

**Dedicated Freight Corridor Corporation of India Ltd**  
(A Govt. of India Enterprise/ Under Ministry of Railways)

**E-Tender No: MUM/S/EL/239/UTILITY/77/REL-F (TENDER)**

**For**

**Name of Work: SUPPLY OF TOWERS & LINE MATERIALS AND ERECTION, TESTING & COMMISSIONING WORK FOR DIVERSION OF TWO NUMBERS OF 220 KV DOUBLE CIRCUIT TRANSMISSION LINES (OWNED BY R-INFRA), TO FACILITATE THE PASSAGE OF RAIL TRACK BEING CONSTRUCTED BY THE DEDICATED FREIGHT CORRIDOR CORPORATION OF INDIA LIMITED (DFCCIL) AT FOUR DIFFERENT CROSSING LOCATIONS NEAR VILLAGE AAGVAN (DAHANU TALUKA); NEAR VILLAGE SHIRGAON (VASAI TALUKA); NEAR VILLAGE BILALPADA (VASAI TALUKA) & NEAR VILLAGE GOKHIVARE (VASAI TALUKA) IN MAHARASHTRA.**

**(PARTICIPATION THROUGH E-TENDER ONLY)**

**E-TENDER**

**E-tendering site- [www.tenderwizard.com/DFCCIL](http://www.tenderwizard.com/DFCCIL)**

**Help: Please contact Tender wizard helpdesk at 011-49424365 or cell no. 7738875559/7666563870**

**TECHNICAL BID  
(PACKET-A)**

**TENDER DOCUMENT**

**APRIL-2018**

**Office of the Chief Project Manager/South/Mumbai**

**Dedicated Freight Corridor Corporation of India Ltd.  
(A Govt. of India Enterprise / Under Ministry of Railways)  
7th floor, Central Railway New Administrative Building  
D. N. Road, Mumbai-400001  
Ph. No: +91-22-22634185; Fax: +91-22-22634184**

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**PART-I**

**CHAPTER-I**

**NOTICE INVITING E-TENDER**

**PART- I**

**CHAPTER - I**

**DEDICATED FREIGHT CORRIDOR CORPORATION OF INDIA LIMITED  
(A GOVERNMENT OF INDIA ENTERPRISE/UNDER MINISTRY OF RAILWAYS)**

**No: MUM/S/EL/239/UTILITY/77/REL-F (TENDER)**

**DATE: 24/04/2018**

**NOTICE INVITING E-TENDER**

**National Competitive Bidding**

Dear Sirs,

**Name of Work:** Supply of towers & line materials and erection, testing & commissioning work for diversion of two numbers of 220 KV double circuit transmission lines (owned by R-Infra), to facilitate the passage of rail track being constructed by the Dedicated Freight Corridor Corporation of India Limited (DFCCIL) at four different crossing locations near Village Aagvan (Dahanu Taluka); near Village Shirgaon (Vasai Taluka); near Village Bilalpada (Vasai Taluka) & near Village Gokhivare (Vasai Taluka) in Maharashtra

- 1.1.1 Chief Project Manager/South/Mumbai, Dedicated Freight Corridor Corporation of India Limited, 7<sup>th</sup> floor, Central Railway New Administrative Building, D.N. Road, Mumbai, India, invites e-tenders on two packet system, on prescribed forms, from firms/Companies/Joint Ventures having requisite experience and financial capacity for execution of the following work:

Table-1				
Sr. No.	Name of work	Tender cost (Rs.)	EMD (Rs.)	Completion Period
1	Supply of towers & line materials and erection, testing & commissioning work for diversion of two numbers of 220 KV double circuit transmission lines (owned by R-Infra), to facilitate the passage of rail track being constructed by the Dedicated Freight Corridor Corporation of India Limited (DFCCIL) at four different crossing locations near Village Aagvan (Dahanu Taluka); near Village Shirgaon (Vasai Taluka); near Village Bilalpada (Vasai Taluka) & near Village Gokhivare (Vasai Taluka) in Maharashtra	22,60,29,172/-	33,90,440/-	12 Months

**1.1.2 Eligibility Criteria:-**

Eligibility shall be assessed on applicants, fulfilling the technical capability and competence as well as for financial and organizational resources as specified in clause no. 1.3.13 (i) A & B of Preamble and General Instruction to Bidders (Chapter III of Part - I).

- 1.1.3 The Tender document can be downloaded from DFCCIL's website [www.dfccil.gov.in](http://www.dfccil.gov.in) & [www.tenderwizard.com/DFCCIL](http://www.tenderwizard.com/DFCCIL) from 10.00 hrs. on 04/05/2018 to 17.00 hrs. on 01/06/2018.

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

- 1.1.4 DFCCIL may issue addendum(s)/corrigendum(s) to the tender documents. In such case, the addendum(s)/corrigendum(s) shall be issued and placed on DFCCIL's website at least 15 days in advance of date fixed for opening of tenders. The tenderers who have downloaded the tender documents from website must visit the website regularly and ensure that such addendum(s)/corrigendum(s) (if any) is also downloaded by them.
- 1.1.5 The tender documents should be submitted through online mode in website **www.tenderwizard.com/DFCCIL** only. The offer submitted through a mode other than online will not be accepted.
- 1.1.6 The tender documents shall be in two separate online packets i.e. Packet – A; containing TECHNICAL BID and Packet-B; containing FINANACIAL BID. Detailed credential as per the requirement of eligibility criteria and all tender papers, are to be submitted in Technical Bid. Duly filled Summary of Prices (Form - 3), with % age above or below or at par on the total amount of Schedule of Prices and Total Prices (Form - 4), to be submitted along with Schedule of Prices and Total Prices (Form - 4), in "Financial Bid" (Packet- B). Packet- B also contains Microsoft Excel filling to be filled as Financial Bid, saved and Uploaded with digital signature. Only the downloaded financial bid form in excel file should be uploaded after filing and saving the file in document library.  
**Caution:** Do not upload scanned copy such as pdf or jpg file etc. of 'Financial Bid' in document library.
- 1.1.7 Tender shall be submitted as per "General Instructions to Bidders" forming a part of the complete tender documents. (Chapter-III of Part-I)

The tender documents should be submitted through online mode in website [www.tenderwizard.com/DFCCIL](http://www.tenderwizard.com/DFCCIL) only. The offer submitted other than online mode will not be accepted. Please refer 'Procedure for submission of E-tender' in Para-2 "Instructions to Bidders for submission of on-line bid" (Chapter-II of Part-I).

To participate in the e-bid submission, it is mandatory for the bidders to have user ID & password to login [www.tenderwizard.com/DFCCIL](http://www.tenderwizard.com/DFCCIL), which has to be obtained by submitting an annual registration charges of INR 2000/- + GST @ 18% or latest prevailing charges to M/s ITI Ltd. through e-payment, which may be confirmed. Bidders have to pay the Tender Processing Fee to M/s ITI Ltd. through e-payment at the time of submission of bid. Already registered vendors with M/s. ITI Ltd. need not pay registration charges.

- 1.1.8 E-Tenders shall be opened online on the time & date given in NIT at the address given below in the presence of the tenderers or their authorized representatives intending to attend the opening.

**Address of Office of the Chief Project Manager/South/Mumbai (for opening of tenders):**

Chief Project Manager/South/Mumbai, DFCCIL, 7<sup>th</sup> Floor, Central Railway New Administrative Building, D. N. Road, Mumbai-400001, Maharashtra.

- 1.1.9 Tender shall be submitted as per “Instructions to Bidders for submission of on-line bid” (Chapter-II of Part-I) forming a part of the tender document.
- 1.1.10 Any tender submitted through e-tendering without Earnest Money (EMD) in the form as specified in tender documents shall not be considered and shall be summarily rejected.
- 1.1.11 DFCCIL reserves the right to cancel the tenders before submission/opening of tenders, postpone the tender submission/opening date and to accept / reject any or all tenders without assigning any reasons thereof. DFCCIL’s assessment of suitability as per eligibility criteria shall be final and binding.
- 1.1.12 Tenderers may note that offers are liable for disqualification at any time during contract process in case any of the information furnished by them is found incorrect. EMD of such tenderer shall be forfeited. The decision of DFCCIL in this regard shall be final and binding.
- 1.1.13 The validity of offer shall be 120 days from the date of opening of the tender.
- 1.1.14 Information required as per various Forms mentioned in the tender document, should be submitted by the tenderers without fail, strictly as per formats.
- 1.1.15 The tender document shall be submitted in online mode through website [www.tenderwizard.com/DFCCIL](http://www.tenderwizard.com/DFCCIL).
- 1.1.16 MSEs registered with a body specified by Ministry of MSME for the item tendered will be exempted from payment of Tender Document cost & Earnest Money Deposit (EMD).

### 1.1.17 NOTICE FOR INVITING TENDER/BID (Online i.e. E-Tender)

Sr. No.	Tender No.	MUM/S/EL/239/UTILITY/77/REL-F (TENDER) dated 24/04/2018
1.	Name of work	Supply of towers & line materials and erection, testing & commissioning work for diversion of two numbers of 220 KV double circuit transmission lines (owned by R-Infra), to facilitate the passage of rail track being constructed by the Dedicated Freight Corridor Corporation of India Limited (DFCCIL) at four different crossing locations near Village Aagvan (Dahanu Taluka); near Village Shirgaon (Vasai Taluka); near Village Bilalpada (Vasai Taluka) & near Village Gokhivare (Vasai Taluka) in Maharashtra
2.	Type of Tender	(Single stage two packet).
3.	Type of Contract	Works Contract.
4.	Tender Value	Rs. 22,60,29,172/- only
5.	Completion Period	12 Months excluding monsoon period (1 <sup>st</sup> June to 30th September).
6.	Earnest Money	Rs. 33, 90, 440/- (To be paid through Demand Draft/ Banker's Cheque/FDR payable in favour of "Dedicated freight Corridor corporation of India Limited, Mumbai"). However, MSEs registered with a body specified by Ministry of MSME for the item tendered will be exempted from payment of Earnest Money Deposit (EMD).
7.	Cost of Tender document	Rs. 10,000/- plus GST @18%; To be paid by D.D./Banker's Cheque in favour of DFCCIL payable at Mumbai. However, MSEs registered with a body specified by Ministry of MSME for the item tendered will be exempted from payment of Cost of Tender Document.
8.	Tender Processing Fee	Rs.7,500/- only plus taxes and duties as applicable (non-refundable) through e- payment while uploading of tender
9.	Performance Bank Guarantee (P.G.)	Performance Guarantee (PG) have to be submitted within 30 (thirty) days from the date of issue of Letter of Acceptance (LOA), amounting to 5% of the contract value in the form prescribed in clause no.16. (4) of GCC/Chapter-IV (A) of Part-I.
10.	Security Deposit (S.D.)	SD shall be 5% of Contract Value as mentioned in clause nos.16. (1) & 16. (2) of GCC/ Chapter-IV (A) of Part-I.
11.	Officer:	Chief Project Manager/South/Mumbai Dedicated Freight Corridor Corporation of India Limited/Mumbai, 7 <sup>th</sup> Floor, New Administrative Building, D.N. Road, Mumbai-400001
12.	E-Tendering Web Site	E-tendering site- <a href="http://www.tenderwizard.com/DFCCIL">www.tenderwizard.com/DFCCIL</a> Help: Please contact Tender wizard helpdesk at 011-49424365 or cell No. 7738875559/7666563870
<b>13. DATE &amp; TIME SCHEDULE</b>		
(a)	Date of Uploading of NIT & Other Documents (Online Publishing date)	03/05/2018 at 15.00 Hrs.
(b)	Documents download/Sell start date (Online)	04/05/2018 at 10.00 Hrs.
(c)	Document download/Sell end date (Online)	01/06/2018 at 17.00 Hrs.
(d)	Bid submission Start date (online)	21/05/2018 at 10.00 Hrs.
(e)	Bid submission Last date (Online)	01/06/2018 up to 18.00 Hrs.
(f)	Last date of submission of originals of statutory documents i.e. EMD & Tender Document Fees.	02/06/2018 up to 15.00 Hrs.
(g)	Technical Bid Opening date & Time (online)	04/06/2018, 15.30 Hrs. onwards.
(h)	Financial Bid Opening date & Time (online)	Will be intimated to qualified bidders later after evaluation of received technical bids.

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

## **PART-I**

## **CHAPTER-II**

# **INSTRUCTIONS TO BIDDERS FOR SUBMISSION OF ON-LINE BID**

Signature & Stamp of Tenderer

For & on behalf of DFCCIL



## **PART-I**

### **CHAPTER-II**

#### **INSTRUCTIONS TO BIDDERS FOR SUBMISSION OF ON-LINE BID**

**1. General:**

All bidders must note that this being e-tender, bids received only through online on e-tendering portal [www.tenderwizard.com/DFCCIL](http://www.tenderwizard.com/DFCCIL) shall be considered as an offer. **Any bid submitted in the paper form will not be received & will not be opened and shall be summarily rejected.**

**Bidders should read the following important instructions before submission of their on-line bids.**

**2. Procedure for submission of e-tender:-**

**2.1. Bid Document obtaining process:-**

The Bidder who wishes to view free Notification and tender documents can visit DFCCIL's website [www.dfccil.gov.in](http://www.dfccil.gov.in) or [www.tenderwizard.com/DFCCIL](http://www.tenderwizard.com/DFCCIL).

Interested bidders who wish to participate should visit website [www.tenderwizard.com/DFCCIL](http://www.tenderwizard.com/DFCCIL), which is the ONLY website for bidding their offer. Procedure is as follows:

- Register yourself with M/s. Indian Telephone Industries (ITI) for obtaining Login ID and Password (after paying necessary charges). This is one time annual payment and applicable for bidding other tenders also.
- Obtain Class-III Digital Signature Certificate from ITI or any other digital signature issuing authority. In case bidder wish to obtain the digital signature certificate from ITI, they may contact at Mobile numbers 7738875539/7666563870.
- Using the login ID, password and digital signature, enter the tender portal to purchase the tender document.
- The tender document charge has to be paid though Demand Draft/Banker's cheque drawn in favour of Dedicated Freight Corridor Corporation of India Limited payable at Mumbai and payment details to be filled & uploaded along with the offer i.e. Bid in website.
- Pay processing fees through e-payment. This payment can be done only through e-payment gateway of ITI.
- With the payment of processing fee, the bidder can download the 'Technical bid' (Microsoft Excel file 'Technicalbid.xls') and 'financial bid' (Microsoft Excel file 'Financialbid.xls') by clicking the link "Show Form".

3. The tender document shall be submitted in online mode through website [www.tenderwizard.com/DFCCIL](http://www.tenderwizard.com/DFCCIL).
4. The bidder must ensure that the tender document submission before the closing time as the tender submission shall stop accepting the offer at prescribed date and time.
5. Bidder can anytime change quoted rates before date & time of closing of tender.
6. This tender being E-tender, the digital signature obtained from approved Controller of Certificate Authorities (CCA) shall only be considered as authentic. The process of obtaining digital signature has been specified as above in para 2.1.
7. Tenderer should submit the Tender Document cost and original EMD in Chief Project Manager/S/Mumbai's Office on/or before date 02/06/2018 up to 15.00 hrs. duly mentioning the tender reference on the envelope. Scanned copy of Tender Document cost & EMD to be submitted with online tender. In case Tender Document cost & original EMD not received by the date 02/06/2018 up to 15.00 hrs. offer will be summarily rejected. However, MSEs registered with a body specified by Ministry of MSME for the item tendered will be exempted from payment of Tender Document cost & Earnest Money Deposit (EMD).
8. The following statutory documents are to be submitted in physical form on/or before the date 02/06/2018 up to 15.00 hrs. in sealed envelope duly mentioning the tender reference, **otherwise, the offer of the tender shall be considered as invalid offer.**
  - (i) **Tender document cost / Tender Fee / Valid Certificate of registration of MSE.**
  - (ii) **Original EMD / Valid Certificate of registration of MSE.**
  - (iii) **Documents related to Sole Proprietorship Firm (if applicable).**

Sole Proprietorship Firm shall submit the notarized copy of the affidavit as per Para 1.3.6.2(a) of Chapter-III of Part-I.
  - (iv) **Documents related to Partnership Firm (if applicable)**

Partnership Firm shall submit notarized copies of;

    - (a) Registered / notarized Partnership Deed as per Para 1.3.6.2(b) (i) of Chapter-III of Part-I,
    - (b) Power of Attorney duly authorizing one or more of the partners of the firm or any other person(s) as per Para 1.3.6.2(b) (ii) Chapter-III of Part-I.
  - (v) **Documents related to JV firm. (if applicable)**

JV firm shall submit;

    - (a) Form 9, 11, 12 & 13 of the tender document (Part-III),
    - (b) In case one or more of the members are Partnership firm then, 1) Notary certified copy of Partnership deed [as per Clause 65.15.1 (a) of GCC/Chapter-IV (A) of Part-I] ; 2) Consent of all the partners to enter into the Joint Venture Agreement on a stamp paper of appropriate value (in original)[as per Clause 65.15.1 (b) of GCC/Chapter-IV (A) of Part-I]; C) Power of Attorney (duly registered as per prevailing law) in favour of one of the partners of the partnership firm to sign the JV Agreement on behalf of the partnership firm and create liability against the firm. [as per Clause 65.15.1 (c) of GCC/Chapter-IV (A) of Part-I].
    - (c) In case one or more members of JV is/are Proprietary Firm or HUF then following documents shall be enclosed:

Affidavit on Stamp Paper of appropriate value declaring that his/her Concern is a Proprietary Concern and he/she is sole proprietor of the Concern OR he/she is in position of "KARTA" of Hindu Undivided Family (HUF) and he/she has the

authority, power and consent given by other partners to act on behalf of HUF [as per Clause 65.15.2 of GCC/Chapter-IV (A) of Part-I]

(d) In case one or more members is/are Limited Companies then following documents shall be submitted:

i) Notary certified copy of resolutions of the Directors of the Company, permitting the company to enter into a JV agreement, authorizing MD or one of the Directors or Managers of the Company to sign JV Agreement, such other documents required to be signed on behalf of the company and enter into liability against the company and/or do any other act on behalf of the company [as per Clause 65.15.3 (a) of GCC/Chapter-IV (A) of Part-I];

ii) Copy of Memorandum and Articles of Association of the Company [as per Clause 65.15.3 (b) of GCC/Chapter-IV (A) of Part-I];

iii) Power of Attorney (duly registered as per prevailing law) by the Company authorizing the person [as per Clause 65.15.3 (c) of GCC/Chapter-IV (A) of Part-I]

(e) **Form No. 1 as per Part- III of tender document.**

(f) **Copy of GST Registration Certificate (GST IN) & PAN.**

9. It is to be ensured by the tenderer that the documents such as Tender document, scan copy of EMD, scan copy of Documents related to Sole Proprietorship Firm, Partnership Firm and Companies registered under Companies Act, as mentioned in the Para 1.3.6 of Chapter-III of Part-I of the tender document and Documents related JV mentioned in Para 65 of GCC (Chapter-IV (A) of Part-I) and Form 9, 11, 12, 13 of the tender document (Part-III) such as mentioned and other documents, as applicable, should be uploaded with tender online before the time and date of closure of the bid.

**Note: The documents, mentioned at para no. 8 above, are to be submitted in physical form and shall be in a sealed envelope duly super scribed “Kind attention to Additional Chief Project Manager/EL/ DFCCIL-Mumbai/S” and the tender number.**

10. Please attach all the addendum(s)/corrigendum(s) (if any) along with the tender document as per Clause 1.1.4 of NIT (Chapter-I of Part-I) and then upload with the tender document.

11. **Financial bid (Microsoft Excel file) to be filled, saved and uploaded with digital signature.** *Only the downloaded financial bid file should be uploaded after filling and saving in document library. Do not upload scanned copy such as pdf or jpg file etc. of ‘Financial Bid’ in document library.*

12. The bidder must obtain for itself on its own responsibility and its own cost all the information including risks, contingencies & other circumstances in execution of the work. The bidder shall also carefully read and understand all its obligations & liabilities given in tender documents.

13. **Cost of biddings:** - The Bidder shall bear all costs associated with the preparation and submission of its Bid and the Employer shall not be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process.

14. Tenderer may carefully note that they are liable to be disqualified at any time during tendering process, in case any of the information furnished by them, is found to be incorrect. In addition, the EMD of such tenderer shall be forfeited. The decision of Employer in this respect shall be final and binding.

15. The bidder shall submit only one bid in the capacity of an individual or sole proprietor, partnership firm, company and Joint venture. Violation of this condition is liable for disqualification of the offers and EMD of all such tenderers shall stand forfeited.

16. The bidder is expected to examine all instructions, terms, conditions & forms.
17. Specifications and other information are given in the bidding document. Failure to furnish all information required by the bidding documents or submission of a bid not substantially responsive to the bidding document in every respect, will be at the bidders risk and may result in rejection of his bid.
18. At any time prior to the deadline for submission of bids, Employer may for any reason whether at its own initiative or in response to any request by any prospective bidder, amend the bidding documents by issuing Corrigendum, which shall be part of the Tender documents.
19. Employer may at its discretion extend the deadline for submission of the bids at any time before the time of submission of the bids.

20. **Bid submission process:-**

The tender documents i.e. Technical Bid and Financial Bid with statutory documents, should be submitted through online mode in website [www.tenderwizard.com/DFCCIL](http://www.tenderwizard.com/DFCCIL) only up to **18:00 Hrs. on 01/06/2018**. The **“Packet - A (TECHNICAL BID)”** will be opened on **04/06/2018, 15:30 Hrs. onwards**. Any modified date and time for submission of tenders shall be uploaded on website [www.dfccil.gov.in](http://www.dfccil.gov.in), [www.tenderwizard.com/DFCCIL](http://www.tenderwizard.com/DFCCIL). The detail procedure of tender opening will be as per Para 1.3.5 of Chapter –III of Part-I.

- Before uploading the Technical Bid and before quoting the rate and uploading the ‘Financial Bid’, bidders are advised to upload scanned copies of the following supporting document (please refer Check list) in “General document link”. The list is indicative and not extensive.
  - 1) *EMD Document / Valid Certificate of registration of MSE; confirming Para 1.3.8 of General Information (Statutory Document). [Chapter –III of Part-I]*
  - 2) *Tender Fee Document / Valid Certificate of registration of MSE; confirming para 1.3.4.1& para 1.3.4.4 of Chapter –III of Part-I (Statutory Document).*
  - 3) *Supporting Documents for Eligibility Criteria as per Form 2A and 2B as per Part III. (Statutory Document)*
  - 4) *Sole proprietorship Firm, Partnership Firm, JV Firm deed/Memorandum and Articles of Association of the firm or company, if applicable as per Para 1.3.6 of Preamble & General Instructions to Bidders. (Statutory document) [Chapter –III of Part-I]*
  - 5) *Power of attorney of the person signing the tender document or photocopy duly attested by Notary Public as per Para 1.3.6 of Preamble & General Instructions to Bidders. (Statutory document) [Chapter –III of Part-I]*
  - 6) *Offer letter as per Form No.1 of Part -III. (Statutory document)*
  - 7) *GST Registration Certificate (GST IN) & PAN. (Statutory document)*
  - 8) *Any other supporting document as required.*
- *After uploading above documents, bidder should quote their rates in the downloaded ‘Financial Bid’ file and save the file. After saving, the bidder can upload the filled*

*file. The name of the downloaded 'Financial Bid' ('Financialbid.xls') file should not be changed.*

- The Bidder should submit the original EMD & Tender Document Fees OR Valid Certificate of registration of MSE in Chief Project Manager/South/Mumbai's Office up to 15.00 hrs. on 02/06/2018. On failure of the same the offer of the bidder shall be rejected.*
- Tenderer should submit the originals of statutory documents and other documents, as given at para 8 above, in Chief Project Manager/South/Mumbai's office up to 15.00 hrs. on 02/06/2018. Documents other than statutory document should be submitted in Chief Project Manager/South/Mumbai's office within 7 days from opening. The bid is liable to be rejected in case of failure to submit the documents on time.*

**21. Opening of the tender :-**

The "Packet-A (TECHNICAL BID)" will be opened online on 04/06/2018, 15.30 Hrs. onwards at the address mentioned in "Notice Inviting E-Tender" and read out in the presence of such tenderer(s) as is/are present. The detail procedure of tender opening will be as per para 1.3.5 of Chapter-III of Part-I. Tenderers or their authorized representatives who are present shall sign register in evidence of their attendance.

**Help desk for E- Tendering:-**

1. For any difficulty in downloading & submission of tender document at website [www.tenderwizard.com/DFCCIL](http://www.tenderwizard.com/DFCCIL), please contact at tenderwizard.com helpdesk no. 011-49424365 or mobile nos. 7738875559/7666563870.
2. Bidder manual & system requirement is available on website [www.tenderwizard.com/DFCCIL](http://www.tenderwizard.com/DFCCIL) for necessary help.

## **PART I**

### **CHAPTER III**

# **PREAMBLE & GENERAL INSTRUCTION TO BIDDERS**

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

## **PART- I**

### **CHAPTER- III**

#### **PREAMBLE & GENERAL INSTRUCTIONS TO BIDDERS**

##### **1.3.1 Introduction**

###### **(a) General**

Dedicated Freight Corridor Corporation of India Ltd. (DFCCIL), a public sector undertaking has been set up under the Indian Companies Act, 1956 for implementation of Dedicated Freight Corridor Project. Government of India is the sole shareholder of the DFCCIL.

Ministry of Railways (MOR), Government of India has planned to construct Dedicated Freight Corridor (DFC) covering about 3338 route Kilometers on Eastern and Western Corridors. The coverage of Eastern Corridor is from Ludhiana to Dankuni and Western Corridor is planned from Jawaharlal Nehru Port, Mumbai to Rewari / Tughlakabad / Dadri near Delhi. There will be a linkage between two corridors at Dadri.

###### **(b) Dedicated Freight Corridor**

Western DFC Route will be approximately 1520 Km long from Dadri to JNPT via Rewari- Mahendragarh – Alwar – Sikar – Nagaur – Jaipur – Ajmer – Pali – Sirohi – Banaskantha – Patan – Mahesana – Gandhinagar – Ahmedabad – Kheda – Anand – Vadodara – Bharuch – Surat – Navsari – Valsad – Palghar – Thane – Raigarh - JNPT.

Eastern DFC Route will be approximately 1839 Km long from Dankuni to Ludhiana via Dankuni – Asansole – Dhanbad – Gaya –Sonnagar – Mughalsarai – Allahabad – Kanpur – Tundla – Aligarh – Khurja – Bulandshahar – Meerut – Saharanpur – Ambala - Ludhiana.

Proposed alignment of DFC has been generally kept parallel to existing Indian Railway line except provision of detours at some stations where the existing yards/cities are congested.

The passage of the DFC corridor encounters some of the 220 KV Double Circuit Transmission Line sections of M/s Reliance-Infra. Such sections of Transmission Lines will need diversion for the purpose of overhead crossing of the corridor and also for the purpose of maintaining statutory electrical clearance above the proposed rail track of DFCCIL.

###### **(c) Scope of Work**

On behalf of MD/DFCCIL, Chief Project Manager/South/Mumbai, DFCCIL, 7<sup>th</sup> Floor, Central Railway New Administrative Building, D. N. Road, Mumbai-400001, Maharashtra, India, herein after referred to as 'DFCCIL', is inviting e-tenders from Firms/Companies/Joint Ventures having requisite experience and financial capacity for execution of the following work:

Signature & Stamp of Tenderer

For & on behalf of DFCCIL



“Supply of towers & line materials and erection, testing & commissioning work for diversion of two numbers of 220 KV double circuit transmission lines (owned by R-Infra), to facilitate the passage of rail track being constructed by the Dedicated Freight Corridor Corporation of India Limited (DFCCIL) at four different crossing locations near Village Aagvan (Dahnu Taluka); near Village Shirgaon (Vasai Taluka); near Village Bilalpada (Vasai Taluka) & near Village Gokhivare (Vasai Taluka) in Maharashtra”

- There are 2 Nos. of existing 220 KV Double Circuit Transmission Lines which are evacuating power from Dahanu Thermal Power Plant of M/s Reliance-Infra which is situated near Dahanu Railway Station. These 220 KV double circuit lines are carrying power to North Mumbai Region. The proposed railway track of DFCCIL is crossing these existing 220 KV double circuit transmission lines at various locations as listed below.

Name of village	Name of nearby town	Location No. of 220 kV SS D/C line	Location No. of 220 kV LS D/C line	Remarks
Aagwan	Dahnu	SS-11 # SS-12	LS-12 # LS-13	The crossing point is on high land & hard rock. The area is not inhabited.
Shirgaon	Virar	SS-194 # SS-195	LS-192 # LS-193	The crossing point is in the agriculture field with hard soil. The area is not inhabited
Bilalpada	Nalasopara	SS-213 # SS-214	LS-211 # LS-212	The crossing point is in the agriculture field with hard soil. The area is inhabited.
Gokhiware	Vasai	SS-225 # SS-226	LS-223 # LS-224	The crossing point is near the pond and the strata are hard rock. The area is not inhabited.

- Minimum Outage of Tr. Lines:**  
Bidders may specifically note that the existing 220 KV Double Circuit Transmission Lines are very crucial power lines of Mumbai Grid and are very important for M/s Reliance-Infra. At one stage, the outage (Shut down) of only one circuit of the Double Circuit Transmission Lines will be made available to the contractor. Therefore the diversion of this Transmission lines to facilitate the passage of DFC corridor will have to be done with minimum outage on the lines. The diversion will therefore have to be done taking outage of said lines, circuit by circuit.
- Since clearance above the track has to be maintained as 18.46 M (after accounting for the mid span sag at the crossing point), the existing line will need provision of tall towers. Since the passage of proposed DFC corridor is finalized and there is no scope for its deviation, the Transmission Lines of R-infra have to be modified to suit the requirement of DFCCIL.
- The plan drawings for proposed diversion of 2 Nos. of 220 KV Double Circuit Transmission Lines (SS & LS lines) at all the four DFC Corridor crossing sites are attached at Part-II.
- Bidders may note that the above referred modification/line diversion work is very precise and also has to be done with a minimum outage (circuit by circuit). It is necessary to carry out proper and effective construction, testing and commissioning for such type of transmission line diversion work.



**(d) Scope of work is as per the requirements given in bid document but not limited to:-**

**(i) Supply of Material:-**

- Supply of 220 KV towers for temporary & permanent arrangement for diversion of 220 KV Double Circuit Transmission. Lines, as per approved drawings and specifications.
- Supply of line materials such as AAAC ZEBRA conductor, composite silicone rubber long rod insulators, OPGW 48C, hardware and accessories for OPGW 48C & AAAC Zebra conductor, tower accessories, earthing materials as per schedule & specifications.
- Tower proto-modelling and inspection at manufacturer's works.
- Tower type testing for 3 types of Towers at approved Tower Testing Station.
- Inspection & testing of towers, insulators, AAAC Zebra conductor, OPGW 48C, hardware assemblies, conductor/OPGW accessories, earthing materials and tower accessories etc. at manufacturer's works.

**(ii) Preliminary works, Execution & Commissioning:-**

- Right of Way/Way leave Clearance for construction, erection, testing & commissioning of lines.
- Detailed check survey including profiling & Tower spotting as necessary.
- Soil Investigation at each location for temporary and permanent diversion works. Submission of Soil Investigation report.
- Classification of different types of tower foundations.
- Storage, preservation etc. of all Tower/Line material at site store.
- Marking of tower locations at site & excavation as per the approved profile and tower foundation drawing.
- Stub setting and foundation works as per approved drawings.
- Erection of towers, tower extensions, installation of tower earthing & installation of tower accessories as per approved methodology and FQAP mentioned in Part-IV of this tender document.
- Stringing of AAAC Zebra and OPGW 48C including installation of insulators, hardware and accessories etc.
- Provision of retaining/protection wall wherever necessary.
- Inspection, Testing & commissioning of lines including diversion works (i.e. temporary & permanent arrangement).
- Dismantling of Existing as well as temporary diversion 220 KV Double Circuit Towers & tower accessories, insulators, insulator hardware, including De-stringing of AAAC ZEBRA conductors (6 Nos.), conductor hardware & accessories, OPGW 48C, OPGW hardware & accessories, tower earthing materials as per approved methodology.
- Demolishing of Existing foundations, Temporary foundations and protection walls, debris management and backfilling as per the instruction of Engineer In charge.
- Retaining of all the dismantled towers (except existing tension towers at Nalasopara site) and line materials dismantled from existing 220 KV Double Circuit Transmission

- Lines (except suspension/tension hardware assemblies) by the contractor (Rebate for dismantled towers and line materials shall be quoted by bidder).
- Retaining of all the dismantled towers and line materials dismantled from Temporary diversion arrangement of 220 KV Double Circuit lines by the contractor (Rebate for dismantled towers and line materials shall be quoted by bidder).
  - Loading, Unloading and Transportation of 2 Nos. dismantled of tension towers from existing lines at Nalasopara site, including hardware assemblies of suspension & tension strings removed from existing transmission lines, to the R-Infra store at Dahanu.
- (iii) Any other items not specified or mentioned in this specification and/or in other part of complete bid document but are necessarily required for successful installation, testing and commissioning of complete transmission lines, unless specifically excluded in the specifications will be in the scope of the bidder.
- (e) **Cost of the work:-** The estimated cost of the tendered work is approximately **Rs.22, 60, 29,172/-Only (Rupees Twenty Two Crore Sixty Lakhs Twenty Nine Thousand One Hundred Seventy Two Only)**
- (f) Bidder shall be governed by conditions and specifications contained in various parts/chapters of the tender document. In case of any contradiction in conditions/ specifications contained in various parts/chapters of the tender document, order of precedence will be as given below;
- (i) Any footnote given in the Schedule of Prices [Form No. – 4 of Financial Bid].
  - (ii) Explanatory notes of Schedule of Prices [Chapter-VI of Part-I].
  - (iii) Schedule of Prices [Form No. – 4 of Financial Bid].
  - (iv) Additional Special Conditions of contract (Price & Payment) [Chapter-V(B) of Part-I]
  - (v) Special Conditions of contract [Chapter-V(A) of Part-I]
  - (vi) Contract Management [Chapter-IV(C) of Part-I]
  - (vii) Technical Specifications [Part-II]
  - (viii) General Conditions of Contract [Chapter-IV(A) of Part-I]
  - (ix) Preamble and General Instructions to bidders[Chapter-III of Part-I]

However, DFCCIL's decision in this connection shall be final and binding.

(g) **Location:-**

Works are to be executed in the jurisdiction of Palghar District of Maharashtra as defined in the scope of work [Para 1.3.1. (c) Above].

**1.3.2 (1) Tender Bid:-**

The Tender Bid shall be submitted online **through uploading on e-tender web site address: - [www.tenderwizard.com/DFCCIL](http://www.tenderwizard.com/DFCCIL)** as under:-

**Packet – A:-**

Eligibility/Qualifying element of the Tender Bid along with other documents mentioned in Para 1.3.2 (2) (i) below, here in after called “TECHNICAL BID”

**Packet –B:-**

Price elements of the Tender Bid as per Para 1.3.2 (2) (ii) below, herein after called “FINANCIAL BID”

The “TECHNICAL BID” (Packet - A) **received through e-tender with physical deposition of EMD, Tender Fee and other statutory documents** shall be opened on the date of tender opening and the detailed scrutiny of TECHNICAL BID shall be carried out.

The “FINANACIAL BID” (Packet - B) **received through e-tender** shall be opened only of those tenderers who qualify in "Technical Bid".

The Financial Bid (Packet- B) of un-qualified tenderers shall not be processed further and not opened. The detailed procedure for tender opening and processing is given in Para 1.3.5 below.

**(2) Form of Tender:-**

The Tender documents shall be in two separate packets viz:-

"**Packet - A**" containing technical bid and "**Packet – B**" containing financial bid. Detailed credentials as per the requirement of eligibility criteria and all tender papers except Summary of Prices and Schedule of Prices, are to be submitted through online e-tender in "TECHNICAL BID" i.e. Packet-A. Summary of Prices and Schedule of Prices duly filled with percentage above/below/at par are to be submitted in “FINANCIAL BID” (Microsoft Excel file) to be filled, saved and uploaded with digital signature through online e-tender.

Completed tender documents in two packets viz. Packet-A and Packet-B shall be submitted through online e-tender on web site:-**www.tenderwizard/DFCCIL**.

**(i) Documents to be uploaded in support of TECHNICAL BID (Packet - A):-**

Sr. No.	Description	Documents
1	Offer letter complete.	Form No. 1 (Part- III of tender document)
2	Tenderer's credentials in accordance with Para 1.3.13 (i) & (ii) of Preamble and General Instructions to Bidders (Chapter-III of Part-I).	Form No. 2A, 2B & 2C (Part- III of tender document)
3	Earnest money or Valid Certificate of registration of MSE in accordance with Para 1.3.8 and Cost of Tender Document or Valid Certificate of registration of MSE in accordance with Para 1.3.4.4 of Preamble and General Instructions to Bidders (Chapter-III of Part-I) in an envelope.	
4	Power of Attorney authorizing the signatory of the tender to commit the tenderer and other documents as per format as applicable, in accordance with Para 1.3.6 of Preamble and General Instructions to Bidders (Chapter-III of Part-I).	

**(ii) Documents to be enclosed with the FINANCIAL BID (Packet B):-**

Sr. No.	Description	Documents
1	Summary of Prices, Schedule of Prices & Total Prices.	Form No. 3 & 4

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

### 1.3.3 **Tender Document:-**

This tender document consists of following four parts:

PART/CHAPTERS	DESCRIPTION	PAGE NO.
<b>PART – I</b>		3
Chapter-I	Notice Inviting E-Tender.	3
Chapter-II	Instructions to Bidders for submission of on-line bids.	8
Chapter-III	Preamble and General Instructions to Bidders	14
Chapter-IV (A)	General Conditions of Contract (GCC)	30
Chapter-IV (B)	Pre Contract Integrity Pact	71
Chapter-IV (C)	Contract Management	78
Chapter-V(A)	Special Conditions of Contract (SCC)	86
Chapter-V(B)	Additional Special Conditions of Contract (Price & Payment)	104
Chapter-VI	Explanatory Notes of Schedule of Prices	111
<b>PART – II</b>		127
Chapter-I	Scope of work for Supply	128
Chapter-II	Technical Specification of Towers & Accessories	135
Chapter-III	Technical Specification of AAAC Zebra Conductor	157
Chapter-IV	Technical Specification of OPGW(Optical Ground Wire) Cable(48F)	165
Chapter-V	Technical Specification of Silicon Rubber Composite & Polymer Long Rod Insulator	205
Chapter-VI	AAAC Zebra Conductor Stringing Hardware & Accessories	218
Chapter-VII	Technical Specification of By-Pass Assembly for Double Tension String Hardware	235
Chapter-VIII	Scope of work for Services, Construction & Erection	248
<b>PART – III</b>	Tender Forms (including Schedule of Prices)	313
<b>PART – IV</b>	Field Quality Assurance Plan (FQAP)	345
<b>PART – V</b>	Appendix-1 to Appendix-5 (IEEMA Circulars for Price Variation)	379

### 1.3.4 **Sale and Submission of Tender Document:-**

- 1.3.4.1 The Tender document can be downloaded from DFCCIL's website [www.dfccil.gov.in](http://www.dfccil.gov.in) or [www.tenderwizard.com/DFCCIL](http://www.tenderwizard.com/DFCCIL) on payment of tender processing fee of the website. The tender document shall be submitted in online mode through website [www.tenderwizard.com/DFCCIL](http://www.tenderwizard.com/DFCCIL). **The Tender Document cost/fee of Rs. 10,000/- plus GST @18% to be paid through Demand Draft / Banker's cheque payable in favour of "Dedicated Freight Corridor Corporation of India Limited, Mumbai". The cost/fee of the tender form is not refundable and also not transferable.** However, MSEs registered with a body specified by Ministry of MSME for the item tendered will be exempted from payment of Tender Document cost/fee.

### 1.3.4.2 **Bid Document obtaining process:-**

As per para 2.1 of "Instructions to Bidders for submission of on-line bids" [Chapter-II of Part- I].

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

**1.3.4.3 Clause applicable for tender submitted through e-tender:-**

Tenderers are free to download tender documents at their own cost, for the purpose of perusal. Master copy of the tender document will be available in the office of Chief Project Manager/South/Mumbai, DFCCIL, 7<sup>th</sup> floor, Central Railway New Administrative Building, D.N. Road, Mumbai-40001. After award of the work, an agreement will be drawn up. The agreement shall be prepared based on the master copy of the tender document available in the office of Chief Project Manager/South/Mumbai/DFCCIL and not based on the tender documents submitted by the Tenderer. In case of any discrepancy between the tender documents submitted through e-tender and the master copy, later shall prevail and will be binding on the Tenderers. No claim on this account shall be entertained.

**1.3.4.4 Cost of Tender documents downloaded from internet:-**

Tender documents are available on web site of DFCCIL i.e. [www.tenderwizard.com/DFCCIL](http://www.tenderwizard.com/DFCCIL). The cost/fee of the tender document as indicated in para 1.3.4.1 above will have to be deposited by the tenderer in the form of Demand draft/Banker's cheque payable in favour of 'Dedicated Freight Corridor Corporation of India Limited' along with the Tender document. Tenderer should submit the Tender Document cost/fee or Valid Certificate of registration of MSE in physical form in Chief Project Manager/ South/Mumbai's Office on/or before date 02/06/2018 up to 15.00 hrs. duly mentioning the tender reference on the envelope. ***Scanned copy of Tender Document cost/fee & EMD or Valid Certificate of registration of MSE is to be submitted with online tender.*** In case tender document cost/fee & original EMD or Valid Certificate of registration of MSE not received by the date 02/06/2018 up to 15.00, offer will be summarily rejected. Tender document cost/fee should be paid separately and should not be included in the earnest money (EMD). In case, tender is not accompanied with the cost/fee of the tender document / Valid Certificate of registration of MSE as detailed above, offer will be summarily rejected.

**1.3.4.5 Bid submission process:-**

As per para 20 of "Instructions to Bidders for submission of on-line bids" [Chapter-II of Part-I].

**1.3.4.6 EMD & Tender Fee / Valid Certificate of registration of MSE and other Statutory documents sealed in an envelope and super-scribed as aforesaid can also be sent by Registered post addressed to the Chief Project Manager/South/Mumbai, DFCCIL, 7<sup>th</sup> floor, Central Railway New Administrative Building, D.N. Road, Mumbai-40001, India. ***EMD & Tender Fee / or Valid Certificate of registration of MSE and other statutory documents received after 15.00 hrs. on 02/06/2018 shall not be considered.*** EMD, Tender Fee and other statutory documents delivered or sent otherwise, will be at the risk of the tenderers.**

**1.3.4.7 The rates should be quoted in Financial Bid (Packet –B) (Microsoft Excel file) and same to be filled, saved and uploaded with digital signature. Only the downloaded financial bid should be uploaded after filling and saving. Don't upload pdf or jpg etc. scanned copy of "financial bid" in document library. The bids submitted without Excel file, shall be summarily rejected.**

**1.3.4.8 Signing of All Bid Papers and completing Financial Bid:-**

This tender being e-tender, the digital signature obtained from approved Controller of Certificate Authorities (CCA) shall only be considered as authentic. The process of obtaining digital signature has been specified at Para - 2.1 of "Instructions to Bidders for submission of on-line bids" [Chapter-II of Part- I].

#### **1.3.4.9 Care in Submission of Tenders:-**

Before submitting a tender, the tenderer will be deemed to have satisfied himself by actual inspection of the site and locality of the works, that all conditions liable to be encountered during the execution of the works are taken into account and that the quoted rates by tenderer in tender forms are adequate and all-inclusive of Taxes, Duties & Levies etc. in terms of General/Special Conditions of bid document to the entire satisfaction of the Employer.

#### **1.3.4.10 Site Visit:-**

Interested bidders may visit the project sites to get acquainted with the site conditions and for better understanding of scope of work, at their own cost, before bidding.

All communication between the Employer and the bidder shall be in writing. For the purposes of seeking clarification, the Employer's address is:

Chief Project Manager/South/Mumbai,  
Dedicated Freight Corridor Corporation of India Limited,  
7<sup>th</sup> floor, Central Railway New Administrative Building, D.N. Road, CST, Mumbai-01,  
Telephone: +91 7977885197, Facsimile number:-022-22634184  
Electronic mail address: hmittal@dfcc.co.in

**1.3.4.11** Conditional tenders are not acceptable. DFCCIL, however, reserves the right to reject such tenders summarily without assigning any reasons whatsoever. The DFCCIL also reserves the right to reject any special conditions stipulated by the Tenderer as considered unacceptable to the DFCCIL and can call upon the Tenderer to withdraw such conditions. If any deviations from the General conditions/Special conditions/Specifications are proposed by the tenderer, that should be mentioned in the **separate statement of deviation** and should be attached as Annexure and not elsewhere in the tender documents.

**1.3.4.12** If it is found at any stage of the finalization of the tender or during actual execution of the work that the information furnished in this tender, including clarifications, is incorrect, the tenders are liable to be rejected.

#### **1.3.4.13 Deduction of Taxes:-**

Deduction on account of Taxes, prescribed by the Central Government/State Government/Local Bodies at the prescribed rate will be done from the bills from time to time. A certificate to that effect will be issued by DFCCIL.

#### **1.3.4.14 The list of documents (Check list) to be attached along with the tender documents is as under:-**

- (i) Requisite Earnest Money (EMD) in proper form or Valid Certificate of registration of MSE.
- (ii) Tender fee/cost in prescribed form or Valid Certificate of registration of MSE.
- (iii) Various Proforma attached with tender document as per Part-III.
- (iv) Offer Letter as per Form No-1 of Part-III.



- (v) Documents establishing fulfillment of the eligibility criteria as per Form No. 2A and 2B as per Part-III.
- (vi) List of personnel, organization available on hand and proposed to be engaged for the subject work.
- (vii) List of plants & machinery available on hand (own) and proposed to be inducted (Own & hired to be given separately) for the subject work.
- (viii) List of works completed in the last three financial years and current financial year giving description of work, organization for whom executed, approximate value of contract at the time of award, date of award, scheduled date of completion of work, date of actual commencement of work, actual date of completion and completion cost. Supportive documents/certificates from the organizations with whom they had worked should also be enclosed. Certificate from private individuals for whom such works were executed will not be accepted.
- (ix) List of works on hand indicating description of work, contract value, date of award, value of work executed & approximate value of balance work yet to be done. Supportive documents/certificates from the organizations with whom they are working, should also be enclosed. Certificate from private individuals for whom such works are being executed will not be accepted.
- (x) MOU for JV as per Form 9 and Partnership deed as per Form 11 of Part- III.
- (xi) Power of Attorneys as per Form 12 & 13 of Part-III.
- (xii) All above documents duly signed & completed in all and signing each and every page of the document.

#### **1.3.5 Opening of Tender:-**

- (a) Tender will be opened online on 04/06/2018, 15.30 hrs. onwards in the office of Chief Project Manager/South/Mumbai, Dedicated Freight Corridor Corporation of India Limited, 7<sup>th</sup> floor, Central Railway New Administrative Building, D.N. Road, CST, Mumbai-01, India, in the presence of the tenderers or their representatives as may be present at the prescribed date and time.
- (b) The outer sealed covers of EMD & Tender Fee / Valid Certificate of registration of MSE, Form 1, 2A, 2B and 2C with other statutory documents shall be opened at 15.00 hrs. on 02/06/2018. Thereafter the packet of 'TECHNICAL BID (Packet- A)' only of the tenderers whose EMD & Tender Fee / Valid Certificate of registration of MSE, stipulated Forms have been received in the office of Chief Project Manager/South/Mumbai /DFCCIL office shall be opened and the contents thereof i.e. qualification details shall be read out. FINANCIAL BID (Packet-B) shall be opened subsequently after informing the parties participated.
- (c) After the opening of "TECHNICAL BID" (Packet-A) of all the tenderers, the Bids shall be scrutinized and analyzed. If found necessary by the Employer, the tenderers shall be asked to furnish clarifications and the Employer may also hold discussions with the tenderers after giving due notice. The names of the tenderers, whose Bid are considered complete and meet eligibility criteria shall be short listed.
- (d) The FINANCIAL BID (Packet – B) shall be opened on a subsequent date and time duly notified well in advance. The Financial Bids of only those tenderers shall be opened who are short listed after scrutiny of their Technical Bid. The Financial Bid of the tenders who do not qualify during scrutiny of Technical Bid shall not be opened. The time of opening, date and venue of online financial bids of shortlisted bidders shall be advised to qualified tenderers well in advance to enable them to depute their representative. The earnest money (EMD) of non-qualifying tenderers will be returned back within a reasonable period of completion of process of Technical Bid.

**1.3.5.1** The Employer (DFCCIL) will notify Bidders in writing whose offer have been rejected on the grounds of their Technical bids being substantially non-responsive to the requirements of the bidding document and their price bids i.e. FINANCIAL BID (Packet-B) submitted online will not be opened.

**1.3.6 Constitution of the Firm:-**

**1.3.6.1** Tenderer shall clearly specify whether the tender is submitted on his own or on behalf of a partnership firm/Joint Venture (JV)/Company. The tenderer(s) who is/are constituents of the firm/Company shall enclose notarized copies of the constitution of their concern, Partnership Deed and Power of attorney along with their tender. Tender documents in such cases shall be signed by such persons as may be legally competent to sign them on behalf of the firm / company as the case may be.

**1.3.6.2** The tenderer shall give full details of the constitution of the Firm/JV/Company and shall also submit following documents (as applicable), in addition to documents mentioned above:

- (a) Sole Proprietorship Firm: The tenderer shall submit the notarized copy of the affidavit.
- (b) Partnership Firm : The tenderer shall submit self-attested copies of (i) registered/notarized Partnership Deed and (ii) Power of Attorney duly authorizing one or more of the partners of the firm or any other person(s), authorized by all the partners to act on behalf of the firm and to submit & sign the tender, sign the agreement, witness measurements, sign measurement books, receive payments, make correspondences, compromise/settle/relinquish any claim(s) preferred by the firm, Sign "No claim Certificate", refer all or any dispute to arbitration and to take similar action in respect of all tenders/contracts or said tender/contract.
- (c) Joint Venture: The tenderer shall submit documents as mentioned in clause 65 of GCC [Chapter IV (A) of Part-I].
- (d) Companies registered under Companies Act-1956: The tenderer shall submit (i) the copies of Memorandum of Association (MOA) and Articles of Association (AOA) of the company; and (ii) Power of attorney duly registered/notarized by the company (backed by the resolution of Board of Directors) in favour of the individual, signing the tender on behalf of company.

**1.3.6.3** **If it is mentioned in the tender submission that it is being submitted on behalf of/by a sole Proprietorship Firm/Partnership Firm/Joint venture/registered Company etc. but above-mentioned documents (as applicable) are not enclosed along with tender, the tender shall be summarily rejected.**

If it is NOT mentioned in the tender submission that it is being submitted on behalf of/by a Sole Proprietorship Firm/Partnership Firm/Joint Venture/Registered Company etc., then the tender shall be treated as having been submitted by the individual who has signed the tender.

After opening of the tender, any document pertaining to the constitution of the Firm/Joint Venture etc. shall neither be asked nor be entertained /considered by DFCCIL.

**1.3.6.4** A tender from Joint Venture/Partnership Firm etc. shall be considered only where permissible as per the tender conditions.



**1.3.6.5** The DFCCIL will not be bound by any power of attorney granted by the tenderer or by changes in the composition of the firm made subsequent to the submission of tender. It may, however, recognize such power of attorney and changes after obtaining proper legal advice.

**1.3.7 Validity of Tender:-**

Tenderer shall keep his offer open for a minimum period of 120 days from the date of opening of the tender or as mentioned in the Tender Notice.

**1.3.8 Earnest Money:-**

- (a) The tender must be accompanied by Earnest Money (EMD) in favour of “**Dedicated Freight Corridor Corporation of India Limited, Mumbai**” deposited in any of the forms as mentioned in Para 1.3.8(c) below, failing which the tender will not be considered. However, MSEs registered with a body specified by Ministry of MSME for the item tendered will be exempted from payment of Earnest Money Deposit (EMD).
- (b) The earnest money shall remain deposited with the DFCCIL for the period of validity of the offer prescribed in this tender i.e. 120 days from the date of opening of tender.
- (c) **The Earnest money (EMD) should be in the form of FDR or Banker’s cheque or Demand Draft executed by State bank of India or any of the nationalized banks or any Indian Scheduled Bank.**
- (d) It shall be understood that the tender documents have been sold/issued to the tenderer and the tenderer is permitted to tender in consideration of stipulation on his part, that after submitting his tender he will not resile from his offer or modify the terms and conditions, thereof, in a manner not acceptable to the Employer. Should the tenderer fail to observe or comply with the said stipulation, the aforesaid amount shall be liable to be forfeited by the DFCCIL.
- (e) The earnest money of the unsuccessful tenderer(s) will, save as here-in-before provided, be returned to the unsuccessful tenderer(s) within a reasonable time but the DFCCIL shall not be responsible for any loss or depreciation that may happen for the due performance of the stipulation to keep the offer open for the period specified in the tender documents or to the earnest money while in their possession nor be liable to pay interest thereon.
- (f) ***The bidder has to submit the original EMD & Tender Fee OR Valid certificate of registration of MSE in physical form and shall be in sealed envelope along with the statutory documents addressed to Additional Chief Project Manager/EL/South/Mumbai/DFCCIL mentioning the tender number on or before 15.00 hrs. on 02/06/2018.***

**NOTE:** No interest shall be paid by DFCCIL on earnest money (EMD) amount.

**1.3.9 Execution of Contract Agreement:-**

The Tenderer whose tender is accepted shall be required to appear in person at the office of Chief Project Manager/South/Mumbai/DFCCIL, 7<sup>th</sup> floor, Central Railway New Administrative Building, D.N. Road, Mumbai-40001 or if a firm or corporation, a duly authorized representative shall so appear and execute the contract agreement within 30 days after issuing the notice that the contract has been awarded to him. Failure to do so shall constitute a breach of the agreement affected by the acceptance of the tender in which case the full value of the earnest money (EMD) accompanying the tender, shall stand forfeited without prejudice to any other rights or remedies.

In the event of any tenderer whose tender is accepted, refuses to execute the contract agreement as here in before provided, DFCCIL may determine that such tenderer has abandoned the contract and there upon his tender and acceptance thereof shall be treated as cancelled and DFCCIL shall be entitled to forfeit the full amount of the Earnest Money(EMD).

**1.3.10 Security Deposit on Acceptance of Tender:-**

The security deposit/rate of recovery/mode of recovery on acceptance of tender, shall be as per the Para 16 (1) to 16 (3) of General Conditions of Contract (GCC) [Chapter IV (A) of Part-I].

**1.3.11 Tenderer's Address:**

The tenderer should state in the tender his postal address & e-mail address, legibly and clearly. Any communication sent in time, to the tenderer by post at his said address, shall be deemed to have reached the tenderer duly and in time. Important documents should be sent by registered post/e-mail.

**1.3.12 Right of DFCCIL to Deal with Tenders:-**

- (a) The DFCCIL reserves the right of not to invite tenders for any of DFCCIL work or works or to invite open or limited tenders and when tenders are called to accept a tender in whole or in part or to reject any tender or all tenders, without assigning reasons for any such action.
- (b) The authority for the acceptance of the tender will rest with the DFCCIL. It shall not be obligatory on the said authority to accept the lowest tender or any other tender and no tenderer(s) shall demand neither any explanation for the cause of rejection of his /their tender nor the DFCCIL undertake to assign reasons for declining to consider or reject any particular tender or tenders.

**1.3.13 (i) Eligibility Criteria:-**

**A. Technical Eligibility Criteria:-**

Criteria Requirement	Compliance Requirement				Documents
	Single Entity	Joint Venture			Submission Requirements
		All parties combined	Each Partner	Lead partner	
<p>The Bidder should have successfully completed at least one similar* single work for a minimum value of 35% of advertised tender value of work in the last three financial years i.e. current Financial year and three previous financial years (with reference to the deadline for submission of tender).</p> <p><b>*The meaning of "similar work" for this work is satisfactory execution of works pertaining to "Supply, erection, testing and commissioning of Transmission Lines working on voltage level 220 KV or above."</b></p>	Must meet requirement	Must meet requirement	Not applicable	Must meet requirement	Copy of completion certificate issued by work awarding authority on its letter head along with copies of Letter of Acceptance (LOA)/ Contract Agreement (CA).

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**Note:**

- Value of completed work done by a member in an earlier JV Firm shall be reckoned only to the extent of the concerned member's share in that JV firm for the purpose of satisfying his/her compliance to the above mentioned technical eligibility criteria in the tender under consideration.
- In case the tenderer/s is a partnership firm, the work experience shall be in the name of partnership firm only.

**B. Financial Eligibility Criteria:**

Criteria Requirement	Single Entity	Compliance Requirement			Documents Submission Requirements
		All parties combined	Each Partner	One of the partner	
The contractual payments received by the tenderer/JV Firm or the arithmetic sum of contractual payments received by all the members of the JV Firm in the previous three Financial years and the current financial year up to the date of submission of tender shall be at least <b>150% of advertised value of tender.</b>	Must meet requirement	Must meet requirement	Not applicable	Not applicable	TDS certificates/ Audited balance sheets and or Photostat of TDS certificates/Audited balance sheets clearly indicating the contractual amount received. All documents either original or photocopy should be attested by Notary.

**Note:**

- Contractual payments received by a Member in an earlier JV firm shall be reckoned only to extent of the concerned member's share in that JV Firm for the purpose of satisfying compliance of the above mentioned financial eligibility criteria in tender for considerations.
- In case the tenderer/s is a partnership firm, the turnover etc. shall be in the name of partnership firm only.

**(ii) Credentials of Tenderer:**

The tenderer shall provide satisfactory evidence in support of their technical and financial eligibility, which are acceptable to DFCCIL, as follows:

- For Technical eligibility criteria, the details will be submitted in Form No. 2A [Part-III] along with supporting documents.
- For Financial eligibility criteria, the details will be submitted in Form No. 2B [Part-III] along with supporting documents.
- The tenderer should submit the attested copies of the certificates obtained from the agencies wherever the works have been completed successfully. These certificates should indicate the details of works carried out and successful commissioning of similar type of work executed by the tenderer.

**The certificate from Private individuals for whom such works are executed/being executed shall not be accepted.**

The following will be applicable for evaluating the eligibility:

- Similar nature of work physically completed within the qualifying period, i.e. last three financial year and current financial year (even though the work might have commenced before the qualifying period) shall only be considered in evaluating the eligibility.
- The total completion value of similar nature of work completed, during the qualifying period, shall be calculated considering original contract agreement value and sanctioned quantity variation value, however, price variation value shall not be considered.

Signature & Stamp of Tenderer

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- (iii) The total value of similar nature of work completed during the qualifying period and not the payment received within qualifying period alone, shall be considered. In case, the final bill of similar nature of work has not been passed and final measurements have not been recorded, the paid amount including statutory deductions is to be considered. If final measurements have been recorded and work has been completed with negative variation, then also the paid amount including statutory deductions, is to be considered. However, if final measurements have been recorded and work has been completed with positive variation but variation has not been sanctioned, original contract agreement value or last sanctioned contract agreement value whichever is lower, shall be considered for judging eligibility.
- (iv) As proof of sufficient financial capacity and organizational resources, contractor should have received total contractual payments against satisfactory execution of all completed/ on-going works of all types (not confined to only similar works) during the last three financial years and in the current financial year (up to the date of submission of the tender) of a value not less than 150% of advertised tender value.
- (v) Tenderer shall submit a statement of contractual payments received during last three financial years and current financial year on the prescribed Proforma as per Form No. 2B [Part-III]. The details shall be based on the Form 26-AS, i.e. the certificate of deduction of tax at source as per Income Tax Act 1961. The photocopies of Form 26-AS shall be enclosed duly attested by Notary Public with seal and Notarial Stamp thereon or a certificate from auditor or audited balance sheet certified by Chartered Accountant clearly indicating the contractual amount received duly attested by Notary Public with seal and Notarial Stamp thereon.
- (vi) The tenderer shall be considered disqualified/in-eligible if:
- (a) The Tenderer or any of its partners and/or subcontractors included in the tender has been banned for business with Ministry of Railways/DFCCIL along with any of its attached and subordinate offices through an order issued by Ministry of Railways as per list available on Web site (<http://www.indianrailways.gov.in /railway board>) of Railway Board pertaining to banning of Business, with the banning being valid as on the date of submission the Tender.
  - (b) The Tenderer or any of its partners has suffered bankruptcy/insolvency or it is in the process of winding-up or there is a case of insolvency pending before any Court on the deadline of submission of application.

**1.3.14 Period of Completion:**

The entire work is required to be completed in all respects within **12 months (Twelve months) from the date of issue of the acceptance letter excluding monsoon period (1<sup>st</sup> June to 30<sup>th</sup> September)**. Time is the essence of contract. The contractor shall be required to maintain steady and regular progress to the satisfaction of the Engineer to ensure that the work will be completed in all respects within the stipulated time period.

- 1.3.15** If the Tenderer/s deliberately gives any wrong information about credentials /documents in his/their tenders and thereby create(s) circumstances for acceptance of his/their tender, DFCCIL reserves the right to reject such tender at any stage, besides, shall suspend business with such tenderer. The EMD of such tenderers shall also be forfeited.

**1.3.16 Quantum of work and materials:**

The indicative schedule of quantities of various items of works is included in Form No. - 4, of Part-III of the tender documents.

- 1.3.17 Variation in Contract Quantities** shall be dealt as per Para 1.5.48 of Additional Special Conditions of Contract (Price and Payments) [Chapter - V (B) of Part-I].
- 1.3.18 Employer not bound to accept any tender:**  
The employer shall not be bound to accept the lowest or any tender or to assign any reason for non-acceptance or rejection of a tender. The employer reserves the right to accept any tender in respect of the whole or any portion of the work specified in the tender papers or to reduce the work or to accept any tender for less than the tendered quantities without assigning any reason whatsoever.
- 1.3.19 Schedule of Prices:**  
The Bidding Schedule of the tender document lists out in Form No. – 4 [Part-III] the Schedule of Basic Prices for various items. GST @ applicable rate will be payable extra.
- 1.3.20 Performance Guarantee:** Refer Clause No.16. (4) of GCC [Chapter IV (A) of Part-I].
- 1.3.21** The tenderer shall furnish information for making payment through ECS/NEFT/RTGS (Tender Form No. 8 placed at Part-III of the tender documents).
- 1.3.22 Negotiation:**  
Should DFCCIL decide to negotiate with a view to bring down the rates, the tenderer called for negotiations should furnish the following form of declaration before commencement of negotiations:  
"I..... do declare that in the event of failure of contemplated negotiations relating to Tender No..... dated .....my original tender shall remain open for acceptance on its original terms and conditions".
- 1.3.23 Site Inspection:**  
Tenderers are requested to inspect the site and carry out careful examination to satisfy them as to the nature of work involved and facilities available at the site. They should note carefully all the existing structures and those under construction through other agencies. They should also study the suitability of utilizing the different equipment and the machinery that they intend to use for the execution of the work. The tenderers should also select suitable sites for the purpose of locating their store yard, laboratory, staff quarters etc., and satisfy themselves with regard to the feasibility of transporting the materials etc. from the store to the final site of placement etc.
- 1.3.24 No form C & D shall be issued to the contractor for this work.**
- 1.3.25 Fraud Prevention & Detection Policy of DFCCIL:-**  
(a) Representative of vendors, suppliers, contractors, consultants, service providers or any other agency(ies) doing any type of business with the Company, is expected and shall be responsible to ensure that there is no fraudulent act being committed in their areas of responsibility/control. As soon as it is learnt that a fraud or suspected fraud has taken or is likely to take place they should immediately apprise the same to the concerned authority as per the procedure.

