper operation of the equipments.

6.8.2.3 Test for Rope Drum Hoists and Cranes

- i) After the Hoist/crane has been erected, adjusted, lubricated and otherwise made ready for operation, it will be operated through cycles of placing and removing of the gate. The hoist/crane shall raise, lower, held in any position the Gate at rated speed. Before conducting any field trial or tests, complete procedure for the tests shall be drawn and submitted by the manufacturer to the Employer for his approval.

- ii) Insulation Tests

After erection but before the hoists are connected to the supply, the insulation of the electrical equipment shall be tested by a suitable instrument and any defects revealed shall be rectified. The voltage required for the insulation resistance test shall be D.C. voltage not less than twice the rated voltage.

Any reading less than 0.5 megaohm obtained with an insulation resistance tester of the unregulated type shall be disregarded and the wiring under test shall be sub-divided until a reading higher than 0.5 megaohm is obtained. Failure to obtain a higher reading shows an unsatisfactory state of insulation. If an installation has been sub-divided for test purposes, each sub-division shall meet the requirement.

The insulation resistance of each wiring circuit exclusive of connected apparatus shall be not less than 2 megaohm, if necessary, it shall be permissible to disconnect individual item of equipment while making this test.

6.8.3 Commissioning Tests

These tests shall include the specified operational tests to demonstrate that the work or section can be operated safely and as specified under all available operating conditions and shall include:



- i) Satisfactory operation of all Works/Plant after erection.
- ii) Vibration & noise shall not exceed permissible limit during entire cycle of operation.
- iii) The testing of Gates and Hoists shall be performed with water pressure against the gate (preferable up to design head).

6.8.3.1 Operational Tests for Gates

- i) The contractor shall carry out in the presence of project authorities such tests on the gate to determine that the gate will fulfill the functions for which it has been designed. Tests shall be repeated, if necessary, until successfully carried out to the satisfaction of the employer. The tests shall be carried out at the convenience of the employer after completion of the other portions of the work and when the reservoir is at its full level. The employer shall have the right to carry out such tests also when the reservoir is at level other than the full reservoir level.

- ii) Wet Test

These tests should simulate the actual operating conditions. Atleast two complete traverses will be made from the fully closed position to the normal raised position as follows:

- a) When Gates/stoplogs is closed, Gates/stoplogs is raised to their normally open position in steps and observe the performance including vibration etc.
- b) Lower the Gates/stoplogs to the fully closed position in steps and observe the performance of the Gates/stoplogs including vibrations etc.
- c) Check for proper operation of the filling valves.
- d) Check up of proper operation of limit switches.

- iii) Leakage Tests

Leakage tests shall be carried out with the Gates lowered on to the sill. Before measuring the leakage, the Gates shall be raised and lowered several times by a metre or so



in order to dislodge any debris that may have lodged in the seal seats. The leakage shall then be measured and recorded. The maximum permissible leakage shall not exceed 5 liters per min. per metre length of periphery of sealing surface.

6.8.3.2 Operational Test for Rope Drum Hoists and Cranes

- a) After the supply has been connected and before the complete hoist/crane installation is put to commercial service, tests shall be carried out to prove the following:
 - i) The satisfactory operation of each control switch, contactor, relay and other control devices and in particular the correct operation of all limit switches under the most unfavourable conditions.
 - ii) The correctness of all circuits and interlocks and sequence of operation.
 - iii) Satisfactory operation of all protective devices.
 - iv) The satisfactory operation of each motion of the hoist.
 - v) The compliance of the hoist with the specified performance requirement.
 - vi) Tolerances on specified speeds on full load shall be within 10%.

b) Deflection Test

The deflection test shall be carried out with the safe working load at rest. The measurement shall not be taken on the first application of the load.

c) Overload Tests

After the above tests but before the crane/hoist is put into service, it shall, with overload relays appropriately set, be tested to lift and sustain a minimum test load of 125 percent of the working load.

During overload test each motion in turn shall be maneuvered in both direction and the crane/hoist shall sustain the load under full control. The specified speeds



need not be attained but the crane shall show itself capable of dealing with the overload without difficulty.

d) **Field Test and Acceptance of EOT Crane**

After the EOT crane has been erected, adjusted, lubricated and otherwise made ready for operation, it will be operated through cycles of placing and removing the stoplog units. The crane shall raise, lower, held in any position and transport the bulkhead/ lifted weight at rated speed.

6.9.0 Field Tests For Lifting Beam

After installation and prior to putting lifting beam in use, the assembly of lifting beam and bulkhead together shall be subjected to field test in the presence of the employer and/or his authorized representative. The assembly shall be initially tested under dry condition for proper clearances and operations. The assembly shall be operated several times under each control mode to verify proper operation. The assembly of lifting beam and bulkhead shall be further tested for the actual conditions. In this condition, the functions of all attachments like hooks, counterweight, guide rollers etc. shall be verified for the satisfactory operation. (If gate/stoplogs is not ready or its manufacture is deferred, then the decision regarding the suitability of lifting beam in regard to compatibility of gate/stoplogs shall be taken by the Engineer and that shall be binding on the manufacturer).

Before conducting any field trial or test, complete procedure for this test shall be drawn and submitted by the manufacturer to the employer for his approval.

Entire testing shall be conducted as per approved test procedure.

During the shop and field tests, all the data needed for proper evaluation of the performance of equipment shall be recorded. All test data shall be submitted for approval. If the test data do not demonstrate compliance with the specified requirements, all remedial actions shall be repeated until complete compliance is demonstrated to the



satisfaction of the employer and/or his authorized representative(s).

The functioning of gate/stoplogs for proper operations has to be demonstrated for water level conditions as stipulated in design criteria. However, water levels, duration of test and timing thereof shall be decided by the employer and shall be binding on the manufacturer. It should be noted by the manufacturer that all testing specified in the above paras may have to be carried out while the Power House is functional and water is discharged through tail race.

6.10.0 Final Checking and Testing at Site

After completion of various phases of works final checking of the entire work shall be done by the contractor to ensure that all the Works/Plant erection and wiring etc. have been done strictly according to the specification drawings and approved by the Employer. All the works shall be thoroughly inspected keeping in view the following various points:

- i) Checking for completion of all works in accordance with specifications and drawings.
- ii) Checking of alignments of all mating parts.
- iii) Checks for correctness of connections, continuity check, insulation resistance test.
- iv) Checks, adjustment and characteristics tests of all control/protective equipment in accordance with manufacturers instructions
- v) Setting and calibration of components e.g. relays, etc.
- vi) Checking of Works/Plant for proper mechanical adjustment and proper adjustment and proper operation
- vii) All routine and pre-commissioning tests and any other special tests required to be conducted at site on each and every Works/Plant as per the relevant standards and manufacturer's instructions/recommendations.



viii) All other tests as specified under relevant standards and codes of practice but not mentioned here.

ix) Tests and commissioning of control panels.

Proper record shall be maintained for all visual inspection, settings and checks carried out and be submitted by the contractor to the Employer.

6.11.0 Operational Acceptance

The operational acceptance of the Works/Plant shall be based on the following:

- i) Quality and Workmanship of the Works/Plant.
- ii) Satisfactory operation of the Works/plant after erection as required under these specifications.
- iii) Acceptance of various tests by the Employer as mentioned above
- iv) All tests may be witnessed by the contractor/ Employer or his authorized representative(s). On successful completion of all tests, the Works/Plant shall be accepted but all the responsibility shall remain with the supplier within the guarantee period.
- v) The taking-over of any part or section of the Permanent Works, which can operate as an independent unit, shall be performed in accordance with the standards and regulations laid down in the Specifications and the test procedure.
- vi) Immediately upon termination of any such testing of a part or section of the Permanent Works a "Protocol of Acceptance", which shall be deemed to be the Test certificate, shall be issued by the Employer.
- vii) This document shall be signed by an authorized representative of the Employer and the Contractor and shall form an integral part of the later "Taking-Over Certificate".

The acceptance of the equipment will be based upon:



- Mutual acceptance of results of test between the contractor and the Employer.
- Acceptance of Inspection and test records/Test Certificates carried out at “Site”.

This “Protocol of Acceptance” shall state:

- The date of testing.
- The Confirmation that the guaranteed data have been proven.
- Confirmation that all contractual documents have been submitted.
- Confirmation that the Employer’s personnel have been familiarized with the works and that they will be able to operate and maintain the works properly.

If any test for the verification of the guaranteed data could not be performed for operational reasons beyond the Contractor’s responsibility, this part of the acceptance shall be stated in the “protocol of Acceptance” and be postponed for a mutually agreed period.

6.12.0 Defective Works/Plant

In case any part of the Works/Plant is found to be defective in materials or workmanship or develops defects or does not otherwise meet the requirements of the specifications including errors or omissions on the part of the contractor, the following shall apply.

a) Defects disclosed prior to Final Acceptance

Any defects in materials or workmanship or other failure to meet the requirements of these specifications including errors or omissions on the part of contractor, which are disclosed prior to final payment or prior to final acceptance tests, whichever occurs at a later date, shall, if so directed by the Employer, be corrected entirely at the expense of the contractor.

b) Defects disclosed after Final Acceptance



Any latent defect not disclosed before the date of final acceptance shall be corrected promptly by the contractor entirely at his expense provided that the total period during which the contractor is liable for replacement due to latent defects shall not exceed twenty four months after the date of final acceptance of the Works/Plant.

6.13.0 Operation of Unsatisfactory Works/Plant

The Employer shall have the right to operate all permanent Works/Plant as soon as and as long as it is in operating conditions, whether or not such Works/Plant is being accepted. Such operation by the employer shall not lessen or impair any expressed or implied warranties concerning such Works/Plant. All repairs or alterations required shall be met at such times as directed by the Employer and in such a manner as will cause the minimum interruptions in the use of the Works/Plant by the Employer. Operation of the Works/Plant in pursuant to this section shall not relieve the contractor of his responsibilities to supply all Works/Plant in complete accordance with these Technical Specifications. While unsatisfactory articles can be taken out of service for correction of latent defects, errors or omissions, the period of such operation for any use, correction of latent defects, errors or omissions, shall not exceed two years without mutual consent of the contractor and the Employer.

CHAPTER-VII

Work and Safety Regulations

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7.0.0 Work and Safety Regulations

7.1.0 Safety Engineering

Accident prevention shall be an essential part of the programme of the Contractor for the Work under this Contract, in order to reduce the cost of construction, measured in terms of:

- i) Human life sacrificed.
 - ii) Temporary and Permanent injuries to workers.
 - iii) Loss of materials resulting from accident.
 - iv) Loss or damage to equipment.
 - v) The cost of Workmen's Compensation Insurance.
 - vi) Loss of time due to accident.
- a) The Safety programme should be so developed, so as to cope up with particular hazards for each operation (blasting, drilling, excavation, transport, cutting of metals, welding, fabricating, handling, erecting, testing and commissioning).
 - b) The Contractor shall ensure proper safety of all the workmen, materials, plant and equipment belonging to him or to Employer or to others, working at or near the site. The Contractor shall also be responsible for provisions of all safety notices and safety equipment, firefighting equipment, first aid etc. required both by the relevant legislations and the Employer as he may deem necessary.
 - c) The Contractor will notify well in advance to the Employer of his intention to bring to the Site any Container filled with liquid or gaseous fuel or explosive or petroleum substance or such chemicals which may involve hazards. The Employer shall have the right to prescribe the conditions, under which such container is to be stored, handled and used during the performance of the works and the Contractor shall strictly adhere to and comply with such instructions. The Employer shall have the right at his sole discretion to inspect any such container or such construction plant/equipment for which material in the container is required to be used and if in his opinion, its use is not safe, he may forbid its use. No claim due to such prohibition shall be entertained by the Employer. Nor the Employer shall entertain any claim of the Contractor towards additional safety provisions/ conditions to be provided for/constructed as per Employer's instructions.
 - d) Further any such decision of Employer shall not, in any way, absolve the Contractor of his responsibilities, and in case, use of such a container or entry thereof into the site



area is forbidden by Employer, the Contractor shall use alternative methods with the approval of Employer without any cost implication to Employer or extension of work schedule.

- e) Where it is necessary to provide and/or store petroleum products or petroleum mixtures and explosives, the Contractor shall be responsible for carrying out such provision and/storage in accordance with the rules and regulations laid down in Petroleum Act 1934, Explosives Act 1948, and Petroleum and Carbide of Calcium Manual Published by the Chief Inspector of Explosives of India. All such storage shall have prior approval of the Employer. In case, any approvals are necessary from the Chief Inspector (Explosives) or any statutory authorities, the Contractor shall be responsible for obtaining the same.
- f) All equipments used in construction and erection by Contractor shall meet Indian, International Standards and where such standards do not exist, the Contractor shall ensure these to be absolutely safe. All equipments shall be strictly operated and maintained by the Contractor in accordance with manufacturer's operation manual and safety instructions and as per Guidelines/Rules of Employer in this regard.
- g) Periodical Examinations and all tests for all lifting/hoisting equipment & tackles shall be carried out in accordance with the relevant provisions of Factories Act 1948, Indian Electricity Act 1910 and associated laws/ Rules in force from time to time. A register of such examinations and tests shall be properly maintained by the contractor and will be promptly produced as and when desired by Employer or by the person authorized by him.
- h) The Contractor shall be fully responsible for the safe storage of his and his sub-contractors radio-active sources in accordance with BARC/DAE Rules and other applicable provisions. All precautionary measures stipulated by BARC/DAE in connection with use, storage and handling of such material will be taken by Contractor.
- i) The Contractor shall provide suitable safety equipment of prescribed standard to all employee and workmen according to the need or as may be directed by Employer who will also have right to examine these safety equipments to determine their suitability, reliability, acceptability and adaptability.
- j) Where explosives are to be used, the same shall be used under the direct control and supervision of an expert,



experienced, qualified and competent person strictly in accordance with the Code Practices/Rules framed under Indian Explosives Act pertaining to handling, storage and use of the explosives.

- k) The Contractor shall provide safe working conditions to all workmen and employees at the Site including safe means of access, railings, stairs, ladders, scaffoldings etc. The Scaffoldings shall be erected under the control and supervisions of an experienced and. competent person. For erection, good and standard quality of material only shall be used by the Contractor.
- l) The Contractor shall not interfere or disturb electric fuses, wiring and other electrical equipment belonging to the Employer or other contractors under any circumstances, whatsoever, unless expressly permitted in writing by Employer to handle such fuses, wiring or electrical equipment.
- m) Before the Contractor connects any electrical appliances to any plug or socket belonging to the other Employer or Contractor, he shall:
 - i) Satisfy the Employer that the appliance is in good working condition.
 - ii) Inform the Employer of the maximum current rating, voltage and phases of the appliances.
 - iii) Obtain permission of the Employer detailing the sockets to which the appliances may be connected.
- n) The Employer will not grant permission to connect until he is satisfied that:
 - i) The appliance is in good condition and is fitted with a suitable plug.
 - ii) The appliance is fitted with a suitable cable having two earth conductors, one of which shall be an earthed metal sheath surrounding the cores.
- o) No electric cables in use by the Employer/Contractor will be disturbed without prior permission. No weight of any description will be imposed on any cable and no ladder or similar equipment will rest against or attached to it.
- p) No repair work shall be carried out on any live equipment. The equipment must be declared safe by Employer and a permit to work shall be issued by Employer before any



repair work is carried out by the Contractor. While working on electric lines/equipments whether live or dead, suitable type and sufficient quantity of tools will have to be provided by contractor to electricians/workmen/ officers.

- q) The contractor shall employ necessary number of qualified, full time Electricians/Electrical Supervisors to maintain his temporary electrical installations.
- r) In case any accident occurs during the construction/erection or other associated activities undertaken by the Contractor thereby causing any minor or major or fatal injury to his employees due to any reason, whatsoever, it shall be the responsibility of the Contractor to promptly inform the same to Employer in prescribed form and also to all the authorities envisaged under the applicable laws.
- s) The Employer shall have the right at his sole discretion to stop the work, if in his opinion the work is being done in such a way that it may cause accidents and endanger the safety of the persons and/or property, and/or equipments. In such cases, the Contractor shall be informed in writing about the nature of hazards and possible injury/accident and he shall comply to remove short comings promptly. The Contractor after stopping the specific work, can, if felt necessary, appeal against the order of stoppage of work to the General Manager of Project within 3 days of such stoppage of work and decision of Project GM in this respect shall be conclusive and binding on the Contractor.
- t) The Contractor shall not be entitled for any damages/compensation for stoppage of work due to safety reasons as provided in above and the period of such stoppage of work will not be taken as an extension of time for completion of work and will not be the ground for waiver of levy of liquidated damages.
- u) The Contractor shall follow and comply with all Employer Safety Rules relevant provisions of applicable laws pertaining to the safety of workmen, employees, plant and equipment as may be prescribed from time to time without any demur, protest or content or reservation. In case of any inconformity between statutory requirement and Employer Safety Rules, if any, referred above, the statutory requirement/provisions shall be binding on the Contractor.

7.2.0 Scaffolding and Ladders

Suitable scaffolding should be provided for workmen for all works that cannot be done from the ground, or from solid



construction, except such short period work as can be done safely from ladders. When a ladder is used, an extra mazdoor shall be engaged for holding the ladder and if the ladder is used for carrying materials, suitable footholds and hand holds shall be provided on the ladder and the ladder shall be given an inclination not steeper than 1/4 to 1.

7.3.0 Scaffolding and Staging Guards

Scaffolding or staging more than 3.5m above the ground and floor swung or suspended from an overhead support or connected with stationary support shall have a guard-rail properly attached, bolted, braced and otherwise secured at least 90cms. high above the floor or platform or such scaffolding or staging and extending along the entire length of the outside and ends thereof with only such openings as may be necessary for the delivery of materials. Such scaffolding or staging is so fastened as to prevent it swaying from the building or structure.

7.4.0 Platform, Gangways and Stairways

Working platform, gangways and stairways should be so constructed that they should not unequally erected. If the height of the platform of the gangway or the stairway is more than 3.5 metre above ground level or floor level, they should be closely boarded, should have adequate width and should be suitably fenced.

7.5.0 Protection for Opening in Floor

Every opening in the floor of a building, bridge or in a working platform shall be provided with suitable means to prevent the fall of a person or materials by providing suitable fencing or railing whose minimum height shall be 90 cms. In case, it may be necessary to cover the opening temporarily.

7.6.0 Safe Access to Working Places

Safe and easy means of access shall be provided to all working platforms and other working places. Every ladder shall be securely fixed. No portable single ladder shall be over 9 metres in length, while the width between side rails in rung ladder shall, in no case, be less than 30 cms length. Uniform step spacing shall not exceed 30 cms.

Adequate precaution shall be taken to prevent danger from electrical equipment. No materials in any of the sites of work shall be so stacked or placed to cause danger or inconvenience to any worker or the public. The Contractor



shall also provide all necessary fencing and lights to protect the public from accident and shall be bound to bear the expenses of defense or every suit, action or other proceedings at law that may be brought by any person for injury sustained, owing to neglect of the above precautions and to pay the damage and costs which may be awarded in any such suit, action or proceedings to any such persons or which may, with the consent of the Contractor be have to be to paid to compromise any claim of any such person.

7.7.0 Drowning Rescue and First Aid

When the work is done near any place where there is risk of drowning, all necessary equipment should be provided and kept ready for use and all necessary steps taken for prompt rescue of any person in danger and adequate provision should be made for prompt first-aid treatment of all injuries likely to be sustained during the course of work.

7.8.0 Hoisting Machines and Tackle Like Cranes Cableways etc.

Use of hoisting machines and tackle, including their attachments, anchorage and supports, shall conform to the following standards or conditions.

- i) a) These shall be of good mechanical construction, sound materials and adequate strength and free from latent defects and shall be kept in good repair and good in working order.
- b) Every rope used in hoisting or lowering material, as a means of suspension shall be of durable quality and of adequate strength and free from latent defects.
- ii) Every crane or cableway operator or hoisting appliance operators shall possess requisite qualifications, and no person under the age of 21 (twenty-one) years shall be placed in charge of any hoisting machine, including any scaffold, which will give signal to the operator.
- iii) In case of hoisting machines and cabin ring hook shackle, swivel and pulley block used in hoisting or lowering as a means of suspension, the safe working load shall be ascertained by adequate means. Every hoisting machine with the working load shall be used. In case of hoisting machines having a variable safe working load, each safe working load of the conditions under which it is applicable, shall be clearly indicated. No part of any machine referred to above in this paragraph shall be loaded beyond the safe working load, except for the purpose of testing.



- iv) In case of departmental machines, the safe working load shall be notified by the Employer. As regards Contractor's machines, the Contractor shall notify the safe working load of the machine to the Employer whenever he brings any machinery to the site of work, and shall get the same verified by the Employer before putting the machine to use.
- v) Every precaution shall be taken by the Contractor to ensure that the cableway skips are visible during night.
- vi) The cableway skips shall be firmly attached to the hooks.
- vii) The travelling and hoisting ropes of the cableway shall be of good quality and shall not break during operation of the cableway,
- viii) The limit switches showing the limits of travel of cableways shall function properly at all times and shall be easily visible from the operator's seat.
- ix) The rope guides shall be so spaced to prevent any accident due to slippage of carriage from the ropes.
- x) Suitable signal men and telephone operator shall be posted on duty whenever cable ways or other hoists are operated.
- xi) Cableways and ropes shall be inspected frequently to ensure safety of the people and materials or work sites and nearby.

7.9.0 Motors, Gearings, etc.

Motors, gearing, transmission, electric wiring are other dangerous parts of hoisting appliances shall be provided with efficient safeguards. Hoisting appliances shall be provided with such means as will reduce to the minimum the risk of accidental descent of the load. Adequate precautions should be taken to reduce to the minimum the risk of any part of a suspended load becoming accidentally displaced. When workers are employed on electrical installations which are already energized, insulating material, wearing apron such as gloves, sleeves, and boots, as may be necessary, shall be provided. The workers shall not wear any rings, watches and carry keys or other materials which are good conductors of electricity.

7.10.0 Maintenance

All scaffolds, ladders and other safety devices mentioned or described herein shall be maintained in safe conditions and




no scaffolds, ladder or equipments shall be altered or removed while it is in use. Adequate washing facilities shall be provided at or near places of work.

7.11.0 Display of Safety Provisions

All Safety provisions shall be brought to the notice of all concerned by display on a Notice Board at a prominent place at work spot. The persons responsible for receiving and processing complaints of safety code shall be named therein by the Contractor.

**Quality Assurance Test Requirements
And
Forms**

Sr. No.	QATR Description	QATR No. / Doc. No.	Rev. No.	Page No.
A.	MANUFACTURING QUALITY ASSURANCE TEST REQUIREMENT			
01.	Lifting Beam & Lifting Beam with Spreader Beam	QAI/A3-LA/M/HM/OM/05B	00	1-2
02.	Intake Steel Gratings	QAI/A3-LA/M/HM/ISG/01	00	1-2
03.	Vertical lift wheel Gate / slide gate (Bulkhead, TRT Gate, Intake Gate)	QAI/A3-LA/M/HM/VG/01	00	1-4
04.	Hydraulic Cylinder Assembly	QAI/A3-LA/M/HM/OM/01A	00	1-2
05.	Hoist Control Module	QAI/A3-LA/M/HM/OM/01B	00	1-2
06.	Rope Drum Hoist	QAI/A3-LA/M/HM/OM/02	00	1-4
07.	EOT Crane	QAI/A3-LA/M/HM/OM/04	00	1-4
08.	Electrical Panel / Control Panel	QAI/A3-LA/M/HM/EP/01	00	1
09.	Power Cables, Control Cables, Instrumentation Cable & Cable Trays	QAI/A3-LA/M/HM/CB/01	00	1
10.	Weld Log Sheet	QAI/A3-LA/WL/01	00	1
B.	FIELD QUALITY ASSURANCE TEST REQUIREMENT			
01.	Lifting Beam & Lifting beam with Spreader Beam	QAI/A3-LA/F/HM/OM/05B	00	1
02.	Intake Steel Gratings	QAI/A3-LA/F/HM/ISG/01	00	1-2
03.	Vertical lift wheel Gate / slide gate (Bulkhead, TRT Gate, Intake Gate)	QAI/A3-LA/F/HM/VG/01	00	1-4
04.	Hydraulic Hoist/ Actuator	QAI/A3-LA/F/HM/OM/01	00	1-3
05.	Rope Drum Hoist	QAI/A3-LA/F/HM/OM/02	00	1-2
06.	EOT Crane	QAI/A3-LA/F/HM/OM/04	00	1-3
07.	Electrical Panel / Control Panel	QAI/A3-LA/F/HM/EP/01	00	1
08.	Power Cables, Control Cables, Instrumentation Cable & Cable Trays	QAI/A3-LA/F/HM/CB/01	00	1
C	Forms			
01.	Vendor / Sub-vendor assessment sheet	F-060-01	01	1-14
02.	Form for submission of manufacturing / field quality plan by contractor	F-060-02	01	1
03.	NCR form for manufacturing, transportation, storage, and erection stages	F-060-04	01	1-5
04.	List of components / equipments / bought out items requiring quality plan approval and QAP submission schedule	F-060-05	00	1
05.	Inspection call request	F-060-06	00	1
06.	Check list for document submission by bidder with regard to quality assurance programme	F-060-07	00	1-2

 MANUFACTURING QUALITY ASSURANCE TEST REQUIREMENT			
PROJECT NAME : ARUN-3 HEP & LOWER ARUN HEP		DOC. NO. QAI/A3-LA/M/HM/OM/05B	REV. NO. 00
ITEM DESCRIPTION: LIFTING BEAM WITH SPREADER BEAM		ISSUE DATE: 30.11.22	PAGES: 2
SR. NO.	COMPONENT, OPERATION & CHARACTERISTIC	APPLICABLE STANDARD	REMARKS
1	2	3	4
1	Incoming Material		
1.1	Guide roller pin		
	Chemical Composition	TS/DRG/IS: 1570	V
	Mechanical Properties	TS/DRG/IS: 1570	V
	NDT (UT)	TS/DRG/ REL. STD	V
	Measurement of thickness	TS/DRG/ REL. STD	V
	Heat treatment (as applicable)	TS/DRG/ REL. STD	V
	Material identification/ Material transfer stamping	TS./DRG/Manufacturer standard practice	V
1.2	Structural component of lifting beam and lifting beam with Spreader beam (as applicable), Steel plates etc .		
	Chemical Composition	TS/DRG /IS:2062	V
	Mechanical Properties	TS/DRG /IS:2062	V
	NDT (UT)	TS/DRG /REL. STD	V
	Measurement of thickness	TS/DRG /REL. STD	V
	Heat treatment (as applicable)	TS/DRG /REL. STD	V
	Material identification/ Material transfer stamping	Tech. Spec./DRG/Manufacturer standard practice/ REL. STD	V
1.3	Hook & Lifting Lugs if applicable		
	Chemical composition	TS/DRG/IS:1875, IS:2062	V
	Mechanical Properties	TS/DRG/IS:1875, IS:2062	V
	Heat treatment	TS/DRG /REL. STD	V
	Proof load test	TS/DRG /REL. STD	V
	UT on raw material of hook	ASME Sec. V & VIII	V
	UT & MPI after proof load test (UT on shank portion only)	ASME Sec. V & VIII	V
1.4	Bush for hooks		
	Check for make, model & type	TS/DRG / IS 305	V
	Dimensional check	TS/DRG / IS 305	V
1.5	Sheaves & roller		
	Chemical Composition	TS/DRG / IS 1030.	V
	Mechanical Properties	TS/DRG / IS 1030.	V
2	In Process Inspection		
2.1	Cutting of Plates and Edge Preparation (for all major fabrications)		
	Visual examination for lamination, cracks, imperfect edges, twists, bends, flatness and other surface defects due to shearing or cutting operation.	Tech. Spec./DRG/Manufacturer standard practice/REL. STD	V
	Visual Examination	Tech. Spec./DRG	V
	Dimension Checks	DRG	V
	Material Traceability Control and transfer stamping	TS./Manufacturer standard practice	V
2.2.	Welding		
2.2.1	WPS, PQR and WPQR	DRG/ASME SEC IX	V
2.2.2	Butt Weld (if applicable as per drawing)		
	DP/MPI test after root run	ASME Section V & VIII/BS 5135/TS/DRG	V
	RT shall be conducted for 10% length of Butt weld joints in the skin plate	ASME Section V & VIII/BS 5135/TS/DRG	V
	UT & DPT/MPI shall be conducted for full length of Butt weld joints	ASME Section V & VIII/BS 5135/TS/DRG	W
2.2.3	Fillet weld		
	NDT of all fillet weld joint as per drawing or MPI / DP of all fillet joints if it is not specified in drawing.	ASME Section V & VIII/BS 5135/TS/DRG	W

2.2.4	All welds		
	Visual Examination for final weld appearance, cracks, undercut, Excess reinforcement, burn through or excess penetration, root concavity , non-uniform width of fillet weld joint, distortion & misalignment.	ASME Section V & VIII/BS 5135/TS/DRG	W
	Complete assembly/sub-assembly (as per drawing) to be stressed relieved after welding & NDT testing as per TS/ approved drawing	ASME Section V & VIII/BS 5135/TS/DRG	V
	Dimensional check of weld joints/ Weld size (Weld size shall be checked with universal weld gauge)	ASME Section V & VIII/BS 5135/TS/DRG	W
2.2.5	Weld/welder records		
	Welding & welder records to be maintained as per weld Log book	ASME Section V & VIII/BS 5135/TS/DRG	V
2.3	Machining		
	Visual Examination	Tech. Spec./DRG	V
	Dimensional Check	DRG	V
	Surface Finish	Tech. Spec./DRG	V
	Traceability Control	DRG/Relevant IS or international STD Manufacturer STD	V
2.4	Fabrication		
2.4.1	Fabricated lifting beam, Lifting beam with spreader beam (as applicable) & Guide Roller Assembly		
	Dimensional Check of all Major components	Tech. Spec./DRG	V
3	Final Assembly		
3.1	Lifting Beam and Lifting beam with Spreader Beam (as applicable)		
	Dimensional Check	DRG/IS: 13591/any other relevant STD	W
	Visual Examination	DRG/IS: 13591/any other relevant STD	W
	Surface Finish	DRG/IS: 13591/any other relevant STD	W
	Load test (1.25 times the working load)	TS/DRG/IS: 13591/any other relevant STD	W
	MPI of all bearing weld after the Load test	ASME Section V & VIII/BS 5135/TS/DRG	W
	Deflection measurement	TS/DRG/IS: 13591/any other relevant STD	W
	Engaging /de-engaging (Latching)	DRG/IS: 13591/any other relevant STD	W
4	Surface preparation and Painting		
	Visual Examination	TS/DRG/IS:14177	V
	Paint Thickness & Adhesion test	TS/DRG/IS:14177	V
	Packing/Protection	TS/DRG/IS:14177	V
LEGEND			
CHP: CUSTOMER HOLD POINT(W)		DRG: DRAWING	
TS: TECHNICAL SPECIFICATION		REL. STD: RELEVANT STANDARD	
V: VERIFICATION OF REPORT/TCs			
NOTE:			
1. Any test at any stage not covered in Quality Assurance Test Requirement (QATR), but part of Technical Specification of contract, shall also be carried out by Contractor/ firm.			
2. QATR shall be read in conjunction with General Quality Assurance Requirement given as part of Technical Specification.			
3. Please refer following QATR for associated equipments of Gate (to be read in conjunction with this QATR for the complete requirement as per TS)			
Sr. No.	QATR Description	DOC. NO. QAI/NM/M/HM/SL/01	REV. NO.
1	Weld Log Sheet	QAI/A3-LA/WL/01	0



MANUFACTURING QUALITY ASSURANCE TEST REQUIREMENT

	PROJECT NAME: ARUN-3 HEP & LOWER ARUN HEP	DOC. No. QA/A3-LAM/HM/ISG/01	REV. No. 00
	ITEM DESCRIPTION: -INTAKE STEEL GRATINGS	ISSUE DATE: 30.11.22	PAGES : 2
SR. NO.	COMPONENT ,OPERATION & CHARECTERISTICS	APPLICABLE STANDARD	REMARKS
1	2	3	4
1.0.	Incoming Material/ Bought Out Items		
1.1	Steel Plates for Embedded Parts		
1.1.1	Anchor Rods,Anchor Bolts and Track Groove Lining with Base etc.		
1.1.1.1	Chemical Composition	TS/ DRG/ IS 2062/Rel.Std.	V
1.1.1.2	Mechanical Properties	TS/ DRG/ IS 2062/Rel.Std.	V
1.1.1.3	NDT as per TS/DRG	TS/ DRG/ Rel.Std.	V
1.1.1.4	Dimensional Check	TS/ DRG/ Rel.Std.	V
1.1.1.5	Heat Treatment	TS/ DRG/ Rel.Std.	V
1.2	Plates/ Flats of Structural Steel for:-		
1.2.1	Gratings Vertical Bars,Horizontal Members,End Vertical Member,Pilot Pins & Shoes, Lifting Hooks/Lugs etc		
1.2.1.1	Chemical Composition	TS/ DRG/ IS 2062.	V
1.2.1.2	Mechanical Properties	TS/ DRG/ IS 2062.	V
1.2.1.3	NDT as per TS/DRG	TS/ DRG/ Rel.Std.	V
1.2.1.4	Dimensions	TS/ DRG/ Rel.Std.	V
1.2.1.5	Heat Treatment	TS/ DRG/ Rel.Std.	V
1.2.1.6	Material Identification	TS/Manufacturer standard practice	V
1.3	Bearing pads		
1.3.1	Chemical Composition & Mechanical Properties	TS/DRG/ REL. STD.	V
1.3.2	Measurement of dimensions	TS/DRG/ REL. STD.	V
1.3.3	NDT as per TS/DRG	TS/DRG/ REL. STD.	V
2	In process Inspection		
2.1	Cutting of Plates and Edge Preparation (for all major fabrication)		
2.1.1	Visual Examination	TS/DRG	V
2.1.2	Dimensional Check	TS/ DRG/ Rel.Std.	V
2.1.3	Traceability Control	TS/Manufacturer standard practice	V
2.2	Examination of Welding		
2.2.1	WPS, PQR and WPQR	DRG/ ASME SEC IX	V
2.2.2	Welding	DRG/ ASME Section V & VIII	V
2.2.3	NDT test as per TS/DRG	TS/ DRG/Rel.Std.	V
2.2.4	Visual Examination of Welding	TS/ DRG/Rel.Std.	V
2.3	Gratings Vertical Bars,Horizontal Members, End Vertical Member and Pilot Shoes		
2.3.1	Dimensional Check	TS/ DRG	V
3.0.	Final Assembly		
3.1	Final Test on complete Assembled Steel Gratings		
3.1.1	Dimensional Check for completeness & Match Marking	TS/ DRG/ Rel. Std	W
3.1.2	Seating of Trash Rack Panel	TS/ DRG/ Rel. Std	W
3.1.3	Visual Examination	TS/ DRG/ Rel. Std	W
3.1.4	Surface Finish	TS/ DRG/ Rel. Std	W
4.0.	Painting		
4.1	Visual Examination	TS/ DRG/ Rel. Std	V
4.2	Paint Thickness	TS/ DRG/ Rel. Std	V
4.3	Packing/ Protection	TS/ DRG/ Rel. Std	V

LEGENDS

W: CUSTOMER HOLD POINT (CHP)	DRG: DRAWING
TS: TECHNICAL SPECIFICATION	REL. STD: RELEVANT STANDARD
V: VERIFICATION OF REPORT / TCs	

NOTES:

1	Any test at any stage not covered in Quality Assurance Test Requirement (QATR), but part of technical specification of contract, shall also be carried out by Contractor / firm.
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MANUFACTURING QUALITY ASSURANCE TEST REQUIREMENT

PROJECT NAME: ARUN-3 HEP & LOWER ARUN HEP

DOC. No. QA/A3-LA/M/HM/ISG/01

REV. No. 00

ITEM DESCRIPTION:-INTAKE STEEL GRATINGS

ISSUE DATE: 30.11.22

PAGES : 2

SR. NO.	COMPONENT ,OPERATION & CHARECTERISTICS	APPLICABLE STANDARD	REMARKS
1	2	3	4
2	QATR shall be read in conjunction with General Quality Assurance Requirement given as part of Technical Specification.		