- (b) All bidders/ service providers/ vendors/ consultants etc. shall be required to certify that they would adhere to the Fraud Prevention & detection Policy of Company and not indulge or allow anybody else working in their organization to indulge in fraudulent activities and would immediately apprise the organization of the fraud/ suspected fraud as soon as it comes to their notice. In respect of contracts funded by Multilateral Agencies, the above will be incorporated after consultation / consents of the Lending Agency.

## **PART - I**

### **CHAPTER IV (A)**

## **GENERAL CONDITIONS OF CONTRACT**

Signature & Stamp of Tenderer

For & on behalf of DFCCIL



## **PART - I**

### **CHAPTER IV (A)**

#### **GENERAL CONDITIONS OF CONTRACT**

##### **DEFINITIONS AND INTERPRETATION:-**

- 1.(1) Definition:-** In these General conditions of Contract, the following terms shall have the meaning assigned hereunder except where the context otherwise requires:-
- (a) The expression “Employer”/ “DFCCIL” as used in the tender document shall mean the Dedicated Freight Corridor Corporation of India Limited, acting through Managing Director (MD)/DFCCIL or the Administrative Officers of the DFCCIL or the Successor, DFCCIL authorized to deal with any matters which these presents are concerned on his behalf.
  - (b) “Managing Director (MD)/DFCCIL” shall mean the officer-in-charge of the General Superintendence and Control of the DFCCIL and shall mean and include their successors, of the successor DFCCIL;
  - (c) “Chief Project Manager” shall mean the officer-in-charge of the field unit or project office of DFCCIL or any officer nominated by Managing Director/DFCCIL and shall mean and include their successors and shall also include GGM/GM of DFCCIL.
  - (d) The expression “Department” used in the tender document shall mean Dedicated Freight Corridor Corporation of India Limited or Civil Engineering/ Electrical Engineering/ Signal & Telecommunication Engineering or any other branch of DFCCIL.
  - (e) “Additional Chief Project Manager” shall mean the Officer-in-charge of Civil Engineering/ Electrical Engineering/ Signal & Telecommunication Engineering branch/department of the field unit or project office of DFCCIL or any officer nominated by Managing Director/DFCCIL and shall mean and include their successors and shall also include GGM/GM of DFCCIL.
  - (f) “Engineer” shall mean the Project Management Consultant appointed by DFCCIL.
  - (g) “Engineer’s Representative” shall mean the assistant/employee deputed by Project Management Consultant (PMC).
  - (h) “Contractor” shall mean the person/Firm/Company/JV whether incorporated or not who enters into the contract with the DFCCIL and shall include their executors, administrators, and successors and permitted assigns.
  - (i) “Contract” shall mean and include the Agreement of Work Order, the accepted schedule of rates of the Schedule or Rates of DFCCIL modified by the tender percentage for items of work quantified, or not quantified, General Conditions of Contract, Special Conditions of Contracts, if any, Drawings, Specifications, Additional /Special Specifications, if any and tender forms, if any, and all other documents included as part of contract.
  - (j) The “Contract Sum”/ “Contract price” shall mean the sum for which the tender is accepted.



- (k) The “Contract Time” means period specified in the tender document for entire execution of contracted works from the date of notification of award.
- (l) “Works” shall mean the works to be executed in accordance with the contract.
- (m) “Technical Specifications”/“Specifications” shall mean the Specifications for materials and works referred/ mentioned in tender documents.
- (n) “Drawing” shall mean the maps, drawings, plans and tracings or prints there of annexed to the contract and shall include any modifications of such drawings and further drawings as may be issued by the Engineer from time to time.
- (o) “Constructional Plan” shall mean all appliances or things of whatsoever nature required for the execution, completion or maintenance of the works or temporary works (as hereinafter defined) but do not include materials or other things intended to form or forming part of the permanent work.
- (p) “Temporary works” shall mean all temporary works of every kind required for the execution completion and/or maintenance of the works.
- (q) “Urgent works” shall mean any measures, which in the opinion of the Engineer, become necessary during the progress of the works to obviate any risk or accident or failure or which become necessary for security of the work or the persons working, thereon.
- (r) “Excepted Risks” are risks due to riots (otherwise than among contractor’s employee) and civil commotion (in so far as both these are un-insurable) was (whether declared or not), invasion, act of foreign enemies, hostilities, civil war, rebellion, revolution, insurrection, military or usurped power, any acts of God, such as earthquake, lightening and un-precedent floods over which the contractor has no control.
- (s) A “Day” shall mean a day of 24 hours from midnight to midnight irrespective of the number of hours worked in that day.
- (t) A “Week” shall mean seven consecutive days without regard to the number of hours worked in any day in that week.
- (u) A “month” shall mean a calendar month.
- (v) “Site” shall mean the lands and other places on, under, in or through which the works are to be carried out and any other lands or places provided by the DFCCIL for the purpose of the contract.
- (w) “Period of Maintenance” shall mean the defect liability period from the date of completion of the works as certified by the Engineer.
- (x) “M/s R-Infra” means Transmission Licensee and Owner of the transmission line sections which are to be diverted at 04 different locations as per scope of work & technical specifications mentioned under Part-II of the tender document.

- 1.(2) **Singular and Plural:** - Words importing the singular number shall also include the plural and vice versa where the context requires.
- 1.(3) **Headings & marginal headings:-**  
The headings and marginal headings in these general conditions are solely for the purpose of facilitating reference and shall not be deemed to be part thereof or be taken into consideration in the interpretation or construction thereof or the contract.

### **GENERAL OBLIGATION**

- 2.(1) **Execution Co-relation and intent of contract Documents:-**  
The contract documents shall be signed in triplicate by the DFCCIL and the Contractor. The contract documents are complementary, and what is called for by any one shall be as binding as if called for by all, the intention of the documents is to include all labour and materials, equipment and transportation necessary for the proper execution of work. Materials or work not covered by or properly inferable from any heading or class of the specifications, shall not be supplied by the DFCCIL to the contractors, unless distinctly specified in the contract documents. Materials or works described in words which so applied have a well-known technical or trade meaning, shall be held to refer to such recognized standards.
- 2.(2) If a work is transferred from the jurisdiction of a Project Authority/ DFCCIL or vice versa while contract is in subsistence, the contract shall be binding on the Contractor and the Successor/Project in the same manner & take effect all respects as if the Contractor and the Successor/Project were parties there to from the inception and the corresponding officer or the Competent Authority in the Successor/Project will exercise the same powers and enjoy the same authority as conferred to the Predecessor/Project under the original contract/agreement entered into.
- 2.(3) If for administrative or other reasons the contract is transferred to the Successor/Successor Project Authority of DFCCIL the contract shall notwithstanding any things contained herein contrary there to, be binding on the Contractor and the Successor/Project Authority/ DFCCIL in the same manner and take effect in all respect as if the Contractor and the Successor/successor Project Authority of DFCCIL had been parties thereto from the date of this contract. The contract shall be administered/managed by CPM/ACPM or any other official nominated by DFCCIL.
- 3.(1) **Law governing the contract:-**  
The contract shall be governed by the law for the time being in force in the Republic of India.
- 3.(2) **Compliance to regulations and bye-laws:-**  
The contractor shall conform to the provision of any statute relating to the works and regulations and by-laws of any location authority and of any water and lighting companies or undertakings, with whose system the work is proposed to be connected and shall before making any variation from the drawings or the specifications that may be necessitated by so confirming give to the Engineer notice specifying the variation proposed to be made and the reasons for making the variation and shall not carry out such variation until he has received instructions from the DFCCIL in respect thereof. The contractor shall be bound to give all notices required by statute, regulations or bye-laws as aforesaid and to pay all fees and taxes payable to any authority in respect thereof.

**4. Communications to be in writing:-**

All notices, communications, reference and complaints made by the DFCCIL or the Engineer or the contractor inters concerning the work shall be in writing and no notice, communication, reference or complaint not in writing shall be recognized.

**5. Service of Notices on Contractors:-**

The contractor shall furnish to the Engineer the name designation and address of his authorized agent and all complaints, notices, communications and references shall be deemed to have been duly given to the contractor if delivered to the contractor or his authorized agent or left at or posted to the address so given and shall be deemed to have been so given in the case of posting on day on which they would have reached such address in the ordinary course of post or on the day on which they were so delivered or left. In the case of contract by partners, any change in the constitution of the firm shall be forthwith notified by the contractor to the Engineer.

**6. Occupation and use of land:-**

No land belonging to or in the possession of the Railway/DFCCIL shall be occupied by the Contractor without the permission of the Railway/DFCCIL. The Contractor shall not use, or allow to be used the site for any purposes other than that of executing the works. Whenever non-railway bodies/persons are permitted to use Railway/DFCCIL premises with competent authority's approval, conservancy charges as applicable from time to time may be levied.

**7. Assignment or subletting of contract:-**

The contractor shall not assign or sublet the contract or any part thereof or allow any person to become interested therein in any manner whatsoever without the special permission in writing of the DFCCIL. Any breach of this condition shall entitle the DFCCIL to rescind the contract under clause 62 of these conditions and also render the contractor liable for payment to the DFCCIL in respect of any loss or damage arising or ensuing from such cancellation. Provided, always that execution of the details of the work by petty contractor under the direct and personal supervision of the Contractor or his agent, shall not be deemed to be sub-letting under this clause. The permitted subletting of work by the contractor shall not establish any contractual relationship between the sub-contractor and the DFCCIL and shall not relieve the contractor of any responsibility under the contract.

**8. Assistance by the DFCCIL for the Stores to be obtained by the Contractor:-**

Owing to difficulty in obtaining certain materials (including Tools & Plant) in the market, the DFCCIL may have agreed without any liability therefore to endeavour to obtain or assist the contractor in obtaining the required quantities of such materials as may be specified in the tender. In the event of delay or failure in obtaining the required quantities of the aforesaid material the contractor shall not be deemed to have been absolved of his own responsibility and shall keep in touch with day to day positions regarding their availability and accordingly adjust progress of works including employment of labour and the DFCCIL shall not in any way be liable for the supply of materials or for the non-supply thereof for any reasons whatsoever nor for any loss or damage arising in consequence of such delay or no supply.

**9. Deleted**

**10. Carriage of materials:-**

No forwarding orders shall be issued by the DFCCIL for the conveyance of contractor's materials, tools and plant by Rail which may be required for use in the works and the contractor shall pay full freight charges at public tariff rates therefore.

**11. Deleted**

**12. Representation on Works:-**

The contractor shall, when he is not personally present on the site of the works place and keep a responsible agent at the works during working hours who shall on receiving reasonable notice, present himself to the Engineer and orders given by the Engineer to the agent, shall be deemed to have the same force as if they had been given to the Contractor. Before absenting himself, the contractor shall furnish the name and address of his agent for the purpose of this clause and failure on the part of the Contractor to comply with this provision at any time, will entitle the DFCCIL to rescind the contract under clause 62 of these conditions.

**13. Relics and Treasures:-**

All gold, silver, oil and other minerals of any description and all precious stones, coins, treasures relics antiquities and other similar things which shall be found in or upon the site shall be the property of the DFCCIL and the Contractor shall duly preserve the same to the satisfaction of the DFCCIL and shall from time to time deliver the same to such person or persons as the DFCCIL may appoint to receive the same.

**14. Excavated material:-**

The contractor shall not sell or otherwise dispose of or remove except for the purpose of this contract, the sand, stones, clay, ballast, earth, rock or other substances or materials which may be obtained from any excavation made for the purpose of the works or any building or produced upon the site at the time of delivery of the possession thereof but all the substances, materials, buildings and produce shall be the property of the DFCCIL provided that the contractor may, with the permission of the Engineer, use the same for the purpose of the works either free of cost or pay the cost of the same at such rates as may be determined by the Engineer.

**15. Indemnity by Contractors:-**

The contractor shall indemnify and save harmless the DFCCIL from and against all actions, suit proceedings losses, costs, damages, charges, claims and demands of every nature and description brought or recovered against the DFCCIL by reason of any act or omission of the contractor, his agents or employees, in the execution of the works or in his guarding of the same. All sums payable by way of compensation under any of these conditions, shall be considered as reasonable compensation to be applied to the actual loss or damage sustained, and whether or not any damage shall have been sustained.

**16. (1) Security Deposit: -**

The earnest money deposited by the contractor with this tender will be retained by the DFCCIL as part of security for the due and faithful fulfilment of the contract by the contractor. The balance to make up the security deposit, the rates for which are given below, may be deposited by the contractor in cash or may be recovered by percentage deduction from the contractor's "on account" bills. Provided also that in case of defaulting contractor the DFCCIL may retain any amount due for payment to the contractor on the pending "on account bills" so that the amounts so retained may not exceed 10% of the total value of the contract.

**16. (2) Recovery of Security Deposit:-**

Unless otherwise specified in the special conditions, if any, the Security Deposit/rate of recovery/mode of recovery shall be as under;

- a. Security Deposit for each work should be 5% of the contract value.
- b. The rate of recovery should be at the rate of 10% of the bill amount till the full security deposit is recovered.
- c. Security Deposits will be recovered only from the running bills of the contract and no other mode of collecting SD such as SD in the form of instruments like BG (except Note (ii) below); FD etc. shall be accepted towards Security Deposit.

Security deposit shall be returned to the contractor after the expiry of the Defect Liability Period in all the cases other than Note (i) mentioned below and after passing the final bill based on No Claim Certificate with the approval of the Competent Authority. The Competent Authority shall normally be the authority who is competent to sign the contract. If this competent authority is of the rank lower than Dy. CPM/ACPM/DFCCIL, then Dy. CPM/ACPM/DFCCIL (Concerned with the work) should issue the certificate. The certificate, inter alia, should mention that the work has been completed in all respects and that all the contractual obligations have been fulfilled by the contractor and that there is no due from the contractor to DFCCIL against the contract concerned. Before releasing the SD, an unconditional and unequivocal no claim certificate from the contractor concerned should be obtained.

**Note:-**

- (i) After the work is physically completed, security deposit recovered from the running bills of a contractor can be returned to him if he so desires, in lieu of FDR/irrevocable Bank Guarantee for equivalent amount to be submitted by him.
- (ii) In case of contracts of value Rs.50 crore and above, irrevocable Bank Guarantee can also be accepted as a mode of obtaining security deposit.

**16. (3)** No interest will be payable upon the Earnest Money and Security Deposit or amounts payable to the contractor under the contract.

**16. (4) Performance Guarantee (P.G.):**

The procedure for obtaining Performance Guarantee is outlined below:

- (a) The successful bidder shall have to submit a Performance Guarantee (PG) within 30 (thirty) days from the date of issue of Letter of Acceptance (LOA). Extension of time for submission of PG beyond 30 (thirty) days and up to 60 days from the date of issue of LOA may be given by the Authority who is competent to sign the contract agreement. However, a penal interest of 15% per annum shall be charged for the delay beyond 30 (thirty) days, i.e. from 31st day after the date of issue of LOA. In case the contractor fails to submit the requisite PG even after 60 days from the date of issue of LOA, the contract shall be terminated duly forfeiting EMD and other dues, if any payable against that contract. The failed contractor shall be debarred from participating in re-tender for that work.
- (b) The successful bidder shall submit the performance Guarantee in any of the following forms amounting to 5% of the contract value:-



- (i) a deposit of Cash
- (ii) irrevocable Bank Guarantee
- (iii) Government Securities including State Loan Bonds at 5 percent below the market value
- (iv) Deposit receipts, pay orders, Demand Drafts and Guarantee Bonds. These forms of Performance Guarantee could be either of the State Bank of India or of any of the Nationalized Banks;
- (v) Guarantee Bonds executed or Deposits Receipts tendered by all Scheduled Banks;
- (vi) A Deposit in the Post Office Saving Bank;
- (vii) A deposit in the National Savings Certificates.
- (viii) Twelve years National Defense Certificates;
- (ix) Ten years Defense Deposits;
- (x) National Defense Bonds; and
- (xi) Unit Trust Certificates at 5 per cent below market value or at the face value whichever is less.

Also FDR in favour of “**Dedicated Freight Corridor Corporation of India Limited, Mumbai**” (free from any encumbrance) may be accepted.

**Note:** The instruments as listed above will also be acceptable for Guarantees in case of Mobilization advance.

- (c) The performance Guarantee shall be submitted by the successful bidder after the letter of acceptance has been issued, but before signing of the contract agreement. The agreement should normally be signed within 30 (thirty) days after the issue of LOA and the Performance Guarantee shall also be submitted within this time limit. This P.G. shall be initially valid up to the stipulated date of completion plus 60 days beyond that. In case, the time limit for completion of work gets extended, the contractor shall get the validity of Performance Guarantee extended to cover such extended time for completion of work plus 60 days.
- (d) The value of P.G. to be submitted by the contractor will not change for variation up to 25% (either increase or decrease). In case during the course of execution, value of the contract increases by more than 25% of the original contract value, an additional performance guarantee amounting to 5% (five percent) for the excess value over the original contract value, shall be deposited by the contractor.
- (e) The performance Guarantee (PG) shall be released after the physical completion of the work based on the ‘completion certificate’ issued by the competent authority stating that the contractor has completed the work in all respects satisfactorily. The security deposit shall, however, be released only after the expiry of the defect liability period and after passing the final bill based on ‘No Claim Certificate’ from the contractor.
- (f) Whenever the contract is rescinded, the security deposit shall be forfeited and the Performance Guarantee shall be encashed. The balance work shall be got done independently without risk and cost of the failed contractor, the failed contractor shall be debarred from participating in the tender for executing the balance work. If the failed contractor is a JV or a partnership firm, then every member/partner of such a firm shall be debarred from participating in the tender for the balance work in his/her individual capacity or as a partner of any other JV/partnership firm.

- (g) The Engineer shall not make a claim under the Performance Guarantee except for amounts to which the President of India/DFCCIL is entitled under the contract (not withstanding and/or without prejudice to any other provisions in the contract agreement) in the event of:
- (i) Failure by the contractor to extend the validity of the Performance Guarantee as described herein above, in which event the Engineer may claim the full amount of the Performance Guarantee.
  - (ii) Failure by the contractor to pay President of India/DFCCIL any amount due, either as agreed by the contractor or determined under any of the Clauses/conditions of the agreement, within 30 days of the service of the notice to the effect by Engineer.
  - (iii) The contract being determined or rescinded under provision of the GCC the Performance Guarantee shall be forfeited in full and shall be absolutely at the disposal of the President of India/DFCCIL.

**17. Force Majeure Clause:-**

If at any time, during the continuance of this contract, the Performance in whole or in part by either party of any obligation under this contract shall be prevented or delayed by reason of any war, hostility, acts of public enemy, civil commotion, sabotage, serious loss or damage by fire, explosions, epidemics, strikes, lockouts or act of God (hereinafter, referred to events) provided, notice of the happening of any such event is given by either party to the other within 30 days from the date of occurrence thereof, neither party shall by reason of such event, be entitled to terminate this contract nor shall either party have any claim for damages against the other in respect of such non-performance or delay in performance, and works under the contract shall be resumed as soon as practicable after such event has come to an end or ceased to exist, and the decision of the Engineer as to whether the works have been so resumed or not shall be final and conclusive, PROVIDED FURTHER that if the performance in whole or in part of any obligation under this contract is prevented or delayed by reason of any such event for a period exceeding 120 days, either party may at its option terminate the contract by giving notice to the other party.

**17-A Extension of time in Contracts:-**

Subject to any requirement in the contract as to completion of any portion or portions of the works before completion of the whole, the contractor shall fully and finally complete the whole of the works comprised in the contract (with such modifications as may be directed under conditions of this contract) by the date entered in the contract or extended date in terms of the following clauses:-

**(i) Extension due to modification:-**

If any modifications have been ordered which in the opinion of the Engineer have materially increased the magnitude of the work, then such extension of the contracted date of completion may be granted as shall appear to the Engineer to be reasonable in the circumstances, provided moreover that the Contractor shall be responsible for requesting such extension of the date as may be considered necessary as soon as the cause thereof shall arise and in any case not less than one month before the expiry of the date fixed for completion of the works.

**(ii) Extension for delay due to DFCCIL or other Contractor:-**

If in the opinion of the Engineer the progress of work has any time been delayed by any act or neglect of DFCCIL's employees or by other contractor employed by the DFCCIL under sub-clause (4) of clause 20 of these conditions or in executing the work not forming part of the contract but on which contractor's performance necessarily depends or by reasons of proceeding taken or threatened by or dispute with adjoining or to neighbouring owners or public authority arising otherwise through the Contractor's own default etc. or by the delay authorized by the DFCCIL pending arbitration or in consequences of the contractor not having received in due time necessary instructions from the DFCCIL for which he shall have specially applied in writing to the Engineer or his authorized representative then upon happening of any such event causing delay, the contractor shall immediately give notice thereof in writing to the Engineer within 15 days of such happening but shall nevertheless make constantly his best endeavours to bring down or make good the delay and shall do all that may be reasonably required of him to the satisfaction of the Engineer to proceed with the works. The contractor may also indicate the period for which the work is likely to be delayed and shall be bound to ask for necessary extension of time.

The Engineer on receipt of such request from the contractor, shall consider the same and shall grant such extension of time as in his opinion is reasonable having regard to the nature and period of delay and the type and quantum of work affected thereby.

No other compensation shall be payable for works so carried forward to the extended period of time, the same rates, terms and conditions of contract being applicable as if such extended period of time was originally provided in the original contract itself.

**(iii) Extension for delay due to DFCCIL:-**

In the event of any failure or delay by the DFCCIL to hand over the Contractor possession of the lands necessary for the execution of the works or to give the necessary notice to commence the works or to provide the necessary drawings or instructions or any other delay caused by the DFCCIL due to any other cause whatsoever, then such failure or delay shall in no way affect or vitiate the contract or alter the character thereof or entitle the contractor to damages or compensation therefore, but in any such case, the DFCCIL may grant such extension or extensions of the completion date as may be considered reasonable.

**17-B Extension of time for delay due to contractor:-**

The time for the execution of the work or part of the works specified in the contract documents shall be deemed to be the essence of the contract and the works must be completed not later than the date(s) as specified in the contract. If the contractor fails to complete the works within the time as specified in the contract for the reasons other than the reasons specified in clause 17 and 17-A, the Engineer may, if satisfied that the works can be completed by the contractor within reasonable short time thereafter, allow the contractor for further extension of (Pro-forma at Form No. 14) time as the Engineer may decide. On such extension the DFCCIL will be entitled without prejudice to any other right and remedy available on that behalf, to recover from the contractor as agreed damages and not by way of penalty a sum equivalent to ½ of 1% of the contract value of the works for each week or part of the week.



For the purpose of this clause, the contract value of the works shall be taken as value of work as per contract agreement including any supplementary work order/contract agreement issued. Provided also, that the total amount of liquidated damages under this condition, shall not exceed the under noted percentage value or of the total value of the item or groups of items of work for which a separate distinct completion period is specified in the contract.

- (i) For contract value up to Rs. 2 lakhs - 10% of the total value of the contract.
- (ii) For contracts valued above Rs. 2 lakhs- 10% of the first Rs.2 lakhs and 5% of the balance.

Further competent authority while granting extension to the currency of contract under clause 17-B of GCC may also consider levy of token penalty as deemed fit based on the merit of the case. Provided further, that if the Engineer is not satisfied that the works can be completed by the Contractor and in the event of failure on the part of the contractor to complete the work within further extension of time allowed as aforesaid, the DFCCIL shall be entitled without prejudice to any other right or remedy available in that behalf, to appropriate the contractor's security deposit and rescind the contract under clause 62 of these conditions, whether or not actual damage is caused by such default.

**18. (1) Illegal Gratification:-**

Any bribe, commission, gift or advantage given, promised or offered by or on behalf to the contractor or his partner, agent or servant or, anyone on his behalf, to any officer or employee of the Engineer, or to any person on his behalf in relation to obtaining or execution of this or any other contract with the DFCCIL shall, in addition to any criminal liability which he may incur, subject contractor to the rescission of the contract and all other contracts with the DFCCIL and to the payment of any loss or damage resulting from such decision and the DFCCIL shall be entitled to deduct the amounts so payable from any moneys due to the Contractor(s) under this contract or any other contracts with the DFCCIL.

- 18. (2)** The contractor shall not lend or borrow from or have or enter into any monitory dealings and transactions either directly or indirectly with any employee of the DFCCIL/Engineer and if he shall do so, the DFCCIL shall be entitled forthwith to rescind the contract and all other contracts with the DFCCIL. Any question or dispute as to the commission or any such offence or compensation payable to the DFCCIL under this clause, shall be settled by the CPM of the DFCCIL, in such a manner as he shall consider fit and sufficient and his decision shall be final and conclusive. In the event of rescission of the contract under this clause, the contractor will not be paid any compensation whatsoever except payments for the work done up to the date of rescission.

**EXECUTION OF WORKS**

**19. (1) Contractor's understanding:-**

It is understood and agreed that the contractor has, by careful examination, satisfied himself as to the nature and location of the work, the conformation of the ground, the character, quality and quantity of the materials to be encountered, the character of equipment and facilities needed preliminary to and during the progress of the works, the general and local conditions, the labour conditions prevailing therein and all other matters which can in any way affect the works under the contract.

**19. (2) Commencement of works:-**

The contractor shall commence the works within 15 days after the receipt by him of an order in writing to this effect from the DFCCIL and shall proceed with the same with due expedition and without delay.

**19. (3) Accepted Program of work:-**

The contractor who has been awarded the work shall as soon as possible but not later than 30 days after the date of receipt of the acceptance letter in respect of contracts with initial completion period of two years or less or not later than 90 days for other contracts, have to submit the detailed program of work indicating the time schedule of various items of works in the form of Bar Chart/PERT/CPM. He shall also submit the details of organization (in terms of labour and supervisors) plant and machinery, that he intends to utilize (from time to time) for execution of the work within stipulated date of completion. The program of work amended as necessary by discussions with the Engineer, shall be treated as the agreed program of the work for the purpose of this contract and the contractor shall endeavour to fulfill this program of work. The progress of work will be watched accordingly and the liquidated damages will be with reference to the overall completion date. Nothing stated herein shall preclude the contractor in achieving earlier completion of item or whole of the works than indicated in the program.

**19. (4) Setting out of works:-**

The contractor shall be responsible for the correct setting out of all works in relation to original points, lines and levels of reference at his cost. The contractor shall execute the work true to alignment, grade, levels and dimensions as shown in the drawing and as directed by the Engineer and shall check these at frequent intervals. The contractor shall provide all facilities like labour and instruments and shall co-operate with the Engineer to check all alignment, grades, levels and dimensions. If, at any time, during the progress of the works any error shall appear or arise in any part of the work, the contractor, on being required so to do by the Engineer shall, at his own cost rectify such errors, to the satisfaction of the Engineer. Such checking shall not absolve the contractor of his own responsibility of maintaining accuracy in the work. The contractor shall carefully protect and preserve all bench marks, pegs and other things used in setting out the work.

**20. (1) Compliance to Engineer's instructions:-**

The Engineer shall direct the order in which the several parts of the works shall be executed and the contractor shall execute without delay all orders given by the Engineer from time to time but the contractor shall not be relieved thereby from responsibility for the due performance of the works in all respects.

**20. (2) Alterations to be authorized:-**

No alterations in or additions to or omissions or abandonment of any part of the works shall be deemed authorized, except under instructions from the Engineer, and the contractor shall be responsible to obtain such instructions in each and every case in writing from the Engineer.

**20. (3) Extra works:-**

Should works over and above those included in the contract require to be executed at the site, the contractor shall have no right to be entrusted with the execution of such works which may be carried out by another contractor or contractors or by other means at the option of the DFCCIL.

**20. (4) Separate contracts in connection with works:-**

The DFCCIL shall have the right to let other contracts in connection with the works. The contractor shall afford other contractors reasonable opportunity for the storage of their materials and the execution of their works and shall properly connect and coordinate his work with theirs. If any part of the contractors work depends for proper execution or result upon the work of another contractor(s), the contractor shall inspect and promptly report to the Engineer any defects in such works that render it unsuitable for such proper execution and results. The contractor's failure so-to inspect and report shall constitute an acceptance of the other contractor's work as fit and proper for the reception of his work, except as to defects which may develop in the other contractor's work after the execution of his work.

**21. Instruction of Engineer's Representative:-**

Any instructions or approval given by the Engineer's representative to contractor in connection with the works shall bind the contractor as though it had been given by the Engineer provided always as follows:

- (a) Failure of the Engineer's representative to disapprove any work or materials shall not prejudice, the power of the Engineer thereafter to disapprove such work or material and to order the removal or breaking up thereof.
- (b) If the Contractor shall be dissatisfied by reason of any decision of the Engineer's representative, he shall be entitled to refer the matter to the Engineer who shall there upon confirm or vary such decision.

**22. (1) Adherence to specifications and drawings:-**

The whole of the works shall be executed in perfect conformity with the specifications and drawings of the contract. If the contractor performs any work in a manner contrary to the specifications or drawings or any of them and without such reference to the Engineer, he shall bear all the costs arising or ensuing there from, and shall be responsible for all loss to the DFCCIL.

**22. (2) Drawings and specifications of the works:-**

The contractor shall keep one copy of drawings and specifications at the site, in good order, and such other contract documents as may be necessary, available to the Engineer.

**22. (3) Ownership of drawings and specifications:-**

All designs/drawings/calculations/data submitted by the contractor for execution of the work shall be property of the DFCCIL and they reserve the right to use them for any work, in any manner deemed fit. In case of any ambiguity in the interpretation of design and drawing, the decision of the DFCCIL shall be final and conclusive. All designs/drawings and specifications and copies thereof furnished by the DFCCIL to the contractor are deemed to be the property of the DFCCIL. They shall not be used on other works and with the exception of the signed contract set, shall be returned by the contractor to DFCCIL on completion of work or on termination of the contract.

**22. (4) Compliance with Contractor's request for details:-**

The Engineer shall furnish with reasonable promptness, after receipt by him of the contractor's request for the same, additional instructions by means of drawings or otherwise, necessary for the proper execution of the works or any part thereof. All such drawing and instructions shall be consistent with the contract Documents and reasonably inferable there from.

**22. (5) Meaning and intent of specification and drawings:-**

If any ambiguity arises as to the meaning and intent of any portion of the specifications and drawings or as to execution or quality of any work or material, or as to the measurements of the works the decision of the DFCCIL's representative thereon shall be final subject to the appeal (within 7 days of such decision being intimated to the contractor) to the CPM/ACPM who shall have the power to correct any errors, omissions, or discrepancies in aforementioned items and whose decision in the matter in dispute or doubt shall be final and conclusive.

**23. Working during night:-**

The contractor shall not carry out any work between sun-set and sun-rise without the previous permission of the Engineer.

**24. Damage to DFCCIL/R-Infra property or private life and property:-**

The contractor shall be responsible for all risk to the work and for trespass and shall make good at his own expense all loss or damage whether to the works themselves or to any other property of the DFCCIL/R-Infra or the lives, persons or property of others from whatsoever cause in connection with the works, until they are taken over by the DFCCIL/R-Infra and this although all reasonable and proper precautions may have been taken by the contractor, and in case the DFCCIL/R-Infra shall be called upon to make good any costs, loss or damages, or to pay an compensation, including that payable under the provisions of the Workmen's Compensation Act or any statutory amendments thereof to any person or persons sustaining damages as aforesaid by reason of any act, or any negligence or omissions on the part of the contractor the amount of any costs or charges including costs and charges in connection with legal proceedings, which the DFCCIL/R-Infra may incur in reference thereto, shall be charged to the contractor. The DFCCIL/R-Infra shall have the power and right to pay or to defend or compromise any claim of threatened legal proceedings or in anticipation of legal proceedings being instituted consequent on the action or default of the contractor, to take such steps as may be considered necessary or desirable to ward off or mitigate the effect of such proceedings, charging to contractor, as aforesaid any sum or sums of money which may be paid and any expenses whether for reinstatement or otherwise which may be incurred and the propriety of any such payment, defense or compromise, and the incurring of any such expenses shall not be called in question by the contractor.

**25. Sheds, stores houses and Yards:-**

The contractor shall at his own expense provide himself with sheds, stores houses and yards in such situations and in such numbers as in the opinion of the Engineer is requisite for carrying on the works and the contractor shall keep at each such sheds, stores houses and yard a sufficient quantity of materials and plant in stock as not to delay the carrying out of the works with due expedition and the Engineer shall have free access to the said sheds, store houses and yards at any time for the purpose of inspecting the stock of materials or plant so kept in hand, and any materials or plan which the Engineer may object to shall not be brought upon or used in the works, but shall be forthwith removed from the sheds, store houses or yards by the contractor. The contractor shall at his own expenses provide and maintain required materials, tools, tackles or any other equipment necessary for the execution of the works.

**26. Provision of efficient and competent Staff at work sites by the Contractor:-**

- 26. (1)** The contractor shall place and keep on the works at all times efficient and competent staff to give the necessary directions to his workmen and to see that they execute their work in sound and proper manner and shall employ only such supervisors, workmen and labourers in or about the execution of any of these works as are careful and skilled in the various trades.
- 26. (2)** The contractor shall at once remove from the works any agents, permitted sub-contractor, supervisor, workman or labourer who shall be objected to by the Engineer and if and whenever required by the Engineer, he shall submit a correct return showing the names of all staff and workmen employed by him.
- 26. (3)** In the event of the Engineer being of the opinion that the contractor is not employing on the works a sufficient number of staff and workmen as is necessary for the proper completion of the works within the time prescribed, the contractor shall forthwith on receiving intimation to this effect, deploy the additional number of staff and labour specified by the DFCCIL/Engineer within seven days of being so required and failure on the part of the contractor to comply with such instructions, will entitle the DFCCIL to rescind the contract under clause 62 of these conditions.

**26A. Deployment of Qualified Engineers at Work Sites by the Contractor:-**

- 26A.(1)** The contractor shall also employ Qualified Graduate Engineer or Qualified Diploma Holder Engineer, based on value of contract, as may be prescribed by the Ministry of Railways/DFCCIL through separate instructions from time to time.
- 26A.(2)** In case the contractor fails to employ the Engineer, as aforesaid in Para 26A.(1), he shall be liable to pay penalty at the rates, as may be prescribed by the Ministry of Railways/DFCCIL through separate instructions from time to time for the default period for the provisions, as contained in Para 26A.(1).

**26A. (3) Deleted**

**27. (1) Workmanship and testing:-**

The whole of the works and/or supply of materials specified and provided in the contract or that may be necessary to be done in order to form and complete any part thereof, shall be executed in the best and most substantial workman like manner with materials of the best and most approved quality of their respective kinds, agreeable to the particulars contained in or implied by the specifications and as referred to in and represented by the drawings or in such other additional particulars, instructions and drawings may be found requisite to be given during the carrying on of the works and to the entire satisfaction of the Engineer according to the instructions and directions which the contractors may from time to time receive from the Engineer. The materials may be subjected to tests by means of such machines, instruments and appliances as the Engineer may direct and wholly at the expense of the contractor.

**27. (2) Removal of improper work and materials:-**

Signature & Stamp of Tenderer

For & on behalf of DFCCIL



The Engineer or the Engineer's Representative shall be entitled to order from time to time:

- (a) The removal from the site within the time specified in the order of any materials which in his opinion are not in accordance with the specifications or drawings.
- (b) the substitution of proper and suitable materials, and
- (c) the removal and proper re-execution, notwithstanding any previous tests thereof or on account payments therefore, of any work which in respect of materials or workmanship; is not in his opinion in accordance with the specifications and in case of default on the part of the contractor in carrying out such order the DFCCIL shall be entitled to rescind the contract under clause 62 of these conditions.

**28. Facilities for inspection:-**

The contractor shall afford the DFCCIL/Engineer every facility for entering in and upon every portion of the work at all hours for the purpose of inspection or otherwise and shall provide all labour, materials, tools, tackles, appliances and things of every kind required for the purpose and the DFCCIL/Engineer shall at all times have free access to every part of the works and to all places at which materials for the works are stored or being prepared.

**29. Examination of work before covering up:-**

The contractor shall give 7 days' notice to Engineer, whenever any work or materials are intended to be covered up in the earth, in bodies or protection walls or otherwise to be placed beyond the reach of measurements in order that the work may be inspected or that correct dimensions may be taken before being so covered, placed beyond the reach of measurement in default whereof, the same shall at the option of Engineer be uncovered and measured at the contractor's expense or no allowance shall be made for such work or materials.

**30. Temporary Works:-**

All temporary works necessary for the proper execution of the works shall be provided and maintained by the contractor and subject to the consent of the Engineer, shall be removed by him at his expenses when they are no longer required and in such manner as the Engineer shall direct. In the event of failure on the part of the contractor to remove the temporary works, the Engineer will cause them to be removed and cost as increased by supervision and other incidental charges, shall be recovered from the contractor.

If temporary huts are provided by the contractor on the DFCCIL/ Railway land for labour engaged by him for the execution of works, the contractor shall arrange for handing over vacant possession of the said land after the work is completed; if the contractor's labour refuse to vacate, and have to be rejected by the DFCCIL/ Railway necessary expenses incurred by the DFCCIL/Railway in connection therewith shall be borne by the contractor.

**31. (1) Contractor to supply water for works:-**

Unless otherwise provided in the contract, the contractor shall be responsible for the arrangements to obtain supply of water necessary for the works.

**31. (2) Deleted**

**31. (3) Deleted**

**31. (4) (a) Contractor to arrange supply of Electric power for works:-**

Unless otherwise provided in the contract, the contractor shall be responsible for arrangements to obtain supply of electric power for the works.

**31. (4) (b) Deleted.**

**32. Property in materials and plant:-**

The materials and plant brought by the Contractor upon the site or on the land occupied by the Contractor in connection with the works and intended to be used for the execution thereof shall immediately, they are brought upon the site of the said land, be deemed to be the property of the DFCCIL/ Railway. Such of them as during the progress of the works are rejected by the Engineer under Clause 25 of these conditions or are declared by him not to be needed for the execution of the works or such as on the grant of the certificate of completion remain unused shall immediately on such rejection, declaration or grant cease to be deemed the property of the DFCCIL/Railway and the Contractor may then (but not before) remove them from the site or the said land. This clause shall not in any way diminish the liability of the Contractor nor shall the DFCCIL/Railway be in any way answerable for any loss or damage which may happen to or in respect of any such materials or plant either by the same being lost, stolen, injured or destroyed by fire, tempest or otherwise.

**33. (1) Tools, Plant and Materials Supplied by DFCCIL:-**

The Contractor shall take all reasonable care of all tools, plant and materials or other property whether or a like description or not belonging to the DFCCIL and committed to his charge for the purpose of the works and shall be responsible for all damage or loss caused by him, his agents, permitted subcontractor, or his workmen or others while they are in his charge. The Contractors shall sign accountable receipts for tools, plants and materials made over to him by the DFCCIL and on completion of the works shall hand over the unused balance of the same to the DFCCIL in good order and repair, fair wear and tear excepted, and shall be responsible for any failure to account for the same or any damage done thereto.

**33. (2) Hire of DFCCIL/ Railway's Plant:-**

The DFCCIL may hire to the Contractor such plant as concrete mixers, compressors and portable engines for use during execution of the works on such terms as may be specified in the special conditions or in a separate agreement for Hire of Plant.

**34. (1) Precaution during progress of works:-**

During the execution of works, unless otherwise specified, the Contractor shall at his own cost provide the materials for and execute all shoring, timbering and strutting works as is necessary for the stability and safety of all structures, excavations and works and shall ensure that no damage, injury or loss is caused or likely to be caused to any person or property.

**34. (2) Roads and Water courses:-**

Existing roads or water courses shall not be blocked, cut through, altered, diverted or obstructed in any way by the Contractor, except with the permission of the Engineer. All compensations claimed for any unauthorized closure, cutting through, alterations, diversion or obstruction to such roads or water courses by the Contractor or his agent or his staff shall be recoverable from the Contractor by deduction from any sums which may become due to him in terms of contract, or otherwise according to law.

**34. (3) Provision of access to premises:-**



During progress of work in any street or thoroughfare, the Contractor shall make adequate provision for the passage of traffic, for securing safe access to all premises approached from such street or thoroughfare and for any drainage, water supply or means of lighting which may be interrupted by reasons of the execution of the works and shall react and maintain at his own cost barriers, lights and other safeguards as prescribed by the Engineer, for the regulation of the traffic, and provide watchmen necessary to prevent accidents. The works shall in such cases be executed night and day if so ordered by the Engineer and with such vigor so that the traffic way is impeded for as short a time as possible.

**34. (4) Safety of Public:-**

The Contractor shall be responsible to take all precautions to ensure the safety of the public whether on public or DFCCIL/Railway/R-Infra property and shall post such look out men as may in the opinion of the Engineer be required to comply with regulations pertaining to the work.

**35. Deleted.**

**36. (1) Suspension of works:-**

The Contractor shall on the order of the Engineer, suspend the progress of the works or any part thereof for such time or times and in such manner as the Engineer may consider necessary and shall during such suspension properly protect and secure the work so far as is necessary in the opinion of the Engineer. If such suspension is:-

- (a) Provided for in the contract, or
- (b) Necessary for the proper execution of the works or by the reason of weather conditions or by some default on the part of the Contractor, and/or
- (c) Necessary for the safety of the works or any part thereof.

**36. (2)** The Contractor shall not be entitled to the extra costs, if any, incurred by him during the period of suspension of the works, but in the event of any suspension ordered by the Engineer for reasons other than aforementioned and when each such period of suspensions exceeds 14 days, the contractor shall be entitled to such extension of time for completion of the work as the Engineer may consider proper having regard to the period or periods of such suspensions and to such compensations as the Engineer may consider reasonable in respect of salaries or wages paid by the Contractor to his employees during the periods of such suspension.

**36. (3) Suspension lasting more than 3 months:-**

If the progress of the works or any part thereof is suspended on the order of the Engineer for more than three months at a time, the Contractor may serve a written notice on the Engineer requiring permission within 15 days from the receipt thereof to proceed with the works or that part thereof in regard to which progress is suspended and if such permission is not granted within that time the Contractor by further written notice so served may, but is not bound to, elect to treat the suspension where it affects part only of the works as an omission of such part or where it affects the whole of the works, as an abandonment of the contract by the DFCCIL.

**37. Rates for items of works:-**

The rates, entered in the accepted Schedule of Rates of the Contract are intended to provide for works duly and properly completed in accordance with the general and special (if any) conditions of the contract and the specifications and drawings together with such enlargements, extensions, diminutions, reductions, alterations or additions as may be ordered in terms of Clause 42 of these conditions and without prejudice to the generality thereof and shall be deemed to include and cover superintendence and labour, supply, including full freight, of materials, stores, patterns, profiles, moulds, fittings, centering, scaffolding, shoring props, timber, machinery, barracks, tackle, roads, pegs, posts, tools and all apparatus and plant required on the works, except such tools, plant or materials as may be specified in the contract to be supplied to the Contractor by the DFCCIL, the erection, maintenance and removal of all temporary works and, buildings, all watching, lighting, bailing, pumping and draining, all prevention of or compensation for trespass, all barriers and arrangements for the safety of the public or of employees during the execution of works, all sanitary and medical arrangements for labour camps as may be prescribed by the Engineer, the setting of all work and of the construction, repair and upkeep of all center lines, bench marks and level pegs thereon, site clearance, all fees duties, royalties, rent and compensation to owners for surface damage or taxes and impositions payable to local authorities in respect of land, structures and all material supplied for the work or other duties of expenses for which the Contractor may become liable or may be put to under any provision of law for the purpose of or in connection with the execution of the contract, and all such other incidental charges or contingencies as may have been specially provided for in the specifications.

**38. Deleted.**

**39. (1) Rates for extra items of works:-**

Any type of work carried out by the Contractor on the instructions of the Engineer which is not included in the accepted schedules of rates, shall be executed at the rates set forth in the "Schedule of Rates of DFCCIL/Railway" modified by the tender percentage and such items are not contained in the latter, at the rate agreed upon between the DFCCIL and the Contractor before the execution of such items of work and the Contractors shall be bound to notify the Engineer at least seven days before the necessity arises for the execution of such items of works that the accepted schedule of rates does not include rate or rates for the extra work involved. The rates payable for such items shall be decided at the meeting to be held between the Engineer and Contractor, in as short a period as possible after the need for the special item has come to the notice. In case the Contractor fails to attend the meeting after being notified to do so or in the event of no settlement being arrived at, the DFCCIL shall be entitled to execute the extra works by other means and the Contractor shall have no claim for loss or damage that may result from such procedure.

**39. (2)** Provided that if the Contractor commences work or incurs any expenditure in regard thereto before the rates as determined and agreed upon as lastly hereunto fore-mentioned, then and in such a case the Contractor shall only be entitled to be paid in respect of the work carried out or expenditure incurred by him prior to the date of determination of rates as aforesaid according to the rates as shall be fixed by the Engineer. However if the Contractor is not satisfied with the decision of the Engineer in this respect he may appeal to the CPM/ACPM within 30 days of getting the decision of the Engineer, supported by analysis of the rates claimed. The CPM/ACPM's decision after hearing both the parties in the matter would be final and binding on the Contractor and the DFCCIL.

**40. (1) Handing over of works:-**

The Contractor shall be bound to hand over the works executed under the contract to the DFCCIL complete in all respects to the satisfaction of DFCCIL. The Engineer shall determine the date on which the work is considered to have been completed, in support of which his certificate shall be regarded as sufficient evidence for all purposes. The Engineer shall determine from time to time, the date on which any particular section of the work shall have been completed, and the contractor shall be bound to observe any such determination of the Engineer.

**40. (2) Clearance of site on completion:-**

On completion of works, the Contractor shall clear away and remove from the site all constructional plant, surplus materials, rubbish and temporary works of every kind and leave the whole of the site and works clean and in a workman like condition to the satisfaction of the Engineer. No final payment in settlement of the accounts for the works shall be paid, held to be due or shall be made to the, Contractor till, in addition to any other condition necessary for final payment, site clearance shall have been affected by him, and such clearance may be made by the Engineer at the expense of the Contractor in the event of his failure to comply with this provision within 7 days after receiving notice to that effect. Should it become necessary for the Engineer to have the site cleared at the expenses of the Contractor, the DFCCIL shall not be held liable for any loss or damage to such of the Contractor's property as may be on the site and due to such removal there from which removal may be effected by means of public sales of such materials and property or in such a way as deemed fit and convenient to the Engineer.

**VARIATIONS IN EXTENT OF CONTRACT**

**41. Modification to contract to be in writing:-**

In the event of any of the provisions of the contract requiring to be modified after the contract documents have been signed, the modifications shall be made in writing and signed by the DFCCIL and the Contractor and no work shall proceed under such modifications until this has been done. Any verbal or written arrangement abandoning, modifying, extending, reducing or supplementing the contract or any of the terms thereof shall be deemed conditional and shall not be binding on the DFCCIL unless and until the same is incorporated in a formal instrument and signed by the DFCCIL and the Contractor, and till then the DFCCIL shall have the right to repudiate such arrangements.

**42. (1) Powers of modification to contract:-**

The officer, nominated on behalf of the DFCCIL, shall be entitled by order in writing to enlarge or extend, diminish or reduce the works or make any alterations in their design, character position, site, quantities, dimensions or in the method of their execution or in the combination and use of materials for the execution thereof or to order any additional work to be done or any works not to be done and the contractor will not be entitled, to any compensation for any increase/reduction in the quantities of work but will be paid only for the actual amount of work done and for approved materials supplied against a specific order.

- 42. (2)** (i) Unless otherwise specified in the contract, the accepted variation in quantity of each individual item of the contract would be up to 25% of the quantity originally contracted, except in case of foundation work. The contractor shall be bound to carry out the work at the agreed rates and shall not be entitled to any claim or any compensation whatsoever up to the limit of 25% variation in quantity of individual item of works.

- (ii) In case of earthwork, the variation limit of 25% shall apply to the gross quantity of earth work and variation in the quantities of individual classifications of soil shall not be subject to this limit.
- (iii) In case of foundation work, no variation limit shall apply and the work shall be carried out by the contractor on agreed rated irrespective of any variation.

**42. (3) Valuation of variations:-**

The enlargements, extensions, diminution, reduction, alterations or additions referred to in sub-clause (2) of this clause shall in no degree affect the validity of the contract but shall be performed by the Contractor as provided therein and be subject to the same conditions, stipulations and obligations as if they had been originally and expressly included and provided for in the specifications and drawings and the amounts to be paid therefore shall be calculated in accordance with the accepted schedule of rates. Any extra items/quantities of work falling outside the purview of the provisions of sub-clause (2) above shall be paid for at the rates determined under clause-39 of these conditions.

**42. (4) Variation in Contract Quantities:-**

1. All individual items in this contract shall be operated with variation of plus or minus 25% and payment would be made as per the agreement rate. For this, no finance concurrence would be required.
2. In case increase in quantity of an individual item by more than 25% of the agreement quantity is considered unavoidable, the same shall be got executed by floating a fresh tender. If floating a fresh tender for operating that item is considered not practicable, quantity of that item will be operated in excess of 125% of the agreement quantity subject to the following conditions.
  - (a) Operation of an item by more than 125% of the agreement quantity needs the approval of an officer of the rank not less than CPM/DFCCIL.
    - (i) Quantities operated in excess of 125%, but up to 140% of the agreement quantity of the concerned item, shall be paid at 98% of the rate awarded for that item in that particular tender.
    - (ii) Quantities operated in excess of 140% but up to 150% of the agreement quantity of the concerned item shall be paid at 96% of the rate awarded for that item in that particular tender.
    - (iii) Variation in individual items beyond 150% will be prohibited and would be permitted only in exceptional unavoidable circumstances with the concurrence of associate finance and shall be paid at 96% of the rate awarded for that item in that particular tender.
  - (b) The variation in quantities as per the above formula will apply only to the Individual items of the contract and not on the overall contract value.
  - (c) Execution of quantities beyond 150% of the overall agreement value should not be permitted and if found necessary, should be only through fresh tenders or by negotiating with existing contractor.
3. In cases where decrease is involved during execution of contract:
  - (a) The contract signing authority can decrease the items up to 25% of individual item without finance concurrence.

- (b) For decrease beyond 25% for individual items or 25% of contract agreement value, the approval of an officer not less than rank of CPM/DFCCIL may be taken, after obtaining 'No Claim Certificate' from the contractor and with finance concurrence, giving detailed reasons for each such decrease in the quantities.
- (c) It should be certified that the work proposed to be reduced will not be required in the same work.
4. The limit for varying quantities for minor value items shall be 100% (as against 25% prescribed for other items). A minor value item for this purpose is defined as an item whose original agreement value is less than 1% of the total original agreement value.
5. No such quantity variation limit shall apply for foundation items.
6. As far as SOR items are concerned, the limit of 25% would apply to the value of SOR schedule as a whole and not on individual SOR items. However, in case of NS items, the limit of 25% would apply on the individual items irrespective of the manner of quoting the rate (single percentage rate or individual item rate).
7. Deleted.
8. Deleted.
9. Deleted.
10. The aspect of vitiation of tender with respect to variation in quantities should be checked and avoided. In case of vitiation of the tender (both for increase as well as decrease of value of contract agreement), sanction of the competent authority as per schedule of power of DFCCIL as per single tender should be obtained.

**Note:** Variation to be approved should be limited so as not to completely change the scope, character and purpose of the original contract.

### **CLAIMS**

**43. (1) Monthly Statement of Claims:-**

The Contractor shall prepare and furnish to the Engineer once in every month an account giving full and detailed particulars of all claims for any additional expenses to which the Contractor may consider himself entitled to and of all extra or additional works ordered by the Engineer which he has executed during the preceding month and no claim for payment for and such work will be considered which has not been included in such particulars.

**43. (2) Signing of "No Claim" Certificate:-**

The Contractor shall not be entitled to make any claim whatsoever against the DFCCIL under or by virtue of or arising out of this contract, nor shall the DFCCIL entertain or consider any such claim, if made by the Contractor, after he shall have signed a "No Claim" Certificate in favour of the DFCCIL in such form as shall be required by the DFCCIL after the works are finally measured up. The contractor shall be debarred from disputing the correctness of the items covered by "No Claim" Certificate or demanding a clearance to arbitration in respect thereof.



### **MEASUREMENTS, CERTIFICATES AND PAYMENTS**

**44. Quantities in schedule annexed to Contract:-**

The quantities set out in the accepted schedule of rates with items of works quantified are the estimated quantities of the works and they shall not be taken as the actual and correct quantities of the work to be executed by the Contractor in fulfillment of his obligations under the contract.

**45. Measurement of works:-**

The Contractor shall be paid for the works at the rates in the accepted schedule of rates and for extra works at rates determined under Clause 39 of these conditions on the measurements taken by the Engineer or the Engineer's representative in accordance with the rules prescribed for the purpose by the DFCCIL. The quantities for items the unit of which in the accepted schedule of rates is 100 or 1000, shall be calculated to the nearest whole number, any; fraction below half being dropped and half and above being taken as one; for items the unit of which in the accepted schedule of rates is single, the quantities shall be calculated to two places of decimals.

Such measurements will be taken of the work in progress from time to time and at such intervals as in the opinion of the DFCCIL/ Engineer shall be proper having regard to the progress of works. The date and time on which "on account" or final measurements are to be made, shall be communicated to the Contractor who shall be present at the site and shall sign the results of the measurements (which shall also be signed by the Engineer or the Engineer's representative) recorded in the official measurements book as an acknowledgement of his acceptance of the accuracy of the measures. Failing the Contractor's attendance the work may be measured up in his absence and such measurements shall, notwithstanding such absence, be binding upon the Contractor whether or not he shall have signed the measurement books provided always that any objection made by him to measurement shall be duly investigated and considered in the manner set out below:-

- (a) It shall be open to the Contractor to take specific objection to any recorded measurements or Classification on any ground within seven days of the date of such measurements. Any re-measurement taken by the Engineer or the Engineer's representative in the presence of the Contractor or in his absence after due notice has been given to him in consequence of objection made by the Contractor, shall be final and binding on the Contractor and no claim whatsoever shall thereafter be entertained regarding the accuracy and classification of the measurements.
- (b) If an objection raised by the Contractor is found by the Engineer to be incorrect the Contractor shall be liable to pay the actual expenses incurred in measurements.

**46. (1) "On-Account" Payments:-**

The Contractor shall be entitled to be paid from time to time by way of "On-Account" payment only for such works, as in the opinion of the Engineer, he has executed in terms of the contract. All payments due on the Engineer's or the Engineer's representative's certificates of measurements shall be subject to any deductions which may be made under these presents and shall further be subject to, unless otherwise required by Clause 16 of these conditions, a retention of ten percent by way of security deposits, until the amount of security deposit by way of retained earnest money and such ***retentions shall amount to 5% of the total value of the contract*** provided always that the DFCCIL/Engineer may by any certificate make any correction or modification in any previous certificate which shall have been issued by him and that the Engineer may withhold any certificate if the works or any part thereof are not being carried out to his satisfaction.



**46. (2) Rounding off amounts: -**

The total amount due on each certificate shall be rounded off to the nearest rupee i.e. sum less than 50 paise shall be omitted and sums of 50 paise and more up to Re. 1/- will be reckoned as Re. 1/-

**46. (3) On Account Payments not prejudicial to final settlement:-**

“On- Account” payments made to the ‘Contractor shall be without prejudice to the final making up of the accounts (except where measurements are specifically noted in the Measurement Book as “Final Measurements” and as such have been signed by the Contractor) and shall in no respect be considered or used as evidence of any facts stated in or to be inferred from such accounts nor of any particular quantity of work having been executed nor of the manner of its execution being satisfactory.

**46. (4) Manner of payment:-**

Unless otherwise specified, payments to the Contractor will be made by RTGS/NEFT/Cheque but no cheque will be issued for an amount less than Rs. 100/-

**47. Maintenance of works:-**

The Contractor shall at all times during the progress and continuance of the works and also for the period of maintenance specified in the Tender Form after the date of passing of the certificate of completion by the Engineer or any other earlier date subsequent to the completion of the works that may be fixed by the Engineer, be responsible for and effectively maintain and uphold in good substantial, sound and perfect condition all and every part of the works and shall make good from time to time and at all times as often as the Engineer shall require, any damage or defect that may during the above period arise in or be discovered or be in any way connected with the works, provided that such damage or defect is not directly caused by errors in the contract documents, act of providence or insurrection or civil riot, and the contractor shall be liable for and shall pay and make good to the DFCCIL or other persons legally entitled thereto whenever required by the Engineer so to do, all losses, damages, costs and expenses they or any of them may incur or be put or be liable to by reasons or in consequence of the operations of the Contractor or of his failure in any respect.

**48. (1) Certificate of completion of works:-**

As soon as in the opinion of the Engineer, the works has been completed and has satisfactorily passed any final test or tests that may be prescribed, the Engineer shall issue a certificate of completion duly indicating the date of completion in respect, of the work and the period of maintenance of the work shall commence from the date of completion mentioned in such certificate.

The Engineer may also issue such a certificate indicating date of completion with respect to any part of the work (before the completion of the whole of work), which has been both completed to the satisfaction of the Engineer and occupied or used by the DFCCIL/R-Infra. When any such certificate is given in respect of part of a work, such part shall be considered as completed and the period of maintenance of such part shall commence from the date of completion mentioned in the completion certificate issued for that part of the work.

**(2) Contractor not absolved by completion Certificate:-**

The Certificate of completion in respect of the works referred to in sub-clause (1) of this clause shall not absolve the Contractor from his liability to make good any defects imperfections, shrinkages or faults which may appear during the period of maintenance/Defect Liability Period specified in the tender arising in the opinion of the Engineer from materials or workmanship not in accordance with the drawings or specifications or instruction of the Engineer, which defects, imperfections, shrinkages or faults shall upon the direction in writing of the Engineer, be amended and made good by the Contractor at his own cost: and in case of default on the part of Contractor, the DFCCIL may employ labour and materials or appoint another Contractor to amend and make good such defects, imperfections, shrinkages and faults and all expenses consequent thereon and incidental thereto shall be borne by the Contractor and shall be recoverable from any moneys due to him under the contract.

**49. Deleted.**

**50. Deleted.**

**51. (1) Final Payment:-**

On the Engineer's certificate of completion in respect of the works, adjustment shall be made and the balance of account based on the Engineer or the Engineer's representative's certified measurements of the total quantity of work executed by the contractor up to the date of completion and on the accepted schedule or rates and for extra works on rates determined under Clause 39 of these conditions shall be paid to the Contractor subject always to any deduction which may be made under these presents and further subject to the Contractor having delivered to the Engineer either a full account in detail of all claims he may have on the DFCCIL in respect of the works or having delivered "No Claim Certificate" and the Engineer having after the receipt of such account given a certificate in writing that such claims are correct, that the whole of the works to be done under the provisions of the Contracts have been completed, that they have been inspected by him since their completion and found to be in good and substantial order, that all properties, works and things, removed, disturbed or injured in consequence of the works have been properly replaced and made good and all expenses and demands incurred by or made upon the DFCCIL for or in the respect of damage or loss by from or in consequence of the works, have been satisfied agreeably and in conformity with the contract.

**(2) Post Payment Audit:-**

It is an agreed term of contract that the DFCCIL reserves to itself the right to carry out a post-payment audit and or technical examination of the works and the final bill including all supporting vouchers, abstracts etc. and to make a claim on the contractor for the refund any excess amount paid to him if as a result of such examination any over-payment to him is discovered to have made in respect of any works done or alleged to have been done by him under the contract.

**51A. Production of vouchers etc. by the Contractor:-**

- (i) For a contract of more than one crore of rupees, the contractor shall, whenever required, produce or cause to be produced for examination by the Engineer any quotation, invoice, cost or other account, book of accounts, voucher, receipt, letter, memorandum, paper of writing or any copy of or extract from any such document and also furnish information and returns verified in such manner as may be required in any way relating to the execution of this contract or relevant for verifying or ascertaining cost of execution of this contract (the decision of the Engineer on the question of relevancy of any documents, information or return being final and binding in the parties). The contractor shall similarly produce vouchers; etc., if required to prove to the Engineer, that materials supplied by him, are in accordance with the specifications laid down in the contract.
- (ii) If any portion of the work in a contract of value more than one crore of rupees be carried out by a sub-contractor or any subsidiary or allied firm or company (as per Clause 7 of the General Conditions of Contract), the Engineer shall have power to secure the books of such sub-contract or any subsidiary or allied firm or company, through the contractor, and such books shall be open to his inspection.
- (iii) The obligations imposed by sub clause (i) & (ii) above are without prejudice to the obligations of the contractor under any statute rules or orders binding on the contractor.

**52. Withholding and lien in respect of sums claimed:-**

Whenever any claim or claims for payment of a sum of money arises out of or under the contract against the contractor, the DFCCIL shall be entitled to withhold and also have a lien to retain such sum or sums in whole or in part from the security, if any, deposited by the contractor and for the purpose aforesaid, the DFCCIL shall be entitled to withhold the said cash security deposit or the security if any, furnished as the case may be and also have a lien over the same pending finalization or adjudication of any such claim. In the event of the security being insufficient to cover the claimed amount or amounts or if no security has been taken from the contractor, the DFCCIL shall be entitled to withhold and have a lien to the extent of the such claimed amount or amounts referred to supra, from any sum or sums found payable or which at any time thereafter may become payable to the contractor under the same contract or any other contract with this or any other DFCCIL or any Department of the Central Government pending finalization or adjudication of any such claim.

It is an agreed term of the contract that the sum of money or moneys so withheld or retained under the lien referred to above, by the DFCCIL will be kept withheld or retained as such by the DFCCIL till the claim arising out of or under the contract is determined by the arbitrator (if the contract governed by the arbitration clause) or by the competent court as the case may be and that the contractor will have no claim for interest or damages whatsoever on any account in respect of such withholding or retention under the lien referred to supra and duly notified as such to the contractor. For the purpose of this clause, where the contractor is a partnership firm or a limited company, the DFCCIL shall be entitled to withhold and also have a lien to retain towards such claimed amount or amounts in whole or in part from any sum found payable to any partner/limited company, as the case may be whether in his individual capacity or otherwise.

**52A. Lien in respect of claims in Other Contracts:-**

- (i) Any sum of money due and payable to the contractor (including the security deposit returnable to him) under the contract may be withheld or retained by way of lien by the DFCCIL, against any claim of this or any other DFCCIL or any other Department of the Central Government in respect of a payment of a sum of money arising out of or under any other contract made by the contractor with this or any other Department of the Central Government.
- (ii) However, recovery of claims of DFCCIL in regard to terminated contracts may be made from the Final Bills, Security Deposits and Performance Guarantees of other contract or contracts, executed by the contractor. The Performance Guarantees submitted by the Contractor against other contracts, if required, may be withheld and encashed. In addition, 10% of each subsequent 'on-account bill' may be withheld, if required, for recovery of DFCCIL's dues against the terminated contract.
- (iii) It is an agreed term of the contract that the sum of money so withheld or retained under this clause by the DFCCIL will be kept withheld or retained as such by the DFCCIL till the claim arising out of or under any other contract is either mutually settled or determined by arbitration, if the other contract is governed by arbitration clause or by the competent court as the case may be and contractor shall have no claim for interest or damages whatsoever on this account or on any other ground in respect of any sum of money withheld or retained under this clause and duly notified as such to the contractor.