MANUFACTURING QUALITY ASSURANCE TEST REQUIREMENT

PROJECT NAME: ARUN-3 HEP & LOWER ARUN HEP

DOC. NO. QAI/A3-LA/M/HM/VG/01

REV. NO. 00

ITEM DESCRIPTION: VERTICAL LIFT WHEEL GATE / SLIDE GATE (TRT Gates, Bulkhead Gate, Intake Gates)

ISSUE DATE: 30.11.22


PAGES: 05


SR. NO.	COMPONENT, OPERATION & CHARACTERISTICS	APPLICABLE STANDARD	REMARKS
1	2	3	4
1	Incoming Material		
1.1	Steel Plates/bars for:		
1.1.1	First stage inserts / second stage embedments, Anchor bolts / studs etc.		
	Chemical composition & Mechanical Properties	TS/DRG/ IS:2062/IS:4622	V
	Measurement of dimensions & NDT	TS/DRG/ REL. STD.	V
	Heat treatment (as applicable)	TS/DRG/ REL. STD.	V
1.1.2	Pipes including air vent pipes / Instrumentation pipes (as applicable)		
	Material of construction	TS/DRG/ IS:2062	V
	Dimensional check & Pressure test	TS/DRG/ REL. STD.	V
1.2	Casting/Forging/steel plates for gate and accessories:		
1.2.1	Wheel Pin/ guide roller pins/ lifting pins, Probe rod etc. (as applicable)		
	Chemical composition & Mechanical Properties	TS/DRG/IS: 1570	V
	NDT as per TS/DRG	TS/DRG/ REL. STD.	V
	Measurement of dimensions	TS/DRG/ REL. STD.	V
	Heat treatment (as applicable)	TS/DRG/ REL. STD.	V
	Material identification/ Material transfer stamping	TS /Manufacturer standard practice / REL. STD.	V
1.2.2	Horizontal girders, vertical girders, stiffeners, guide shoe/roller/bar, lifting bracket, track bases, seal seat bases, latching arrangement, side guide tracks, skin plate etc.		
	Chemical composition & Mechanical Properties	TS/DRG /IS:2062	V
	NDT as per TS/DRG	TS/DRG/ REL. STD.	V
	Measurement of dimensions	TS/DRG/ REL. STD.	V
	Heat treatment (as applicable)	TS/DRG/ REL. STD.	V
	Material identification/ Material transfer stamping	TS /Manufacturer standard practice / REL. STD.	V
1.2.3	Wheels (as applicable)		
	Chemical composition & Mechanical Properties including Hardness in BHN	TS/DRG/ IS:2004/IS:1030	V
	NDT as per TS/DRG	TS/DRG/ REL. STD.	V
	Measurement of Dimensions	TS/DRG/ REL. STD.	
	Heat treatment	TS/DRG/ REL. STD.	V
1.2.4	Bearings in wheel (as applicable)		
	Check for make, model/designation & type	TS/DRG / Relevant Std.	V

SR. NO.	COMPONENT, OPERATION & CHARACTERISTICS	APPLICABLE STANDARD	REMARKS
1	2	3	4
	Dimensional check	TS/DRG / Relevant Std.	V
1.2.5	Side, top & bottom Seals		
	Dimensional Check	DRG	V
	Surface Finish	TS/IS: 11855/IS:15466	V
	Chemical composition	TS/IS: 11855/IS:15466	V
	Physical Properties (Shore's hardness, UTS, Water absorption, Specific Gravity, Elongation, low temperature brittleness test)	TS/IS: 11855/IS:15466	V
	Tensile test after ageing test	TS/IS: 11855/IS:15466	V
1.2.6	Wheel track / slide track, seal seats		
	Chemical Composition & Mechanical Properties, Hardness in BHN on track plate	TS/DRG/ IS : 1570	V
	Heat treatment (as applicable)	TS/DRG/ REL. STD.	V
	NDT as per TS/DRG	TS/DRG/ REL. STD.	V
	Measurement of dimensions	TS/DRG/ REL. STD.	V
1.2.7	Fasteners for seals / screw / bolts for seals, seal clamps		
	Chemical composition & Mechanical Properties	TS/DRG/ REL. STD.	V
	NDT as per TS/DRG	TS/DRG/ REL. STD.	V
	Measurement of dimensions	TS/DRG/ REL. STD.	V
1.2.8	Steel Liner (as applicable)		
	Chemical Composition & Mechanical Properties including Hardness in BHN	TS/DRG/ REL. STD.	V
	Heat treatment (as applicable)	TS/DRG/ REL. STD.	V
	NDT as per TS/DRG	TS/DRG/ REL. STD.	V
	Measurement of thickness & flatness	TS/DRG/ REL. STD.	V
1.2.9	Thrust pads / slide blocks (as applicable)		
	Chemical Composition & Mechanical Properties	TS/DRG/ REL. STD. / IS: 305 / IS: 1570	V
	Measurement of dimensions	TS/DRG/ REL. STD.	V
	NDT as per TS/DRG	TS/DRG/ REL. STD.	V
1.3	Filling Valves (as applicable)		
1.3.1	Spring, stem for valves		
	Chemical composition & Mechanical properties	TS/DRG/ REL. STD. / IS: 1570	V
1.3.2	Seal for valves		
	Chemical composition & Mechanical properties	TS/DRG/ REL. STD.	V
1.3.3	Filling valve		
	Dimension check	TS/DRG/ REL. STD.	V
2	In Process Inspection		
2.1	Cutting of Plates and Edge Preparation (for all major fabrications)		

SR. NO.	COMPONENT, OPERATION & CHARACTERISTICS	APPLICABLE STANDARD	REMARKS
1	2	3	4
	Visual examination for lamination, cracks, imperfect edges, twists, bends, flatness and other surface defects due to shearing or cutting operation.	TS/DRG/Manufacturer standard practice	V
	Visual Examination	TS/DRG	V
	Dimension Checks	DRG	V
	Material Traceability Control and transfer stamping	TS /Manufacturer standard practice / REL. STD.	V
2.2.	Welding		
2.2.1	WPS, PQR and WPQR	DRG/ASME SEC IX	W/V
2.2.2	Butt Weld (if applicable as per drawing)		
	DP/MPI test after root run	ASME Section I & VIII/BS 5135/DRG	V
	RT shall be conducted as per approved drawing/TS/Standard	ASME Section V & VIII/BS 5135/DRG/TS/ IS:2595/IS:2825	V
	UT, DPT & MPI shall be conducted as per approved drawing/TS/Standard	ASME Section V & VIII/BS 5135/DRG/TS/ IS:2595/IS:2825	W
2.2.3	Fillet weld		
	NDT of all fillet weld joint as per drawing or MPI / DP of all fillet joints if it is not specified in drawing.	ASME Section V & VIII/BS 5135/DRG/TS	W
2.2.4	All welds		
	Visual Examination for final weld appearance, cracks, undercut, Excess reinforcement, burn through or excess penetration, root concavity , non-uniform width of fillet weld joint, distortion & misalignment.	ASME Section V & VIII/BS 5135/DRG/TS	W
	Complete assembly/sub-assembly (as per drawing) to be stressed relieved after welding as per approved DRG/TS.	ASME Section V & VIII/BS 5135/DRG/TS	V
	Dimensional check of weld joints/ Weld size (Weld size shall be checked with universal weld gauge)	ASME Section V & VIII/BS 5135/DRG/TS	W
2.2.5	Weld/welder records		
	Welding & welder records to be maintained as per weld Log book	ASME Section V & VIII/BS 5135/DRG/TS	V
2.3	Machining		
	Visual Examination & Dimensional Check	TS/DRG	V
	Surface Finish	TS/DRG	V
	Material Traceability Control and transfer stamping	DRG/REL. STD. / Manufacturer standard	V
2.4	Fabrication		
2.4.1	Second stage embedments (wheel / slide track member, side seal member, top seal member, sill beam, seat guide member), gate etc.		
	Dimensional Check of all major parts	DRG	V
2.5	Sub-assemblies: Wheel assembly, side guide shoe / roller assembly, filling valve (as applicable), latching / dogging bracket, etc.		
	Dimensions, accuracy of machining, Clearances, proper fitment, surface finish, tolerances.	DRG	V/W
3	Final Assembly		
3.1	Latching assembly, Dogging bracket assembly		
	Dimensions, Check for proper fitment, straightness and alignment, Visual examination.	TS/DRG/IS: 7718/REL. STD.	V/W

SR. NO.	COMPONENT, OPERATION & CHARACTERISTICS	APPLICABLE STANDARD	REMARKS
1	2	3	4
3.2	Final Test on complete assembled Gate with wheels / pads, side guides shoe / roller, Seals etc.		
	Dimensional Check	TS/DRG/IS: 7718/REL. STD.	W
	Visual Examination and check for freedom of defects and workmanship	TS/DRG/IS: 7718/REL. STD.	W
	Surface Finish including seal surfaces	TS/DRG/IS: 7718/REL. STD.	W
	Check correct operation of Release probe (if applicable)	TS/DRG/IS: 7718/REL. STD.	W
	Check for proper alignment, fits, clearances, flatness and tolerances required in specification and drawing etc.	TS/DRG/IS: 7718/REL. STD.	W
	Rotation of wheels / guide roller (as applicable) of the gate to ensure their free movement.	TS/DRG/IS: 7718/REL. STD.	W
	Proper fitment of seals	TS/DRG/IS: 7718/REL. STD.	W
	Establishment of correct CG during shop assembly before final welding of lifting lugs.	TS/DRG/IS: 7718/REL. STD.	V
	Operational check of filling valve.	TS/DRG/IS: 7718/REL. STD.	W
3.3	Marking		
	Match marking of all components before dismantling/Various connecting parts shall be match marked	TS/DRG/IS: 7718/REL. STD.	V
	All erection marks shall be hard-punched	TS/DRG/IS: 7718/REL. STD.	V
4	Surface preparation/Sand blasting and Painting		
	Visual Examination	TS/DRG/IS:14177	V
	Paint Thickness & Adhesion test	TS/DRG/IS:14177	V
	Packing/Protection	TS/DRG/IS:14177	V
LEGENDS			
W: CUSTOMER HOLD POINT (CHP)		DRG: DRAWING	
TS: TECHNICAL SPECIFICATION		REL. STD: RELEVANT STANDARD	
V: VERIFICATION OF REPORT / TCs			
NOTES:			
1	Any test at any stage not covered in Quality Assurance Test Requirement (QATR), but part of technical specification of contract, shall also be carried out by Contractor / firm.		
2	QATR shall be read in conjunction with General Quality Assurance Requirement given as part of Technical Specification.		
3	Please refer following QATR for associated equipments of Gate to be read in conjunction with this QATR for the complete requirement as per TS.		
Sr. No.	QATR Description	Doc. No.	Rev. No.
3.1	Rope Drum Hoist	QAI/A3/M/HM/OM/02	0
3.2	Electrical Panel / Control Panel	QAI/A3/M/HM/EP/01	0
3.3	Air and water jet groove cleaning system (as applicable)	QAI/A3/M/HM/AW/01	0
3.4	Cable	QAI/A3/M/HM/CB/01	0
3.5	Gantry Crane	QAI/A3/M/HM/OM/04	0
3.6	Weld Log Sheet	QAI/A3/WL/01	0


 MANUFACTURING QUALITY ASSURANCE TEST REQUIREMENT			
PROJECT NAMME: ARUN-3 HEP & LOWER ARUN HEP		DOC.No.QAI/A3-LA/M/HM/OM/01A	REV. No. 00
ITEM DESCRIPTION:-HYDRAULIC CYLINDER ASSEMBLY		ISSUE DATE: 30.11.22	PAGES :02
SR. NO.	COMPONENT,OPERATION & CHARECTERISTICS	APPLICABLE STANDARD	REMARKS
1	2	3	4
1	Incoming Material		
1.1	Structural Steel for Cylinder Mounting & Support Structure		
1.1.1	Chemical Analysis & Mechanical Properties	TS/DRG/ IS 2062	V
1.1.2	Dimensional Check and NDT	Rel. Std./TS/DRG.	V
1.2	Upper & Lower Cylinder Head		
1.2.1	Chemical Analysis & Mechanical Properties	TS/DRG/IS 1030/ IS 2002 Gr. 2A	V
1.2.2	Dimensional Check	Rel. Std./TS/DRG	V
1.2.3	NDT	Rel. Std./TS/DRG	V
1.2.4	Material Traceability Control and transfer stamping	TS/Manufacturer standard practice	V
1.3	Cylinder		
1.3.1	Chemical Analysis & Mechanical Properties	TS/DRG/ IS 2004/IS 2002 Gr. 2A	V
1.3.2	NDT	Rel. Std./TS/DRG	V
1.3.3	SR	SR Chart	V
1.3.4	Dimensional Check	DRG	V
1.3.5	Surface Finish	TS/DRG	V
1.3.6	Material Traceability Control and transfer stamping	TS/Manufacturer standard practice	V
1.4	Piston Stem/Rod		
1.4.1	Chemical Analysis, Mechanical Stength & Buckling Strength	IS 1570/DIN 17440 Type X20 Cr 13 (15) /ASTM A276 Type 316.	V
1.4.2	NDT, SR and Dimensional Check	Rel. Std./TS/ DRG	V
1.4.3	Material Traceability Control and transfer stamping	TS/Manufacturer standard practice	V
1.5	Piston		
1.5.1	Chemical Analysis & Mechanical Properties	IS 2004,IS 1875,IS 1030	V
1.5.2	Dimensional Check	DRG	V
1.5.3	Material Traceability Control and transfer stamping	TS/Manufacturer standard	V
1.6	Piston Rings		
1.6.1	Chemical Analysis & Mechanical Properties	IS318/TS	V
1.6.2	NDT , SR and Dimensional Check	Rel. Std./TS	V
1.7	Mild Steel Studs and Bolts		
1.7.1	Chemical Analysis & Mechanical Stength	IS 1367/IS 1570/IS 10210/TS	V
1.7.2	NDT & Dimensional Check	IS 1367/IS 1570/IS 10210/TS	V
1.8	Clevis Bushing & Pin		
1.8.1	Chemical Analysis & Mechanical Properties	IS 1570 or ASTM A-276 Type 316 or ASTM A-564	V
1.8.2	Shear,Bending & Bearing Stresses	IS 1570 or ASTM A-276 Type 316	V
1.9	Gland, Seals, Gaskets,Scraper,Wiper Ring & Guide bushing		
1.9.1	Chemical Analysis and Mechanical Properties	IS 10210/Rel. Std./TS	V
1.10.	Bearing for Cylinder Mounting & Bush Bearing		
1.10.1	Chemical Analysis and Mechanical Properties	IS 318/Rel. Std./TS	V
1.10.2	Dimensional Check	DRG/Rel. Std./TS	V
1.11.	Proximity Switches		
1.11.1	Operational and Functional Checks	TS/DRG/Rel. Std.	V
1.12	Position Transducers		
1.12.1	Dielectric Test	TS/ DRG/ ANSI C 37.90a	V
1.12.2	Functional & Accuracy Check	TS/ DRG/ ANSI C 37.90a	V
2.0.	Final Inspection		
2.1	Hydraulic Cylinder Assembly		
2.1.1	Surface Finish	TS/ DRG/ IS 10210/ IS 2815/ DIN 19704	W
2.1.2	Dimensional Check	TS/ DRG/ IS 10210/ IS 2815/ DIN 19704	W

 MANUFACTURING QUALITY ASSURANCE TEST REQUIREMENT			
PROJECT NAME: ARUN-3 HEP & LOWER ARUN HEP		DOC.No.QAI/A3-LA/M/HM/OM/01A	REV. No. 00
ITEM DESCRIPTION:-HYDRAULIC CYLINDER ASSEMBLY		ISSUE DATE: 30.11.22	PAGES :02
SR. NO.	COMPONENT, OPERATION & CHARACTERISTICS	APPLICABLE STANDARD	REMARKS
1	2	3	4
2.1.3	Soundness of hydraulic cylinder assy. (Both Side)	TS/ DRG/Rel Std.	W
2.1.4	Stroke/Over Stroke (Both Lowering & raising)	TS/ DRG/Rel Std.	W
2.1.5	Leakage Across Piston	TS/ DRG/Rel Std.	W
2.1.6	Pressure Test/Hydrostatic Test (1.5 times of design pressure)	TS/ DRG/Rel Std.	W
2.1.7	Easy Movement of piston and piston rod	TS/ DRG/Rel Std.	W
2.1.8	Effectiveness of NRV & Flow Control Valve Operation	TS/ DRG/Rel Std.	W
2.1.9	Stroke Opening Timing	TS/ DRG/Rel Std.	W
2.1.10	Stroke Closing time (Before Cushioning Effect)	TS/ DRG/Rel Std.	W
2.1.11	Effectiveness of cushioning operation	TS/ DRG/Rel Std.	W
2.1.12	Paint Film Thickness, Adhesion Test and Cleanlines	TS/ DRG/ IS 10210/ IS 2815/ DIN 19704	V
LEGENDS			
W: CUSTOMER HOLD POINT (CHP)		DRG: DRAWING	
TS: TECHNICAL SPECIFICATION		REL. STD: RELEVANT STANDARD	
V: VERIFICATION OF REPORT / TCs			
NOTES:			
1	Any test at any stage not covered in Quality Assurance Test Requirement (QATR), but part of technical specification of contract, shall also be carried out by Contractor / firm.		
2	QATR shall be read in conjunction with General Quality Assurance Requirement given as part of Technical Specification.		



MANUFACTURING QUALITY ASSURANCE TEST REQUIREMENT

SR. NO.	COMPONENT, OPERATION & CHARACTERISTICS	APPLICABLE STANDARD	REMARKS
PROJECT NAME: ARUN-3 HEP & LOWER ARUN HEP		DOC.No.QAI/A3-LA/M/HM/OM/01B	REV. No. 00
ITEM DESCRIPTION:-HOIST CONTROL MODULE		ISSUE DATE: 30.11.22	PAGES : 2
1	2	3	4
1.0.	Bought out Material		
1.1	Hydraulic Valves like Shut off Valves, Check Valves, Directional Control Valves, Pressure Relief Valves, Flow Control Valves etc.		
1.1.1	Routine Tests & Hydrostatic Test	TS/ DRG	V
1.2	Accessories like Filters and Strainers, Desiccant Breather cap with silicagel and filters, Oil filling cap and oil level gauges		
1.2.1	Make , Model & Type	TS/ DRG/ GTP	V
1.3	Pressure and Temperature Gauges, Dial Type Thermometers, Level Switch		
1.3.1	Make , Model & Type	TS/ DRG/ GTP	V
1.3.2	Operational and Functional Checks	TS/ DRG/ GTP	V
1.3.3	Callibration Certificate	TS/ DRG/ GTP	V
1.4	Hydraulic Accumulators (As applicable)		
1.4.1	Verification of Make and Type, NDT,Routine Test & Painting and Protection	TS/ DRG/ ASME Sec V	V
1.5	Connecting Piping & Flexible Connection		
1.5.1	Chemical & Mechanical Properties	TS/ DRG/ DIN-17440/8,DIN-17458,DIN-2462/BS-3604	V
1.5.2	Dimensional Check		V
1.5.3	Pressure Test		V
1.5.4	NDT	TS/ DRG/ ASME Sec V & VIII	V
1.6	Fittings and Flanges,Pipe Supports, Seals etc.		
1.6.1	Chemical & Mechanical Properties	TS/ DRG/ Rel. std.	V
1.7	Hydraulic Working Fluids (Oil)		
1.7.1	Physical Properties,Hydrolytic Stability & Wear Test	TS/ DRG/ ISO VG-32	W/V
1.8	Hydraulic Flushing Fluids (Oil)		
1.8.1	Physical Properties	TS/ DRG/ NAS 1638, class 8	V
1.9	Dehydration & Oil Cleaning Machine		
1.9.1	Make, Model & Type	Rel. Std./ 10210/TS	V
1.9.2	Routine & Performance Test	Rel. Std./ 10210/TS	V
1.10.	Fluid Reservoir (Oil tank)		
1.10.1	Chemical Analysis	Rel.Std./ 10210/TS	V
1.10.2	Mechanical Properties	Rel. Std./ 10210/TS	V
1.10.3	NDT, Leakage Test & Dimensional Check	Rel. Std./ 10210/TS	V
1.11	Electric Motor Driven Pump		
1.11.1	Electric Motor		
1.11.1.1	Type Tests	TS/DRG/GTP/ Rel.Std.	V
1.11.1.2	Data Sheet & Routine Tests	TS/ DRG/ IS 325	V
1.11.2	Motor Pump Assembly		
1.11.2.1	Routine Tests and Performance & Characteristics Curve	TS/DRG/GTP/ Rel. Std.	V
1.13	Petrol Engine Driven Pumps (As applicable)		
1.13.1	Petrol Engine (As applicable)		
1.13.1.1	Make, Model , Type & Routine Test	TS/ DRG/ BS 5514/ Bs 649/ ISO 3046/ IS 1000/Latest Version of Bharat/Euro	V
1.13.2	Engine Pump Assembly		
1.13.2.1	Type Tests,Routine Tests and Performance & Characteristics Curve	TS/DRG/GTP/Rel. Std.	V
3.0.	Final Inspection		
3.1	Hydraulic Control Module		
3.1.1	Check for proper assembly and mounting of components of Hydraulic system like pumps, valves, pressure and temperature gauges, level switches, filters and strainers, breather caps etc.	TS/ DRG	W
3.1.2	Final Main Dimensions of Hydraulic Control Module	TS/ DRG	W
3.1.3	Check on Electrical/Control Panel ((For detail testing of panels please refer QATR No. QAI/A3/M/HM/EP/01)	TS/DRG/Rel. Std.	W
3.1.4	Leakage Test	TS/DRG/Rel. Std.	W
3.1.5	Operational and Functional Checks	TS/ DRG/ IS 10210	W

 MANUFACTURING QUALITY ASSURANCE TEST REQUIREMENT			
PROJECT NAME: ARUN-3 HEP & LOWERE ARUN HEP		DOC.No.QAI/A3-LA/M/HM/OM/01B	REV. No. 00
ITEM DESCRIPTION:-HOIST CONTROL MODULE		ISSUE DATE: 30.11.22	PAGES : 2
SR. NO.	COMPONENT, OPERATION & CHARECTERISTICS	APPLICABLE STANDARD	REMARKS
1	2	3	4
3.1.6	Check for Completeness of Equipment in all respects	TS/ DRG	V
3.1.7	Paint Film Thickness, Adhesion Test and Cleanlines	TS/ DRG/ IS 10210/ IS 2815/ DIN 19704	V
LEGENDS			
W: CUSTOMER HOLD POINT (CHP)		DRG: DRAWING	
TS: TECHNICAL SPECIFICATION		REL. STD: RELEVANT STANDARD	
V: VERIFICATION OF REPORT / TCs		GTP:- Guaranteed Technical Particular	
NOTES:			
1	Any test at any stage not covered in Quality Assurance Test Requirement (QATR), but part of technical specification of contract, shall also be carried out by Contractor / firm.		
2	QATR shall be read in conjunction with General Quality Assurance Requirement given as part of Technical Specification.		




MANUFACTURING QUALITY ASSURANCE TEST REQUIREMENT

PROJECT NAMME: ARUN-3 HEP & LOWER ARUN HEP **DOC. No.:** QAI/A3-LA/M/HM/OM/02 **REV. No.** 00

ITEM DESCRIPTION:- ROPE DRUM HOIST **ISSUE DATE:** 30.11.22 **PAGES :** 4

SR. NO.	COMPONENT , OPERATION & CHARACTERISTICS	APPLICABLE STANDARD	REMARKS
1	2	3	4
1	Incoming Material/ Bought Out Items		
1.1	Girder,Column, Beams &Bed Frame		
1.1.1	Chemical Analysis	TS/DRG/ IS 2062	V
1.1.2	Mechanical Properties	TS/DRG/ IS 2062	V
1.1.3	UT of plates	ASTM A435 / TS/ DRG/REL. STD.	V
1.1.4	Dimensional Check	TS/ DRG	V
1.1.5	Material Identification & transfer stamping	TS/Manufacturer Standard Practice	V
1.2	Casting/plate for Rope Drum		
1.2.1	Chemical Analysis	TS/DRG/ IS 2062/IS1030	V
1.2.2	Mechanical Properties	TS/DRG/ IS 2062/IS1030	V
1.2.3	UT of casting/plate	ASTM A435 / TS/ DRG/REL. STD.	V
1.2.4	Dimensional Check	TS/ DRG	V
1.2.5	Material Identification & transfer stamping	TS/Manufacturer Standard Practice	V
1.3	Wire Rope		
1.3.1	Identification & Grade	TS/ DRG/ IS 2266.	V
1.3.2	Chemical Composition	TS/ DRG/ IS 2266.	V
1.3.3	Mechanical Properties	TS/ DRG/ IS 2266.	V
1.3.4	Check for twist, kinks,proper thimble connection & Splicing	TS/ DRG/ IS 2266.	V
1.3.5	Dimensional Check	TS/ DRG/ IS 2266.	V
1.4	Gear Box Casing (Worm Reducer)		
1.4.1	Chemical Analysis	TS/DRG/ IS 2062	V
1.4.2	Mechanical Properties	TS/DRG/ IS 2062	V
1.4.3	Surface condition	TS/ DRG	V
1.5	Spur Gears & Pinions		
1.5.1	Chemical Composition	TS/ DRG/IS 1030/IS 1875/IS 1570/Rel. Std.	V
1.5.2	Mechanical Properties		V
1.5.3	Hardness		V
1.5.4	Dimensional Check		V
1.5.5	UT after proof machining	ASME Sec VIII & V	V
1.5.6	DP Test on teeth	No crack and line of indication	V
1.5.7	Heat Treatment	TS/ DRG/Rel. Std.	V
1.6	Shaft, Coupling Shaft & Axles		
1.6.1	Chemical Composition	TS/ DRG/IS 2004/IS 1570/Rel. Std.	V
1.6.2	Mechanical Properties		V
1.6.3	Hardness		V
1.6.4	Dimensional Check		V
1.6.5	NDT after machining		V
1.6.6	Heat Treatment		V
1.7	Bearings		
1.7.1	Type, make & size	TS/ DRG	V
1.8	Lifting Hook and Block		
1.8.1	Chemical Properties	TS/ DRG/ IS 2004/Rel. Std.	V
1.8.2	Heat Treatment	TS/DRG/ ASME Sec- VIII	V
1.8.3	Mechanical Properties on integral test bar	TS/ DRG/ IS 2004/Rel. Std.	V
1.8.4	UT on raw material of Hook	TS/DRG/ ASME Sec- VIII	V
1.8.5	Proof Load Test	TS/ DRG/ IS 2004/Rel. Std.	V
1.8.6	UT & MPI after proof load test (UT on shank portion only)	TS/DRG/ ASME Sec- VIII & V	V
1.8.8	Material Identification & transfer stamping	TS/Manufacturer Standard Practice	V
1.9	Pulleys, brake drums, coupling & other major steel casting & forging		
1.9.1	Chemical Composition	TS/ DRG	V
1.9.2	Mechanical properties	TS/ DRG	V
1.9.3	Hardness except pulleys	TS/ DRG	V
1.9.4	Final Dimensional Check	TS/ DRG	V

 MANUFACTURING QUALITY ASSURANCE TEST REQUIREMENT			
PROJECT NAMME: ARUN-3 HEP & LOWER ARUN HEP		DOC. No.: QAI/A3-LA/M/HM/OM/02	REV. No. 00
ITEM DESCRIPTION:- ROPE DRUM HOIST		ISSUE DATE: 30.11.22	PAGES :4
SR. NO.	COMPONENT , OPERATION & CHARACTERISTICS	APPLICABLE STANDARD	REMARKS
1	2	3	4
1.9.5	DPT in groove after machining of pulleys	TS/ DRG	V
1.10.	Electric Motors		
1.10.1	Routine Test	TS/ DRG/ IS 325	V
1.10.2	Verification of IP class	TS/ DRG/ IS 325	V
1.10.3	Type test	TS/ DRG/ IS 325	V
1.12	Brakes		
1.12.1	Routine Test	TS/ DRG	V
1.13	Resistance Box if applicable		
1.13.1	HV Test	TS/ DRG/ IS 3177	V
1.13.2	IR Test	TS/ DRG/ IS 3177	V
1.13.3	Temperature Rise	TS/ DRG/ IS 3177	V
1.13.4	Measurement of Resistance	TS/ DRG/ IS 3177	V
1.13.5	Verification of IP class	TS/ DRG/ IS 3177	V
1.14	Power & Control Cables		
1.14.1	Routine Test	ITS/ DRG/ IS 9968/ IS 1554	V
1.14.2	Acceptance Test	ITS/ DRG/ IS 9968/ IS 1554	V
1.15	Limit switch		
1.15.1	HV, IR & Functional Check	TS/DRG	V
1.15.2	Verification of IP class	TS/ DRG/ Rel. Std.	V
1.16	Sockets for wire rope		
1.16.1	Destructive tensile test in which rope shall fail first than the socket or	TS/DRG/IS 2062/IS 2485	V
1.20.	Threaded fasteners		
1.20.1	Chemical Composition, Mechanical properties & NDT	IS:1363 / IS:1364 / IS: 1365 / IS:1367 / IS2389 / IS1570	V
1.20.2	Dimensions	IS:1363 / IS:1364 / IS: 1365 / IS:1367 / IS2389 / IS1570	V
1.21	Pressure Sensor, depth Indicator Dial,Digital Position Indicator, Load Pin Transducer & Rope Retention Device		
1.21.1	Make, Model & Type	TS/ DRG/ Rel. Std.	V
1.21.2	Routine Test & Functional Test	TS/ DRG/ Rel. Std.	V
1.21.3	Callibration Certificate	TS/ DRG/ Rel. Std.	V
2	In process Inspection		
2.1	WPS, PQR, WPQR		
2.1.1	Welder's Qualification Records, PQR & WPS	DRG/ ASME Sec IX	W/V
2.2	Butt weld, if any, in Girder,Column,Rope Drum ,Hoist Bridge & Gear Box Casing (as per drawing)		
2.2.1	DP/MPI test after root run	ASME Section V & VIII/BS 5135/DRG/TS	V
2.2.2	RT shall be conducted as per approved drawing/TS/Standard	ASME Section V & VIII/BS 5135/DRG/TS	V
2.2.3	UT, DPT & MPI shall be conducted as per approved drawing/TS/Standard (Addiitionally, NDT of inaccessible weld joints in box girder (before closing) shall also be witnessed by SAPDC)	ASME Section V & VIII/BS 5135/DRG/TS	W
2.3	Fillet weld, in Box Girder,Column,Rope Drum,Hoist Bridge & Gear Box casing (as per drawing)		
2.3.1	NDT of all fillet weld joint as per drawing or MPI / DP of all fillet joints if it is not specified in drawing(Addiitionally, NDT of inaccessible weld joints in box girder (before closing, if applicable) shall also be witnessed by SAPDC).	ASME Section V & VIII/BS 5135/DRG/TS	W
2.4	All weld joints		
2.4.1	Visual Examination for final weld appearance, cracks, undercut, Excess reinforcement, burn through or excess penetration, root concavity , non-uniform width of fillet weld joint, distortion & misalignment.	ASME Section VIII &V/DRG	W



MANUFACTURING QUALITY ASSURANCE TEST REQUIREMENT

PROJECT NAMME: ARUN-3 HEP & LOWER ARUN HEP

DOC. No.: QAI/A3-LA/M/HM/OM/02


REV. No. 00

ITEM DESCRIPTION:-ROPE DRUM HOIST

ISSUE DATE: 30.11.22

PAGES :4

SR. NO.	COMPONENT , OPERATION & CHARACTERISTICS	APPLICABLE STANDARD	REMARKS
1	2	3	4
2.4.2	Stress relieving of individual component / assembly / sub-assembly after welding (as per approved DRG / TS)	TS/ASME Section V&VIII/ DRG	V
2.4.3	Dimensional check of weld joints/ Weld size (Weld size shall be checked with universal weld gauge)	ASME Section VIII/DRG	W
2.5	Weld/welder records		
2.5.1	Welding & welder records to be maintained for Box Girder, Column & Rope Drum as per weld Log sheet.	Rel. Std. ASME/IS/IEC	V
2.6	Machining		
2.6.1	Visual Examination	TS/DRG	V
2.6.2	Dimensional Check	DRG	V
2.6.3	Surface Finish	TS/DRG	V
2.6.4	Traceability Control	DRG/Relevant IS or international standard Manufacturer standard	V
2.7	Girder ,Columns & beams		
2.7.1	Dimensional check including camber, verticality & bend	TS/ DRG/ IS 3177/ IS 807	W
2.7.2	Material Identification & transfer stamping	TS/ DRG	V
2.8	Rope Drum		
2.8.1	Dimensional check	TS/ DRG/ IS 1030/ IS 2062	V
2.8.2	DP test after machining	TS/ DRG/ ASME	V
2.8.3	Visual check for surface defects after machining	TS/ DRG/ IS	V
2.8.4	Stress relieving after welding, if applicable	TS/ASME Section V&VIII/ DRG	V
2.9	Gear Box Casing (Worm Reducer)		
2.9.1	Dimensional check	TS/ DRG/ IS 3177/ IS 807	V
2.9.2	Stress relieving after welding	TS/ASME Section V&VIII/ DRG	V
2.10.	Hoist Bridge,Platforms &Hand Railings		
2.10.1	Dimensional Check	TS/ DRG/ IS 3177	V
2.11	Gear Box Assembly - Idle Running and Spur Gear & Pinion		
2.11.1	Check for Oil Leakage (As applicable)	TS/ DRG	V
2.11.2	Noise Level	TS/ DRG	V
2.11.3	Backlash, Meshing of gear & pinions teeth	TS/ DRG/IS: 919/IS:4460	V
2.11.4	Rise in Temperature after 2 hrs of running	TS/ DRG	V
2.12	Brakes		
2.12.1	Check for alignment, tightness and capacity	TS/ DRG	V
2.13	Shafts		
2.13.1	Run out & Roundness Tolerance Test	DRG	V
2.14	Manual Drive		
2.14.1	Routine Test	TS/ DRG	V
3.0.	Final Inspection		
3.1	Rope Drum Hoist at Manufacturer's Works		
3.1.1	Overall dimensions: Span, Diagonal Dimensions check etc.	TS/ DRG/ Rel. Std.	W
3.1.2	Equipment Layout on platform	TS/ DRG/ Rel. Std.	W
3.1.3	Electrical/control Panel (For detail testing of panels please refer QATR No. QAI/A3/M/HM/EP/01)	TS/ DRG/ Rel. Std.	W
3.1.4	No load Running of Machinery for Direction & Speed	TS/ DRG/ Rel. Std.	W
3.1.5	Skewness	TS/ DRG/ Rel. Std.	W
3.1.6	Cambering of Frame/ Girder	TS/ DRG/ Rel. Std.	W
3.1.7	Insulation Test on Electrical Components of Rope Drum Hoist	TS/ DRG/ Rel. Std.	W
3.1.8	No load Test of Hoists, Travel Speed & Current Measurement	TS/ DRG/ Rel. Std.	W
3.1.9	Overload Test of Hoists(At 125% of SWL)	TS/ DRG/ Rel. Std.	W
3.1.10	SWL: Hoists, Travel speed Current & Deflection Measurement	TS/ DRG/ Rel. Std.	W
3.1.11	Simultaneous Operation of Hoists, if applicable	TS/ DRG/ Rel. Std.	W
3.1.12	Braking Test	TS/ DRG/ Rel. Std.	W

 MANUFACTURING QUALITY ASSURANCE TEST REQUIREMENT			
PROJECT NAME: ARUN-3 HEP & LOWER ARUN HEP		DOC. No.: QAI/A3-LA/M/HM/OM/02	REV. No. 00
ITEM DESCRIPTION: -ROPE DRUM HOIST		ISSUE DATE: 30.11.22	PAGES : 4
SR. NO.	COMPONENT , OPERATION & CHARACTERISTICS	APPLICABLE STANDARD	REMARKS
1	2	3	4
3.1.13	Functional check for emergency stop, limit switch operation & overload protection.	TS/ DRG/ Rel. Std.	W
3.1.14	Oil leakage check in gear box	TS/ DRG/ Rel. Std.	W
3.1.15	Visual inspection of Hook & accessible weld joints after load test	TS/ DRG/ Rel. Std.	W
3.1.16	DP test of Hook & accessible weld joints after load test	TS/ DRG/ Rel. Std.	W
3.2	Cleaning, Coating and Painting		
3.2.1	Surface Preparation	TS/ DRG/ IS 3177/ IS 807	V
3.2.2	Coating & Painting	TS/ DRG/ IS 3177/ IS 807	V
3.2.3	Adhesion Test	TS/ DRG/ IS 3177/ IS 807	V
LEGENDS			
W: CUSTOMER HOLD POINT (CHP)		DRG: DRAWING	
TS: TECHNICAL SPECIFICATION		REL. STD: RELEVANT STANDARD	
V: VERIFICATION OF REPORT / TCs			
NOTES:			
1	Any test at any stage not covered in Quality Assurance Test Requirement (QATR), but part of technical specification of contract, shall also be carried out by Contractor / firm.		
2	QATR shall be read in conjunction with General Quality Assurance Requirement given as part of Technical Specification.		
Sr. No.	QATR Description	Doc. No.	Rev. No.
1	Weld Log Sheet	QAI/A3/WL/01	0