**53. Signature on Receipts for Amounts:-**

Every receipt for money which may become payable or for any security which may become transferable to the Contractors under these presents, shall, if signed in the partnership name by anyone of the partners of a Contractor's firm be a good and sufficient discharge to the DFCCIL in respect of the moneys or security purported to be acknowledged thereby and in the event of death of any of the Contractor, partners during the pendency of the contract it is hereby expressly agreed that every receipt by anyone of the surviving Contractor partners shall if so signed as aforesaid be good a sufficient discharge as aforesaid provided that nothing in this clause contained shall be deemed to prejudice or effect any claim which the DFCCIL may hereafter have against the legal representative of any contractor partner so dying for or in respect to any breach of any of the conditions of the contract, provided also that nothing in this clause contained shall be deemed to prejudice or effect the respective rights or obligations of the Contractor partners and of the legal representatives of any deceased Contractor partners inter-se.

**LABOUR**

- 54. Wages to Labour:** - The Contractor shall be responsible to ensure compliance with the provision of the Minimum Wages Act, 1948 (hereinafter referred to as the "said Act") and the Rules made there under in respect of any employees directly or through petty contractors or subcontractors employed by him on road construction or in building operations or in stone breaking or stone crushing for the purpose of carrying out this contract.

If, in compliance with the terms of the contract, the Contractor supplied any labour to be used wholly or partly under the direct orders and control of the DFCCIL whether in connection with any work being executed by the Contractor or otherwise for the purpose of the DFCCIL such labour shall, for the purpose of this clause, still be deemed to be persons employed by the Contractor.

If any moneys shall, as a result of any claim or application made under the said Act be directed to be paid by the DFCCIL, such money shall be deemed to be moneys paid by it as aforesaid within seven days after the same shall have been demanded, the DFCCIL shall be entitled to recover the same from any moneys due or accruing to the Contractor under this or any other Contract with the DFCCIL.

**54A. Apprentices Act:-**

The Contractor shall be responsible to ensure compliance with the provisions of the Apprentices Act, 1961 and the Rules and Orders issued there under from time to time in respect of apprentices directly or through petty contractors or sub-contractors employed by him for the purpose of carrying out the Contract.

If the contractor directly or through petty contractors or sub-contractors fails to do so, his failure will be a breach of the contract and the DFCCIL may, in its discretion, rescind the contract. The contractor shall also be liable for any pecuniary liability arising on account of any violation of the provisions of the Act.

**Note:** The contractors are required to engage apprentices when the works undertaken by them last for a period of one year or more and/the cost of works is rupees one lakh or more.

**55. Provisions of payments of Wages Act:-**

The Contractor shall comply with the provisions of the Payment of Wages Act, 1936 and the rules made there under in respect of all employees directly or through petty contractors or sub-contractors employed by him in the works. If In compliance with the terms of the contract, the Contractor directly or through petty contractors or sub-contractors shall supply any labour to be used wholly or partly under the direct orders and control of the Engineer whether in connection with the works to be executed hereunder or otherwise for the purpose of the Engineer such labour shall never the less be deemed to comprise persons employed by the contractor and any moneys which may be ordered to be paid by the Engineer shall be deemed to be moneys payable by the Engineer on behalf of the Contractor and the Engineer may on failure of the contractor to repay such money to the DFCCIL deduct the same from moneys due to contractor in the terms of contract. The DFCCIL shall be entitled to deduct from any moneys due to the contractor (whether under this contract or any other contract) all moneys paid or payable by the DFCCIL by the way of compensation of aforesaid or for costs of expenses in connection with any claim thereto and the decision of the Engineer upon any question arising out of the effect or force of this clause shall be final and binding upon the Contractor.

**55A. Provisions of Contract labour (Regulation and Abolition) Act, 1970:**

- (i) The contractor shall comply with the provision of the contract labour (Regulation and Abolition) Act, 1970 and the Contract labour (Regulation and Abolition) Central Rules 1971 as modified from time to time, wherever applicable and shall also indemnify the DFCCIL from and against any claims under the aforesaid Act and the Rules.



- (ii) The Contractor shall obtain a valid license under the aforesaid Act as modified from time to time before the commencement of the work and continue to have a valid license until the completion of the work. Any failure to fulfill the requirement shall attract the penal provision of the Contract arising out of the resultant non-execution of the work.
- (iii) The Contractor shall pay to the labour employed by him directly or through subcontractors the wages as per provision of the aforesaid Act and the Rules wherever applicable. The Contractor shall notwithstanding the provisions of the contract to the contrary, cause to be paid the wages to labour indirectly engaged on the works including any engaged by subcontractors in connection with the said work, as if the labour had been immediately employed by him.
- (iv) In respect of all labour directly or indirectly employed in the work for performance of the contractor's part of, the contract, the Contractor shall comply with or cause to be complied with the provisions of the aforesaid Act and Rules wherever applicable.
- (v) In every case in which, by virtue of the provisions of the aforesaid Act or the Rules, the DFCCIL is obliged to pay any amount of wages to a workman employed by the Contractor or his sub-contractor in execution of the work or to incur any expenditure on account of the Contingent, liability of the DFCCIL due to the contractor's failure to fulfill his statutory obligations under the aforesaid Act or the rules the DFCCIL will recover from the Contractor, the amount of wages so paid or the amount of expenditure so incurred, and without prejudice to the rights of the DFCCIL under the section 20, sub-section (2) and section 2, sub-section (4) of the aforesaid Act, the DFCCIL shall be at liberty to recover such amount or part thereof by deducting it from the security deposit and/ or from any sum due by the DFCCIL to the contractor whether under the contract or otherwise.

The DFCCIL shall not be bound to contest any claim made against it under sub-section (1) of section 20 and sub-section (4) of section 21 of the aforesaid Act except on the written request of the contractor and upon his giving to the DFCCIL full security for all costs for which the DFCCIL might become liable in contesting such claim. The decision of the DFCCIL regarding the amount actually recoverable from the contractor as stated above shall be final and binding on the Contractor.

**55B. Provisions of Employees Provident Fund and Miscellaneous Provisions Act, 1952:**

The Contractor shall comply with the provisions of Para 30 & 36-B of the Employees Provident Fund Scheme, 1952; Para 3 & 4 of Employees' Pension Scheme, 1995; and Para 7 & 8 of Employees Deposit Linked Insurance Scheme, 1976; as modified from time to time through enactment of "Employees Provident Fund & Miscellaneous Provisions Act, 1952", wherever applicable and shall also indemnify the DFCCIL from and against any claims under the aforesaid Act and the Rules.

**56. Reporting of Accidents of Labour:-**

The Contractor shall be responsible for the safety of all employees directly or through petty contractors or sub- contractor employed by him on the works and shall report serious accidents to any of them however and wherever occurring on the works to the Engineer or the Engineer's Representative and shall make every arrangements to render all possible assistance.



**57. Provision of Workmen's Compensation Act:-**

In every case in which by virtue of the provisions of section 12 sub-section (1) of the Workmen's Compensation Act 1923, DFCCIL is obliged to pay compensation to a workman directly or through petty contractor or subcontractor employed by the Contractor in executing the work, DFCCIL will recover from the Contractor the amount of the compensation so paid, and, without prejudice to the rights of DFCCIL under Section 12 Sub - section (2) of the said Act, DFCCIL shall be at liberty to recover such amount or any part thereof by deducting it from the security deposit or from any sum due by DFCCIL to the Contractor whether under these conditions or otherwise, DFCCIL shall not be bound to contest any claim made against it under Section 12 Sub-section (1) of the said Act except on the written request of the Contractor and upon his giving to DFCCIL full security for all costs for which DFCCIL might become liable in consequence of contesting such claim.

**57A. Provision of Mines Act:-**

The contractor shall observe and perform all the provisions of the Mines Act, 1952 or any statutory modifications or re-enactment thereof for the time being in force and any rules and regulations made there under in respect of all the persons directly or through the petty contractors or sub-contractors employed by him under this contract and shall indemnify the DFCCIL from and against any claims under the Mines Act, or the rules and regulations framed there under, by or on behalf of any persons employed by him or otherwise.

**58. DFCCIL not to provide quarters for Contractors:-**

No quarters shall normally be provided by the DFCCIL for the accommodation of the contractor or any of his staff employed on the work.

**59. (1) Labour Camps:-**

The contractor shall at his own expense make adequate arrangements for the housing, supply of drinking water and provision of latrines and urinals for his staff and workmen, directly or through the petty contractors or sub-contractors and for temporary crèche (Bal-Mandir) where 50 or more women are employed at a time. Suitable sites on DFCCIL land, if available, may be allotted to the contractor for the erection of labour camps, either free of charge or on such terms and conditions that may be prescribed by the DFCCIL. All camp sites shall be maintained in clean and sanitary conditions by the contractor at his own cost.

**59. (2) Compliance to rules for employment of labour:-**

The contractor(s) shall conform to all laws, by-laws rules and regulations for the time being in force pertaining to the employment of local or imported labour and shall take all necessary precautions to ensure and preserve the health and safety of all staff employed directly or through petty contractors or sub-contractors on the works.

**59. (3) Preservation of peace:-**

The contractor shall take requisite precautions and use his best endeavors to prevent any riotous or unlawful behavior by or amongst his workmen and other employed directly or through the petty contractors or sub-contractors on the works and for the preservation of peace and protection of the inhabitants and security of property in the neighborhood of the works. In the event of the DFCCIL requiring the maintenance of a special Police Force at or in the vicinity of the site during the tenure of works, the expenses thereof shall be borne by the contractor and if paid by the DFCCIL shall be recoverable from the contractor.

**59. (4) Sanitary arrangements:-**

The contractor shall obey all sanitary rules and carry out all sanitary measures that may from time to time be prescribed by the Railway Medical Authority and permit inspection of all sanitary arrangements at all times by the Engineer or the Engineer's Representative. Should the contractor fail to make the adequate sanitary arrangements, these will be provided by the DFCCIL and the cost therefore recovered from the contractor.

**59. (5) Outbreak of infectious disease:-**

The contractor shall remove from his camp such labour and their families as refuse protective inoculation and vaccination when called upon to do so by the Engineer or the Engineer's representative on the advice of the DFCCIL. Should cholera, plague or other infectious disease break out, the contractor shall burn the huts, beddings, clothes and other belongings of or used by the infected parties and promptly erect new huts on health sites as required by the Engineer, failing which within the time specified in the Engineer's requisition, the work may be done by the DFCCIL and the cost therefore recovered from the contractor.

**59. (6) Deleted.**

**59. (7) Medical facilities at site:-**

The Contractor shall provide medical facilities at the site as may be prescribed by the Engineer on the advice of the DFCCIL in relation to the strength of the Contractor's resident staff and workmen.

**59. (8) Use of intoxicants:-**

The sale of ardent spirits or other intoxicating beverages upon the work or in any of the buildings, encampments or tenements owned, occupied by or within the control of the contractor or any of his employees shall be forbidden and the Contractor shall exercise his influence and authority to the utmost extent to secure strict compliance with this condition.

**59. (9) Non-employment of female labour:-**

The Contractor shall see that the employment of female labour on/in Cantonment areas, particularly in the neighborhood of soldier's barracks, should be avoided as far as possible.

**59. (10) Restrictions on the Employment of Retired Engineers of Railway/DFCCIL services within one year of their Retirement:**

The Contractor shall not, if he is a retired Government Engineer of Gazetted rank, himself engage in or employ or associate a retired Government Engineer of Gazetted rank, who has not completed one year from the date of retirement, in connection with this contract in any manner whatsoever without obtaining prior permission of the President and if the Contractor is found to have contravened this provision it will constitute a breach of contract and administration will be entitled to terminate the contract and forfeit Earnest Money Deposits (EMD), Performance Guarantee (PG) and Security Deposits (SD) of that contract.

**60. (1) Non-employment of labours below the age of 15:-**

The Contractor shall not employ children below the age of 15 as labourers directly or through petty contractors or subcontractors for the execution of work.

**60. (2) Medical Certificate of fitness for labour:-**

It is agreed that the contractor shall not employ a person above 15 and below 19 years of age for the purpose of execution of work under the contract unless a medical certificate of fitness in the prescribed form (Pro-forma at Form No.15) granted to him by a certifying surgeon certifying that he is fit to work as an adult is obtained and kept in the custody of the contractor or a person nominated by him in this behalf and the person carries with him, while at work; a token giving a reference to such certificate. It is further agreed that the responsibility for having the adolescent examined medically at the time of appointment or periodically till he attains the age of 19 years shall devolve entirely on the contractor and all the expenses to be incurred on this account shall be borne by him and no fee shall be charged from the adolescent or his parent for such medical examination.

**60. (3) Period of validity of medical fitness certificate:-**

A certificate of fitness granted or renewed for the above said purposes shall be valid only for a period of one year at a time. The certifying surgeon shall revoke a certificate granted or renewed if in his opinion the holder of it is, no longer fit for work in the capacity stated therein. Where a certifying surgeon refuses to grant or renew a certificate or revoke a certificate, he shall, if so required by the person concerned, state his reasons in writing for doing so.

**60. (4) Medical re-examination of labourer:-**

Where any official appointed in this behalf by the Ministry of labour is of the opinion that any person employed in connection with the execution of any work under this contract in the age group 15 to 19 years is without a certificate of fitness or is having a certificate of fitness but no longer fit to work in the capacity stated in the certificate, he may serve on the Contractor, or on the person nominated by him in the regard, a notice requiring that such persons shall be examined by a certifying surgeon and such person shall not if the concerned official so directs, be employed or permitted to do any work under this contract unless he has been medically examined and certified that he has been granted a certificate of fitness or a fresh certificate of fitness, as the case may be.

**EXPLANATIONS:-**

1. Only qualified medical practitioners can be appointed as “Certifying Surgeons” and the term “Qualified Medical Practitioners” means a person holding a qualification granted by an authority specified in the Schedule to the Indian Medical Degrees Act, 1916 (VII to 1916) or in the Schedule to the Indian Medical Council Act, 1933 (XXVII) of 1933.
2. The Certifying surgeon may be a medical officer in the service of State or Municipal Corporation.

**DETERMINATION OF CONTRACT**

**61. (1) Right of DFCCIL of determine the contract:-**

The DFCCIL shall be entitled to determine and terminate the contract at any time should, in the DFCCIL’s opinion, the cessation of work becomes necessary owing to paucity of funds or from any other cause whatever, in which case the value of approved materials at site and of work done to date by the Contractor will be paid for in full at the rate specified in the contract. Notice in writing from the DFCCIL of such determination and the reasons therefore shall be conclusive evidence thereof.

**61. (2) Payment on determination of contract:-**

Should the contract be determined under sub clause (1) of this clause and the Contractor claims payment for expenditure incurred by him in the expectation of completing the whole of the work, the DFCCIL shall admit and consider such claims as are deemed reasonable and are supported by vouchers to the satisfaction of the DFCCIL/Engineer. The DFCCIL's decision on the necessity and propriety of such expenditure shall be final and conclusive.

**61. (3)** The contractor shall have no claim to any payment of compensation or otherwise, howsoever on account of any profit or advantage which he might have derived from the execution of the work in full but which he did not derive in consequence of determination of contract.

**62. (1) Determination of contract owing to default of contractor: -If the Contractor should;**

- (i) Becomes bankrupt or insolvent, or
- (ii) Make an arrangement with of assignment in favour of his creditors, or agree to carry out the contract under a Committee of Inspection of his creditors, or
- (iii) Being a Company or Corporation, go into liquidation (other than a voluntary liquidation for the purposes of amalgamation or reconstruction), or
- (iv) Have an execution levied on his goods or property on the works, or
- (v) Assign the contract or any part thereof otherwise than as provided in Clause 7 of these conditions, or
- (vi) Abandon the contract, or
- (vii) Persistently disregard the instructions of the Engineer, or contravene any provision of the contract, or
- (viii) Fail to adhere to the agreed program of work by a margin of 10% of the stipulated period, or
- (ix) Fail to remove materials from the site or to pull down and replace work after receiving from the Engineer notice to the effect that the said materials or works have been condemned or rejected under clause 25 and 27 of these conditions, or
- (x) Fail to take steps to employ competent or additional staff and labour as required under clause 26 of the conditions
- (xi) Fail to afford the Engineer or Engineer's representative proper facilities for inspecting the work or any part thereof as required under clause 28 of the conditions, or
- (xii) Promise, offer or give any bribe, commission, gift or advantage either himself or through his partner, agent or servant to any officer or employee of the DFCCIL or to any person on his or on their behalf in relation to the execution of this or any other contract with this DFCCIL.

**(xiii)**

(A) At any time after the tender relating to the contract, has been signed and submitted by the Contractor, being a partnership firm admit as one of its partners or employee under it or being an incorporated company elect or nominate or allow to act as one of its directors or employee under it in any capacity whatsoever any retired engineer of the gazetted rank or any other retired gazetted officer working before his retirement, whether in the executive or administrative capacity, or whether holding any pensionable post or not, in the DFCCIL for the time being owned and administered by the President of India before the expiry of one year from the date of retirement from the said service of such Engineer or Officer unless such Engineer or Officer has obtained permission from the President of India or any officer duly authorized by him in this behalf to become a partner or a director or to take employment under the contract as the case may be, or

**(B) Fail to give at the time of submitting the said tender:-**

- (a) The correct information as to the date of retirement of such retired engineer or retired officer from the said service, or as to whether any such retired engineer or retired officer was under the employment of the Contractor at the time of submitting the said tender, or
- (b) The correct information as to such engineers or officers obtaining permission to take employment under the contractor, or
- (c) Being a partnership firm, the correct information as to, whether any of its partners was such a retired engineer or a retired officer, or
- (d) Being in incorporated company, correct information as to whether any of its directors was such a retired engineer or a retired officer, or
- (e) Being such a retired engineer or retired officer suppress and not disclose at the time of submitting the said tender the fact of his being such a retired engineer or a retired officer or make at the time of submitting the said tender a wrong statement in relation to his obtaining permission to take the contract or if the contractor be a partnership firm or an incorporated company to be a partner or director of such firm or company as the case may be or to seek employment under the contractor.

Then and in any of the said clause, the Engineer on behalf of the DFCCIL may serve the Contractor with a notice (Proforma at Form No.16) in writing to that effect and if the contractor does not within seven days after the delivery to him of such notice proceed to make good his default in so far as the same is capable of being made good and carry on the work or comply with such directions as aforesaid of the entire satisfaction of the Engineer, the DFCCIL shall be entitled after giving 48 hours' notice (Pro-forma at Form No.17) in writing under the hand of the Engineer to rescind the contract as a whole or in part or parts (as may be specified in such notice) and after expiry of 48 hours' notice, a final termination notice (Pro-forma at Form No. 18) should be issued and adopt the following courses:

To measure up or the whole or part of the work from which the contractor has been removed and get it completed by another contractor, the manner and method in which such work is completed shall be in the entire discretion of the Engineer whose decision shall be final.



**62. (2) Right of DFCCIL after, rescission of contract owing to default of contractor:-**

In the event of any or several of the courses, referred to in sub-clause (1) of the clause, being adopted;

- (a) the contractor shall have no claim to compensation for any loss sustained by him by reason of his having purchased or procured any materials or entered into any commitments or made any advances on account of or with a view to the execution of the works or the performance of the contract and contractor shall not be entitled to recover or be paid any sum for any work thereto for actually performed under the contract unless and until the Engineer shall have certified the performance of such work and the value payable in respect thereof and the contractor shall only be entitled to be paid the value so certified.
- (b) The Engineer or the Engineer's representative shall be entitled to take possession of any materials, tools, implements, machinery and buildings on the works or on the property on which these are being or ought to have been executed, and to retain and employ the same in the further execution of the works or any part thereof until the completion of the works without the contractor being entitled to any compensation for the use and employment thereof or for wear and tear or destruction thereof.
- (c) The Engineer shall as soon as may be practicable after removal of the contractor fix and determine ex-parte or by or after reference to the parties or after such investigation or enquiries as he may consider fit to make or institute and shall certify what amount (if any) had at the time of rescission of the contract been reasonably earned by or would reasonably accrue to the contractor in respect of the work then actually done by him under the contract and what was the value of any unused, or partially used materials, any constructional plan and any temporary works upon the site. The legitimate amount due to the contractor after making necessary deductions and certified by the Engineer should be released expeditiously.

**STATEMENT OF DISPUTES - INDIAN RAILWAY ARBITRATION RULES**

**63. Matters finally determined by the DFCCIL-**

All disputes and differences of any kind whatsoever arising out of or in connection with the contract, whether during the progress of the work or after its completion and whether before or after the determination of the contract, shall be referred by the contractor to the Director/General Manager/CPM, DFCCIL and the Director/General Manager/CPM, DFCCIL shall within 120 days after receipt of the contractor's representation make and notify decisions on all matters referred to by the contractor in writing provided that matter for which provision has been made in clauses 8, 18, 22.(5), 39, 43.(2), 45.(a), 55, 55A.(5), 57, 57A, 61.(1), 61.(2) and 62.(1) to (xiii)(B) of General Conditions of contract or in any special clause of the conditions of the contract shall be deemed as 'excepted matters' (matters not arbitrable) and decisions of the DFCCIL authority, thereon shall be final and binding on the contractor; provided further that 'excepted matters' shall stand specifically excluded from the purview of the arbitration clause.

**64. (1) Demand for Arbitration:-**

Signature & Stamp of Tenderer

For & on behalf of DFCCIL



- (i) In the event of any dispute or difference between the parties hereto as to the construction or operation of this contract, or the respective rights and liabilities of the parties on any matter in question, dispute or difference on any account or as to the withholding by the DFCCIL of any certificate to which the contractor may claim to be entitled to, or if the DFCCIL fails to make a decision within 120 days, then and in any such case, but except in any of the 'excepted matters' referred to in clause 63 of these conditions, the contractor, after 120 days but within 180 days of his presenting his final claim on disputed matters shall demand in writing that the dispute or difference be referred to arbitration.
- (ii) The demand for arbitration shall specify the matters which are in question, or subject of the dispute or difference as also the amount of claim item wise. Only such dispute or difference, in respect of which the demand has been made, together with counter claims or set off, given by the DFCCIL, shall be referred to arbitration and other matters shall not be included in the reference.
- (iii) (a) The arbitration proceedings shall be assumed to have commenced from the day, a written and valid demand for arbitration is received by the DFCCIL.
- (b) The claimant shall submit his claim stating the facts supporting the claims along with all the relevant documents and the relief or remedy sought against each claim within a period of 30 days from the date of appointment of the Arbitral Tribunal.
- (c) The DFCCIL shall submit its defence statement and counter claim(s), if any, within a period of 60 days of receipt of copy of claims from Tribunal thereafter, unless otherwise extension has been granted by Tribunal.
- (d) The place of arbitration would be Mumbai.
- (iv) No new claim shall be added during proceedings by either party. However, a party may amend or supplement the original claim or defence thereof during the course of arbitration proceedings subject to acceptance by Tribunal having due regard to the delay in making it.
- (v) If the contractor(s) does/do not prefer his/their specific and final claims in writing, within a period of 90 days of receiving the intimation from the DFCCIL that the final bill is ready for payment, he/they will be deemed to have waived his/their claim(s) and the DFCCIL shall be discharged and released of all liabilities under the contract in respect of these claims.

**64. (2) Obligation during Pendency of Arbitration:-**

Work under the contract shall, unless otherwise directed by the Engineer, continue during the arbitration proceedings, and no payment due or payable by the DFCCIL shall be withheld on account of such proceedings, provided, however, it shall be open for Arbitral Tribunal to consider and decide whether or not such work should continue during arbitration proceedings.

**64. (3) Appointment of arbitrator**

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

- 64. (3) (a) (i)** In cases where the total value of all claims in question added together does not exceed Rs. 25,00,000/- (Rupees twenty five lakhs only), the Arbitral tribunal shall consist of a sole arbitrator nominated by the MD/DFCCIL. The sole arbitrator shall be appointed within 60 days from the day when a written and valid demand for arbitrator is received by MD/DFCCIL.
- (ii)** In cases not covered by the clause 64 (3) (a) (i), the Arbitral Tribunal shall consist of a Panel of three officials, as the arbitrators. For this purpose, the DFCCIL will send a panel of more than 3 names of DFCCIL officers which may also include the name(s) of Officer(s) empanelled to work as Arbitrator to the contractor within 60 days from the day when a written and valid demand for arbitration is received by the MD/DFCCIL. Contractor will be asked to suggest to MD/DFCCIL at least 2 names out of the panel for appointment as contractor's nominee within 30 days from the date of dispatch of the request by DFCCIL. The MD/DFCCIL shall appoint at least one out of them as the contractor's nominee and will, also simultaneously appoint the balance number of arbitrators either from the panel or from outside the panel, duly indicating the 'presiding arbitrator' from amongst the 3 arbitrators so appointed. MD/DFCCIL shall complete this exercise of appointing the Arbitral Tribunal within 30 days from the receipt of the names of contractor's nominees. While nominating the arbitrators it will be necessary to ensure that one of them is from the Accounts department. An officer of selection grade of accounts department shall be considered of equal status to the officers in SA grade of other department of DFCCIL for the purpose of appointment of arbitrator.
- (iii)** If one or more of the arbitrators appointed as above refuses to act as arbitrator, withdraws from his office as arbitrator, or vacates his/their office/offices or is/are unable or unwilling to perform his functions as arbitrator for any reason whatsoever or dies or in the opinion of the MD/DFCCIL fails to act without undue delay, the MD/DFCCIL shall appoint new arbitrator/arbitrators to act in his/their place in the same manner in which the earlier arbitrator/arbitrators had been appointed. Such re-constituted Tribunal may, at its discretion, proceed with the reference from the stage at which it was left by the previous arbitrator(s).
- (iv)** The arbitral Tribunal shall have power to call for such evidence by way of affidavits or otherwise as the arbitral Tribunal shall think proper, and it shall be the duty of the parties hereto to do or cause to be done all such things as may be necessary to enable the arbitral Tribunal to make the award without any delay. The arbitral Tribunal should record day-to-day proceedings. The proceedings shall normally be conducted on the basis of documents and written statements.
- (v)** While appointing arbitrator(s) under sub-clause (i), (ii) & (iii) above, due care shall be taken that he/they is/are not the one/those who had an opportunity to deal with the matters to which the contract relates or who in the course of his/their duties as DFCCIL servant(s) expressed views on all or any of the matters under dispute or differences. The proceedings of the arbitral Tribunal or the award made by such Tribunal will, however, not be invalid merely for the reason that one or more arbitrator had, in the course of his service, opportunity to deal with the matters to which the contract relates or who in the course of his/their duties expressed views on all or any of the matters under dispute.

- 64. (3) (b) (i)** The arbitral award shall state item wise, the sum and reasons upon which it is based. The analysis and reasons shall be detailed enough so that the award could be inferred there from.
- (ii)** A party may apply for corrections of any computational errors, any typographical or clerical errors or any other error of similar nature occurring in the award of a tribunal and interpretation of a specific point of award to tribunal within 60 days of receipt of the award.
- (iii)** A party may apply to tribunal within 60 days of receipt of award to make an additional award as to claims presented in the arbitral proceedings but omitted from the arbitral award.
- 64. (4)** In case of the Tribunal, comprising of three Members, any ruling on award shall be made by a majority of Members of Tribunal. In the absence of such a majority, the views of the Presiding Arbitrator shall prevail.
- 64. (5)** Where the arbitral award is for the payment of money, no interest shall be payable on whole or any part of the money for any period till the date on which the award is made.
- 64. (6)** The cost of arbitration shall be borne by the respective parties. The cost shall inter-alia include fee of the arbitrator(s), as per the rates fixed by the DFCCIL from time to time and the fee shall be borne equally by both the parties.
- 64. (7)** Subject to the provisions of the aforesaid Arbitration and Conciliation Act 1996 and the rules there under and any statutory modifications thereof shall apply to the arbitration proceedings under this clause.

### **JOINT VENTURE (JV) FIRMS IN WORKS TENDERS**

**65. Participation of Joint Venture (JV) Firms in Works Tender:**

This Clause shall be applicable for works tenders of value as approved and communicated by Railway Board /DFCCIL from time to time.

- 65. (1)** Separate identity/name shall be given to the Joint Venture Firm.
- 65. (2)** Number of members in a JV Firm shall not be more than three.
- 65. (3)** A member of JV Firm shall not be permitted to participate either in individual capacity or as a member of another JV Firm in the same tender.
- 65. (4)** The tender form shall be purchased and submitted only in the name of the JV Firm and not in the name of any constituent member.
- 65. (5)** Normally earnest money deposit (EMD) shall be submitted only in the name of Employer “Dedicated Freight Corridor Corporation of India Limited” A/C JV Firm and not in the name of constituent member. However, in exceptional cases EMD in the name of Employer “Dedicated Freight Corridor Corporation of India Limited” A/C JV Firm and in the name of Lead Member can be accepted subject to written confirmation from JV members to the effect, that EMD submitted by the Lead Member may be deemed as EMD submitted by JV Firm.

- 65. (6)** One of the members of the JV Firm shall be its Lead Member who shall have a majority (at least 51%) share of interest in the JV Firm and also, must have satisfactorily completed in the three previous financial years and the current financial year up to the date of opening of the tender, one similar single work for a minimum value of 35% of advertised tender value and as defined in technical eligibility criteria. The other members shall have a share of not less than 20% each in case of JV Firms with up to three members. In case of JV Firm with foreign member(s), the Lead Member has to be an Indian Firm with a minimum share of 51%.
- 65. (7)** A copy of Memorandum of Understanding (MoU) executed by the JV members shall be submitted by the JV Firm along with the tender. The complete details of the members of the JV Firm, their share and responsibility in the JV Firm etc. particularly with reference to financial, technical and other obligations shall be furnished in the MOU. (The MOU format for this purpose is enclosed along with the tender, Form No. 9).
- 65. (8)** Once the tender is submitted, the MoU shall not be modified/alterd/terminated during the validity of the tender. In case the tenderer fails to observe/comply with this stipulation, the full Earnest Money Deposit (EMD) shall be liable to be forfeited.
- 65. (9)** Approval for change of constitution of JV Firm shall be at the sole discretion of the Employer (DFCCIL). The constitution of the JV Firm shall not be allowed to be modified after submission of the tender bid by the JV Firm, except when modification becomes inevitable due to succession laws etc. and in any case the minimum eligibility criteria should not get vitiated. However, the Lead Member shall continue to be the Lead Member of the JV Firm. Failure to observe this requirement would render the offer invalid.
- 65. (10)** Similarly, after the contract is awarded, the constitution of JV Firm shall not be allowed to be altered during the currency of contract except when modification become inevitable due to succession laws etc. and in any case the minimum eligibility criteria should not get vitiated. Failure to observe this stipulation shall be deemed to be breach of contract with all consequential penal action as per contract conditions.
- 65. (11)** On award of contract to a JV Firm, a single Performance Guarantee shall be submitted by the JV Firm as per tender conditions. All the Guarantees like Performance Guarantee, Bank Guarantee for Mobilization Advance, Machinery Advance etc. shall be accepted only in the name of the JV Firm and no splitting of guarantees amongst the members of the JV Firm shall be permitted.
- 65. (12)** On issue of LOA (Letter Of Acceptance), an agreement among the members of the JV Firm (to whom the work has been awarded) shall be executed and got registered before the Registrar of the Companies under Companies Act or before the Registrar/Sub-Registrar under the Registration Act, 1908. This JV Agreement shall be submitted by the JV Firm to the DFCCIL before signing the contract agreement for the work. In case the tenderer fails to observe/comply with this stipulation, the full Earnest Money Deposit (EMD) shall be forfeited and other penal actions due shall be taken against partners of the JV and the JV. This Joint Venture Agreement shall have, inter-alia, following Clauses:

**65. (12) (1) Joint and Several Liability:-**

Members of the JV Firm to which the contract is awarded, shall be jointly and severally liable to the Employer (DFCCIL) for execution of the project in accordance with General and Special Conditions of Contract. The JV members shall also be liable jointly and severally for the loss, damages caused to the DFCCIL during the course of execution of the contract or due to non-execution of the contract or part thereof.

**65. (12) (2) Duration of the Joint Venture Agreement:-**

It shall be valid during the entire currency of the contract including the period of extension, if any and the Defect Liability Period after the work is completed.

**65. (12) (3) Governing Laws:-**

The Joint Venture Agreement shall in all respect be governed by and interpreted in accordance with Indian Laws.

**65. (13) Authorized Member:-**

Joint Venture members shall authorize one of the members on behalf of the Joint Venture Firm to deal with the tender, sign the agreement or enter into contract in respect of the said tender, to receive payment, to witness joint measurement of work done, to sign measurement books and similar such action in respect of the said Tender/contract. All notices/correspondences with respect to the contract would be sent only to this authorized member of the JV Firm.

**65. (14)** No member of the Joint Venture Firm shall have the right to assign or transfer the interest right or liability in the contract without the written consent of the other members and that of the employer (DFCCIL) in respect of the said tender/contract.

**65. (15)** Documents to be enclosed by the JV Firm along with the tender:

**65. (15) (1)** In case one or more of the members of the JV Firm is/are partnership firm(s), following documents shall be submitted:

- (a) Notary certified copy of the Partnership Deed,
- (b) Consent of all the partners to enter into the Joint Venture Agreement on a stamp paper of appropriate value (in original).
- (c) Power of Attorney (duly registered as per prevailing law) in favour of one of the partners of the partnership firm to sign the JV Agreement on behalf of the partnership firm and create liability against the firm.

**65. (15) (2)** In case one or more members is/are Proprietary Firm or HUF, the following documents shall be enclosed:

Affidavit on Stamp Paper of appropriate value declaring that his/her Concern is a Proprietary Concern and he/she is sole proprietor of the Concern OR he/she is in position of "KARTA" of Hindu Undivided Family (HUF) and he/she has the authority, power and consent given by other partners to act on behalf of HUF.

**65. (15) (3)** In case one or more members is/are limited companies, the following documents shall be submitted:

- (a) Notary certified copy of resolutions of the Directors of the Company, permitting the company to enter into a JV agreement, authorizing MD or one of the Directors or Managers of the Company to sign JV Agreement, such other documents required to be signed on behalf of the Company and enter into liability against the company and/or do any other act on behalf of the company.
- (b) Copy of Memorandum and Articles of Association of the Company.
- (c) Power of Attorney (duly registered as per prevailing law) by the Company authorizing the person to do/act mentioned in the para (a) above.

**65. (15) (4) Deleted.**

**65. (16) Credentials & Qualifying Criteria:**

Technical and financial eligibility of the JV Firm shall be adjudged based on satisfactory fulfillment of the following criteria:

**65. (16) (1) Technical Eligibility Criteria:** As defined in Preamble and General Instructions to Bidders.

**65. (16) (2) Financial Eligibility Criteria:** As defined in Preamble and General Instructions to Bidders.



## **PART-I**

### **CHAPTER IV (B)**

## **PRE CONTACT INTEGRITY PACT**

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

**PART-I**

**CHAPTER IV (B)**

**PRE CONTRACT INTEGRITY PACT**

**General:-**

This pre-bid pre-contract Agreement (hereinafter called the Integrity Pact) is made on \_\_\_\_\_ day of the month of \_\_\_\_\_ 2018, between, on one hand, the DFCCIL acting through Shri \_\_\_\_\_ Designation of the officer, (hereinafter called the CLIENT, which expression shall mean and include, unless the context otherwise requires, his successors in office and assigns) of the First Part and M/s \_\_\_\_\_ represented by Shri \_\_\_\_\_, Chief Executive Officer (hereinafter called the “BIDDER/SELLER” which expression shall mean and include, unless the context otherwise requires, his successors and permitted assigns) of the Second part.

WHEREAS the CLIENT proposes for “Supply of towers & line materials and erection, testing & commissioning work for diversion of two numbers of 220 KV double circuit transmission lines (owned by R-Infra), to facilitate the passage of rail track being constructed by the Dedicated Freight Corridor Corporation of India Limited (DFCCIL) at four different crossing locations near Village Aagvan (Dahnu Taluka); near Village Shirgaon (Vasai Taluka); near Village Bilalpada (Vasai Taluka) & near Village Gokhivare (Vasai Taluka) in Maharashtra” and the [A] is willing to offer/has offered for stores or works.

WHEREAS the [A] is a private company/public company/Government undertaking/partnership/registered export agency, constituted in accordance with the relevant law in the matter and the CLIENT is a PSU performing its functions on behalf of the President of India.

NOW, THEREFOR,

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 CLIENT to obtain the desired said (Supply of towers & line materials and erection, testing & commissioning work for diversion of two numbers of 220 KV double circuit transmission lines (owned by R-Infra), to facilitate the passage of rail track being constructed by the Dedicated Freight Corridor Corporation of India Limited (DFCCIL) at four different crossing locations near Village Aagvan (Dahnu Taluka); near Village Shirgaon (Vasai Taluka); near Village Bilalpada (Vasai Taluka) & near Village Gokhivare (Vasai Taluka) in Maharashtra) 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 BIDDERS to abstain from bribing or including in any corrupt practice in order to secure [B] by providing assurance to them that their competitors will also abstain from bribing and other corrupt practices and the CLIENT will commit to prevent corruption, in any form, by its officials by following transparent procedures.

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

The parties hereto hereby agree to enter into Integrity Pact and agree as follows:

**1. Commitments of the CLIENT:-**

- 1.1 The CLIENT undertakes that no official of the CLIENT, connected directly or indirectly with the [B], will demand, take a promise for or accept, directly or through intermediaries, any bribe, consideration, gift, reward, favour or any material or immaterial benefits or any other advantage from the [A] either for themselves or for any person, organization or third party related to the [B], in exchange for the advantage in the bidding process, bid evaluation, contracting or implementation process related to the [B].
  - 1.2 The CLIENT will, during the pre-contract stage, treat all BIDDERS alike, and will provide to all BIDDERS the same information and will not provide any such information to any particular BIDDER which could afford an advantage to that particular [A] in comparison to other BIDDERS.
  - 1.3 All the officials of the CLIENT will report to the appropriate Government office any attempted or completed breaches of the above commitments as well as any substantial suspicion of such a breach.
2. In case any such preceding misconduct on the part of such official (s) is reported by the [A] to the CLIENT with full and verifiable facts and the same is prima facie found to be correct by the CLIENT, necessary disciplinary proceedings, or any other action as deemed fit, including criminal proceedings may be initiated by the CLIENT and such a person shall be debarred from further dealings related to the [B] process. IN such a case while an enquiry is being conducted by the CLIENT the proceedings under the [B] would not be stalled.

**3. Commitments of BIDDERS:-**

The [A] 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 [B] contract or in furtherance to secure it and in particular commit itself to the following:-

- 3.1 The [A] 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 CLIENT, conducted directly or indirectly with the bidding process, or to any person, organization or third party related to the [B] in exchange for any advantage in the bidding, evaluation, contracting and implementation of the [B].
- 3.2 The [A] 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 CLIENT or otherwise in procuring the Contract or forbearing to do or having done any act in relation to the obtaining or execution of the [B] or any other [B] with the Government for showing or forbearing to show favour or disfavour to any person in relation to the [B] or any other [B] with the Government.
- 3.3 [A] shall disclose the name and address of agents and representatives and Indian [A] shall disclose their foreign principals or associates.
- 3.4 [A] shall disclose the payments to be made by them to agents/brokers or any other intermediary, in connection with this bid/document.

- 3.5 The [A] further confirms and declares to the CLIENT that the [A] is the original manufacturer/integrator/authorized government sponsored export entity and has not engaged any individual or firm or company whether Indian or foreign to intercede, facilitate or in any way to recommend to the CLIENT or any of its functionaries, whether officially or unofficially to the award of the [B] to the [A] nor has any amount been paid, promised or intended to be paid to any such individual, firm or company in respect of any such intercession, facilitation or recommendation.
- 3.6 The [A] either while presenting the bid or pre-contract negotiations or before signing the [B] shall disclose any payments he has made, is committed to or intends to make to officials of the CLIENT or their family members, agents, brokers or any other intermediaries in connection with the [B] and the details of services agreed upon for such payments.
- 3.7 The [A] will not collude with other parties interested in the [B] to impair the transparency, fairness and progress of the bidding process, bid evaluation, contracting and implementation of the [B].
- 3.8 The [A] will not accept any advantage in exchange for any corrupt practice, unfair means and illegal activities.
- 3.9 The [A] shall not use improperly, for purposes of competition or personal gain, or pass on to others, any information provided by the CLIENT as part of the business relationship, regarding plans, technical proposals and business details, including information contained in any electronic data carrier. The [A] also undertakes to exercise due and adequate care lest any such information is divulged.
- 3.10 The [A] commits to refrain from giving any complaint directly or through any other manner without supporting it with full and verifiable facts.
- 3.11 The [A] shall not instigate or cause to instigate any third person to commit any of the actions mentioned above.
- 3.12 If the [A] or any employee of the [A] or any person acting on behalf of the [A], either directly or indirectly, is a relative of any of the officers of the CLIENT, or alternatively, if any relative of an officer of the CLIENT has financial interest/stake in the BIDDERS firm, the same shall be disclosed by the [A] at the time of filling of tender.

The term 'relative' for this purpose would be as defined in section 6 of the Companies Act 1956.

- 3.13 The [A] 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 CLIENT.

#### **4. Previous Transaction:-**

- 4.1 The [A] declares that no previous transaction occurred in the last three years immediately before signing of this Integrity Pact, with any other company in any country in respect of any corrupt practices envisaged hereunder or with any Public Sector Enterprise in India or any Government Department in India that could justify BIDDERS exclusion from the tender process.
- 4.2 The [A] agrees that if it makes incorrect statement on this subject, [A] can be disqualified from the tender process or the contract, if already awarded, can be terminated for such reason.

## **5. Earnest Money & Security Deposit:-**

- 5.1 While submitting bid, the [A] shall deposit an amount of Rs. 33, 90,440/- (to be specified in RFP) as Earnest Money, with the CLIENT through Demand Draft or Banker's Cheque or FDR payable in favour of DFCCIL.
- 5.2 The successful [A] shall submit Security Deposit @ 5% of contract value which shall be valid up to end of defect liability period or the complete conclusion of the contractual obligations to the complete satisfaction of both the BIDDER and the CLIENT, including warranty period, whichever is later.
- 5.3 In case of the successful [A] a clause would also be incorporated in the Article pertaining to Performance Guarantee in the [B] that the provisions of Sanction for Violation shall be applicable for forfeiture of Performance Bond in case of a decision by the CLIENT to forfeit the same without assigning any reason for imposing sanction for violation of this pact.
- 5.4 No interest shall be payable by the CLIENT to the [A] on Earnest Money & Security Deposit for the period of its currency.

## **6. Sanctions for Violations:-**

- 6.1 Any breach of the aforesaid provisions by the [A] or any one employed by it or acting on its behalf (whether with or without the knowledge of the [A]) shall entitle the CLIENT to take all or any one or the following actions, wherever required.
  - (i) To immediately call off the pre-contract negotiations without assigning any reason or giving any compensation to the [A]. However, the proceedings with the BIDDER(s) would continue.
  - (ii) The Earnest Money Deposit (in pre-contract stage) and/or Security Deposit/performance Bond (after the [B] is signed) shall stand forfeited fully and the CLIENT shall not be required to assign any reason therefore.
  - (iii) To immediately cancel the [B], if already signed, without giving any compensation to the [A].
  - (iv) To recover all sums already paid by the CLIENT, and in case of an Indian [A] with interest thereon at 2% higher than the prevailing Prime Lending Rate of State Bank of India, while in case of a [A] from the country other than LIBOR. If any outstanding payment is due to the [A] from the CLIENT in connection with any other [B], such outstanding payment could also be utilized to recover the aforesaid sum and interest.
  - (v) To encase the advance bank guarantee and performance bond/ warranty bond, if furnished by the [A], in order to recover the payments, already made by the CLIENT, along with interest.
  - (vi) To cancel all or any other Contracts with the [A]. The [A] shall be liable to pay compensation for any loss or damage to the CLIENT resulting from such cancellation/ rescission and the CLIENT shall be entitled to deduct the amount so payable from the money(s) due to the [A].
  - (vii) To debar the [A] from participating in future bidding processes of the Government of India for a minimum period of five years, which may be further extended at the discretion of the CLIENT.
  - (viii) To recover all sums paid in violation of this Pact by [A] to any middleman or agent or broker with a view to securing [B] the contract.

- (ix) In cases where irrevocable Letters of Credit have been received in respect of any [B] signed by the CLIENT with the [A], the same shall not be opened.
- (x) Forfeiture of Performance Bond in case of a decision by the CLIENT to forfeit the same without assigning any reason for imposing sanction for violation of this pact.

6.2 The CLIENT will entitled to take all or any of the actions mentioned at para 6.1(i) to (x) of this Pact also on the Commission by the [A] or any one employed by it or acting on its behalf (whether with or without the knowledge of the [A], of an offence as defined in chapter IX of the Indian Penal Code, 1860 or Prevention of Corruption Act, 1988 or any other stature enacted for prevention of corruption.

6.3 The decision of the CLIENT to the effect that a breach of the provisions of this Pact has been committed by the [A] shall be final and conclusive on the [A]. However, the [A] can approach the independent Monitor(s) appointed for the purposes of this Pact.

## **7. Fall Clause:-**

7.1 The [A] undertakes that it has not supplied /is not supplying similar product/system or sub systems at a price lower than that offered in the present bid in respect of any other Ministry/Department of the Government of the India or PSU and if it is found at any stage that similar product/ systems or sub systems was supplied by the [A] to any other Ministry/ Department of the Government India or a PSU at a lower price, then that very price, with due allowance for elapsed time, will be applicable to the present case and the difference in the cost would be refunded by the [A] to the CLIENT, if the [B] has already been concluded.

## **8. Independent Monitors:-**

- 8.1 The CLIENT has appointed Independent Monitors (hereinafter referred to as Monitors) for this Pact in consultant with the Central Vigilance Commission (Names and Addresses of the Monitors to be given).
- 8.2 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.
- 8.3 The monitors shall not be subject to instructions by the representatives of the parties and perform their functions neutrally and independently.
- 8.4 Both the parties accept that the Monitors have the right to access all the documents relating to the project/ procurement, including minutes of meetings.
- 8.5 As soon as the Monitor notices, or has reason to believe, a violation of this Pact, he will so inform the Authority designed by the CLIENT.
- 8.6 The BIDDER(s) accepts that the Monitors have the right to access without restriction to all project documentation of the CLIENT including that provided by the BIDDER. The [A] 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 Subcontractors. The Monitor shall be under contractual obligation to that treat the information and documents of the [A] with confidentially.
- 8.7 The CLIENT 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.



8.8 The Monitor will submit a written report to the MD/DFCCIL within 8 to 10 weeks from the date of reference or intimation to him by the CLIENT/BIDDER and, should the occasion arise, submit proposals for correcting problematic situations.

**9. Facilitation of Investigation:-**

In case of any allegation of violation of any provisions of this Pact of payment of commission, the CLIENT or its agencies shall be entitled to examine all the documents including the Books of Accounts of the [A] and the [A] shall provide necessary information and documents in English and shall extend all possible help for the purpose of such examination.

**10. Law and Place of Jurisdiction:-**

This Pact is subject to Indian Law. The place of performance and jurisdiction is the seat of the CLIENT.

**11. Other Legal Actions:-**

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.

**12. Validity:-**

- 12.1 The validity of this Integrity Pact shall be from date of its signing and extend up to 5 years or the complete execution of the [B] to the satisfaction of both the CLIENT and the [A], including warranty period, whichever is later. In case [A] is unsuccessful, this Integrity Pact shall expire after six months from the date of the signing of the [B].
- 12.2 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 intentions.

13. The parties hereby sign this Integrity Pact at \_\_\_\_\_ on \_\_\_\_\_

**CLEINT**  
**Name of the Officer :**  
**Designation:**  
**Dept. /Ministry/ PSU:**

**BIDDER**  
**CHIEF EXECUTIVE OFFICER**

**Witness**

1. \_\_\_\_\_

2. \_\_\_\_\_

**Witness**

1. \_\_\_\_\_

2. \_\_\_\_\_

## **PART-I**

### **CHAPTER IV(C)**

## **CONTRACT MANAGEMENT**

## **PART - I**

### **CHAPTER IV(C)**

#### **CONTRACT MANAGEMENT**

##### **1.4.1 Role and Responsibilities of the Parties to the Contract:-**

- (i) There are 2 Nos. of existing 220 KV Double Circuit Transmission Lines of M/s Reliance-Infra which are evacuating power from Dahanu Thermal Power Plant of M/s Reliance-Infra which is situated near Dahanu Railway Station. These 220 KV double circuit lines are carrying power to North Mumbai Region. The proposed railway track of DFCCIL is crossing these existing 220 KV double circuit transmission lines at four different crossing locations near Village Aagvan (Dahnu Taluka); near Village Shirgaon (Vasai Taluka); near Village Bilalpada (Vasai Taluka) & near Village Gokhivare (Vasai Taluka) in Maharashtra. Such sections of Transmission Lines will need diversion for the purpose of overhead crossing of the corridor for the purpose of maintaining statutory electrical clearances from the proposed rail track of DFCCIL. The roles of the Employer, Contractor and Engineer have been brought out below. In case the Employer's representative is designated as the Engineer, the responsibilities of the Engineer will be appended to that of the Employer except for the duties assigned to the PMC as per the contract with PMC.
- (ii) **Employer (DFCCIL)** is responsible for defining the scope of the work, the Terms of Reference, setting the employer's requirements, specifications and standards to which the work shall be constructed and completed, laying down adequately provisions of Applicable Law, Clearly spelling out Safety plan requirements and making payments, approving any variations or design changes. In addition to these the Employer's representative will also be responsible for ensuring quality of construction.
- (iii) **Contractor** is responsible for construction methods, provision of competent and experienced personnel, supply and organization of labour, job safety, traffic management, construction related quality assurance and quality programmes, compliance with all applicable laws relevant to the work, ensuring a robust Safety plan and overall completion of the Contract Works. He will keep proper records including those for quality, inspection, rejection or rectification of work.
- (iv) **Engineer** is the party mentioned in the Contract for Project Management. The Engineer, as such, is the consultancy firm engaged by the Employer or any official of DFCC designated as such. The Consultant is, however, required to appoint a person to act as the Engineer and delegate to him the responsibilities to work and act on its behalf and carry out most of the functions related to the project. The consultancy firm may have internal regulatory and control arrangements with the said person and give him required directions. The Engineer is responsible for inspection of plant, materials and workmanship, making measurements of quantities as work proceeds and making engineering decisions where ambiguities or unforeseen circumstances occur. He will act impartially, give proper and timely advice to the Employer/Contractor to enable corrections during execution, and give reasons for his recommendations and decisions when called by the Employer. He will keep proper records including those for quality, inspection, rejection or acceptance of work, and make available such records as may be called for by the Employer.

#### **1.4.2 Role of Employer:-**

ACPM/EL/S/Mumbai and his team will be responsible for supervision and managing the contract and ensuring an overall Quality Assurance of the work.

#### **1.4.3 Duties and Authority of the Engineer:-**

- (i) The Engineer shall provide complete construction management services including construction management, co-ordination, scheduling, administration, inspection, construction staking, quality assurance, materials testing, drawing submittal, review and approval co-ordination, maintaining project documents as provided in the Contract Documents. In particular, he shall perform the functions hereinafter described.
- (ii) The Engineer shall be the Employer's representative vis-à-vis the Contractor during construction and until final payment is due. The Engineer shall advise and consult with the Employer. The Employer's instructions to the Contractor shall be forwarded through the Engineer.
- (iii) The Engineer shall have authority to act on behalf of the Employer only to the extent provided in the Contract Documents as they may be amended in writing in accordance with the Contract.
- (iv) The Engineer shall visit the Site regularly to familiarize himself with the progress and quality of the Works and to determine if the Works are proceeding in accordance with the Contract Documents. On the basis of his on-site observations as an Engineer, he shall keep the Employer informed of the progress of the Works.
- (v) Any proposal, inspection, examination, testing, consent, approval or similar act by the Engineer (including absence of disapproval) shall not relieve the Contractor from any responsibility including responsibility for his errors, omissions, discrepancies and non-compliance with conditions of contract.
- (vi) Except as otherwise provided in the Contract, the Engineer shall have no authority to relieve the Contractor of any of his obligations under the Contract nor to order any work involving delay in completion of the Works or any extra payment to the Contractor by the Employer, or to make any variations to the Works.
- (vii) The Engineer shall copy to the Employer all communications given or received by him in accordance with the Contract.

#### **1.4.4 Approval and Acceptance:-**

The Engineer's duties for approval and acceptance shall, in general be, as follows –

- (a) Approval of the Contractor's programme, his proposed methods of working;
- (b) Approval of setting out of works;
- (c) Temporary Works approval;
- (d) Issue of Working Drawings;
- (e) Acceptance of workmanship and approval of the quality of materials;
- (f) Approval of measures to deal with problems such as unforeseen physical conditions or slow progress;
- (g) Issue of certificates accepting the work as substantially complete and accepting the satisfactory completion of the maintenance period/defect liability period; and
- (h) Application of the test of 'satisfaction' as the standard of compliance for all matters pertaining to the Contract, including maintenance of records.
- (i) Any extension of time.

#### **1.4.5 Evaluation:-**

The Engineer's duties for evaluation shall comprise of but not be limited to;

- (a) Explanation and adjustment of ambiguities, discrepancies, errors and omissions in the Contract Documents;
- (b) Assessment of whether physical conditions or artificial obstructions were 'unforeseen';
- (c) Assessment of delays and evaluation of extra costs incurred by the Contractor;
- (d) Allocation of liability of damage to the Works, roads or public highways;
- (e) Assessment of the rate of progress against completion date;
- (f) Assessment of any extension to the Contract period;
- (g) Measurement and valuation of Works for interim payment and final account. The Engineer shall take measurements of the works independently and not through a different agency/ subcontractors; and
- (h) Evaluation of whether and how contract rates should be varied to take into account changes in the Works.

#### **1.4.6 Instructions:-**

The Engineer's duties for instructions shall comprise of but not be limited to

- (a) Giving order to commence the Works;
- (b) Issue of further drawings and variation orders to supplement, delete or modify any part of the Works;
- (c) Suspension (for a limited period) of the works due to weather, default of the Contractor, reasons of safety or the presence of unforeseen physical conditions;
- (d) Direction to the Contractor in dealing with unforeseen physical conditions;
- (e) Ordering removal and substitution of improper work and/or materials;
- (f) Direction to the Contractor regarding the use of provisional or prime cost items in the bill of quantities; and
- (g) Direction to the Contractor regarding the keeping and maintenance of particular contemporary records in connection with any claim.

#### **1.4.7 Consultation with and approval of the Employer:-**

Consultation with the Employer, where required, shall be adequate and visible. In certain specified responsibilities, listed below, the Engineer is obliged to obtain prior permission and specific approval of the Employer before taking appropriate decisions.

- (a) Issuing notice to commence the work;
- (b) Consenting to subletting any part of the Works;
- (c) Certifying additional cost on account of unforeseen physical obstructions and conditions;
- (d) Determining any extension of Contract time;
- (e) Ordering suspension of work;
- (f) Fixing new rates or prices;
- (g) Issuing order for Special Tests not provided in the Contract;
- (h) Issuing changes or additional Specifications;
- (i) Any extension of time.

#### **1.4.8 Emergency:-**

- (i) Notwithstanding the obligation, as set out above, to obtain approval, if, in the opinion of the Engineer, for reasons to be recorded in writing, an emergency occurs affecting the safety of life or of the works or of adjoining property, he may, without relieving the Contractor of any of his duties and responsibilities under the Contract, instruct the Contractor to execute all such work or to do all such things as may, in the opinion of the Engineer, be necessary to abate or reduce the risk. The Contractor shall forthwith comply, despite the absence of approval of the Employer, with any such instruction of the Engineer. The Engineer shall determine an addition to the Contract Price, in respect of such instruction, in accordance with conditions of the contract and shall notify the Contractor accordingly, with a copy to the Employer.
- (ii) The Engineer shall notify the ACPM/EL/S/MUM, within an hour of such a situation on phone and shall send them a copy of such instructions by email.

#### **1.4.9 Other Responsibilities of the Engineer:-**

The Engineer has to perform several other duties and these may include but not be limited to, the following:

- (a) Assist/advise Employer for advance action to be taken to achieve different milestones for completion of the project as per schedule;
- (b) Prepare monthly fund requirement projections for the Employer in an acceptable form;
- (c) Make independent measurements and check all quantity measurements and calculations required for payment purposes;
- (d) Superintend and ensure performance by the Sub-contractors and Joint Ventures strictly as per approvals given and terms of the Agreement;
- (e) Inspect the works during construction regarding safety, adequacy of methods of construction, quality, and deployment of the required materials and equipment;
- (f) Inspect the works at proper intervals during Defects Liability Period, issue Defects Liability Certificate after rectification by the Contractor of possible defects, and issue final payment certificates;
- (g) Verify and correct the 'as-built' drawings supplied by the Contractor;
- (h) Maintain records of all plant, labour and material used in construction of the works;
- (i) Assist the Employer in taking over from the Contractor each section in particular by preparing list of deficiencies/defects which need to be corrected and handing over to R-Infra, and further assist with monitoring of the performance of the works during the Defects Liability Period;
- (j) Assist the Employer in providing clarifications/explanations to observations made from time to time by Audit.

#### **1.4.10 Setting up of Milestones:-**

'Deadlines' or 'Contractual Milestones' should be set up and tabulated to facilitate monitoring of the progress of work.

#### **1.4.11 Delegation by the Engineer:-**

- (a) The Engineer or the Engineer's representative may appoint a number of assistants to assist them after duly notifying their names, duties and scope of authority to the contractor.



- (b) Each Assistant to whom duties have been assigned or authority has been delegated shall be authorized to issue instructions to the Contractor to the extent defined by the delegation. Any approval, check, certificate, consent, examination, inspection, instruction, notice, proposal, request, Test or similar act by assistance shall have the same effect as though the act had been act of the Engineer. However, any failure to disapprove any work, plant or Materials shall not constitute Approval, and shall not therefore prejudice the right of the Engineer to reject the work, plant, machinery, equipment, design, workmanship and materials.
- (c) If the Contractor questions any determination or instruction of an assistant, the contractor may refer the matter to the Engineer who shall promptly confirm, reverse or vary the determination or instruction.

#### **1.4.12 Instructions of the Engineer:-**

- (a) The Contractor shall comply with the instructions given by the Engineer, Engineer's Representative or the delegated assistant, on any matter related to the Contract. Wherever practicable, the instructions shall be given in writing. If the Engineer or a delegated assistant gives an oral instruction and receives a written communication of the instruction, from (or on behalf of) the Contractor, within two working days after giving the instruction, and does not reply by issuing a written rejection and/or instruction within two working days after receiving the confirmation, then the confirmation shall constitute the written instruction of the Engineer or delegated assistant (as the case may be).
- (b) The Contractor shall give reasonable notice to the Engineer of any instruction which he considers necessary for execution of the Works to enable the Engineer to issue the instruction so that the progress of Works is not delayed. The Engineer shall, however, not be bound to issue any instruction which, in his opinion, is unnecessary.
- (c) No act or omission by the Engineer or the assistants to the Engineer in the Performance of any of the Engineer's duties or exercise of any of the Engineer's powers under the Contract shall, in any way, operate to relieve the Contractor of any of the duties, responsibilities, obligations or liabilities imposed by any of the provisions of the Contract.

#### **1.4.13 Contractor's General Obligations:-**

- (a) The Contractor shall design (to the extent required & specified in the Contract), execute and complete the Works wholly in accordance with the Contract and fit for the purposes for which they are intended, as defined in the Contract. The Works shall include any work which is necessary to satisfy the Employer's requirements, the Contractor's proposal and schedules or is implied by the Contract, or arises from any obligation of the Contractor and all works not mentioned specifically in the Contract but which may be inferred to be necessary for stability or completion or safe, reliable and efficient operation of the Works. The Contractor shall remedy any defects in the Works, as directed by the Engineer.
- (b) The Contractor shall design (to the extent required & specified in the Contract) manufacture, procure, supply, execute, install, complete, test (including Integrated Testing) and commission the Works, including providing Construction and/or Manufacture Documents within the Time for Completion and shall remedy the defects within the Contract Period. The Contractor shall provide all superintendence, labour, Plant, Materials, Contractor's Equipment, and Temporary Works etc. required.

- (c) Before commencing manufacture, the Contractor shall satisfy himself regarding the Employer's Requirements (including design, criteria and calculations etc.) and the items of reference mentioned in the contract. The Contractor shall give notice to Engineer of any error, fault, or other defect in the Employer's requirements or such items of reference. After receipt of such notice, the Engineer shall determine whether Contract Clause shall be applied and shall notify the Contractor accordingly.
- (d) The Contractor shall be responsible for the adequacy, stability and safety of all site operations and of all methods of construction, manufacture and all Works irrespective of any approval or consent of the Engineer. The Contractor shall, whenever required by the Engineer, submit details of the arrangement and methods which the contractor proposes to adopt for the execution of the works. No significant alteration to these arrangements and methods shall be made without this having previously been notified to the Engineer.
- (e) The Contractor is responsible for ascertaining and securing at his own cost:
  - (i) Conditions affecting the proper transportation, disposal, handling and storage of materials (including but not limited to hazardous toxic substances and excavated materials).
  - (ii) Availability and costs of electricity, water and gas
  - (iii) Availability and rates of employment of skilled and unskilled manpower
  - (iv) The character and quantum of equipment and facilities needed preliminary to and during the procurement, manufacture, installation, execution, testing (including Integrated Testing) and commissioning of the Works and remedying of any defect.
  - (v) The protection of the environment and adjacent structures which will be necessary preliminary to and during the procurement, manufacture, installation, execution, testing (including Integrated Testing) and commissioning of the Works and remedying of any defect.
  - (vi) The location of and the authorization required for and the means of diversion and facilities required for the purposes of the Works.

#### **1.4.14 Contractor's Warranty of Design:-**

The contractor shall be deemed to have checked and accepted full responsibility for the design:

- (a) Notwithstanding that such design as may be or have been prepared, developed or issued by the Employer or Engineer or any of Contractor's consultants, his sub contractor's and/or his qualified personnel/persons or cause to be prepared, developed or issued by others.
- (b) Notwithstanding any warranties, guaranties and/or indemnities that may be or may have been submitted by any other person.
- (c) Notwithstanding that the same have been accepted by the Engineer.

#### **1.4.15 Compliance with Regulations and Bylaws:-**

The Contractor shall confirm in all respects with:

- (a) provision of any statute relating to the works and regulation and bye-laws of any local authority and of any water and lighting companies or undertakings, with whose system the work is proposed to be connected. The Contractor shall be bound to give all notices required by statute, regulations or bye-laws as aforesaid and to pay all fees and taxes payable to any authority in respect thereof which will be reimbursed on production of proper record.

- (b) The provision of all laws of land in force and enacted from time to time will be complied by the Contractor.
- (c) The regulations or bye-laws of any local body and utilities.
- (d) The contractor shall be bound to give all notices, if required, by statute, regulations or bye-laws, aforesaid and to pay all fees and bills payable in respect thereof. The contractor will arrange necessary clearances and approvals before the work is taken up. Nothing will be paid by employer on this account.

Ignorance of rules, regulations and bylaws shall not constitute a basis for any claim at any stage of work.

#### **1.4.16 Provision of Efficient and Competent Staff:-**

The Contractor shall employ and keep on the works at all times efficient and competent staff to give necessary directives to his workers for execution of works in a safe and proper manner. If the Engineer asks the Contractor to remove a person of his work force stating the reasons, the contractor shall ensure that the person leaves the site within seven days and has no further connection with the work in the Contract.

#### **1.4.17 Commencement of Works:-**

After signing the Contract and issue of Letter of Acceptance, the following steps become mandatory:

- (a) The Engineer instructs the Contractor to 'Commence the Works';
- (b) The Contractor, within the stipulated time, submits to the Engineer for his consent, programme in such form and detail as the Engineer reasonably prescribes;
- (c) methods statement which the Contractor proposes to adopt for execution of the Works, and
- (d) Quality Assurance Plan – only General Procedures.

#### **1.4.18 Technical Standards and Regulations:-**

The Construction, the Manufacture, the execution and the completed Works shall comply with the specifications, technical standards, safety regulations and other standards specified in the tender document applicable to the Works or defined by the applicable laws and regulations.

#### **1.4.19 As Built Drawings and Documents:**

- (i) The Contractor shall prepare, and keep up-to-date, a complete set of "as-built" records of the execution of the Works, showing the exact "as-built" locations, sizes and details of the Works as executed, with cross references to relevant specifications and data sheets.
- (ii) Prior to the issue of any Taking over Certificate, the Contractor shall submit to the Engineer one soft copy, one full-size original copy and six printed copies of the relevant "as-built drawings". The Works shall not be considered to be completed for the purposes of Taking Over until such documents have been submitted to the Engineer.

## **PART-I**

### **CHAPTER V (A)**

## **SPECIAL CONDITIONS OF CONTRACT**

## **PART - I**

### **CHAPTER V (A)**

#### **SPECIAL CONDITIONS OF CONTRACT**

**1.5.1** This contract shall be governed by conditions and specifications contained in various parts/chapters of the tender document. In case of any contradiction in conditions/specifications contained in various parts/chapters of the tender document, order of precedence will be as given below;

- (i) Any footnote given in the Schedule of Prices [Form No. – 4 of Financial Bid].
- (ii) Explanatory notes of Schedule of Prices [Chapter-VI of Part-I].
- (iii) Schedule of Prices [Form No. – 4 of Financial Bid].
- (iv) Additional Special Conditions of contract (Price & Payment) [Chapter-V(B) of Part-I]
- (v) Special Conditions of contract [Chapter-V(A) of Part-I]
- (vi) Contract Management [Chapter-IV(C) of Part-I]
- (vii) Technical Specifications [Part-II]
- (viii) General Conditions of Contract [Chapter-IV(A) of Part-I]
- (ix) Preamble and General Instructions to bidders[Chapter-III of Part-I]

**1.5.2** If there is varying or conflicting provisions in the documents forming part of the contract, ACPM/EL/S/MUM/DFCCIL shall be deciding authority with regard to the intentions of the provision and decision of ACPM/EL/S/MUM/DFCCIL will be final and binding on the contractor.

**1.5.3 Time Schedule & Milestones: -**

**(a) Time Schedule:-**

- (i) The time period allowed for completion of the works is 12 (Twelve months) from the date of issue of Letter of Acceptance (LOA) from DFCCIL excluding monsoon period (1<sup>st</sup> June to 30<sup>th</sup> September) and contractor shall be expected to complete the whole work within stipulated time period.
- (ii) The contractor is expected to mobilize resources and commence execution of the works within 15 days beginning from issue of Letter of Acceptance (LOA) by DFCCIL.

**(b) Progress of works:-**

The contractor shall submit a program of work in the form of a Bar Chart of all the activities. In case this bar chart requires to be modified, the Engineer and the contractor shall agree upon a time and progress chart. The chart shall be prepared in direct relation to the time stated as 12 months excluding monsoon period (1<sup>st</sup> June to 30<sup>th</sup> September) for the completion of the works. It shall indicate the forecast of the dates of commencement and completion of various activities of the work and may be amended as necessary by agreements between the Engineer and the contractor within the limitation of 12 months excluding monsoon period (1<sup>st</sup> June to 30<sup>th</sup> September) as overall completion period.

**1.5.4 Quality Assurance Program in Supply and Erection /Execution:-**

**(a) Quality of Materials: -**

- (i) All materials used in the work shall be of the best quality and of the class best suited for the purpose specified and procured from the sources approved by DFCCIL and shall be as per the relevant Standard.

- (ii) It is essential that the manufacturer, from whom supply is arranged, should have long experience of design and manufacture of equipment, components, materials and fittings.
- (iii) The requisite facilities for testing of prototypes, supplied against this contract, should be available with the manufacturer. In the case of those equipment, components or fittings for which the requisite facilities for testing of prototypes are not available with the manufacturer, the manufacturer shall arrange to carry out the prototype tests on his own cost in a testing laboratory approved by the DFCCIL.
- (iv) Prototype testing will be required to be carried out only for those items which are being designed /procured for the first time and earlier Prototype test reports are not available.
- (v) Only tested quality steel shall be used. The contractor shall ensure that the DFCCIL's prescribed Quality Assurance Standards are rigidly followed in the manufacture and erection/installation of all the materials/components and fittings/equipment required for the work as given in the tender document.
- (b) **Quality of Erection:** - All erection work carried out shall also be of the best quality acceptable to DFCCIL. The work shall be carried out as per latest relevant specification as on the date of opening of tender even if mentioned otherwise elsewhere in the tender.
- (c) **Quality Assurance of Materials:** - All the equipment, materials, fittings and component will be subject to quality control program of manufacturer, being a part of the Quality Assurance Program of the Contractor. The materials may also be inspected by the Engineer either at the manufacturer work or at the Contractors' depot. Engineer shall have the right to be present during all the stages of manufacture and shall be afforded free of charge all reasonable facilities for inspection and testing as well as to examine the stage inspection report of the manufacturer in addition to the quality audit which the Contractor may institute as a part of his program, so as to satisfy himself that the materials are in accordance with specifications, approved drawings and designs and prescribed Quality Assurance Standards.
- (d) **Quality Assurance of Erection:** - All erection works will also be subjected to the Quality Assurance Program including inspection by the Engineer to ensure that the work is done in accordance with the specification and approved drawings and designs and prescribed quality assurance standards.

#### **1.5.5 Expenses of DFCCIL and Engineer's Representatives:-**

**M/s Takalkar Power Engineers & Consultants Pvt. Ltd (TPECPL), Vadodara** is the sole Engineer and Project Monitoring Consultant (PMC) appointed by DFCCIL for this project.

- (i) All the expenses of Engineer and DFCCIL's representatives for inspection of proto model of towers, Tower materials & Line materials or any other item as mentioned in Part-II of 'Technical Bid Document', at manufacturers works including witnessing of tower testing at testing stations, shall be borne by the contractor whether the inspected material is finally utilized in work or not. This shall include to & fro travel by train (2 tier AC) or air (Economy Class), lodging & Boarding and local transport from the head quarter of the representative of Engineer/DFCCIL.



- (ii) Successful bidder will set up two site offices one at Dahanu & other at near other three sites in Mumbai region. The site office will have adequate facility for night stay of Engineer/DFCCIL representative, as and when required, for 24 hours working and supervision. Successful bidder will also provide transport facility to the Engineer/DFCCIL representative for the smooth functioning of site supervision activities, as and when required. Cost for the above will be borne by the successful bidder.
- 1.5.6** The decision of the Engineer shall be final in respect of acceptability or otherwise of any material, fittings, component or equipment required for the work.
- 1.5.7** (a) **Contractor's Drawings etc.**:- All calculations, designs, drawings, schedules, information data progress charts etc. (as applicable) required by the Engineer's representatives in connection with the contract, shall be furnished by the Contractor at his own expenses.
- (b) **Adherence to Specification and Drawings**:-The whole of the works shall be executed in perfect conformity with the specifications, designs and drawings of the contract. If the contractor performs any work in a manner contrary to the specifications or designs or drawings or any of them and without such reference to the DFCCIL, then, he shall bear all the costs arising or ensuring there from and shall be responsible for all loss to the DFCCIL.
- (c) **Drawings and Specifications of the Works**:-The contractor shall keep one copy of designs, drawings and specifications at the site, in good order, and such other contract documents as may be necessary, available to the Engineer's representative.
- (i) **Ownership of Drawings and Specifications**: - All designs/drawings/calculations/data submitted by the contractor for execution of the work shall be property of the DFCCIL and they reserve the right to use them for any work, in any manner deemed fit. In case of any ambiguity in the interpretation of design and drawing, the decision of the Engineer shall be final and conclusive. All designs/drawings and specifications and copies thereof furnished by the DFCCIL to the contractor are deemed to be the property of the DFCCIL. These documents shall not be used for other works and with the execution of the signed contract set, same shall be returned by the contractor to DFCCIL on completion of work or on termination of the contract.
- (ii) **Compliance with Contractor's request for Details**: - Engineer will furnish, with reasonable promptness after receipt of the contractors request for the same, additional details or additional instructions by means of drawings or otherwise, necessary for the proper execution of the works or any part thereof. All such drawings and instructions shall be consistent with the contract documents and reasonably inferable there from.
- (iii) **Meaning and Intent of Specification and Drawings**: -If any ambiguity arises as to the meaning and intent of any portion of the specifications and drawings or as to execution or quality of any work or material or as to the measurements of the works, the decision of the DFCCIL there shall be final subject to appeal within seven days of such decision being intimated by the contractors to the CPM/S/MUM or his nominated representative, who shall have the power to correct any errors, omissions or discrepancies in the specifications, drawings, classification or work or materials and whose decision in the matter in dispute or doubt shall be final and conclusive and binding.

**1.5.8 Power Shut Down of Existing 220 KV Double Circuit Transmission Lines (Power lines) owned by R-Infra:-**

- (a) The contractor will get Power Shut down of only one circuit at a time of the existing as well as temporarily diverted 220 KV Double Circuit Transmission Lines (Power lines) owned by R-Infra. Works such as foundations of towers shall be done without Shutdown. The requirement of detailed shut down/power blocks based execution plans shall be prepared by the contractor and will be submitted to the Engineer for the approval. All the erection of towers/stringing of conductors, shifting of conductors/OPGW for Temporary/Permanent diversion works (as specified in the respective drawings and diversion work methodology of DFC corridor crossing sites) including dismantling of towers, conductors/OPGW & insulators etc. shall be done under minimum power block/shut down. Contractor shall arrange adequate gangs of labours i.e. expert of Transmission Line fitters, Semi-skilled fitters, helpers etc. with supervisors and sufficient tools and tackles required as per site conditions. Work shall be done day & night at war foot level with the approval of Engineer. Contractor is required to refer detailed execution methodology explained in the tender document at c Chapter-VIII of Part-II.
- (b) Power Shut down/Power Block will be granted for a specific period during day & night hours based on detailed shut down approved plan. The Contractor shall confirm that he shall equip himself to carry out all construction during stipulated shut down period during day hours as well as night hours efficiently by suitable special lighting equipment without any extra cost. Contractor shall also note that in any case shut down period will not be extended beyond approved period and has to complete planned work by deploying adequate manpower and resources.
- (c) If planned shutdown is deferred/canceled by statutory authority, no extra charges whatsoever shall be paid to the contractor. However, Engineer shall co-ordinate to avail outage as planned again.
- (d) R-Infra's Standard Operating Procedures (SOP) shall be strictly followed for obtaining and normalizing any outages. SOP will be discussed prior to availing the outages and also during the kick-off meeting.
- (e) Shut down of one of the circuits of existing 220 KV Double Circuit Transmission Lines (Power lines) shall be subject to normal operating conditions and rules of the DFCCIL/R-Infra. All necessary formalities will be done by the contractor for this purpose. Engineer and R-Infra may depute a representative for each erection gang, who will facilitate for imposing shut down and also returning the same after men, material and equipment have been removed by the Contractor from site and the line section is declared safe for charging.

**1.5.9 Correctness of Work and Materials:-**

- (a) The contractor shall be solely responsible for correctness of the positions, levels and dimensions of the works according to approved designs & drawings, notwithstanding the fact that he may have been assisted by the Engineer in setting out the same.

- (b) If any dimension figured upon a drawings differs from that obtained by scaling the drawings the figured dimensions should be normally taken as correct, unless it is prima facie a mistake. But all such cases shall be brought to the notice of the Engineer/DFCCIL's representative and the discrepancy set right before execution.

**1.5.10 Contractor's Responsibility for discrepancy:-**

- (a) All designs and drawings submitted by the Contractor shall be based on Engineer's proposal and a thorough study and shall be such that the Contractor is satisfied about their suitability. Engineer's approval will be based on these considerations. Notwithstanding approval communicated by the Engineer, during the progress of the contract for designs and drawings, prototype samples of components, materials and equipment after inspection of materials, after erection and adjustments to installations, the ultimate responsibility for correct execution of work shall be with contractor.
- (b) The Contractor shall be responsible for and shall bear and pay the cost for any alternation or works arising from any discrepancies, errors or omissions in the designs and drawings, whether such designs and drawings have been approved by the Engineer or not.

**1.5.11 Additions and alterations to erected equipment :-**

Engineer may require additional installations or modifications to be carried out on the works he deems necessary, either during the execution or after a part or whole of the installations coming with the purview of the Contract has been put into commercial service. Further, it may be necessary and expedient to energize Transmission Line Sections which have been completed and finally adjusted in portions in Transmission Line. This will necessitate erection of new equipment in the vicinity of or joining energized equipment. In case the prices for such additional works or modifications are not covered by the schedule of price and are such that either party considers additional prices for such works justified, such additional works or modification shall be carried out, only after the additional prices proposed by the Contractor are accepted by the Engineer. In case additional installations or modifications are required to be carried out under this para, the Engineer shall grant a reasonable extension of time, should it be necessary.

**1.5.12 Work by Other Agencies:-**

- (a) Any other works undertaken at the same time by the DFCCIL or R-Infra direct or through some other agency at the same time or site where the contractor is carrying out his work, will not entitle the contractor to prefer any claim regarding any delays or hindrances he may have to face on this account but the Engineer shall grant a reasonable extension of time to the contractor. The contractor shall comply with any instruction which may be given to him by the Engineer in order to permit simultaneous execution of his own works and those undertaken by other contractors or the DFCCIL, without being entitled for this account on any extra charge.
- (b) The contractor shall not be entitled to any extra payment due to hindrance resulting from normal DFCCIL/R-Infra operations, such as delay on account of adequate number of and duration of blocks not being granted, operational delay in DFCCIL/R-Infra works or extension of time to the contractor.

- (c) In the course of checking/finalizing of Diversion Plan, ROW Plan, Tower Profile, Tower & Foundation Design and Structural Drawing of Tower corresponding to permanent as well as temporary diversion schemes, the contractor shall prepare a list of infringements if any exists, and advise the Engineer in time.

#### **1.5.13 Infringement of patents:-**

- (a) The Contractor is forbidden to use any patents or registered drawings, process or pattern in fulfilling his contract without the previous consent in writing of the DFCCIL of such patent, drawing, pattern or trade mark, except where these are specified by the DFCCIL himself. Royalties where payable for the use of such patented processes, registered drawings or patterns, shall be borne exclusively by the Contractor. The contractor shall advise the DFCCIL of any proprietary right that may exist on such processed drawings or patterns which he may use or his own accord.
- (b) In the case of patent taken out by the Contractor of the drawings or patterns registered by him, or of those patents, drawings, or patents for which he holds a license, the signing of the Contract automatically gives the DFCCIL the right to repair by himself the purchased articles covered by the patent or by any person or body chosen by him and to obtain from any sources he desires, the component parts required by him in carrying out the repair work. In the event of infringement of any patent rights due to above action of the DFCCIL, he shall be entitled to claim damages from the contractor on the grounds of any loss of any nature which he may suffer e.g. in the case of attachment because of counterfeiting.
- (c) **Indemnification by contractor:-** In the event of any claim or demand being made or action being brought against the DFCCIL for infringement of later patent in respect of any equipment, machine, plant, work or things used or supplied by the Contractor under this contract or in respect of any methods of using or working by the DFCCIL of such equipment machine, plant work or thing, the contractor shall indemnify the DFCCIL and keep him indemnified and harmless against all claims, costs, charges and expenses arising from or incurred by reason of such claim provided that the DFCCIL shall notify the contractor immediately any claim is made and that the contractor shall be at liberty, if he so desires with the assistance of the DFCCIL if required but at the Contractor's expense, to conduct all negotiations for the settlement of the same or any litigation that may arise there from and provided that no such equipment, machine, plant work or thing, shall be used by the DFCCIL for any purpose or in any manner other than that for which they have been supplied by the Contractor and specified under this contract.

#### **1.5.14 Insurance:-**

- (a) The contractor shall take out and keep in force a policy or policies of insurance against all liabilities of the contractor or the DFCCIL at common law or under any status in respect of accidents to person who shall be employed by the contractor in or about the site of the contractors office for the purpose of carrying out the works on the site. The contractor shall also take out and keep in force a policy or policies of insurance against all recognized risks to their offices and depots. Such insurance shall in all respects be to the approval of the DFCCIL and if he so requires, in his name

- (b) **Insurance of man, materials and installations:** - The contractor shall take out and keep in force a policy or policies of insurance against all liabilities of the contractor or the DFCCIL at common law or under any statute in respect of accidents to persons, till installations are provisionally handed over to the R-Infra. For this purpose the installation in a site/section shall be deemed to have been provisionally handed over when provisional acceptance certificate is issued for the site/section or the installations in the site/section or commissioned or on the expiry of twelve months after installations are deemed to be ready in all respect for handing over, whichever is earlier, for commercial use. The contractor shall not be liable for losses or damages to equipment erected, in the course of erection or in stores at the contractor's depot in consequence of mutiny or other similar causes over which the contractor has no control and which cannot be insured, such losses or damages shall, if required by the DFCCIL, be made good by the contractor at the cost of the DFCCIL.
- (c) The contractor should, however, insure the materials brought to site against risks in consequence of war and invasion as required under the emergency risks (goods) Insurance Act 1962 from time to time.

**1.5.15 Accident:-**

- (a) The contractor shall, in respect of all staff engaged by him or by his sub-contractor, indemnify and keep the DFCCIL at all times indemnified and protected against all claims made and liabilities incurred under Workman's Compensation Act, the Factories Act and the Payment of Wages Act and rules made thereunder from time to time or under any other Labour and Industrial Legislation made from time to time.
- (b) The contractor shall indemnify and keep the DFCCIL indemnified and harmless against all actions, suits, claim demands, costs, charges or expenses arising in connection with any death or injury sustained by any person or persons sustained due to the acts or omission of the contractor, his sub-contractors, his agents or his staff during the executions of this contract, irrespective of whether such liability arises under the Workman's Compensation Act, or Fatal Accident Act or any other statute in force at that time.
- (c) The contractor's liability to meet third party claims of the type outlined above will be applicable only in cases where accidents have been caused by bad design, workmanship, material or negligence on the part of the contractor.
- (d) The contractor shall be responsible for all repairs and rectification of damages to transmission line installations erected or under erection due to accidents, thefts, pilferage or any other cause, without delay to minimize or to avoid Power failure, in a section of the existing transmission lines, until the installation is provisionally handed over to the R-Infra.

**1.5.16 Safety measures:-**

- (a) The contractor shall take all precautionary measures in order to ensure the proper protection of his own personnel moving about or working on the DFCCIL/R-Infra premises, but shall then conform to the rules and regulations of the EHV Transmission Lines, if and when, in the course of the work there is likely to be any danger to persons in the employment of the contractor due to existing live EHV Transmission Lines while working at crossing sites, the contractor shall provide safety officer for protection of such persons. The DFCCIL shall remain indemnified by the contractor in the event of any accident occurring in the normal course of work, arising out of the failure of contractor or his men to exercise reasonable precaution at all places of work.



- (b) Blasting of rocks for foundation work shall be done only after due notice is given to the Engineer and time/s and date/s for blasting operations agreed to by the DFCCIL. Blasting, if required to be done in the vicinity of the existing transmission lines, shall not be undertaken until the DFCCIL/R-Infra/Engineer's personnel on duty and contractor shall take necessary step to protect existing transmission lines and other surroundings against damage by the debris of blasted rock. The contractor shall assist Engineer in this matter and follow detailed instructions which will be issued to him regarding blasting operations in the vicinity of existing transmission lines and surroundings.
- (c) The contractor shall abide by all DFCCIL/R-Infra regulations in force from time to time and ensure that the same are followed by their representatives, Agents or sub-contractors or workmen. He shall give due notice to his employees and workers about provision of this para.
- (d) The works must be carried out most carefully without any infringement of the Indian Electricity Act/Rules or Standard Operating Procedure (SOP) of R-Infra or DFCCIL Rules in force, in such a way that they do not hinder DFCCIL/R-Infra operation or affect the proper functioning of or damage any DFCCIL/R-Infra equipment, structure except as agreed to by the DFCCIL, provided that damage and disfiguration caused by the contractor shall be made good by the contractor at his own cost, failing which cost of such repairs shall be recovered from the contractor.
- (e) If safety of existing transmission lines or track or track drainage etc. is affected as a consequence of works undertaken by the contractor, the contractor shall take immediate steps to restore normal conditions. In case of delay, the DFCCIL shall, after giving due notice to the contractor in writing, take necessary steps and recover the costs from the contractor.
- (f) The contractor shall be responsible for safe custody of all Tower Materials/Line Materials/Accessories/ Equipment till provisional acceptance/handing over.

**1.5.17 Provisional Acceptance:-**

- (a) Immediately after completion of works at or in a site/section, the Contractor shall certify and advise the Engineer in writing that the site/section is/are (i) complete (ii) ready for satisfactory commercial service and (iii) ready to be handed over. He will also place at the disposal of the Engineer, the required staff, for checking it and putting it into operation.
- (b) The test or tests in connection with the taking over by the R-Infra of the equipment and installations, shall be carried out jointly by the Engineer/R-Infra and the contractor within a specified period after the receipt of the contractor's notifications, as stated in sub-para/s above.
- (c) After inspection and satisfactory conclusion of tests and when the Engineer is satisfied with the satisfactory working of the installations, DFCCIL will issue a 'Provisional Acceptance Certificate' which would be signed by Engineer, DFCCIL and Contractor. The Provisional Acceptance Certificate will not be withheld for any minor defects. Engineer appointed by DFCCIL will coordinate in this matter.



- (d) Should the result/s of inspection and the test/s be not satisfactory, an extension of a specified period will be granted to the contractor to make good the defects and deficiencies pointed out by the Engineer/R-Infra. Fresh inspection and test will then be carried out after the contractor has attended to the defects and deficiencies. If these tests are also not satisfactory, the DFCCIL may proceed at the contractor's expenses, by all means deemed expedient, to have the installation made satisfactory until they comply with the specifications and approved drawings and designs.
- (e) In such a case, or in case of delay in completing the work under this contract within the specified time limit, the DFCCIL reserves the right if he deems it possible to use in a reasonable manner any site/section or any part of the site/section even if some installations of the site/section are not completely erected. The DFCCIL will give to the contractor for this purpose seven days advance notice. The contractor shall then take at his own expenses all necessary steps to complete the works in accordance with, the provisions of the contract. In case it becomes impossible to proceed with the above mentioned taking over tests, for reasons other than for which the contractor is responsible, the "Provisional Acceptance Certificate" shall be issued at or within a mutually agreed reasonable period not exceeding three months after completion of the relevant sites/sections as indicated in sub-para/s above.

**NOTE:-**

1. Provisional Acceptance Certificate for each diversion site/crossing modification will be issued immediately after all tests are completed to the satisfaction of the Engineer. Should the Engineer/R-Infra be unable to complete the tests and energization of the line within a reasonable time, which shall not exceed one month from the date of contractor's notification, the issue of Provisional Acceptance Certificate shall not be delayed and shall be issued within a maximum time of three months after contractor's notification has been issued.
2. The issue of Provisional Acceptance Certificate shall not be withheld for rectification of minor defects which may reasonably be considered not essential for energization and operation of installation. In such cases, only the value of materials and cost of rectification of minor defects shall be withheld from the payments of Provisional Acceptance, until rectification is completed.

**1.5.18 Defective equipment to be changed:-**

- (a) Notwithstanding the issue of Provisional Acceptance Certificate and partial or full use of any equipment, if the completed equipment or any portion thereof before it is finally taken over at the end of the guarantee period be found to be or to have become defective in course of usage by the R-Infra due to faulty material, design or workmanship, or otherwise fails to fulfill the requirement of the Contract and/or its purpose, the DFCCIL shall normally give the Contractor prompt notice setting forth the particulars of each defects or failure and the Contractor shall forthwith make the defects good or modify or replace the equipment, as may be directed by the DFCCIL, at his own cost in all respects to make it comply satisfactorily with the said requirements. Should the Contractor fail to do within a reasonable time the service of the said notice upon him or should time not permit of service of such notice, the DFCCIL may repair or reject and replace the whole or part of such defective equipment as the case may be, at the cost of the Contractor.

The Contractor's full liability under this clause shall be satisfied by the payment to the DFCCIL of the extra total cost, if any, of such replacement delivered and erected as provided for in the original Contract, such extra cost being the ascertained difference between the price paid by the DFCCIL under the provisions above mentioned for such replacement and the Contractor's price for the plant so replaced, plus the sum, if any, paid by the DFCCIL to the Contractor in respect of such defective equipment. Should the DFCCIL not so replace the rejected equipment within a reasonable time, the Contractor's liability under this clause shall be satisfied by the repayment by the Contractor of all moneys paid by the DFCCIL to him in respect of such rejected equipment. Rejected/defective materials shall be returned to the Contractor to the extent possible.

- (b) Provisions of this para will apply only in respect of the equipment and components supplied by the Contractor or his sub-Contractor.

**1.5.19 Use of Rejected Equipment:-**

In the event of such rejection as aforesaid, the DFCCIL shall, without prejudice to his other rights and remedies and, in particular, without prejudice to his rights under the clause just preceding, be entitled to the use of the rejected equipment for a time reasonably sufficient to enable him to obtain other replacement equipment. During such period, if the rejected equipment is used commercially, the contractor shall not be entitled to the payment on energization until such rejected equipment is rectified and/or replaced, but the DFCCIL shall not be entitled to claim any damages arising out of rejected equipment in respect of such period.

**1.5.20 Guarantee/Defect Liability Period: –**

- (a) The successful bidder (contractor) shall ensure regarding satisfactory services of diverted portions/sections of the 220 KV Double Circuit transmission lines for a period of one year after commissioning. In case of any latent defect observed during operation period of the diverted portions/sections of the 220 KV Double Circuit transmission lines, the contractor will have to rectify/repair the same to the satisfaction of Engineer. All the expenditure involved in repair/rectification shall be borne by the contractor in case the defect is due to improper work by the contractor.
- (b) The Contractor shall guarantee that all the equipment and works executed under this contract shall be free from all defects and faults in material, design, workmanship and manufacture and shall be of acceptable standards for the contracted work and in full conformity with the technical specifications, drawings and other contract stipulations, **for a period of one year from the date of Provisional Acceptance by the DFCCIL.**
- (c) During the period of guarantee the Contractor shall keep available an experienced engineer/man power and necessary equipment (including Emergency Restoration Structures) to attend to any defective installations resulting from defective erection and/or defects in the equipment supplied by the Contractor. This engineer shall not attend to rectification of defects which arise out of normal wear and tear and come within the purview of routine maintenance work. The contractor shall bear the cost of modifications, additions or substitutions that may be considered necessary due to faulty materials, design or workmanship for the satisfactory working of the equipment. The final decision shall rest with DFCCIL.

- (d) During the period of Guarantee, the Contractor shall be liable for the replacement at site of any parts which may be found defective in the equipment whether such equipment be of his own manufacture or those of his sub-contractor whether arising from faulty design, materials, workmanship or negligence in any manner on the part of the Contractor provided always that such defective parts as are not repairable at site are promptly returned to the Contractor if so required by him, at his (Contractor's) own expenses. In case of type defects in Contractor's equipment and components detected during guarantee period, contractor should replace all such items irrespective of the fact whether all such items have failed or not. The Contractor shall bear the cost of repairs carried out on his behalf by the DFCCIL at site. In such a case, the contractor shall be informed in advance of the works proposed to be carried out by the DFCCIL.
- (e) If it becomes necessary for the Contractor to replace or renew any defective portion of the equipment under the para aforesaid, then the provision of the said para shall also apply to the portions of the equipment so replaced or renewed until the expiration of six month from the date of such replacement or renewal or until the end of the above mentioned period whichever is later. Such extension shall not apply in case of defects of a minor nature, the decision of the DFCCIL being final in the matter. If any defect be not remedied within a reasonable time during the aforesaid period, the DFCCIL may proceed to do work at the Contractor's risk and expense, but without prejudice to any other rights and remedies which the DFCCIL may have against the Contractor in respect of such defects or faults.
- (f) The repaired or renewal parts shall be delivered and erected on site free of charge to DFCCIL.
- (g) Any materials, fittings, components or equipment supplied under items for supplying/providing and fixing in schedule of prices shall also be covered by the provisions of this paragraph. The liability of the Contractor under the guarantee will be limited to re-supply of equipment, components and fittings. Such re-supply shall be effected at the Contractor's depot or, in the event of closure of the depot, at the stores depot of the R-Infra/DFCCIL of the site/section covered by the contract.

#### **1.5.21 Final Acceptance:-**

- (a) The final acceptance of the entire equipment installed for diversion works shall take effect from the date of expiry of the period of guarantee as defined above in paragraph 1.5.20 or the expiry of the last of the respective periods of guarantee of various sites/sections for which provisional Acceptance Certificates are issued or brought into commercial operation, provided in any case that the Contractor has complied fully with his obligations under clause 1.5.20 in respect of each site/section of diversion, provided also that the attention has been paid by way of maintenance by the R-Infra.
- (b) If on the other hand the contractor has not so complied with his obligation under para 1.5.20 in respect of any site/section, the DFCCIL may either extend the period of guarantee in respect of that site/section until the necessary works are carried out by the Contractor or carry out those works or being them carried out suo-moto, on behalf of the Contractor at the Contractor's expenses. After expiry of the period of guarantee for each section, a certificate of final acceptance for the section shall be issued by the DFCCIL and the last of such certificates will be called the last and final acceptance certificate. The contract shall not be considered as completed until the issue of final acceptance certificate by the DFCCIL.

- (c) The DFCCIL shall not be liable to the Contractor for any matter arising out of or in connection with the contract or execution of the work unless the Contractor shall have made a claim in writing in respect thereof before the issue of final acceptance certificate under this clause.
- (d) Notwithstanding the issue of final acceptance certificate, the Contractor and the DFCCIL (subject to sub-clause as above) shall remain liable for fulfillment of any obligation incurred under the provision of the contract prior to the issue of final acceptance certificate which remains unperformed at the time such certificate is issued and for determining the nature and extent of such obligation the contract shall be deemed to remain in force between the parties hereto.

#### **1.5.22 Payment:-**

Payment will be governed by the terms specified in Part-I, Chapter-V (B) and in accordance with accepted schedule of prices, read with relevant para of the other parts and Chapters of the Tender Document. The DFCCIL retains the right to withhold money due to the contractor arising out of this contract for any default of the contractor from other contracts which the contractor may have with the Government of India.

- (i) The Contractor shall, whenever required, produce or cause to be produced for examination by the DFCCIL any quotation/invoice, cost of other account, book of account, voucher, receipt letter, memorandum paper or writing or any copy of or extract from any such document and also furnish information and returns verified in such manner as may be required in anyway relating to the execution of this contract or relevant for verifying or ascertaining the cost of the execution of this Contract (the decision of the DFCCIL on the question of relevancy of any documents, information or return being final and binding on the parties). The Contractor shall similarly produce vouchers etc., if required, to prove to the DFCCIL that materials supplied by him are in accordance with the specifications laid down in the contract.
- (ii) If any portion of the work be carried out by a sub-contractor or any subsidiary or allied firm or company, the DFCCIL shall have power to secure the books of such sub-contractor or any subsidiary or allied firm or company, through the Contractor, and such books shall be open to his inspection. The Contractor should seek prior permission from the DFCCIL for subletting whole and/or part of the work to any sub-contractor.
- (iii) The obligations imposed by sub-clause (i) and (ii) above are without prejudice to the obligation of the Contractor under any statute, rules or order binding to the Contractor or other conditions of the contract.
- (iv) It is an agreed term of the contract that the DFCCIL reserves the right to carry out post-payment Audit and/or technical examination of the works and the final bill, including all supporting vouchers, abstracts etc. and to make a claim on the Contractor for the refund of any excess amount paid to him if as a result of such examination any over payment to him is discovered to have been made in respect of any work done or alleged to have been done by him under the contract.

- 1.5.23** All payments in respect of the contract during the currency of the contract shall be made through Electronic Clearing System (ECS)/Electronic Funds Transfer (EFT). The successful Bidder on award of contract must submit ECS/EFT Mandate Form complete in all respects as detailed at Form-8 of the tender document.

**1.5.24 Emergency Works:-**

In the event of any accident or failure occurring in the execution of work/ arising out of it which in the opinion of the Engineer requires immediate attention, the DFCCIL may bring its own workmen or other agency/agencies to execute or partly execute the necessary work or carry out repairs if the Engineer considers that the contractor(s) is/are not in a position to do so in time without giving any notice and charge the cost thereof, to be determined by the Engineer, to the contractor.

**1.5.25 Observance of Bonded Labour System (Abolition Ordinance Act, 1975):-**

The “Bonded Labour System (Abolition Ordinance, 1975)” would apply to the present contract. The contractors shall duly observe the provisions thereof.

**1.5.26 Clause 55-B to GCC: Provision of Employees Provident Fund and Miscellaneous Provisions Act, 1952.**

The contractor shall comply with the provisions of Para 30 & 36-B of the Employees Provident Fund Scheme, 1952; Para 3 & 4 of Employees’ Pension Scheme, 1995; and Para 7 & 8 of Employees Deposit Linked Insurance Scheme, 1976; as modified/amended from time to time through enactment of ‘Employees Provident Fund & Miscellaneous Provisions Act, 1952’, wherever applicable and shall also indemnify the DFCCIL from and against any claims under the aforesaid Act and the Rules’

**1.5.27 Arbitration:-**

Unless settled amicably, any dispute in respect of which the recommendations (if any) of conciliation has not become final and binding, shall be finally decided by reference to arbitration by a Board of Arbitrators appointed in accordance with sub-clause (i) below. Such arbitration shall be held in accordance with the Indian Arbitration and Reconciliation Act, 1996. The seat of such arbitration shall be Mumbai, and the language of arbitration proceedings shall be English.

- (i) For value of claims up to Rs. 1.5 crore, a sole arbitrator shall be appointed out of a panel of arbitrators. For claims above Rs. 1.5 crore, the arbitral tribunal will comprise three Members, one each to be appointed by DFCCIL and the contractor. The Third member, who will also act as the presiding member, will be appointed by mutual consent of the first two members. If these two members fail to reach an agreement on the third member, then on request by either or both parties, appointment will be made by the Managing Director (MD)/DFCCIL.

**1.5.28 Jurisdiction of Courts:-**

If any dispute arises between the parties with respect to this contract, any application or suit shall be instituted only in the court within the local limits of whose jurisdiction, the CPM/SOUTH/MUMBAI/DFCCIL Office is situated and both the parties shall be bound by this clause.

**1.5.29** Every endeavour has been made to avoid any error which can materially affect the basis of the tender and it is understood that the contractor has taken upon himself and provided for the risk of any error which may be subsequently and shall make no subsequent claim on account thereof.

## **PART-I**

### **CHAPTER V (B)**

## **ADDITIONAL SPECIAL CONDITIONS OF CONTRACT** **(PRICE AND PAYMENT)**

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For & on behalf of DFCCIL



## **PART-I**

### **CHAPTER – V (B)**

#### **ADDITIONAL SPECIAL CONDITIONS OF CONTRACT (PRICE AND PAYMENT)**

##### **1.5.30 Scope:-**

This chapter deals with prices to be paid for supply and/or erection of various items of work or for supplies and other amounts payable in accordance with accepted schedule of prices and rates and terms and conditions of payment mentioned herein. This is a works contract. The total prices for the completed items of work are the actual prices payable to the contractor as per the terms and conditions of the contract.

##### **1.5.31 Schedule of Prices:-**

###### **(a) Prices for items:-**

- (i) The rates given against various items of work in Bidding Schedule-1/Summary of Prices & Total Prices (Form No. – 4 of Part-III) of the tender document are the Schedule of Basic Prices. The Bidders are required to quote **SINGLE PERCENTAGE BELOW/AT PAR/ABOVE**, against Schedule of Basic Prices, while quoting the Summary of Basic Prices (Form No. – 3 of Part-III). The actual payment to be made, against any item of bidding Schedule-1/Summary of Prices & Total Prices, shall be derived after loading the Schedule of Prices with the Bidder's quoted percentage plus GST @ applicable rate. The prices so obtained shall be the prices for the various items of work given in bidding Schedule-1/Summary of Prices & Total Prices.

- (ii) **Deleted.**

###### **(b) Unit Prices for Materials/ Erection: -**

**The estimated rates as shown in tender schedule (Form No. – 3 of Part-III) are Basic Prices exclusive of GST. Therefore, the bidders should quote their prices taking into account this aspect.**

The prices shall cover all cost of administration of the contract, insurance premium, banker's charges for guarantees, cost of stamps, cost of storage, loading, unloading and handling of materials and for any road transport which the Contractor may use for carriage of materials between his depot/s and site of work. The unit prices shall include cost of works and adjustments necessary to be done by the contractor during or after the tests carried out by the employer as per tender conditions.

**No taxes/levies except GST will be payable over & above the quoted price.**

**(c) Quantities:-**

The approximate estimated quantities of various items of works are included in Bidding Schedule-1/Summary of Prices & Total Prices (Form No. – 4 of Part-III).

**(d) Explanatory Notes:-**

Explanatory notes for various items of work included in Bidding Schedule-1/Summary of Prices & Total Prices (Form No. – 4 of Part-III), are given in Chapter-VI of Part-I.

**(e) New items of work:-**

If during the execution of the work the Contractor is called upon to carry out any new item of work not included in Bidding Schedule-1/Summary of Prices & Total Prices (Form No. – 4 of Part-III), the Contractor shall execute such works at such prices as may be mutually agreed with the Engineer/DFCCIL before commencement.

**1.5.32 Price of Equipment, Components, Materials and Executions: -**

The price of tender quoted by tenderer shall include cost of material, labour, equipment, tools & plant, lead and lift and all other costs for timely & successful completion of the work. Royalty, Toll tax, Levy and any other tax, except GST, levied by the Central or State Government or Local Bodies shall be borne by the bidder. No part of such taxes, except GST, on contractor's labour/materials or any other amount will be paid by DFCCIL. This should be kept in view before tendering.

**1.5.33 Payments and Recoveries:-**

(a) 'On Account' payment of running bills in the form of monthly invoices will be done on pro-rata basis, in accordance with accepted schedule of prices & as per details given below;

S. N.	Schedule Item Description	Stage Payment	Weightage	Payment Procedure
1.	Proto-Modelling & Proto-Type Testing of 3-Type Towers. (Schedule Items – 1.1 to 1.6)	On completion of Proto-Type Testing. (Schedule Item-1)	90%	On acceptance of test reports for a type of tower.
		On completion of supply of Tower Material. (Schedule Items - 2.1.1 & 2.1.2)	10%	On acceptance of material at site/depot for Schedule Item-2.1.1
2.	Supply of Tower & Line materials and accessories. (Schedule Items – 2.1 to 2.8)	On receipt and acceptance of material at site. (Schedule Item – 2)	70%	On acceptance of material at site/depot on pro-rata basis.
		On Completion of Erection/ Installation work at a site. (Schedule Item - 3)	20%	On completion of all the works at a site.
		On Completion of entire work for all the 4 sites.	10%	On issue of "Provisional Acceptance Certificate" with due account for rebate for released material as per schedule Item-4.
3.	Erection/ Installation of Transmission Line. (Schedule Items – 3.1 to 3.13)	On Erection/ Installation item.	70%	On acceptance of erection/ installation work at site.
		On Completion of Erection/ Installation work at a site. (Schedule Item - 3)	20%	On completion of all the works at a site.
		On Completion of entire work for all the 4 sites.	10%	On issue of "Provisional Acceptance Certificate" with due account for rebate for released material as per schedule Item-4.

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- (b) DFCCIL reserves the right to carry out post-payment Audit and/or technical examination of the works and the final bill, including all supporting vouchers, abstracts etc. and to make a claim on the Contractor for the refund of any excess amount paid to him if as a result of such examination any over payment to him is discovered to have been made in respect of any work done or alleged to have been done by him under the contract.

**1.5.34 Invoicing procedure:-**

- (a) The contractor shall submit his invoicing procedure for approval by the Engineer within 15 Days from the date of receipt of Letter of Acceptance of Tender (LOA). Separate invoices shall be submitted for different types of payment mentioned above. All invoices shall be submitted with original supporting documents or certified true copies of supporting document wherever these are acceptable to Engineer. Where copies of original documents are required in support of several invoices, true certified copies of the original documents may be forwarded to Engineer, with his consent.
- (b) Invoices shall be submitted only on the basis of agreed principles and prices, quantities and measurements of works completed shall be approved by the Engineer prior to the submission of invoices. For this purpose, the schedule of quantities and measurements submitted by the contractor for approval of the Engineer may be only up to the extent of work completed except in the case of payments on provisional acceptance.

**1.5.35 On account payments:-**

‘On Account’ payment will be made for part supply/erection of equipment, components, fittings and materials required for the execution of work as per para 1.5.33. All ‘On Account’ payment shall be covered by a standing indemnity bond in the approved Form (Form - 7).

**NOTE:** - All the invoices should be accompanied by the following documents;

1. Supplier’s challans.
2. Inspection Certificate granted by the Engineer.
3. Certificate of receipt of materials at Contractor’s Depot duly accepted by Engineer.
4. Proof that the stores have been insured.

**1.5.36 Progress payments for supply and erection (General):-** As per para 1.5.33 above.

**1.5.37 GST:-**

GST shall be paid by DFCCIL as per prevailing rate and rules on the value of work done @ quoted price in each bill. In case of disallowance of input tax credit the amount so paid is liable for recovery from next on hand bill.

**1.5.38 Deduction of Taxes/Levies at source:-**

- (a) Income Tax as per rates applicable/amended under Income Tax Act of Work shall be deducted at source (TDS) unless the contractor is exempted by Income Tax Authorities.
- (b) All taxes, duties & levies (including Octroi etc.), except GST, arising out of the transactions between the contractor and his sub-contractors/Suppliers for this work will be included in the rates quoted by the contractor/bidder in the relevant schedule.
- (c) Wherever the law makes it statutory for the DFCCIL, to deduct any amount towards any tax, the same will be deducted and deposited with the concerned authority. A certificate to that effect will be issued by DFCCIL.

**1.5.39 Permits, Fees, Taxes & Royalties:-**

Unless otherwise provided in the contract documents, the contractor shall secure and pay for all permits, Government fees and licenses necessary for the execution and completion of the works. The contractor shall pay all taxes/duties levied by Competent Authorities. GST will be paid to the contractor by DFCCIL as per prevailing rates.

The DFCCIL will not take any responsibility of refund of such taxes/fees. Any violation, in the legal provision of taxes, duties, permits and fees, carried out by the Contractor and detected subsequently shall be sole responsibility of the Contractor and his legal heirs.

**1.5.40 Other Taxes/Duties:-**

The contractor shall bear other taxes / duties, except GST, levied by State Government and / or Central Government/Local bodies from time to time. This would be entirely a matter between the contractor and the State / Central Government /Local bodies. No claim, what so ever, on this account shall be entertained by DFCCIL.

**1.5.41 Statutory Increase in Duties, Taxes etc.:-**

All the taxes and duties, except GST, levied by the Government Authorities at the prevailing rates, as applicable on 30 days prior to the date of tender opening, shall be fully borne by the Contractor and shall not be reimbursed to him on any account. The tender shall be inclusive of all taxes, except GST, as applicable on 30 days prior to the date of tender opening.

Further, **DFCCIL** shall reimburse/recover the claim arising after the date 30 days prior to the date of tender opening, due to any increase/decrease in any of the prevailing statutory duties, taxes & levies etc. or due to any modification/change in the taxation system by Government of India or Government of Maharashtra, on submission of proof of payment of the same.

**1.5.42 Cutting/Up-rooting of Trees:-**

No extra rate shall be paid for cutting or up-rooting trees but the contractor would be authorized to take away the tree observing the forest laws and the rules in the state of Maharashtra.

**1.5.43 Road Tax Charges:-**

Road Tax/Charges levied by Government for movement of vehicles of contractor, used in transportation, shall be borne by the contractor and no re-imbursement on this account will be made by the DFCCIL.

**1.5.44. Foreign Exchange Requirements:-**

Any demand of foreign exchange for importing of equipment and materials shall not be accepted.

#### **1.5.45 Measurements:-**

- (a) Payment for field work shall be made in accordance with approved designs and drawings and measured in relevant units except where provided for otherwise. In case the dimensions of the work are more than those shown in approved designs and drawings, the contractor will not be entitled to any extra payment, unless dimensions were increased on account of physical impossibility of carrying out the work in accordance with approved drawings and designs. In case the dimensions of work are less than those shown in the approved designs and drawings and the work is accepted without being rejected, payment will be made as per work actually done.
- (b) The measurements will be made generally in accordance with standard engineering practice and in conformity with the Bidding Schedule-1/Summary of Prices & Total Prices (Form No. – 4 of Part-III) and explanatory Notes for Bidding Schedule-1/Summary of Prices & Total Prices (Form No. – 4 of Part-III) (Packet - B).

#### **1.5.46 Mobilization Advance:-**

- (i) An interest bearing mobilization advance shall be paid to the bidder exclusively for the costs of mobilization at ten percent of contract price on the provision by the bidder of an unconditional bank guarantee of 110 % of the sanctioned advance amount on prescribed format. The Bank guarantee shall be from a nationalized Bank in India or any Scheduled Bank in India, in a form acceptable to DFCCIL. (Format of BG is placed as Form No.19 at Part-III of the tender documents)
- (ii) Such bank guarantees shall remain effective until the advance payment has been fully recovered, but the amount thereof shall be progressively reduced by the amount repaid by the bidder, as indicated in the Interim Payment Certificates.
- (iii) **This shall be limited to 10% of the contract value and payable in 2 stages as indicated below:**
  - (a) **5% of the contract value on signing of the contract agreement.**
  - (b) **5% on mobilization of site establishment, setting up offices, bringing in equipment and actual commencement of work.**
- (iv) The rate of interest shall be 4.5% per annum above the Base rate of State Bank of India as effective on the date of approval of payment of Mobilization advance by the Competent Authority.
- (v) The recovery of advance and interest thereon will be made through the every on account bills, pro-rata, commencing from the time the value of the work executed under the contract reaches 15% of the contract value @ 20% of Gross Bill amount and completed along with recovery of interest when the value of the work executed under the contract reaches 85% of the contract value or assessed value whichever is less.
- (vi) The advances shall be used by the Bidder exclusively for mobilization expenditures, including the acquisition of construction related plant and equipment. Mobilization expenditures mentioned herein shall not include the margin money and bank commission etc. paid by the bidder for procurement of BGs against performance security and mobilization advance etc. Should the Bidder misappropriate any portion of the advance, it shall become due and payable immediately, and no further advance will be made to the Bidder thereafter. In such cases the bidder shall also be liable for appropriate action under the contract.

- (vii) The Mobilization Advance granted shall be returned back to the DFCCIL, along with interest, in case the work is not completed in the original contract completion period.

#### **1.5.47 Release of Security Deposit:-**

- (a) After issue of the certificate of acceptance of the entire installation, and after expiry of the Guarantee Period/Defect Liability Period, the DFCCIL shall release the Security Deposit submitted by the Contractor.
- (b) The Security deposit shall, however, be liable to be forfeited in case of any breach by the contractor of any of the conditions of the contract for non- completion of the full contract without prejudice to other rights remedies of the employer whether specifically provided herein or otherwise.

#### **1.5.48 Price Variation on Material & Price Variation Clauses:-**

1.5.48.1 Price Variation Clauses applicable for different items of Schedule of Prices & Total Prices (Form No. - 4/Schedule -1) are given below;

Sr. No. of Item as per Schedule of Prices & Total Prices (Form No. – 4 / Schedule-1)	Applicable IEEMA Price Variation Formula / Clause No. with date of effectuation.	IEEMA Circular No. with issue date.	Remarks
2.1.	Formula No. (B) of IEEMA/PVC/TLT/2010 (R-1) for Transmission Line Towers & effective from 01/04/2014.	66/DIV/T&D P/05 dated 20/05/2014.	Attached as Appendix-1.
2.2.	Formula No. 1 (For Excise duty Units) of IEEMA (PVC)/ CONDUCTOR/ 2012 for AAC/ AAAC/ACSR Conductors effective from 01/04/2012.	103/DIV/Conductor /05 dated 15/05/ 2012.	Attached as Appendix-2.
2.4.	IEEMA/PVC/INSLR/2013 for Composite Insulators effective from 01/01/2013.	10/DIV/INSU/05 dated 15/05/ 2012.	Attached as Appendix-3.
2.5, 2.6.1.	Formula No. (A) of IEEMA/PVC/TL-A&H/2001(R-3) for Transmission Line Towers and Transmission Line Accessories & Hard ware effective from 01/04/2014.	66/DIV/T&D P/05 dated 20/05/2014.	Attached as Appendix-4.
2.6.2 & 2.6.3.	Formula No. (B) of IEEMA/PVC/TL-A&H/2001(R-3) for Transmission Line Towers and Transmission Line Accessories & Hard ware effective from 01/04/2014.		

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Sr. No. of Item as per Schedule of Prices & Total Prices (Form No. – 4 / Schedule-1)	Applicable IEEMA Price Variation Formula / Clause No. with date of effectuation.	IEEMA Circular No. with issue date.	Remarks
3.3, 3.4.7, 3.6.1, 3.6.4, 3.6.7, 3.6.8, 3.7, 3.8, 3.9, 3.10 & 3.12.	Formula No. 3 of IEEMA (PVC)/ CW-ER/2005 for Erection (Excluding Reinforced and other steel works and concreting) effective from 01/04/2005.	40/DIV/PRJ/05 dated 24/02/2006 for Civil Works and Erection.	Attached as Appendix-5.
3.4.1, 3.4.2, 3.4.3, 3.4.4, 3.4.5, 3.6.2, 3.6.3 & 3.6.5.	Formula No. 1 of IEEMA (PVC)/ CW-ER/2005 for Concreting effective from 01/04/2005.		
3.4.6, & 3.6.6.	Formula No. 2 of IEEMA (PVC)/ CW-ER/2005 for Reinforced and other steel works effective from 01/04/2005.		
1, 2.3, 2.7, 2.8, 3.1, 3.2, 3.5, 3.11, 3.13, 4.1, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, & 4.9.	Price variation shall not be applicable.		
4.2	Price Variation Formula / Clause is given below at Clause No. 1.5.48.2.		
4.10, 4.11 & 4.12.	Price Variation Formula / Clause is given below at Clause No. 1.5.48.3.		

**1.5.48.2 Price variation clause for released AAAC conductor Material: -**

The formula for calculating the amount of variation on account of variations in prices of released AAAC conductor Material for rebate under item no. 4.2 of Schedule of Prices & Total Prices (Form No. - 4/Schedule -1) shall be as indicated below;

$$A_{CS} = L \times R_{CS_0} \left( \frac{AL - AL_0}{AL_0} \right)$$

Where;

$A_{CS}$  - Amount of price variation in rebate for released AAAC conductor Material recoverable/ payable

$L$  - Length of released AAAC conductor Material in meters (MTR) retained by the contractor as measured & certified by the Engineer.

$R_{CS_0}$  - Agreement Rate for rebate on released AAAC conductor Material in Rupees per meter (Rs. / MTR).

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AL – WPI of Aluminium Ingots published by Ministry of Commerce and Industry of one month prior to the month during which line conductor material is released and certified by the Engineer.

AL<sub>o</sub> – WPI of Aluminium Ingots published by Ministry of Commerce and Industry of one month prior to the month of opening of tender.

**1.5.48.3 Price variation clause for released Tower Material (Fabricated Steel):-**

The formula for calculating the amount of variation on account of variations in prices of released tower material (fabricated steel) for rebate under item nos. 4.10, 4.11 & 4.12 of Schedule of Prices & Total Prices (Form No. - 4/Schedule -1) shall be as indicated below:

$$A_{SS} = Q \times R_{SSo} \left( \frac{M_s - M_{So}}{M_{So}} \right)$$

Where;

A<sub>SS</sub> - Amount of price variation in rebate for released Tower Material (Fabricated Steel) recoverable/ payable.

Q - Weight of steel in Metric Tonnes (MT) retained by the contractor as measured & certified by the Engineer.

R<sub>SSo</sub> – Agreement Rate for rebate on released Tower Material (Fabricated Steel) in Rupees per Metric Tonne (Rs. / MT).

M<sub>s</sub> – WPI of melting scrap published by Ministry of Commerce and Industry of one month prior to the month during which Tower Material (Fabricated Steel) is released and certified by the Engineer.

M<sub>So</sub> – WPI of melting scrap published by Ministry of Commerce and Industry of one month prior to the month of opening of tender.

1.5.48.4 It is clearly indicated that price variation implies both increase as well decrease in input prices and therefore price variation during the currency of the contract may result in extra payment or recovery as the case may be.

1.5.48.5 The successful bidder shall have to submit all the certified photocopies of the IEEMA and other relevant circulars right from first day of One Month prior to date of opening of Technical bid (Packet-A) onwards in chronological order irrespective of the fact whether there is any change in any of the components or not during the currency of the contract.

1.5.48.6 In case of non-publication of applicable indices on a particular date, which happens to be the applicable date for price adjustment purposes, the published indices prevailing immediately prior to the particular date shall be applicable.

1.5.48.7 For supply & erection items, covered under price variation clause no. 1.5.48.1 above, If the price adjustment amount works out to be positive, the same is payable to the Contractor by the Employer and if it works out to be negative, the same is to be recovered by the Employer from the Contractor.

- 1.5.48.8 For released items, covered under price variation clause nos. 1.5.48.2 & 1.5.48.3 above, If the price adjustment amount works out to be positive, the same is to be recovered by the Employer from the Contractor and if it works out to be negative, the same is to be payable to the Contractor by the Employer.
- 1.5.48.9 The Contractor shall promptly submit the price adjustment invoices for the supplies made / works done, positively within three (3) months from the date of supply/work done whether it is positive or negative.

**1.5.49 Input Tax Credit (ITC) under GST Scheme:-**

The tenderers will have to give the following certificates in their offer:

“We hereby declare that in quoting the above price, we have taken into effect, the full effect of the duty set-off available as Input Tax Credit (ITC) under GST scheme. We further agree to pass on such additional duties and set-off as may become available in future in respect of all the inputs used for the manufacture/erection of the final product, on the date of the supply as ITC under GST scheme, by the way of reduction in price and advise the purchaser accordingly.”

**1.5.50 Way Leave/ROW Charges:-**

- 1.5.50.1 The payment for cost of Way Leave / ROW charges for encumbrance free corridor for permanent and temporary diversion will be based on length measured from the actual as erected drawings for tower diversion scheme duly certified by the Engineer. For this purpose “as erected drawings” means erection of foundation.
- 1.5.50.2 The contractor shall submit proof of all the statutory payments made to Government bodies or PAPs, along with other relevant documents, in order to ensure encumbrance free Way Leave/ ROW for execution of diversion work.

## **PART - I**

### **CHAPTER – VI**

#### **EXPLANATORY NOTES OF SCHEDULE OF BASIC PRICES** **(SCHEDULE-1)**

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

**PART - I**

**CHAPTER – VI**

**EXPLANATORY NOTES OF SCHEDULE OF BASIC PRICES (SCHEDULE-1)**

**SECTION-1**

**General:-**

Explanatory notes for various items of work in Schedule-1/Summary of Basic Prices & Total Basic Prices (Form No. – 4 of Part-III) are given below:

- 1.6.1 Wherever an item of work covers supply of materials and/or erection, such include all bolts, nuts, locknuts, washers etc.
- 1.6.2 The equipment and materials to be supplied by the contractor against various items should conform to relevant Specification.
- 1.6.3 Erection of any item of equipment supplied by the contractor will include proper connecting, testing, commissioning and bringing the equipment into operation in accordance with Part-II and to the satisfaction of Engineer/DFCCIL.
- 1.6.4 Special notes for measurements and Particulars (explanatory notes) are included in Section-2 of this chapter under various items, where necessary.
- 1.6.5 Dismantled Materials:-Dismantled materials involved in the diversion arrangement has been indicated in Schedule of Prices (Schedule-1).
  - (i) The contractor shall have to deposit the dismantled Towers and Line Materials from existing 220 kV D/C Transmission Lines as per item nos.- 3.10.2, 3.11.1 & 3.11.2 of Schedule-1/Summary of Prices & Total Prices (Form No. – 4 of Part-III) to R-Infra Store at Dahanu. The contractor shall return all the dismantled materials as indicated above released from the existing system at the first available opportunity but not later than two weeks, at the R-Infra Store at Dahanu. If the contractor fails to return the dismantled material in specified time, the cost of dismantled material will be recovered from the progressive payment bill before releasing any payment.
  - (ii) Dismantled Materials to be retained by the contractor as per item nos. - 4.1 to 4.12 of Schedule-1/Summary of Prices & Total Prices (Form No. – 4 of Part-III).The contractor shall retain the Towers and Line Materials dismantled from temporary diversion arrangements as well as released from existing 220 kV D/C Transmission Lines [other than indicated at (i) above] and material used in tower proto type testing and clear the site at the first available opportunity but not later than two weeks.

## **PART- I**

### **CHAPTER – VI**

#### **EXPLANATORY NOTES OF SCHEDULE OF BASIC PRICES (SCHEDULE-1)**

#### **SECTION-2**

**Particular (Explanatory Note):-** For Supply of Tower & Line Material, Erection, Testing, commissioning and proto modeling and proto type testing as per Schedule of Prices (Schedule-1).

**Item No.1 Proto Modelling & Proto-Type Testing of 3 Type Towers:-**

The price shall cover fabrication, supply, proto modelling at vendors work, transport charges towards supply of material at tower type test bed location. Also price shall cover charges of type test bed to carry out the type test and other associated charges for all the three towers as indicated in Schedule of Prices (Schedule-1) from item no. 1.1 to item no.1.6.

**Item No.2 Supply of Tower & Line material and accessories:-**

**2.1 Tower Structure GI Material:-**

The price shall cover fabrication, galvanizing & supply of various types of towers & tower parts, tower/leg extensions, stubs, template (complete) excluding bolts & nuts but including hangers, D-Shackles, pack washers etc. High Tensile Steel and Mild Steel together, as per technical specifications given at Chapter- I & II of Part-II of tender document.

2.1.2 The price shall cover supply of G.I. Bolts & Nuts for towers structures, Stub & Template including Step Bolts, Spring Washers etc., as per technical specifications given at Chapter- I & II of Part-II of tender document.

**2.1.3 Tower Material for Spare Tower to R-Infra:-**

(a) The price shall cover fabrication, galvanizing & supply of various types of towers & tower parts, tower/leg extensions, stubs, template (complete) excluding bolts & nuts but including hangers, D-Shackles, pack washers etc. High Tensile Steel and Mild Steel together, as per technical specifications given at Chapter- I & II of Part-II of tender document.

(b) The price shall cover supply of G.I. Bolts & Nuts for towers structures, Stub & Template including Step Bolts, Spring Washers etc., as per technical specifications given at Chapter- I & II of Part-II of tender document.

**2.2 Supply of Single AAAC ZEBRA Conductor:-**

The price shall cover Manufacture and supply of Single AAAC Zebra Conductor complete in all respect as per technical specifications given at Chapter- I & III of Part-II of tender document.

**2.3 Supply of OPGW(48/DWSM):-**

The price shall cover Manufacture and supply of 48C OPGW complete in all respect as per technical specifications given at Chapter- I & IV of Part-II of tender document.



**2.4 Composite Silicone Rubber Polymeric Insulators for 245kV Single AAAC Zebra Conductor:-**

2.4.1 The price shall cover supply of 90 KN Suspension String (including grading ring), complete in all respect as per technical specifications given at Chapter- I & V of Part-II of tender document.

2.4.2 The price shall cover supply of 120 KN Tension String (including grading ring), complete in all respect as per technical specifications given at Chapter- I & V of Part-II of tender document.

**2.5 Hardware Suitable for 245kV, Single AAAC Zebra Conductor:-**

2.5.1 The price shall cover supply of Double suspension string Hardware including anchor shackles, ball-link, ball-clevis eye, socket-clevis, arcing horn/grading rings, yoke plates, suspension clamps, drop clamp, complete in all respect, necessary for single AAAC Zebra conductor, as per technical specifications given at Chapter- I & VI of Part-II of tender document.

2.5.2 The price shall cover supply of Pilot string Hardware including anchor shackles, ball-link, ball-clevis eye, socket-clevis, arcing horn/grading rings, yoke plates, suspension clamps, drop clamp, complete in all respect, necessary for single AAAC Zebra conductor, as per technical specifications given at Chapter- I & VI of Part-II of tender document.

2.5.3 (a) The price shall cover supply of Double tension string Hardware including anchor shackles, ball-link, ball-clevis eye, socket-clevis, arcing horn/grading rings, yoke plates, tension clamps compression type, jumper cone, sag adjustment device, drop clamp, twisted shackles, turn buckle, complete in all respect, necessary for single AAAC Zebra conductor, as per technical specifications given at Chapter- I & VI of Part-II of tender document.

(b) The price shall cover supply of Double tension string Hardware with By Pass assembly including anchor shackles, ball-link, ball-clevis eye, socket-clevis, arcing horn/grading rings, yoke plates, tension clamps compression type, jumper cone, sag adjustment device, drop clamp, twisted shackles, turn buckle, complete in all respect, necessary for single AAAC Zebra conductor, as per technical specifications given at Chapter- I, VI, & VII of Part-II of tender document.

**2.6 Conductor Accessories Suitable for Single AAAC Zebra Conductor:-**

2.6.1 The price shall cover supply of Vibration Damper, complete in all respect as per technical specifications given at Chapter- I & VI of Part-II of tender document.

2.6.2 The price shall cover supply of Mid Span Compression Joint, complete in all respect as per technical specifications given at Chapter- I & VI of Part-II of tender document.

2.6.3 The price shall cover supply of Repair Sleeve, complete in all respect as per technical specifications given at Chapter- I & VI of Part-II of tender document.

**2.7 OPGW Accessories:-**

2.7.1 The price shall cover supply of Optical Joint Box (Junction) Box, complete in all respect as per technical specifications given at Chapter- I & IV of Part-II of tender document.

2.7.2 The price shall cover supply of Single Suspension Clamp with Earth Bond, complete in all respect as per technical specifications given at Chapter- I & IV of Part-II of tender document.