MANUFACTURING QUALITY ASSURANCE TEST REQUIREMENT

SR. NO.	CHARACTERISTICS	APPLICABLE STANDARD	REMARKS
PROJECT NAME: ARUN-3 HEP & LOWER ARUN HEP		DOC.NO.QAI/A3-LA/M/HM/OM/04	REV. NO. 00
ITEM DESCRIPTION: EOT CRANE		ISSUE DATE: 30.11.22	PAGES: 04
1	2	3	4
1	In-coming Material		
1.1	EOT, End carriage, Crab Frame, Columns, Beams, Bed Frame / Base plates.		
	Chemical Analysis & Mechanical Properties	TS/DRG/ IS 2062	V
	UT of plates	ASTM A435/ REL. STD	V
	Dimensional Check	TS/ DRG	V
	Material Identification & transfer stamping	TS/Manufacturer Standard Practice / REL. STD	V
1.2	Casting/plate for Rope Drum		
	Chemical Analysis & Mechanical Properties	TS/DRG/ IS 2062 / IS 1030	V
	UT of casting/plate	TS/DRG/ASTM A435/REL. STD.	V
	Dimensional Check	TS/ DRG	V
	Material Identification & transfer stamping	TS/Manufacturer Standard Practice / REL. STD	V
1.3	Wheels		
	Chemical Analysis & Mechanical Properties	TS/ DRG /IS:2004/IS1030/ REL. STD.	V
	UT & DPT	TS/ DRG/ ASME Sec- VIII	V
	Hardness	TS/ DRG / REL. STD.	V
	Dimensional Check	TS/ DRG / REL. STD.	V
	Heat Treatment	TS/ DRG/ ASME Sec- VIII	V
1.4	Wire Rope		
	Identification	TS/ DRG/ IS 2266	V
	Grade	TS/ DRG/ IS 2266	V
	Dimensional Check	TS/ DRG/ IS 2266	V
	Check for twist, kinks, proper thimble end connection & splicing	TS/ DRG/ IS 2266	V
	Braking Strength	TS/ DRG/ IS 2266	V
1.5	Gear Box casing (Worm reducer)		
	Chemical Analysis & Mechanical Properties	TS/DRG/ IS 2062 / REL. STD	V
	Surface condition	TS/ DRG	V
1.6	Gears (Supr, pinions)		
	Chemical Analysis & Mechanical Properties	TS/ DRG/IS 1030 / IS:3681 / IS:4058 / IS4460 / IS 4702 / IS 2004 / IS 1570	V
	Hardness	TS/ DRG/IS 1030 / IS:3681 / IS:4058 / IS4460 / IS 4702 / IS 2004 / IS 1570	V
	Dimensional Check	TS/ DRG/IS 1030 / IS:3681 / IS:4058 / IS4460 / IS 4702 / IS 2004 / IS 1570	V
	UT after proof machining	ASME Sec VIII & V / No crack and line of indication	V
	DP Test on teeth	No crack and line of indication	V
	Heat Treatment	TS/ DRG/IS 1030 / IS:3681 / IS:4058 / IS4460 / IS 4702 / IS 2004 / IS 1570	V
1.7	Shaft, coupling shaft & Axles		
	Chemical Analysis & Mechanical Properties	TS/ DRG/IS 2004/ IS:1570	V
	Hardness	TS/ DRG/IS 2004/ IS:1570	V
	Dimensional Check	TS/ DRG	V
	UT after proof machining	ASME Sec VIII & V / No crack and line of indication	V
	DP Test on teeth	No crack and line of indication	V
	Heat Treatment	TS/ DRG/IS 2004/ IS:1570 / REL. STD.	V
1.8	Bearings		

SR. NO.	CHARACTERISTICS	APPLICABLE STANDARD	REMARKS
1	2	3	4
	Type, make & size	TS/ DRG / REL. STD.	V
1.9	Lifting Hook and Block		
	Chemical Properties	TS/ DRG/ IS: 2004 / IS:3815/IS:5749 / REL. STD	V
	Heat Treatment	TS/DRG/ ASME Sec- VIII	V
	Mechanical Properties on integral test bar	TS/ DRG/ IS: 2004 / IS:3815/IS:5749	V
	UT on raw material of Hook	TS/DRG/ ASME Sec- VIII	V
	Proof Load Test	TS/ DRG/ IS: 2004 / IS:3815/IS:5749	W
	UT & MPI after proof load test (UT on shank portion only)	TS/DRG/ ASME Sec- VIII & V	W
	Material Identification & transfer stamping	TS/Manufacturer Standard Practice / REL. STD	V
1.10.	Rails		
	Chemical Composition	TS/ DRG/ IS 3443	V
	Size / Dimensional check	TS/ DRG/ IS 3443	V
1.11	Pulleys, brake drums, coupling, sheaves & other major steel casting & forging		
	Chemical Composition & Mechanical properties	TS/ DRG /IS:1030/ IS: 1570/ REL. STD.	V
	Hardness except pulleys	TS/ DRG /IS:1030/ IS: 1570/ REL. STD.	V
	Final Dimensional Check	TS/ DRG / REL. STD.	V
	DPT in groove after machining of pulleys	TS/ DRG / REL. STD.	V
1.12	Electric Motors		
	Routine Test	TS/ DRG/ IS 325	V
	Verification of IP class	TS/ DRG/ IS 325	V
	Type test	TS/ DRG/ IS 325	V
1.13	Master controllers Radio Remote, Pendant Controller, if applicable		
	HV, IR, Functional tests	TS/ DRG / REL. STD.	V
1.14	Brakes		
	Routine Test	TS/ DRG / REL. STD.	V
1.15	Resistance Box if applicable		
	HV & IR Test	TS/ DRG / REL. STD.	V
	Temperature Rise	TS/ DRG / REL. STD.	V
	Measurement of Resistance	TS/ DRG / REL. STD.	V
	Verification of IP class	TS/ DRG / REL. STD.	V
1.16	Power & Control Cables		
	Routine & Acceptance Tests	ITS/ DRG/ IS 9968/ IS 1554	V
1.17	Limit switch		
	HV, IR & Functional Check	TS/ DRG / REL. STD.	V
	Verification of IP class	TS/ DRG / REL. STD.	V
1.18	Sockets for wire rope		
	Destructive tensile test in which rope shall fail first than the socket or joints	TS/DRG / REL. STD.	V
1.19.	Threaded fasteners		
	Chemical Composition, Mechanical properties & NDT	IS:1363 / IS:1364 / IS: 1365 / IS:1367 / IS2389 / IS1570	V
	Dimensions	IS:1363 / IS:1364 / IS: 1365 / IS:1367 / IS2389 / IS1570	V
1.20.	Pressure sensor, depth indicator dial, digital position indicator, Load Pin Transducer & Rope Retention device		
	Make, Model & Type	TS/ DRG / REL. STD.	V
	Operational / calibration check	TS/ DRG / REL. STD.	V
2	In process Inspection		
2.1	WPS, PQR, WPQR		
	Welder's Qualification Records, PQR & WPS	DRG/ ASME Sec IX	W/V

SR. NO.	CHARACTERISTICS	APPLICABLE STANDARD	REMARKS
1	2	3	4
2.2	Butt weld, if any, in EOT Girder, End carriage, Crab Frame, Rope Drum, Column, Gear box casing (as per drawing)		
	DP/MPI test after root run	ASME Section V & VIII/BS 5135/DRG/TS	V
	RT shall be conducted as per approved drawing/TS/Standard	ASME Section V & VIII/BS 5135/DRG/TS	V
	UT, DPT & MPI shall be conducted as per approved drawing/TS/Standard	ASME Section V & VIII/BS 5135/DRG/TS	W
2.3	Fillet Welds in Gantry Girder, End carriage, Crab Frame, Rope Drum, Column, Gear box casing (as per drawing)		
	NDT of all fillet weld joint as per drawing or MPI / DP of all fillet joints if it is not specified in drawing.	ASME Section V & VIII/BS 5135/DRG/TS	W
2.4	All weld joints		
	Visual Examination for final weld appearance, cracks, undercut, Excess reinforcement, burn through or excess penetration, root concavity , non-uniform width of fillet weld joint, distortion & misalignment.	ASME Section VIII & V/DRG	W/V
2.5	Stress relieving of individual component / assembly / sub-assembly after welding (as per approved DRG / TS)	TS/ASME Section V&VIII/ DRG	V
2.6	Dimensional check of weld joints/ Weld size (Weld size shall be checked with universal weld gauge)	ASME Section VIII/DRG	W/V
2.7	Weld/welder records		
	Welding & welder records to be maintained for Box Girder, Crab Frame, Rope Drum, columns as per weld Log sheet	Relevant standard ASME/IS/IEC	V
2.8	Machining		
	Visual examination & Dimensional check	TS/ DRG / REL. STD.	V
	Surface finish	TS/ DRG / REL. STD.	V
	Material traceability control	TS/Manufacturer Standard Practice / REL. STD	V
2.9	EOT Girder , Columns & beams		
	Dimensional check including camber, verticality & bend	TS/ DRG/ IS 3177/ IS 807	W
	Material Identification & transfer stamping	TS/Manufacturer Standard Practice / REL. STD	V
2.10.	End carriage		
	Dimensional check	TS/ DRG/ IS 3177/ IS 807	V
2.11	Rope Drum		
	Dimensional check	TS/ DRG / REL. STD.	V
	DP test after machining	TS/ DRG / REL. STD.	V
	Visual check for surface defects after machining	TS/ DRG / REL. STD.	V
	Stress relieving after welding, if applicable	TS/ASME Section V&VIII/ DRG	V
2.12	Gear Box casing (Worm reducer)		
	Dimensional check	TS/ DRG/ IS 3177/ IS 807	V
	Stress relieving after welding	TS/ASME Section V&VIII/ DRG	V
2.13	Platforms, LT Frames, Hand Railings, Crab Assembly		
	Dimensional Check	TS/ DRG/ IS 3177	V
2.14	Gear Box Assembly (Worm reducer): Idle Running		
	Check for Oil Leakage	TS/ DRG / REL. STD.	V
	Noise Level	TS/ DRG / REL. STD.	V
	Backlash, Meshing of gear & pinions teeth	TS/ DRG / REL. STD.	V
	Rise in Temperature after 2 hrs of running	TS/ DRG / REL. STD.	V
2.15	Brakes		
	Check for alignment, tightness and capacity	TS/ DRG / REL. STD.	V
2.16	Cabin, if applicable		
	Dimensional check	TS/ DRG/ IS 3177	V

SR. NO.	CHARACTERISTICS	APPLICABLE STANDARD	REMARKS
1	2	3	4
2.17	Bridge with LT		
	Dimensions, wheel level alignment	TS/ DRG/ IS 3177	V
2.18	Crab assembly		
	Dimensions, wheel level alignment	TS/ DRG/ IS 3177	V
3	Final Inspection		
3.1	Crane at Manufacturer's Works (Crane shall be completely assembled, inspected, operated & tested)		
	Overall dimensions, Span, Diagonal Dimensions, alignment check etc. Concentricity of each wheel of gantry shall be checked by dial gauge.	TS/ DRG/ IS 3177/ IS 807	W
	Equipment Layout on platform	TS/ DRG / REL. STD.	W
	Tests on Electrical Panel / Control Panel shall be carried out as per QATR No. QAI/NM/M/HM/EP/01	TS/ DRG / REL. STD.	W
	No load Running of Machinery for Direction & Speed	TS/ DRG/ IS 3177/ IS 807	W
	Skewness	TS/ DRG/ IS 3177/ IS 807	W
	Cambering of Frame/ Girder	TS/ DRG/ IS 3177/ IS 807	W
	Insulation Test on Electrical Components of Crane	TS/ DRG/ IS 3177/ IS 807	W
	All motion of crane: No load Test of Hoists, CT, LT Speed & Current Measurement	TS/ DRG/ IS 3177/ IS 807	W
	Overload Test (at 125% of SWL):During overload test each motion in turn shall be measured in both direction.	TS/ DRG/ IS 3177/ IS 807	W
	SWL: Hoists, CT speed Current & Deflection Measurement	TS/ DRG/ IS 3177/ IS 807	W
	Simultaneous Operation of Hoists, if applicable	TS/ DRG/ IS 3177/ IS 807	W
	Braking Test	TS/ DRG/ IS 3177/ IS 807	W
	Functional check for emergency stop, limit switch operation & overload protection.	TS/ DRG/ IS 3177/ IS 807	W
	Oil leakage check in gear box	TS/ DRG/ IS 3177/ IS 807	W
	Visual inspection of Hook & accessible weld joints after load test	TS/ DRG / REL. STD.	W
	DP test of Hook & accessible weld joints after load test	TS/ DRG / REL. STD.	W
3.2	Cleaning, Coating and Painting		
	Surface Preparation, Coating & Painting	TS/ DRG/ REL. STD.	V
	Adhesion, paint thickness	TS/ DRG/ REL. STD.	V
LEGENDS			
W: CUSTOMER HOLD POINT (CHP)		DRG: DRAWING	
TS: TECHNICAL SPECIFICATION		REL. STD: RELEVANT STANDARD	
V: VERIFICATION OF RECORDS / REPORTS / TCs			
NOTES:			
1	Any test at any stage not covered in Quality Assurance Test Requirement (QATR), but part of technical specification of contract, shall also be carried out by Contractor / firm.		
2	QATR shall be read in conjunction with General Quality Assurance Requirement given as part of Technical Specification.		
3	Please refer following QATR for associated equipments of Gate to be read in conjunction with this QATR for the complete requirement as per TS.		
Sr. No.	QATR Description	Doc. No.	Rev. No.
3.1	Weld Log Sheet	QAI/A3-LA/WL/01	0

SR. NO.	CHARACTERISTICS	APPLICABLE STANDARD	REMARKS
 MANUFACTURING QUALITY ASSURANCE TEST REQUIREMENT			
PROJECT NAME: ARUN-3 HEP & LOWER ARUN HEP		DOC.NO.QAI/A3-LA/M/HM/EP/01	REV. NO. 00
ITEM DESCRIPTION: ELECTRICAL PANEL / CONTROL PANEL		ISSUE DATE: 30.11.22	PAGES: 01
1	Power Panel		
A	Raw Material		
1	CT, PT & control transformers		
	Routine & Acceptance tests	REL. STD/DRG/TS	V
2	ACB, MCCB, MCB, Contactors, Relays, Timer, Auxiliary switches, Transducer, VFD, Soft Starter		
	Routine & Acceptance tests	REL. STD/DRG/TS	V
3	Bus Bar		
	Material Test	REL. STD/DRG/TS	V
	Dimension Check and Check for silver plating.	Approve Drg/GTP	V
4	Meters		
	Make, Model & Type and Calibration certificates of all meters	REL. STD/DRG/TS	V
5	Indicators		
	Make, Type & operational check	REL. STD/DRG/TS	V
6	Cards (Processors, Input / Output Cards, Power Supply Cards)		
	Make, Type & operational check	REL. STD/DRG/TS	V
7	Steel sheet		
	Dimensions, Chemical composition and Mechanical properties including bend test.	REL. STD/DRG/TS	V
B	Final Inspection		
1	Dimension check for height, width, depth & sheet thickness of panel	Approve Drg/GTP	W
2	Dimension check of bus bar & check phase to phase, phase to earth clearance.	Approve Drg/GTP	W
3	Visual check of alignment of boards, operation of doors, locks, shutters, racking device for ACB / MCCB, base grouting & gland plates.	Approve Drg/GTP/TS	W
4	Visual check as per OGA, DRG & verification of BOM	REL. STD/DRG/TS	W
5	Verification of correct wiring, Ferruling, dressing, routing, bunching, continuity check, colour coding and earthing.	REL. STD/DRG/TS	W
6	Insulation resistance measurement before & after HV test	IEC 60204-1	V
7	Dielectric tests on auxiliary and control circuits	IEC 62271-203 § 7.2	V
8	Functional test on all AC & DC circuit including heating, Lighting, Fan & thermostat	REL. STD/DRG/TS	W
9	Operational & functional test, protection and interlocks.	REL. STD/DRG/TS	W
10	Verification of IP Class	REL. STD/DRG/TS	V
11	Check for operation & operating limit of contactors & motor starter.	REL. STD/DRG/TS	W
12	ACB/MCCB (as applicable)		
12.1	Operational test, trip free operation, verification of release.	REL. STD/DRG/TS	W
13	Surface Protection coating, Paint Shade & Finish, Adhesion test	REL. STD/DRG/TS	W
LEGENDS			
W: CUSTOMER HOLD POINT (CHP)		DRG: DRAWING	
TS: TECHNICAL SPECIFICATION		REL. STD: RELEVANT STANDARD	
V: VERIFICATION OF REPORT / TCs			
NOTES:			
1	Any test at any stage not covered in Quality Assurance Test Requirement (QATR), but part of technical specification of contract, shall also be carried out by Contractor / firm.		
2	QATR shall be read in conjunction with General Quality Assurance Requirement given as part of Technical Specification.		

SR. NO.	CHARACTERISTICS	APPLICABLE STANDARD	REMARKS
MANUFACTURING QUALITY ASSURANCE TEST REQUIREMENT			
PROJECT NAME: ARUN-3 HEP & LOWER ARUN HEP		DOC.NO.QAI/A3-LA/M/HM/CB/01	REV. NO. 00
ITEM DESCRIPTION: POWER CABLES, CONTROL CABLES, INSTRUMENTATION CABLES & CABLE TRAYS		ISSUE DATE: 30/11/2022	PAGES: 01
LEGENDS			
W: CUSTOMER HOLD POINT (CHP)		DRG: DRAWING	
TS: TECHNICAL SPECIFICATION		REL. STD: RELEVANT STANDARD	
V: VERIFICATION OF REPORT / TCs			
NOTES:			
1	Any test at any stage not covered in Quality Assurance Test Requirement (QATR), but part of technical specification of contract, shall also be carried out by Contractor / firm.		
2	QATR shall be read in conjunction with General Quality Assurance Requirement given as part of Technical Specification.		

FIELD QUALITY ASSURANCE TEST REQUIREMENT

	FIELD QUALITY ASSURANCE TEST REQUIREMENT		
	PROJECT NAME : ARUN-3 HEP & LOWER ARUN HEP	DOC. NO. QAI/A3-LA/F/HM/OM/05B	REV. NO. 00
	ITEM DESCRIPTION: LIFTING BEAM WITH SPREADER BEAM	ISSUE DATE: 30.11.22	PAGES: 1
SR. NO.	COMPONENT, OPERATION & CHARACTERISTIC	APPLICABLE STANDARD	REMARKS
1	2	3	4
1	Receipt		
1.1	Receipt of Material		
	External conditions of Equipment free from Damages etc.	TS/Instruction Manual/ Reference standard	W
	Number of packages of each Equipment and physical condition of each package.	TS/Instruction Manual/ Reference standard	W
2	Storage		
2.1	Storage of Material		
	Proper Placement of equipment as per the Instruction Manual.	TS/Instruction Manual/ Reference standard	W
	Ensure that no damage or rusting takes place during storage	TS/Instruction Manual/ Reference standard	W
	Ensure that all delicate Equipment are stored in protected area.	TS/Instruction Manual/ Reference standard	W
3	Erection Check		
3.1	Ensure proper assembly of all part like Guide roller, Hooks, Lifting Lugs, Bush of hooks Sheaves etc	TS/Instruction Manual/ Reference standard	W
3.2	Ensure proper Match Marking	-do-	W
3.3	Dimensional check	-do-	W
3.4	Alignment	-do-	W
4	Pre-commissioning/commissioning check (Complete assembled beam with their associated equipment)		
4.1	Proper Clearance and operation of all attachments like Hooks, Bush for hooks, Counterweight, Guide rollers, Sheaves etc. several times under each control mode to verify proper operation	TS/Instruction Manual/ Reference standard/DRG	W
4.2	Engaging /de-engaging	-do-	W
4.3	Operational/Functional Tests on beam with Gate/stoplog unit (as applicable) for proper operations for different water level conditions as stipulated TS	-do-	W
4.4	Measurement of vibration and noise during entire cycle of operation.	-do-	W
4.5	Load Test	-do-	W
4.6	Final Painting and preservation.	-do-	W
4.7	Check that all equipments are handed over to SAPDC for use with all necessary documents and details in a satisfactory condition.	-do-	W
LEGEND			
CHP: CUSTOMER HOLD POINT (W)		DRG: DRAWING	
TS: TECHNICAL SPECIFICATION		REL. STD: RELEVANT STANDARD	
V: VERIFICATION OF REPORT/TCs			
NOTE:			
1. Any test at any stage not covered in Quality Assurance Test Requirement (QATR), but part of Technical Specification of contract, shall also be carried out by Contractor/ firm.			
2. QATR shall be read in conjunction with General Quality Assurance Requirement given as part of Technical Specification.			
3. Please refer following QATR for associated equipments of Gate (to be read in conjunction with this QATR for the complete requirement as per TS)			

FIELD QUALITY ASSURANCE TEST REQUIREMENT			
	PROJECT NAME: ARUN - 3 HEP (4x225 MW)	DOC. No.: QAI/A3-LA/F/HM/ISG/01	REV. No. 00
	ITEM DESCRIPTION:-INTAKE STEEL GRATINGS	ISSUE DATE: 30.11.22	PAGES : 2
SR. NO.	COMPONENT, OPERATION & CHARACTERISTICS	APPLICABLE STANDARD	REMARKS
1	2	3	4
1	Receipt		
1.1	Receipt of Material		
1.1.1	External conditions of Equipment free from Damages etc.	TS/Instruction Manual/ Ref. std.	W
1.1.2	Number of packages of each Equipment and physical condition of each package	TS/Instruction Manual/ Ref. std.	W
1.2	Storage		
1.2.1	Proper Placement of equipment as per the Instruction Manual.	TS/Instruction Manual/ Ref. std.	W
1.2.2	Ensure that no damage or rusting takes place during storage	TS/Instruction Manual/ Ref. std.	W
1.2.3	Ensure that all delicate Equipment are stored in protected area.	TS/Instruction Manual/ Ref. std.	W
2	Pre-Erection/Erection Checks		
2.1	Site welding		
2.1.1	WPS, PQR & WPQR	ASME-IX	V
2.1.2	Joint preparation, Edge preparation & root gap	DRG/ASME-V&VIII	W/V
2.1.3	NDT	DRG/ASME-V&VIII	W
2.1.4	Stress relieving if applicable	ASME-V&VIII	W
2.1.5	Visual check	ASME-V&VIII	W
2.2	1st & 2nd Stage Embedded parts.		
2.2.1	Ensure that the surfaces are in a true plane and within the tolerance limits.	TS/Instruction Manual/ Ref. std.	W
2.2.2	Concreting of Embedded parts.	TS/Instruction Manual/ Ref. std.	W
2.2.3	Realignment of Embedded parts (if necessary).	TS/Instruction Manual/ Ref. std.	W
2.2.4	Tightness/Torque tests of nuts and bolts.	TS/Instruction Manual/ Ref. std.	W
2.2.5	Dimensional check	TS/Instruction Manual/ Ref. std.	W
2.3	STEEL GRATING		
2.3.1	Ensure Proper assembly of all parts	TS/Instruction Manual/ Ref. std.	W
2.3.2	Ensure proper assembly as per Match Marking.	TS/Instruction Manual/ Ref. std.	W
2.3.3	Dimensional Check.	TS/Instruction Manual/ Ref. std.	W
2.3.4	Alignment of all parts & Ensure free movement in groove	TS/Instruction Manual/ Ref. std.	W
3	Pre-commissioning/commissioning check (Complete assembled gates with their associated		
3.1	STEEL GRATING		
3.1.1	Proper Placement of equipment as per the Instruction Manual.	TS/Instruction Manual/ Ref. Std. IS11388 /DRG	W
3.1.2	Check of stability against vibrations during turbine operation	TS/Instruction Manual/ Ref. Std. IS11388 /DRG	W

FIELD QUALITY ASSURANCE TEST REQUIREMENT			
PROJECT NAME: ARUN - 3 HEP (4x225 MW)		DOC. No.: QAI/A3-LA/F/HM/ISG/01	REV. No. 00
ITEM DESCRIPTION:-INTAKE STEEL GRATINGS		ISSUE DATE: 30.11.22	PAGES : 2
SR. NO.	COMPONENT, OPERATION & CHARACTERISTICS	APPLICABLE STANDARD	REMARKS
1	2	3	4
3.1.3	Final Painting, preservation & Adhesion Test	TS/Instruction Manual/ Ref. Std./DRG	W
3.1.4	Check that all equipments are handed over to SAPDC for use with all necessary documents and details in a satisfactory condition.	TS/Instruction Manual/ Ref. Std./DRG	W
LEGENDS			
W: CUSTOMER HOLD POINT (CHP)		DRG: DRAWING	
TS: TECHNICAL SPECIFICATION		REL. STD: RELEVANT STANDARD	
V: VERIFICATION OF REPORT / TCs			
NOTES:			
1	Any test at any stage not covered in Quality Assurance Test Requirement (QATR), but part of technical specification of contract, shall also be carried out by Contractor / firm.		
2	QATR shall be read in conjunction with General Quality Assurance Requirement given as part of Technical Specification.		
Sr. No	QATR Description	Doc. No.	Rev. No.
1	Weld Log Sheet	QAI/A3/WL/01	0



FIELD QUALITY ASSURANCE TEST REQUIREMENT

PROJECT NAME: ARUN-3 HEP & LOWER ARUN HEP	DOC. No.: QAI/A3-LA/F/HM/VG/01	REV. No. 00
ITEM DESCRIPTION:- VERTICAL LIFT WHEEL GATE / SLIDE GATE (TRT Outfall Gates, Bulkhead for TRT Gate, Intake Gates)	ISSUE DATE: 30/11/2022	PAGES : 05

Sr. No.	COMPONENT, OPERATION & CHARACTERISTICS	APPLICABLE STANDARD	REMARKS
1	2	3	4
1	Material Receipt & Storage		
	External conditions of Equipment free from Damages etc	TS/Instruction Manual/ REL STD	V
	Number of packages of each Equipment and physical condition of each package	TS/Instruction Manual/ REL STD	V
	Proper Placement of equipment as per the Instruction Manual.	TS/Instruction Manual/ REL STD	W
	Ensure that no damage or rusting takes place during storage	TS/Instruction Manual/ REL STD	W
	Ensure that all delicate Equipment are stored in protected area.	TS/Instruction Manual/ REL STD	W
2	Pre-Erection and Erection Checks		
2.1	Site welding		
	WPS, PQR & WPQR	ASME-IX	W/V
	Joint preparation, Edge preparation & root gap, ensure pre-heat temperature of job & consumable as per WPS & ensure consumables are used as per WPS	DRG/ASME-V&VIII	W/V
	DPT/MPI after root run for Butt Weld	DRG/ASME-V&VIII	W/V
	RT, UT, MPI & DPT test of butt weld shall be carried out as per approved DRG/ TS/ Standard	DRG/ASME-V&VIII	W
	NDT test of fillet weld shall be carried out as per approved DRG/ TS/Standard	DRG/ASME-V&VIII	W
	Stress relieving (as applicable)	ASME-V&VIII	W
	Welding & welder records to be maintained as per weld Log book	Relevant standard ASME/IS/IEC	V
	Dimensional check of weld joints/ Weld size (Weld size shall be checked with universal weld gauge)	ASME Section VIII/DRG	W
	Visual Examination for final weld appearance, cracks, undercut, Excess reinforcement, burn through or excess penetration, root concavity, non-uniform width of fillet weld joint, distortion & misalignment.	ASME Section VIII/DRG	W
	Punching of weld number	ASME Section VIII/DRG	W
2.2	General Inspection		
	Measurement of reference axis lines /centre of openings and levels having relations to completed civil structure .	DRG/IS: 7718	W
2.3	Inspection of block outs		
	Check for visual, Dimensional & co-ordinates of block out	DRG/IS: 7718	W
2.4	Civil Works		
	Ensure that the surfaces are in true plane and within the tolerance limits throughout their entire length (before & after concreting)	TS/ Instruction Manual/ REL STD/ DRG	W
	Realignment of embedded parts (if applicable)	TS/ Instruction Manual/ REL STD/ DRG	W
	Concreting of embedded parts	TS/ Instruction Manual/ REL STD/ DRG	W
	Tightness/ Torque tests of nuts and bolts	TS/ Instruction Manual/ REL STD/ DRG	W
	Dimensional check of weld joints/ Weld size (Weld size shall be checked with universal weld gauge)	TS/ Instruction Manual/ REL STD/ DRG	W
	The aggregate used for grouting shall be as TS/DRG. The concrete mix shall be compacted.	TS/ Instruction Manual/ REL STD/ DRG	W
2.5	Inspection of Embedded Parts		
	Ensure that the sill beam is correctly positioned both in level and location	DRG/IS: 7718	W
	All the nuts & bolts of anchorages of the sill beam should be tightened so as to prevent dislocation during and after concreting	DRG/IS: 7718	W



FIELD QUALITY ASSURANCE TEST REQUIREMENT

Sr. No.	COMPONENT, OPERATION & CHARACTERISTICS	APPLICABLE STANDARD	REMARKS
PROJECT NAME: ARUN-3 HEP & LOWER ARUN HEP		DOC. No.: QAI/A3-LA/F/HM/VG/01	REV. No. 00
ITEM DESCRIPTION:- VERTICAL LIFT WHEEL GATE / SLIDE GATE (TRT Outfall Gates, Bulkhead for TRT Gate, Intake Gates)		ISSUE DATE: 30/11/2022	PAGES : 05
1	2	3	4
	Wheel/ Slide/ Track member, guides, side seal seat members, top seal seat member (as applicable), gate groove lining etc shall be checked when all these parts are in their final position at least up to double the gate height in one operation. The check should be carried out both with respect to location and level with respect to the sill beam	DRG/IS: 7718	W
	Each part mentioned above should be checked first individually and thereafter relatively with the other parts	DRG/IS: 7718	W
	The Wheel/ Slide/ Track member, side seal seat member and top seal seat member (as applicable) shall be in true alignment. It can be checked by means of a fine plumb bob and feeler gauge preferably at 300 mm intervals from bottom to top side of the gate opening	DRG/IS: 7718	W
	After checking the Wheel/ Slide/ Track member, side seal seat member on both sides it shall be ensured that they are in terms of their respective planes. It should be checked that top seal seat member, wherever provided, shall also be in the required plane	DRG/IS: 7718	W
	Side Guide, should be checked for exact location and true alignment, first individually and then also relatively	DRG/IS: 7718	W
	Groove liners and corner protection angles, when provided, should be checked for true location and true alignment	DRG/IS: 7718	W
	Dimensional check at interval of 300 mm from the bottom to double the gate height.	DRG/IS: 7718	W
	A) Centre to centre distance of wheel/ slide track	DRG/IS: 7718	W
	B) Centre to centre distance of side seal seat	DRG/IS: 7718	W
	C) Face to face distance of guides	DRG/IS: 7718	W
	D) Face of wheel/ slide track to face of side seal seat	DRG/IS: 7718	W
	E) Face to wheel/ slide track to centre line of side guide	DRG/IS: 7718	W
	F) Vertical distance between sill and the centre line of top seal seat	DRG/IS: 7718	W
	Eccentricity or some such arrangement, if provided to a gate for its fine adjustment in the groove, shall not be accounted for while erecting embedded parts	DRG/IS: 7718	W
	Anchorage, should be fastened or welded rigidly, after final adjustment of the embedded parts, so as to prevent dislocation of the parts while pouring second stage concrete	DRG/IS: 7718	W
	Random recheck of alignment of the embedded parts shall be done after concreting	DRG/IS: 7718	W
	Ensure that there is no step at the joints while extending the embedded parts	DRG/IS: 7718	W
	Second stage concrete surfaces must be smooth and properly matched with the surface of the embedded parts and of the first stage concrete design profile, so as to avoid any future cavitation	DRG/IS: 7718	W
	It is to be ensured matching the concrete surfaces with the embedded parts wherever the free stream flow velocity is likely to exceed 30 m/sec	DRG/IS: 7718	W
2.6	Inspection of Gate		
	Dimensional check at an interval of at least 300 mm, least wherever applicable	DRG/IS: 7718	W
	A) Centre to centre distance between wheel treads/ thrust pads (as applicable)	DRG/IS: 7718	W
	B) Centre to centre distance between side seals/ bases	DRG/IS: 7718	W
	C) Face to Face distance between guide shoes/ rollers	DRG/IS: 7718	W
	D) Face of seal base to wheel tread/ face of thrust pad (as applicable)	DRG/IS: 7718	W
	E) Centre line of guide shoes/ roller to wheel tread	DRG/IS: 7718	W



FIELD QUALITY ASSURANCE TEST REQUIREMENT

PROJECT NAME: ARUN-3 HEP & LOWER ARUN HEP **DOC. No.:** QAI/A3-LA/F/HM/VG/01 **REV. No.** 00

ITEM DESCRIPTION:-VERTICAL LIFT WHEEL GATE / SLIDE GATE (TRT Outfall Gates, Bulkhead for TRT Gate, Intake Gates) **ISSUE DATE:** 30/11/2022 **PAGES :** 05

Sr. No.	COMPONENT, OPERATION & CHARACTERISTICS	APPLICABLE STANDARD	REMARKS
1	2	3	4
	F) Vertical Distance between sill and centre line of top seal/ bases	DRG/IS: 7718	W
	The seals of seal bases should be checked to ensure that they are coplaner	DRG/IS: 7718	W
	All the wheels should be adjusted to ensure that all wheels treads are in their proper alignment	DRG/IS: 7718	W
	The wheel pins should be locked after making adjustment	DRG/IS: 7718	W
	CSK HD bolts for thrust pads shall be tightened adequately and uniformly	DRG/IS: 7718	W
	The seal bolts shall be tightened adequately and uniformly	DRG/IS: 7718	W
	The gate wheel should be checked for free rotation to ensure that they are not jammed during transport/ handling	DRG/IS: 7718	W
	To check the effectiveness of the seal, actual seal interference should be compared with that provided in the design, which affects the efficiency of sealing arrangement and easy operation of gate	DRG/IS: 7718	W
	In case of counterweighted gates or gates with ballast it should be ensured that the weights have been added and secured properly at correct place.	DRG/IS: 7718	W
2.7	Pre- Commissioning (Complete Assembled Gate with their associated equipment)		
	Visual inspection of complete assembled gate and hoist shall be carried out after erection.	DRG/ IS: 7718	W
	The erection tolerance shall be checked for all parts during and after erection.	DRG/ IS: 7718	W
	Satisfactory operation of gate after erection	DRG/ IS: 7718	W
3	Commissioning testing (Operational and Functional tests of complete)		
3.1	Dry Test		
	Trouble free and smooth operation during up down in the groove with no obstruction and no undue efforts required for its operation	TS/Instruction Manual/ REL STD/DRG	W
	Measurement of vibration and noise during the operation of gate (if any). There shall be no noise of friction or other noise, no sign of excessive friction, no jerky performance, no dangling of the gate, no twist in rubber seal, Top seals should not leave their plane and rubber seal are not over pressed.	TS/Instruction Manual/ REL STD/DRG	W
	Checking of contact between gate seal and seal seats against light source.	TS/Instruction Manual/ REL STD/DRG	W
	In case of rubber seals, no dry friction of the seals	TS/Instruction Manual/ REL STD/DRG	W
	Leakage test using jetting water at 1.5 times the designed pressure on sealing position from bottom to top. All joints, if any shall be tested to ensure perfect working of gate.	TS/Instruction Manual/ IS:7718, CI no. 3.5/DRG	W
	Check for preventing the travel of the gate or hoist beyond the designed limit.	TS/Instruction Manual/ REL STD/DRG	W
3.2	Wet test		
	Performance tests & determination of characteristics		
	Trouble free and smooth operation during two complete traverses from maximum raised position to fully closed/seating position in wet conditions.	TS/Instruction Manual/ REL STD/DRG	W
	Measurement of vibration and noise during entire cycle of operation of gate or civil structure at any of the gate openings.	TS/Instruction Manual/ REL STD/DRG	W
	Leakage Test: - Measurement of maximum leakage from gate in fully closed/seated condition, after removing any debris from seal seats.	TS/Instruction Manual/ REL STD/DRG	W
	Filling valve arrangement made for the water, when provided, should be checked to ensure the proper working of the arrangement.	TS/Instruction Manual/ REL STD/DRG	W
	Proper operation of Limit Switches	TS/Instruction Manual/ REL	W