2.7.3 The price shall cover supply of Double Tension Clamp (Pass Through) with Earth Bond, complete in all respect as per technical specifications given at Chapter- I & IV of Part-II of tender document.

2.7.4 The price shall cover supply of Single Tension assembly (with Earth Bond), complete in all respect as per technical specifications given at Chapter- I & IV of Part-II of tender document.

2.7.5 The price shall cover supply of Vibration damper for OPGW along with Armor rods, complete in all respect as per technical specifications given at Chapter- I & IV of Part-II of tender document.

2.7.6 The price shall cover supply of Down Lead Clamp for OPGW on Tower, complete in all respect as per technical specifications given at Chapter- I & IV of Part-II of tender document.

**2.8 Tower Accessories:-**

2.8.1 The price shall cover supply of Danger Plate, complete in all respect as per technical specifications given at Chapter- I & II of Part-II of tender document.

2.8.2 The price shall cover supply of Number Plate, complete in all respect as per technical specifications given at Chapter- I & II of Part-II of tender document.

2.8.3 The price shall cover supply of Phase Plate (Set of three), complete in all respect as per technical specifications given at Chapter- I & II of Part-II of tender document.

2.8.4 The price shall cover supply of Circuit Plate (Set of two), complete in all respect as per technical specifications given at Chapter- I & II of Part-II of tender document.

2.8.5 The price shall cover supply of Anti-Climbing Devices, complete in all respect as per technical specifications given at Chapter- I & II of Part-II of tender document.

**Item No.3 Prices for Erection/Installation of Tower & Line Material:-**

**3.1 Check survey including Preparation of Profile and tower spotting:-**

The price shall cover check survey of the all the four DFCC corridor crossing sites on a flat rate basis of per KM, preparation of drawings showing the longitudinal axis of the transmission line. The layout shall show the location and the type of towers and other relevant and necessary details as road, trees, rivers, overhead line crossings, Railway crossing etc. within 50 Meters on either side of the route and the distance of the transmission line from the DFCCIL track.

The price shall also include the preparation and submission of all drawings and design (wherever applicable) including completion drawings as per clause no. 2.8.2 of technical specifications given at Chapter- VIII of Part-II of this tender document as a complete job.

### **3.2 Detailed soil investigation:-**

The price shall cover soil investigation and testing in an approved manner for all kind of soil including fissured rock & hard rock up to 10 Meter to 15 Meter depth. The investigation shall generally be done as per IS: 1498 (1970), IS: 2720 (Part IV, V & VI). The price shall also include the preparation and submission of all drawings and design (wherever applicable) including completion drawings as per clause nos. 2.8.2 & 2.8.3 of technical specifications given at Chapter- VIII of Part-II of this tender document as a complete job.

### **3.3 Earthwork, Excavation below final ground level in all classes of soil/murum/rock etc. up to a depth of 3.0 M:-**

The price of open cast foundation shall cover Earthwork in excavation below final ground level (Raised Ground Level) in foundation in all classes of soil/murum/rock up to depth of maximum of 4 meter including dewatering, shoring and shuttering, local authority approval, if required refilling the foundation by excavated earth including Compaction up to 95% standard proctor density, spreading the surplus earth within plot boundary etc. complete as per instruction of Engineer & as per clause nos. 2.8.7 of technical specifications given at Chapter- VIII of Part-II of this tender document.

### **3.4 Foundation:-**

#### **3.4.1 CAST-IN-SITU BORED PILES- Boring in all types of soil & installing cast- in – situ RCC vertical bored piles of 1200 mm Diameter:-**

The price shall cover boring in all types of soil & installing cast-in-situ RCC vertical bored piles of specified diameter and of specified length for working piles as per the Engineer/DFCCIL's design, drawings, specification including cost of labour, materials, using ordinary Portland cement 53 grade (excluding reinforcement) with associated plants, tools & tackles etc. all complete as per the direction of Engineer & as per clause no. 2.8.7 of technical specifications given at Chapter- VIII of Part-II of this tender document. (Grade of concrete M 30)

The following activities are deemed to be included in the quoted rate.

- (a) Provision of temporary liner / bentonite slurry to arrest collapse of sides in the bore.
- (b) Breaking of piles up to cutoff levels and removal of debris.
- (c) Cost of concrete.
- (d) Muck removal.
- (e) Pile integrity testing, 1200 mm Diameter Pile.

#### **3.4.1.1 For depth from GL to 10.00 M:-**

Actual measurement will be done from cut off level to 10 M depth as per the direction of Engineer & as per clause no. 2.8.7 of technical specifications given at Chapter- VIII of Part-II of this tender document (As per approved drawing).

**3.4.1.2 For depth from 10.0 to 20.00 M:-**

Actual measurement will be done from 10 M to 20 M depth as per the direction of Engineer & as per clause no. 2.8.7 of technical specifications given at Chapter- VIII of Part-II of this tender document (As per approved drawing).

**3.4.1.3 For depth from 20.0 to 30.00 M\*:-**

Actual measurement will be done from 20 M to 30 M depth as per the direction of Engineer & as per clause no. 2.8.7 of technical specifications given at Chapter- VIII of Part-II of this tender document (As per approved drawing).

**3.4.2 SOCKETING IN ROCK:-**

The price shall cover boring in greyish basalt, weathered rock, fissured rock, soft rock, shale etc. for socketing as directed and to the satisfaction of Engineer & specification including cost of labour, materials, using ordinary Portland cement 53 grade (excluding reinforcement) with associated plants, tools & tackles etc. all complete as per the direction of Engineer & as per clause no. 2.8.7 of technical specifications given at Chapter- VIII of Part-II of this tender document. (Grade of concrete M 30)

The following activities are deemed to be included in the quoted rate.

- (a) Removal of debris.
- (b) Cost of concrete.
- (c) Muck removal for socketing 1200 mm diameter pile.

**3.4.3 M30 Concrete Design Mix:-**

The price shall cover on per cubic meter of concrete rate basis for, foundations, supply and handling of all materials, excavation including shoring, shuttering and dewatering wherever required, grouting of stubs casting and curing of concrete including form work and back filling of the pits with excavated earth, benching and leveling of the site .with all contractors material, labour, tools and plants, lead and lift, dewatering as a complete job as per clause no. 2.8.7 of technical specifications given at Chapter- VIII of Part-II of this tender document and as directed by Engineer. Concrete to be used shall be (Design mix) M-30 grade. The price shall also include design where drawings are not available.

**3.4.4 M25 Concrete Nominal Mix (1:1:2):-**

The price shall cover on per cubic meter of concrete rate basis for, foundations, supply and handling of all materials, excavation including shoring, shuttering and dewatering wherever required, grouting of stubs casting and curing of concrete including form work and back filling of the pits with excavated earth, benching and leveling of the site .with all contractors material, labour, tools and plants, lead and lift, dewatering as a complete job as per clause no. 2.8.7 of technical specifications given at Chapter- VIII of Part-II of this tender document and as directed by Engineer. Concrete to be used shall be M-25 grade (Nominal Mix 1:1:2). The price shall also include design where drawings are not available.

**3.4.5 M10 Lean Concrete Nominal Mix (1:3:6):-**

The price shall cover on per cubic meter of concrete rate basis for, foundations, supply and handling of all materials, excavation including shoring, shuttering and dewatering wherever required, grouting of stubs casting and curing of concrete including form work and back filling of the pits with excavated earth, benching and leveling of the site .with all contractors material, labour, tools and plants, lead and lift, dewatering as a complete job as per clause no. 2.8.7 of technical specifications given at Chapter- VIII of Part-II of this tender document and as directed by Engineer. Concrete to be used shall be M10 grade Lean Concrete (Nominal Mix 1:3:6). The price shall also include design where drawings are not available.

**3.4.6 Supply, transportation, cutting bending and placement of reinforcement steel:-**

The price shall cover supplying and placing in position reinforcement Steel at all height/levels above or below Final Ground level for all type of RCC structures including cleaning, decoiling, cutting, bending to required shape and length dinging as per drawing and details, binding with 16 SWG black soft annealed binding wire supplying and straightening, placing with proper cover block, support chairs, overlaps, spacers etc. complete in all respect as directed by Engineer and as per clause no. 2.8.7 of technical specifications given at Chapter- VIII of Part-II of this tender document. Payment will be made as on length basis (actual or theoretical as per drawing whichever is less) and converted into weight by using standard IS coefficient (rolling margins, wastes, couplings. welded joints, spacer bars, stays, hangers annealed steel wire or other methods of binding and placing shall not be measured and not paid separately. Only authorized laps and chairs shall be measured and paid).

**Note: - For Item No. 3.4.3 to Item No. 3.4.6 above.**

- (i) Payment for foundation against Item No. 3.4.3 to Item No. 3.4.5 above shall be on per cubic meter basis of concrete as a complete job.
- (ii) The muff will be included as part of respective foundation.
- (iii) For purpose of computation of volume of concrete for Item No. 3.4.3 to Item No. 3.4.5 above, the volume of steel work, if any, embedded in foundation and muff shall be ignored.
- (iv) Payment against Item No. 3.4.3 to Item No. 3.4.5 above shall be on the basis of design volume and that against Item No. 3.4.6 above shall be on the basis of design weight.

**3.4.7 Installation of Stubs including bolts &nuts using template:-**

The price shall cover Stub Setting in all type of soil with the help of stub setting template including transportation to the desired location, fixing of stubs in position as per the alignment, fixing and leveling the template and the stub as directed by Engineer and as per clause no. 2.8.7 of technical specifications given at Chapter- VIII of Part-II of this tender document.

### **3.5 Installation of Earthing of Towers with Material:-**

#### **3.5.1 Solid MS Rod Earthing:-**

The price shall cover on a flat rate basis supply and erection of one earth electrode (40 mm Dia. MS Rod) and code of practice for earthing as per IS: 3043-1987 and also as shown in typical Drawing No. MUM/EL/UTILITY/REL-A/CONSULT/239/2015/5.2.1/4B/RTE shown at clause no. 2.2.9.3 (B) (Chapter-II of Part-II). The price shall also cover supply and erection of 50 mm x 6 mm steel flat painted with two coats of red oxide zinc chromate primer to IS: 2074, CNSL based and furnish with two coat of bitumen 82/25 blows grade buried 450 mm below in ground level as per clause no. 2.8.9.1 (B) (Chapter-VIII of Part-II) & its connection to the structure and to the earth electrode with all contractors material, labour, tools and plants, lead and lift, dewatering as a complete job as directed by Engineer and as per clause no. 2.8.9.1 (B) of technical specifications given at Chapter- VIII of Part-II of this tender document.

#### **3.5.2 Counterpoise Type -100 Meter length:-**

The price shall cover on a flat rate basis supply and erection of counterpoise type earthing and code of practice for earthing as per IS: 3043-1987 and also as shown in typical Drawing No. MUM/EL/UTILITY/REL-A/CONSULT/239/2015/5.2.1/4B/CPE shown at clause no. 2.2.9.3 (A) (Chapter-II of Part-II). The price shall also cover supply and installation of counter poise type earthing in radial directions buried 1000 mm below in ground level as per clause no. 2.8.9.1 (A) (Chapter-VIII of Part-II) & its connection to the structure with all contractors material, labour, tools and plants, lead and lift, dewatering as a complete job as directed by Engineer and as per clause no. 2.8.9.1 (A) of technical specifications given at Chapter- VIII of Part-II of this tender document.

### **3.6 Protection of Tower footing:-**

#### **3.6.1 Excavation of all kinds of ordinary & hard soils such as clay, sand, sandy clay, gravel, soft murrum hard murrum etc. [Open Excavation of Soil including Dewatering (0.00 m to 2.00 m)] :-**

The price shall cover excavation to required side slopes below ground level in all kinds of ordinary and hard soils such as Clay, sand, sandy clay, gravel, soft murrum, hard murrum etc. for foundations, pits, trenches etc. including dewatering, leveling, dressing, protection of side slopes by proper shoring, strutting as necessary and transporting excess excavated soil to stack or fill within the basic initial lead of 500 meter and unloading, stacking, filling, leveling and dressing to required levels and grades etc. complete as per specifications and as directed by Engineer. (Only PCC plan area as per drawing shall be measured for payment) In case, if there will be any statutory Royalty charges, same shall be paid by contractor to the concerned Government authorities before commencement of excavation. Contractor should submit the copy of same to Engineer before start of works. Contractor shall be solely liable for legal and financial issues in this regard.



**3.6.2 P/L PCC – Providing and Laying in position and curing Plain Cement Concrete of Mix M15:-**

The price shall cover providing and Laying in position and curing Plain Cement Concrete of Mix M15 (1:2:4) using graded crushed stone (20 mm down) as per drawing, specification and direction of Engineer at all elevation including necessary shuttering required.

**3.6.3 P/L Plum Concrete – Providing and Laying plum concrete in 1:4:8 (Cement: Sand : Coarse aggregate):-**

The price shall cover providing and laying plum concrete, in 1:4:8 (Cement: Sand: Coarse Aggregate) using 30% of 8 to 10" size plums of approved quality stones. (Boulders shall be stacked separately and quantity (net volume) assessed for the work requirement) (The rate shall include the cost of boulders and concreting including transporting and stacking and providing in work as per Specification)

**3.6.4 P/I of PVC Pipes for Weep Holes:-**

The price shall cover providing, supplying and fixing 75 mm dia. PVC pipes conforming to relevant IS code including necessary fixtures and fitting such as bends, tees, fixing clamps, junction etc. including making chases, holes etc. in walls, slabs etc. wherever required and making good the same to original condition complete with lead caulked fully water tight joints including all labour, materials etc. complete and painting with two coats of approved black bitumen paint complete as per specification and directions including equipment, scaffolding, all labour, material etc. complete.

**3.6.5 Concrete M30 Grade Design Mix:-**

The price shall cover laying in position design mix cement concrete of M30 Grade in superstructure with following heights from finished ground level for reinforced concrete work, in all kinds of work using graded crushed stones (20 mm down) as coarse aggregate including conveying, staging, laying, vibrating, compacting and curing etc. complete as per drawings & specifications and direction of the Engineer.

**3.6.6 P/L Reinforcement:-**

The price shall cover supply of reinforcement and Cleaning, Cutting, Straightening (if required) bending, placing in position, and binding with 18SWG annealed soft iron wire TMT bars of minimum grade Fe-500 conforming to IS-1786 reinforcement of all diameters for RCC members as per drawings, specification & directions of Engineer at all elevations, with proper cover blocks, supports, chairs, spacers etc. fixing and binding of reinforcement with 16 SWG black soft annealed wire (Binding wire will not be measured and paid for). The rate shall include labour, T & P, cost of binding wire, preparation of detailed bar bending schedule (BBS) etc. required for satisfactory completion of works all complete

### 3.6.7 Plywood Shuttering (Formwork):-

The price shall cover providing and fixing Plywood with film face formwork (for sub-structure and superstructure) of approved quality for cast-in-situ, plain or reinforced concrete works of any type and at all elevations including labour, materials, equipment, waste for forms, shoring, strutting, scaffolding, staging, tying, nailing, caulking, bolting, testing, etc. including removal of formwork and staging etc. all complete as per specifications, drawings and instructions of the Engineer. The contractor shall supply, fabricate, erect and dismantle (after use) all staging that is required for all activities covered under 'Formwork'. If it is so desired by the Engineer, the Contractor shall prepare before commencement of the actual work, the scheme and submit along with the supporting design calculations and drawings for formwork and staging and get them approved by the Engineer.

### 3.6.8 Weatherproof Exterior Emulsion Paint:-

The price shall cover providing & applying three (3) coats Weatherproof Exterior Emulsion paint of approved manufacturer (Dulux Weather shield Max of ICI Dulux, Apex Ultima of Asian Paints, Weather coat all guard of Berger, or equivalent brand and quality of Nerolac) for external application consisting of a primer base coat and two finishing coats of paints of approved colour, shade over the smooth surface plastered with application of putty by suitable means, including all labour, material, scaffolding, preparing the surface etc. complete as per specification and direction of Engineer/DFCCIL at all elevations.

## 3.7 Erection of Towers, extensions with all tower accessories:-

### 3.7.1 Erection of various towers, tower parts and tower extensions:-

The price shall cover erection of various Towers & Tower Parts, Tower Extensions (Complete), and Bolts & Nuts, tightening, punching and fitting including attachments of Hangers, D-Shackles, Step Bolts and Pack/spring Washers strain plate, applying Zinc Primer & Enamel Paint up to bottom cross arm including Transportation of material from stores to work sites as directed by Engineer and as per clause nos. 2.8.10, 2.8.11 & 2.8.12 of technical specifications given at Chapter- VIII of Part-II of this tender document.

### 3.7.2 Fixing of Anti Climbing Device:-

The price shall cover fixing of Anti Climbing Device as directed by Engineer and as per clause nos. 2.8.12.4 of technical specifications given at Chapter- VIII of Part-II of this tender document.

### 3.7.3 Fixing of DP/NP/PP/CP:-

The price shall cover fixing of Danger Plate, Number plate, Phase Plate, Circuit Plate as directed by Engineer and as per clause nos. 2.8.12 of technical specifications given at Chapter- VIII of Part-II of this tender document.

**3.7.4 Tack Welding:-**

The price shall cover tack welding of Nut bolts up to Bottom Cross arm.

**3.8 Stringing of OPGW & AAAC Zebra Conductors:-**

**3.8.1 One Circuit live (Hot line stringing):-**

**3.8.1.1 Installing and stringing of OPGW (48C Fiber) & associated hardware & accessories:-**

The price shall cover Installing and stringing of OPGW (48C Fiber) on earth wire peak including loading, unloading & transportation of OPGW and required material from store to site locations, laying, paving, jointing, rough sagging, final sagging, clipping, fixing of accessories, hoisting necessary hardware considering one circuit live and outage of other circuit of 220 kV D/C Existing, temporary & Permanent line as directed by Engineer and as per clause nos. 2.8.13 & 2.8.14 of technical specifications given at Chapter- VIII of Part-II of this tender document.

**3.8.1.2 Stringing three nos. conductor (one circuit at a time) considering outage of one circuit and other circuit live of existing 220 KV D/C line for Temporary & Permanent Diversion:-**

The price shall cover Stringing of Conductors on towers including loading, unloading & transportation of conductor and required material from store to site locations, laying, paving, jointing, rough sagging, final sagging, clipping, fixing of accessories, hoisting of Insulator Strings Complete with Arching Horns and necessary hardware, installing and stringing of 3 (Three) Nos. conductor (one circuit at a time) considering one circuit live and outage of other circuit of 220 kV D/C Existing, temporary & Permanent line as directed by Engineer and as per clause nos. 2.8.16, 2.8.17, 2.8.19, 2.8.20, 2.8.21, 2.8.22, 2.8.23, 2.8.24 & 2.8.25 of technical specifications given at Chapter- VIII of Part-II of this tender document.

**3.8.2 Stringing in Cold condition:-**

**3.8.2.1 Installing and stringing of OPGW (48C Fiber) & associated hardware & accessories:-**

The price shall cover Installing and stringing of OPGW (48C Fiber) & its associated Hardware & accessories on Earthwire peak as directed by Engineer and as per clause nos. 2.8.13 & 2.8.14 of technical specifications given at Chapter- VIII of Part-II of this tender document.

**3.8.2.2 Stringing 6 (six) AAAC ZEBRA Conductor on for temporary & permanent line:-**

The price shall cover Stringing of Conductors on towers including loading, unloading & transportation of conductor and required material from store to site locations, laying, paving, jointing, rough sagging, final sagging, clipping, fixing of accessories, hoisting of Insulator Strings Complete with Arching Horns and necessary hardware, installing and stringing of 6 (Six) Nos. of conductor on temporary & Permanent line as directed by Engineer and as per clause nos. 2.8.16, 2.8.17, 2.8.19, 2.8.20, 2.8.21, 2.8.22, 2.8.23, 2.8.24 & 2.8.25 of technical specifications given at Chapter- VIII of Part-II of this tender document.

### **3.9 De-stringing of OPGW & 220 KV (AAAC Zebra) Conductor & Associated Hardware accessories:-**

#### **3.9.1 One Circuit live (Hot line stringing):-**

##### **3.9.1.1 De-stringing of three nos. conductor (one circuit at a time) considering outage of one circuit and other circuit live of existing 220 KV D/C line for Temporary & Permanent Diversion:-**

The price shall cover De-stringing of Conductors from existing as well as temporary diverted lines including loading, Hardware, accessories & Insulator Strings Complete. De-stringing of 3 (Three) conductors (one circuit at a time) considering one circuit live and outage of other circuit of 220 kV D/C Existing & temporary lines as per clause no. 2.8.18 of technical specifications given at Chapter- VIII of Part-II of this tender document.

##### **3.9.1.2 De-stringing of OPGW (48C Fiber) –Hot line Condition : -**

The price shall cover De-stringing of OPGW (48 C Fiber) including associated hardware and accessories in Hot line condition. This shall include cost of all the tools & equipment for doing work with one line in live condition as per clause no. 2.8.15 of technical specifications given at Chapter- VIII of Part-II of this tender document.

#### **3.9.2 De-Stringing in Cold condition:-**

##### **3.9.2.1 De-stringing 6 (six) AAAC ZEBRA Conductor on for temporary & permanent line:-**

The price shall cover De-stringing of 6 (Six) AAAC ZEBRA Conductors from existing & temporary lines including loading, Hardware, accessories & Insulator Strings complete as per clause no. 2.8.18 of technical specifications given at Chapter- VIII of Part-II of this tender document.

##### **3.9.2.2 De-stringing of OPGW (48C Fiber) and associated hardware & accessories: -**

The price shall cover De-stringing of OPGW (48C Fiber) including associated hardware and accessories as per clause no. 2.8.15 of technical specifications given at Chapter- VIII of Part-II of this tender document.

### **3.10 Dismantling of towers with all accessories:-**

#### **3.10.1 Dismantling of Temporary and Existing Towers & Tower parts, Tower extensions (Complete):-**

The price shall cover dismantling of Temporary & Existing Tower locations, Tower Parts, Tower Extensions (Complete), Bolts & Nuts, Hangers, D-Shackles, Step Bolts, and Pack/spring Washers etc.

#### **3.10.2 Dismantling of Existing Towers (i.e. LS-211 & SS-214, ) & Tower Parts, Tower Extensions (Complete) & Transportation to Dahanu Store of R Infra:-**

The price shall cover dismantling of Existing Tower locations, Tower Parts, Tower Extensions (Complete), Bolts & Nuts, Hangers, D-Shackles, Step Bolts, Pack/spring Washers etc. and removing, loading, unloading and segregating, labeling & stacking tower superstructure, nut bolts & washers etc. All required tools/tackles, equipment shall be arranged by Contractor. All hardware and tension towers dismantled from the existing lines to be transported to R-Infra store at Dahanu (within 100 km Radius) as directed by Engineer.

**Note:** - The contractor should ensure that no part of Tension Tower of Existing Transmission Lines shall be damaged during dismantling work. Contractor shall also note that he cannot use gas cutter for dismantling of existing Tension Towers.

**3.11 Transportation charges toward transport of De-strung AAAC Zebra Hardware fittings from existing 220kV D/C line & Deposit to R-Infra Store at Dahanu:-**

**3.11.1 Single Suspension:-**

The price shall cover transportation charges for Single suspension string Hardware including anchor shackles, ball-link, ball-clevis eye, socket-clevis, arcing horn/grading rings, yoke plates, suspension clamps, drop clamp, complete in all respect, necessary for single AAAC Zebra conductor.

**3.11.2 Single Tension:-**

The price shall cover transportation charges for Single tension string Hardware including anchor shackles, ball-link, ball-clevis eye, socket-clevis, arcing horn/grading rings, yoke plates, tension clamps compression type, jumper cone, sag adjustment device, drop clamp, twisted shackles, turn buckle, complete in all respect, necessary for single AAAC Zebra conductor.

**3.12 Demolition of Tower Foundation and protection walls:-**

**3.12.1 Demolition of Tower foundations of Existing & Temporary Line:-**

The price shall cover demolition of Temporary & Existing Tower foundations demolishing of existing RCC including cutting and removing of embedded reinforcement at any level wherever indicated, making protective arrangement, carting away and disposal of debris out of the premises etc. (within a radius of 50 KM) all complete. The statutory royalty charges shall be paid by the contractor to the concerned Government authorities for disposal, Contractor shall be solely liable for the legality in this regard. filling in ground/ plinth with selected (Non expansive) earth brought from outside plot boundary spread in layer of 150 mm to 230 mm thickness to achieve required level, slope of gradient and watering, consolidating compacted to 95% standard proctor density including transportation cost, royalty etc. complete in all respect as per the instructions of Engineer.

**3.12.2 Demolition of Existing Tower protection wall:-**

The price shall cover demolition of Existing Tower protection wall including cutting and removing of embedded reinforcement at any level wherever indicated, making protective arrangement, carting away and disposal of debris out of the premises etc. (within a radius of 50 KM) all complete. The statutory royalty charges shall be paid by the contractor to the concerned Government authorities for disposal contractor shall be solely liable for the legality in this regard. filling in ground/ plinth with selected (Non expansive) earth brought from outside plot boundary spread in layer of 150 mm to 230 mm thickness to achieve required level, slope of gradient and watering, consolidating compacted to 95% standard proctor density including transportation cost, royalty etc. complete in all respect as per the instructions of Engineer.



### **3.13 Way Leave/Right of Way:-**

#### **3.13.1 Cost of Right of way and Tree Clearance/Crop Compensation/Way Leave etc. for Permanent Diversion:-**

The price shall cover cost of arranging Right of Way and Tree Clearance/Crop Compensation/Way Leave etc. for Permanent Diversion.

#### **3.13.2 Cost of Right of way and Tree Clearance/Crop Compensation/way leave etc. for Temporary Diversion:-**

The price shall cover cost of arranging Right of Way and Tree Clearance/Crop Compensation/Way Leave etc. for Temporary Diversion.

### **Item No.4 Rebate to be given by Contractor to DFCCIL on- released Tower materials, Line Material, hardware & accessories:-**

#### **4.1 De Strung OPGW:-**

The rebate shall cover cost of De Strung OPGW.

#### **4.2 De Strung AAAC Zebra Conductor:-**

The rebate shall cover cost of De Strung AAAC Zebra Conductor.

#### **4.3 De Strung 90 KN Insulator String of Existing Line:-**

The rebate shall cover cost of Dismantled 90 KN Insulator String of Existing Line.

#### **4.4 De Strung 120 KN Insulator String of Existing Line:-**

The rebate shall cover cost of Dismantled 120 KN Insulator String of Existing Line.

#### **4.5 De Strung 90 KN Insulator String of Temporary Line:-**

The rebate shall cover cost of Dismantled 90 KN Insulator String of Temporary Line.

#### **4.6 De Strung 120 KN Insulator String of Temporary Line:-**

The rebate shall cover cost of Dismantled 120 KN Insulator String of Temporary Line.

#### **4.7 De Strung Pilot string Hardware:-**

The rebate shall cover cost of Dismantled Pilot string Hardware.

#### **4.8 De Strung Double tension String Hardware:-**

The rebate shall cover cost of Dismantled Double tension String Hardware.

#### **4.9 De-Strung Vibration Damper of AAAC Zebra Conductor:-**

The rebate shall cover cost of Dismantled Vibration Damper of AAAC Zebra Conductor

#### **4.10 Dismantled tower material of Temporary & Existing line:-**

The rebate shall cover cost of Dismantled tower material of Temporary & Existing line (except tension towers released from existing lines).

#### **4.11 Stub setting template:-**

The rebate shall cover cost of Stub setting template (handing over one template of each tower to R-Infra store at Dahanu).

#### **4.12 Released Tower Material after Proto Type Testing:-**

The price shall cover Rebate to be given by Contractor to DFCCIL towards retaining of Tested Tower Material.



# **PART-II**

## **SCOPE OF WORK & TECHNICAL SPECIFICATIONS**

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

## **PART-II**

### **CHAPTER-I**

## **SCOPE OF WORK FOR SUPPLY**

## **PART-II**

### **CHAPTER-I**

#### **SCOPE OF WORK FOR SUPPLY**

#### **2.1 PROJECT DESCRIPTION:-**

- 2.1.1 Dedicated Freight Rail Corridor Corporation of India Limited (DFCCIL) is a Central Government organization incorporated for the construction of an electrified double track railway line between New Delhi and Jawaharlal Nehru Port Trust (JNPT) harbor in New Mumbai. The purpose of this rail corridor is to hasten the movement of goods and consignments between two Major cities, mostly meant for export.
- 2.1.2 Proposed corridor is on the east side of the existing Delhi-Mumbai double line railway track as it enters the Maharashtra State.
- 2.1.3 The passage of the DFCCIL rail track encounters some of the 220 kV D/C transmission line sections of M/s Reliance-Infra. Such sections of Transmission lines need diversion for the purpose of overhead crossing of the corridor for the purpose of maintaining statutory electrical clearances above the proposed rail tracks of DFCCIL.
- 2.1.4 There are 2 Nos. of existing 220 kV Double Circuit Transmission lines which are evacuating power from the Dahanu Thermal power plant of M/s Reliance-Infra which is situated near Dahanu Railway station. These 220 kV double circuit lines are carrying power to North Mumbai Region. The proposed railway track of DFCCIL is crossing these existing 220 kV double circuit lines at various locations as listed below.

Name of village	Name of nearby town	Location No. of 220 kV SS D/C line	Location No. of 220 kV LS D/C line	Remarks
Agwan	Dahanu	SS-11 # SS-12	LS-12 # LS-13	The crossing point is on high land& hard rock. The area is not inhabited
Shirgaon	Virar	SS-194 # SS-195	LS-192 # LS-193	The crossing point is in the agriculture field with hard soil. The area is not inhabited
Bilalpada	Nalasopara	SS-213 # SS-214	LS-211 # LS-212	The crossing point is in the agriculture field with hard soil. The area is inhabited.
Gokhiware	Vasai	SS-225 # SS-226	LS-223 # LS-224	The crossing point is near the pond and the strata are hard rock. The area is not inhabited.

### 2.1.5 Climatic & Isoceraunic Conditions:-

Project	Diversion of R-Infra's 220 KV D/C T-Lines at 04 different locations.
Site Locations	Mumbai
Altitude	<1000m
Atmospheric pressure	1.01246 bar
Seismic Zone	IS:1893 Zone III
Pollution level	G3 as per ISA 71.04
Ambient temperature	50°C
Relative Humidity	
Maximum	99%
Wind Data	
a) Wind design pressure for structure	As per IS:875
b) Wind zone	4 (As per IS:875)
c) Basic Wind Speed	47 m/sec

### 2.1.6 Electrical Parameters:-

Sr. No	Description	Details
1	System operating voltage	220 kV
2	Frequency	50 Hz
3	Phases	3
4	Full wave impulse (1.2/50 micro sec.)	1050 kVp
5	Switching impulse withstand voltage (250/2500 micro seconds) dry & wet	-
6	One minute power frequency dry and wet withstand voltage (rms)	460 kV
7	Corona extinction voltage	156 kV
8	Max. radio interference voltage for frequency between 0.5 MHz and 2 MHz	1000 micro-volt
9	Min. creepage distance	35 mm/kV
10	Min. clearance	
(i)	Phase to phase	<b>2100 mm</b>
(ii)	Phase to earth	<b>2400 mm</b>
(iii)	Sectional clearance	<b>5000 mm</b>
11	Rated short circuit duration for 3 sec	40 kA
12	System neutral earthing	Solidly earthed

### 2.1.7 SCOPE:-

- 2.1.7.1 The scope of work include supply of fabricated & galvanized towers accessories, associated line material for diversion work of 2Nos. of 220 kV D/C Tr. Lines (owned by R-Infra) to facilitate the passage of rail track being constructed by the Dedicated Freight Corridor Corporation of India Limited (DFCCIL) at the crossing points near Village - Agwan (Dahanu Taluka); Village - Shirgaon (Vasai Taluka); Village Bilalpada (Vasai Taluka) & Village Gokhivare (Vasai Taluka) in Maharashtra.

### **2.1.7.2 Supply of Material:-**

- (a) Fabrication & galvanizing of 220 kV Towers for temporary & permanent arrangement for diversion of 220 kV D/C Transmission Lines, as per approved tower structure drawings.
- (b) Supply / procurement of tower/line material, insulators, AAAC ZEBRA conductor, OPGW 48C, hardware fittings (for power conductor & OPGW), accessories (For power conductor & OPGW), tower accessories & earthing material as per technical specifications & Schedule of Prices & Total Prices (Form No.- 4) given in the tender document.
- (c) Arranging for tower proto-model inspection as per technical specifications at manufacturer's works. Arranging for Proto-type testing of Towers as per standards.
- (d) Arranging for inspection & testing of insulators, conductor, hardware fittings, conductor accessories (for power conductors & OPGW48C), and tower accessories etc. as per relevant specifications and standards.

**2.1.7.2** DFCCIL shall provide approved structural drawings, shop drawings & foundation drawings for 220 kV D/C towers and tentative BOQ of tower, foundation, insulators, hardware fittings, AAAC ZEBRA conductor/OPGW 48C accessories, conductor (for AAAC Zebra power conductor & OPGW), tower accessories, tower grounding/earthing for execution purpose to successful bidder.

**2.1.7.3** This scope also provides for fabrication of prototype tower, its assembly & offering the same for proto-inspection and testing by Engineer/DFCCIL.

**2.1.7.4** This scope also provides for modifications in shop drawings of the towers, if required, during prototype tower assembly. The successful bidder has to incorporate such modifications & prepare revised shop drawings. The revised shop drawing shall be submitted by the successful bidder to Engineer/DFCCIL for necessary approval before the type testing of the towers. The expenditure for such modifications in proto model of towers including the expenditure for preparation of revised shop drawing shall be borne by the successful bidder.

**2.1.7.5** The technical description of these items is given in respective chapters of Part-II of this tender.

**2.1.7.6** All the raw materials such as steel & zinc for galvanizing etc. are included in the bidder's scope.

**2.1.7.7** All the material shall be procured from the reputed manufactures/vendors mentioned in the Bid document. Bidder shall submit its proposal for vendor approval before procurement of material along with copies of credentials and approval from the State/Centre Power Utilities. However, vendor approval from Engineer/DFCCIL is necessary before commencement of procurement.

**2.1.7.8** Bidders may however visit the line route/site to acquaint themselves with terrain conditions and associated details of the proposed transmission lines on specified date intimated by DFCCIL. For this purpose they are requested to contact the following address:

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

Chief Project Manager/Mumbai/South,  
Dedicated Freight Corridor Corporation of India Ltd.  
[A Govt. of India (Ministry of Railway) Enterprise]  
7<sup>th</sup> floor, Central Railway New Administrative Building,  
D. N. Road, Mumbai-400001  
Ph. No: +91-22-22634185; Fax: +91-22-22634184, MAHARASHTRA, INDIA

### 2.1.8 **Specific Technical Requirements:-**

- (a) The following figures/drawings/documents shall be obtained by the successful bidder from the Engineer.
- (i) Tower design details and loading calculations.
  - (ii) Tower Geometry for each type of tower
  - (iii) Structural & fabrication drawings for all types of towers
  - (iv) Bill of Material for 220 kV D/C Towers & line material
- (b) The following figures/drawings/documents shall be submitted by the bidder to Engineer for approval prior to initiation of procurement.
- (i) Insulator Assembly Drawings–Suspension, Tension, Bypass and Pilot.
  - (ii) Insulator Hardware, Conductor Accessories drawings.
  - (iii) AAAC ZEBRA conductor and OPGW drawings & details.
  - (iv) OPGW Hardware fittings & accessories drawings.
  - (v) Tower Grounding drawings & details including counterpoise.
  - (vi) Drawings for Tower Accessories (Danger plate/Number plate /Phase plate /Circuit Identification Plates)

### 2.1.9 **Specific Technical Particulars for Towers, Accessories & Line Materials :-**

The specific technical particulars, according to which the towers have been designed and line materials are to be procured, are given below.

#### 2.1.9.1 **220 kV D/C Tower:-**

The details of Towers to be procured for 220 kV D/C Line is as follows:

Sr. No.	Tower Type	Reference Drawing Number	Height of Normal Tower	Base width of Normal Tower
1	220 kV D/C Tower, Type DD 5 Degree Deviation (Narrow Base)	No. 2.2.9.1 (B) at Chapter-II of Part-II	34.15Meter	4.451Meter
2	220 kV D/C Tower, Type DD 60 Degree Deviation (Narrow Base)	No. 2.2.9.1 (C) at Chapter-II of Part-II	34.15Meter	4.769Meter
3	220 kV D/C Tower, Type DD 75 Degree Deviation (Narrow Base)	No. 2.2.9.1 (A) at Chapter-II of Part-II	34.9 Meter	7.5 Meter



### 2.1.9.2 Tower accessories & Tower Earthing Material:-

The relevant standard details of Tower accessories & Tower Earthing Material to be procured for 220 kV Line is as follows

Sr. No.	Particulars	Standard
1	Number Plate	IS 5613 (Part 2/Sec-1)-1985
2	Danger Notice Plates	IS 2551 – 1983
3	Phase Plate	IS 5613 (Part 2/Sec-1) - 1985
4	Circuit Plate	IS 5613 (Part 2/Sec-1) - 1985
5	Anti-climbing Device	IS 5613 (Part 2/Sec-1) - 1985
6	Counter Poise Type Earthing	IS 3043 -1991
7	Solid rod type earthing	IS 3043

### 2.1.9.3 AAAC ZEBRA Conductor:-

The conductor details to be procured for 220 kV Line is as follows:

(i)	Material	AAAC ZEBRA
(ii)	Size and stranding	525 mm <sup>2</sup> , 61/3.31 mm
(iii)	Ultimate tensile strength	14890.9Kg.
(iv)	Weight	1.448Kg/m
(v)	Overall diameter	29.79mm
(vi)	Modulus of elasticity	550800Kg/cm <sup>2</sup>
(vii)	Calculated DC resistance at 20 <sup>0</sup> C	0.0651 Ohm/ KM
(viii)	Coefficient of linear expansion	23X10 <sup>-6</sup> per <sup>0</sup> C
(ix)	Number of conductors per phase	One

### 2.1.9.4 OPGW (48/DWSM):-

(A) Dimensional Requirement:-

(i)	Material	OPGW
(ii)	Cladding Diameter	125 ± 1 mm
(iii)	Cladding Non-circularity	≤ 1.0 %
(iv)	Core coating diameter - uncolored	235 to 255 mm
(v)	Primary coating diameter - colored	235 to 265 mm
(vi)	Primary coating diameter – cladding concentricity error	≤ 12.5
(vii)	Fiber Length	4 km
(viii)	Modulus of elasticity	11010Kg/mm <sup>2</sup>
(ix)	Coefficient of linear expansion	15.3X10 <sup>-6</sup> per <sup>0</sup> C

**(B) Mechanical Requirement:-**

(i)	Proof Stress Level	$\geq 0.69 \text{ GPa}$
(ii)	Coating Strip Force (average)	$1.0 \geq F_{ave} \leq 5.0 \text{ N}$
(iii)	Coating Strip Force (peak)	$1.0 \geq F_{peak} \leq 5.0 \text{ N}$
(iv)	Fiber curl radius	$\geq 2 \text{ M}$
(v)	Tensile strength for 0.5 m specimen length	$\geq 3.8 \text{ GPa}$
(vi)	Stress corrosion susceptibility constant, $n_d$	$\geq 18 \text{ M}$

**2.1.9.5 Composite Silicone Rubber Polymeric Insulators:-**

(i)	Suspension(90KN)		Size of composite Insulator (*Core dia. X Nominal length) (mm)
	Silicon rubber composite	:	20 x 2175
(ii)	Tension(120KN)		Size of composite Insulator (*Core dia. X Nominal length) (mm)
	Silicon rubber composite	:	20 x 2175
(iii)	Pilot (90KN)		Size of composite Insulator (*Core dia. X Nominal length) (mm)
	Silicon rubber composite	:	20 x 2175

\*The core dia. of composite insulators is indicative only. The bidder shall offer composite long rod insulators of suitable core dia. to meet specified E&M strength requirements.

**2.1.9.6 Insulator Hardware & Conductor Accessories:-**

Sr. No.	Particulars
(i)	Single suspension Hardware assembly (AGS)
(ii)	Double suspension Hardware assembly (AGS)
(iii)	Suspension Hardware for Pilot strings
(iv)	Single Tension Hardware assembly
(v)	Double Tension Hardware assembly
(vi)	Dead End Clamp for AAAC Zebra Conductor
(vii)	Vibration Dampers
(viii)	Mid Span Joint
(ix)	Repair sleeves

**2.1.9.7 OPGW Hardware & Accessories:-**

Sr. No.	Description
(i)	Armored Roads for Vibration Dampers
(ii)	Protection Splice Set (Reinforcing Rod)
(iii)	Dead End Clamp Assembly (Tension)
(iv)	Vibration Damper
(v)	Down Lead Clamp (Fastening Clamp)
(vi)	In Line Splice Enclosure(Junction Box)
(vii)	Optical Fiber Cable Accommodations (FODP)
(viii)	Cable Termination Splice Accommodations (FMS)
(ix)	Suspension Clamp Assembly

**PART-II**

**CHAPTER-II**

**TECHNICAL SPECIFICATION OF**

**TOWERS**

**AND**

**ACCESSORIES**

## **PART-II**

### **CHAPTER-II**

### **TECHNICAL SPECIFICATION FOR PROCUREMENT OF TOWERS AND ACCESSORIES**

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## **PART-II**

### **CHAPTER-II**

#### **TECHNICAL SPECIFICATION FOR PROCUREMENT OF TOWER AND ACCESSORIES**

##### **2.2.1 Steel Structures for Transmission Line:-**

###### **2.2.1.1 General:-**

- (A) This chapter covers the furnishing of galvanized structural steel for transmission towers. It includes supply of all raw materials, fabrication, galvanizing, and delivery of structures with necessary connection bolts, step bolts and other miscellaneous material required to make complete transmission towers structures.
- (B) This chapter is intended for use with complimentary chapters and appropriate drawings which outline electrical clearances, loading assumptions and other details pertaining to specified standards.
- (C) All raw materials of tower shall be branded new and free of pitting, dents, bends and other defects.

###### **2.2.1.2 Materials of Fabrication:-** Materials shall conform to the following specifications:

###### **(A) Rolled Shapes and Plates:-**

- (i) All materials shall be hot rolled of mild structural and/or high-strength structural steel. All structural steel shall be made by the open hearth or electric furnace process.
  - (a) **Structural Mild Steel:-**  
Structural mild steel shall conform to IS: 2062, 1992, ASTM A36 or BS 15.
  - (b) **High Strength Structural Steel:-**  
High Strength structural steel shall conform to IS961, ASTM A441 or BS 4360.
  - (c) Steel Grade Substitution E250 A/B.
- (ii) Steel rolled for and released as structural grade, shall not be used as a substitute for high-strength grade regardless of test values.
- (iii) Steel rolled for high-strength grade may be used for structural grade if it meets the required specifications.

- (B) Structural steel other than those specified above may be substituted provided Engineer approves their quality and suitability for the proposed contract. The prospective supplier must furnish with his proposal, test certificates covering the mechanical properties and chemical composition of any such alternative steel.

- (C) Steel shall be purchased by the bidder from either prime manufacturers or reputed re-rollers acceptable to the Engineer/DFCCIL.
- (D) Connection Bolts, U-Bolts and Nuts:-
- (i) Steel for connection bolts, U-bolts, nuts and locknuts shall be in accordance with IS 6639, IS 1363 & IS 1367 or BS 4190, IS 12427, 1998 or of property class 5.6 conforming to IS 6639. High strength bolts, if used (only with structural steel of IS: 8500) shall conform to property class 8.8 of IS: 3757. Bolts, U-Bolts, nuts and locknuts shall be of uniform quality, either mild steel or high-strength and no combination of both in a tower are permitted. The size of bolts shall be appropriate.
- (ii) Bolts, Nuts & Spring/Pack washers shall be Hot Dip Galvanized
- (E) Step Bolts: - Step bolts shall conform to IS: 10238 (1982).
- (F) Spring Washers: - Spring washers shall be carbon steel conforming to IS 3063 B-type. Washers to be used with high strength bolts and nuts shall conform to IS: 6649.
- (G) Plain Washers: - Plain washers shall be made of IS 2016, ASTM A 36 or BS 15 steel.
- (H) Tower Signs:- Tower signs, consisting of number signs, phasing signs and danger signs shall be made of mild steel with enameled finish. The thickness shall not be less than 3 mm. The bolts of tower signs shall have 3mm thick lead washers (relevant IS to be quoted).

## **2.2.2 Fabrication of Tower:-**

### **2.2.2.1 General:-**

- (A) All workmanship and finish shall be of best quality, first class throughout and shall conform to the best-approved method of Fabrication. All the pieces shall be finished straight, true to detail drawings. All holes and edges shall be free from burrs. Shearing and chipping, bevel cutting, bending, grinding etc. shall be neatly and accurately done. Unless otherwise directed/approved, reference may be made to the IS: 7215 or American Institute of Steel Construction Manuals for providing standard fabrication tolerances. Material for fabrication shall be kept clean and protected from weather.
- (B) All identical pieces bearing the same erection number must be exactly interchangeable with each other and interchangeable in their relative position in all towers or structures of which they-form a part.

### **2.2.2.2 Connections:-**

- (A) All connections shall be bolted type only.
- (B) Bolts shall be full size in shanks. Threads of bolts and nuts shall be clearly rolled or cut and face and head of nut shall be truly at right angle to the axis of bolt. The shank will be round and free of projected fins. The bolt head shall be hexagonal, properly-centered on the shank and have a bearing surface truly at right angle to the axis of bolt, free from burrs and reasonably smooth.



- (C) Nuts shall be hexagonal of dimensions adequate to develop full strength of bolts. All nuts shall be securely locked by the use of lock-nuts or spring washers or by other means approved by Engineer. The nuts and locknut shall fit freely for entire length of bolt threads. Dimensions of spring washers shall meet the following requirements.

Nominal Diameter (mm)	Basic Inside Diameter (mm)	Maximum Outside diameter(mm)	Average thickness (mm)
12	12.2	21.1	2.5
16	16.2	27.4	3.0
20	20.2	33.5	4.0

- (D) In all cases where bearing is critical, the unthreaded bolt shall bear on members assembled. A suitable washer of adequate thickness may be provided to exclude the threads from the bearing thickness, in case a longer grip bolt has to be used for this purpose. As far as possible not more than four thicknesses shall be connected together at any point.

#### 2.2.2.3 Fabrication Procedure:-

(A) Straightening:-

Rolled material shall be straightened before being worked, unless otherwise specified. The straightening or flattening shall be done without any injury to the Material or its strength. Long plates shall be straightened by passing through leveling rolls and structural shapes by use of mechanical or hydraulic bare/section straightening machines. Heating or forging shall not be resorted to without the prior approval of Engineer in writing.

(B) Cutting:-

- Cutting may be by shearing, cropping or sawing. Flame cutting shall be avoided as far as possible.
- All re-entrant corners shall be shaped notch-free to a radius of at least 12 mm. sheared or cropped edges shall be dressed to a neat workmanlike finish and shall be free from burrs and distortions so as to avoid any difficulty of assembly caused by the interference of end sections with other members at the time of assembling the tower.

(C) Punching and Drilling:-

- Holes may be punched through material not over 12 mm thickness. Holes for thickness higher than 12 mm shall preferably be drilled and the burrs removed effectively.
- The diameter of bolt hole shall not exceed 1.5 mm over the nominal diameter of bolt used. Special care shall be exercised to ensure exact spacing of holes and their distance from the back of angle and to the end of piece. Any member having holes or cuts more than 1.0 mm from correct position, will be subject rejection. No welding, filling or plugging will be permitted Poor matching, over-drilling and ovality in holes shall be subject to rejection. Burning holes with gas is strictly prohibited.
- Holes in bent members affected by bending operation shall be laid out and punched or drilled after bending.

(D) Welding:-

- (i) Welding shall be avoided as far as possible, however if used, shall be carried out before galvanizing. Electrodes for manual welds shall comply with the requirements of IS 814 or AWS A5.1 and shall be of approved make. Welding shall be continuous unless otherwise specified. Caution shall be exercised to obtain full penetration of weld when welding light members to heavy members.
- (ii) All welds shall be made only by welders and welding operators who have been properly trained and previously qualified by tests to perform the type of work required and prescribed in the relevant applicable standards.
- (iii) All welds shall be free from defects like blow holes, slag inclusion, lack of penetration, under cutting, cracks etc. All welds shall be cleaned of slag or flux and show uniform sections, smoothness of weld metal, feather edges without overlap and freedom from porosity.
- (iv) Fillet welds larger than 8 mm shall be, made with 2 or more passes. Each layer of multiple layer welds, except the root and surface run, may be moderately pined with light blows from a blunt tool. Care shall be exercised to prevent scaling or flaking of weld and base metal from over pinning.

(E) Bending:-

- (i) All bending of high-strength structural steel must be done hot. Bends of difficult nature on mild steel would be done hot; otherwise cold bending could be employed.
- (ii) If cold bending is adopted the Engineer shall have the right to make any test in accordance with ASTM A143.
- (iii) Members bent hot shall be heated in non-oxidizing flame over a sufficient area to prevent excessive deformation. Hot bends shall be cooled by natural air cooling method and not by quenching. In case where bends are near splices, the upset metal shall be forged smooth for full bearing on the contact surface.
- (iv) All bends shall be finished free from waves, folds, localized reduction in sectional area or reduction in leg length in excess of 5%.

(F) Tolerances:-

- (i) The acceptable limits for straightness (sweep and camber) for rolled or fabricated members are:

Main struts and legs of towers	-	L/1000 or 10 mm whichever is smaller
For other members not primarily in compression, Such as redundant members	-	L/500 or 15 mm whichever is smaller

Where L is the axial length of member between points of lateral supports

- (ii) Tolerances in specified length of finished member shall be as follows:

Finished member without ends finished for contact bearing shall have tolerances  $\pm 1.5$  mm for member up to 3 m in length. For members over 3 m long an additional 1 mm for every 3 m length may be allowed, but in no case will a tolerance more than 3 mm be allowed for any member.

(G) Marking:-

After checking and inspection, all members shall be marked for identification during erection. The mark shall conform to the piece marks on the approved detail drawings. Markings shall be stamped with metal dye prior to galvanizing and the figures and letters shall be at least of 20 mm height and to such optimum depth as to be clearly visible ever after the member is galvanized.

- (i) Marking of tower members shall be in A-BB-CC-DDD pattern and as below:-  
A = R-Infra's code assigned to the contractor-Alphabet  
B= Contractor's Mark-Numerical  
CC = Tower type-Alphabet  
DDD = Number mark to be assigned by contractor-Numerical
- (ii) All the erection marks shall be on outer surface and placed preferably near one end in the same relative position on each member so as to be easily seen after assembly of tower. They shall be stamped so as not to reduce the effective net section of the member. Members having length more than 4 meters shall have marking at both ends.
- (iii) After galvanizing the marking shall be encircled boldly by distinguishable paint to facilitate easy location.
- (iv) Member, having identical size and details, shall have the same marking regardless of its position in the structure.

(H) Errors:-

- (i) Any error in shop work, which prevents proper assembling and fitting up of parts in the field by moderate use of drift pin or moderate amount of reaming, shall be rejected as defective workmanship. All charges incurred by the contractor either directly or indirectly because of such defective workmanship, will be deducted from the amount due to the contractor before payment is made. The amount of such deduction will consist of the sum total to the cost of labour, direct or indirect material, plant, transportation equipment rental and overhead expenses.
- (ii) In case the Engineer chooses to reject the material because of poor workmanship, the cost of all handling or returning the material to the contractor, if he so desires, shall be entirely to the account of contractor. All the replacement material shall be supplied free and delivered at site in all such cases.

2.2.2.4 Cleaning & Galvanization:-

(A) Workmanship:-

After all the shop work is complete, all the structural materials shall be stamped with erection mark and is hot-dip galvanized. Before galvanizing, the steel shall be thoroughly cleaned of any paint, grease, rust scale, acid or alkali or such other foreign matters as or likely to interfere with the galvanizing process or with the quality and durability of the zinc coating. Pickling shall be very carefully done and shall be proper.

- (B) Galvanizing for structural steel members, bolts, nuts, step bolts and other accessories of tower shall meet the requirements of IS: 2629, IS: 5358 & IS: 6745.
- (C) The galvanized surface shall consist of a continuous and uniformly thick coating of zinc, firmly adhering to the surface of steel. The finished surface shall be clean and smooth, and shall be free from defects like discoloured patches, bare spots, unevenness of coating, which is loosely attached to the steel, globules, spiky deposits, blistered surface, flaking or peeling off etc. The presence of any of these defects noticed on visual or microscopic inspection shall render the material liable to rejection.
- (D) There shall be no flaking or loosening when struck squarely with a chisel faced hammer. The galvanized steel member shall withstand minimum number of one minute dips in copper sulphate solution as per tests specified in IS: 2633 or ASTM A-239.

The minimum repetition times for one minute dip in uniformity tests shall be as follows:

- (i) Structural members, gussets : 6
- (ii) Bolts, nuts & other accessories : 4

- (E) Galvanizing of each member shall be carried out in one complete immersion. Double dipping shall not be permitted. However, in case of members over 7.5 m long, the contractor shall take prior approval of Engineer for double dipping. When the steel section is removed from the galvanizing kettle excess shall be removed by 'bumping'. The process known as 'wiping' or 'scraping' shall not be used for this purpose.
- (F) Wherever galvanized bolts, nuts, locknuts, washers, accessories etc. are specified, they shall be hot dip galvanized. Spring washers shall be electro galvanized. Excess spelter from bolts, nuts, etc. shall be removed by centrifugal spinning. Rehashing of bolt threads after galvanizing shall not be permitted. Nuts however may be tapped, but not to cause appreciable rocking of the nuts on the bolts.
- (G) Defects in certain members indicating presence of impurities in the galvanizing bath in quantities larger than that permitted by the Specifications, or lack of quality control in any manner in the galvanizing plant, shall render the entire production in the relevant shift liable to rejection.
- (H) All galvanized members shall be treated with Sodium Dichromate solution or an approved equivalent after galvanizing, so as to prevent white storage stains.
- (I) Prior approval shall be secured from Engineer if galvanizing is done outside contractor's plant or place other than that indicated in his bid offer.
- (J) Contractor shall ensure that galvanizing is not damaged in transit and shall at his cost replace such members as are damaged in transit. If, Engineer accepts repair of minor damages, contractor shall furnish sufficient quantity of appropriate paint, free of cost, for repairing galvanized surfaces damaged in transit.

#### 2.2.2.5 Minor Repairs:-

- (A) Material on which galvanizing has been damaged shall be re-dipped unless in the option of the Engineer, the damage is local and can be repaired by applying zinc rich/galvanizing repair paint.
- (B) Where such repair is authorized, the damaged area shall be cleaned by wiping with clean rags saturated with mineral spirits of xylene, followed by wire brushing. Subsequently, the area shall be re-cleaned with solvent to remove residue, and shall be given one heavy coat of zinc rich/galvanizing regular paint. The percentage of pure zinc by weight in dry film shall not be less than 85%.

#### 2.2.3 Tower Accessories:-

##### 2.2.3.1 Step Bolt Ladders:-

- (A) Each tower shall be provided with step bolts on one of the main legs, of not less than 16mm diameter and 175 mm long, spaced not more than 450 mm apart and extending from about 3.5 meters above the ground level to the top of the tower.

Each step bolt shall be provided with two nuts on one end to fasten the bolt securely to the tower and button head at the other end to prevent the feet from slipping away. The step bolts shall be capable of withstanding a vertical load not less than 1.5 KN and shall be used as a ladder for climbing. The step bolts shall conform to IS: 10238 and shall have a hexagonal head.

- (B) Each tower accessories shall be supplied as per the below mentioned standards.

Number Plate	IS 5613 (Part 2/Sec-1)-1985
Danger Notice Plates	IS 2551 – 1983
Phase Plate	IS 5613 (Part 2/Sec-1) - 1985
Circuit Plate	IS 5613 (Part 2/Sec-1) - 1985
Anti-climbing Device	IS 5613 (Part 2/Sec-1) - 1985
Bird Guard (for suspension insulator string)	IS 5613 (Part 2/Sec-1) - 1985

##### 2.2.3.2 Anti-Climbing Devices:-

Fully galvanized barbed wire type anti-climbing device shall be provided at a height of approximately 3 meters as an anti-climbing measure. Four layers of barbed wires will be provided each inside and outside the tower in horizontal plane, spacing between the layers being 140 to 150 mm. The angle pieces with 12mm x 12mm notches for accommodating barbed wire shall be supplied with the towers along with provision for suitable bolt holes on leg members for fitting the angles. The barbed wire shall conform to IS-378 (1978). The anti-climbing devices shall in general conform to fig.8 of IS: 5613 (Part-II/Sec-I).

##### 2.2.3.3 Insulator String hangers:-

- For the attachment of suspension insulator strings a suitable swinging hanger on the tower shall be provided so as to obtain requisite clearance under extreme swinging conditions and free swinging of the string. The hanger shall be designed to withstand an ultimate tensile strength of more than 120 KN.

2. At tension towers, horizontal strain plates of suitable dimensions on the underside of each power cross-arm tip and at the top ground wire peak shall be provided for taking the 'D' shackles of the tension insulator strings or ground wire tension clamps, as the case may be.

#### **2.2.3.4 Caution Plates, Number Plates, Circuit Plates and Bird Guards:-**

- (A) Each tower shall be fitted with Number Plates, Caution Plates (Danger Boards), Circuit plates and phase plates. These shall be provided at appropriate level from the ground level (about 2.5m to 3.5 m from ground level) so that the man standing at the foot ground tower will be able to clearly identify the same. These plates shall be 2 mm thick and vitreous enameled on both back and front.
- (B) The letters, figures and the conventional skull and bones on danger plates are in signal red on the front side. On the number plate, the number of the tower location preceded by the letters defining the type of the tower shall be inscribed. Phase plates shall be coloured red, yellow and blue to indicate the phase of the conductor. The letter on number plates shall be in red against white back ground. The number plates shall confirm to Fig.-5 of IS: 5613 (Part-I/Sec-I). Similarly, the plates and circuit plates to Fig.6 & 7 in the said IS. The danger notice plates shall confirm to IS: 2551. Bird guards shall be of the saw tooth type and confirm to Fig.10 of IS (5613 Part-II/Sec-I).

#### **2.2.4 Proto-Modelling and Proto-Type Testing of Towers:-**

##### **2.2.4.1 Proto-Modelling (Shop Assembly-Proto Inspection) of Towers:-**

- (A) One tower of each type and height, including every combination of leg extensions, shall be assembled in shop and shall be offered to Engineer for inspection to ensure proper field erection. Reaming of holes not properly matching will not be permitted. A moderate amount of drifting will be allowed.
- (B) If any errors on the drawings or fabrication are discovered in such assembly all the corrections or modifications shall be incorporated in the drawings and correct part re-fabricated and assembled. All revised drawings shall be resubmitted for approval from Engineer.
- (C) Mass fabrication of the towers shall be carried out only after approval of Proto Assembly Inspection for each type of tower as well as after satisfactory type testing of Tower at approved testing station.
- (D) The successful bidder shall also arrange for tack welding of bolts & nuts up to the bottom cross arm including supply and application of zinc rich primer and two coats of enamel paint.

##### **2.2.4.2 Proto-Type Testing of Towers:-**

One Galvanized tower of each type shall be subjected to proto type testing up to destruction, as per IS 802 (Part-III), at Government owned or NABL accredited testing station. Prefix 'T' shall be marked on all members of all test towers.

The Contractor shall submit one set of shop drawings along with the bill of materials. Further, Contractor shall submit one copy of test reports and final tracings of shop drawings and Bill of materials for Engineer's reference and record.



The Contractor shall ensure that the specification of materials and workmanship of all towers actually supplied conform strictly to the towers which have successfully undergone the tests. In case any deviation is detected, the Contractor shall replace such defective towers free of cost to the DFCCIL. All expenditure incurred in erection, to and fro transportation and any other expenditure or losses incurred by the Engineer/DFCCIL on this account shall be fully borne by the Contractor. No extension in delivery time shall be allowed on this account.

The Proto Type Testing of towers shall be as per the procedure described below;

(A) Bolt Slip Test:-

In the bolt slip test, the test loads shall be gradually applied up to the 50% of design loads under normal condition and held for two (2) minutes at that loads and then released gradually.

The initial and final readings on the scales (for measurement of deflection) before application and after the release of Loads respectively shall be taken with the help of theodolite. The difference between these readings gives the values of the bolt slip.

(B) Normal/Broken Wire Load Tests:-

All the loads, for a particular load-combination test shall be applied gradually up to the full design loads in the following steps and shall also be released in the similar manner:

- (i) 50 percent
- (ii) 75 percent
- (iii) 90 percent
- (iv) 95 percent
- (v) 100 percent

(C) Observation Periods:-

Under normal and broken wire load tests, the tower shall be kept under observation for sign of any failure for two minutes (excluding the time for adjustment of loads) for all intermediate steps of loading up to and including 95 per cent of full design loads.

For normal, as well as broken wire tests, the tower shall be kept under observation for five (5) minutes (excluding the time for adjustment of loads) after it is loaded up to 100 percent of full design loads.

While the loading operations are in progress, the tower shall be constantly watched, and if it shows any tendency of failure anywhere, the loading shall be immediately stopped, released and then entire tower shall be inspected. The reloading shall be started only after the corrective measures are taken.

The structure shall be considered to be satisfactory, if it is able to support the specified full design loads for five (5) minutes, with no visible local deformation after unloading (such as bowing, buckling etc.) and no breakage of elements or constituent parts.

Ovalization of holes and permanent deformation of bolts shall not be considered as failure.

(D) Recording:-

The deflection of the tower shall be recorded at each intermediate and final stage of normal load and broken wire load tests by means of a theodolite and graduated scale. The scale shall be of about one meter long with marking up to 5 mm accuracy.

(E) Destruction Test:-

The destruction test shall be carried out under normal condition or broken wire condition. The Engineer at the time of approval of rigging chart/test data sheet shall intimate the contractor. Under which load condition the destruction test is to be carried out.

The procedure for application of load for normal/broken wire test shall also be applicable for destruction test. However, the load shall be increased in steps of five (5) percent after the full design loads have been reached.

**2.2.5 Tower Earthing (Counter Poise Type/Solid Rod Type):-**

**2.2.5.1 Scope:-**

- (A) The bidder shall supply the counter poise/solid rod earthing material as per drawings, documents in accordance with relevant codes, standards & local rules by law.

The footing resistance of all towers shall be measured by the contractor in dry weather after tower erection but before the stringing of earth wire. All the towers are to be earthed; however, in no case tower footing resistance shall exceed 10 ohms. Solid rod (Pipe) type earthing and counterpoise type earthing wherever required shall be provided in accordance with the stipulations made in IS:3043-1987 and IS:5613 (Part-II / Section-2) 1985. The details for pipe and counterpoise type earthing are given in drawing enclosed with the specification.

- (B) The scope of supply for earthing system shall include transportation, loading/unloading of earthing material at site.

**2.2.5.2 Codes, Standards & Regulations:-**

All earthing work shall be in accordance with the following codes.