FIELD QUALITY ASSURANCE TEST REQUIREMENT

PROJECT NAME: ARUN-3 HEP & LOWER ARUN HEP	DOC. No.: QAI/A3-LA/F/HM/VG/01	REV. No. 00
ITEM DESCRIPTION:- VERTICAL LIFT WHEEL GATE / SLIDE GATE (TRT Outfall Gates, Bulkhead for TRT Gate, Intake Gates)	ISSUE DATE: 30/11/2022	PAGES : 05

Sr. No.	COMPONENT, OPERATION & CHARACTERISTICS	APPLICABLE STANDARD	REMARKS
1	2	3	4
	Air Vents, when provided, are to be tested for their choke free performance	TS/Instruction Manual/ REL STD/DRG	W
	Final Painting and preservation.	TS/Instruction Manual/ REL STD/DRG	W
	Check that all equipments are handed over to SAPDC for use with all necessary documents and details in a satisfactory condition.	TS/Instruction Manual/ REL STD/DRG	W
	Satisfactory operation of all gates after erection	TS/Instruction Manual/ REL STD/DRG	W

LEGEND

TS: TECHNICAL SPECIFICATIONS	REL. STD : RELEVANT STANDARD
V: VERIFICATION OF REPORTS/ TCs	W: CUSTOMER HOLD POINT (CHP)
DRG: DRAWING	

NOTES:

1	Any test at any stage not covered in Quality Assurance Test Requirement (QATR), but part of technical specification of contract, shall also be carried out by Contractor/ firm.
2	QATR shall be read in conjunction with General Quality Assurance Requirement given as part of Technical Specification
3	Please refer following QATR for associated equipment of Gate (to be read in conjunction with this QATR for the complete requirement as per TS)

Sr.No.	QATR Description	Doc. No.	Rev. No.
3.1	Rope Drum Hoist	QAI/A3-LA/F/HM/OM/02	0
3.2	Electrical Panel/ Control Panel	QAI/A3-LA/F/HM/EP/01	0
3.3	Air/ Water jet Groove Cleaning System	QAI/A3-LA/F/HM/AW/01	0
3.4	Cables (Power, Control & Instrumentation)	QAI/A3-LA/F/HM/CB/01	0
3.5	Weld Log Sheet	QAI/A3-LA/WL/01	0

FIELD QUALITY ASSURANCE TEST REQUIREMENT

FIELD QUALITY ASSURANCE TEST REQUIREMENT			
	PROJECT NAME: ARUN-3 HEP & LOWER ARUN HEP	DOC. NO. QAI/A3-LA/F/HM/OM/01	REV. NO. 00
	ITEM DESCRIPTION: HYDRAULIC HOIST / ACTUATOR	ISSUE DATE: 30.11.22	PAGES: 03
SR. NO.	COMPONENT, OPERATION & CHARACTERISTICS	APPLICABLE STANDARD	REMARKS
1	2	3	4
1	Receipt		
1.1	Receipt of Material		
	External conditions of Equipment free from Damages etc	TS/Instruction Manual/ Reference standard	W
	Number of packages of each Equipment and physical condition of each package	TS/Instruction Manual/ Reference standard	W
1.2	Storage of Material		
	Proper Placement of equipment as per the Instruction Manual.	TS/Instruction Manual/ Reference standard	W
	Ensure that no damage or rusting takes place during storage	TS/Instruction Manual/ Reference standard	W
	Ensure that all delicate Equipment are stored in protected area.	TS/Instruction Manual/ Reference standard	W
2	Pre-Erection and Erection Checks		
2.1	For all pre-erection activities ,viz, civil works, embedments & welding requirement, NDT testing please refer relevant QATR mentioned at page no. 3.		
2.2	Erection		
	The subassemblies of the Hydraulic hoist / actuator which are received at site duly inspected in workshop should be reinspected at site before lowering for assembly in the bay.	DRG/IS: 10096 - 2/TS/Instruction Manual	W
	Ensure Proper assembly of all parts.	DRG/IS: 10096 - 2/TS/Instruction Manual	W
	Check Dimensional accuracy, correct location of components / sub-assembly	TS/Instruction Manual/ Reference standard/DRG	W
	Proper Leveling & Alignment of all matching parts.	TS/Instruction Manual/ Reference standard/DRG	W
	Ensure erection of hydraulic cylinder as per drawing. Measurement of Leveling and Alignment.	TS/Drg/Latest relevant standards	W
	Inspection of hoist / actuator for exact location of lifting eye/clevis eye over the lifting point of equipments/gates and for proper matching and connections.	TS/Drg/Latest relevant standards	W
	Torque test of nuts and bolts.	TS/Drg/Latest relevant standards	W
	Ensure proper greasing and lubrication.	TS/Drg/Latest relevant standards	W
	Ensure proper erection of hydraulic control module including all components.	TS/Instruction Manual/ Reference standard/DRG	W
	Verticality of piston Surge suppressor	TS/Instruction Manual/ Reference standard/DRG	W
	Installation of various instrumentation and valves as per drawing	TS/Instruction Manual/ Reference standard/DRG	W
	Cleaning of pipelines by oil/acid cleaning/acid pickling as per drawing	TS/Instruction Manual/ Reference standard/DRG	W

SR. NO.	COMPONENT, OPERATION & CHARACTERISTICS	APPLICABLE STANDARD	REMARKS
1	2	3	4
	Hydraulic cylinder pressure testing by oil on both side of piston at a pressure specified in DRG / Procedure	TS/Instruction Manual/ Reference standard/DRG	W
	Erection / routing of pipes as per approved layout.	TS/Instruction Manual/ Reference standard/DRG	W
	Pressure testing of pipe lines, valves after connection / installation.	TS/Instruction Manual/ Reference standard/DRG	W
	Visual inspection of all hoists / actuator shall be carried out after erection.	TS/Instruction Manual/ Reference standard/DRG	W
	The erection tolerance shall be checked for all parts during and after erection/ Measurement of all critical dimensions within permissible erection tolerances.	TS/Instruction Manual/ Reference standard/DRG	W
3	Pre-commissioning		
	Setting & calibration and mechanical adjustment of all components/equipment / instruments.	TS/Drg/Latest relevant standards	W
	Operational and functional checks	TS/Drg/Latest relevant standards	W
	Satisfactory operation of each instrument, control switch, relay and other control devices and in particular the correct operation of all limit switches under the most unfavorable conditions.	TS/Drg/Latest relevant standards	W
	Satisfactory operation and adjustment / setting of all protective devices & relays.	TS/Drg/Latest relevant standards	W
	Operation of valves for easy operation	TS/Instruction Manual/ Reference standard/DRG	W
	Petrol Engine driven pump (as applicable)		
	Operational & functional check	TS/Instruction Manual/ Reference standard/DRG	W
	Motor driven pump		
	Operational & functional check	TS/Instruction Manual/ Reference standard/DRG	W
	Check for phase sequence of main supply & Direction of rotation of motor	TS/Instruction Manual/ Reference standard/DRG	W
	Measurement of Insulation Resistance of motor	TS/Instruction Manual/ Reference standard/DRG	W
	Dry stroking		
	The hoist / actuator provided for operation of the gate / pinch valve should first be independently tested when it is not connected to the gate / pinch valve to ensure its satisfactory working. The hoist should be kept running for sufficient period so as to satisfy its independent working. Bush and bearings shall be checked for temperature rise to satisfy that there is no undue friction.	TS/Instruction Manual/ Reference standard/DRG	W
	In case of hoists, the following points which are by no means exhaustive, need to be looked into by EIC: 1. Incase of double hoists cylinder both the hoists cylinders are properly synchronized. 2. Electric installations have been properly earthed; and 3. The limit switches have been properly adjusted.	TS/Instruction Manual/ Reference standard/DRG	W

SR. NO.	COMPONENT, OPERATION & CHARACTERISTICS	APPLICABLE STANDARD	REMARKS
1	2	3	4
4	Commissioning testing (Complete assembled Hydraulic Hoist with Gate and Actuator with Sleeve Valve) - For commissioning test please refer respective QATR mentioned below.		
LEGENDS			
W: CUSTOMER HOLD POINT (CHP)		DRG: DRAWING	
TS: TECHNICAL SPECIFICATION		REL. STD.: RELEVANT STANDARD	
V: VERIFICATION OF REPORT / TCs			
NOTES			
1	Any test at any stage not covered in Quality Assurance Test Requirement (QATR), but part of technical specification of contract, shall also be carried out by Contractor / firm.		
2	QATR shall be read in conjunction with General Quality Assurance Requirement given as part of Technical Specification.		
3	Please refer following QATR indicated at cl. No. 2.1 (page no. 1) and cl. No. 4 (page no. 3) for completion in testing for respective gate.		
Sr. No	QATR Description	Doc. No.	Rev. No.
1	Radial Gate	QAI/A3/F/HM/RG/01	0

FIELD QUALITY ASSURANCE TEST REQUIREMENT

FIELD QUALITY ASSURANCE TEST REQUIREMENT			
PROJECT NAME: ARUN-3 HEP & LOWER ARUN HEP		DOC. No.: QAI/A3-LA/F/HM/OM/02	REV. No. 00
ITEM DESCRIPTION: ROPE DRUM HOIST		ISSUE DATE: 30/11/2022	PAGES : 02
SR. NO.	COMPONENT, OPERATION & CHARACTERISTICS	APPLICABLE STANDARD	REMARKS
1	2	3	4
1	Receipt of Material		
	External conditions of Equipment free from Damages etc	Packing list /Drawings /Tech Spec.	W
	Number of packages of each Equipment and physical condition of each package	Packing list /Drawings /Tech Spec.	W
2	Storage		
	Proper Placement of equipment as per the Instruction Manual.	All parts fully covered	W
	Ensure that no damage or rusting takes place during storage	All parts fully covered	W
	Ensure that all delicate Equipment are stored in protected area.	All parts fully covered	W
3	Pre-Erection/Erection Checks		
3.1	Site welding of supporting structure and other component		
	WPS, PQR & WPQR	ASME-IX	V
	Joint preparation, Edge preparation & root gap	DRG/ASME-V&VIII	W/V
	NDT	DRG/ASME-V&VIII	W
	Stress relieving if applicable	ASME-V&VIII	W
	Visual check	ASME-V&VIII	W
3.2	Embedments		
	Installation/fixing of embedments as per drawing	Drg/TS/Plant Std	W
	Levelling & alignment before & after concreting	Drg/TS/Plant Std	W
3.3	Blockout		
	Check for visual, dimension & co-ordinates of blockout	Drg/TS/Plant Std	W
3.4	Supporting structure/Column & Girder		
	Alignment	TS/Instruction Manual/ Reference standard/DRG	W
	Matching of fastener holes for joint	Drg. / Plant std	W
	Check Diagonal Distance.	Drg. / Plant std	W
	Major Dimensional Check	TS/Instruction Manual/ Reference standard/DRG	W
3.5	Hoist		
	Alignment of Hoist mechanism.	Drg. / Plant std	W
3.6	Electrification and cabling		
	Check Hoist Motions for proper electrical work.	App. Drg. / TS	W
4	Pre-commissioning & commissioning check		
4.1	No Load Static Test		
	Overall inspection & verification of hoist dimensions, clearances, hook reaches & other important items	DRG./TS/Rel.Std./Plant Std.	W
	Tightness of nuts and bolts	DRG./TS/Rel.Std./Plant Std.	W
	Checking of gears, bearings, couplings and rotating parts for proper oil level or lubrication and hydraulic brakes for brake fluid	DRG./TS/Rel.Std./Plant Std.	W
	Verification of insulation resistance for electrical equipment and wiring circuits	DRG./TS/Rel.Std./Plant Std.	W
	Check correctness of all circuits, interlocks, logics and sequence of operation.	DRG./TS/Rel.Std./Plant Std.	W
	Satisfactory operation of all protective devices	DRG./TS/Rel.Std./Plant Std.	W
	Checking of the controller for each motion to ensure that hook and travel motions is in accordance with marked controller directions.	DRG./TS/Rel.Std./Plant Std.	W
	Satisfactory operation of each controller, switch, contactor, relay and other control devices including limit switches under the most unfavorable conditions.	DRG./TS/Rel.Std./Plant Std.	W
	Checking of satisfactory operation and to determine if lamp fixtures on each bridge walkway are approachable and convenient for re-lamping.	DRG./TS/Rel.Std./Plant Std.	W
	Check of drift point for smooth and effective operation	DRG./TS/Rel.Std./Plant Std.	
	Testing of electrical /control panel shall be carried out as per QATR no. QAI/A3/F/HM/EP/01	DRG./TS/Rel.Std./Plant Std.	
4.2	Operation tests (No Load).		
	Check Speed & Current measurement for hoist motions.	DRG./TS/Rel.Std.	W
	Check for approaches/reach for lifting beam	DRG./TS/Rel.Std.	W
4.3	Limit Switch, brake setting & oil leakage at no load condition.		
	Check working of limit switch for motion of hoist	DRG./TS/Rel.Std.	W
	Check working of limit switch for travelling with hook approach	DRG./TS/Rel.Std.	W
	Check working of limit switch for hoist motion with given height of lift.	DRG./TS/Rel.Std.	W
	Check all Brake setting.	DRG./TS/Rel.Std.	W


SR. NO.	COMPONENT, OPERATION & CHARACTERISTICS	APPLICABLE STANDARD	REMARKS
1	2	3	4
	Check oil leakage in all gear Boxes.	DRG./TS/Rel.Std.	W
4.4	Emergency stop at no load		
	Switch off, emergency off	DRG./TS/Rel.Std.	W
4.5	Load Test (with operation of gate in dry & wet condition)		
	Check Girder Deflection at SWL	DRG./TS/Rel.Std.	W
	Check speed of hoist	DRG./TS/Rel.Std.	W
	Check current during motion	DRG./TS/Rel.Std.	W
	Check effectiveness of brake and Pad for Hoist (Braking Test)	DRG./TS/Rel.Std.	W
	Check all components for overheating, Measurement of vibration & noise during entire cycle of operation.	DRG./TS/Rel.Std.	W
4.6	Commissioning		
	Check trouble Free running of rope drum hoist and set right wherever any trouble.	DRG./TS/Rel.Std.	W
4.8	Acceptance test		
	After the rope drum hoist has been erected, adjusted, lubricated and otherwise made ready for operation, it will be operated through cycles of placing and removing the gate. The hoist shall raise, lower, held in any position	DRG./TS/Rel.Std.	W
	The testing of hoist shall be performed with water pressure against the gate (preferable up to design head).	DRG./TS/Rel.Std.	W
4.9	Paint touch up		
	Paint applied all over rope drum hoist parts	DRG./TS/Rel.Std.	W
LEGENDS			
W: CUSTOMER HOLD POINT (CHP)		DRG: DRAWING	
TS: TECHNICAL SPECIFICATION		REL. STD: RELEVANT STANDARD	
V: VERIFICATION OF REPORT / TCs			
NOTES:			
1	Any test at any stage not covered in Quality Assurance Test Requirement (QATR), but part of technical specification of contract, shall also be carried out by Contractor / firm.		
2	QATR shall be read in conjunction with General Quality Assurance Requirement given as part of Technical Specification.		


FIELD QUALITY ASSURANCE TEST REQUIREMENT

FIELD QUALITY ASSURANCE TEST REQUIREMENT			
PROJECT NAME: ARUN-3 HEP & LOWER ARUN HEP		DOC.NO.QAI/A3-LA/F/HM/OM/04	REV. NO. 00
ITEM DESCRIPTION: EOT CRANE		ISSUE DATE: 30.11.22	PAGES: 03
SR. NO.	CHARACTERISTICS	APPLICABLE STANDARD	REMARKS
1	2	3	4
1	Receipt of Material		
	External conditions of Equipment free from Damages etc	Packing list /Drawings /TS	W
	Number of packages of each Equipment and physical condition of each package	Packing list /Drawings /TS	W
2	Storage		
	Proper Placement of equipment as per the Instruction Manual.	All parts fully covered	W
	Ensure that no damage or rusting takes place during storage	All parts fully covered	W
	Ensure that all delicate Equipment are stored in protected area.	All parts fully covered	W
3	Pre-erection & erection check		
3.1	Welding		
	WPS, PQR and WPQR	DRG/ASME SEC IX	W/V
	NDT as per DRG / TS	ASME Section V & VIII/BS 5135/DRG/TS/ IS:2595/IS:2825	W/V
	Visual Examination and dimensions	ASME Section V & VIII/BS 5135/DRG/TS	W/V
3.2	Embedments		
	Installation/fixing of embedments as per drawing	DRG/TS/Plant std	W
	Check for alignment & level before & after concreting	DRG/TS/Plant std	W
3.3	Blockout		
	Check for visual, dimensions & Co-ordinates of block out	DRG/TS/Plant std	W
3.4	Rail		
	Centre distance measure at every 6 Mtr. Length	Drg. / Plant std	W
	Rail centre distance at every 6 mtr. length. Diagonal, straightness of each rail.	Drg. / Plant std	W
	Verification of expansion gap within rail w.r.t. civil drawing.	DRG/TS/Plant std	W
	Tightening of rail clamps (LT Rail)	Drg. / Plant std	W
	Waviness of rail (horizontal and vertical planes)	Drg. / Plant std	W
3.5	Erection of end carriage		
	Free movement of wheel over rail. All wheels in contact with Rail	Drg. / Plant std	W
3.6	Erection of girders & joint with end carriage / Boggie.		
	Matching of fastener holes for joint E/C, alignment & major dimensions and Girder for joining boggies with girder	Drg. / Plant std	W
	Check span both drive and idle side	Drg. / Plant std	W
	Check Diagonal Dist. Over L.T. Wheels	Drg. / Plant std	W
3.7	Fixing crab on CT Rail (Girder Rails) and Hoist Mechanism		
	Alignment of CT mechanism.	Drg. / Plant std	W
	Alignment of MH & AH mechanism.	Drg. / Plant std	W
3.8	Rope Waving, Hook Block Fixing.		
	Free movement of hook, Head Room	Drg. / Plant std	W
3.9	Electrification and cabling		
	Check L.T., C.T., Hoist Motions for proper electrical work.	App. Drg. / TS	W
	Phase sequence check & direction of rotation of motor	App. Drg. / TS	W
4	Pre-commissioning & commissioning check		
4.1	Pre-commissioning check		

SR. NO.	CHARACTERISTICS	APPLICABLE STANDARD	REMARKS
1	2	3	4
	Overall inspection & verification of crane dimensions, clearances, hook reaches & other important items	App Drg. / IS: 3177/TS	W
	Tightness of nuts and bolts	App Drg. / IS: 3177/TS/Plant STD	W
	Checking of gears, bearings, couplings and rotating parts for proper oil level or lubrication and hydraulic brakes for brake fluid	App Drg. / IS: 3177/TS	W
	Verification of insulation resistance for electrical equipment and wiring circuits	App Drg. / IS: 3177/TS	W
	Check correctness of all circuits, interlocks, logics and sequence of operation.	App Drg. / IS: 3177/TS/Plant STD	W
	Satisfactory operation of all protective devices	App Drg. / IS: 3177/TS/Plant STD	W
	Measurement of throat opening of hook	App Drg. / IS: 3177/TS/Plant STD	W
	Checking of the controller for each motion to ensure that hook and travel motions is in accordance with marked controller directions.	App Drg. / IS: 3177/TS	W
	Satisfactory operation of each controller, switch, contactor, relay and other control devices including limit switches under the most unfavorable conditions.	App Drg. / IS: 3177/TS/Plant STD	W
	Checking of satisfactory operation and to determine if lamp fixtures on each bridge walkway are approachable and convenient for re-lamping.	App Drg. / IS: 3177/TS	W
	Check of drift point for smooth and effective operation	App Drg. / IS: 3177/TS/Plant STD	W
	Testing of electrical panel / control panel shall be carried out as per QATR no. QAI/A3/F/HM/EP/01	App Drg. / REL. STD./TS/Plant STD	W
4.2	Operation tests (No load)		
	Satisfactory operation of each motion of crane, check Speed & Current measurement for all motions.	App Drg. / IS: 3177/TS	W
	Check for all hook approaches /reach	App Drg. / IS: 3177/TS	W
4.3	Limit Switch, brake setting & oil leakage at no load condition.		
	a) Check working of limit switch for L.T.	App Drg. / IS: 3177/TS	W
	b) Check Working of limit switch for C.T. with hook approach.	App Drg. / IS: 3177/TS	W
	c) Check working of limit switch for hoist motion with given height of lift.	App Drg. / IS: 3177/TS	W
	d) Check all Brake setting.	App Drg. / IS: 3177/TS	W
	e) Check oil leakage in all gear Boxes.	App Drg. / IS: 3177/TS	W
4.4	Emergency stop at no load		
	Switch off, emergency off	App Drg. / IS: 3177/TS	W
4.5	Load Test (at rated load)		
	Check Deflection at SWL	App Drg. / IS: 3177/TS	W
	Check speeds for all three motions	App Drg. / IS: 3177/TS	W
	Check current for all three motions	App Drg. / IS: 3177/TS	W
	Check effectiveness of brake and Pad for main and Aux. Hoist (Braking Test)	App Drg. / IS: 3177/TS	W
	Check all components for overheating, Measurement of vibration & noise during entire cycle of operation.	App Drg. / IS: 3177/TS	W
	Measurement of throat opening of hook and shall be compared with earlier value measured during no load test.	App Drg. / IS: 3177/TS	W
4.6	Commissioning		
	a) Check trouble Free running of crane. Set right wherever any trouble.	App Drg. / IS: 3177/TS	W
4.7	Acceptance test		

SR. NO.	CHARACTERISTICS	APPLICABLE STANDARD	REMARKS
1	2	3	4
	After the gantry crane has been erected, adjusted, lubricated and otherwise made ready for operation, it will be operated through cycles of placing and removing the stoplog unit. The crane shall raise, lower, held in any position and transport the stoplogs unit at rated speed.	App Drg. / IS: 3177/TS	W
	The testing of cranes and stoplogs shall be performed with water pressure against the stoplogs (preferable up to design head).	App Drg. / IS: 3177/TS	W
4.8	Paint touch up		
	Paint applied all over crane parts	App Drg. / IS: 3177/TS	W
LEGENDS			
W: CUSTOMER HOLD POINT (CHP)		DRG: DRAWING	
TS: TECHNICAL SPECIFICATION		REL. STD: RELEVANT STANDARD	
V: VERIFICATION OF RECORDS / REPORTS / TC			
NOTES:			
1	Any test at any stage not covered in Quality Assurance Test Requirement (QATR), but part of technical specification of contract, shall also be carried out by Contractor / firm.		
2	QATR shall be read in conjunction with General Quality Assurance Requirement given as part of Technical Specification.		

 FIELD QUALITY ASSURANCE TEST REQUIREMENT			
PROJECT NAME: ARUN-3 HEP & LOWER ARUN HEP		DOC.NO.QAI/A3-LA/F/HM/EP/01	REV. NO. 00
ITEM DESCRIPTION: ELECTRICAL PANEL / CONTROL PANEL		ISSUE DATE: 30.11.22	PAGES: 01
SR. NO.	CHARACTERISTICS	APPLICABLE STANDARD	REMARKS
1	2	3	4
1	Receipt of Material		
	External conditions of Equipment free from Damages etc	Packing list /DRG /TS	W
	Number of packages of each Equipment and physical condition of each package	Packing list /DRG /TS	W
2	Storage		
	Proper Placement of equipment as per the Instruction Manual.	All parts fully covered	W
	Ensure that no damage or rusting takes place during storage	All parts fully covered	W
	Ensure that all delicate Equipment are stored in protected area.	All parts fully covered	W
3	Pre - erection activities		
	Blockout		
	Verification of blockout location, elevation & dimension	DRG/TS	W
4	Erection Activities / Test during installation		
	Visual check as per OGA, DRG & verification of BOM	Approved GTP/TS/DRG	W
	Installation of panels as per drawing	DRG/TS/Plant std	W
	Leveling & alignment	DRG/TS/Plant std	W
	Check for verticality of panels within 5 mm	Approved GTP/TS/DRG	W
	Check for clearances on all sides	Approved GTP/TS/DRG	W
	check for proper tightness of base plate bolts, bolt joining panels	Approved GTP/TS/DRG	W
	check for tightness of bus bar joints including earth bus bar, all terminals, CTs, PTs, meter and relays.	Approved GTP/TS/DRG	W
	Ensure that all unused holes are plugged properly.	Approved GTP/TS/DRG	W
5	Pre-commissioning & Commissioning Tests		
	check for lubrication of all moving parts like doors etc.		
	Verification of correct wiring, Ferruling, dressing, routing, bunching, continuity check, color coding and earthing.	As per drawing	W
	Check for correctness of inter panel wiring/cabling, cable termination, tightness & phase sequence, dressing etc.	As per drawing	W
	Insulation resistance & HV test	IEC 60204-1	W
	Functional test on all AC & DC circuit including heating, Lighting, Fan & thermostat	Approved GTP/Tech. Spec./Drg	W
	Operational & functional test	DRG/Manufacturer Plant standard	W
	Surface Protection coating, Paint Shade & Finish	Approved GTP/TS/DRG	W
LEGENDS			
W: CUSTOMER HOLD POINT (CHP)		DRG: DRAWING	
TS: TECHNICAL SPECIFICATION		REL. STD: RELEVANT STANDARD	
V: VERIFICATION OF REPORT / TCs			
NOTES:			
1	Any test at any stage not covered in Quality Assurance Test Requirement (QATR), but part of technical specification of contract, shall also be carried out by Contractor / firm.		
2	QATR shall be read in conjunction with General Quality Assurance Requirement given as part of Technical Specification.		

FIELD QUALITY ASSURANCE TEST REQUIREMENT			
	PROJECT NAME: ARUN-3 HEP & LOWER ARUN HEP	DOC.NO.QAI/A3-LA/F/HM/CB/01	REV. NO. 00
	ITEM DESCRIPTION: POWER CABLES, CONTROL CABLES, INSTRUMENTATION CABLES & CABLE TRAYS	ISSUE DATE: 30/11/2022	PAGES: 01
SR. NO.	CHARACTERISTICS	APPLICABLE STANDARD	REMARKS
1	2	3	4
1	Receipt of Material		
	Visual Checks of Cable Drums and trays	Packing list /DRG /TS	W
	Check for transit damage	Packing list /DRG /TS	W
	Check Quantity of Drums and cable trays	Packing list /DRG /TS	W
2	Storage		
	Proper Placement of Cable Drums as per the Instruction Manual.	All parts fully covered	W
	Ensure that no damage or rusting takes place during storage	All parts fully covered	W
	Ensure that all delicate Equipment are stored in protected area.	All parts fully covered	W
3	Erection of Cable tray		
	The dimensions of the rack and trays. Support and spacing between tray	DRG/ REL STD	W
	Earthing of racks and trays	DRG/ REL STD	W
4	Erection of Cables		
	Marking/ Identification of Cable Drums	DRG/ REL STD	W
	IR Value of Cables	DRG/ REL STD	W
	Securing of cables	DRG/ REL STD	W
	Lying of Control cables and Power cable in different layers of trays	DRG/ REL STD	W
	Earthing and bonding (Metal sheathing, Metal screening and armour of cable should be earthed at both ends)	DRG/ REL STD	W
	Cable Identification tag, Glanding, dressing, clamping and putting address tags of cables	DRG/ REL STD	W
	Clearing of cable trench & cover the cable, if applicable	DRG/ REL STD	W
	Laying of sand bricks/ slabs for buried cables, if applicable	DRG/ REL STD	W
5	Pre-Commissioning and Commissioning Checks of Cables		
	Cable Checking	DRG/ REL STD	W
	Continuity Checking	DRG/ REL STD	W
	Resistance Checking	DRG/ REL STD	W
	IR before and after laying	DRG/ REL STD	W
	Verification of Phase Sequence for Power Cables.	DRG/ REL STD	W
	HV tests for Cables	DRG/ REL STD	W
LEGENDS			
W: CUSTOMER HOLD POINT (CHP)		DRG: DRAWING	
TS: TECHNICAL SPECIFICATION		REL. STD: RELEVANT STANDARD	
V: VERIFICATION OF REPORT / TCs			
NOTES:			
1	Any test at any stage not covered in Quality Assurance Test Requirement (QATR), but part of technical specification of contract, shall also be carried out by Contractor / firm.		
2	QATR shall be read in conjunction with General Quality Assurance Requirement given as part of Technical Specification.		

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VENDOR / SUB-VENDOR ASSESSMENT SHEET

TO BE FILLED-IN BY SUPPLIER / SUB-VENDOR

NAME OF SUPPLIER / SUB-VENDOR IN FULL					
	REGISTERED OFFICE	FACTORY / WORKS			
ADDRESS					
TELEPHONE NO.					
FAX NO.					
EMAIL ID					
PERSON(S) TO BE CONTACTED (NAME & DESIGNATION & MOBILE NO.)					
WEEKLY OFF					
SHIFT WORKING					
		Type of Company (Pl. Tick)		Type of Industry (Pl. Tick)	
OFFICE	WORKS	Pvt. Ltd	Public Ltd.	MSME	Large Scale
ONE <input type="checkbox"/>	ONE <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
TWO <input type="checkbox"/>	TWO <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
THREE <input type="checkbox"/>	THREE <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		Proprietary	Partnership	Govt.	Contractor
		Public Sector			
Sr. No.	Items / Services / Process for which Approval is desired for		Rating / Size & Type	Applicable Standards	

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			IS/DIN/BS/IEC Etc.

REGISTRATION DETAILS #

PAN / TAN NO.	CENTRAL SALES TAX REG. NO.	STATE SALES TAX / TIN NO.	EXCISE DUTY REGISTRATION NO.
EXCISE CONTROL CODE NO.	SERVICE TAX REG. NO.	CATEGORY OF INDUSTRY	REGISTRATION NO. & VALIDITY DATE
		Micro <input type="checkbox"/> Small <input type="checkbox"/> Medium <input type="checkbox"/> Large <input type="checkbox"/>	

A. ORGANISATIONAL SOUNDNESS

SR. NO.	DESCRIPTION	DETAILS TO BE FURNISHED
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1.	Nature of Business (Strike whichever is not applicable)	Manufacturing Unit / Engineering Consultant / Agents / Distributors / Stockists / Dealers / Traders / Indian Subsidiary / EPC contractor / Channel Partner (Attach authorization certificate of principal) / Erection contractor / Other				
2.#	Year of commencement of Business / Factory Establishment					
3.	Year of Commencement of Manufacture / Services					
4.	Total Area/Covered Area in Sq. m.	Total Area	Covered Area			
5.	Electric Power-Connected Load					
6.#	Electric Power Standby Load & System					
7.	Details of Directors					
Sr. No.	Name	Designation	Qualification	Experience		
8.	Details of Employees					
Please attach copy of Company's Organization Chart (For Unit)						
Division Status	Graduate		Diploma	Skilled	Un-Skilled	Remarks
	Technical	Non-Technical				
Production						
Engineering & Quality Control						
Administration & Other Supporting activities.						
9.	Brief Details of Product and Manufacturing Capability					
Sr. No.	Item & Material	Description (Type, Size Rating)	Annual Production for Last Three Years			
			I	II	III	

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10.#	Details of Foreign or Indigenous Collaborator				
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Sr. No.	Product	Name & Address of Collaborator	Collaboration		
			Scope	Year	Valid up to

11#	Have your product been type tested by any external agency? If so, give details				
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Sr. No.	Product	Test (Size / Type & class	Test Report No.	Next Due date

12.#	Have you been approved by any Statutory agency / third party agency like LLOYD, ASME, NTPC, PGCIL, EIL, Railways etc. ? If so, indicate details and enclose copies of approval letters				
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Sr. No.	Item / Material / Service / Process	Description (Size, Type & Class)	Agency	Date of approval	Next Due date

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13.# Indicate Approval / Certification by National / International Standards / Agencies applicable for the subject product.

Sr. No.	Product	Codes / Standards	License No. & Date

14.# Reference List (Experience in Particular Type of Equipment / Service / Process). Please indicate since how many years similar type of item / equipment / service / process provided (please furnish documentary evidence).

Sr. No.	Item / Material / Service / Process	Type & Capacity / Rating	Customer (End User with Address)	Date of Supply / Service provided	Under Operation since year / Month

#Note: Please furnish the performance feedback certificate for proposed item / equipment / process / service form end user in line with requirement stipulated in Technical Specification.

15.# Business Commenced with SAPDC/SJVN in past

Sr. No.	Year	Name of Department / Project Dealt with	Item Supplied / Services Offered.

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16.A#	Machinery, Instrument & other Equipment Specific to Process & Product Facilities / service				
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Sr. No.	Description of Machine	Capacity & Nos.	Location Shop	Make	Year of Manufg.

16.B#	Other General Facilities				
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Sr. No.	Description of Machine	Capacity & Nos.	Location Shop	Make	Year of Manufg.
i	Material Handling Mobile Crane Fork Lift Over Head Cranes				
ii	Metal Cutting & Bending				
iii	Casting				
iv	Forging				
v	Fabrication				
vi	Welding				
vii	Machining				
viii	Heat Treatment				

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ix	Sheet Metal					
x	Fettling & Cleaning, Sand Blasting, Shot Blasting & Pickling					
xi	Painting					
xii	Metal Coating					
xiii	Protection before packing					
xiv	Packing					
xv	Other					
17.#	If In-House Manufacturing Facilities not available, inform source of manufacturing details along with their facilities and experience					
Sr. No.	Process outsourced	Name of the company	Description of machine / Equipment	Remarks		
18. A#	Facilities for In-house Testing & Inspection					
Sr. No.	Description	Capacity & Nos.	Make & Year of Mfg.	Calibration Status	Approval Qualificati on	
18.B#	If In-house testing facilities are not available, indicate source of testing with relevant details.					
Sr. No.	Source of Testing	Description	Capacity & Nos.	Make & Year of Mfg.	Calibration Status	Approval Qualificati on

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Note: In case of outsourcing of major testing such as NDT, Electrical & Mechanical testing, no marks will be awarded. However, material composition testing by chemical method from NABL Lab shall not attract negative marking.

18 C #	Details of any Government Laboratory facility available in area	
	Product related testing facility (type / Performance / Routine / Acceptance Test)	

19	Sources of Raw Material and Bought out Items
----	--

Sr. No.	Description of Raw Material / Bought Out Items	Source

20 #	Storage Area Availability	
	Storage for finished goods (Open / Close)	
	Raw Material storage and identification	

21 #	Do you have in-house Design / R&D departments?	
------	--	--

22 #	Details of pending legal issues on contractual aspects with customers, if any.	
------	--	--

23 #	Please furnish details of Labour problems in the last three years, if any?	
------	--	--

--	--	--	--	--

B.	FINANCIAL SOUNDNESS OF ORGANIZATION			
-----------	--	--	--	--

Financial Information for last Three Years (Please furnish copy of annual report)				
---	--	--	--	--

Sr. No.	Parameters	Year 20	Year 20	Year 20
1#	Please furnish annual turnover of the company.			

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	Growth in annual turnover w.r.t. previous years (%)			
2#	Please furnish Profit before tax (PBT) of the company.			
	Growth in PBT w.r.t. previous years (%).			
3#	Please indicate the net worth (Net current assets – Net current liabilities) of the company?			
4#	Whether the vendor has been referred to BIFR / NCLT / any other similar Govt. agency.			
5#	Whether the supplier is a potentially sick company.			
6	Please mention current order book position, as on date in terms of Value and time			

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C. QUALITY SYSTEM		
SR. NO.	DESCRIPTION	Sub-vendor response (along with supporting document)
1#	Are you an ISO 9001 company? If yes, please furnish the certificate and what is your quality policy?	
2#	Is the company an ISO 14000 approved?	
3#	Is the company an OHSAS approved?	
4#	Have your company won any Quality award like Rajeev Gandhi National Quality Award, IMC Ramkrishna Bajaj National Quality Award, Golden Peacock National Quality Award etc? If yes provide documentary evidence.	
5#	Have you received appreciation letter from your customer. Please provide evidence.	
6	To whom your Q.C./Q.A. Chief reports to ? (Please furnish your organization structure)	
7#	If you have a written quality control manual/procedure, then please furnish the same.	
7 (i) #	Incoming Material Control System (Furnish a copy of system and organization)	
7 (ii) #	Process Control: Are written procedure defining stage wise operations and functions on shop floor established and followed? (Furnish copy of work instruction and record of process control parameter)	
7 (iii) #	Manufacturing/Testing Procedure Qualification & Personnel Qualification (Procedure qualification specification & Record of personnel qualification (PQR) to be submitted).	
7 (IV) #	Are written Quality Control Instruction sheets prepared & properly used? (Please furnish evidence)	
7 (V) #	Are records generated during inspection maintained & available for review? (Please furnish evidence)	

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7 (VI) [#]	Are quality control checks / procedure adequate to maintain desired quality level right from the incoming stage to final stage? Please furnish copy of such control checks / procedure.	
8.#	Documentation Control	
8 (i)	Does a system for clear and precise stipulation of responsibilities for documentation issue & change control exists?	
8 (ii)	Are changes made in writing?	
9 [#]	Control of Inspection, measuring and testing equipment	
9 (i)	Are necessary gauges, testing and measuring equipment's, available and used?	
9 (ii)	Are testing and measuring equipment properly maintained?	
9 (iii)	Is recorded control on calibration of equipment available?	
10 [#]	System of Identification & Traceability of materials, tools, jigs, fixtures & processed components, etc. (Copy of procedure to be submitted).	
11 [#]	System of Storage / Preservation / Painting and Packing (copy of Procedure to be submitted)	
12 [#]	Do you have written procedure for disposing off the non-conformities? If yes, please furnish the copy of the same also furnish three copies of NCR & CAPA.	
13 [#]	Safety measures (Submit copy of safety system & record of accidents for last two years)	
14 [#]	What type of Sampling Inspection Plan is used in your factory/company? Please furnish details.	
15	How good are you in keeping your dispatch commitments? Please give details of last ten deliveries stating details as below (Provide documentary evidence) Within delivery period: Delayed but accepted by user: Delayed but accepted with penalty:	
16 [#]	Have you ever been de-listed or put in under temporary suspension by any customer / contractor.	

D.	AFTER SALES SERVICE	
SR. NO.	DESCRIPTION	Sub-vendor response (along with supporting document)
1 [#]	For overcoming product deficiencies what are the analytical methods used at Customer's premises?	
2 [#]	What is the strength of your "after-sales service" team?	
3 [#]	What is the response time after receiving complaints from the	

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	customers? Provide evidence.	
4[#]	Customer complaints handling system (Submit list of customer complaints & status for the last three years) Please furnish complete list of complaints attended to during last one year.	
5[#]	How do you keep your “after-sales service” team updated?	
6[#]	Provide certificate from 02 customers (end user) for satisfactory after sails services.	

Declaration by Director/ Partner/ Proprietor

I declare that the information furnished above and attached documents are correct to the best of my knowledge, I undertake to inform you at the earliest any change(s) in the details mentioned above.

Signature and Date

Name & Designation

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TO BE FILLED BY MAIN CONTRACTOR FOR SUB-VENDOR (MC)

Sr. No.	Parameters	Supplier response (along with supporting document)
1	Name and address of sub-vendor:	
2 (a)	Type of equipment / item / process / service for which approval is sought:	
2 (b)	Details of equipment / item / process / service for which approval is sought (i.e. Rating, capacity, type, size, weight, etc.):	
3	Experience of main contractor with sub-vendor:	
(a)#	Since how many years sub-vendor is registered with you for proposed type of equipment / item / process / services (furnish documentary evidence):	
4#	Whether sub-vendor is meeting the qualification criteria indicated in the technical specification (furnish documentary evidence).	
5#	Sub-vendor rating as per contractor's internal procedure in the scale 0-10 or 0-100% (furnish documentary evidence).	
6#	Any dispute of main contractor with vendor during execution of last 05 contracts.	
7#	Have you ever de-listed or put in temporary suspension the proposed sub-vendor? If yes, please provide the reason for same.	
8	Please indicate the reason for re-approving / re-listing the sub-vendor.	

I declare that the information furnished by Sub-vendor has been verified and found in order / minor changes which have been marked and initialed on this form itself / observed the following discrepancies.

(Signature & Designation)

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**GUIDELINES TO SUPPLIERS FOR FILLING-UP VENDOR/SUPPLIER
REGISTRATION FORM**

1. All columns are to be filled up properly in the space provided for. Wherever it is not applicable / not available, please mention "Not Applicable" / "Not Available". All pages of the form are to be signed along with seal by the authorized signatory.
2. A separate sheet may be attached if the space provided is insufficient or additional information is to be given, Please put proper identification tag on the separately attached sheet.
3. Any information / clarification required by SAPDC/ Consultant during evaluation must be given expeditiously.
4. Please ensure that all required enclosures are attached with the filled up Vendor Registration Form.
5. Marks shall be awarded on the basis of documentary evidences submitted by Vendor / sub-vendor wherever called in vendor / sub-vendor assessment form.
6. Incomplete or incorrect forms will be rejected.
7. Please fill up the check list given below and send along with the vendor registration forms to SAPDC/Consultant.
8. In case any information found incorrect / false, the vendor shall be rejected / de-listed at any stage.
9. Information with # marks is score able.
10. Accepting or rejecting a vendor is sole discretion of SAPDC.
11. Product catalogue / manual for the proposed item / equipment / process / service, if available, shall be submitted alongwith other documents.

Furnish following information/Documents:-

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Sr. No.	Description	Yes / No	Page No / Annexure
1	Latest audited annual account.		
2	Balance Sheet.		
3	Valid Income Tax Clearance Certificate.		
4	Details of Pending Arbitration cases.		
5	Details of pending disputes with Statutory Authorities.		
6	Organization chart		
7	Copy of Performance certificate (minimum 03)		
8	Copy of minimum three (03) completion certificates of similar work / service.		
9	Letter of approval from ASME / NTPC/ EIL / Railway / Lloyds / Power Grid etc. if any.		
10	ISO: 9001 certificate		
11	Quality Manual		
12	ISO: 14000 certificate		
13	OHSAS, ISO 18000 certificate		
14	Experience list		
15	Type test report & approval certificate		
16	Product Approval certificate from national / international agency.		
17	Quality award certificate		
18	Process and Personnel qualification certificates		
19	Copy of registration / enlistment with reputed / large organizations		
20	Detail of existing clients and details such as address, contact number and mail address.		
21	List of works / projects of similar nature executed with documentary evidences of works executed in last 02 years.		
22	Other documents mentioned elsewhere in vendor / sub-vendor assessment form.		

(Signature & Designation)

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FORM		

PROJECT NAME (MW)			MANUFACTURING / FIELD QUALITY ASSURANCE PLAN					CONTRACTOR NAME, ADDRESS & LOGO						
ITEM DESCRIPTION			SUB-ITEM	QAP NO.	REV. NO	ISSUE DATE	SUB-CONTRACTOR NAME, ADDRESS & LOGO							
SR. NO.	COMPONENT & OPERATION	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			REMARKS	
					M/C	S				M	C	S		
1	2	3	4	5	6		7	8	9	10			11	
LEGENDS														
M	MANUFACTURER	C	CONTRACTOR		S	SAPDC LTD.								
P	PERFORM	V	VERIFICATION OF RECORDS		W	WITNESS / CHP								
IR	INSPECTION REPORT	DRG	DRAWING		CHP	CUSTOMER HOLD POINT								
MA	MAJOR	MN	MINOR		CR	CRITICAL								
ME	MEASUREMENT	NDT	NON DESTRUCTIVE TESTING		HT	HEAT TREATMENT								
TR1	CERTIFICATE OF COMPLIANCE TO TS/STANDARD REQUIREMENT WITHOUT ANY CHECK LIST OF TESTS CARRIED OUT.	TR2	CERTIFICATE OF COMPLIANCE TO TS/STANDARD REQUIREMENT WITH CHECK LIST OF TESTS CARRIED OUT.		TR3	TEST REPORT/TEST CERTIFICATE WITH TEST RESULTS BASED ON SPECIFIC INSPECTION & TESTING AT MANUFACTURER FACILITY/NABL APPROVED LAB.								
NOTE: QAP SHALL BE READ IN CONJUNCTION WITH QUALITY ASSURANCE REQUIREMENT GIVEN AS PART OF TECHNICAL SPECIFICATION.														
MANUFACTURER / SUB-CONTRACTOR:			CONTRACTOR:		FOR SAPDC USE:		REFERENCE DOC NO. OF SJVN:							
PREPARED BY:		REVIEWED BY		REVIEWED & RECOMMENDED BY		REVIEWED BY		RECOMMENDED BY		APPROVED BY				
NAME, DESIGNATION & SIGNATURE		NAME, DESIGNATION & SIGNATURE		NAME, DESIGNATION & SIGNATURE		NAME & SIGNATURE		NAME & SIGNATURE		SIGNATURE & SEAL				

Prepared By:	Reviewed By:	Approved By:
		Process Owner

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	FORM	

NON-CONFORMITY REPORT FOR MANUFACTURING, TRANSPORTATION, STORAGE & ERECTION STAGES	FOR SAPDC USE ONLY
	NC NO. _____
	Date: _____
	PAGE 1 of 5

PART-A (Proposal of Disposition of Non Conformity)

Please read instructions carefully before filling up the form and attach separate sheet wherever required.

Contract No.	CATEGORY OF NON CONFORMITY (Please refer instruction no.1&Tick appropriate)
Package Unit No.	
Supplier/ Contractor	
Sub-Vendor	
Place of Manufacture	
	MAJOR <input type="checkbox"/>
	MINOR <input type="checkbox"/>

DETAILS

ITEM DESCRIPTION: _____ IDENTIFICATION NO. _____

RANGE/SIZE/TYPE: _____ QUALITY PLAN NO.: _____
& CLAUSE NO. _____

STAGE OF NON-CONFORMITY

DESIGN (A) /RAW MATERIAL (B) /ASSEMBLY (C) / IN PROCESS (D)-Specify _____ /
TESTING (E)/ STORAGE (F) /HANDLING & TRANSPORTATION (G) /ERECTION &
COMMISSIONING (H) /ANY OTHER (I) (SPECIFY) _____

NON CONFORMITY-DESCRIPTION WITH CAUSE (Attach Relevant Drawings/ Details):

PROPOSED DISPOSITION WITH JUSTIFICATION(For Correction):
(Note: Attach Details including design calculation)

Disposition Code

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NON-CONFORMITY REPORT FOR MANUFACTURING, TRANSPORTATION, STORAGE & ERECTION STAGES	FOR SAPDC USE ONLY
	NC NO.
	Date:
	PAGE 2 of 5

STEPS TO PREVENT RECCURANCE (For Corrective Action):

ENCLOSURE SUBMITTED BY CONTRACTOR:-

- DRAWINGS/ DETAILS
 INSPECTION REPORT
 ROOT CAUSE ANALYSIS
 PROCEDURE OF DISPOSAL OF NCR
 ANY OTHER (Please specify) _____

DATE	NAME & DESIGN	SIG.OF CONTRACTOR	SEAL
FINAL DISPOSITIONING BY SAPDC			Disposition Code
INCHARGE of RIO or FQA (In case of Minor) SAPDC (In case of Major)			<input style="width: 50px; height: 20px;" type="text"/>

DATE	NAME & DESIG.	SIGNATURE
------	---------------	-----------

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NON-CONFORMITY REPORT FOR MANUFACTURING, TRANSPORTATION, STORAGE & ERECTION STAGES	FOR SAPDC USE ONLY
	NC NO.
	Date:
	PAGE 3 of 5

FOR SAPDC INTERNAL USE ONLY

RECOMMENDATION of INCHARGE of RIO or FQA (In case of Major)/ CONCERNED SAPDC 's INSPECTION/ SITE ENGINEER (In case of Minor)	Disposition Code <input type="text"/>
--	---

DATE NAME & DESIG. SIGNATURE

RECOMMENDATION OF SAPDC CONCERNED ENGINEER	Disposition Code <input type="text"/>
---	---

DATE NAME & DESIG. SIGNATURE
GROUP HEAD

DATE NAME & DESIG. SIGNATURE

RECOMMENDATION OF SAPDC (FOR MAJOR CATEGORY) (Comments of Engineering / Others deptt as applicable to be considered)	
--	--

DATE NAME & DESIG. SIGNATURE

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NON-CONFORMITY REPORT FOR MANUFACTURING, TRANSPORTATION, STORAGE & ERECTION STAGES	FOR SAPDC USE ONLY
	NC NO.
	Date:
	PAGE 4 of 5

PART B (Verification of Corrections of Non- Conformity)
(Filled after Completion of corrections of Non-Conformity)

ACTION TAKEN BY SUPPLIER/ CONTRACTOR (Attach Report of verification)

DATE	NAME & DESIGN	SIG.OF SUPPLIER/ CONTRACTOR	SEAL
------	---------------	-----------------------------	------

VERIFICATION BY SAPDC'S SITE ENGINEER/ INSPECTION ENGINEER

DATE	NAME & DESIG.	SIGNATURE
IN-CHARGE of RIO/ FQA		

DATE	NAME & DESIG.	SIGNATURE
------	---------------	-----------

COMMENTS OF SAPDC ENGINEER

DATE	NAME & DESIG.	SIGNATURE
GROUP HEAD		

DATE	NAME & DESIG.	SIGNATURE
HOD		

DATE	NAME & DESIG.	SIGNATURE
------	---------------	-----------

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NON-CONFORMITY REPORT FOR MANUFACTURING, TRANSPORTATION, STORAGE & ERECTION STAGES	FOR SAPDC USE ONLY
	NC NO.
	Date:
	PAGE 5 of 5

INSTRUCTIONS

1. 'MAJOR' NONCONFORMITY IS DEFINED AS DEPARTURE FROM SPECIFICATION WHICH AFFECTS PERFORMANCE RELIABILITY. SAFETY INTERCHANGEABILITY. ERECTION, COMMISSIONING OR WORKING LIFE ALL OTHER NON-CONFORMITIES SHALL BE TREATED AS CATEGORY 'MINOR'.
2. ACCEPTANCE OF DISPOSITIONED NON-CONFORMANCE IS WITHOUT PREJUDICE TO SAPDC RIGHT TO CLAIM COMMERCIAL REBATE AND DOES NOT ABSOLVE CONTRACTUAL OBLIGATIONS.
3. OBTAINING APPROVAL OF STATUTORY AUTHORITY IF ANY W.R.T. ABOVE NON CONFORMANCE IS THE RESPONSIBILITY OF SUPPLIER/ CONTRACTOR.
4. DISPOSITIONING OF THIS NON-CONFORMANCE IS FOR THIS SPECIFIC CASE ONLY AND NOT TO BE REGARDED AS PRECEDENCE.
5. **DISPOSITION CODE** THE NON-CONFORMANCE SHALL BE DISPOSITIONED AS UNDER BY SAPDC AND SUPPLIER. (GIVE CODE AT APPROPRIATE BOXES):-
(01) NC-REJECTED **(02)** NC- CONDITIONALLY ACCEPTED (SPECIFY CONDITION)
(03) NC-ACCEPTED AS-IT-IS **(04)** NC-ACCEPTED WITH REPAIR.
6. **NC NUMBER** - THIS NO. SHALL BE ALLOTTED BY SAPDC AND SHALL HAVE SAPDC,PROJECT NAME, PACKAGE, FOLLOWED BY RUNNING SERIAL NO. & ENTER TO NC REPORT BY RIO/ FQA / COAI

RESPONSIBILITIES OF CONTRACTOR

1. ASCERTAIN EXACT NATURE OF NON-CONFORMANCE AND ALONGWITH SUPPORTING DRAWING OF ITEMS/ EQUIPMENT ETC WITH WHICH NON-CONFORMANCE EXISTS.
2. IDENTIFY THE CAUSE OF NON CONFORMITY.
3. DECIDE ON CODE OF DISPOSING.
4. FINALISE THE CAUSE OF NON-CONFORMITY AND PROPOSE CORRECTIVE ACTION.
5. ENSURE AND CERTIFY THAT THE PRODUCT QUALITY PERFORMANCE. RELIABILITY AND WORKING LIFE IS NOT AFFECTED FOR MINOR NON-CONFORMITIES AND QUANTIFY THE EXTENT TO WHICH IT IS AFFECTED IN THE CASE OF CATEGORY 'MAJOR' NON-CONFORMITIES.
6. IMPLEMENT AGREED CORRECTIVE ACTION IN A TIME BOUND PROGRAMME AND PROVIDE FEEDBACK AS PER PART-B OF THE FORMAT

RESPONSIBILITIES OF RIO/ FQA

1. IDENTIFY THE PRODUCT APPROPRIATELY.
2. ANALYSE THE CAUSE OF NON-CONFORMITY AND PROPOSE RECOMMENDATION

FORM	FORM NO.: F-060-05 PAGE: 1 of 1 ISSUE: 2.0 REV. 00 DATE: 30/06/2016

LIST OF COMPONENT / EQUIPMENT / BOUGHT OUT ITEMS REQUIRING QUALITY PLAN APPROVAL and QAP SUBMISSION SCHEDULE

Sr. No.	Main Item	Components / Sub-Components	Quality Plan No.	Quality Plan Submission date	Quality Plan Category	Whether supplied by Contractor / his sub-vendor / Bought Out Item.
(1)	(2)	(3)	(4)	(5)	(6)	(7)

Note: -

- 1) In case the component / Item is being supplied by Contractor having multi Units / Works, please also indicate the place of manufacture in Column (7).
- 2) The proposal of bidder for detailing / listing of Quality Plan shall be as per bidder's best quality practices and Quality Assurance Test Requirement (QATR) given elsewhere in the technical specification. The items requiring the quality plan approval shall necessarily be included in Billing Break-up (BBU).
- 3) Quality plan category indicated at Column (6) shall be categorized and proposed by bidder as per the following on the basis of Quality Assurance Test Requirement (QATR) given elsewhere in technical specification and shall be mutually agreed with SAPDC/Consultant prior to placement of award
 - i) Category "I" - Quality Plan approved by SAPDC/Consultant and material accepted on the basis of physical inspection / TC review / Certificate of compliance, as identified in Quality Assurance Plan.
 - ii) Category "II" - Quality Plan approved by main contractor and material accepted on the basis of Certificate of Compliance (COC) issued by main contractor.
- 4) The items subsequently identified in detailed engineering or in approved Billing Break-up, but not appearing in the list shall be added in the same manner during post award stage.

Date:

Signature with Seal

Place:

Name & Designation

FORM	FORM NO.: F-060-06 PAGE: 1 of 1 ISSUE: 2.0 REV. 00 DATE: 30/06/2016

INSPECTION CALL REQUEST

Inspection Call No.		Date:				
Project:		Contract No. :				
Contractor/Supplier's Name & Address:		Sub-vendor/Sub-Supplier's Name & Address:				
Contact Person:		Contact Person:				
Telephone/Mobile No.:		Telephone/Mobile No.:				
Fax No.		Fax No.				
email ID:		email ID:				
Details of Equipment with Unit No.:						
Sr. No.	Equipment/Item Description and Sr. No.	Unit No.	BBU Ref.	QAP No. & Rev. No.	Relevant QAP Clause No.	Approved Drawing No. & Rev. No.
Status of Type Tests		Approved / Not Approved / Not Applicable		Place of Inspection:		
Proposed date of Inspection:				Anticipated Working Days Required		
Status of internal inspection by Vendor/sub-vendor		Completed <input type="checkbox"/>	In-progress <input type="checkbox"/>		Yet to be done <input type="checkbox"/>	
Tentative date of completion of internal inspection in case inspection is in-progress/yet to be done:						
Note: Readiness status is to be submitted separately after completion of internal inspection by Manufacturer.						

Date:
Place:

Signature
Name
Designation
Department
Company

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	FORM	

ATTACHMENT - 13
CHECK LIST FOR DOCUMENT SUBMISSION BY BIDDER WITH REGARD TO
QUALITY ASSURANCE PROGRAMME

BIDDER'S NAME & ADDRESS:

To
SAPDC PVT. LTD.
NEPAL

DEAR SIRs,

WE HEREBY CONFIRM THAT WE WILL FOLLOW THE QUALITY ASSURANCE PROGRAMME (CONTAINING OVERALL QUALITY MANAGEMENT AND PROCEDURES), AS PROVIDED IN THE BID DOCUMENTS AND ALL RELEVANT DETAILS / DOCUMENTS REQUIRED TO BE SUBMITTED ALONGWITH THE BID AS PER **CL. NO. 1.20** OF GENERAL TECHNICAL SPECIFICATION.

SR NO.	DOCUMENT DESCRIPTION	SUBMITTED (YES / NO)
1	ORGANISATION STRUCTURE FOR THE MANAGEMENT AND IMPLEMENTATION OF THE PROPOSED QUALITY ASSURANCE PROGRAMME	
2	QUALITY SYSTEM MANUAL	
3	DESIGN CONTROL SYSTEMS	
4	DOCUMENTATION AND DATA CONTROL SYSTEMS	
5	QUALIFICATION/EXPERIENCE OF BIDDER'S KEY PERSONNEL.	
6	PROCEDURE FOR PURCHASE OF MATERIAL, PARTS, COMPONENTS AND SELECTION OF SUB-VENDOR'S SERVICES INCLUDING VENDOR ANALYSIS, SOURCE INSPECTION, INCOMING RAW-MATERIAL INSPECTION, VERIFICATION OF MATERIALS PURCHASED, ETC.	
7	SYSTEM FOR SHOP MANUFACTURING AND SITE ERECTION CONTROLS INCLUDING PROCESS, FABRICATION AND ASSEMBLY.	
8	CONTROL OF NON-CONFORMING ITEMS AND SYSTEM FOR CORRECTIVE ACTIONS AND RESOLUTION OF DEVIATIONS.	
9	CONTROL OF CALIBRATION AND TESTING OF MEASURING / TESTING EQUIPMENT.	
10	SYSTEM FOR QUALITY AUDITS.	
11	SYSTEM FOR IDENTIFICATION AND APPRAISAL OF INSPECTION STATUS.	
12	SYSTEM FOR AUTHORISING RELEASE OF MANUFACTURED PRODUCT TO THE PURCHASER.	
13	SYSTEM FOR TRANSPORTATION /DELIVERY, HANDLING, STORAGE AND PRESERVATION.	
14	SYSTEM FOR MAINTENANCE OF RECORDS.	

Prepared By:	Reviewed By:	Approved By:
		Process Owner

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I HEREBY CONFIRM THAT GENERAL QUALITY ASSURANCE REQUIREMENTS AND QUALITY ASSURANCE TEST REQUIREMENTS (QATRs) HAVE BEEN READ IN DETAIL AND SAME ARE *ACCEPTED / ACCEPTED WITH DEVIATIONS MENTIONED IN SCHEDULE FOR DEVIATION.

Date:

Signature with Seal

Place:

Name & Designation

NOTE:

*Strike whichever is not applicable

Prepared By:	Reviewed By:	Approved By: Process Owner
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Annexures

Annex.-I

**List of Documents to be submitted along with Bid as per the Technical Specifications
(Clause No. 1.6.0)**

Sr. No.	Documents
1.	Basic Design calculations/ General arrangement drawings
2.	Estimated weights
3.	Hoist capacity calculations
4.	Completion schedule on Primavera software Programme.
5.	Erection methodology
6.	List of erection equipment/cranes etc.
7.	Detail of sub-vendors (on Annex.-IV)
8.	Manufacturing Quality Assurance Plans and Field Quality Assurance Plans

The above list of documents is not exhaustive, however the bidder shall have to submit the documents as per relevant clauses of bid documents and as advised by the employer.

(Signature of Bidder)

Item Wise Schedule of Submission of Design Calculations, Drawings, Supply, Erection, Testing & Commissioning

EXPECTED DATE OF PLACEMENT OF ORDERS: By _____
Date Month Year

A) SUBMISSION OF DESIGN & DRAWINGS FOR APPROVAL

- i) 50T EOT Crane By _____
- ii) 5T EOT Crane By _____
- iii) TRT Gates By _____
- iv) Hydraulic Hoists By _____
- v) Bulkhead By _____
- vi) Intake Gates By _____
- vii) Rope Drum Hoists By _____
- viii) Submersible Slurry Pump By _____
- ix) Monorail Crane By _____

B) APPROVAL OF DESIGN AND DRAWINGS

Approval of design and drawings will be communicated within 30 days of the receipt of complete submission of drawings and designs for the above four groups subjected to the conditions that the designs and drawings are complete and self explanatory in all respects, otherwise it shall be governed by the relevant clause of the tender document. However, the approval shall not in any way relieve the manufacturer of his responsibility for correct design, fabrication, erection & performance of equipment.

C) SUPPLY AND ERECTION

a) Supply

- i) 50T EOT Crane By _____
- ii) 5T EOT Crane By _____
- iii) TRT Gates By _____
- iv) Hydraulic Hoists By _____
- v) Bulkhead By _____
- vi) Intake Steel Gratings By _____
- vii) Intake Gates By _____
- viii) Rope Drum Hoists By _____
- ix) Submersible Slurry Pump By _____
- x) Monorail Crane By _____

b) Erection, Testing & Commissioning

- | | | |
|-------|-------------------------|----------|
| i) | 50T EOT Crane | By _____ |
| ii) | 5T EOT Crane | By _____ |
| iii) | TRT Gates | By _____ |
| iv) | Hydraulic Hoists | By _____ |
| v) | Bulkhead | By _____ |
| vi) | Intake Steel Gratings | By _____ |
| vii) | Intake Gates | By _____ |
| viii) | Rope Drum Hoists | By _____ |
| ix) | Submersible Slurry Pump | By _____ |
| x) | Monorail Crane | By _____ |

D) Total Contract Period

w.e.f _____ to _____

NOTES:

- 1) The erection work shall be in phases as indicated above.

(SIGNATURE OF BIDDER)

**List of Deviations from Technical Specifications
(To be furnished by the Bidders)**

Sr. No. 1	Clause No. 2	Deviation 3	Remarks/Justifications 4

(Signature of Bidder)

References

Following publications referred to in the Bidding document for designation only, form a part of these specifications.

DIN-19704	Hydraulic Steel structures criteria for Design and Calculation
DIN-17440	Technical delivery conditions for stainless steel plates, hot rolled strip, and bars for pressure purposes, drawn wires and forgings.
DIN- 17100	Steel for general structure purpose Quality Standard
IS 28: 1985	Phosphor bronze ingots and castings (fourth revision)
IS 305: 1981	Aluminum bronze ingots and castings (second revision)
IS 318: 1981	Leaded tin bronze ingots and castings (second revision)
IS 12615: 2011	Energy Efficient induction motors-Three Phase Squirrel Cage (second revision)
IS 456:1978	Code of Practice for plain and Reinforced concrete (third revision) with amendment No.1
IS 800: 1984	Code for practice for general construction in steel (second revision)
IS 807:1976	Code of practice for design, manufacture, erection and testing (structural portion) of cranes and hoists (first revision)
IS 808 (Part 1) 1989	Dimension for hot rolled steel beams column, angle sections.
IS 900:1992	Code of practice for installation and maintenance of induction motors (second revision)
IS 1028:1987	Silicon bronze ingots and castings (second revision)
IS 1030:1982	Carbon steel castings for general Engineering purposes (third revision)
IS 1231:1974	Dimensions of three-phase foot-mounted induction motors (third revision) (Amendments 4)
IS 1239 (Part I)1990	Mild steel tubes, tubular and other wrought steel fittings: Part 1 mild steel tubes (fifth revision)
IS 1239 (2): 1991	Mild steel tubes, tubular and other wrought steel fittings: Part 2 Mild steel

tubular and other wrought steel pipe fittings (third revision)

IS 1363 (Part 1): 1984	Hexagon head bolts, screws and nuts of product grade C: Part 1 Hexagon head bolts (size range M5 to M36)
IS 1363 (Part 2) : 1984	Hexagon head bolts, screws and nuts of product grade C: Part 2 Hexagon head screws (size range M5 to M36) (second revision)
IS 1363 (Part 2) : 1983	Hexagon head bolts, screws and nuts of product grade C: Part 3 Hexagon nuts (size range M5 to M36) (second revision)
IS 1364 (Part 1) : 1983	Specification for Hexagon Head Bolts, screws and nuts of product grade A and B: Part 1 Hexagon head bolts (size range M3 to M36) (second revision)
IS 1364 (Part 2) : 1983	Specification for Hexagon Head Bolts, screws and nuts of product grade A and B: Part 2 Hexagon screws (size range M3 to M36) (second revision)
IS 1364 (Part 3)	Hexagon head bolts, screws and nuts of product grades A&B: Part 3 Hexagon nuts (Size range M1.6 to M36).
IS 1364 (Part 4)	Hexagon head bolts, screws and nuts of product grades A&B: Part 4 Part 4 Hexagon thin nuts (Chamfered) (size rouge M1.6 to M10)
IS 1364 (Part 5)	Hexagon head bolts, screws and nuts of product grades A&B: Part 5 Hexagon thin nuts (un chamfered) (size rouge M1.6 to M10)
IS 1367 (Part 1) : 1980	Technical supply conditions for threaded steel fasteners, Part 1, introduction and general information (second revision)
IS 1367 (Part 2) :1979	Technical supply conditions for threaded steel fasteners, Part 2, product grades and tolerances (second revision)
IS 1367 (Part 3) : 1991	Technical supply conditions for threaded steel fasteners, Part 3, mechanical properties and test methods for bolts, screws and studs with full loadability (second revision) (with amendment No.1)
IS 1367 (Part 5) : 1980	Technical supply conditions for threaded steel fasteners, Part 5, mechanical properties and test methods for setscrews and similar threaded fasteners not under tensile stresses.
IS 1367 (Part 6) : 1980	Technical supply conditions for threaded steel fasteners, Part 6, mechanical properties and test methods for nuts with specified proof loads (second revision)

IS 1367 (Part 7) : 1980	Technical supply conditions for threaded steel fasteners, Part 7, mechanical properties and test methods for nuts without specified proof loads (second revision)
IS 1367 (Part 9) : 1980	Technical supply conditions for threaded steel fasteners, Part 9, surface discontinuities on bolts, screws and studs (second revision)
IS 1367 (Part 10) : 1980	Technical supply conditions for threaded steel fasteners, Part 10, surface discontinuities on nuts (second revision),
IS 1367 (Part 12) : 1981	Technical supply conditions for threaded steel fasteners, Part 12, phosphate coatings on treaded fasteners.
IS 1367 (Part 13) : 1983	Technical supply conditions for threaded steel fasteners, Part 13, Hot dip galvanized coatings on threaded fastener (second revision)
IS 1367 (Part 14) : 1984	Technical supply conditions for threaded steel fasteners, Part 14, stainless steel threaded fasteners (second revision)
IS 1367 (Part 16) : 1979	Technical supply conditions for threaded steel fasteners, Part 16 Designation system and symbols (first revision)
IS 1367 (Part 18) : 1979	Technical supply conditions for threaded steel fasteners, Part 18 Making and mode of livery (second revision)
IS 1458: 1965	Railway bronze ingots and casting (revised) (amendments 4)
IS 1570 (Part 5) : 1985	Schedule for wrought steels: part 5 stainless and heat resisting steels, (Second revision).
IS 1608:1972	Method of tensile testing of steel products (first revision) (Amendment. 1)
IS 1875:1992	Carbon steel billets, blooms, slabs and bars for forging (fifth revision).
IS 1893:1984	Criteria for earthquake resistant design of structures (fourth revision) (amendment 1)
IS 2002:1982	Steel plates for pressure vessels for intermediate and high temperature service including boilers (first revision) (amendment 1)
IS 2004: 1991	Carbon steel forging for general engineering purposes (third revision)
IS 2048:1983	Parallel keys and keyways (second revision) (amendment 1)

IS 2062:1992	Steel for general Structural purposes - Specifications
IS 2147:1962	Degrees of protection provided by enclosures for low voltage switch gear and control gear
IS 2223:1983	Dimensions of flange mounted ac induction motors (first revision) (amendments 2)
IS 2266:1989	Steel, wire ropes for general engineering purpose (third revision)
IS 2291:1990	Tangential keys and keyways (third revision)
IS 2292: 1974	Taper keys and keyways (first version)
IS 2365:1977	Steel wire suspension ropes for lifts, elevators and hoists (first revision)
IS 2485:1979	Drop forged sockets for wire ropes for general engineering purpose (first revision)
IS 2516 (Part 1 / Sec1): 1985	Circuit breakers: Part 1 Requirements and tests, Section 1 voltage not exceeding 1000V ac or 1200 V DC 9second revision)
IS 2516 (Part 1 /Sec2): 1980	Circuit breakers: Part 1 Requirement and tests, Section 2 for voltage above 1000V ac (first revision)
IS 2516 (Part 2/ Sec2): 1980	Circuit breakers: Part 2 Rating section 2: for voltage above 1000 V ac (first revision)
IS 2516 art3/Sec2) : 1980	Circuit breakers: Part 3 Design and construction, section 2 for voltage above 1000 V ac (first revision).
IS 2516 art4/Sec2) : 1980	Circuit breakers: Part 4 Type tests and routine tests, section 2 for voltage above 1000 V ac (first revision)
IS 2516 art5/Sec2) : 1980	Circuit breakers: Part 5 information to be given with enquiries, tenders and orders and rules for transport erection and maintenance section 2 for voltage above 1000 V ac (first revision)
IS 2595:1978	Code of practice for Radiographic testing.
IS 2825:1969	Code for unfired pressure vessels (amendments 5)
IS3177: 1999	Code of practice for electric overhead travelling cranes and gantry cranes other than steel work cranes (first revision)

IS: 3658:1981	Code of practice for liquid penetrant flaw detection
IS: 3664:1981	Code of practice for Ultrasonic pulse echo testing by contact and immersion methods.
IS 3681:1966	General plan for spur and helical gears
IS 3703:1980	Code of Practice for Magnetic Particle Flaw detection.
IS 4058:1967	Accuracy requirements for coarse quality low speed gears.
IS 4460:1967	Method for rating of machine cut spur and helical gears (amendments 2)
IS 4702:1968	Accuracy requirements for high precision gears
IS 4715:1968	Excavators dental, No. Ex ½,3/4,5/6,7/8, 9/10,11/12 and 13/14.
IS 5669:1987	General plan of boundary dimensions for radial rolling bearings (first revision) (ISO Title: Rolling bearing –Radial bearing-Boundary dimensions-General plan)
IS 5692:1988	Tolerances for radial rolling bearings (first revision)
IS 5932:1970	Boundary dimensions for thrust ball bearings with flat seats.
IS 5933:1970	Tolerances for thrust ball bearings with flat seats.
IS 6623:1985	High strength structural nuts (first revision) (amendment 1)
IS 11855:2004	Guidelines for Design and Use of Different Types of Rubber Seals for Hydraulic Gates
IS 6938:1989	Code of practice for design of rope drum and chain hoists for hydraulic gates (first revision)
IS 7307 art1):1974	Approval test for welding procedures: Part 1 fusion welding of steel
IS 7310 (Part 1) : 1974	Approval test for welders working to approved welding procedures: Part 1 fusion welding of steel.
IS 7318:1974	Approval tests for welders when welding procedure approval is not required
IS 9968: (Part 1)	Elastomer in insulated Cables Part I for working voltage upto and including

1100V.