- (A) IS: 3043 – Code of practice for earthing.
- (B) Indian Electricity rules 1956.
- (C) IEEE Std. 524: Guide for installing the Overhead Transmission Line Conductor.
- (D) IEEE Std. 1048: Guide for Protective grounding of Power lines.
- (E) IS: 5613

**2.2.5.3 Technical Specification:-**

(A) Counterpoise earth:-

Counterpoise earth consists of four lengths of galvanized steel stranded wires, each fitted with a lug for connection to the tower leg at one end. The wires are connected to arch of the legs and taken radially away from the tower and embedded horizontally 450 Meter. Below ground level. The length of earth wire is normally limited to 15 M. The size of the galvanized steel stranded wire may be taken equal to sizes of the earth conductor. The counterpoise type earthing of tower shall be accordance with IS: 5613.

(B) Solid rod type Earthing :-

Solid rod type earthing system shall consist of MS 40mm Dia. solid rod of 3000mm length which shall be hot deep galvanized. This rod shall be install inside earth pit of depth 3000mm and filled with treated material like charcoal, salt etc. which shall further lower the earth resistance. Entire Solid rod arrangement shall connect to Tower leg using Galvanized MS flat of size 50x6mm.

(C) Earthing arrangement provided at tower locations shall have earth resistance less than 5 ohms after installation.

**2.2.6 Acceptance Tests:-**

Inspection of materials & Acceptance tests shall be conducted as per relevant standards in the presence of the Engineer/DFCCIL's representative.

**2.2.7 List of Drawings:-** Following drawings are attached at 2.2.9 below;

**2.2.7.1 Single Line Diagram all type of Towers:-**

- (A) 75 Deg. Deviation Tower for Temporary Arrangements.
- (B) 5 Deg. Deviation Tower for Permanent Arrangements.
- (C) 60 Deg. Deviation Tower for Permanent Arrangements.

**2.2.7.2 Tower Accessories:-**

- (A) Anti-Climbing Device.
- (B) Danger Plate.
- (C) Tower Phase Plate.
- (D) Tower Circuit Plate.
- (E) Tower Number Plate.

**2.2.7.3 Earthing of Tower:-**

- (A) Counter Poise Type Earthing.
- (B) (Solid MS Rod) Type Earthing.

**2.2.8 List of Likely Manufacturers/Vendors for Supply of Tower:-**

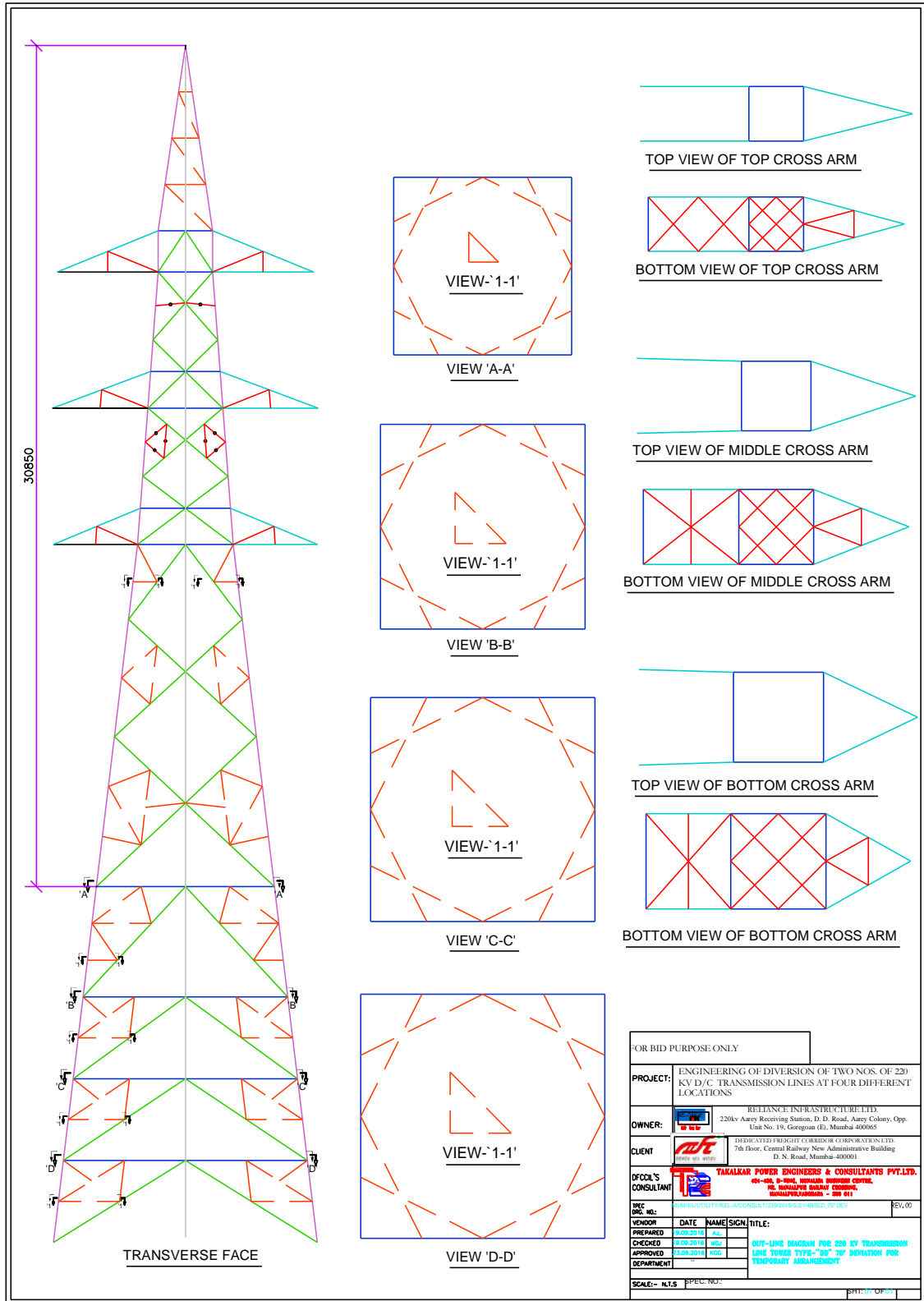
- (1) M/s Kalpataru Power, Gandhinagar.
- (2) M/s KEC International Ltd., Jaipur.
- (3) M/s Electrotherm India Ltd., Vadodara.
- (4) M/s Vijay Transmission, Raipur.
- (5) M/s Richardson & Cruddas, Nagpur.
- (6) M/s Shanz Powertech, Thane.
- (7) M/s Larsen & Toubro (L&T), Pondicherry.
- (8) M/s Utkal Galvanizers Ltd., Cuttack.
- (9) M/s Maharashtra Power Transmission Structures Pvt. Ltd., Thane.
- (10) M/s Nandan Steel & Power Ltd., Raipur.
- (11) M/s Bajaj Electricals Limited, Ranjangaon, Pune.
- (12) M/s VATCO Electrical Power Private Limited, Mumbai.

Bidder shall submit vendor for approval of Engineer, before procurement of material, along with latest copies of existing approval from the State/Centre owned Power Utilities.

## 2.2.9 Drawings (Annexure-I):-

### 2.2.9.1 Single Line Diagram all type of Towers:-

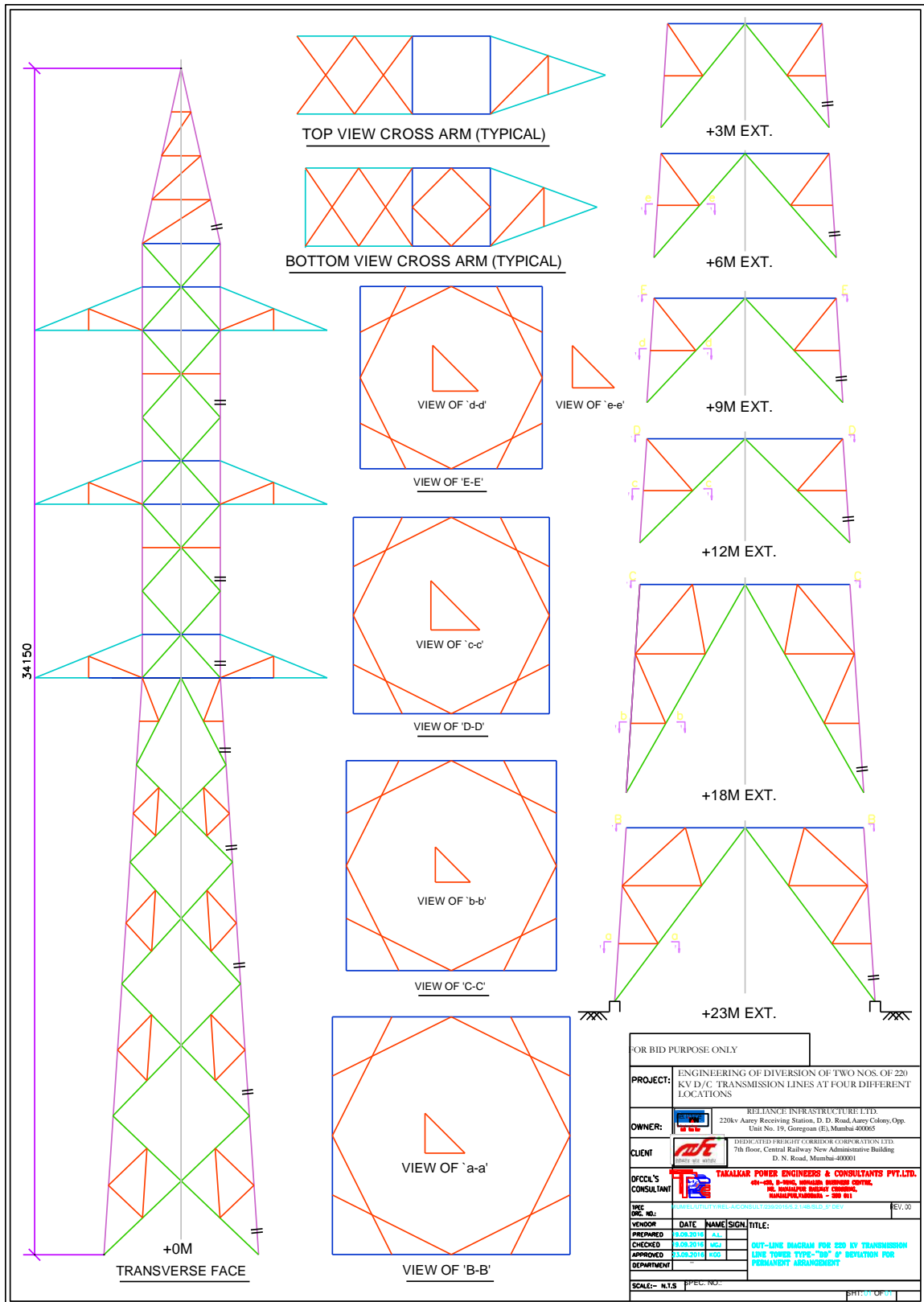
#### (A) 75 Deg. Deviation Tower for Temporary Arrangements:-



Signature & Stamp of Tenderer

For & on behalf of DFCCIL

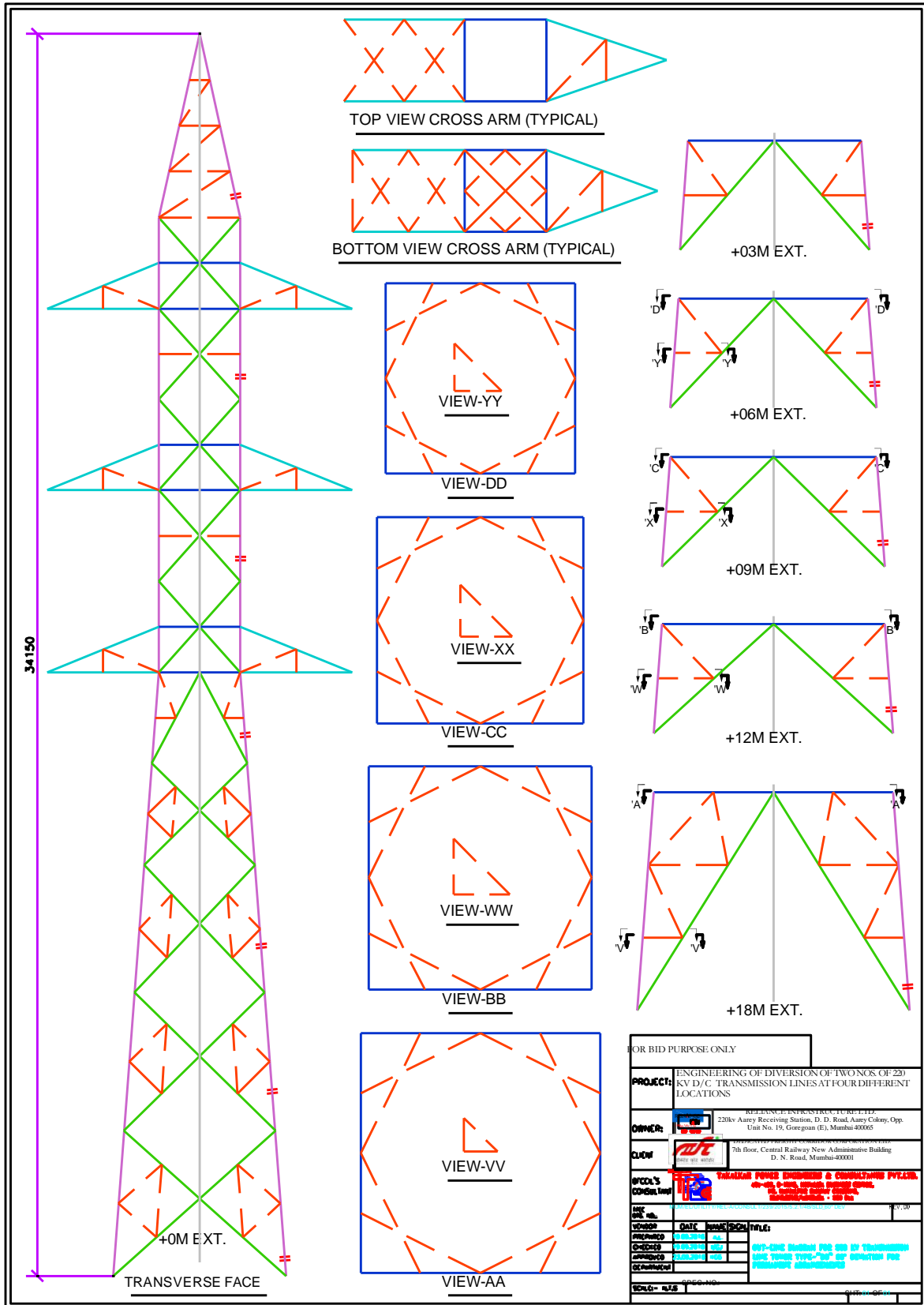
**(B) 5 Deg. Deviation Tower for Permanent Arrangements:-**



Signature & Stamp of Tenderer

For & on behalf of DFCCIL

**(C) 60 Deg. Deviation Tower for Permanent Arrangements:-**



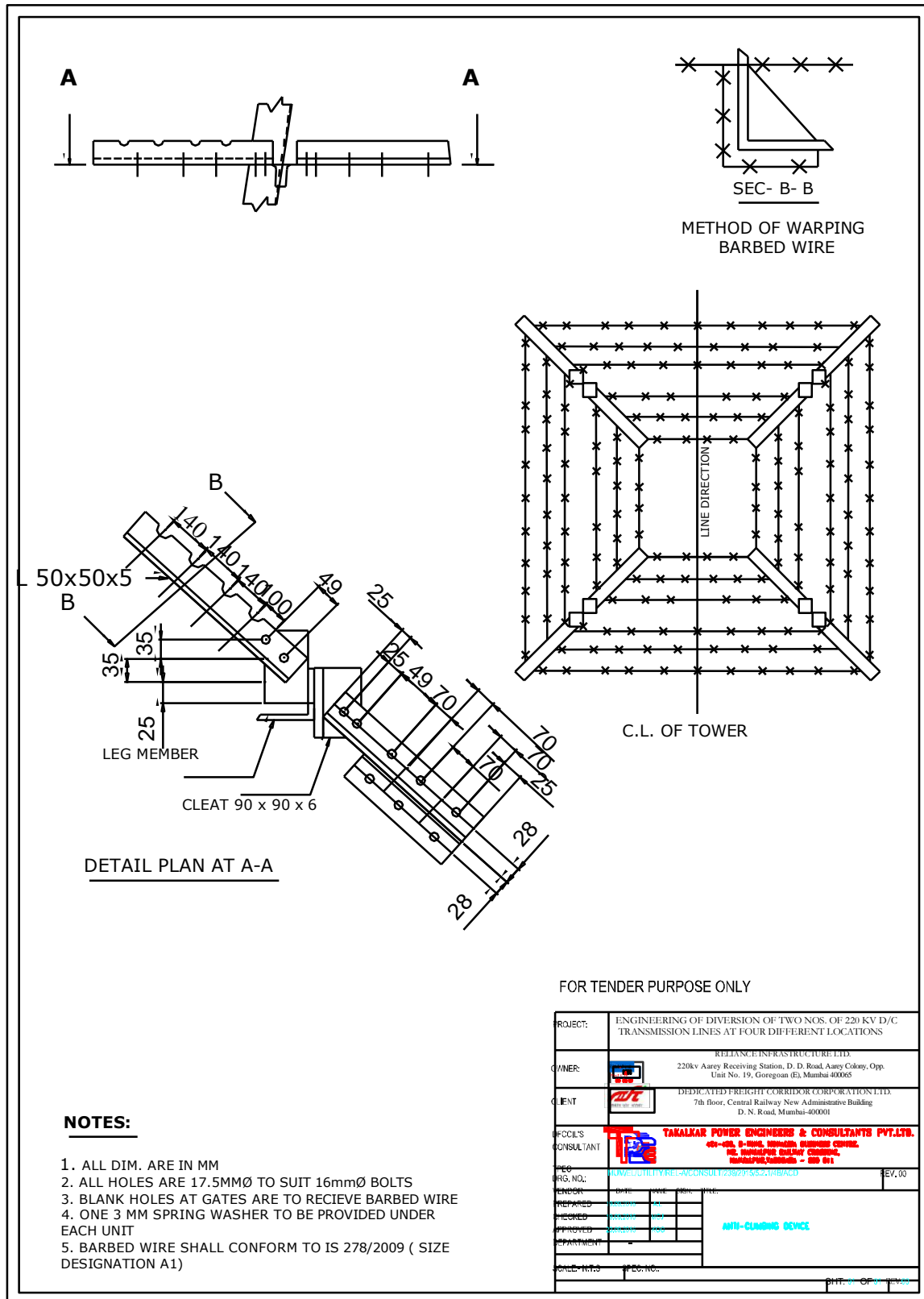
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For & on behalf of DFCCIL



### 2.2.9.2 Tower Accessories:-

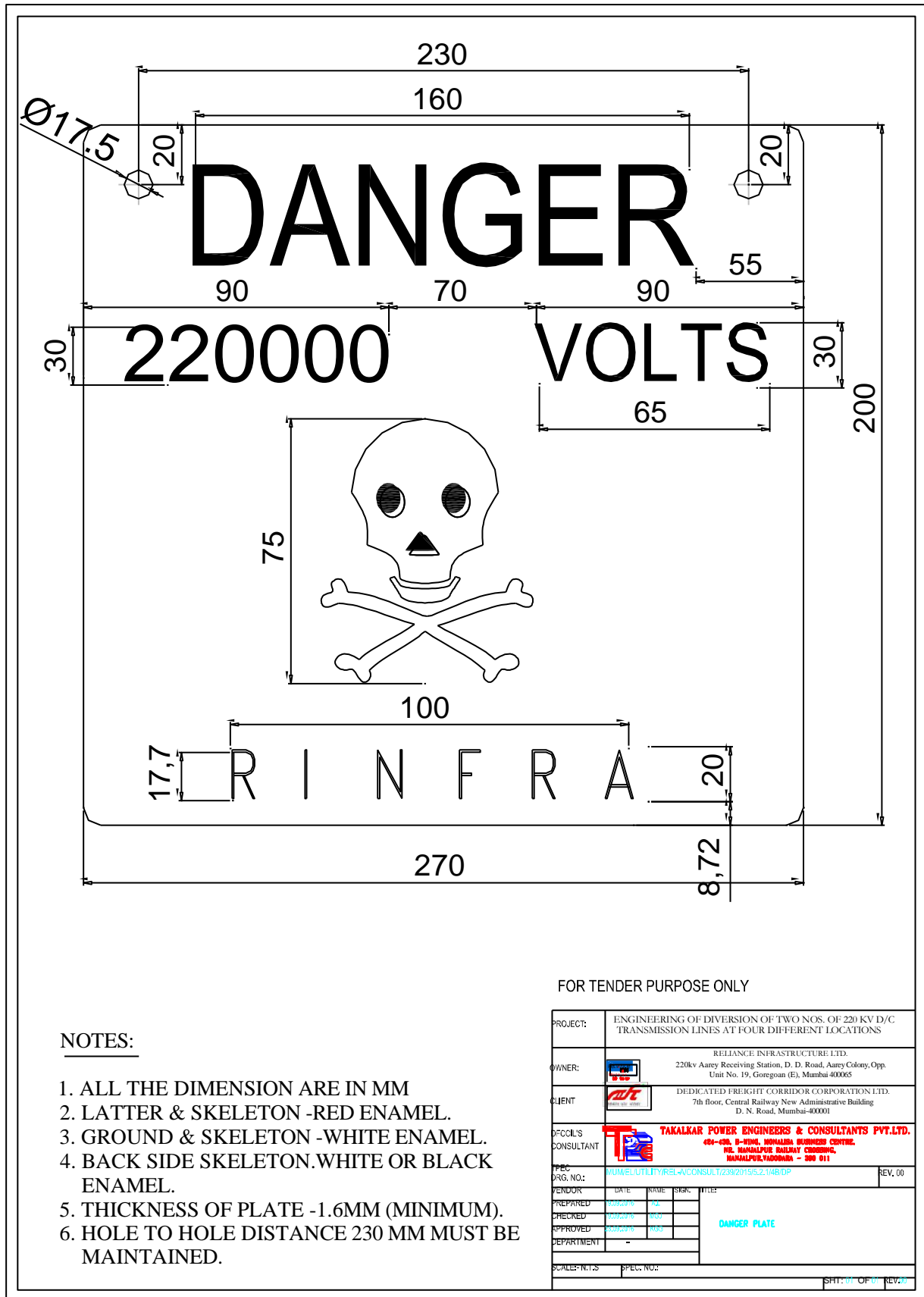
#### (A) Anti-Climbing Device:-



Signature & Stamp of Tenderer

For & on behalf of DFCCIL

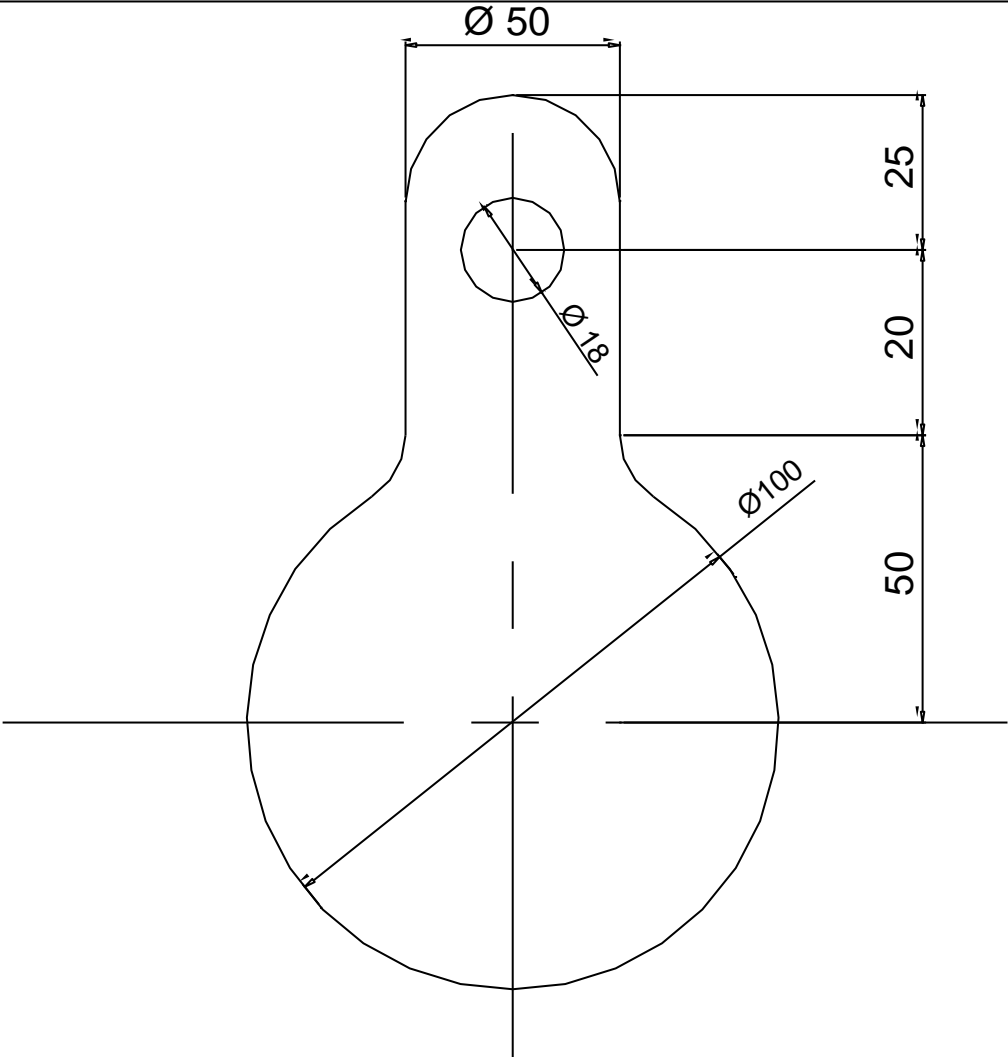









(B) Danger Plate:-



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For & on behalf of DFCCIL

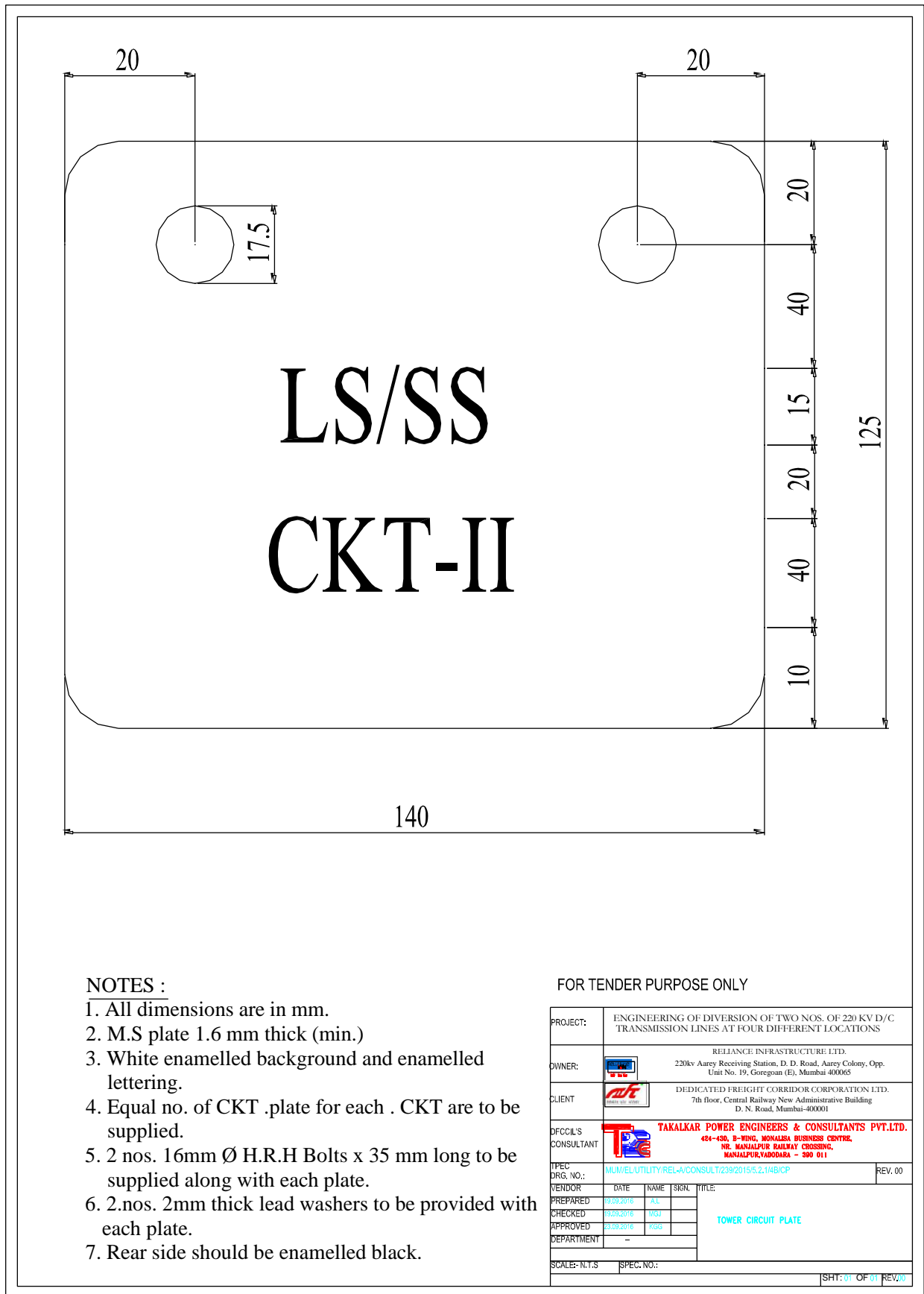
**(C) Tower Phase Plate:-**

	<p><b>QUANTITIES PER TOWER</b> 1. ONE OF EACH COLOUR FOR S/C POLE.</p>																																																																														
<p><b>NOTES :</b></p> <ol style="list-style-type: none"> <li>1. ALL DIMENSIONS ARE IN MM.</li> <li>2. M.S PLATE 1.6MM THICK.</li> <li>3. PHASE PLATES TO BE ENAMELLED RED. YELLOW AND BLUE ON FRONT AND BACK.</li> <li>4. 2 NOS. 2MM THK. LEAD WASHER TO BE PROVIDED WITH EACH PLATE.</li> <li>5. 1 NO. 16MM DIA BOLT FASTNER &amp; WASHERS PER PLATE.</li> </ol>	<p align="center"><b>FOR TENDER PURPOSE ONLY</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">PROJECT:</td> <td colspan="5">ENGINEERING OF DIVERSION OF TWO NOS. OF 220 KV D/C TRANSMISSION LINES AT FOUR DIFFERENT LOCATIONS</td> </tr> <tr> <td>OWNER:</td> <td colspan="5">  RELIANCE INFRASTRUCTURE LTD. 220kv Aarey Receiving Station, D. D. Road, Aarey Colony, Opp. Unit No. 19, Goregoan (E), Mumbai-400065                 </td> </tr> <tr> <td>CLIENT:</td> <td colspan="5">  DEDICATED FREIGHT CORRIDOR CORPORATION LTD. 7th floor, Central Railway New Administrative Building D. N. Road, Mumbai-400001                 </td> </tr> <tr> <td>DFCCIL'S CONSULTANT:</td> <td colspan="5">  <b>TAKALKAR POWER ENGINEERS &amp; CONSULTANTS PVT.LTD.</b> 404-405, D-WING, MARLBORO BUSINESS CENTRE, NO. MANJAPUR BULKWAY CROSSING, MANJAPUR, VADODRA - 390 011                 </td> </tr> <tr> <td>PEC:</td> <td colspan="5">MUM/EL/UTILITY/REL-VC/CONSULT/23/2015/5.2.1.4B/PP</td> </tr> <tr> <td>PRG. NO.:</td> <td colspan="4"></td> <td>REV. 00</td> </tr> <tr> <td>VENDOR:</td> <td>DATE:</td> <td>NAME:</td> <td>SIGN:</td> <td colspan="2">TITLE:</td> </tr> <tr> <td>PREPARED:</td> <td>06/06/2016</td> <td>JAL</td> <td></td> <td colspan="2"></td> </tr> <tr> <td>CHECKED:</td> <td>06/06/2016</td> <td>REK</td> <td></td> <td colspan="2"></td> </tr> <tr> <td>APPROVED:</td> <td>06/06/2016</td> <td>REK</td> <td></td> <td colspan="2"></td> </tr> <tr> <td>DEPARTMENT:</td> <td colspan="5"></td> </tr> <tr> <td colspan="6" style="text-align: center;"><b>TOWER PHASE PLATE</b></td> </tr> <tr> <td>SCALE: N.T.S</td> <td colspan="4">SPEL. NO.:</td> <td>SHT. NO. OF 01</td> </tr> </table>	PROJECT:	ENGINEERING OF DIVERSION OF TWO NOS. OF 220 KV D/C TRANSMISSION LINES AT FOUR DIFFERENT LOCATIONS					OWNER:	 RELIANCE INFRASTRUCTURE LTD. 220kv Aarey Receiving Station, D. D. Road, Aarey Colony, Opp. Unit No. 19, Goregoan (E), Mumbai-400065					CLIENT:	 DEDICATED FREIGHT CORRIDOR CORPORATION LTD. 7th floor, Central Railway New Administrative Building D. N. Road, Mumbai-400001					DFCCIL'S CONSULTANT:	 <b>TAKALKAR POWER ENGINEERS &amp; CONSULTANTS PVT.LTD.</b> 404-405, D-WING, MARLBORO BUSINESS CENTRE, NO. MANJAPUR BULKWAY CROSSING, MANJAPUR, VADODRA - 390 011					PEC:	MUM/EL/UTILITY/REL-VC/CONSULT/23/2015/5.2.1.4B/PP					PRG. NO.:					REV. 00	VENDOR:	DATE:	NAME:	SIGN:	TITLE:		PREPARED:	06/06/2016	JAL				CHECKED:	06/06/2016	REK				APPROVED:	06/06/2016	REK				DEPARTMENT:						<b>TOWER PHASE PLATE</b>						SCALE: N.T.S	SPEL. NO.:				SHT. NO. OF 01
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For & on behalf of DFCCIL

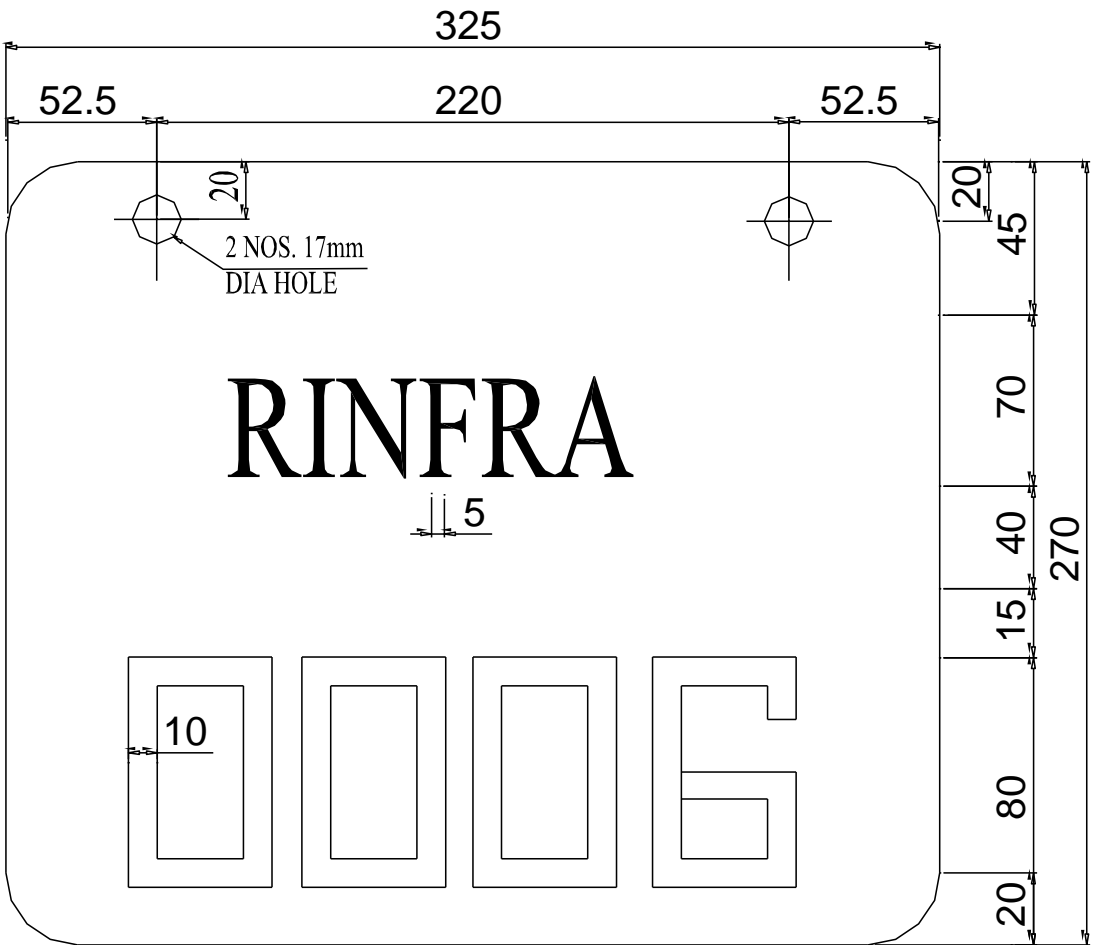
**(D) Tower Circuit Plate:-**



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For & on behalf of DFCCIL




(E) Tower Number Plate:-



**NOTES :**

1. All dimensions are in mm.
2. Letter Red enamelled.
3. Ground White vitreous enamelled.
4. Back: Black vitreous enamelled.
5. 1.6 mm thick MS plate.
6. 2 nos. 2mm thick lead washer to be provided with each plate.
7. Each no. will have four digits as shown No to be started from 1 ownwords.
8. Two no 16 mm H.R.h blots x 35 mm long are to be supplied along with each plate.

**FOR TENDER PURPOSE ONLY**

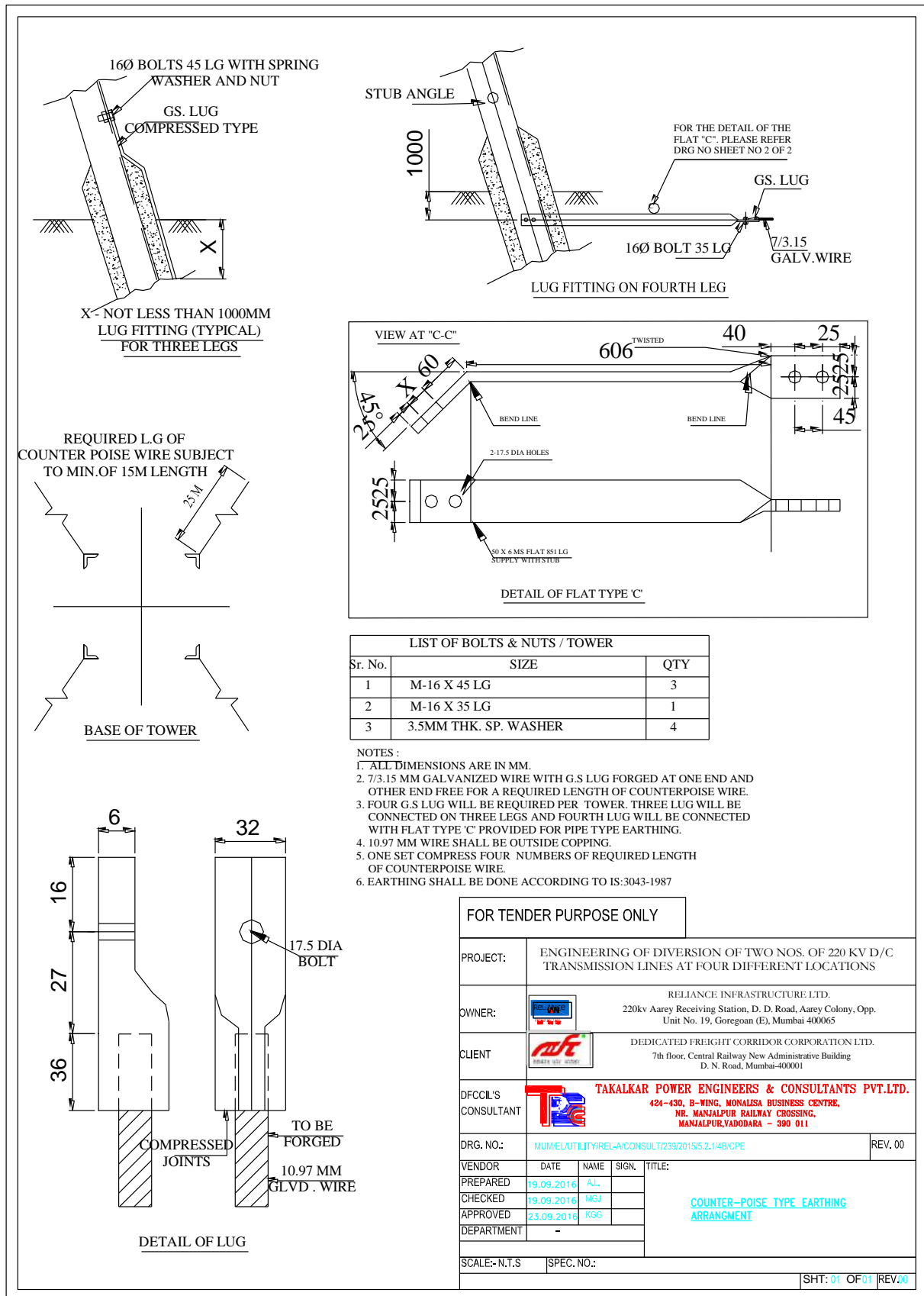
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For & on behalf of DFCCIL

### 2.2.9.3 Earthing of Tower:-

#### (A) Counter Poise Type Earthing:-

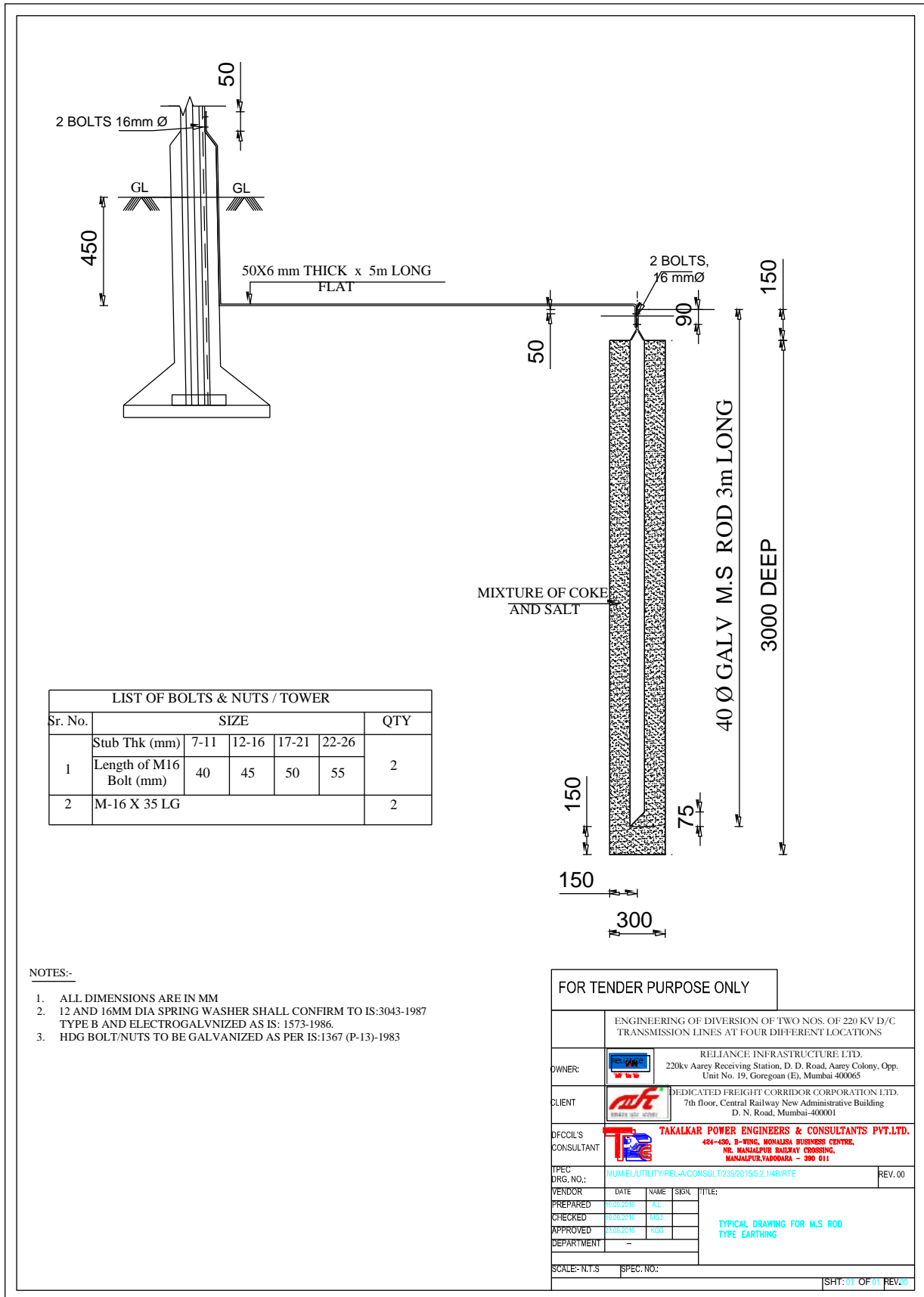


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For & on behalf of DFCCIL



**(B) (Solid MS Rod) Type Earthing:-**



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For & on behalf of DFCCIL

## **PART-II**

### **CHAPTER-III**

# **TECHNICAL SPECIFICATION** **OF** **AAAC ZEBRA CONDUCTOR**

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

## **PART-II**

### **CHAPTER-III**

#### **TECHNICAL SPECIFICATION OF AAAC ZEBRA CONDUCTOR**

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Signature & Stamp of Tenderer

For & on behalf of DFCCIL

**PART-II**

**CHAPTER-III**

**TECHNICAL SPECIFICATION FOR PROCUREMENT OF AAAC ZEBRA CONDUCTOR**

**2.3.1 Conductor Specifications:-**

The AAAC ZEBRA Conductor shall generally conform to IS 398 (part IV)/IEC: 1089 except where otherwise specified herein.

<b>The details of the AAAC ZEBRA Conductor are tabulated below:</b>		
<b>Sr. No.</b>	<b>Description</b>	<b>Value</b>
1	Stranding	61/3.31 mm
2	Actual Area	525 mm <sup>2</sup>
3	Overall conductor diameter	29.79 mm
4	Approximate weight of conductor	1448.39 Kg/Km
5	Approximate ultimate tensile strength	146.03 KN
6	Calculated max. Resistance at 20 °C	0.0651 Ohm/Km
7	Final Modulus of Elasticity	0.5508 X 10 <sup>6</sup> kg/cm <sup>2</sup>
8	Coefficient of Linear expansion	23 x 10 <sup>-6</sup> / °C
9	Maximum operating temperature	85 °C
10	Cross section area of nominal dia. of Aluminium wire	8.605 mm <sup>2</sup>

The manufacturing tolerances to the extent of the following limits only shall be permitted.

<b>Sr. No.</b>	<b>Description</b>	<b>Standard</b>	<b>Maximum</b>	<b>Minimum</b>
1	Diameter	3.31 mm	3.28 mm	3.34 mm
2	Lay ratio of Conductor	Standard	Maximum	Minimum
		6 wire layer	17	10
		12 wire layer	16	10
		18 wire layer	15	10
		24 wire layer	14	10

The Aluminum wires shall be of heat treated aluminum, magnesium silicon alloy having a composition appropriate to the mechanical & electrical properties.

<b>Sr. No.</b>	<b>Description</b>	<b>Before stranding</b>	<b>After stranding</b>
1	Minimum Breaking Load of Aluminum wires	2.66 KN	2.53 KN

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For & on behalf of DFCCIL

### 2.3.2 **Workmanship:-**

The finished conductor shall be smooth, compact, uniform and free from all imperfections including spills and splits, die marks, scratches, abrasions, scuff marks, kinks (protrusion of wires), dents, press marks, cut marks, wire cross over, over riding, looseness (wire being dislocated by finger/hand pressure and/or unusual bangle noise on tapping), material inclusions, white rust, powder formation or black spots (on account of reaction with trapped rainwater etc.), dirt, grit etc.

### 2.3.3 **Joints in Aluminium Wires:-**

No joints shall, be permitted in the individual wires in the outermost layer of the finished conductor, however, joints in the 12 wire and 18 wire inner layers of the conductor shall be allowed but these joints shall be made by cold pressure butt welding and shall be such that no such joints are within 15 meters of each other in the complete stranded conductor.

### 2.3.4 **Tolerances:-**

The manufacturing tolerances of  $\pm 0.3$  mm shall be permitted in the diameter of individual aluminum and steel strands.

### 2.3.5 **Standard Length:-**

2.3.5.1 The standard drum length of the conductor shall be 2000 meters. A tolerance of  $\pm 5\%$  on the standard length offered by the Bidder shall be permitted. All lengths outside this limit of tolerance shall be treated as random lengths.

2.3.5.2 Random lengths will be accepted provided no length is less than 80% of the standard length and the total quantity of such random lengths shall not be more than 10% of the total quantity ordered. At any point, the cumulative quantity supplied of such random lengths shall not be more than 12.5% of the total cumulative quantity supplied including such random lengths.

2.3.5.3 Bidder shall also indicate the maximum single length, above the standard length, he can manufacture in the guaranteed technical particulars (GTP) of offer. This is required for special stretches like river crossing etc. The DFCCIL reserves the right to place orders for the above lengths on the same terms and conditions applicable for the standard lengths during the pendency of the Contract.

### 2.3.6 **Conductor Tests:-**

#### 2.3.6.1 **Type Tests:-**

Type Test Certificate of AAAC Zebra Conductor, from a Government owned or NABL accredited laboratory, shall be submitted by the bidder before starting commercial production of AAAC Zebra Conductor. Type test date should not be older than 5 years from the date of submission of Bid. If Type test results of AAAC Zebra Conductor are not available, the bidder shall arrange the same at his own cost.

The following tests as per relevant standard shall be conducted once on sample/samples of conductor for every 1000 Kms. of production from each manufacturing facility;

- (A) DC resistance test on stranded conductor.
- (B) UTS test on stranded conductor.
- (C) Radio interference voltage test (dry).
- (D) Corona extinction voltage test (dry).
- (E) Temperature Rise Test corresponding to specified current carrying capacity.

#### 2.3.6.2 Acceptance Tests:-

All the below mentioned tests shall be carried out on Aluminum strands after stranding as applicable.

- (A) Visual check for joints, scratches etc. and lengths of conductor.
- (B) Dimensional check on Aluminum strands.
- (C) Check for lay ratios of various layers.
- (D) Torsion and Elongation test on Al strands.
- (E) Breaking load test on aluminum strands.
- (F) Wrap test on aluminum strands.
- (G) DC resistance test on aluminum strands.
- (H) UTS test on welded joint of aluminum strands.

#### 2.3.6.3 Routine Test:

- (A) Check to ensure that the joints are as per Specification.
- (B) Check that there are no cuts, fins etc. on the strands.
- (C) Check that drums are as per Specification.
- (D) All acceptance test as above to be carried out on each coil.

#### 2.3.6.4 Tests During Manufacture:-

Chemical analysis of aluminium used for making aluminium strands.

2.3.6.5 Tests on conductors and raw materials: On receipt of each consignment of the raw materials viz. Aluminium alloy rods at works of the conductor manufactures, the contractor shall get verified the same during inspection, the Conductor Manufacturers test report of tests carried out at their works on raw materials.

#### 2.3.6.6 Sample Batch for Testing:-

- (A) All the tests shall be carried out on the required number of samples as stipulated in the IS-398(Part-1V)-1994.
- (B) The bidder shall offer material for selection of samples for testing, only after getting quality assurance plans approved from Engineer. The sample shall be manufactured strictly in accordance with the Quality Assurance Plan approved by Engineer.

#### 2.3.6.7 Additional Tests:-

- (A) The Engineer reserves the right of having, at bidder's expenses, any other test(s) of reasonable nature carried out at manufacturer's premises, at site or in any other place in addition to the aforesaid type, acceptance and routine tests to satisfy him that the materials comply with the Specifications.
- (B) The Engineer also reserves the right to conduct all the tests mentioned in this specification, at bidder's expenses, on the samples drawn from the site at manufacturer's premises or at any other test laboratories. In case of evidence of non-compliance, it shall be binding on the part of bidder to prove the compliance of the items to the technical specifications by repeat tests, or correction of deficiencies, or replacement of defective items all without any extra cost to the DFCCIL.



#### 2.3.6.8 Test Reports:-

- (A) Copies of type test reports (not older than 5 years) shall be furnished in at least three copies along with one original. One copy will be returned duly certified by the Engineer only after which the commercial production of the material shall start. If Type test results are not available the bidder shall do the same in his own cost.
- (B) Record of routine test reports shall be maintained by the manufacturer at his works for periodic inspection by the Engineer's representative.
- (C) Test Certificates of tests during manufacture shall be maintained by the manufacturer.
- (D) These shall be produced for verification as and when desired by Engineer.

#### 2.3.6.9 Inspection:-

The Engineer's representatives shall at all times be entitled to have access to the works and all places of manufacture, where conductor shall be manufactured and representative shall have full facilities for unrestricted inspection of the manufacturer's works, raw materials and process of manufacture for conducting necessary tests as detailed herein.

2.3.6.10 No material shall be dispatched from its point of manufacture before it has been satisfactorily inspected and tested, unless the inspection is waived off by the Engineer in writing. In the latter case also the conductor shall be dispatched only after satisfactory testing for all tests specified herein have been completed & MDCC issued by Engineer.

2.3.6.11 The acceptance of any quantity of material shall in no way relieve the bidder of any of his responsibilities for meeting all requirements of the Specification, and shall not prevent subsequent rejection if such material is later found to be defective.

2.3.6.12 Test Facilities:- The following additional test facilities shall be available at the manufacturer's works:

- (A) Calibration of various testing and measuring equipment including tensile testing machine, resistance measurement facilities, burette, thermometer, barometer etc.
- (B) Standard resistance for calibration of resistance bridges.
- (C) Finished conductor shall be checked for length verification and surface finish on separate rewinding machine at reduced speed (variable from 8 to 16 meters per minute). The rewinding facilities shall have appropriate clutch system and free of vibrations, jerks etc. with traverse laying facilities.

#### 2.3.7 Packing:-

##### 2.3.7.1 General:-

- (A) All conductor reels shall steel drums conform to relevant revisions, if any and be of dimensions approved by the Engineer before arrival at site, with appropriate packaging considering hazards inland and ocean transit. The reels shall be of such size as to provide at least 12 mm clearance at all points from the cable to the inner surface of the laggings.

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- (B) All reels shall have two coats of aluminium paint on both inside and outside surface and shall be fitted with malleable iron Hub-bushings.
- (C) All reels shall be a layer of waterproof paper around the hub under the conductor and another layer over the outermost layer of the cable that is next to the lagging.
- (D) The reels shall be properly reinforced with galvanized steel wires or iron straps over the lagging in two places in an approved manner. There shall be one standard length of conductor in each drum.
- (E) Records of conductor Production i.e. copies of works Log sheets giving identification number of the Aluminium wire spools, Aluminium Alloy wire spool or shall be submitted in duplicate and Engineer's approval obtained prior to dispatch.
- (F) The method of tests and the number of samples tested may be in accordance with the standard practice of the manufacturers who shall clearly certify that the full quantity of the conductor supplied will be identical to the sample or samples tested. No dispatch shall be affected prior to the Engineer's written approval on the Test Certificates.

**2.3.7.2 Marking of Drums and Packing:-** Each drum/package shall be marked on the sides as follows:

- (A) Name or designation of the consignee to be furnished by the manufacturer.
- (B) Ultimate destination and/or the port of discharge as required by the Engineer.
- (C) The items and the respective quantities contained in it or the number of pieces or cable and their respective lengths, as the case may be.
- (D) The net and gross weights of the materials.
- (E) The makings shall be indelible ink on each package/drum.

### **2.3.8 ANNEXURE-I:-**

**2.3.8.1 General Technical Particulars:-**

Sr. No.	Description	DFCCIL Requirements	Bidder Data
1	Stranding	61/3.31 mm	
2	Actual area	525 mm <sup>2</sup>	
3	Overall diameter	29.79 mm	
4	Approximate weight	1448.39 kg/km	
5	Calculated max. Resistance at 20 °C	0.0651 ohm/km	
6	Approx. Calculated Breaking Load	146.03 KN	
7	Current carrying capacity (at 85 °C)	750A	
8	Coefficient of Linear expansion	23x10 <sup>-6</sup> /°C.	
9	Maximum operating temperature	85 °C	
10	Cross section area of nominal diameter Aluminium wire	8.605 mm <sup>2</sup>	

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11	Final Modulus of Elasticity	0.5508 X 10 <sup>6</sup> kg/cm <sup>2</sup>			
12	Diameter	Standard mm	Maximum mm	Minimum mm	
		3.31	3.28	3.34	
13	Lay ratio of Conductor	Standard	Maximum	Minimum	
		6 wire layer	17	10	
		12 wire layer	16	10	
		18 wire layer	15	10	
		24 wire layer	14	10	
14	Minimum Breaking Load of Al. wires	Before Standing		After stranding	
		2.66 KN		2.53 KN	
15	Others data as mentioned in specification or as requested by DFCCIL/Engineer.				

### 2.3.9 List of Likely Manufacturers/Vendors for Supply of AAAC Zebra Conductor:-

- (1) M/s Apar Industries Ltd., Silvassa.
- (2) M/s Sterlite Technologies Ltd., Silvassa.
- (3) M/s Galaxy Transmission, Sangli.
- (4) M/s Smita Conductors, Silvassa.
- (5) M/s Hindusthan Urban Infrastructure Ltd., Faridabad.
- (6) M/s Gammon India Ltd., Dadra & Nagar Haveli.
- (7) M/s Gupta Power Infrastructure, Bhubaneswar.

Bidder shall submit vendor for approval of Engineer, before procurement of material, along with latest copies of existing approval from the State/Centre owned Power Utilities.

**PART-II**

**Chapter-IV**

**TECHNICAL SPECIFICATION**

**OF**

**OPGW (OPTICAL FIBER GROUND WIRE) CABLE (48F)**

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For & on behalf of DFCCIL

## **PART-II**

### **Chapter-IV**

## **TECHNICAL SPECIFICATION** **OF** **OPGW (OPTICAL FIBER GROUND WIRE) CABLE (48F)**

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## **PART-II**

### **CHAPTER-IV**

#### **TECHNICAL SPECIFICATION OF OPGW (OPTICAL FIBER GROUND WIRE) CABLE** **(48F)**

##### **2.4.1 Scope:-**

This specification covers the technical requirements, design, manufacturing, assembly, testing at manufacturer's works, packing, transportation, loading, unloading of OPGW 48C (Optical fiber ground wire) at site complete with all accessories for efficient and trouble-free operation.

##### **2.4.2 Codes and Standards:-**

2.4.2.1 The equipment to be furnished under this specification shall be in accordance with the applicable section of the latest version of the relevant Indian Standards and IEC publications and any other standards, if any, except where modified and/or supplemented by this specification.

IEC 61232	Aluminum-clad steel wires for electrical purposes.
IEC 61089	Round wire concentric lay overhead electrical stranded conductors.
IEC60793-1	Part-1 Optical Fiber, generic specification, measurement and test.
IEC 60793-2	Part-2 Optical Fiber Cable Product Specification.
IEC 60793-4	Part-4 Sectional Specification-Aerial optical cables along electrical power lines.
IEC 60793-4-10	Part 4-10 Aerial optical cables along electrical power lines – Family specification for OPGW (Optical Ground Wire).
IEC 60794-2	Part-2 Optical Fiber Cable Product Specification.
ITU-T G.652D	Characteristics of Single Mode Optical Fiber Cable.
IEC 61328	Guidelines for installation of transmission line conductor and earth wires.

2.4.2.2 The component and devices which are not covered by the above standards shall conform to, and comply with, the latest applicable standards, codes and regulations of the internationally recognized standardizing bodies/professional societies as may approved by the Engineer. The manufacturer shall list all applicable standards; codes etc. and provide copies thereof for necessary approval.

2.4.2.3 In the case of conflict between various requirements/order documents, the precedence of authority of documents shall be as follows:

- (i) Technical Requirement of this Specification.
- (ii) Applicable codes & standards.
- (iii) Approved drawings.
- (iv) Guaranteed Technical Particulars (GTP).
- (v) Type test result acceptance.
- (vi) Other acceptable documents.

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### 2.4.3 **Terms and Definition:-**

MAT	Maximum Allowable Tension
RTS	Rated Tensile Strength
MAOC	Maximum allowable ovality
OPGW	Optical ground Wire
SM	Single Mode
DWSM	Dense Wavelength Division Multiplexing
WDM	Wavelength Division Multiplexing
G Pa	Giga Pascal
PMD	Polarization Mode Dispersion
SDH	Synchronous Digital Hierarchy

### 2.4.4 **Fiber Attributes:-**

- 2.4.4.1 The optical fiber shall consist of a glass fiber core and glass cladding in accordance with construction of optical fiber category B1.3 Single mode fiber as given in IEC 60793-2 or ITU-T G.652D.
- 2.4.4.2 Single mode optical fibers shall meet the requirement in accordance with IEC 60793-2-50 or ITU-T G.652D.
- 2.4.4.3 The Optical fiber shall be such that it shall be used from 1265 nm to 1625 nm.
- 2.4.4.4 Fiber shall be coated with material suitable for protecting the cladding material from damage.
- 2.4.4.5 The coating shall be in close contact with the cladding material to preserve the initial integrity of the surface.
- 2.4.4.6 The coating shall consists of one or more layers of the same or different materials.
- 2.4.4.7 The coating shall be removable for connecting purpose.
- 2.4.4.8 The interstices between the coated fiber and loose buffer shall be filled with suitable fluid or easily deformable materials.
- 2.4.4.9 Dual Window Single Mode optical fiber characteristics shall meet the following dimensional, mechanical, transmission and environmental requirement as per ITU-T G652.D and IEC-60793-2-50 as detailed below:-

#### (A) **Dimensional Requirement:-**

Attributes	Unit	Limits
Cladding Diameter	mm	125 ± 1
Cladding Non-circularity	%	≤1.0
Core concentricity error	mm	≤0.6
Primary coating diameter-uncolored	mm	235 to 255
Primary coating diameter-colored	mm	235 to 265
Primary coating diameter-cladding concentricity error	mm	≤12.5
Fiber Length	km	4

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**(B) Mechanical Requirement:-**

Attributes	Unit	Limits
Proof Stress Level	G Pa	$\geq 0.69$
Coating Strip Force (average)	N	$1.0 \leq F_{avg} \leq 5.0$
Coating Strip Force (peak)	N	$1.0 \leq F_{peak} \leq 8.9$
Fiber curl radius	M	$\geq 2$
Tensile strength for 0.5m specimen length	G Pa	$\geq 3.8$
Stress corrosion susceptibility constant,	nd	$\geq 18$

**(C) Transmission Requirement:-**

Attributes	Unit	Limits
Attenuation Co-efficient from 1310nm to 1625nm	dB/km	$\leq 0.40$
Attenuation Co-efficient from 1383nm $\pm$ 3nm	dB/km	$\leq 0.40$
Attenuation Co-efficient at 1550nm	dB/km	$\leq 0.30$
Zero dispersion Wavelength, $\lambda_0$	Nm	$1300 \leq \lambda_0 \leq 1324$
Zero dispersion slope	Ps/nm <sup>2</sup> .km	$\leq 0.092$
Nominal MFD range at 1310 nm	mm	8.6 – 9.5
MFD Tolerance	mm	$\pm 0.6$
Cable cut-off Wavelength	Nm	$\leq 1260$
Macro bending loss at 1625nm, 100 turns on a 30mm radius mandrel	dB	$\leq 0.1$
Polarization mode dispersion (PMD) coefficient	ps/ $\sqrt$ km	$< 0.2$

**(D) Environmental Requirement:-**

- (i) Fiber optical and mechanical characteristics shall comply the environmental attributes such as heat, temperature and water.
- (ii) Change in Optical Characteristics–attenuation from the initial value shall not be less than the values detailed below :-

Environment	Wave length Nm	Maximum attenuation increase dB/km
Damp Heat	1550	$\leq 0.05$
Dry Heat	1550	$\leq 0.05$
Change in temperature	1550	$\leq 0.05$
Water Immersion	1550	$\leq 0.05$

- (iii) Attenuation shall be measured periodically during the entire exposure to each environment and after removal.
- (iv) Mechanical attributes such as coating strip force, tensile strength and stress corrosion susceptibility shall comply with environmental condition test as follows.