IS 9968: (Part 2)	Elastomer in insulated Cables Part 2 for working voltage from 3.3 KV upto and including 11KV.
IS 8130:1984	Conductors for insulated electric cables and flexible cords (first revision)
IS 12843:1989	Tolerances for erection of steel structures.
IS 4622:2003	Recommendations for Structural Design of Fixed-Wheel Gates
IS 4623:2000	Recommendations for Structural Design of Radial Gates
IS 5620: 1985	Recommendations for Structural Design Criteria for Low Head Slide Gates
IS 9349:1986	Recommendation for structural design of medium and high head slide gates (first revision)
IS 13053:1991	Hydraulic fluid power system - Commissioning and maintenance of complete hydraulic systems – Recommendations
IS 7718:1991	Recommendations for inspection, testing and maintenance of fixed wheel and slide gates.
IS 10210:1993	Criteria for Design of Hydraulic Hoists for Gates
ASME Code ivn.1 Section –VIII-I	Boiler and Pressure Vessel Code.
ANSI-B.1.1	Unified Inch Screw Threads.
ANSI B16-11	Steel Pipe Flanges and Flanged Fittings.
ANSI-B 15-11	Forged Steel, Fittings, Socket welding and Threaded.
ANSI B-93.18	Non-Integral Industrial Fluid Power Hydraulic Reservoir.
ANSI 1/NFPA.70	National Electrical Code.
ANSIC 37.90a	Standard Relays and Relays system Associated with Electrical Power Apparatus.
ASME Code LOS- 5C1,ASTM-SME	Recommended Practices for the Flushing and cleaning of Oil Systems for Lubrication and control of Hydro-Electric Equipment

ASTM A-7/A27M	Specifications for steel castings, carbon for General Applications.
ASTM A-6/A36M	Specifications for Structural Steel.
ASTM A 123	Specifications for Zinc (Hot Dip Galvanized) coating for Iron and Steel Hardware.
ASTM A 153	Specifications for Stainless and Heat Resisting Bars and Shapes.
ASTM A 276	Specification for Stainless and Heat Resisting Bars and Shapes.
ASTM A 325	Specification for High Strength Bolts for Structural Steel Joints.
ASTM A 490	Specification for Heat Treated Structural Bolts. 150 Kasi (1035 Mpa) Tensile Strength.
ASTM A 564	Specifications for Hot Rolled and Cold Finished Age Hardening. Stainless and Heat Resisting Steel Bars, Wires and Shapes.
ASTM A572M	Specification for High Strength, Low Alloy Columbium – Vanadium Steel of Structural Quality.
JIC Standards	Hydraulic Standards for Industrial Equipments.
NAS 1638	Cleanliness requirements of Parts used in Hydraulic Systems.
ASTM A 668	Specifications for Steel Forgings, Carbon Alloy for general industrial use.

SJVN ARUN-3 POWER DEVELOPMENT CO. (P) LTD.

A company promoted by SJVN Ltd., a joint venture of Govt. of India and Govt. of HP



ARUN-3 HYDRO ELECTRIC PROJECT (900 MW)

DISTT. SANKHUWASABHA, NEPAL

PACKAGE C-6

HYDRO-MECHANICAL WORKS - TRT GATES AND ASSOCIATED EQUIPMENT FOR ARUN-3 HEP AND ASSOCIATED EQUIPMENT FOR LOWER ARUN HEP IN SANKHUWASABHA DISTT. OF NEPAL

TENDER NO. DCB-P&C-AHEP-HM-C-6/2023-94

VOLUME IV

TENDER DRAWINGS

TUMLINGTAR, NEPAL

FEBRUARY, 2023

CLASSIFICATION	SYMBOLS & ABBREVIATIONS
MILLIMETRE	mm
CENTIMETRE	cm
METRE	m
KILOMETRE	km
KILOGRAM	kg
SECOND	s
MINUTE	min
HOUR	hr
ACTUAL LENGTH	L
EFFECTIVE LENGTH	l
TONNE	T
TEMPERATURE IN DEGREE CELSIUS	°C
KILOVOLT	kv
MEGAWATT	MW
SJVN ARUN-3 POWER DEVELOPMENT COMPANY PVT. LTD. DRAWING	SAPDC Drg
CONCRETE MIX OF 20 N/mm2 COMPRESSIVE STRENGTH	M 20
CONCRETE MIX OF 25 N/mm2 COMPRESSIVE STRENGTH	M 25
CONCRETE MIX OF 30 N/mm2 COMPRESSIVE STRENGTH	M 30
MILD & MEDIUM TENSILE STEEL BARS	MS
COLD TWISTED DEFORMED BARS OF STEEL	CTD
REINFORCED CEMENT CONCRETE	RCC
LEAN CEMENT CONCRETE	LCC
PLAIN CEMENT CONCRETE	PCC
FOR EXAMPLE	e.g.
POLY VINYL CHLORIDE	PVC
MACHINE	M/C
CENTRE LINE	☉
AT THE RATE OF	@
LENGTH OF CURVE	R
TANGENT LENGTH	TL
RADIUS OF CURVE	R
ZERO DEGREE	0°
GENERAL	GE
PRESSURE SHAFT	PS
FULL RESERVOIR LEVEL	FRL
MAXIMUM WATER LEVEL	MWL
MAXIMUM SURGE LEVEL	MSL
TAIL RACE TUNNEL	TRT
HEAD RACE TUNNEL	HRT
BUREAU OF INDIAN STANDARDS	BIS
INDIAN STANDARDS INSTITUTION	ISI
INDIAN STANDARD CODES PUBLISHED BY BIS	IS
CENTRAL WATER COMMISSION	CWC
CENTRAL ELECTRICITY AUTHORITY	CEA
TUNNEL INVERT LEVEL	TIL
CENTRE TO CENTRE	C/C
ARUN 3 HYDRO ELECTRIC PROJECT	AHEP
LOWER ARUN HYDRO ELECTRIC PROJECT	LAHEP
NEWTON	N
DIAMETER	∅
ELEVATION ABOVE MEAN SEA LEVEL	EL.
INDIAN STANDARD HEAVY BEAM	ISHB
NET POSITIVE SUCTION HEAD	NPSH
SPECIFIC SPEED	NS
REVOLUTION PER MINUTE	rpm

CLASSIFICATION	SYMBOLS & ABBREVIATIONS
INDIAN STANDARD MEDIUM BEAM	ISMB
INDIAN STANDARD LIGHT BEAM	ISLB
MILD STEEL PLATE	M.S.PLATE
ROLLED STEEL JOIST	RSJ
DOWN STREAM	D/S
UP STREAM	U/S
NATIONAL HIGHWAY	N.H.
TUNNEL OVERT LEVEL	T.O.L.
REDUCED DISTANCE	R.D.
GEOLOGICAL SURVEY OF INDIA STATION	G.S.I. STA OR sta.
NORMAL FLOOD LEVEL	N.F.L.
HIGH FLOOD LEVEL	H.F.L.
INTERNATIONAL SYSTEM OF UNITS	S.I.units
MAIN INLET VALVE	M.I.V.
MINIMUM TAIL WATER LEVEL	MIN.T.W.L.
DRAFT TUBE	D/T
POWER HOUSE	P.H.
MINIMUM	Min.
THICK	TH.
BRINELL HARDNESS NUMBER	B.H.N
HORSE POWER	H.P
FLOW	→ OR →
NORTH	— Z →
DEFLECTION ANGLE	∇
BEND	⤵
FILLET WELD	⌒
SQUARE BUTT WELD	∩
SINGLE V-BUTT WELD	∇
DOUBLE V-BUTT WELD	⋈
SINGLE U- BUTT WELD	∩
DOUBLE U- BUTT WELD	⋈
BACKING STRIP	=
SEAM	xxx
ROUGHNESS FROM 25 µm TO 12.5µm	∇
ROUGHNESS FROM 6.3 µm TO 1.6 µm	∇∇
ROUGHNESS FROM 0.8 µm TO 0.2 µm	∇∇∇
DEGREE MINUTES SECONDS	0° ' " "
ANGLE	θ
PERCENTAGE	%
SLOPE	1 4 S →
HEIGHT	ht.
NUMBER	No. no
INSIDE, OUTSIDE DIAMETER	ID,OD
MIN. DRAW DOWN LEVEL	M.D.D.L.
NATURAL SURFACE LEVEL	N.S.L.
MILE STONE	Ⓜ
INDIAN STANDARD ANGLE	I.S.A.
LITRE PER SECOND	LPS
CUBIC METRE PER HOUR	m3/hr
SPEED	n
HEAD	H
WIDTH	w
KINEMATIC VISCOSITY	v (nu)
SPECIFIC WEIGHT	γ
EFFICIENCY	η
BEND TO SHAPE	BTS
CUT TO SHAPE	CTS

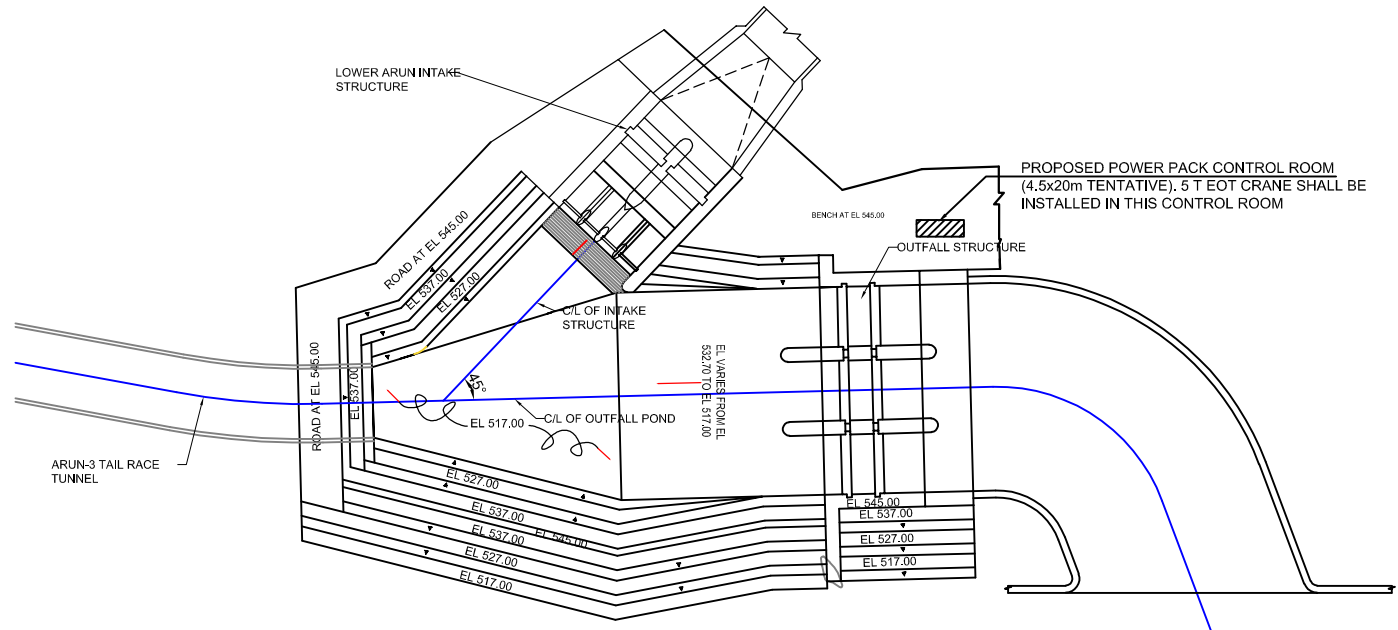
CLASSIFICATION	SYMBOLS
EARTH SURFACE	
ROCK SURFACE	
CENTRE LINE	
BREAK OF SECTION	
ROAD	
SECOND STAGE CONCRETE IN SECTION	
FIRST STAGE CONCRETE IN SECTION	
RIVER & NALLAHS (CREEK)	
RETAINING WALL	
CROSSING POINT	
STONE PITCHING	
SECOND STAGE CONCRETE	
NARROW GAUGE RAILWAY TRACK	
BROAD GAUGE RAILWAY TRACK	

NOTE:-

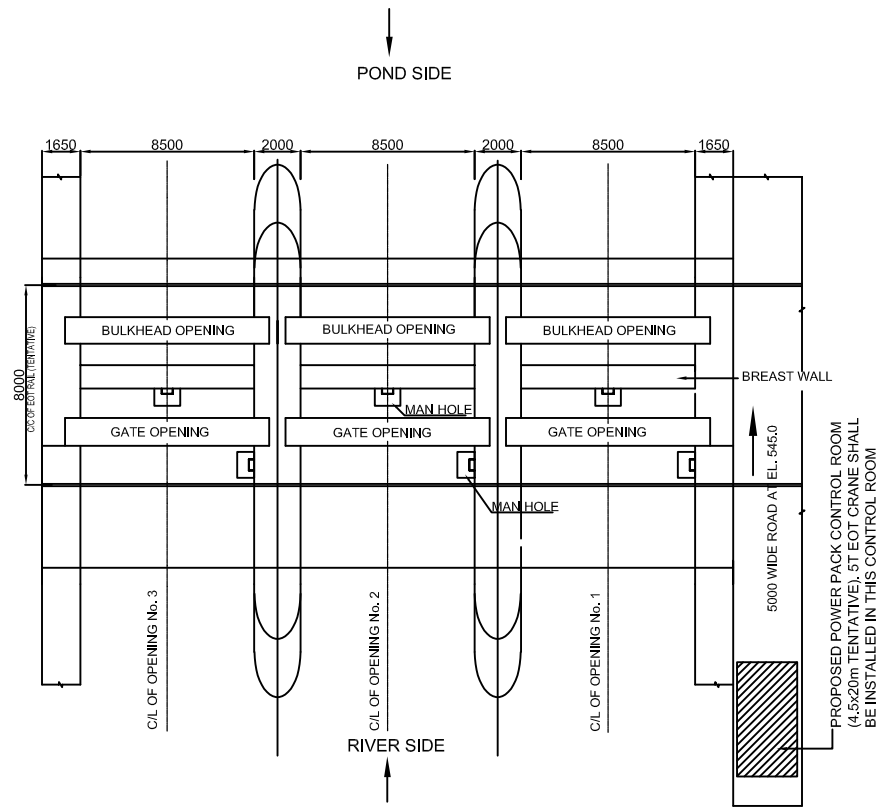
1. THIS DRAWING INDICATES VARIOUS SYMBOLS AND LEGENDS SHOWN IN THE SPECIFICATION DRAWINGS.

SPECIFICATION DRAWING ONLY
NOT TO BE USED FOR CONSTRUCTION

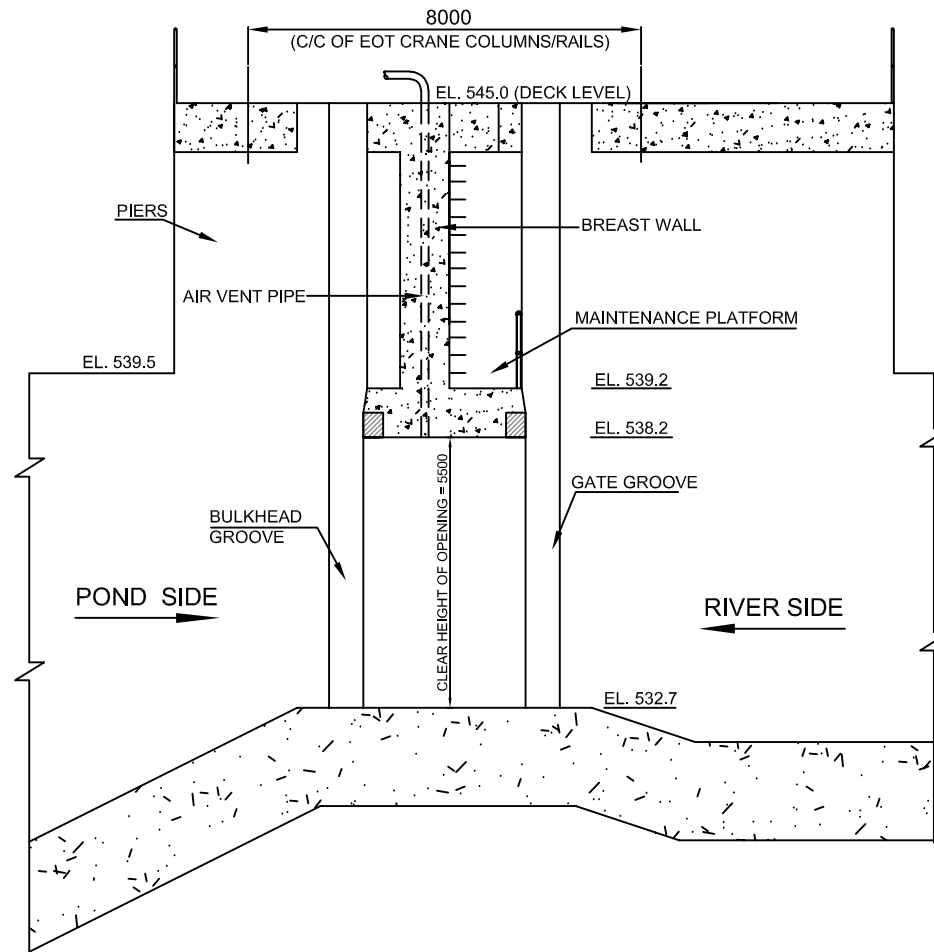
एसएपीडीसी प्रा० लिमिटेड SAPDC PVT. LIMITED		
CONSULTANT: SJVN LIMITED		
लोअर अरुण जल विद्युत परियोजना LOWER ARUN HYDROELECTRIC PROJECT		
SYMBOLS & ABBREVIATIONS		
डिजाइन DESIGN Er. GIRISH KANG (ENGINEER) ड्राफ्टिंग DRAWN(AUTOCAD) Mrs. CHAMPA BAKSHI (J.O. Plng.)	चेक किया CHECKED Er. MANOJ KUMAR (S.MANAGER) संशोधन RECD. Er. ARUN KUMAR (DGM)	अनुमोदित APPD. Er. RAJEEV AGGARWAL (CGM)
HYDROMECHANICAL DESIGN DEPTT., SHIMLA		
DRG. No. LA-HM-SA-S01	NOV, 2022	No. HM-



KEY PLAN SHOWING ARUN-3 HEP TRT OUTFALL STRUCTURE AND LOWER ARUN INTAKE



PLAN AT EL. 545
(TAILRACE OUTFALL STRUCTURE)



KEY ELEVATION SHOWING ARUN-3 HEP TRT OUTFALL STRUCTURE


NOTES:-

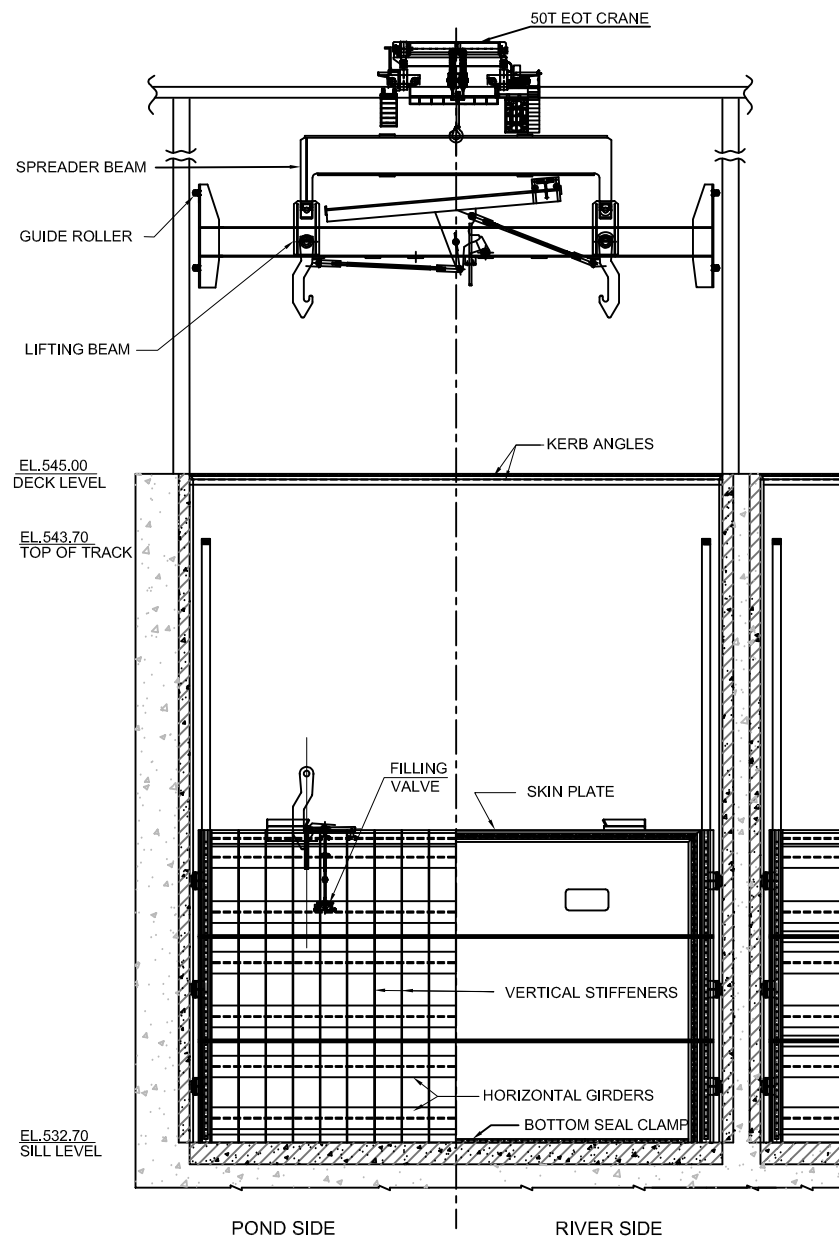
1. ALL DIMENSIONS ARE IN MILLIMETRES AND ELEVATIONS IN METRES UNLESS OTHERWISE SPECIFIED.
2. NO DIMENSION IS TO BE SCALED OUT, ONLY WRITTEN DIMENSIONS ARE TO BE TAKEN AS CORRECT.

SPECIFICATION DRAWING ONLY
NOT TO BE USED FOR FABRICATION

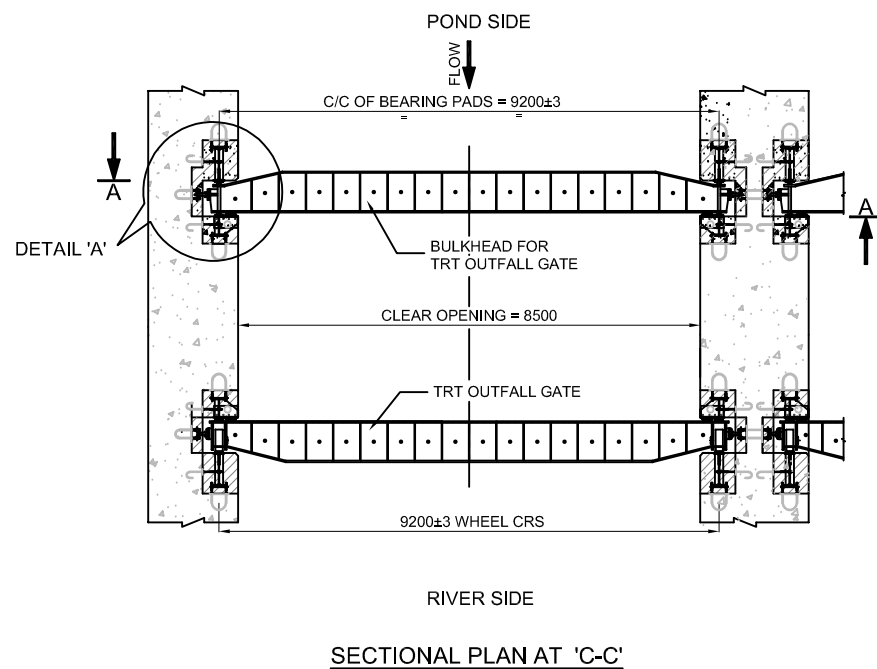
LEGENDS:-

- FIRST STAGE CONCRETE IN SECTION.....
- SECOND STAGE CONCRETE IN SECTION.....

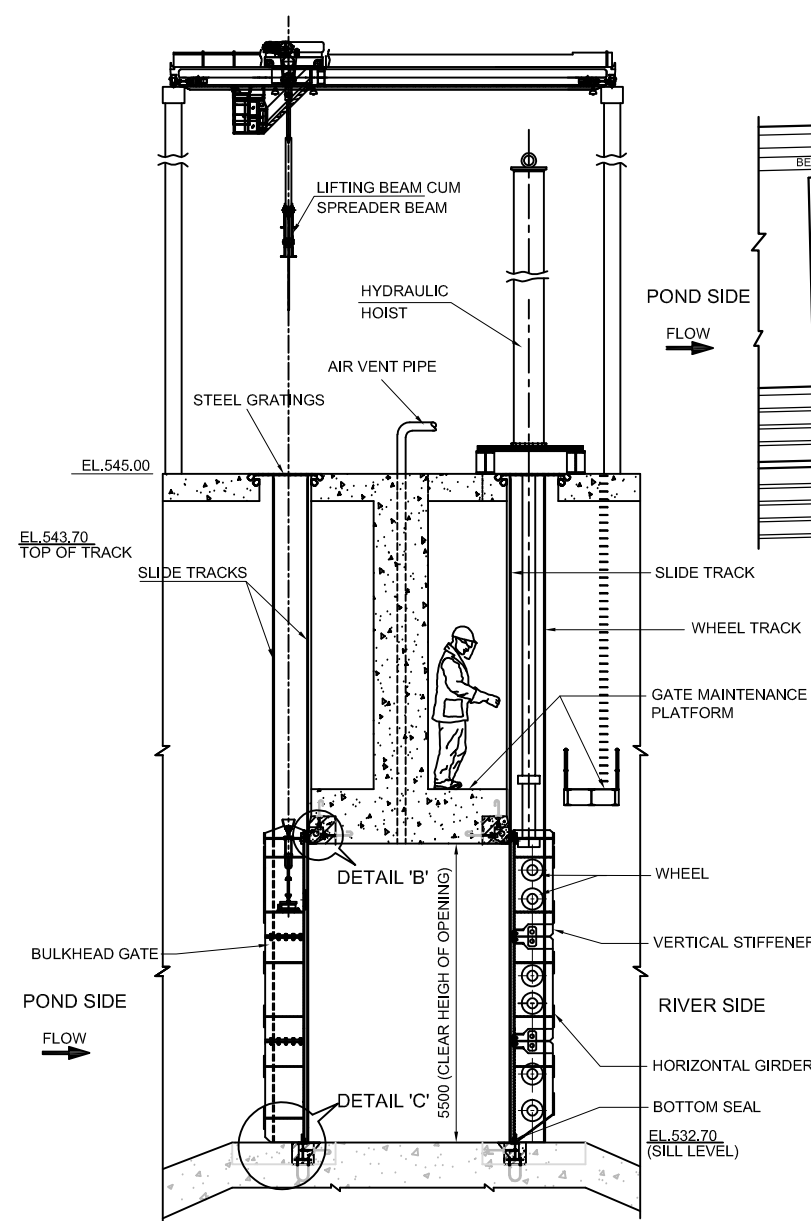
 एसएपीडीसी प्रा० लिमिटेड SAPDC PVT. LIMITED		
CONSULTANT: SJVN LIMITED		
अरुण 3 जल विद्युत परियोजना ARUN-3 HYDROELECTRIC PROJECT		
TRT OUTFALL STRUCTURE GENERAL LAYOUT & PLAN		
अभिकल्पित DESIGN Er. SANJEEV SHARMA (DGM)	संचालित CHECKED Er. MANOJ KUMAR (Sr. MANAGER)	अनुमोदित APPD. Er. RAJEEV AGGARWAL (CGM)
रेखांकित DRAWN(AUTOCAD) Ms. CHAMPA BAKSHI (J.O. Png.)	संशुद्ध RECD. Er. ARUN KUMAR (DGM)	
HYDROMECHANICAL DESIGN DEPTT., SHIMLA		
DRG. No. AH-HM-TRT-S30	NOV., 2022	No. HM-



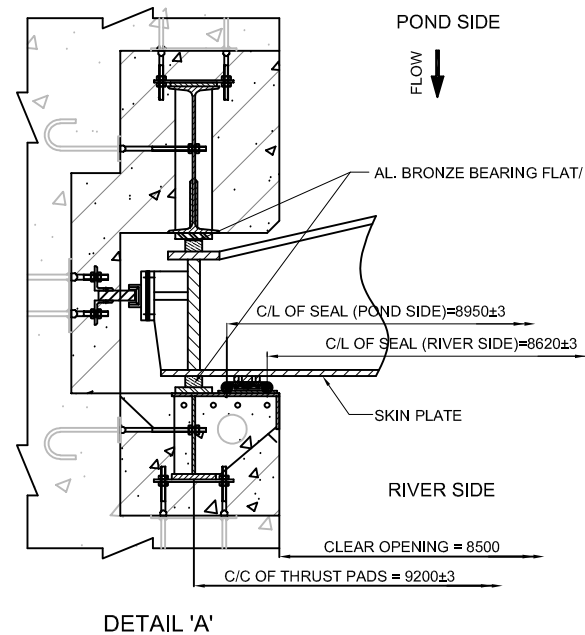
SECTIONAL ELEVATION 'A-A'
(BULKHEAD FOR TRT OUTFALL GATE)



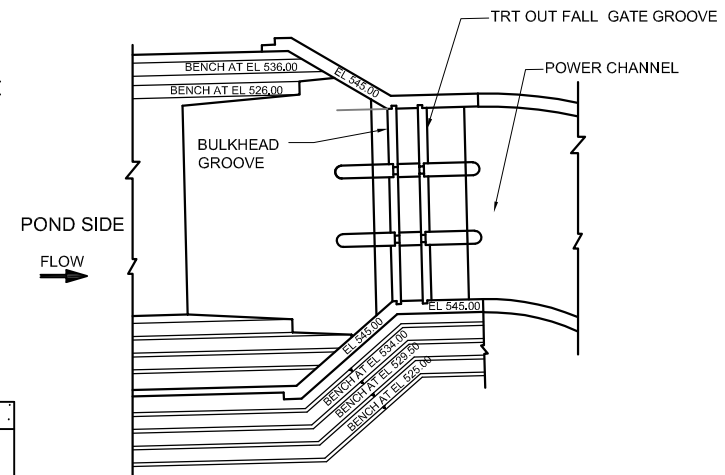
SECTIONAL PLAN AT 'C-C'



SECTION THROUGH C/L OF BAY



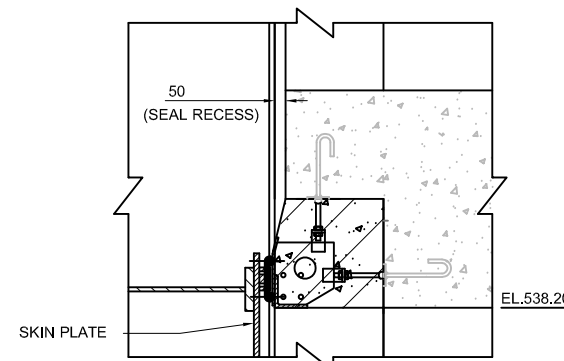
DETAIL 'A'



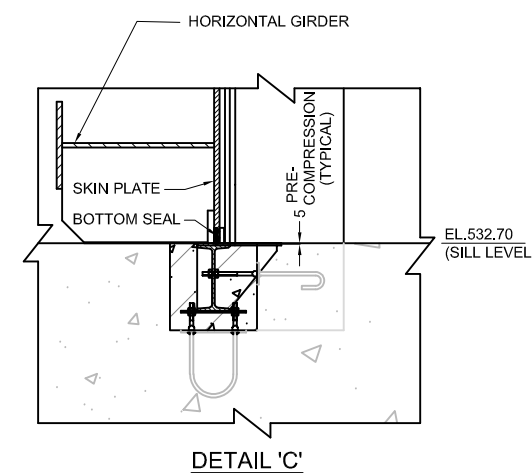
KEY PLAN

SALIENT FEATURES OF BULKHEAD :

- CLEAR WIDTH OF OPENING — 8500 mm.
- CLEAR HEIGHT OF OPENING — 5500 mm.
- No. OF OPENINGS — THREE
- No. OF GATES REQ. — ONE
- TYPE OF GATE — VERTICAL LIFT SLIDE TYPE.
- DESIGN HEAD — 12.3m
- TYPE OF HOIST — 50T EOT CRANE
- TYPE OF OPERATION:
 - LOWERING: UNDER BALANCED WATER HEAD CONDITIONS
 - CLOSING: UNDER BALANCED WATER HEAD CONDITIONS ACHIEVED THROUGH TWO NO. FILLING VALVES.



DETAIL 'B'



DETAIL 'C'

NOTES:-

- ALL DIMENSIONS ARE IN MILLIMETRES AND ELEVATIONS IN METRES UNLESS OTHERWISE SPECIFIED.
- NO DIMENSION IS TO BE SCALED OUT, ONLY WRITTEN DIMENSIONS ARE TO BE TAKEN AS CORRECT.
- No. OF OPENINGS FOR BULKHEAD = 3 (THREE).
- No. OF BULKHEADS REQUIRED = 1 (ONE).
- No. OF OPENINGS FOR TRT OUTFALL GATE = 3 (THREE).
- No. OF TRT OUTFALL GATES REQUIRED = 3 (THREE).
- THE BULKHEAD SHALL BE USED FOR MAINTENANCE OF TRT OUTFALL GATES AND SHALL BE OPERATED WITH THE HELP OF EOT CRANE.
- SINGLE CYLINDER DOUBLE ACTING HYDRAULIC HOIST SHALL BE PROVIDED FOR THE OPERATION OF TRT OUTFALL GATES.
- MINOR MAINTENANCE OF TRT OUTFALL GATES SHALL BE CARRIED OUT AT PLATFORM AT EL.539.70M AND FOR MAJOR MAINTENANCE, THE GATE SHALL BE LIFTED TO DECK LEVEL WITH THE HELP OF EOT CRANE.
- METHODOLOGY FOR DISMANTLING THE HYDRAULIC HOIST FOR LIFTING OF TRT GATES FOR CARRYING OUT MAINTENANCE AT DECK LEVEL SHALL BE DEVISED AND NECESSARY EQUIPMENT/ TOOLS AND TACKLES SHALL BE PROVIDED.
- BULKHEAD AND TRT OUTFALL GATES SHALL HAVE BOTH SIDE OF SEALING i.e. POND SIDE & RIVER SIDE.
- ALL FILLET WELDS SHALL BE CONTINUOUS AND MINIMUM OF 6mm SIZE UNLESS STATED OTHERWISE. ALL BEVEL AND BUTT WELDS SHALL BE FULL PENETRATION WELDS.
- SEALS SHALL BE CONTINUOUS AND WATER TIGHT.
- ALL CORNERS AND EDGES IN CONTACT WITH RUBBER SEALS AND WELDING SHALL BE SMOOTH AND ROUNDED MINIMUM RADIUS OF 6mm.

CONNECTED DRAWINGS:-

- TRT OUTFALL STRUCTURE- BULKHEAD & TRT OUTFALL GATE (SHEET 2 OF 2)


REFERENCE DRAWINGS:-

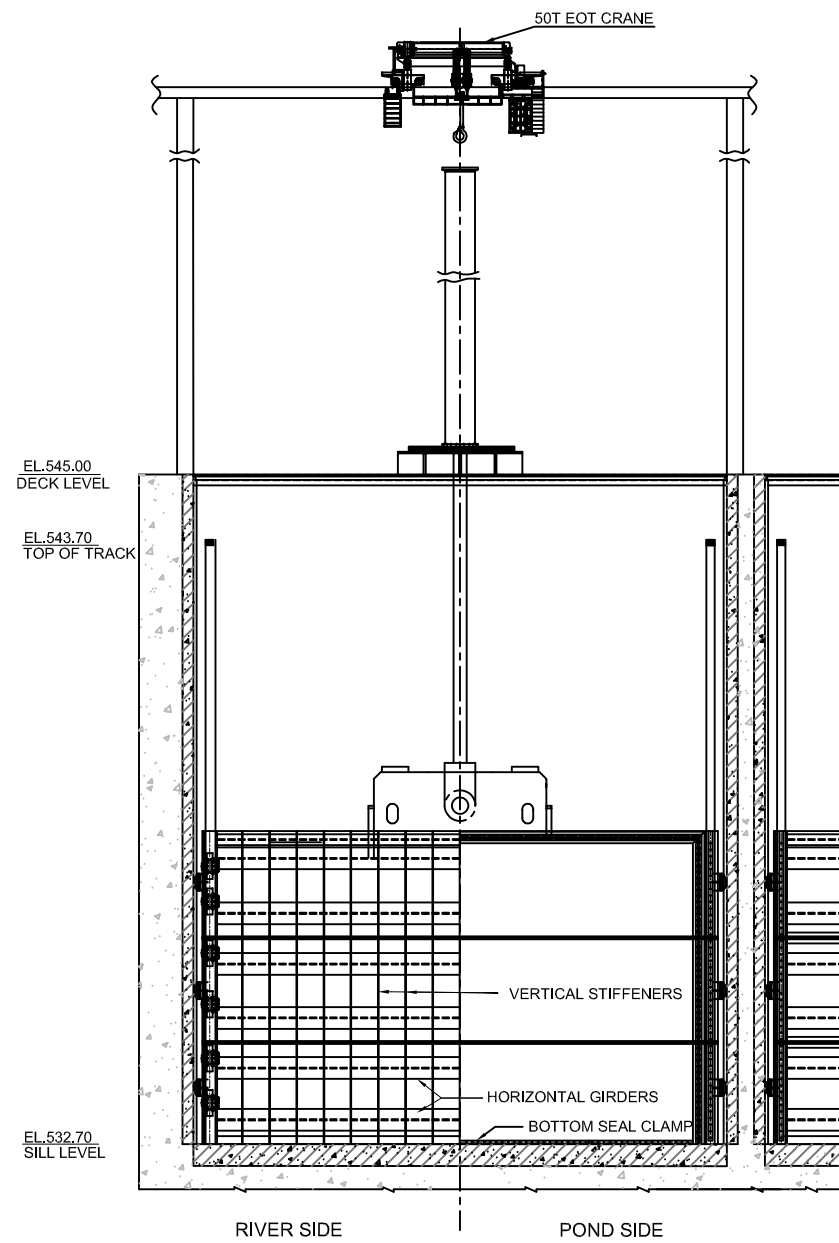
- TAILRACE OUTFALL POND, LAYOUT PLAN & SECTIONS.....DRG.No.TR-C2-AR3-C25

SPECIFICATION DRAWING
NOT TO BE USED FOR FABRICATION

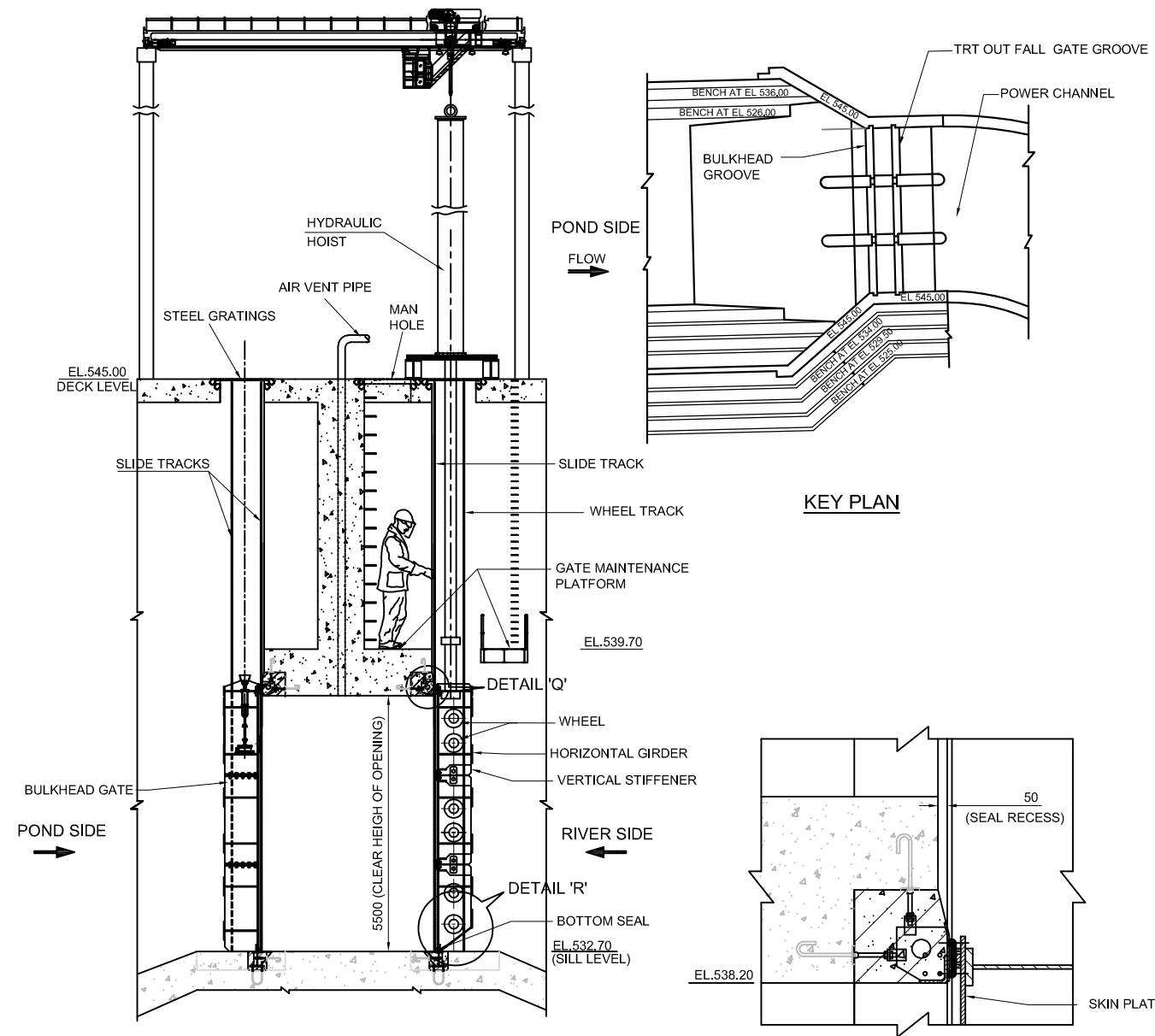
LEGENDS:-

- FIRST STAGE CONCRETE IN SECTION.....
- SECOND STAGE CONCRETE IN SECTION.....
- STEEL IN SECTION.....
- STAINLESS STEEL IN SECTION.....

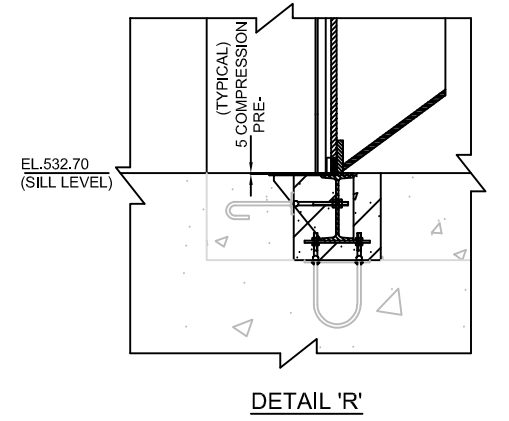
 एसएपीडीसी प्रा० लिमिटेड SAPDC PVT. LIMITED		
CONSULTANT: SJVN LIMITED		
अरुण 3 जल विद्युत परियोजना ARUN 3 HYDROELECTRIC PROJECT		
TRT OUTFALL STRUCTURE GENERAL ARRANGEMENT OF BULKHEAD & TRT OUTFALL GATE (SHEET 1 OF 2)		
अभिकल्पित DESIGN Er. SANJEEV SHARMA (DGM)	संचालित CHECKED Er. MANOJ KUMAR (Sr. MANAGER)	अनुमोदित APPD. Er. RAJEEV AGGARWAL (CGM)
HYDROMECHANICAL DESIGN DEPTT., SHIMLA		
DRG. No. AH-HM-TRT-S31	NOV., 2022	No. HM-



SECTIONAL ELEVATION 'B-B'
(TRT OUTFALL GATE)



SECTION THROUGH C/L OF BAY



SALIENT FEATURES OF TRT OUTFALL GATES :

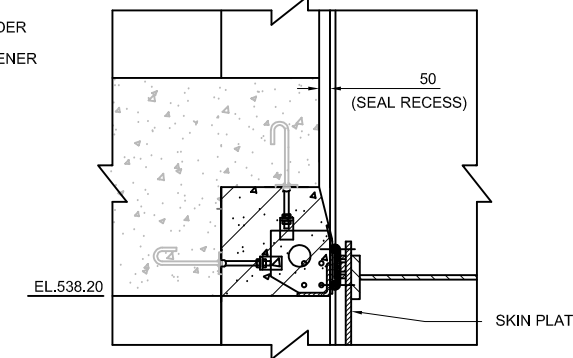
1. CLEAR WIDTH OF OPENING — 8500 mm.
2. CLEAR HEIGHT OF OPENING — 5500 mm.
3. No. OF OPENINGS — THREE
4. No. OF GATES REQ. — THREE
5. TYPE OF GATE — VERTICAL LIFT WHEELED CUM SLIDE TYPE.
6. DESIGN HEAD — 12.3m
7. TYPE OF HOIST — 55 T SINGLE CYLINDER DOUBLE ACTING HYDRAULIC HOIST
7. WORKING STROKE — 6850 MM (MIN.)
8. OPERATION — UNBALANCED HEAD (REGULATING TYPE)
9. OPERATING SPEED — 1.0 M/MIN.

CONNECTED DRAWINGS:-

1. TRT OUTFALL STRUCTURE- BULKHEAD & TRT OUTFALL GATE (SHEET 1 OF 2)

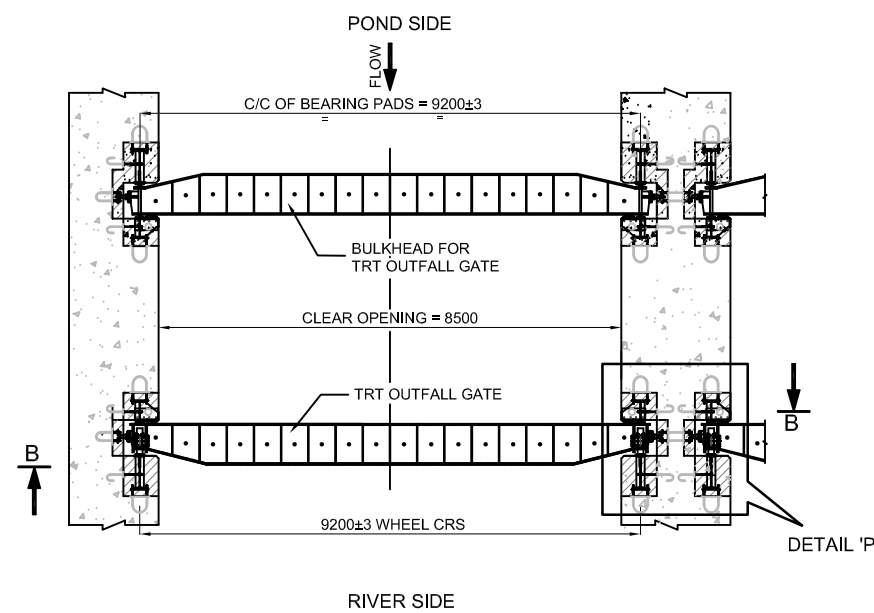
REFERENCE DRAWINGS:-

1. TAILRACE OUTFALL POND, LAYOUT PLAN & SECTIONS.....DRG.No.TR-C2-AR3-C25

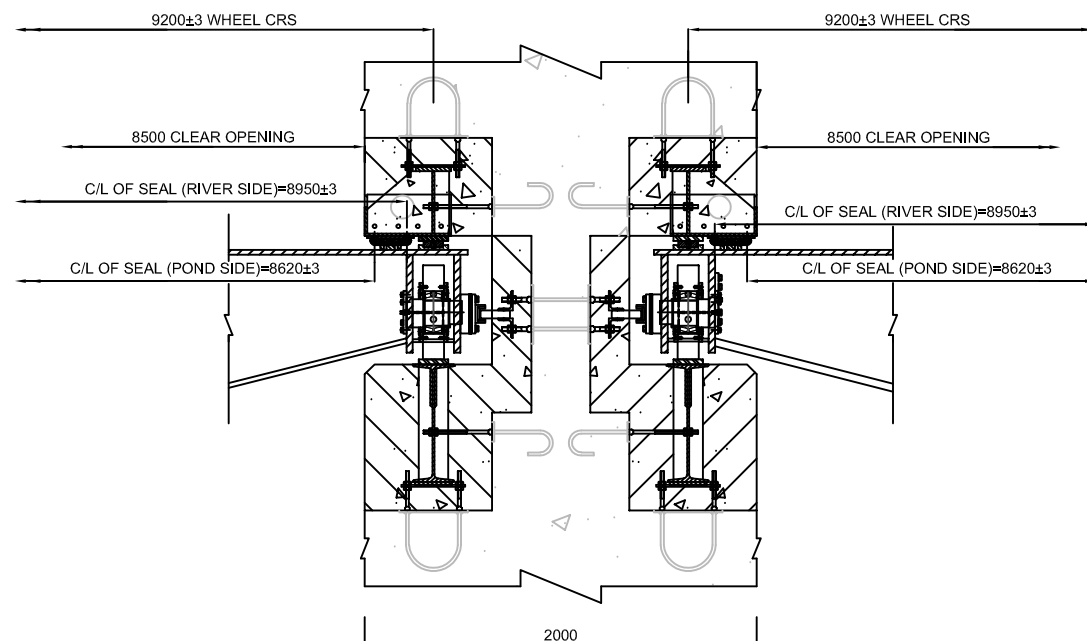


DETAIL 'Q'

SPECIFICATION DRAWING
NOT TO BE USED FOR FABRICATION



SECTIONAL PLAN AT 'C-C'



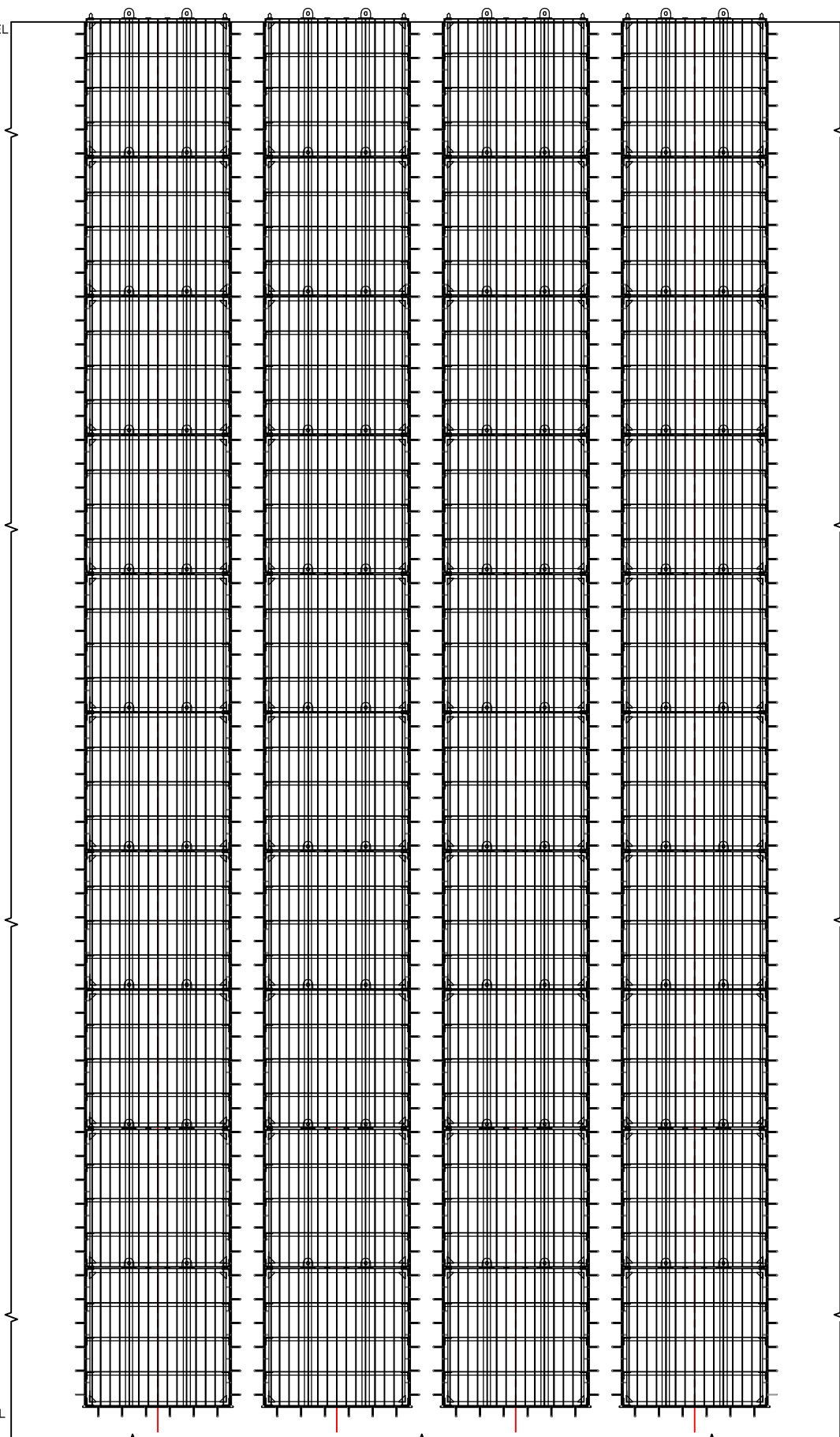
DETAIL 'P'

LEGENDS:-

- FIRST STAGE CONCRETE IN SECTION.....
- SECOND STAGE CONCRETE IN SECTION.....
- STEEL IN SECTION.....
- STAINLESS STEEL IN SECTION.....

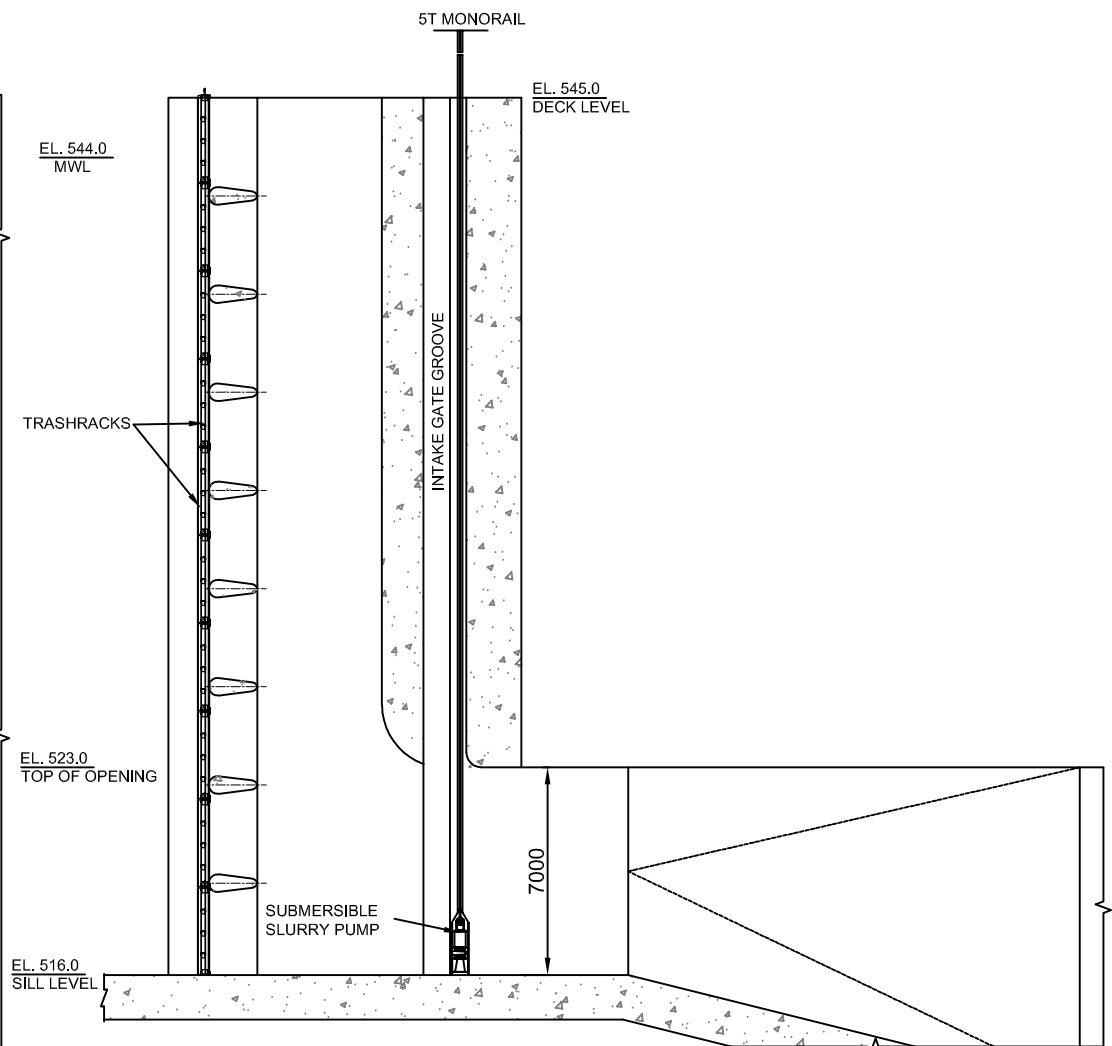
एसएपीडीसी प्रा० लिमिटेड SAPDC PVT. LIMITED		
CONSULTANT: SJVN LIMITED		
अरुण 3 जल विद्युत परियोजना ARUN 3 HYDROELECTRIC PROJECT		
TRT OUTFALL STRUCTURE GENERAL ARRANGEMENT OF BULKHEAD & TRT OUTFALL GATE (SHEET 2 OF 2)		
अभिकल्पित DESIGN Er. SANJEEV SHARMA (DGM)	जांचित CHECKED Er. MANOJ KUMAR (Sr. MANAGER)	अनुमोदित APPD. Er. RAJEEV AGGARWAL (CGM)
HYDROMECHANICAL DESIGN DEPTT., SHIMLA		
DRG. No. AH-HM-TRT-S32	NOV., 2022	No. HM-

EL. 545.0
DECK LEVEL

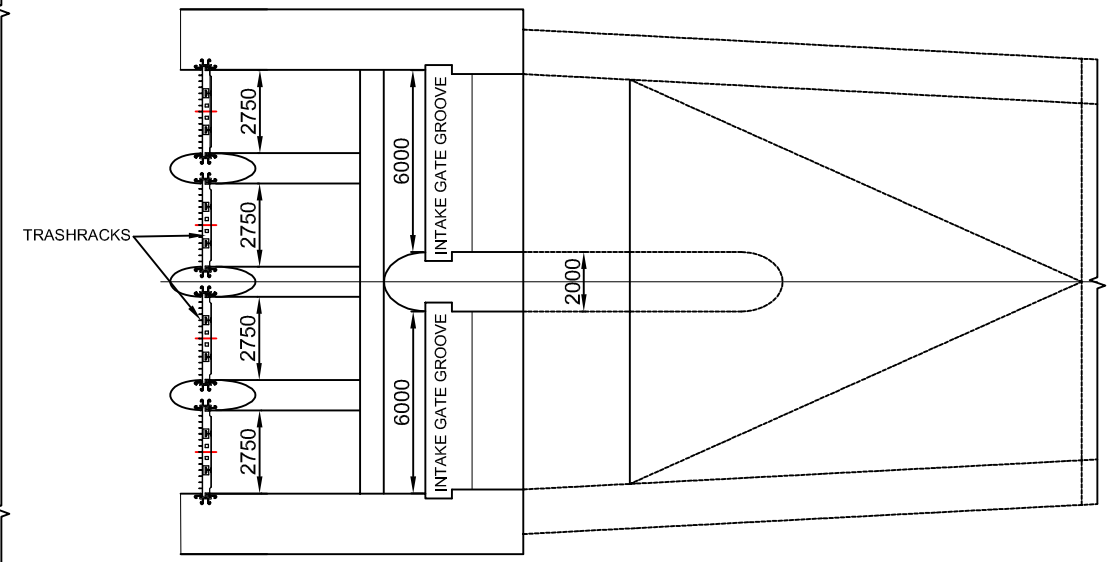


UPSTREAM ELEVATION

EL. 516.0
SILL LEVEL



SECTION THRO' C/L OF BAY



KEY PLAN OF INTAKE

NOTES:-

1. ALL DIMENSIONS ARE IN MILLIMETRES AND ELEVATIONS IN METRES UNLESS OTHERWISE SPECIFIED.
2. NO DIMENSION IS TO BE SCALED OUT, ONLY WRITTEN DIMENSIONS ARE TO BE TAKEN AS CORRECT.

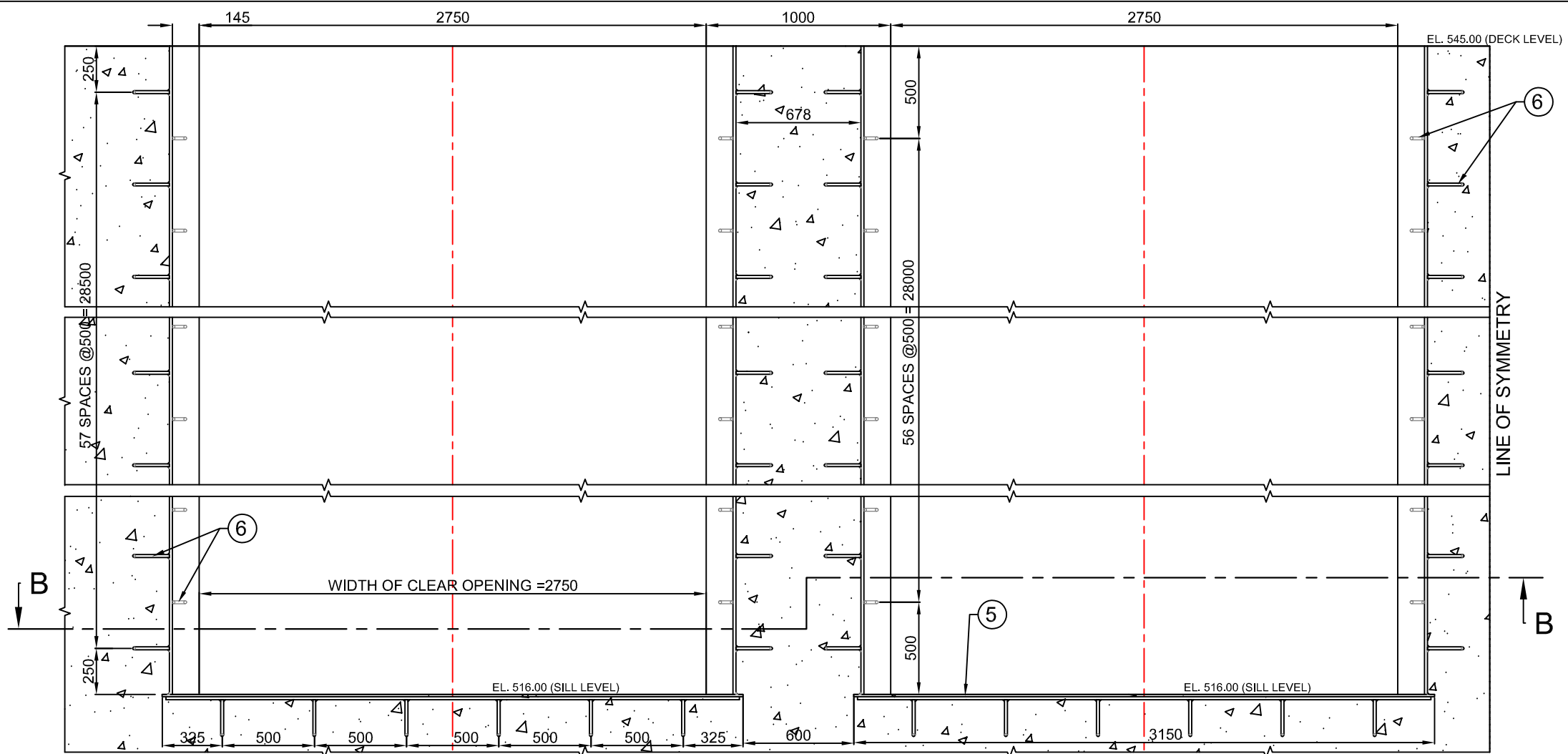
SALIENT FEATURES:-

1. CLEAR HEIGHT OF BAY.....29000mm
2. No. OF OPENING/ BAYS.....4 (Four)
3. No. OF EMBEDDED PARTS REQUIRED.....4 (FOUR) SETS
4. STEEL GRATING PANEL SIZE.....3010mm(w) x 2880mm(h)
5. No. OF GRATING PANELS PER BAY.....10 (Ten)
6. SILL LEVEL.....EL.516.00m
7. DECK LEVEL.....EL. 545.00m
8. TOTAL STEEL GRATING PANELS 44 (4 X 10 + 4 SPARE)

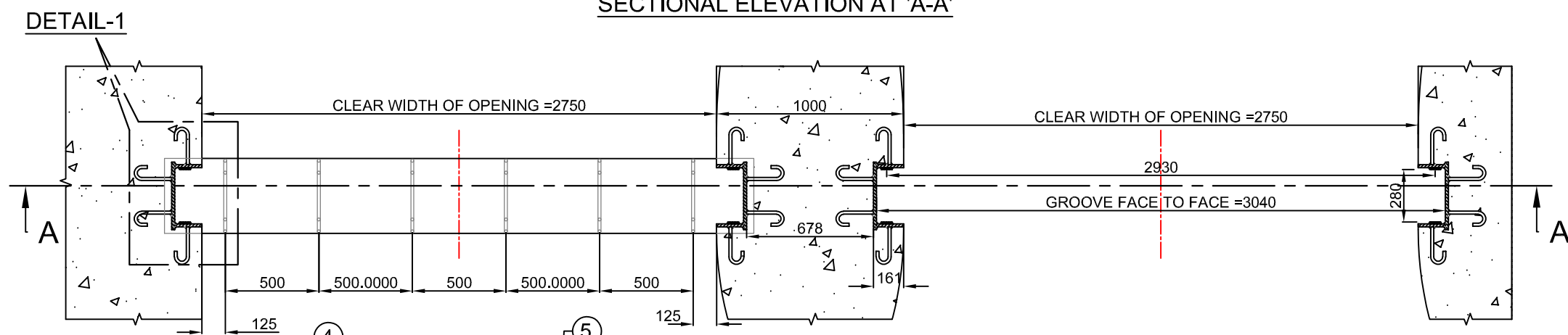
LEGEND :-

- FIRST STAGE CONCRETE IN SECTION.....
- SECOND STAGE CONCRETE IN SECTION.....
- STEEL IN SECTION.....
- STAINLESS STEEL IN SECTION.....

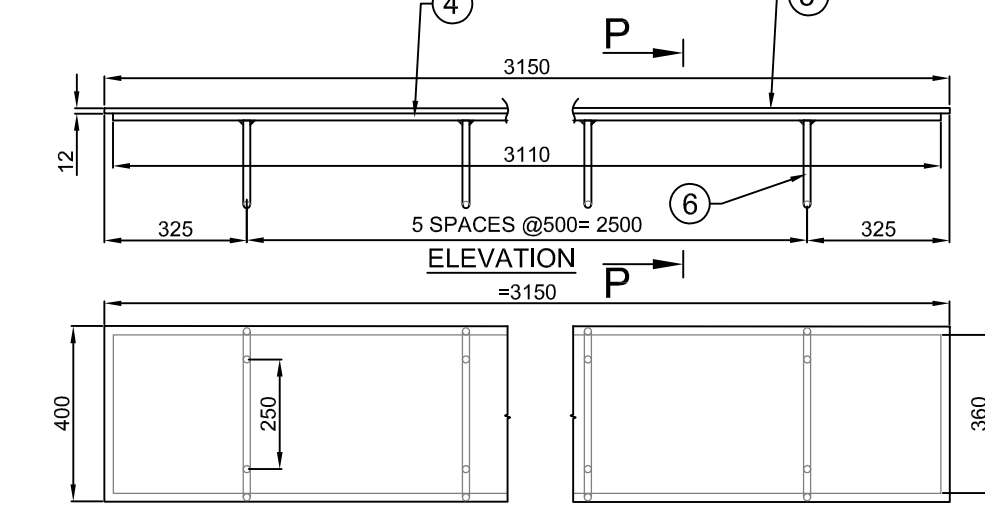
 एसएपीडीसी प्रा. लिमिटेड SAPDC PVT. LIMITED		
CONSULTANT: SJVN LIMITED लोअर अरुण जल विद्युत परियोजना LOWER ARUN HYDROELECTRIC PROJECT		
LOWER ARUN INTAKE STRUCTURE INTAKE STEEL GRATINGS GENERAL ARRANGEMENT		
अभिकल्पित DESIGN Er. GIRISH KANG (ENGINEER) तैयार किया DRAWN/AUTOCAD Sh. CHAMPA BAKSHI (J.O. Png.)	संचालित CHECKED Er. SANJEEV SHARMA (DGM) संशोधन RECD. Er. ARUN KUMAR (DGM)	अनुमोदित APPD. Er. RAJEEV AGGARWAL (GGM)
HYDROMECHANICAL DESIGN DEPTT., SHIMLA		
DRG. No. LA-HM-ISG-S02	NOV., 2022	No. HM-



SECTIONAL ELEVATION AT 'A-A'

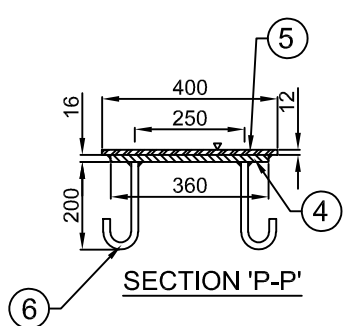


SECTION 'B-B'

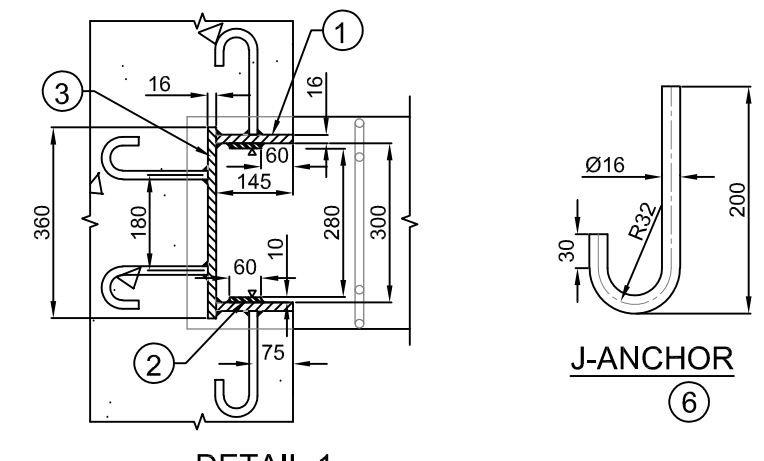


PLAN

DETAIL OF SILL MEMBER



SECTION 'P-P'



DETAIL-1

J-ANCHOR

NOTES:-

1. ALL DIMENSIONS ARE IN MILLIMETRES AND ELEVATIONS IN METRES UNLESS OTHERWISE SPECIFIED.
2. NO DIMENSION IS TO BE SCALED OUT, ONLY WRITTEN DIMENSIONS ARE TO BE TAKEN AS CORRECT.
3. MINIMUM SIZE OF WELD SHALL BE 8mm UNLESS OTHERWISE NOTIFIED. WELDING SHALL CONFORM TO IS:813 (LATEST REVISION).