**(a) Coating strip force:-**

Environment	Average strip force-N	Peak strip force-N
Damp Heat	$1.0 \leq F_{evg} \leq 5.0$	$F_{peak} \leq 8.9$
Water Immersion	$1.0 \leq F_{evg} \leq 5.0$	$F_{peak} \leq 8.9$

(b) Tensile strength:-

Environment	Median Tensile strength (G Pa), specimen length 0.5m	15 percentile of tensile strength distribution (G Pa), specimen length 0.5m
Damp Heat	$\leq 3.03$	$\leq 2.76$

(c) Stress corrosion susceptibility:-

Environment	Stress corrosion susceptibility constant, $n_d$
Damp Heat	$\geq 18.0$

2.4.4.10 Attenuation:-

(A) Attenuation Co-efficient:-

- (i) Typical maximum attenuation co-efficient of the cables fibers at 1310 nm is 0.4dB/km and/or 0.3dB/km at 1550nm.
- (ii) Attenuation Co-efficient shall be measured in accordance with IEC 60793-1-40.

(B) Attenuation Uniformity:-

Local attenuation shall not have point of discontinuities in excess of 0.1dB

2.4.4.11 Cut-Off wavelength of cabled fiber:-

The cabled fiber cut-off wavelength  $\lambda_{cc}$  shall be less than the operational wavelength and measured in accordance with IEC 60793-1-44.

2.4.4.12 Fiber Coloring:-

- (A) If the primary coated fibers are colored for identification, the colored coating shall be readily identifiable throughout the life time of the cable and shall reasonably match to IEC 60304.
- (B) The coloring shall permit sufficient light to be transmitted through the primary coating to allow local light injection and detection.
- (C) The fibers shall be marked by using a set 12 different colours as per ITU G652D for first 12 fibers.
- (D) For next 12 fibers the same set of different colours will be accompanied by a single marking over the color at a uniform length.
- (E) For future next 12 fibers the same set of different colours will be accompanied by a double marking over the colour at a uniform length.
- (F) For future next 12 fibers the same set of different colours will be accompanied by a triple marking over the color at a uniform length.
- (G) Marking shall be distinctive color rings. Printed marking shall be adhered satisfactory
- (H) Marking shall be easily identifiable with a constant repeated distance.
- (I) The colour used for fiber colour-coding does not inhibit the operation of LID (Light Injection and Detection) devices (splicing devices, attenuation measuring systems etc.) The colour is made of an UV-cured acrylate material.
- (J) The optical fibers colors are stable during temperature cycling and do not subject to fading or smearing onto each other or into the gel filling material.
- (K) The color coating should withstand the Acetone wiping more than 10 times if wiped with tissue paper.

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**2.4.4.13 Polarization mode dispersion:-**

PMD shall be in accordance with IEC 60793-1-48.

**2.4.5 Cable Element:-**

- 2.4.5.1 Components of cable element shall take into account the cable application, operating environment and manufacturing process, protecting fiber during handling and cabling.
- 2.4.5.2 The materials used for a cable element shall be selected to be compatible with the other elements in contact with it. An appropriate compatibility test shall be included in type test.
- 2.4.5.3 Optical elements and each fiber within a cable element shall be uniquely identified by colours, positional scheme, markings or as specified in the product specification.
- 2.4.5.4 The cable element shall have a metallic steel tube.
- 2.4.5.5 Primary coated and coloured fibers shall be packaged in a metallic hermetically sealed tube.
- 2.4.5.6 The cable element shall be filled with a suitable jelly compound to avoid water penetration
- 2.4.5.7 The inside surface of the tube shall be smooth without any defects.

**2.4.6 Optical Fiber Cable Construction:-**

- 2.4.6.1 The cable shall be designed and manufactured for a predicated operating lifetime of 25 years the attenuation of the installed cable at the operating wavelength shall not relevant parts of sectional Specification IEC 60794-4.
- 2.4.6.2 Optical Fiber cable length are provided as transmission route length.
- 2.4.6.3 The bidder shall ensure the requirement of the cable length as per site conditions.
- 2.4.6.4 There shall be no fiber splice in a delivery length.
- 2.4.6.5 It shall be possible to identify each individual fiber throughout the length of the cable.
- 2.4.6.6 Optical fiber unit shall protect the optical fibers from environmental or mechanical forces such as longitudinal compression, crushing, bending, twisting, tensile stress, long and short term heat effects.

**2.4.7 OPGW 48C:-**

- 2.4.7.1 OPGW cable construction shall comply with IEC- 60794-4-10.
- 2.4.7.2 OPGW cable shall meet construction and performance requirement such that the ground wire function, optical fiber integrity and optical transmission characteristics are suitable for the proposed in installation.
- 2.4.7.3 OPGW cable shall be suitable for installation on 220kV Transmission line.
- 2.4.7.4 OPGW shall be suitable for installation under live line condition.
- 2.4.7.5 OPGW length defined shall be between Gantries of termination stations.
- 2.4.7.6 The fiber optic cable construction shall be designed and installed such that optic fibers experience no strain under all loading conditions throughout entire life cycle of the cable.
- 2.4.7.7 MAT strain shall be less than or equal to MWT strain margin of the cable.
- 2.4.7.8 The sag shall not exceed the earth wire sag in all conditions.
- 2.4.7.9 The MAT shall also be less than or equal to 0.4 times the UTS.
- 2.4.7.10 The everyday tension shall not exceed 20% of the UTS for the OPGW Cable.

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- 2.4.7.11 The sag-tension chart of OPGW cable indication MAX tension, cable strain and sag shall be calculated for minimum and maximum wind and ice condition.
- 2.4.7.12 The composite fiber optic overhead ground wire shall be made of single buffer tube embedded in water tight aluminium alloy/stainless steel with aluminium coating protective central fiber optical unit surrounded by concentric-lay stranded metallic wires in single or multiple layers.
- 2.4.7.13 The actual delivered cable length shall consider other factors such as sag, service loops, splicing, working length and wastage.
- 2.4.7.14 Central al Fiber Optic Unit.
- 2.4.7.15 The central fiber optic shall be designed to house and protect multiple buffered optical fiber units from damage due to forces such as crushing, bending, twisting, tensile stress and moisture.
- 2.4.7.16 The central fiber unit and the outer stranded metallic conductor shall be an integral part to protect the optical fiber from degradation due to dynamic environmental conditions.
- 2.4.7.17 The central optical unit shall be necessarily of stainless steel tube with aluminium coating.
- 2.4.7.18 Cable construction.
- 2.4.7.19 The cable construction and material shall be in accordance to IEC 61089.
- 2.4.7.20 The cable mechanical and electrical characteristics shall comply to IEC-61089
- 2.4.7.21 The conductor shall be of aluminium clad steel wires with 27% conductivity.
- 2.4.7.22 The base metal shall be steel produced by the open hearth, electric furnace or basic oxygen process and shall be of such composition that the finished clad wires shall have properties and characteristics as per IEC-61232.
- 2.4.7.23 The aluminium for covering shall have a minimum purity of 99.5% and quality sufficient to meet thickness and electrical resistance requirement.
- 2.4.7.24 The wires shall be smooth and fresh from all imperfections such as fissures, roughness, grooves, inclusions which may endanger the performance of the OPGW cable.
- 2.4.7.25 The density of the aluminium clad steel wires shall be in accordance to table-1 of IEC-61232.
- 2.4.7.26 The wires shall not depart from the nominal diameter by more than the value given in table-2 of IEC 61232.
- 2.4.7.27 The minimum aluminium thickness of wires at any point shall comply with table-3 of IEC 61232.
- 2.4.7.28 The wire tensile strength shall with table-5 of IEC-61232.
- 2.4.7.29 Elongation of the wire shall comply with the requirement of 1% minimum elongation after fracture or 1.5% minimum total elongation at fracture the test and result shall be as defined in Clause 6.3.2 of IEC 61232.
- 2.4.7.30 Resistivity of wires shall conform to the requirement given in table-5 at a temperature of 20°C.
- 2.4.7.31 The wires shall withstand without fracture, not less than 20 twists in a length equivalent to 100 times the nominal diameter of the wire.
- 2.4.7.32 The wire shall conform to the requirement of stress at 1% extension given in table-5 of IEC-61232.
- 2.4.7.33 The wire shall be no joints of any kind made in the finished wire.

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- 2.4.7.34 The lay ratio for 6-wire layer of 7 steel cores shall be not less than 16 or more than 26.
- 2.4.7.35 Cable construction shall be bare concentric lay stranded metallic wires with the outer layer having left hand lay.
- 2.4.7.36 The wires may be of multiple layers with a combination of various metallic wires in each layer.
- 2.4.7.37 The finished wires shall have no joints or splices.
- 2.4.7.38 The wires shall be so stranded when the complete OPGW is cut the individual wires can be readily grouped and the held in place.
- 2.4.7.39 The rated tensile strength (RTS) of homogenous steel conductors shall be taken as the sum of RTS of all wires at failure.
- 2.4.7.40 The conductivity of the homogeneous conductors with aluminium clad steel wires shall be calculated based on the relevant conductivity in IEC 61232.
- 2.4.7.41 The conductor cross-section, wire diameter, conductor diameter, linear mass rated strength and DC resistance shall comply with IEC61089 table D.23.
- 2.4.7.42 Breaking Strength.
- 2.4.7.43 The rated breaking strength of the complete OPGW shall be no more than 90% of the sum of rated breaking strength of the individual wires, calculated from their nominal diameter and the specified minimum tensile strength.
- 2.4.7.44 The rated breaking strength shall not include the strength of the optical unit
- 2.4.7.45 The fiber optic unit shall not be considered a load bearing tension member while determining the total rated breaking strength of the composite conductor.
- 2.4.7.46 Rated tensile strength for the conductor shall be comply IEC-61089 table D.23.
- 2.4.7.47 Electrical and Mechanical requirement.
- 2.4.7.48 Minimum electrical and mechanical performance characteristics shall be as detailed below;
- (a) Everyday Tension shall less than or equal to 20% of UTS of OPGW.
- (b) DC Resistance at 20°C shall be less than 1Ω/km.
- 2.4.7.49 OPGW conductor element shall comply with following parameters as per IEC-61232.

Characteristic	Unit	Value
Standard diameter	mm	4.05
Tolerance of diameter	%	± 1.5
Minimum tensile strength	MPa (kgf/mm <sup>2</sup> )	1080 (110)
Minimum elongation in 250mm	%	1.5
Minimum conductivity	%	27
Minimum number of twisting	-	20
Minimum thickness of aluminum	mm	0.301
Breaking load	N (kgf)	15,680 (1,600)
Standard cross-sectional area	mm <sup>2</sup>	14.52
Standard mass	kg/km	85.83
Standard resistance at 20°C	W/km	4.40

- 2.4.7.50 OPGW cable shall comply with following parameters.

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Characteristic	Unit	Value
Number and Type of Fibers		48/DWSM
Tolerance of diameter		
Overall Diameter	mm	12.8
Calculated Cross Sectional area concerning calculation of RTS	mm <sup>2</sup>	87.13
Calculated mass	kg/km	560
RTS-Rated Tensile Strength	KN	
Modulus of elasticity	MPa	140
Coefficient of linear expansion	10 <sup>-6</sup> /K	13.4 X10 <sup>-6</sup>
Calculated D.C. resistance at 20°C	Ω/km	0.743
Fault Current Capacity I <sup>2</sup> t	(kA) <sup>2</sup> s	10 <sup>2</sup> x 0.5
MAT-Maximum allowable Tension	kN	84.7
Allowable temperature range for storage, installation and operation	°C	
Strain margin point	%	
Lay ratio (P/D)	-	10-16
Lay direction of outer layer		Left hand lay
Min bending radius during installation	mm	
Min bending radius installed.	mm	
Hydrogen effect		
Type and amount of Grease		
Construction Aluminum-clad steel wire Steel tube	Nos./mm Nos./mm	6 / 4.3 1 / 4.1
Minimum breaking load	kN	84.7
Short circuit current capacity for 0.5sec Conductor temperature	kA (°C)	10 (200)
Maximum length per reel	m	4000±2%

#### **2.4.8 OPGW Hardware & Accessories:-**

- 2.4.8.1 The scope of supply of the optical cable includes the supply of all required fittings and hardware.
- 2.4.8.2 The OPGW hardware fittings and accessories shall follow the general requirements regarding design, materials, dimensions & tolerances, protection against corrosion and markings as specified in IEC-61284.
- 2.4.8.3 The shear strength of all bolts shall be at least 1.5 times the maximum installation torque.
- 2.4.8.4 The bidder shall provide the OPGW hardware & accessories drawing & Data Requirement Sheets (DRS) document for all the assemblies & components.
- 2.4.8.5 All component reference numbers, dimensions and tolerances, bolt tightening torques & shear strength and ratings such as UTS; slip strength etc. shall be marked on the drawings.
- 2.4.8.6 The hardware fittings shall be capable of withstanding maximum temperature during short circuit.
- 2.4.8.7 The fittings must be of the helical, preformed type. However alternate fittings which have a satisfactory track record shall also be acceptable.

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- 2.4.8.8 The fittings shall secure proper and safe grip of the OPGW in the whole range of tensile strength and shall not influence any parameters of the OPGW-mechanical, electrical, optical.
- 2.4.8.9 Jointing box for OPGW shall be hermetically seal and shall have a degree of protection of IP68.
- 2.4.8.10 The fittings and accessories described herein are indicative of installation hardware typically used for OPGW installations and shall not necessarily be limited to the following:-
- (A) Suspension Assemblies:-
- (i) Preformed Armour grip suspension clamps and aluminium alloy armour rods/ reinforcing rods shall be used.
  - (ii) The suspension clamps shall be designed to carry a vertical load of not less than 25 KN.
  - (iii) The suspension clamps slippage shall occur between 12kN and 17kN.
  - (iv) The bidder shall supply all the components of the suspension assembly including shackles, bolts, nuts, washers, split pins, etc.
  - (v) The total drop of the suspension assembly shall not exceed 150 mm (measured from the center point of attachment to the center point of the OPGW).
- (B) Dead End Clamp Assemblies:
- (i) All dead end clamp assemblies shall preferably be of the performed armoured grip type and shall include all necessary hardware for attaching the assembly to the tower strain plates.
  - (ii) Dead end clamps shall allow the OPGW to pass through continuously without cable cutting. The slip strength shall be rated not less than 95% of the rated tensile strength of the OPGW.
- (C) Clamp Assembly Earthing Wire:
- (i) Earthing wire consisting of a 1500 mm length of aluminium or aluminium alloy conductor equivalent in size to the OPGW shall be used to earth suspension and dead end clamp assemblies to the tower structure.
  - (ii) The earthing wire shall be permanently fitted with lugs at each end.
  - (iii) The lugs shall be attached to the clamp assembly at one end and the tower structure at the other.
- (D) Structure Attachment Clamp Assemblies (Down Lead Clamps):
- (i) Clamp assemblies used to attach the OPGW to the structures shall have two parallel grooves for the OPGW, one on either side of the connecting bolt.
  - (ii) The clamps shall be such that clamping characteristics do not alter adversely when only one OPGW is installed.
  - (iii) The tower attachment plates shall locate the OPGW on the inside of the tower and shall be attached directly to the tower legs/cross-members without drilling or any other structural modifications.
- (E) Vibration Dampers:
- (i) Vibration dampers having four (4) different frequencies spread within the Aeolian frequency bandwidth shall be used for suspension and tension points in each span.

- (ii) The design of Vibration damper shall be without messenger cable and in case messenger cable is to be used, it shall be of stainless steel.
- (iii) The bidder shall determine the exact numbers and placement(s) of vibration dampers through a detailed vibration analysis as specified in appendices.
- (iv) Design calculation for installation of Vibration dampers shall be submitted by the vendor.
- (v) Vibration damper clamps shall be made of aluminium or aluminium alloy,
- (vi) Is shall support the dampers during installation and shall maintain the dampers in position without damage to the OPGW and without causing fatigue.
- (vii) Armour or patch rods made of aluminium or aluminium alloy shall be provided as required to reduce clamping stress on the OPGW.
- (viii) The vibration damper body shall be cast zinc alloy.

**2.4.8.11 Line Fiber Optic Splice Enclosures:-**

- (A) All in-line splices shall be encased in In-Line Fiber Optic Splice Enclosures.
- (B) Suitable splice enclosures shall be provided to encase the optical cable splices in, moisture and dust free environment.
- (C) In line splice enclosures shall comply with ingress protection class IP 68 or better.
- (D) The splice enclosures shall be designed for the storage and protection of a minimum of 48 optical fiber splices and equipped with sufficient number of splice trays for splicing all fibers in the cable.
- (E) In-line splice enclosures shall be suitable for outdoor use with each of the cable types provided under this contract.
- (F) Splice enclosures shall be appropriate for mounting on EHV transmission towers above anti-climb guard levels at about 10 meters from the ground level and shall accommodate pass-through splicing.
- (G) No more than 6 fibers shall be terminated in a single splice tray.

**2.4.8.12 Optical Fiber Splice:-**

All optical fiber splice shall comply with the following.

- (A) No. of Optical Splice along the entire route shall be minimized.
- (B) No mid-span splices shall be allowed along the entire route.
- (C) All Fiber splices shall be accomplished through fusion splicing.
- (D) Each fiber splice shall be fitted with splice protection sheath fitted over the final splice.
- (E) All splices and bare fiber shall be nearly installed in covered splice trays.
- (F) No more than 6 fiber shall be installed in each splice tray.
- (G) For each link, bi-directional attenuation of single mode fusion splices, shall not average more than 0.05dB and no single splice loss shall exceed 0.1dB at 1550nm.
- (H) For splicing, fiber optic cable service loops of adequate length shall be provided so that all splices occurring at the tower structure can be performed at ground level.

**2.4.8.13 Bending Radius:-**

Bending Radius influences additional optical fiber losses laser safety and life time of fibers bending radius shall fulfill the requirement of the fiber and cable manufacture.

**2.4.8.14 Fiber Storage:-**

- (A) Fiber storage shall be design for at least following requirement such as reserve length for re-splicing, non-active fibers, Uncut Fibers. Remote Splicing. Patch cords & pigtails. Reserve length for future needs.
- (B) Function of Fiber storage is to provide long term protection and should fulfill the requirement for storage of fiber in fiber tray, splice tray, splice organizer, or Fiber management system.

**2.4.8.15 Optic Fiber Connector Pigtail & connectors:-**

- (A) Optical Fiber shall be connectrized with FC-PC type connector
- (B) Optical Fiber pigtails shall meet the following optical characteristics

Sr. No.	Parameter	Unit	Particulars
1	Optical Fiber	mm	Type-Single Mode
2	Mode Field Diameter	μm	9.5+/-1 = 1.31
3	Cladding Diameter	μm	125 +/-2
4	Outer Coating diameter	mm	0.9+/- .1
5	Reinforcement		Aramid yarn
6	Outer jacket material		PVC
7	Outer jacket colour		Yellow
8	Outer jacket diameter	μm	2 +/- 0.2
9	Permissible Bending Radius	mm	Min.40
10	Insertion loss	μm	≤0.5 dB at = 1.31
11	Operating Temperature	°C	0 to +60
12	Storage Temperature	°C	0 to +60

**2.4.9 Type Test for OPGW and OPGW Hardware & Accessories:-**

OPGW cable and OPGW hardware & accessories must be of “type tested” quality. Three copies of Type test report shall be submitted for the type, size and rating of the OPGW and OPGW hardware & accessories, offered (not older than 5 years from the date of submission of bid), before starting supply of the same. If Type test results are not available the bidder shall arrange the same at his own cost.

**2.4.10 Testing Expenses:-**

- 2.4.10.1 All the testing charges for the Type/Acceptance/Routine tests specified shall be borne by the bidder.
- 2.4.10.2 The entire cost of testing for the acceptance and routine tests and tests during manufacture specified herein shall be treated as included in the quoted unit price of OPGW and OPGW hardware & accessories.

**2.4.11 Inspection & Testing: -** All tests and inspection shall be made in accordance with following mentioned standard specifications.

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Test Item		Test Method	Number of Samples
Optical fiber	Mode field diameter	Conforming to ITU-T G.650	All in 10% of OPGW reels
	Cladding diameter		
	Mode field concentricity Error		
	Cladding non-circularity		
	Cut-off wavelength		
	Buffer coating diameter		
	Number of fibers	Visual inspection	10% of OPGW reels
	Fiber identification		
	Attenuation	Conforming to IEC 60793	All in all OPGW reels
	Dispersion	Conforming to ITU-T G.650	All in 10% of OPGW reels (test on bare fibers)
Aluminum-clad steel wire	Appearance	Conforming to IEC 61232	10% of bobbins
	Diameter		
	Tensile strength		
	Elongation		
	Conductivity		
	Number of twisting		
	Thickness of aluminum		
Steel tube	Appearance	(Micrometer)	10% of OPGW reels
	Diameter		
Completed OPGW	Appearance	Conforming to IEC 61089	10% of OPGW reels
	Overall diameter		
	Construction		
	Lay ratio		
	Lay direction		
	Breaking load		

<b>Routine test</b>	<b>All the tests in line with relevant IEC/IS standards with latest amendments.</b>
Type test	OPGW cable and OPGW hardware & accessories must be of “type tested” quality. Type test report shall be submitted for the type, size and rating of the cable offered (not older than 5 years), along with the Bid. If Type test results are not available the bidder shall do the same in his own cost.
	All type tests shall be carried out in accordance with relevant IEC/IS standards
Inspection	The Engineer/DFCCIL reserves the right to witness all Incoming, In-process & Final process of cable manufacturing
	The Engineer/DFCCIL reserves the right to inspect the manufacturer’s works at any time prior dispatch, to verify compliance with the specifications.
	In-process and final inspection call intimation shall be given in advance to Engineer/DFCCIL.
Test Certificates	Three sets of complete test certificates shall be submitted along with the dispatch documents.

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## 2.4.12 Guaranteed Technical Particulars (GTP):-

### 2.4.12.1 OPGW 48C - Complete cable:-

Sr. No.	Details	Unit	Particulars	Bidder to Specify
(A) General:				
1	Nominal cross sectional area	mm <sup>2</sup>	79	
2	Centre -Stainless steel tube - No./Dia.	mm	1/4.0	
3	L1-Aluminium clad steel wires - No./Dia.	mm	6/4.1	
4	Lay direction - outer layer	LH/RH	Left Hand	
(B) General design data:				
Sr. No.	Details	Unit	Particulars	
1	Nominal overall diameter	mm	12.3	
2	Ultimate conductor tensile strength	kgf	8190	
3	Approximate total mass	Kg/Km	504	
4	Electrical resistance at 20° C	Ω/Km	0.806	
5	Modules of elasticity	N/mm <sup>2</sup>	140000	
6	Coefficient of linear expansion	x10 <sup>-6</sup> /°C	13.4	
7	S. C. Current capacity (Amb.53 °C)	KA per Sec	40	
(C) Optical Data:				
Sr. No.	Details	Unit	Particulars	Bidder to Specify
1	Optical Fiber type		Single Mode G.652D	
2	Manufacturer		OFS	
3	Mode Field Diameter-1310nm	μm	9.2 ± 0.4	
4	Mode Field Diameter-1550nm	μm	10.4 ± 0.8	
5	Cladding Diameter	μm	125.0 ± 0.7	
6	Core-Clad Concentricity	μm	≤ 0.5	
7	Cladding Non-Circularity	%	≤ 1.0	
8	Coating Diameter (Uncolored)	μm	245 ± 5	
9	Coating-Cladding Concentricity	μm	< 12	
10	Attenuation Coefficient-1310nm	dB/km	≤ 0.35	
11	Attenuation Coefficient-1550nm	dB/km	≤ 0.21	
12	Cable cut-off Wavelength	nm	≤ 1260	
13	Zero Dispersion Wavelength	nm	1302 – 3022	

### 2.4.12.2 OPGW Cable – Construction Details:-

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Sr. No.	Details	Unit	Particulars	Bidder to Specify
<b>(A) Construction Details:</b>				
1	Fiber Manufacturer DWSM	mm <sup>2</sup>	OFS	
2	No. of Fibers DWSM	Each	48	
3	Buffer Type		SS Loose Tube	
4	Buffer Tube Diameter	mm	4	
5	Buffer Tube Material		Stainless Steel	
6	No. of Buffer Tube	Each	1	
7	No. of Fiber / Tube	Each	48	
8	Identification no. of Individual tubes		NA	
9	No. of empty Tubes	Each	NA	
10	Filling Material		Water Blocking Gel	
11	Filling Material complaint with Tech. Specs	Y/N	Y	
12	20% Aluminium Clad steel wire			
	(a) Diameter	mm	4.1 (27% ACS)	
	(b) Number	Each	6	
13	Aluminium alloy wires		None	
	(a) Diameter	mm		
	(b) Number	Each		
14	Aluminium tube inner diameter	mm	3.5 (SS tube Dia.)	
15	Aluminium tube Outside diameter	mm	4.0 (SS tube Dia.)	
16	Cable Diameter (Nominal $\pm$ Deviation)	mm	12.3 $\pm$ 1%	
17	Cable cross - section area (Nominal)	mm <sup>2</sup>	79	
18	Cable cross - section area (Effective)	mm <sup>2</sup>	79	
19	Is complaint with IEEE P1138	Y/N	Y	
<b>(B) Mechanical Properties Of Cable:</b>				
Sr. No.	Details	Unit	Particulars	Bidder to Specify
1	Max. .Breaking Load (UTS)	kN	8190 kgf	
2	Fiber Strain Margin	%	$\geq 0.6\%$	
3	Zero Fiber Strain Up To Load	kN	60% UTS	
4	Weight	kg/km	504	
5	Crush Strength	kg/km	A load of 312 kg applied to cable for 10 minutes without any permanent or temporary change in attenuation of more than 0.1db.	
6	Equivalent Module of Elasticity	kN/mm <sup>2</sup>	140	
7	Minimum Bending Radius without	mm	50(For Optical Fiber)	

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	micro-bending			
8	Maximum Bending Radius :-			
	Short Term	mm	300 (During Installation)	
	Long Term (Continuous)	mm	400(For Fix Position)	
9	Tensile proof test (Screening) Level	kN/mm <sup>2</sup>	0.69	
10	Maximum permissible tensile stress	kN/mm <sup>2</sup>	0.61	
11	Permissible CTS tensile stress	kN/mm <sup>2</sup>	0.203	
12	Everyday tension, No wind	% of UTS	20%	
13	Maximum tension at Everyday condition with full wind pressure of 178.45 Kg/m <sup>2</sup> on full projected area 400 meter span	Kg	60% UTS	
(C) Thermal Properties of Cable:				
1	Co-efficient of Linear expansion	Per °C	0.0000134	
2	Co-efficient of expansion			
	Cladding	Per °C	0.0000005	
	Core	Per °C	0.0000005	
3	Nominal operating temperature range	°C	-40°C to +85°C	
4	SC Current transient peak temperature	°C	200°C	
5	Maximum allowable temperature for Lightning strike	°C	200°C	
(D) Installation:				
1	Splice Loss :-			
	Maximum	dB	0.05(At 1550nm)	
	Average	dB	0.04(At 1550nm)	
2	Operating Temperature Range	°C	-40°C to +85°C	
3	Expected Cable Life	Yrs.	40	
4	Maximum Possible span for specified Operating Condition		600	
5	Cable Swing Angles			
	Worst Case		78	
	Everyday		0	

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**2.4.12.3 OPGW-Optical Parameters:-**

Sr. No.	Details	Unit	Particulars	Bidder to Specify
<b>(A) Optical Parameters:</b>				
1	Fiber Manufacturer (s) / Type		OFS / DWSM	
2	Fiber Production Method		VAD	
3	Attenuation Co-efficient :-			
	@ 1310 nm	dB / km	0.35	
	@ 1550 nm	dB / km	0.21	
4	Attenuation Variation with Wave length( $\pm 25$ nm)	dB / km	0.05dB/km Max.	
5	Attenuation at Water Peak	dB / km	0.31	
6	Point Discontinuity :-			
	@ 1310 nm	dB	$\leq 0.1$	
	@ 1550 nm	dB	$\leq 0.1$	
7	Temperature Dependence (Induced attenuation)	dB	$\leq 0.05$	
8	Nominal Mode field Diameter :-			
	@ 1350 nm	$\mu\text{m}$	9.2	
	@ 1550 nm	$\mu\text{m}$	10.4	
9	Mode Field Diameter Deviation :-			
	@ 1350 nm	$\mu\text{m}$	$\pm 0.4$	
	@ 1550 nm	$\mu\text{m}$	$\pm 0.8$	
10	Mode Field Non-Circularity	%	$\leq 6$	
11	Chromatic Dispersion Co-efficient			
	@ 1310 (1288-1339) nm	ps/nm.km	3.5	
	@ 1310 (1271-1360) nm	ps/nm.km	5.3	
	@ 1550 nm	ps/nm.km	18	
12	Zero Dispersion Wavelength	nm	1302-1322	
13	Zero Dispersion Slope	ps/nm <sup>2</sup> .km	$\leq 0.092$	
14	Cut-off Wave length	nm	$\leq 1260$	
15	Refractive Index		1.468 at 1310nm	
16	Refractive Index Profile		Step Index	
17	Cladding Design		Matched Cladding	
18	Numerical Aperture		0.14	
<b>(B) Physical and Mechanical Properties:</b>				
Sr. No.	Details	Unit	Particulars	Bidder to Specify
1	Bend Performance :-			
	(37.5 mm radius, 100 turns) @ 1310 nm & @ 1550nm	dB	$\leq 0.05@1310\text{nm}$	
	(16 mm radius, 1 turn) @ 1550 nm	dB	$\leq 0.10@1550\text{nm}$	
		dB	$\leq 0.50$	
2	Core Diameter (Nominal $\pm$ Deviation)	$\mu\text{m}$	$8.3 \pm 0.4$	
3	Core Non- circularity	%	$\leq 6$	
4	Cladding Diameter (Nominal $\pm$ Deviation)	$\mu\text{m}$	$125 \pm 0.7$	

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5	Core-clad Concentricity Error	μm	≤ 0.5	
6	Cladding No Circularity	%	≤ 1.0	
7	Fiber Cut-off Wave length	μm	≤ 1260	
8	Protective Coating Type & Material			
	Primary :-		UV Cured Acrylate	
	Secondary :-		UV Cured Acrylate	
9	Protective Coating Diameter(Nominal+-Deviation)	μm	245 ± 5	
10	Protective Coating Removal Method		Mech. Stripping	
11	Coating Concentricity	μm	< 12	
12	Polarization Mode Dispersion Co-efficient	ps/km <sup>1/2</sup>	≤ 0.5	
13	Proof Test Level	kpsi	≥ 100	
14	Whether Color coding scheme complaint with EIA/TIA 598 or IEC 60304 or Bell Core GR-20	Y/N	Y	
15	Whether Color material complaint with tech. spec.	Y/N	Y	

#### 2.4.12.4 GTP OPGW-Hardware:-

Sr. No.	Description	Unit	Particulars	Bidder to Specify
	(A) Suspension Clamp Assembly:			
1	Minimum Vertical Strength	kN	70	
2	Maximum Slip Strength	kN	20% RTS OPGW	
3	Minimum Slip Strength	kN	14% RTS OPGW	
4	Length (Nominal)	mm	1854	
5	Weight (Nominal)	kg	5.98	
6	Total Drop (Including Shackles) Max.	mm	250	
7	Tightening Torque (Nominal)	Nm	NA	
8	Details of Armor Rod Set:			
	(a) No. of Rods per Clamp		11	
	(b) Direction of Lay		Left Hand	
	(c) Overall Length	mm	1854	
	(d) Diameter of Each Rod	mm	3.7	
	(e) Tolerances :-			
	(1) Diameter of Each Rod	±%	3	
	(2) Length of Each Rod	±%	4	
	(f) Material Of Manufacture		Al. Alloy	
	(g) UTS of Each Rod	kN	NA	
	(h) Weight	Kg	1.1	

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9	Details of Protection Splice Set (Reinforcing Rod)			
	(a) No. of Rods per Clamp		10	
	(b) Direction of Lay		Left Hand	
	(c) Overall Length	mm	1168	
	(d) Diameter of Each Rod	mm	6.4	
	(e) Tolerances :-			
	(1) Diameter of Each Rod	±%	3	
	(2) Length of Each Rod	±%	4	
	(f) Material Of Manufacture		Al. Alloy	
	(g) UTS of Each Rod	kN	NA	
	(h) Weight	kg	0.6	
(B) Dead End Clamp Assembly:				
1	Minimum Slip Load	kN	95% RTS OPGW	
2	Length (Nominal)			
	(a) Reinforcing Rods	mm	1372	
	(b) Dead End	mm	960	
3	Weight (Nominal)			
	(a) Reinforcing Rods	kg	0.8	
	(b) Dead End	kg	0.9	
4	Breaking Strength (Minimum)	kN	111	
5	Wire Size			
	(a) Reinforcing Rods	mm	2.9	
	(b) Dead End	mm	3.2	
(C) Vibration Damper:				
1	Total Weight	kg	1.7	
2	Weight of Each Damper	kg	0.7 & 0.5	
3	Material of Damper Weight		GI	
4	Clamp Material		Aluminum	
5	Clamp Bolt Tightening Torque	Nm	41	
6	Clamp Bolt Material		Steel	
7	Messenger Cable Material		Steel	
8	No. of Strands in Messenger Cable		7	
9	Breaking Strength of Messenger Cable	kN	NA	
10	Resonance Frequencies			
	(a) First Frequency	Hz	8	
	(b) Second Frequency	Hz	18	
	(c) Third Frequency	Hz	34	
	(d) Forth Frequency	Hz	45	
11	Minimum Slip Strength of Damper Clamp			
	(a) Before Fatigue Test	kN	2.5	
	(b) After Fatigue Test	kN	2.5	

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<b>(D) Down Lead Clamp (Fastening Clamp):</b>				
1	Material		Galvanized Steel	
2	Suitable for OPGW (Dia. Range)	mm	10 to 20	
3	Tightening Torque	Nm	NA	
4	Vertical Load	kN	NA	
5	Filler Details			
	(a) Material		Galvanized Steel	
	(b) Diameter	mm	NA	
6	Tower Attachment Arrangement		Less Than 450	
<b>(E) In Line Splice Enclosure (Junction Box):</b>				
1	Dimensions H*W*D	cm	230*487*173	
2	Weight	kg	7	
3	Color and Finish		Stainless steel AISI 304	
4	Cable Glanding & Fixing		Mechanical	
5	Construction Materials & Gauge		Stainless steel 15110 Aluminum .Alloy	
6	Locking Arrangements		Mechanical (Bolts & nuts)	
7	Installation Clearances (All Sides)	cm	NA	
8	IP Protection	Class	IP 68	
9	Total No. of Optical Couplings	Each	150	
10	Provision of Pass Through Splicing	Y/N	Y	
11	Whether Filled with Suitable Encapsulate	Y/N	N	
12	Method(s) for Mounting with the tower		Hose Clamp	
<b>(F) Optical Fiber Cable Accommodations:</b>				
1	Cable Glanding		Silica Gel	
2	Max No. of Cables that can be Accommodated	Each	4	
3	Diameter of Cables that can be Accommodated		As Required	
<b>(G) Cable Termination Splice Accommodations:</b>				
1	Details of Splice Trays :-			
	Dimension		180*108*11	
	Material / Gauge		Plastic	
	Weight	kg	0.04	
	Color & Finish		Black	
	Method of Mounting		Pin Lock	
2	Maximum No. of Splice Trays		10	
3	Number of Splice Tray		6	
4	Provision of Splice Organizers		NA	
5	Do Splice trays require a separate enclosure	Y/N	N	
6	Excess Length of Fiber Service Loops	m	3-4 Mtr.	

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**2.4.13. Packing, Marking, Shipping, Handling and site support:-**

Packing	<p>The OPGW cable shall be provided with steel drum. Drum identification labels: List shall be attached to the outside and Inside of the drum flanges. Labels shall be protected by transparent Plastic envelopes and shall give the following information :</p> <p>(i) Drum No. (ii) Type of cables (iii) Physical Cable length (iv) User's / Consignee's Name (v) Manufacturer's Name, Month, Year and Batch No. (vi) Cable length initial reading &amp; end reading shall be marked on drum Cable starting end shall be taken out from winding to read this drum reading with proper sealing to protect against external damaged (vii) The drum progressive length of cable at every meter. (Zero point being the cable end at its inner coil on the cable drum)</p>
Packing identification label	<p>To show purchaser name, address, purchase order number, equipment name, quantity. <u>Note 1:-</u> The contactor shall supply the cable in Steel drum of MS spindle plate with nut bolts. <u>Note 2:-</u> The contractor shall be held responsible for all Transit damage due to improper packing.</p>
Accessories & tools	Packed in separate wooden case or box.

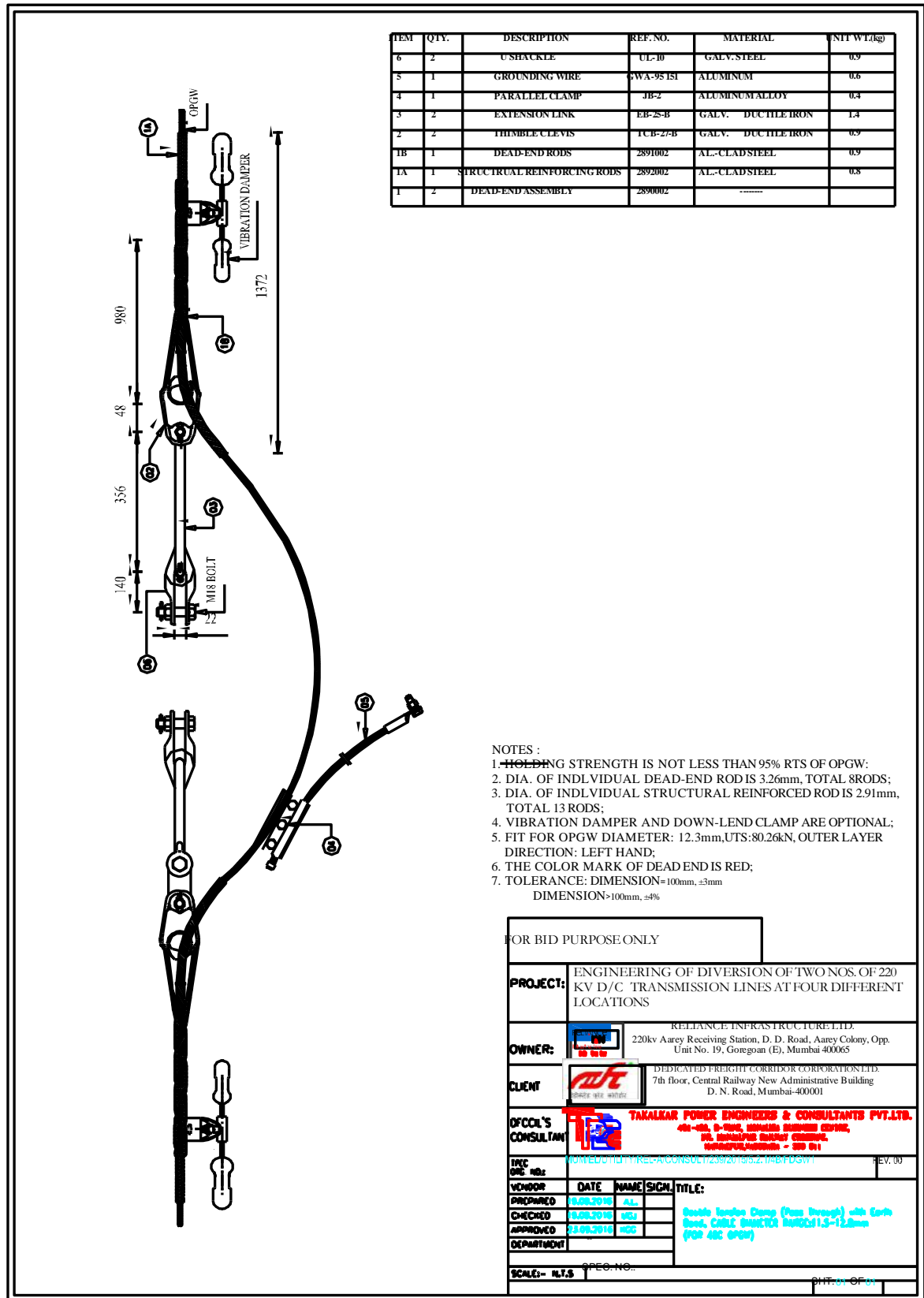
**2.4.14 List of Likely Manufacturers/Vendors for Supply of OPGW and OPGW Hardware Fittings & Accessories:-**

- (1) M/s Sterlite Technologies, Silvassa.
- (2) M/s SFPOC, Shanghai, China.
- (3) M/s Taihan, Korea.
- (4) M/s ZTT, China & India.
- (5) M/s Fuzikura Hengton, China.

Bidder shall submit vendor for approval of Engineer, before procurement of material, along with latest copies of existing approval from the State/Centre owned Power Utilities.

## 2.4.15 Drawings:-

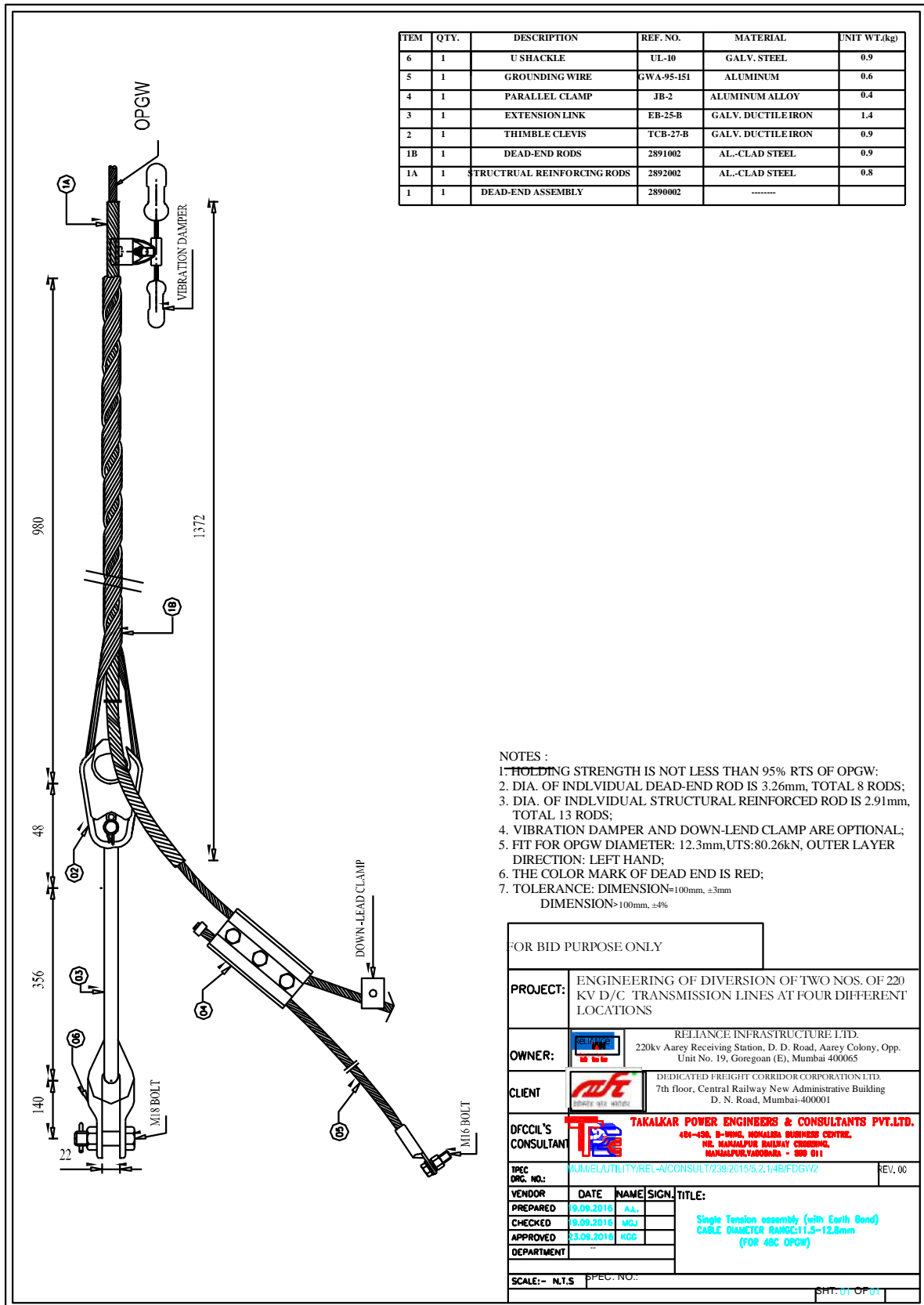
### 2.4.15.1 Double Tension Clamp (Pass Through) with Earth Bond:-



Signature & Stamp of Tenderer

For & on behalf of DFCCIL

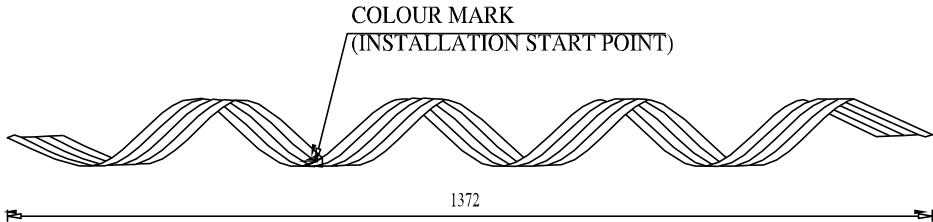
### 2.4.15.2 Single Tension Assembly (With Earth Bond):-



Signature & Stamp of Tenderer




For & on behalf of DFCCIL

### 2.4.15.3 Structural Reinforcing Rod:-



**NOTE:-**

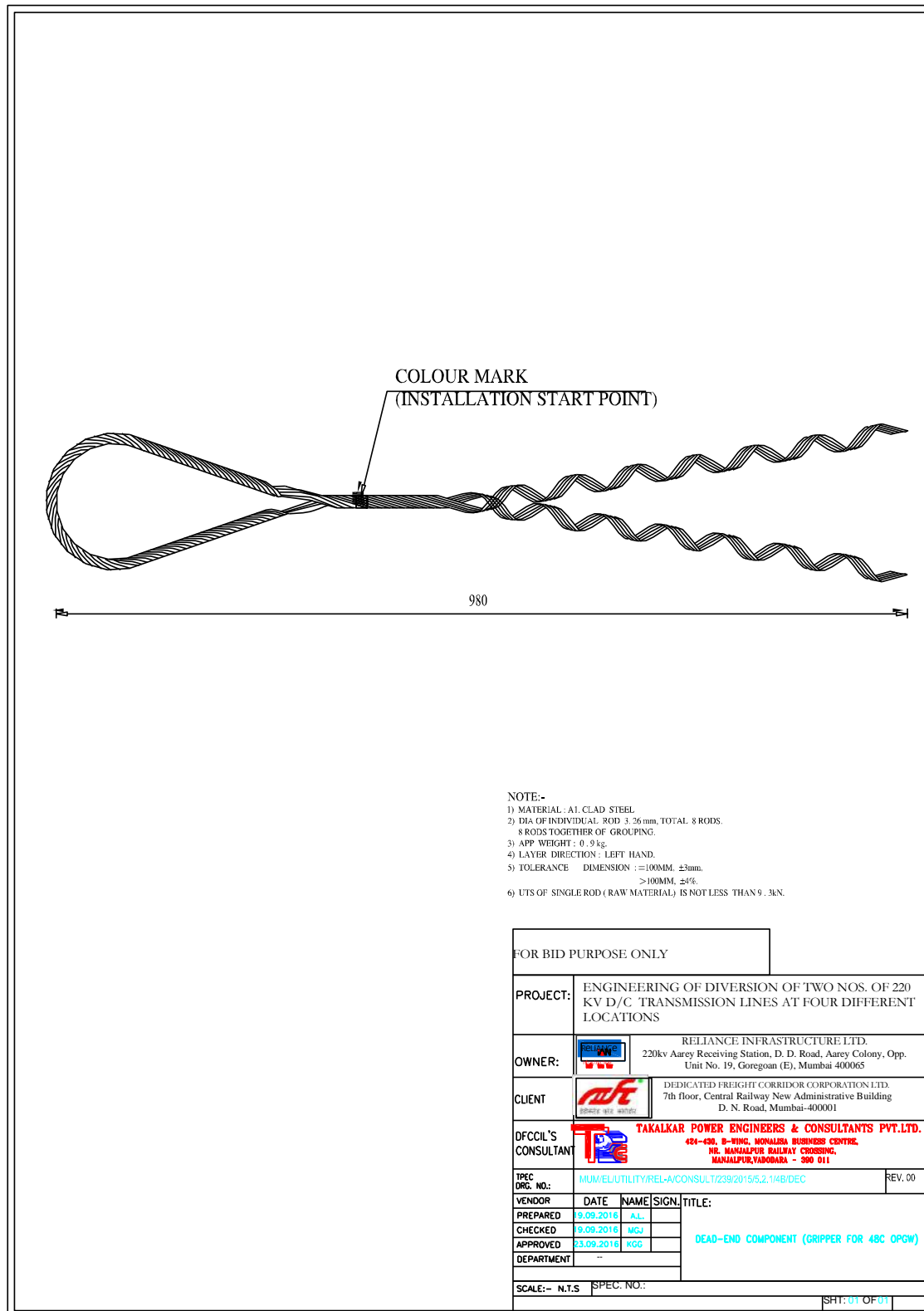
- 1) MATERIAL : A1 CLAD STEEL
- 2) DIA OF INDIVIDUAL ROD 2.91 mm, TOTAL 13 RODS.
- 3) APP. WEIGHT : 0.8 kg.
- 4) LAYER DIRECTION : RIGHT HAND.
- 5) TOLERANCE DIMENSION : ±100MM, ±4%.
- 6) UTS OF SINGLE ROD (RAW MATERIAL) IS NOT LESS THAN 7.6kN.

FOR BID PURPOSE ONLY			
PROJECT:	ENGINEERING OF DIVERSION OF TWO NOS. OF 220 KV D/C TRANSMISSION LINES AT FOUR DIFFERENT LOCATIONS		
OWNER:	 RELIANCE INFRASTRUCTURE LTD. 220kv Aarey Receiving Station, D. D. Road, Aarey Colony, Opp. Unit No. 19, Goregoan (E), Mumbai 400065		
CLIENT:	 DEDICATED FREIGHT CORRIDOR CORPORATION LTD. 7th floor, Central Railway New Administrative Building D. N. Road, Mumbai-400001		
DFCCIL'S CONSULTANT:	 <b>TAKALKAR POWER ENGINEERS &amp; CONSULTANTS PVT.LTD.</b> 404-430, B-WING, MONALISA BUSINESS CENTRE, WIL. MANALPUR RAILWAY CROSSING, MANALPUR, YADODARA - 390 011		
TPEC ORG. NO.:	MUMEL/UTILITY/REL-A/CONSULT/239/2015/5.2.1148/SRR		REV. 00
VENDOR	DATE	NAME	SIGN. TITLE:
PREPARED	19.09.2016	AL	<b>STRUCTURAL REINFORCING RODS (FOR 48C OPGW)</b>
CHECKED	19.09.2016	MCJ	
APPROVED	23.09.2016	KGG	
DEPARTMENT			
SCALE:- N.T.S		SPEC. NO.:	
		SHT:01 OF 01 REV:00	

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

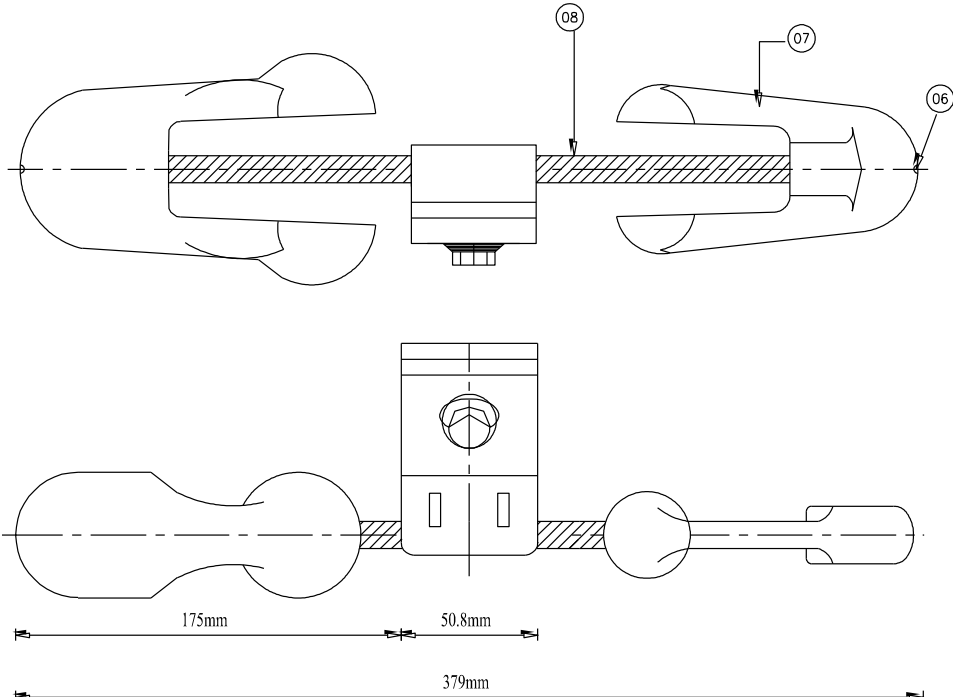
#### 2.4.15.4 Dead-End Component:-



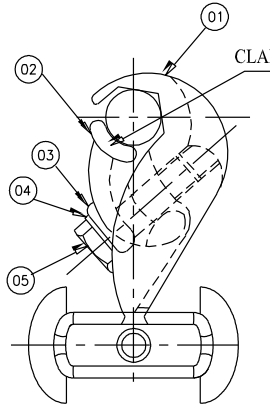
Signature &amp; Stamp of Tenderer

For &amp; on behalf of DFCCIL

### 2.4.15.5 Vibration Damper for 48C OPGW:-



CLAMP RANGE SEE NOTE 5






**NOTES :**

1. BOLT TORQUE: 41 N.M/30 ft. lb;
2. APPROX. ASSEMBLED WEIGHT: 1.8 kg/3.9 lbs;
3. FERROUS COMPONENTS GALVANIZED TO IEC /ISO/ASTM STANDARD.
4. TOLERANCE: DIMENSION=100mm, ±3mm  
DIMENSION=100mm, ±4%
5. CLAMP RANGE: 15.5-20.0mm.
6. BOLT GRADE IS 8.8.

SYM	DESCRIPTION	QTY.	MATERIAL
8	MESSENGER	1	GALVANIZED STEEL
7	WEIGHT	2	GALVANIZED STEEL
6	COLLET	2	ALUMINUM ALLOY
5	HEX BOLT-M10 X 50	1	GALVANIZED STEEL
4	LOCK WASHER	1	GALVANIZED STEEL
3	WASHER	1	GALVANIZED STEEL
2	KEEPER	1	ALUMINUM ALLOY
1	CLAMP	1	ALUMINUM ALLOY

**FOR BID PURPOSE ONLY**

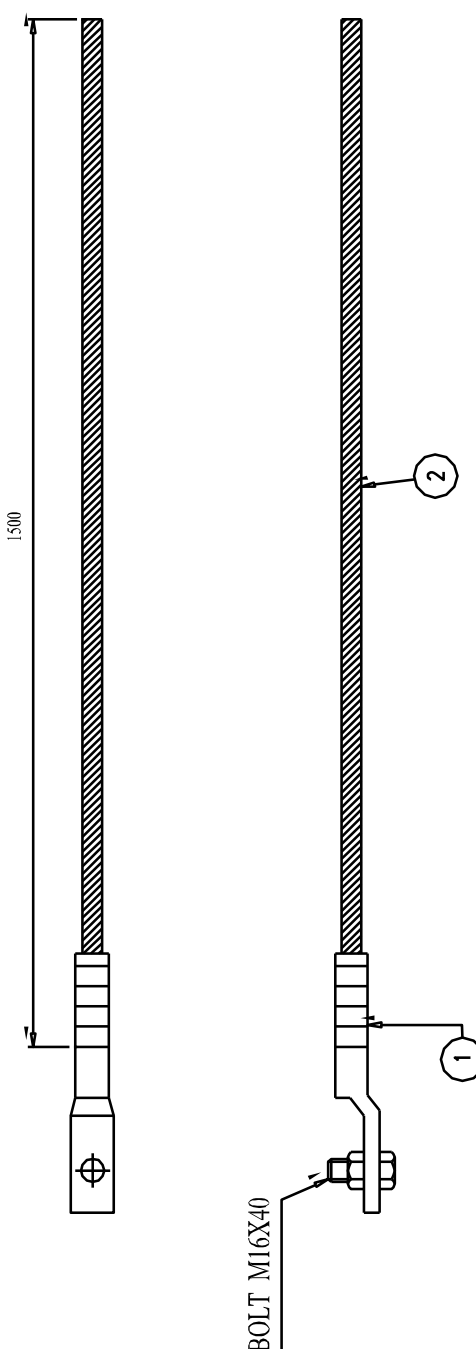
PROJECT:	ENGINEERING OF DIVERSION OF TWO NOS. OF 220 KV D/C TRANSMISSION LINES AT FOUR DIFFERENT LOCATIONS
OWNER:	 <b>RELIANCE INFRASTRUCTURE LTD.</b> 220kv Aarey Receiving Station, D. D. Road, Aarey Colony, Opp. Unit No. 19, Goregoan (E), Mumbai 400065
CLIENT:	 <b>DEDICATED FREIGHT CORRIDOR CORPORATION LTD.</b> 7th floor, Central Railway New Administrative Building D. N. Road, Mumbai-400001
DFCCIL'S CONSULTANT:	 <b>TAKALKAR POWER ENGINEERS &amp; CONSULTANTS PVT.LTD.</b> 424-430, B-WING, MONALISA BUSINESS CENTRE, NR. MANJALPUR RAILWAY CROSSING, MANJALPUR, VADODARA - 390 011
TPEC DRG. NO.:	MUM/EL/UTILITY/REL-A/CONSULT/239/2015/5.2.1/4B/SDC&GW
VENDOR:	DATE: 19.09.2016 NAME: A.L. SIGN: TITLE: VIBRATION DAMPER FOR 48C OPGW
PREPARED:	19.09.2016 MGJ
CHECKED:	23.09.2016 KGG
APPROVED:	DEPARTMENT: --
SCALE:-	N.T.S
SPEC. NO.:	SHT: 01 OF 01 REV: 00

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

### 2.4.15.6 Grounding Wire:-

NO	QTY	NAME	CODE	MATERIAL	WEIGHT (kg)
2	1	WIRE	GWA-95	ALUMINUM	0.4
1	1	HEAD	JT95-16	AL. ALLOY	0.2

NOTE:-  
 1) ALUMINIUM WIRE : DIAMETER IS 12.3 mm,  
 CROSS SECTIONAL AREA IS 79mm<sup>2</sup>  
 2) BOLT GRADE IS 4.8.  
 3) DIMENSION TOLERANCE : <100MM, ±3mm,  
 ≥100MM, ±4%.