SALIENT FEATURES:-

1. CLEAR HEIGHT OF BAY.....29000mm
2. No. OF OPENING/ BAYS.....4 (Four)
3. No. OF EMBEDDED PARTS REQUIRED.....4 (FOUR) SETS
4. STEEL GRATING PANEL SIZE.....3010mm(w) x 2880mm(h)
5. NO. OF GRATING PANELS PER BAY.....10 (Ten)
6. SILL LEVEL.....EL.516.00m
7. DECK LEVEL.....EL. 545.00m
8. TOTAL GRATING PANELS 44 (4 X 10 + 4 SPARE)

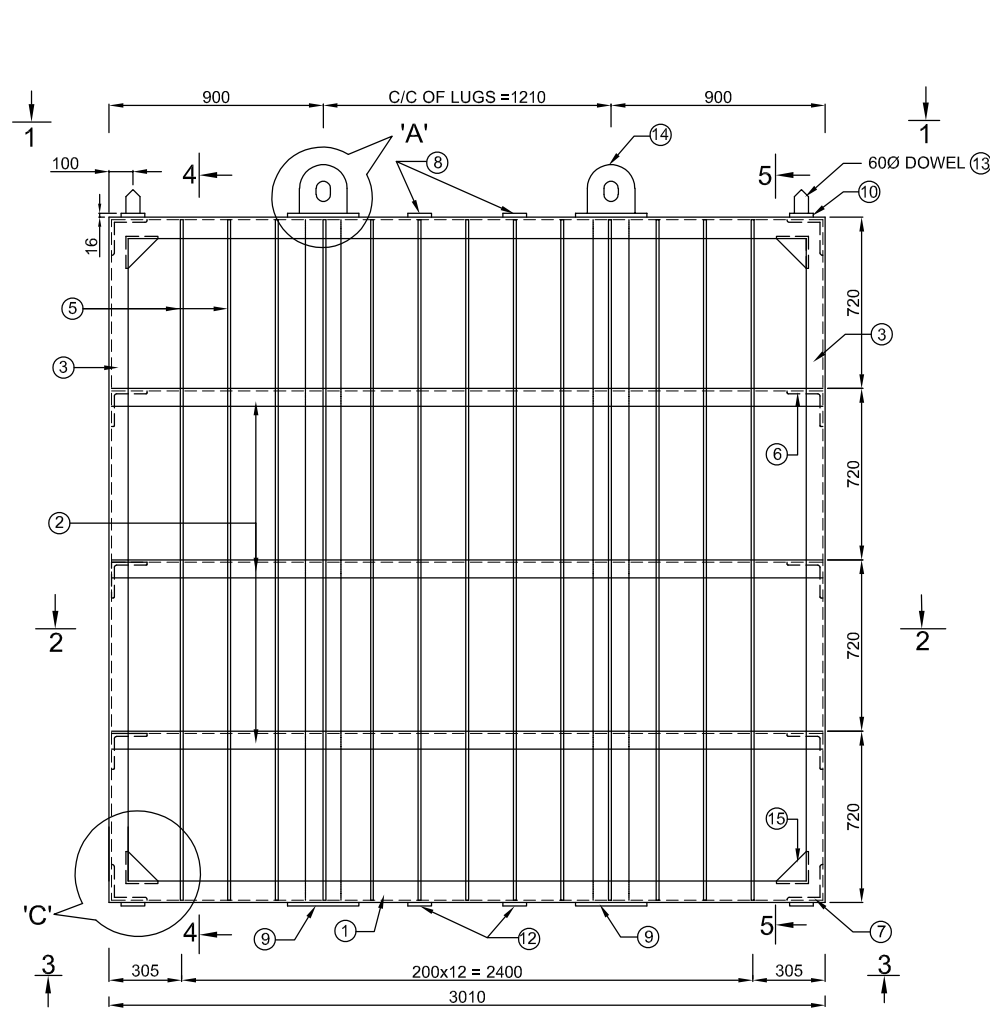
		TOTAL WT. =		5758 KG					
1	PLATE	145	16	29000	4	2112.6	IS:2062		
2	PLATE	60	10	29000	4	546.4	IS:1570 (V)/AISI 420		
3	PLATE	360	16	29000	2	2622.5	IS:2062		
4	PLATE	360	16	3110	1	140.6	IS:2062		
5	PLATE	400	12	3150	1	118.7	IS:1570 (V)/AISI 420		
6	J-ANCHOR		16	291	472	216.9	IS:2062		
ITEM NO.	DESCRIPTION	W	T/D	L	MASS (KG/M)	QTY.	WT.	MATERIAL	REMARKS

BILL OF MATERIAL (FOR 1 SET ONLY)

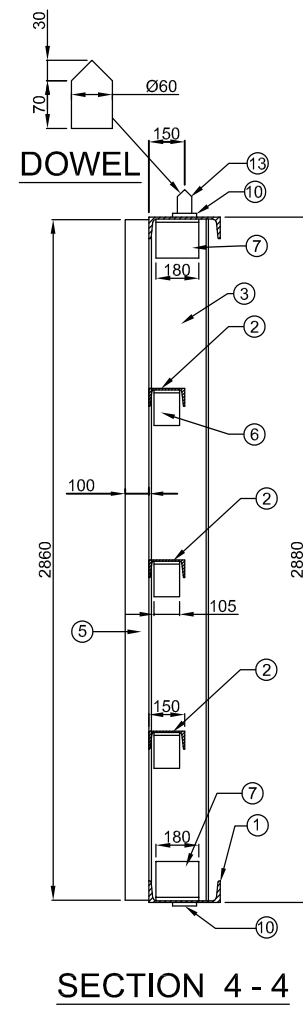
LEGEND :-

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- STEEL IN SECTION.....
- STAINLESS STEEL IN SECTION.....

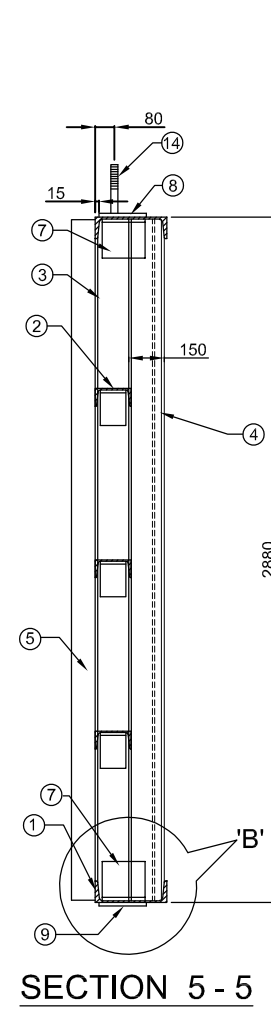
<p>एसएपीडीसी प्रा. लिमिटेड SAPDC PVT. LIMITED</p>		
<p>CONSULTANT: SJVN LIMITED</p>		
<p>लोअर अरुण जल विद्युत परियोजना LOWER ARUN HYDROELECTRIC PROJECT</p>		
<p>LOWER ARUN INTAKE STRUCTURE INTAKE STEEL GRATINGS EMBEDDED PARTS DETAIL</p>		
<p>अभिहित DESIGN ER. GIRISH KANG (ENGINEER)</p>	<p>समीक्षा CHECKED ER. MANOJ KUMAR (S. MANAGER)</p>	<p>अनुमोदित APPD. ER. RAJEEV AGGARWAL (GDM)</p>
<p>HYDROMECHANICAL DESIGN DEPTT., SHIMLA</p>		
DRG. No. LA-HM-ISG-S03	NOV., 2022	No. HM-



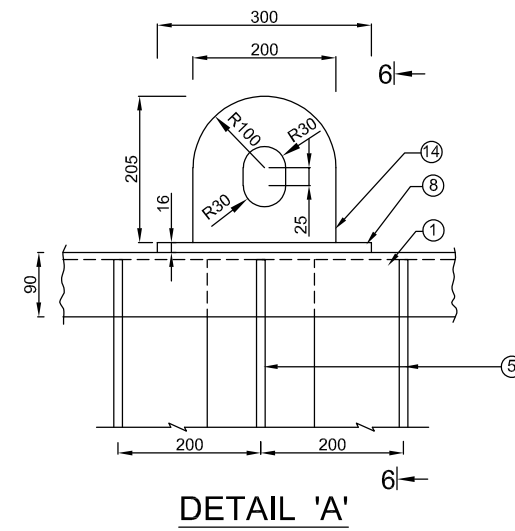
ELEVATION



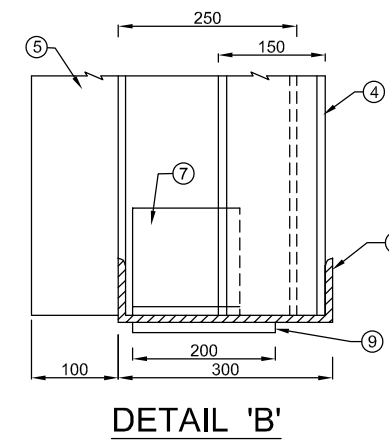
SECTION 4 - 4



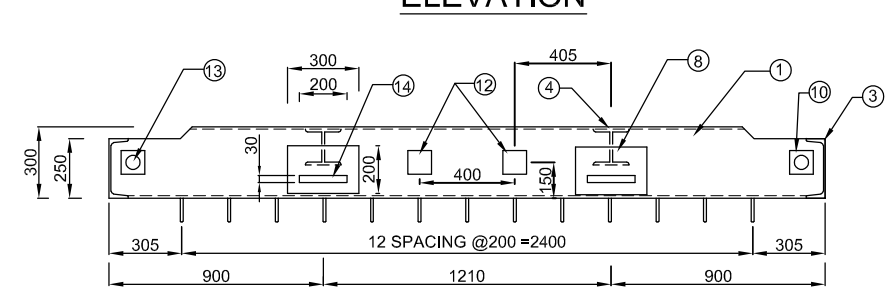
SECTION 5 - 5



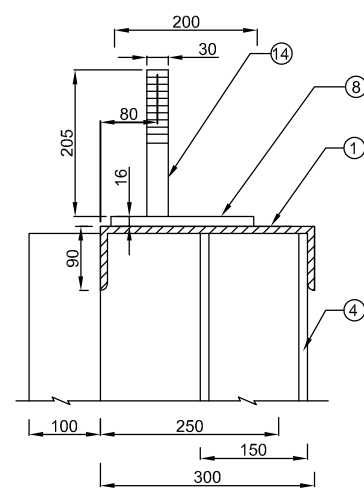
DETAIL 'A'



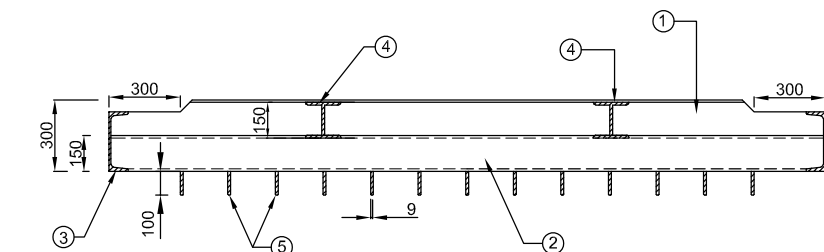
DETAIL 'B'



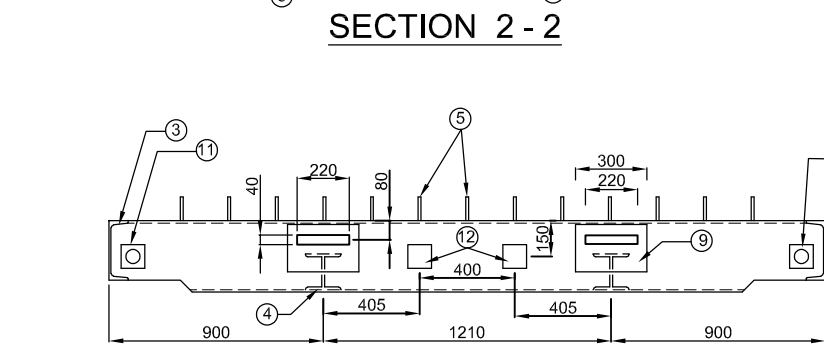
VIEW 1-1



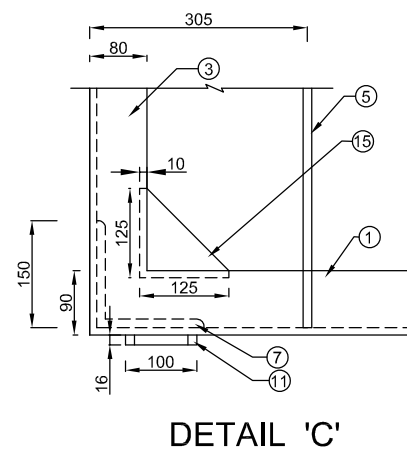
SECTION 6 - 6



SECTION 2 - 2



VIEW 3 - 3



DETAIL 'C'

TOTAL WEIGHT OF 1 NO. PANEL = 1161 KG
TOTAL PANELS REQUIRED = 4x10+4 = 44 Nos.

						1161		KG	
1	ISMC 300			3010	36.3	2	218.5	IS:2062	CTS
2	ISMC 150			3010	16.8	3	151.7	IS:2062	CTS
3	ISMC 250			2880	30.6	2	176.3	IS:2062	
4	ISHB 150			2880	27.1	2	156.1	IS:2062	
5	STEEL FLAT	100	12	2860		13	350.2	IS:2062	
6	ISA 150X150X12			105	27.3	6	17.2	IS:2062	
7	ISA 150X150X12			180	27.3	4	19.7	IS:2062	
8	PLATE	200	16	300		2	15.1	IS:2062	
9	PLATE	200	16	300		2	15.1	IS:2062	
10	PLATE	100	16	100		2	2.5	IS:2062	
11	PLATE	100	16	100		2	2.5	IS:2062	
12	PLATE	100	16	100		4	5.0	IS:2062	
13	BAR DIA. 60			60		2	4.4	IS:1018	
14	PLATE	200	30	205		2	19.3	IS:2062	
15	PLATE	125	16	125		4	7.9	IS:2062	
ITEM NO.	DESCRIPTION	W	T/D	L	MASS (KG/M)	QTY.	WT.	MATERIAL	REMARKS

NOTES:-

1. ALL DIMENSIONS ARE IN MILLIMETRES AND ELEVATIONS IN METRES UNLESS OTHERWISE SPECIFIED.
2. NO DIMENSION SHALL BE SCALED OUT, ONLY WRITTEN DIMENSIONS ARE TO BE TAKEN AS CORRECT.
3. ALL WELDS TO BE 8MM CONTINUOUS FILLET UNLESS OTHERWISE STATED.
4. B.O.Q. INDICATED FOR ONE STEEL GRATING PANEL. TOTAL PANELS REQUIRED = 10 X 4 + 4 = 44 NOS.
5. ALL THICKNESSES SHOWN ARE MINIMUM AFTER MACHINING, MACHINING ALLOWANCE MUST BE ADDED WHEREVER REQUIRED.
6. STEEL GRATING PANEL TO BE DIAGONALLY SQUARE TO WITHIN ±2MM.
7. WELDING ELECTRODE SHALL BE CAREFULLY SELECTED BY THE FABRICATOR TO PROVIDE EQUIVALENT STRENGTH AS PARENT MATERIAL.
8. THE C.G. ARRIVED IS TENTATIVE, THE ACTUAL C.G. IS TO BE ARRIVED AFTER COMPLETION OF FABRICATION OF PANEL.
9. PAINTING SHALL BE AS PER TECHNICAL SPECIFICATIONS.

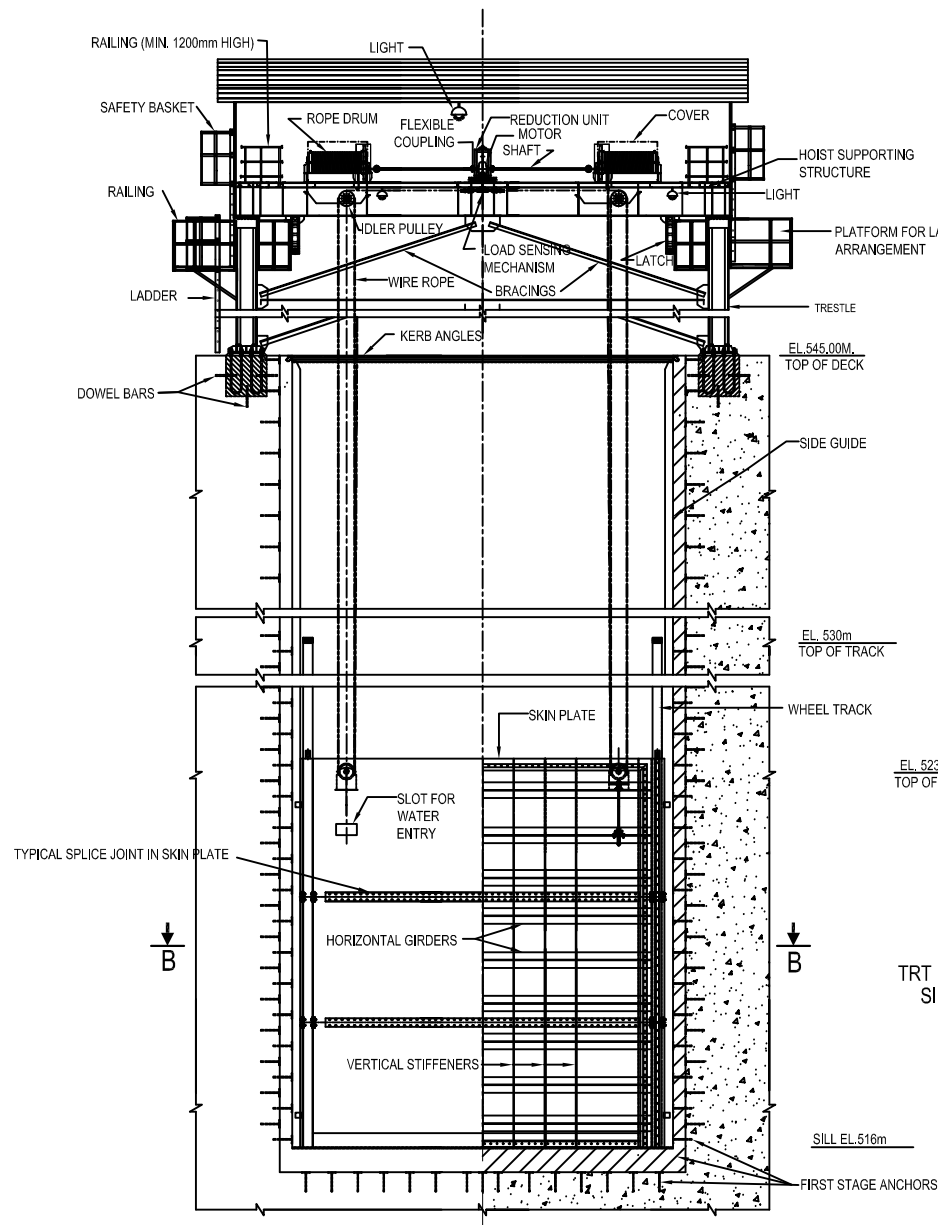
LEGENDS:-

- FIRST STAGE CONCRETE IN SECTION.....
- SECOND STAGE CONCRETE IN SECTION.....
- STEEL IN SECTION.....

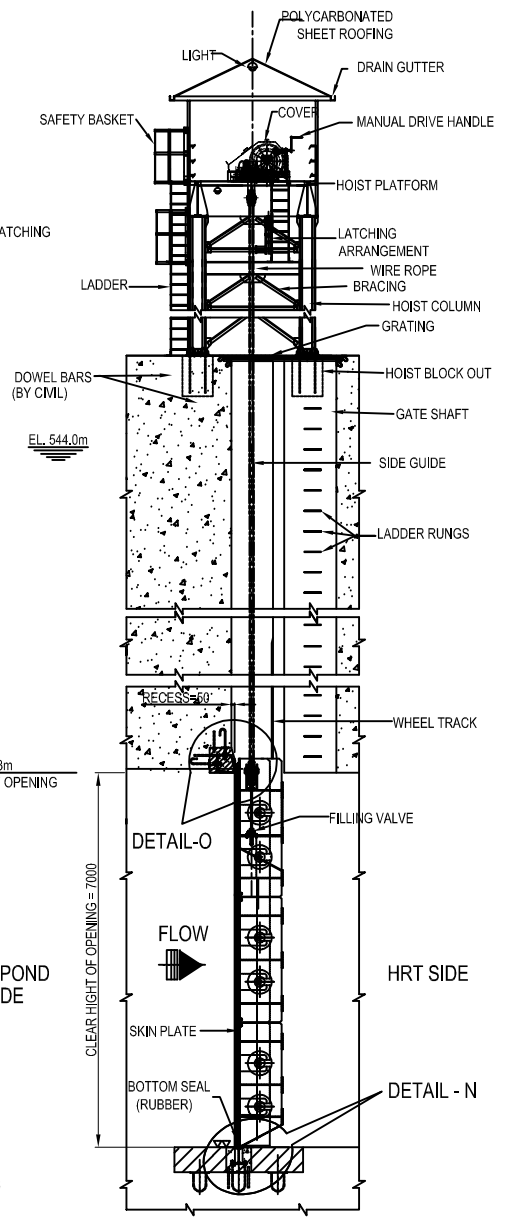

एसएपीडीसी प्रा० लिमिटेड
SAPDC PVT. LIMITED
CONSULTANT: SJVN LIMITED
लोअर अरुण जल विद्युत परियोजना
LOWER ARUN HYDROELECTRIC PROJECT
LOWER ARUN INTAKE STRUCTURE
INTAKE STEEL GRATINGS
DETAIL OF GRATING PANEL

डिजाइन DESIGN E.R. GIRISH KANG (ENGINEER) ड्राइंग DRAWN(AUTOCAD) Ms. CHAMPA BAKSHI (J.O. Png.)	चेक CHECKED E.R. SANJEEV SHARMA (CGM) रिकॉर्ड RECD E.R. ARUN KUMAR (CGM)	अंमोदित APPD E.R. RAJEEV AGGARWAL (CGM)
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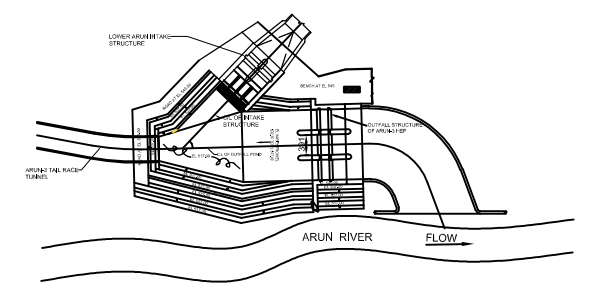
HYDROMECHANICAL DESIGN DEPTT., SHIMLA
 DRG. No. LA-HM-ISG-S04 NOV., 2022 No. HM-



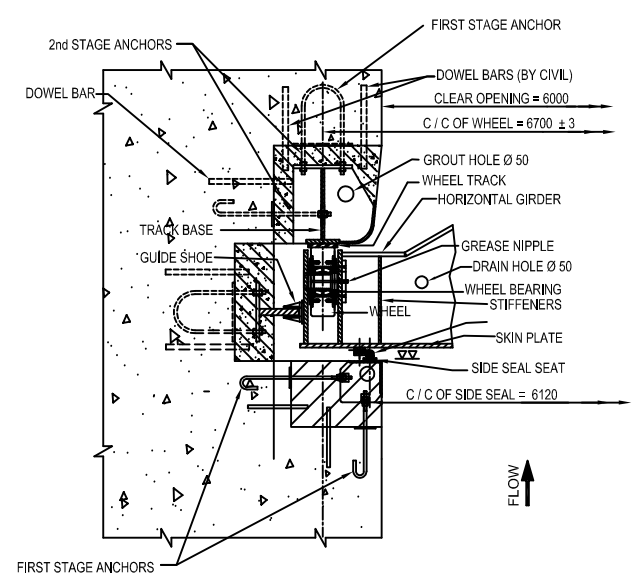
SECTION - AA



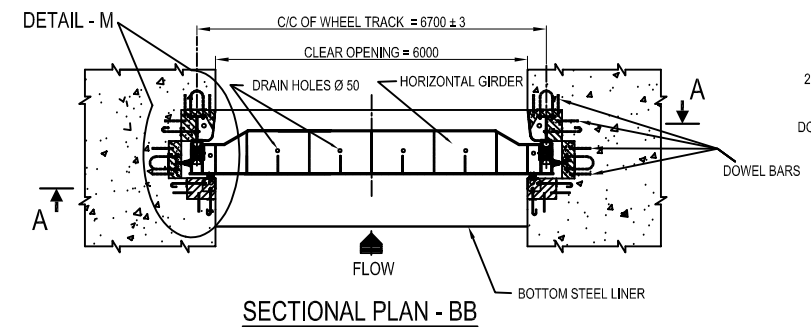
SECTION THROUGH C/L OF BAY



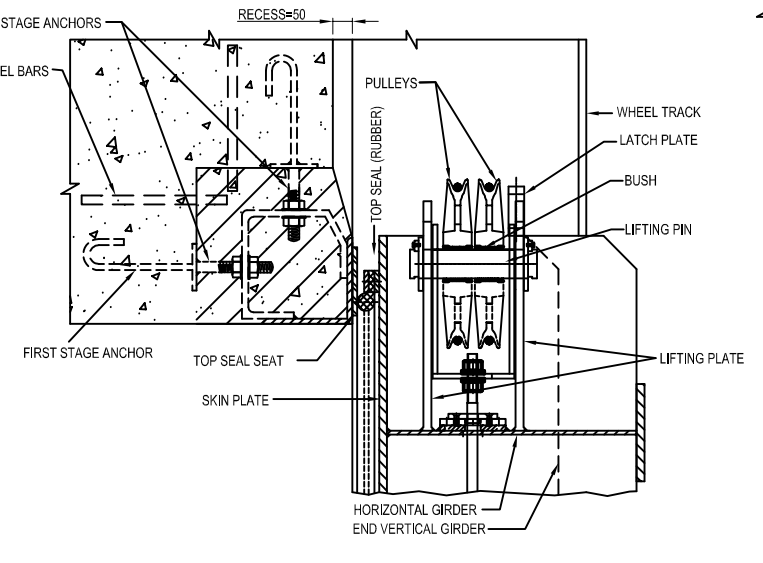
KEY PLAN



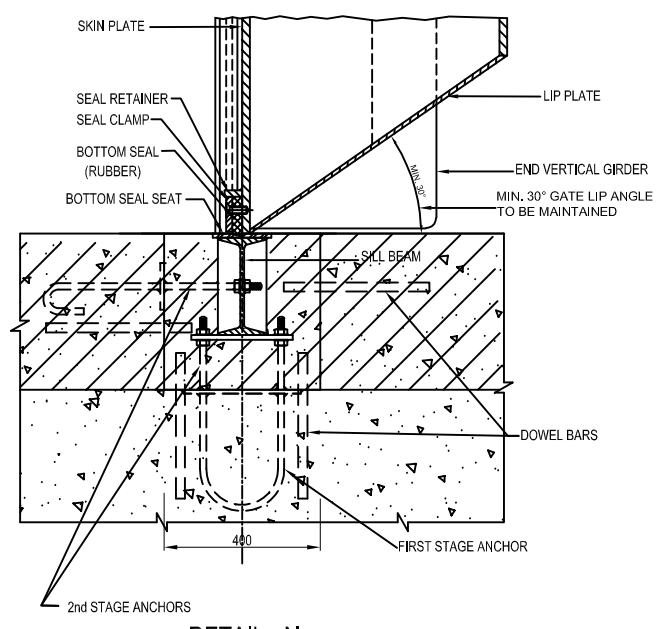
DETAIL - M



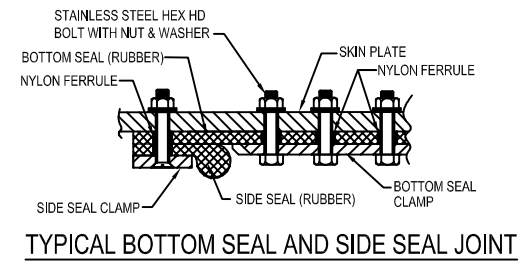
SECTIONAL PLAN - BB



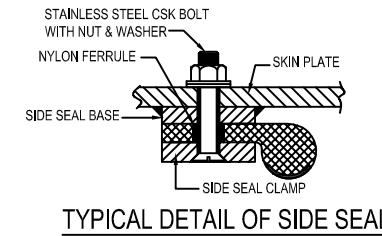
DETAIL - N



DETAIL - O



TYPICAL BOTTOM SEAL AND SIDE SEAL JOINT



TYPICAL DETAIL OF SIDE SEAL

NOTES:-

- ALL THE DIMENSIONS ARE IN MILLIMETRES AND ELEVATIONS IN METRES UNLESS OTHERWISE SPECIFIED.
- NO DIMENSION SHALL BE SCALED OUT, ONLY WRITTEN DIMENSIONS ARE TO BE TAKEN AS CORRECT.
- SUFFICIENT Nos. OF DOWEL BARS SHALL BE KEPT IN FIRST STAGE CONCRETE TO HAVE PROPER BOND WITH SECOND STAGE CONCRETE.
- THE SECOND STAGE CONCRETE SHALL BE ONE GRADE HIGHER THAN THAT OF FIRST STAGE CONCRETE AND SHALL NOT BE LESS THAN M-25 GRADE CONFORMING TO IS:456 (LATEST EDITION).
- FOR CIVIL WORKS AND REINFORCEMENT DETAILS REFER RELEVANT CIVIL DRAWINGS.
- ALL FILLET WELDS TO BE USED IN FABRICATION SHALL BE CONTINUOUS AND NOT LESS THAN 6mm LEG SIZE UNLESS OTHERWISE STATED.
- THE GATE SHALL BE OPERATED BY INDEPENDENT ROPE DRUM HOISTS OF MIN. 60 T CAPACITY.
- ALL TOLERANCES, CRITICAL DIMENSIONS AND DESIGN OF GATES AS WELL AS THEIR EMBEDDED PARTS SHALL CONFORM TO IS: 4622 & 9349 (LATEST EDITION).
- B.H.N. VALUE OF TRACK PLATES SHALL BE KEPT ATLEAST 50 POINTS HIGHER THAN THAT OF WHEEL TREAD.
- FACES OF TRACK, SEAL, SEAL SEATS & GUIDES SHALL BE IN TRUE PLANE WITHIN THE TOLERANCES AS SPECIFIED IN IS: 4622 (LATEST EDITION).
- SUITABLE LADDERS & RUNGS SHALL BE PROVIDED FOR APPROACHING THE HOIST PLATFORM OF THE GATE.
- SUITABLE COVERS FOR HOISTING EQUIPMENT SHALL BE PROVIDED. THE THICKNESS OF SHEET FOR COVERS SHALL NOT BE LESS THAN 3mm.
- WALKWAYS OF MIN. 600mm (CLEAR) WIDTH SHALL BE PROVIDED ALL AROUND THE HOISTING MACHINERY.
- CHEQUERED PLATES TO BE PROVIDED ON THE HOIST DECK SHALL NOT BE LESS THAN 8mm THICK.
- THE CONTRACTOR SHALL ALSO PROVIDE SUITABLE GRATING AT THE TOP OF INTAKE GROOVES & GATE SHAFTS AT EL. 545.00m.
- THIS DRAWING INDICATES GENERAL ARRANGEMENT OF INTAKE GATES INCLUDING HOISTING ARRANGEMENT FOR THEIR OPERATION.
- THE SIZE OF ALL BLOCKOUTS ARE TENTATIVE.
- THE CONTRACTOR SHALL PROVIDE POLYCARBONATED SHEET ROOFING ABOVE THE HOIST PLATFORM.
- S.S. DENOTES STAINLESS STEEL.
- RADIOGRAPHIC TESTS SHALL BE CARRIED OUT FOR ALL CRITICAL FULL STRENGTH BUTT WELDS IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS.

SALIENT FEATURES :

- CLEAR WIDTH OF OPENING 6000 mm.
- CLEAR HEIGHT OF OPENING 7000 mm.
- No. OF OPENINGS TWO
- No. OF GATES REQ. TWO
- TYPE OF GATE VERTICAL LIFT FIXED WHEEL TYPE.
- DESIGN HEAD FOR GATE 28m
- MODE OF OPERATION INDEPENDENT ROPE DRUM HOIST.
- TYPE OF OPERATION REGULATING TYPE WITH LOWERING & RAISING UNDER UNBALANCED WATER HEAD CONDITIONS.
- HOISTING SPEED 0.5m/min.

MACHINING INDEX :-

- ∇ > 6.3 μ m.
- ∇ > 1.6 TO 6.3 μ m.

LEGEND :-

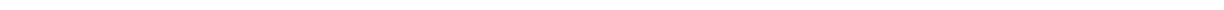
- FIRST STAGE CONCRETE IN SECTION
- SECOND STAGE CONCRETE IN SECTION
- STEEL IN SECTION
- STAINLESS TEEL IN SECTION

SPECIFICATION DRAWING NOT TO BE USED FOR FABRICATION

<p>एसएपीडीसी प्रा० लिमिटेड SAPDC PVT. LIMITED</p>		
<p>CONSULTANT: SJVN LIMITED</p>		
<p>लोअर अरुण जल विद्युत परियोजना LOWER ARUN HYDROELECTRIC PROJECT</p>		
<p>LOWER ARUN INTAKE STRUCTURE GENERAL ARRANGEMENT OF INTAKE GATE</p>		
<p>अधिकारिण DESIGN Er. SANJEEV SHARMA (DGM)</p>	<p>समीक्षित CHECKED Er. MANOJ KUMAR (S/MANAGER)</p>	<p>अनुमोदित APPRO. Er. RAJEEV AGGARWAL (CGM)</p>
<p>DRAWN(AUTOCAD) Mrs. CHAMPA BAKSHI (J.O., P/ing.)</p>		
<p>RECD. Er. ARUN KUMAR (DGM)</p>		
<p>HYDROMECHANICAL DESIGN DEPTT., SHIMLA</p>		
DRG. No. LA-HM-IG-S05	NOV., 2022	No. HM-

VOLUME – V

Data Sheets



Data Sheets

Index

S.No.	Particulars	
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2.	Data Sheet 1A: Personnel candidate data	2
3.	Data Sheet 2: Proposed Site Organization	3
4.	Data Sheet 3: Erection Programme	4
5.	Data Sheet 4 : Erection Methodology	5
6.	Data Sheet 5: Break down of Prices	6
7.	Data Sheets-6: Details of Taxes and Duties considered in the Bid	8

DATA SHEET - 1

Personnel Capabilities

Name of Bidder or Partner of a joint venture
--

*For specific positions essential to contract implementation, Bidders should provide the names of at least two candidates qualified to meet the specified requirements. The data on their experience should be supplied in separate sheets using **Form 1A** for each candidate.*

1.	Title of position	
	Name of prime candidate	
	Name of alternate candidate	
2.	Title of position	
	Name of prime candidate	
	Name of alternate candidate	
3.	Title of position	
	Name of prime candidate	
	Name of alternate candidate	
4.	Title of position	
	Name of prime candidate	
	Name of alternate candidate	
5.	Title of position	
	Name of prime candidate	
	Name of alternate candidate	

Note: Names proposed above will be posted against the work. Any change in name at later stage will require the approval of the Employer.

DATA SHEET - 1A

Personnel Candidate Data

Name of Bidder or Partner of a joint venture
--

Position		Candidate () Prime () Alternative	
<i>Candidate information</i>	Name of candidate		Year of birth
	Professional qualifications		
<i>Present employment</i>	Name of employer		
	Address of employer		
	Telephone Fax		Contact (manager/personnel officer)
	Present job title of candidate		Years with present employer

Summarize professional experience to meet the specified requirements, in reverse chronological order. Indicate particular technical and managerial experience relevant to the Project.

<i>From: month/yr.</i>	<i>To: month/yr.</i>	<i>Company</i>	<i>Project (country)/Position/Relevant technical and management experience</i>

DATA SHEET - 2

Proposed Site Organization

Name of Bidder or Partner of a joint venture
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A. Preliminary Site Organization Chart *

B. Narrative Description of Site Organization Chart

C. Description of Quality Assurance at Site

D. Description of Relationship between Head Office and Site Management

* **Note:** The details of foreign nationals (number and designation) to be deployed at site should also be specified.

DATA SHEET – 3

ERECTION PROGRAMME

Name of Bidder or Partner of a joint venture
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Submit Erection programme in bar chart form, which starts at the date of Letter of Acceptance and is completed within scheduled time.

The Erection Programme shall show various activities and their period including interdependent milestones.

DATA SHEET 4

ERECTION METHODOLOGY

Name of Bidder or Partner of a joint venture
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The Bidder shall submit an outline of description of proposed methods, sequences, facilities and layouts to be used for construction. The information should be submitted in sufficient detail to allow an assessment of the general adequacy of the Bidder's proposal. Sketches, drawings and diagrams should be included where ever necessary for clarification of the description. Required number and classification of manpower, equipment and materials to be used for each particular activity shall be described. The Bidder shall prepare construction methodology in detail after careful study of Project site. The Erection methodology should commensurate with their equipment planning (with month-wise deployment schedule), project personnel and deployment, duly supported with broad calculations and quality control procedures proposed to be adopted, demonstrating their capability of achieving the completion of Works as per specified Interim Contract Milestones within the stipulated Time for Completion referred to in Appendices.

DATA SHEET-5

BREAK DOWN OF PRICES

(To be submitted later, if required by the Employer)

Name of Bidder or Partner of a joint venture
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Note: *Bidders are not required to complete this Data Sheet at the time of preparation of Bids. Only the Bidders, who are requested by the Employer, will submit the analysis of unit rates as per the format below in accordance with the Instructions to Bidders. (Clause 27.1).*

Bidder shall provide the breakdown of such Unit Prices as the Employer may determine, in accordance with the form shown hereunder. This cost breakdown shall include the overhead and profit. This form shall become part of the Contract and no claims may be made against the Employer for excess or deficiency therein whether actual or relative to other items.

Item No. _____ (in the Schedule)

Work: _____

Unit Price:

Particular Description (by item): Unit Quantity Rate Amount

1. Material costs

Subtotal 1 ----- -----

2. Manpower costs (by grade, except supervisory and managerial staff)

Subtotal 2 ----- -----

3. Plant and equipment costs (by type)

Subtotal 3 ----- -----

Data Sheets-6

Details of Taxes and Duties considered in the Bid

(To be submitted with Price Bid)

Sr. No.	Tax Heads	Rate

Note: In case bidder’s provided rate(s) of Taxes are at variance with that actually prevailing on the specified date, the actually prevailing rate(s) shall only be considered for the purpose of adjustment of contract price.

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Other terms and conditions of the bidding documents shall remain unchanged.