FOR BID PURPOSE ONLY	
<b>PROJECT:</b>	ENGINEERING OF DIVERSION OF TWO NOS. OF 220 KV D/C TRANSMISSION LINES AT FOUR DIFFERENT LOCATIONS
<b>OWNER:</b>	RELIANCE INFRASTRUCTURE LTD. 220kv Aarey Receiving Station, D. D. Road, Aarey Colony, Opp. Unit No. 19, Goregoan (E), Mumbai-400065
<b>CLIENT:</b>	DEDICATED FREIGHT CORRIDOR CORPORATION LTD. 7th floor, Central Railway New Administrative Building D. N. Road, Mumbai-400001
<b>DFCCIL'S CONSULTANT:</b>	<b>TAKALKAR POWER ENGINEERS &amp; CONSULTANTS PVT.LTD.</b> 405-406, 8-FLOOR, BOMBAY BUSINESS CENTRE, MG. MARAPUR, RAJIV GANDHI CRIDRUM, MUMBAI-400001 - 200 011
<b>IPC ORG. NO.:</b>	MUM/EL/UTILITY REL-A/CONSULT/239/2015/5.2.1-4-B/GW
<b>VENDOR</b>	<b>DATE</b> <b>NAME</b> <b>SIGN.</b> <b>TITLE:</b>
<b>PREPARED</b>	19.09.2016 A.L.
<b>CHECKED</b>	19.09.2016 M.S.
<b>APPROVED</b>	19.09.2016 M.S.
<b>DEPARTMENT</b>	
<b>SCALE:-</b> N.T.S	<b>SPEC. NO.:</b>

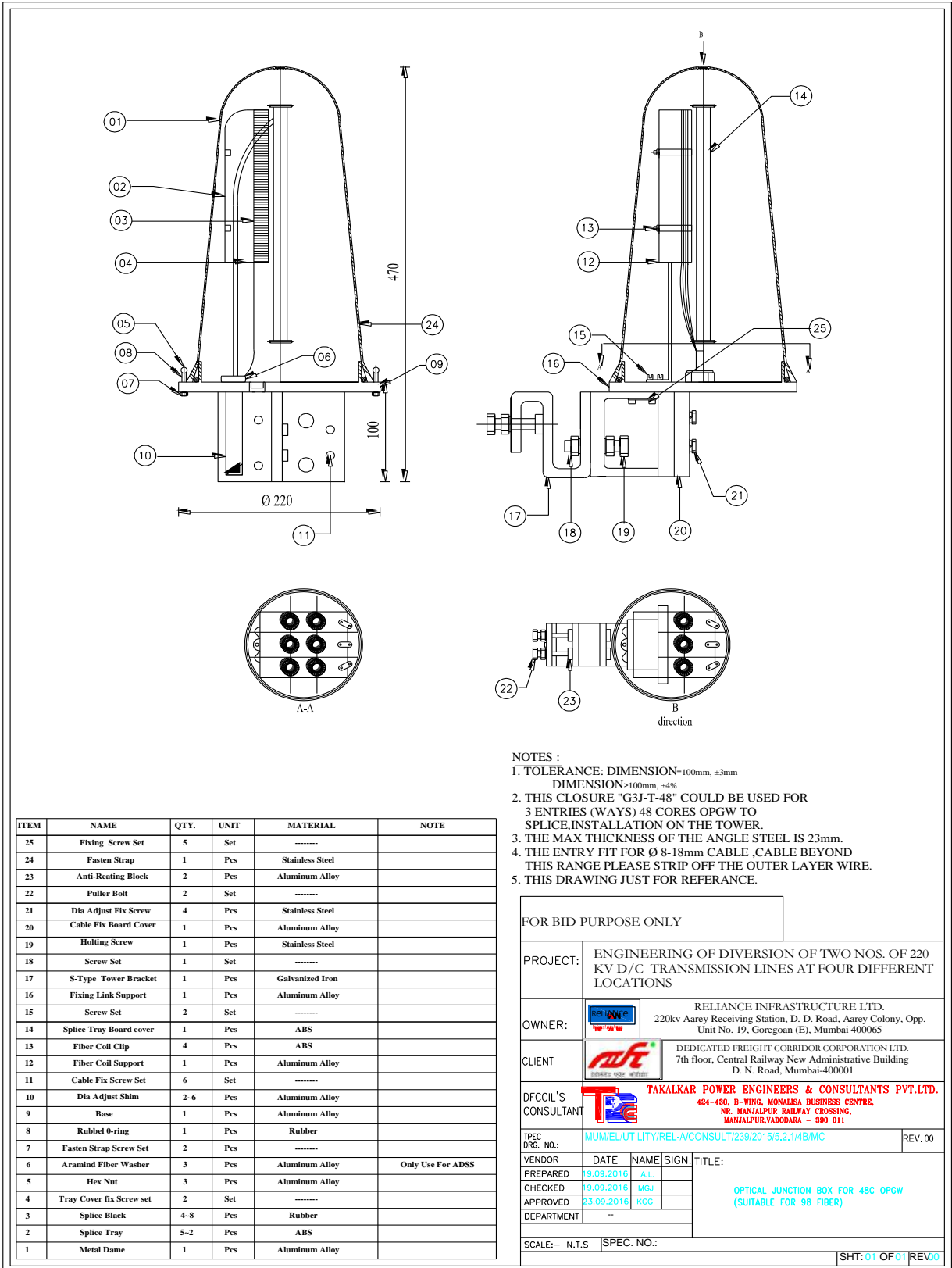
SHT. 01 OF 01 REV.00

Signature & Stamp of Tenderer

For & on behalf of DFCCIL



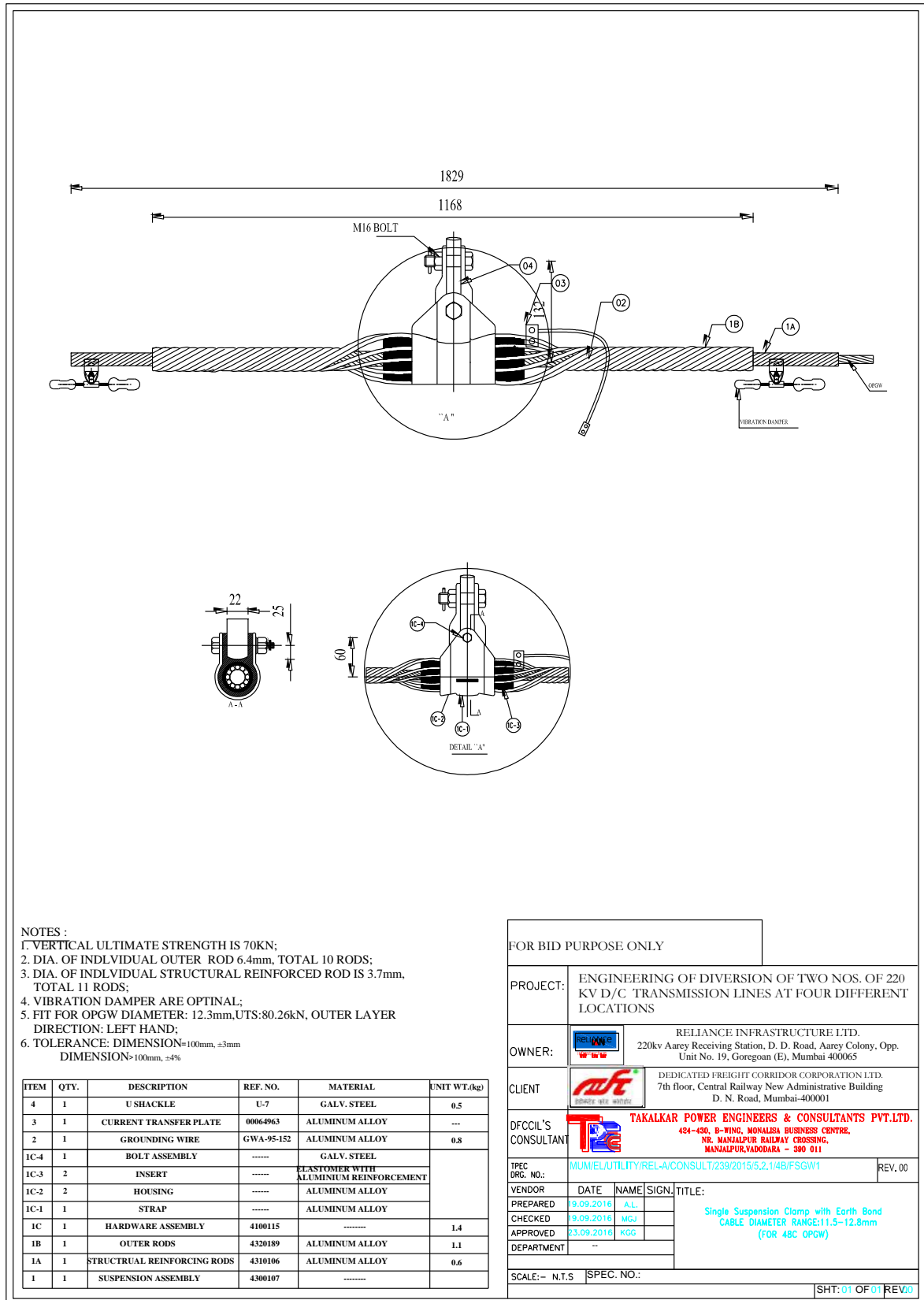
### 2.4.15.7 Optical Junction Box:-



Signature & Stamp of Tenderer

For & on behalf of DFCCIL

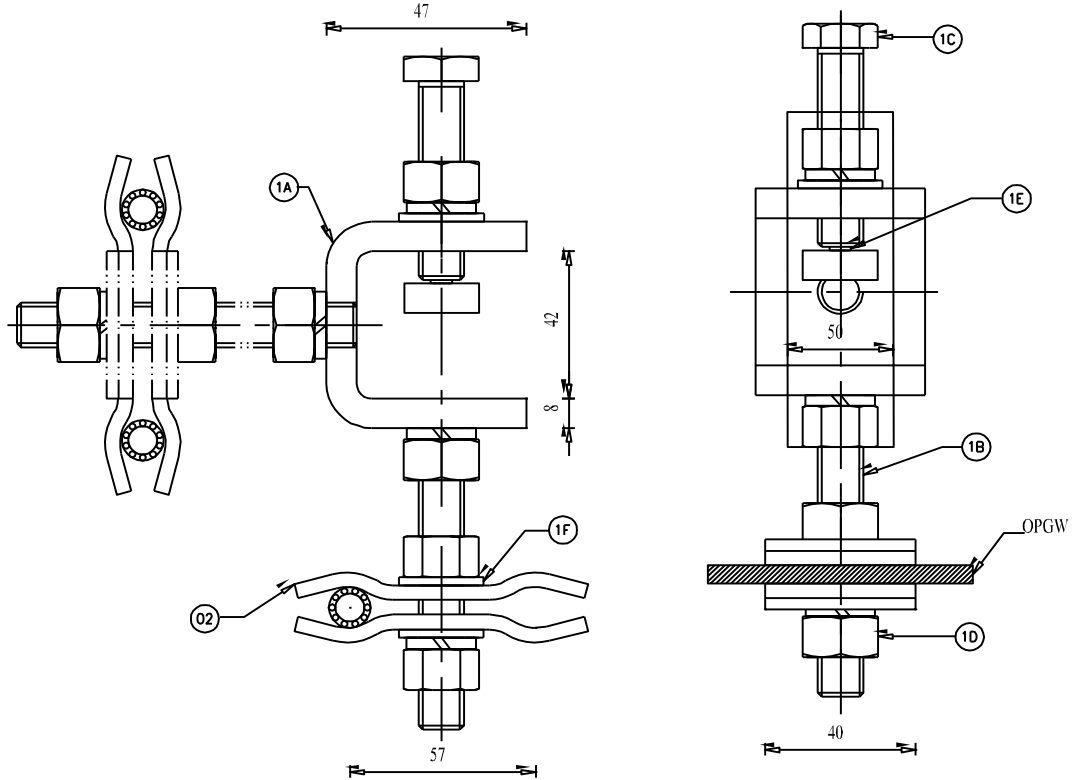
### 2.4.15.8 Single Suspension Clamp with Earth Bond:-



Signature & Stamp of Tenderer

For & on behalf of DFCCIL

### 2.4.15.9 OPGW & ADSS Down-lead Clamp:-



- NOTES :
1. DOWNLEAD CLAMP FIT FOR DIA. RANGE 12.3 MM DIA;
  2. DASHED PART MEAN THE OTHER FIXED DIRECTION;
  3. TOLERANCE: DIMENSION=100mm, ±3mm  
DIMENSION>100mm, ±4%
  4. PART 8004000 (ITEM.2) AND PART DL-5C (ITEM.1) NEED TO BE ASSEMBLED BY CLIENT.

FOR BID PURPOSE ONLY

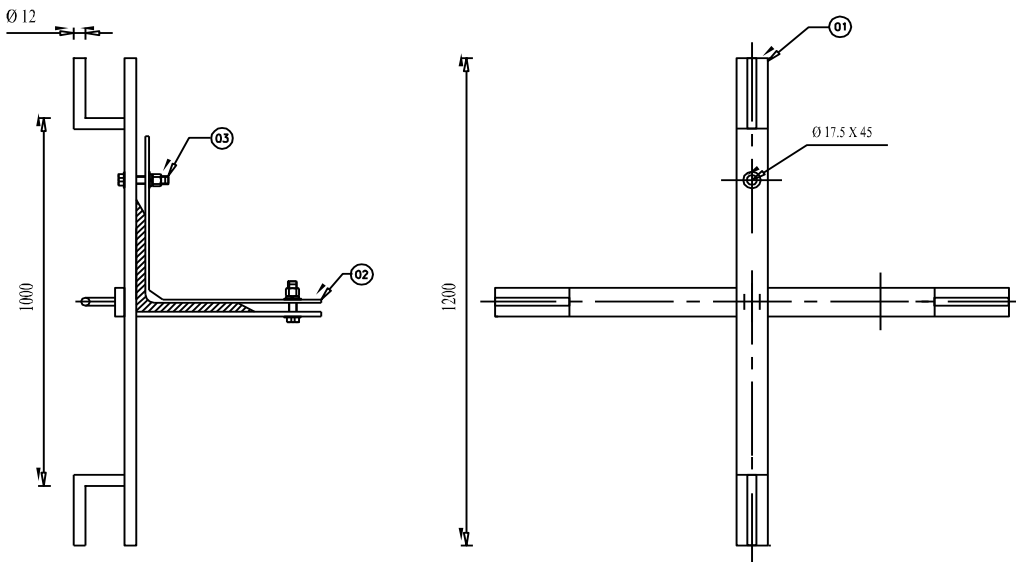
<b>PROJECT:</b>		ENGINEERING OF DIVERSION OF TWO NOS. OF 220 KV D/C TRANSMISSION LINES AT FOUR DIFFERENT LOCATIONS	
<b>OWNER:</b>		RELIANCE INFRASTRUCTURE LTD. 220kv Aarey Receiving Station, D. D. Road, Aarey Colony, Opp. Unit No. 19, Goregoan (E), Mumbai-400065	
<b>CLIENT:</b>		DEDICATED FREIGHT CORRIDOR CORPORATION LTD. 7th floor, Central Railway New Administrative Building D. N. Road, Mumbai-400001	
<b>DFCCIL'S CONSULTANT:</b>		TAKALKAR POWER ENGINEERS & CONSULTANTS PVT.LTD. 404-406, B-WING, MOHALLA BUSINESS CENTRE, NR. MANJALPUR RAILWAY CROSSING, MANJALPUR, VADODARA - 390 011	
<b>TPEC DRG. NO.:</b>		MUM/EL/UTILITY/REL-A/CONSULT/239/2015/5.2.1/4B/RTE	
<b>VENDOR</b>		<b>DATE</b>	
<b>PREPARED</b>		<b>NAME</b>	
<b>CHECKED</b>		<b>SIGN.</b>	
<b>APPROVED</b>		<b>TITLE:</b>	
<b>DEPARTMENT</b>		OPGW & ADSS DOWNLEAD CLAMP CABLE DIAMETER RANGE:11.5-12.8mm FOR 4BC OPGW	
<b>SCALE:-</b>		<b>SPEC. NO.:</b>	
N.T.S		SHT: 01 OF 01 REV: 0	

ITEM	QTY.	DESCRIPTION	REF. NO.	MATERIAL	UNIT WT.(kg)	TOTAL WT(kg)
2	1	CLAMP	-----	GALV. STEEL	0.15	0.8
1F	2	WASHER	-----	GALV. STEEL	0.01	
1E	3	SPRING WASHER	-----	GALV. STEEL	0.01	
1D	4	NUT	-----	GALV. STEEL	0.02	
1C	1	M12 X 70 BOLT	-----	GALV. STEEL	0.11	
1B	1	M12 X 135 BOLT	-----	GALV. STEEL	0.1	
1A	1	TOWER MOUNTING KIT BODY	-----	GALV. STEEL	0.4	
1	1	TOWER MOUNTING KIT	DL -5C	GALV. STEEL	-----	

Signature & Stamp of Tenderer




For & on behalf of DFCCIL

### 2.4.15.10 Surplus Cable Support:-



NOTES :

1. MATERIAL: GALV. STEEL.
2. FIT TO TOWER, ANGLE STEEL, WIDTH 80-200mm;
3. TOLERANCE: DIMENSION=100mm, ±3mm  
DIMENSION>100mm, ±4%

FOR BID PURPOSE ONLY					
<b>PROJECT:</b>		ENGINEERING OF DIVERSION OF TWO NOS. OF 220 KV D/C TRANSMISSION LINES AT FOUR DIFFERENT LOCATIONS			
<b>OWNER:</b>		 <b>RELIANCE INFRASTRUCTURE LTD.</b> 220kv Aarey Receiving Station, D. D. Road, Aarey Colony, Opp. Unit No. 19, Goregoan (E), Mumbai 400065			
<b>CLIENT</b>		 <b>DEDICATED FREIGHT CORRIDOR CORPORATION LTD.</b> 7th floor, Central Railway New Administrative Building D. N. Road, Mumbai-400001			
<b>DFCCIL'S CONSULTANT</b>		 <b>TAKALKAR POWER ENGINEERS &amp; CONSULTANTS PVT.LTD.</b> 404-406, B-WING, MONALISA BUSINESS CENTRE, NO. MANJALPUR RAILWAY CROSSING, MANJALPUR, ANDHRA - 500 011			
<b>TPCC ORG. NO.:</b>		MUMEL/UTILITY/REL-A/CONSULT/239/2015/6.2.1/48/SCS			<b>REV. 00</b>
<b>VENDOR</b>		<b>DATE</b>	<b>NAME</b>	<b>SIGN.</b>	<b>TITLE:</b>
<b>PREPARED</b>		19.09.2016	AL		<b>SURPLUS CABLE SUPPORT (FOR 48C OPGW)</b>
<b>CHECKED</b>		19.09.2016	MSJ		
<b>APPROVED</b>		23.09.2016	KGG		
<b>DEPARTMENT</b>					
<b>SCALE:-</b>		N.T.S		<b>SPEC. NO.:</b>	
				SHT: 01 OF 01 REV: 00	

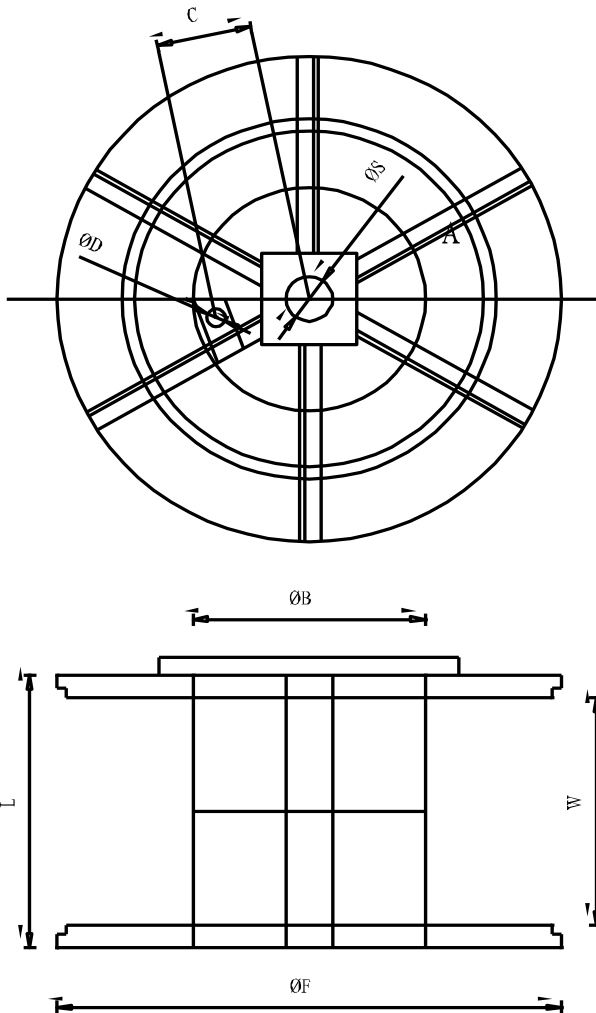
ITEM	QTY.	DESCRIPTION	REF. NO.	MATERIAL	UNIT WT.(kg)	TOTAL WT(kg)
3	2	BOLT	M16 X 65	GALV. STEEL	0.2	15.2
2	1	FIXING BAR	-----	GALV. STEEL	3.0	
1	1	CROSS TRAY SUPPORT	-----	GALV. STEEL	12.0	

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

### 2.4.15.11 Steel Reinforced Wood Reel:-

FLANGE DIA F(mm)	BARREL DIA B(mm)	TRANSVERSE DIA W(mm)	SPINDLE HOLE DIA S(mm)	DRIVE PIN DIA D(mm)	OVERALL WIDTH L(mm)	DRIVE PIN POSITION C(mm)
1220	610	813	78	38	1020	300+/-30
1370	711	813	78	38	1050	300+/-30
1450	813	813	78	38	1050	300+/-30

**OPGW (SFSJ-J-5370)**

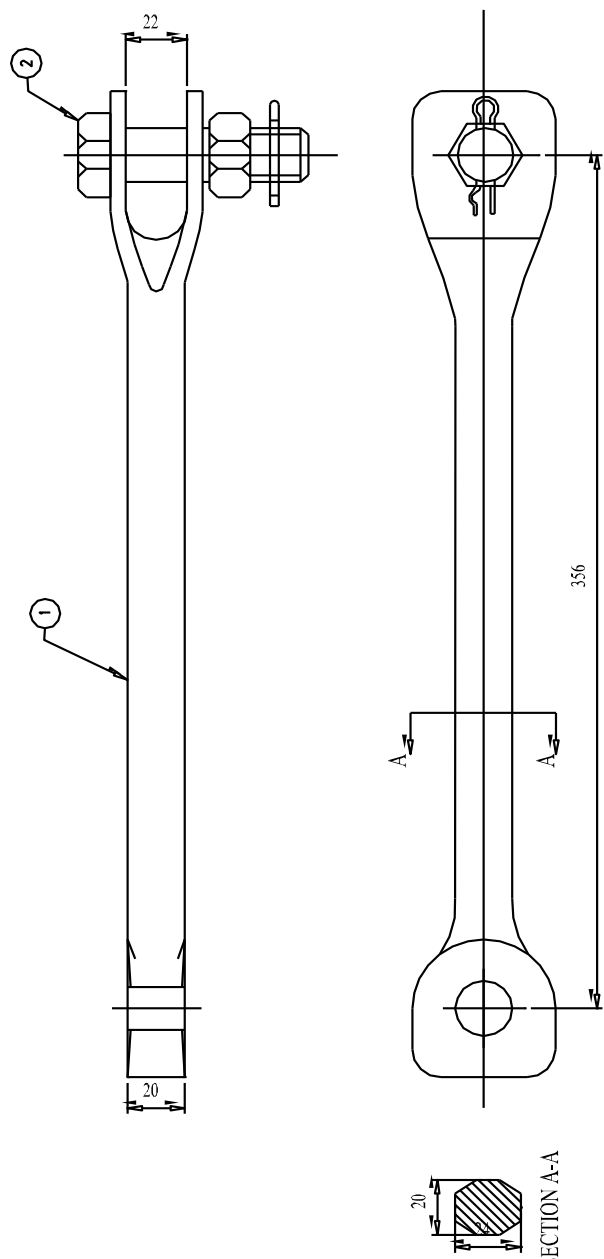
FOR BID PURPOSE ONLY																					
<b>PROJECT:</b>	ENGINEERING OF DIVERSION OF TWO NOS. OF 220 KV D/C TRANSMISSION LINES AT FOUR DIFFERENT LOCATIONS																				
<b>OWNER:</b>	RELIANCE INFRASTRUCTURE LTD. 220kv Aarey Receiving Station, D. D. Road, Aarey Colony, Opp. Unit No. 19, Goregoan (E), Mumbai 400065																				
<b>CLIENT:</b>	DEDICATED FREIGHT CORRIDOR CORPORATION LTD. 7th floor, Central Railway New Administrative Building D. N. Road, Mumbai-400001																				
<b>DFCCIL'S CONSULTANT:</b>	<b>TAKALKAR POWER ENGINEERS &amp; CONSULTANTS PVT.LTD.</b> 401-402, 8-10th, HANUMANI BUSINESS CENTRE, RD. HANUMANI BUSINESS CENTRE, HANUMANI BUSINESS CENTRE - 400 011																				
<b>WPC ORL NO.:</b>	U/MD/UTCL/REL-ACONSULT/239/2015/S.2.1/AB/SRWK <span style="float: right;">REV. 00</span>																				
<b>VENDOR:</b>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>DATE</th> <th>NAME</th> <th>SIGN.</th> <th>TITLE:</th> </tr> <tr> <td>PREPARED 19.09.2016</td> <td>AL</td> <td></td> <td></td> </tr> <tr> <td>CHECKED 23.09.2016</td> <td>WGI</td> <td></td> <td></td> </tr> <tr> <td>APPROVED 23.09.2016</td> <td>MDG</td> <td></td> <td></td> </tr> <tr> <td colspan="4"><b>DEPARTMENT:</b></td> </tr> </table>	DATE	NAME	SIGN.	TITLE:	PREPARED 19.09.2016	AL			CHECKED 23.09.2016	WGI			APPROVED 23.09.2016	MDG			<b>DEPARTMENT:</b>			
DATE	NAME	SIGN.	TITLE:																		
PREPARED 19.09.2016	AL																				
CHECKED 23.09.2016	WGI																				
APPROVED 23.09.2016	MDG																				
<b>DEPARTMENT:</b>																					
<b>SCALE:-</b> N.T.S	<b>SPEC. NO.:</b> <div style="text-align: right; color: blue; font-weight: bold;">STEEL REINFORCED WOOD REEL (FOR 40C OPGW)</div>																				

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

**2.4.15.12 Extension Link for Tension Assembly:-**

NO	QTY	NAME	CODE	MATERIAL	WEIGHT (kg)
2	1	Bolt Assembly	BS-18X75	—	1.4
1	1	EB BODY	TCB-27-A	Cal. ductile iron	

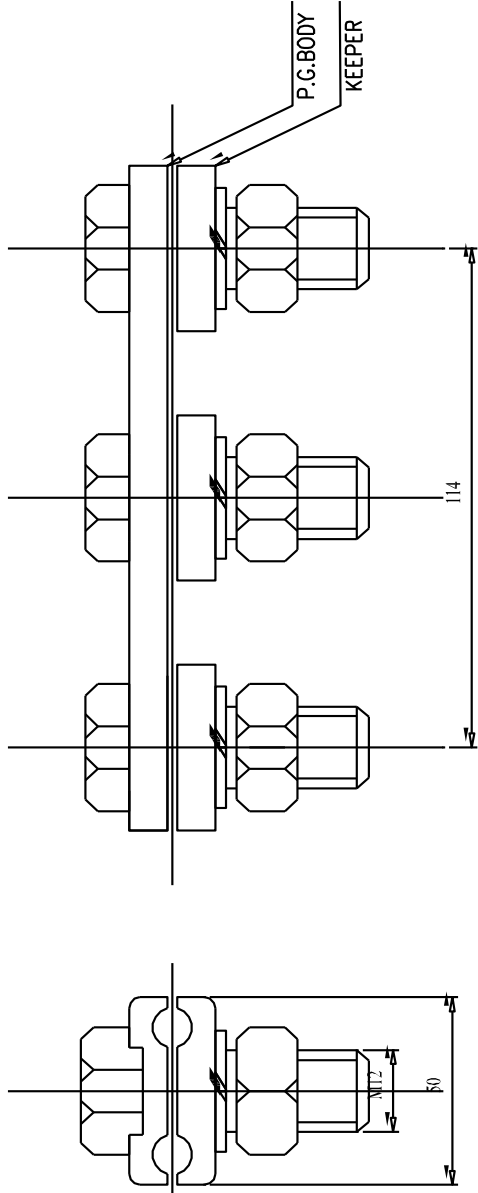
**NOTE:-**  
 1) THE BREAK STRENGTH IS NOT LESS THAN 120kN.  
 2) BOLT GRADE IS 6.8.  
 3) DIMENSION TOLERANCE : <50MM, ±2mm,  
 >50MM, ±4%.

FOR BID PURPOSE ONLY	
<b>PROJECT:</b>	ENGINEERING OF DIVERSION OF TWO NOS. OF 220 KV D/C TRANSMISSION LINES AT FOUR DIFFERENT LOCATIONS
<b>OWNER:</b>	RELIANCE INFRASTRUCTURE LTD. 220kv Aarey Receiving Station, D. D. Road, Aarey Colony, Opp. Unit No. 19, Goregoan (E), Mumbai 400065
<b>CLIENT</b>	DFCCIL 7th floor, Central Railway New Administrative Building D. N. Road, Mumbai-400001
<b>DFCCIL'S CONSULTANT</b>	<b>TAKALKAR POWER ENGINEERS &amp; CONSULTANTS PVT.LTD.</b> 404-430, B-WING, HONOLULU BUSINESS CENTRE, NE. MANALPUR RAILWAY CROSSING, MANALPUR, VADODRA - 390 011
<b>TPEC ORG. NO.:</b>	MUM/EL/UTILITY/REL-A/CONSULT/239/2015/5.2.1/4B/EL
<b>VENDOR</b>	DATE NAME SIGN. TITLE:
<b>PREPARED</b>	9.09.2016 A.L.
<b>CHECKED</b>	9.09.2016 M.G.
<b>APPROVED</b>	23.09.2016 H.G.
<b>DEPARTMENT</b>	
<b>EXTENSION LINK FOR TENSION ASSEMBLY (4BC OPCW)</b>	
<b>SCALE:-</b>	N.T.S
<b>SPEC. NO.:</b>	
SHT: 01 OF 01 REV: 0	

Signature & Stamp of Tenderer




For & on behalf of DFCCIL

### 2.4.15.13 Parallel Clamp:-



**NOTE:-**

- 1) MATERIAL OF BODY AND KEEPER : ALUMINUM ALLOY.
- 2) BOLT GRADE IS 4.8.
- 3) WEIGHT : 0.4 KG.
- 4) CABLE DIAMETER RANGE : 10.8 MM- 14.0MM.
- 5) DIMENSION TOLERANCE : <50MM, ±2mm.  
≥50MM, ±4%.

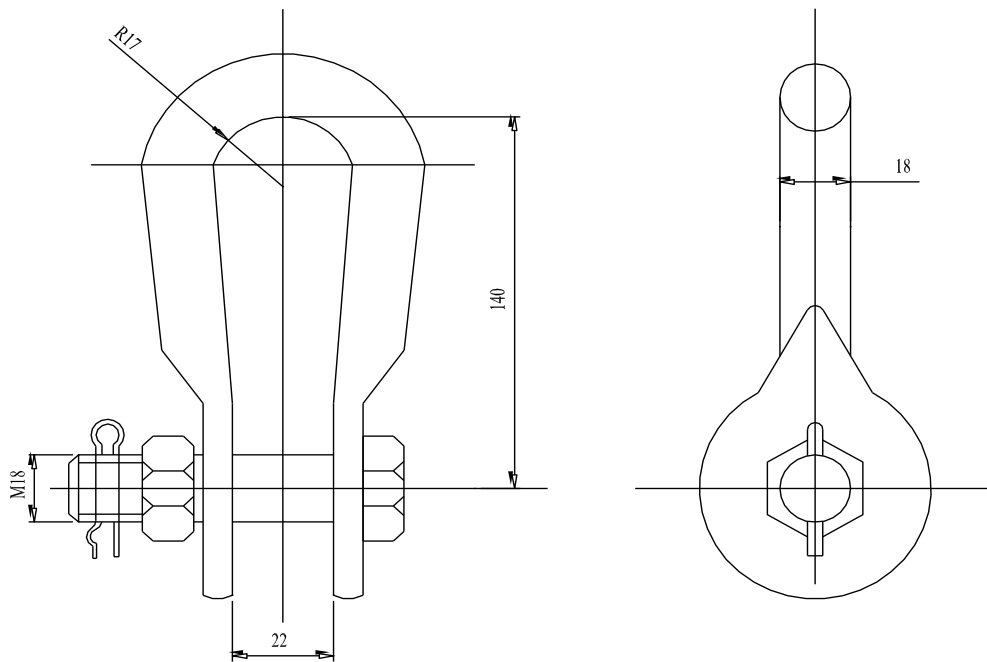
FOR BID PURPOSE ONLY			
<b>PROJECT:</b>	ENGINEERING OF DIVERSION OF TWO NOS. OF 220 KV D/C TRANSMISSION LINES AT FOUR DIFFERENT LOCATIONS		
<b>OWNER:</b>	 RELIANCE INFRASTRUCTURE LTD. 220kv Aarey Receiving Station, D. D. Road, Aarey Colony, Opp. Unit No. 19, Goregoan (E), Mumbai 400065		
<b>CLIENT</b>	 DEDICATED FREIGHT CORRIDOR CORPORATION LTD. 7th floor, Central Railway New Administrative Building D. N. Road, Mumbai-400001		
<b>DFCCIL'S CONSULTANT</b>	 <b>TAKALKAR POWER ENGINEERS &amp; CONSULTANTS PVT.LTD.</b> 404-450, 8-ROUND, HONOLULU BUSINESS CENTRE, NO. MANALPURI RAILWAY CROSSING, MANALPURI, YADODARA - 380 011		
<b>TPEC ORG. NO.:</b>	MUM/EL/UTILITY/REL-A/CONSULT/239/2015/5.2.1/48/PG		REV. 00
<b>VENDOR</b>	<b>DATE</b>	<b>NAME</b>	<b>SIGN. TITLE:</b>
PREPARED	19.09.2016	A.L.	
CHECKED	19.09.2016	MGJ	
APPROVED	23.09.2016	KGJ	
<b>DEPARTMENT</b>			
<b>PARALLEL CLAMP (FOR 48C OPGW)</b>			
<b>SCALE:-</b>	N.T.S		
<b>SPEC. NO.:</b>			
SHT. 01 OF 01 REV.0			

Signature & Stamp of Tenderer

For & on behalf of DFCCIL






#### 2.4.15.14 U-Shackle for Tension Assembly:-



**NOTE:-**

- NOTE:-
- 1) BODY MATERIAL : GALVANIZED STEEL.
  - 2) BREAK STRENGTH IS NOT LESS THAN 100 KN.
  - 3) BOLT GRADE IS 4.8.
  - 4) WEIGHT : 0.9 kg.
  - 5) DIMENSSION TOLERANCE : <50MM ±2mm,  
≥50MM ±4%.

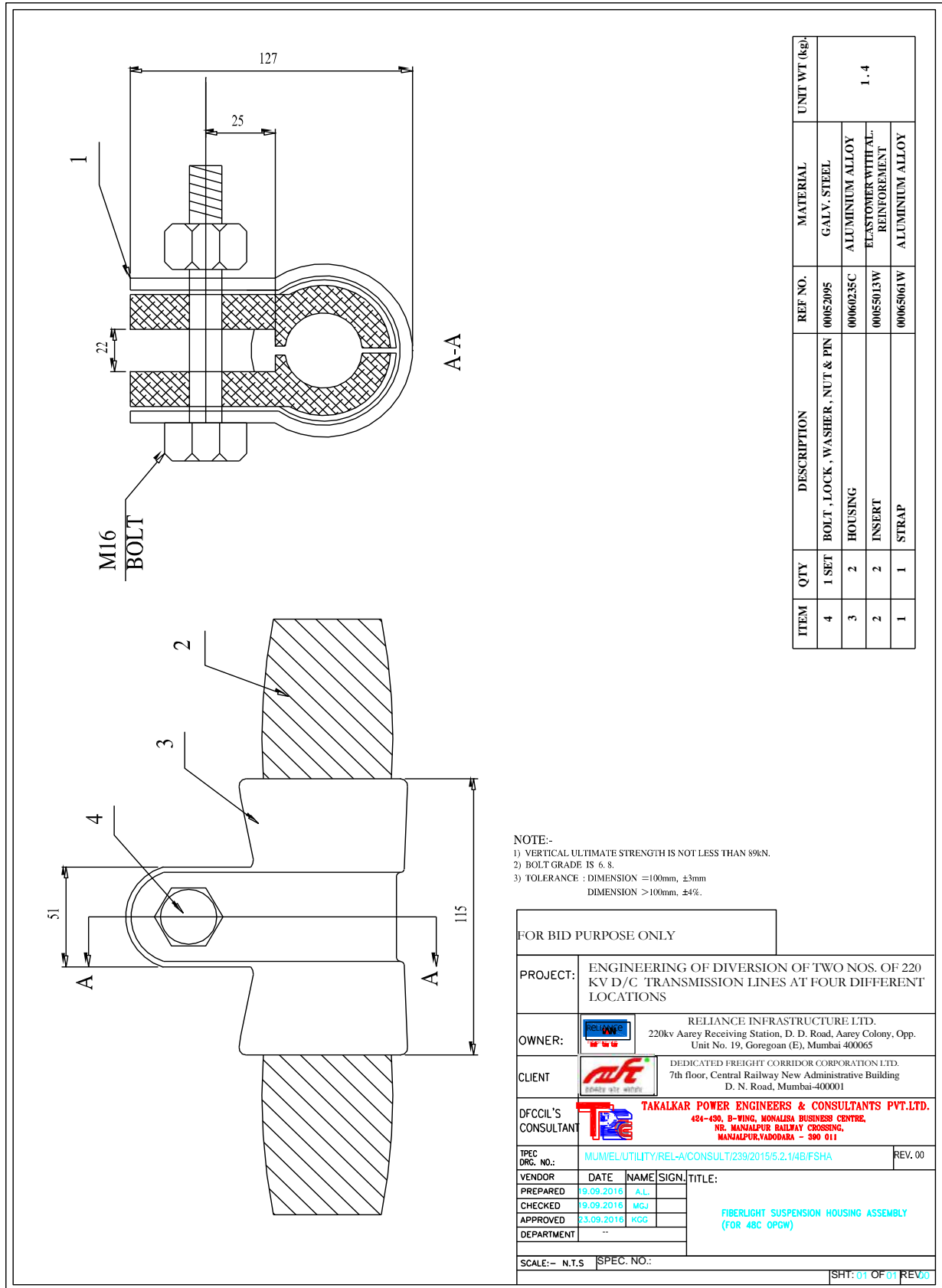
FOR BID PURPOSE ONLY

PROJECT:	ENGINEERING OF DIVERSION OF TWO NOS. OF 220 KV D/C TRANSMISSION LINES AT FOUR DIFFERENT LOCATIONS				
OWNER:	 RELIANCE INFRASTRUCTURE LTD. 220kv Aarey Receiving Station, D. D. Road, Aarey Colony, Opp. Unit No. 19, Goregaon (E), Mumbai 400065				
CLIENT	 DEDICATED FREIGHT CORRIDOR CORPORATION LTD. 7th floor, Central Railway New Administrative Building D. N. Road, Mumbai-400001				
DFCCIL'S CONSULTANT	 <b>TAKALKAR POWER ENGINEERS &amp; CONSULTANTS PVT.LTD.</b> 424-430, B-WING, MONALISA BUSINESS CENTRE, NW, MANALPUR RAILWAY CROSSING, MANALPUR,VADODARA - 390 011				
TPEC DRG. NO.:		MUM/EL/UTILITY/REL-A/CONSULT/2392015/5,2,14B/US2			REV. 00
VENDOR	DATE	NAME	SIGN.	TITLE:  U SHACKLE FOR TENSION ASSEMBLY (FOR 48C OPGW)	
PREPARED	9.09.2016	A.L.			
CHECKED	9.09.2016	MGJ			
APPROVED	23.09.2016	KGG			
DEPARTMENT	---				
SCALE: - N.T.S		SPEC. NO.:			
[SHEET: 01 OF 01 REV.00]					

Signature &amp; Stamp of Tenderer

For &amp; on behalf of DFCCIL

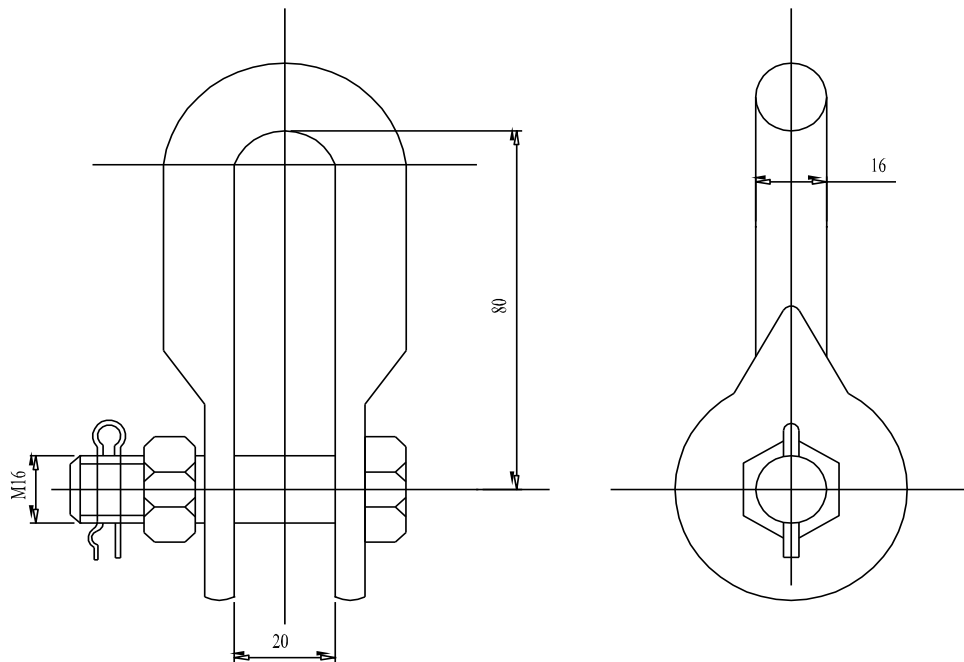
### 2.4.15.15 Fiber light Suspension Housing Assembly:-



Signature & Stamp of Tenderer




For & on behalf of DFCCIL

2.4.15.16 70kN U Shackle (Suspension Assembly):-



NOTE:-

- NOTE:-
- 1) BODY MATERIAL : GALVANIZED STEEL.
  - 2) BREAK STRENGTH IS NOT LESS THAN 70 kN.
  - 3) WEIGHT : 0.5 kg.
  - 4) BOLT GRADE IS 4.8.
  - 5) DIMENSION TOLERANCE (EXCEPT HOLES AND BOLTS) :  $<50\text{MM} \pm 2\text{mm}$ ,  
 $>50\text{MM} \pm 4\%$ .

FOR BID PURPOSE ONLY				
PROJECT:	ENGINEERING OF DIVERSION OF TWO NOS. OF 220 KV D/C TRANSMISSION LINES AT FOUR DIFFERENT LOCATIONS			
OWNER:		RELIANCE INFRASTRUCTURE LTD. 220kv Aarey Receiving Station, D. D. Road, Aarey Colony, Opp. Unit No. 19, Goregaon (E), Mumbai 400065		
CLIENT		DEDICATED FREIGHT CORRIDOR CORPORATION LTD. 7th floor, Central Railway New Administrative Building D. N. Road, Mumbai-400001		
DFCCIL'S CONSULTANT	 <b>TAKALKAR POWER ENGINEERS &amp; CONSULTANTS PVT.LTD.</b> 424-430, 8-WING, MONALISA BUSINESS CENTRE, NR. MANJAPUR RAILWAY CROSSING, MANJAPUR, YADODRAHA - 390 011			
TPC ORG. NO.: MUM/EL/UTILITY/REL-A/CONSULT/239/2015/5.2, 1/4B/US1				REV. 00
VENDOR	DATE	NAME	SIGN.	TITLE:
PREPARED	19.09.2016	A.L.		
CHECKED	19.09.2016	MGJ		
APPROVED	23.09.2016	KGC		70KN U SHACKLE (SUSPENSION ASSEMBLY ) (4BC OPGW)
DEPARTMENT	---			
SCALE:- N.T.S		SPEC. NO.:		

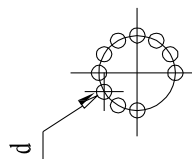
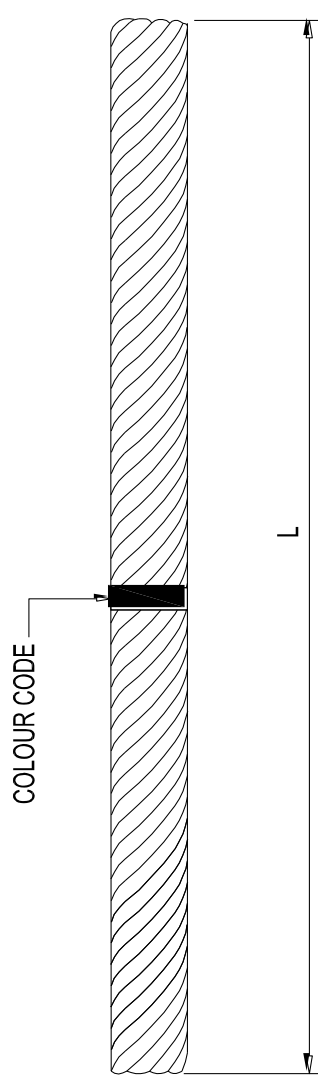
Signature &amp; Stamp of Tenderer

For &amp; on behalf of DFCCIL




### 2.4.15.17 Armor Rods for Dampers:-

CABLE RANGE (mm)	ROD DIA (mm)	RODS/SET	L(mm)	COLOR CODE	WEIGHT(kg).
11.8-12.4	3.07	13	381	GREEN	0.1

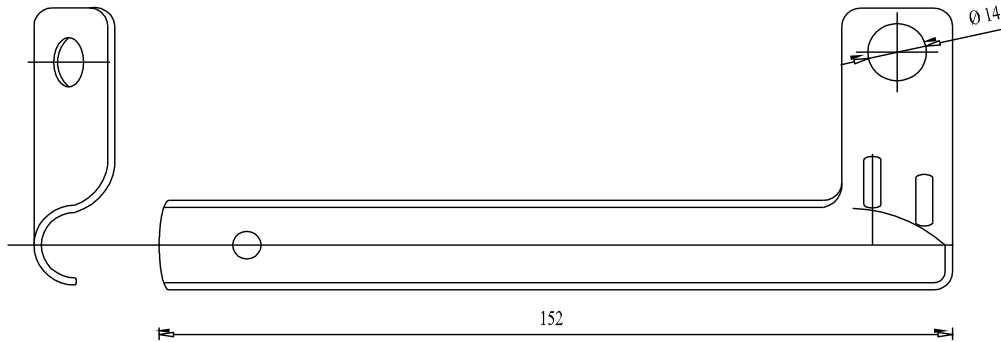
**NOTE:-**  
1) TOLERANCE : DIMENSION = 100m, ±3mm  
DIMENSION > 100m, ±30mm

FOR BID PURPOSE ONLY			
PROJECT:	ENGINEERING OF DIVERSION OF TWO NOS. OF 220 KV D/C TRANSMISSION LINES AT FOUR DIFFERENT LOCATIONS		
OWNER:	 RELIANCE INFRASTRUCTURE LTD. 220kv Aarey Receiving Station, D. D. Road, Aarey Colony, Opp. Unit No. 19, Goregoan (E), Mumbai 400065		
CLIENT:	 DEDICATED FREIGHT CORRIDOR CORPORATION LTD. 7th floor, Central Railway New Administrative Building D. N. Road, Mumbai-400001		
DFCCIL'S CONSULTANT:	 TAKALKAR POWER ENGINEERS & CONSULTANTS PVT.LTD. 424-430, B-WING, MONALISA BUSINESS CENTRE, NRI MANALPUR RAILWAY CROSSING, MANALPUR, YADODARA - 390 011		
TPCC DRG. NO.:	MUM/EL/UTILITY/REL-A/CONSULT/239/2015/5.2.1/4B/ARD		REV. 00
VENDOR	DATE	NAME	SIGN. TITLE:
PREPARED	19.09.2016	A.L.	
CHECKED	19.09.2016	MGJ	
APPROVED	23.09.2016	KGG	
DEPARTMENT	--		
ARMOR RODS FOR DAMPERS (FOR 48C OPGW)			
SCALE:-	N.T.S	SPEC. NO.:	
			SHT: 01 OF 01 REV: 00




Signature & Stamp of Tenderer

For & on behalf of DFCCIL

**2.4.15.18 Current Trans Tab (Suspension Assembly):-**



- NOTES :
1. BODY MATERIAL: ALUMINUM ALLOY;
  2. FIT FOR OPGW DIAMETER RANGE: 11.7-12.9mm,  
THIS PRODUCT IS INSTALLED ON THE  
OUTSIDE OF SSR OF SUSPENSION;
  3. SHORT TIME CURRENT CAPACITY IS 150KA'S.

FOR BID PURPOSE ONLY				
PROJECT:	ENGINEERING OF DIVERSION OF TWO NOS. OF 220 KV D/C TRANSMISSION LINES AT FOUR DIFFERENT LOCATIONS			
OWNER:	 RELIANCE INFRASTRUCTURE LTD. 220kv Aarey Receiving Station, D. D. Road, Aarey Colony, Opp. Unit No. 19, Goregoan (E), Mumbai 400065			
CLIENT:	 DEDICATED FREIGHT CORRIDOR CORPORATION LTD. 7th floor, Central Railway New Administrative Building D. N. Road, Mumbai-400001			
DFCCIL'S CONSULTANT:	 <b>TAKALKAR POWER ENGINEERS &amp; CONSULTANTS PVT.LTD.</b> 424-430, B-WING, MONALISA BUSINESS CENTRE, NR. MANJALPUR RAILWAY CROSSING, MANJALPUR, VADODARA - 390 011			
TPEC DRG. NO.:	MUM/EL/UTILITY/REL-A/CONSULT/7239/2015/5.2.1/4B/CTB			REV. 00
VENDOR	DATE	NAME	SIGN.	TITLE:
PREPARED	19.09.2016	A.L.		CURRENT TRANS TAB FOR 48C OPGW (SUSPENSION ASSEMBLY)
CHECKED	19.09.2016	MCJ		
APPROVED	23.09.2016	KGG		
DEPARTMENT	--			
SCALE:- N.T.S		SPEC. NO.:		
				SHT: 01 OF 01 REV: 00

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

**PART-II**

**CHAPTER-V**

**TECHNICAL SPECIFICATION**

**OF**

**SILICON RUBBER COMPOSITE /**

**POLYMER LONG ROD INSULATORS**

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

## **PART-II**

### **Chapter-V**

# **TECHNICAL SPECIFICATION** **FOR** **SILICON RUBBER COMPOSITE / POLYMER LONG ROD** **INSULATORS**

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## **PART-II**

### **CHAPTER-V**

#### **TECHNICAL SPECIFICATION**

#### **FOR**

#### **SILICON RUBBER COMPOSITE / POLYMAR LONG ROD INSULATORS**

##### **2.5.1 Scope:-**

This specification covers design, manufacture, testing at manufacturer's works before dispatch and supply of Silicon Rubber Composite ling rod Insulators.

##### **2.5.2 Codes and Standards:-**

2.5.2.1 The insulators shall comply in all respects with IEC standards 61109 Edition 2.02008-05, 62217-2005, 62039 60120, 20 & 60120, 16/16A, 60815-1986, 60587 method 1, class 1A4.5 or 1B4.5, 60383-1 & 60383-2 or ANSI C29.11, 29.12, ASTM A153 with their latest amendments & editions.

2.5.2.2 Insulators conforming to any other internationally accepted standards, which ensure equal or higher quality than the standards mentioned above will also be acceptable. Where the material is offered according to any such international standard, an English version of the standard shall be attached to the tender.

##### **2.5.3 General Requirements:-**

For evaluation of bidder's qualifications, bidder should submit a reference list showing supply experience of polymer insulators of the manufacturer. The polymer insulators shall be designed, manufactured and tested in accordance with the requirements of the following standards unless otherwise noted. Manufacturer shall be in the approved list of vendors of State/Centre power utility companies. Latest approved copy shall be submitted for vendor approval.

(i)	IEC pub. 61109 Edition 2.0 2008-05: Composite insulators for A.C. overhead lines with a nominal voltage greater than 1000V- Definitions, test method and acceptance criteria.
(ii)	IEC Pub. 60815-1986: Guide for the selection of Insulators in respect of polluted conditions.
(iii)	IEC 60120-For the selection of coupling
(iv)	IEC Pub: 60587 for Track resistance of the material
(v)	IEC 62039 Selection guide for polymeric materials for outdoor use under HV stress.
(vi)	IEC- 60383 for galvanizing thickness or ANSI C 29.11, 29.12/ASTM A 153 or any other with latest amendments.
(vii)	IEC Pub 62217-2005 Polymeric insulators for indoor & outdoor use with nominal voltage > 1000v-General definitions test methods and acceptance criteria.

**Note:** The manufacturer must be an ISO: 9001 certified company.

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#### 2.5.4 **Locations:-**

The Silicone Rubber Composite Insulators are to be used for the 220 KV lines located near thermal power stations using coal, near sea coast and in the vicinity of cement factories which are getting polluted by certain deposits from the sea, salt deposits in the water vapor from cooling towers coal dust & cement/Fly ash & also Highly polluting Gases as H<sub>2</sub>S & NH<sub>3</sub>.

H<sub>2</sub>S → 209.96 ppb.

NH<sub>3</sub> → 38001 ppb.

#### 2.5.5 **Design and Type:-**

2.5.5.1 The size of long rod insulator, minimum creepage distance, the number to be used in different type of strings, their electromechanical strength and mechanical strength of insulator string along with hardware fittings shall be as follows:

Sr. No.	Type of String	Size of composite Insulator (*Core dia. x Nominal length)(mm)	Minimum Creepage Distance (mm)	Electro-Mechanical Strength of Insulator Unit (KN)	Mechanical Strength of Insulator String along with Hardware fittings (KN)
1	Suspension	20 x 2175	8600	90	90
2	Tension	20 x 2175	8600	120	120

\* The core dia. of composite insulators is indicative only. The bidder shall offer Composite long rod insulators of suitable core dia. to meet specified E&M strength requirements.

2.5.5.2 Insulators shall have sheds of the open aerodynamic or shallow under rib profile or a combination of both with good self-cleaning properties. Insulator shed profile, spacing projection etc. shall be decided as per relevant practices but in keeping mind a very highly linearized voltage distribution decided only after a 3D study of Electric Field Voltage Distribution with corona rings and without corona rings by industry approved software tools and attain the best of the class Electric Field Voltage Distribution. A copy of values shall be submitted along with the offer and shall be revalidated with actual insulator design before mass production clearance from the Engineer.

2.5.5.3 The overall shed and shank diameter design calculations shall be submitted. It is suggested to have s/p equal to or greater than 1 where 's' stands for shed spacing and 'p' stands for shed projection. Similarly the shank diameter also needs to design keeping in view salinity resistance.

2.5.5.4 All insulators shall be designed and proportioned such that any dust, external contamination on the surface gets cleaned itself and does not require any washing or cleaning throughout the life of transmission line of minimum 40 years. However, the insulator shall be capable of withstanding high-pressure water washing.

#### 2.5.6 **Type Tested Insulators:-**

Type Test Certificate of Silicon Rubber Composite Insulators from a Government or NABL accredited laboratory shall be submitted by the bidder before starting commercial production of the same. Type test certificate should not be older than 5 years from the date of submission of Bid. If Type test results of Silicon Rubber Composite Insulators are not available, the bidder shall arrange the same at his own cost.

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## 2.5.7 Materials:-

### 2.5.7.1 Core:-

The reinforced E-CR (Electrically Corrosion Resistant) fiberglass core shall be epoxy fiberglass rod having superior electrical performance and mechanical strength & with Brittle Fracture Resistant quality.

(A) The insulator core shall be mechanically and electrically sound, free from voids, foreign substances, and other manufacturing flaws.

(B) Fiberglass Reinforced Plastic is of 20 mm or larger diameter shall be required for insulators of 3 m or longer to prevent excessive bending.

### 2.5.7.2 Housing (Sheath and Sheds):-

(A) The fiberglass core of the polymer insulators shall be equipped with housing made of high temperature vulcanized (HTV) Silicone Rubber. The Silicone elastomeric compound for housing shall have Si-O chemical backbone with fumed Silica and tracking control filler, ATH.

(B) The housing shall be manufactured of 100 percent Silicone Rubber before fillers are added. The housing shall have shore 'A' hardness of not less than 60. The track resistance of the material shall meet IEC 60587 method 1 class 1A4.5 or 1B4.5 requirements.

(C) The housing shall one piece molding of entire weather shed structure (sheds with the shank) on to the Fiberglass Plastic core rod of polymer insulator. The material of sheath and sheds shall be the same (i.e. insulator design shall be with one continuous polymer housing bonded to the central core of the polymer insulator). The distance between adjacent sheds over the sheath should be greater than 25mm.

(D) The interface between the housing and rod shall be chemically bonded to prevent contaminants and moisture ingress. The bonding strength between the sheath and rod shall be greater than the breaking strength of the polymer material itself.

(E) The end fittings (electrodes) shall not be covered with the housing to prevent electrical puncture through the housing.

(F) The minimum thickness to housing shall be not less than 3.0 mm. Shed profile shall be in accordance with IEC pub.60815.

(G) The color of the housing material shall be array, uniform and consistent.

(H) Polymer insulator shall be designed to withstand high-pressure water washing with 3800 kappa, nozzle diameter 6mm the distance of 3m from nozzle to polymer insulator.

### 2.5.7.3 End-fitting:-

(A) The end fittings shall be designed to transmit the mechanical load to the core and to develop the uniform and consistent mechanical strength of the insulators.

(B) The material and the methods used in the fabrication of the end fittings shall be selected to provide good toughness and ductility. The metal shall be heat-treated appropriately to produce the minimum strength and ductility requirements.

(C) Forgings shall be uniform in quality and without sharp edges or corners. Forgings shall be free of cracks, pipe, flakes, heat checks, seams, laps, and silvers, scabs, affected. Before forged end fittings are galvanized, all die flashing shall be carefully removed, without reducing the size below the dimension requirements.

- (D) Castings shall be uniform in quality and without sharp edges or corners. Castings shall be free of cracks, blowholes, shrinkage defects, and localized porosity to the extent that the strength or suitability of the item is affected.
- (E) All ferrous material (except stainless steel) shall be hot-dip galvanized in accordance with ASTM A153. The galvanized thickness shall satisfy IEC Pub.60383-1 clause 26.2.2 and IS: 2633 after the crimping.
- (F) Ball fitting shall be made of forged steel.

**2.5.7.4 Assembly:-**

- (A) The end fittings shall be attached to the core through crimping process (compression) so that end fittings uniformly transmit the mechanical load to the core. In the crimping process, the equipment such as Acoustic Emission Detector which can reject the harmful, cracks occurred on the FRP core shall be applied. The information concerned the above equipment, such as method and description, shall be submitted prior to award of this contract.
- (B) The bonding material used in the construction of insulators, particularly for joining the metal parts with the insulator, shall not cause fracture by expansion or loosening by contraction and must have high compression and shearing strengths and be free from change in volume due to ageing and temperature changes. It shall not give rise to chemical reaction with the metal fittings and/or thermal instability or chemical changes either in the insulator or the metal parts themselves.
- (C) The end fittings of polymer insulators after complete assembly with the core and housing shall be coaxial with one another.

**2.5.7.5 Sealing:-**

The junction of the metal end fitting and housing shall be sealed to prohibit the entrance of the moisture and foreign materials. Bidder is allowed to use properly sealing methods except that RTV Silicone shall not be allowed to be used. System of attachment of end fitting to the rod shall provide superior sealing performance between housing and metal connection. The sealing must be humidity proof.

**2.5.7.6 Marking:-**

The marking shall be put on the end fitting. Marking on the weather shed is not permitted and the characters shall be legible, durable and permanently marked as follows:

- (A) Manufacturer's name or trademark
- (B) Specified mechanical load
- (C) Routine mechanical load
- (D) Year of make and series number
- (E) Country of manufacture
- (F) Purchasers Name (DFCCIL)

**2.5.7.7 Grading Ring:-**

Polymer insulator rated at 150 KV and above shall have grading ring(s) attached. The RIV and corona performance of insulator with corona ring(s) shall conform to the requirement specified in IEC Pub.61109 Amendment-1.

**2.5.8 Dimensions and Tolerances:-**

The Silicone Rubber Composite Insulators covered by this specification shall have the dimensions specified in Annexure-A of this specification subject to the tolerances indicated in relevant IEC standards 61109 Edition 2.0 2008-05, 62217-2005, 60120, 20 & 60120, 16/16A, 60815-1986, 60587 method 1, class 1A 4.5 or 1 B 4.5, 60383-1 or ANSI C29.11, 29.12, ASTM A153 with their latest amendments.

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

### **2.5.9 Workmanship:-**

- 2.5.9.1 The insulators covered by this specification shall be of latest design and conform to the latest scientific methods and shall be suitable for use on 220 kV transmission lines, Sound design, latest manufacturing processes and proper material quality control shall be ensured at various stages. Good finish and elimination of sharp edges and corners shall also be ensured. The Silicone Rubber Composite Insulators shall be free from all sorts of defects. All exposed surfaces shall be smooth and perfect.
- 2.5.9.2 The forged metal sockets and shank pins shall be free from cracks, seams, shrinks, air holes and rough edges. Metal pins shall be free from laps, folds, seams, burrs and rough edges. All surfaces of metal parts shall be perfectly smooth with no projecting points of irregularities.
- 2.5.9.3 All the ferrous parts shall be hot dip galvanized in accordance with the latest edition of ASTM A153 and shall satisfy the tests mentioned in latest edition of ASTM A153. The zinc coating shall be adherent, smooth, reasonably bright, continuous and free from such imperfection like flux, ash rust stains, bulky white deposits and blisters. Bituminous paint coating shall be provided on the metal units after assembly shall be concentric and co-axial within the limits as permitted by the relevant standards.
- 2.5.9.4 The zinc used for galvanizing shall be of grade Zn.99.95 as per ASTM A153/ IEC 61109.
- 2.5.9.5 The manufacturer of the insulators shall guarantee an insulator failure rate not exceeding one in 10000 insulators in one year. In case the annual failure rate exceeds the above limit, the manufacturer shall supply to the owner free of cost spare insulators equal to 10 times the excess failure every year for 25 years of operation.
- 2.5.9.6 The bidder shall guarantee the performance of the insulator under actual use condition for 60 months from the date of commissioning and beyond which for the next 20 years, the bidder shall be responsible for replacement and rectification of latent defects in the product or for catastrophic failure of the product attributable to faulty design, workmanship or any other material related failure. Failure would also include all impending failures as per ageing, FTIR or such tests of predictive nature. The bidder shall guarantee that there shall not be any brittle fracture and breakage of insulators. In event of any brittle fracture or breakage resulting in line drop, the bidder shall have to pay Rs. 1, 00,000/- (Rs. One Lakh) per dropped string towards expenditure to be incurred by the DFCCIL/R-Infra for this line repair. This damage would be concurrent to other punitive steps for failure as described.

### **2.5.10 Test Requirements:-**

All polymer insulators shall have completed the following Design, Type, Sample and Routine tests procedures described in IEC Pub.61109 Edition 2.0 2008-05 & IEC Pub.62217-2005, unless stipulated otherwise in this specification.

#### **(A) Design tests:-**

All the tests shall be performed as per clause 10 of IEC 61109 Edition 2.0 2008-05 & IEC Pub.62217-2005 (Certified test reports based on tests performed prior to award of this contract may be accepted provided that the test requirements and product design have not been changed if design is changed then tests mentioned in IEC 61109 Edition 2.0 2008-05 table-1 has to be carried out).

#### **(i) Test on Inter faces & connection of end fittings:-**

(As per IEC 61109 Edition 2.0 2008-05 Clause 10 & IEC Pub.62217-2005)

- (a) Press stressing
- (b) Water immersion pre-stressing.
- (c) Visual examination.
- (d) Steep-front impulse voltage test.
- (e) Dry power frequency voltage test.

**(ii) Test on shed & housing material:-**

(As per IEC 61109 Edition 2.0 2008-05 Clause 10 & IEC Pub.62217-2005)

- (a) Hardness test.
- (b) Accelerated weathering test.
- (c) Tracking & Erosion test.
- (d) Flammability test.

**(iii) Test on the core material:-**

(As per IEC 61109 Edition 2.0 2008-05 Clause 10 & IEC Pub.62217-2005)

- (a) Dye penetration test.
- (b) Water diffusion test.

**(iv) Assembled core load-time test:-**

(As per IEC 61109 Edition 2.0 2008-05 Clause 10 & IEC Pub.62217-2005)

- (a) Determination of the average failing load of the core of the assembled insulator.
- (b) Control of the slope of the strength-time curve of the insulator.

**(v) Additional tests:-**

- (a) Brittle fracture resistance test.
- (b) Accelerated Ageing Test of 5000 hours.
- (c) Ozone Resistance test.
- (d) Energy Dispersive Analysis of X-Rays.
- (e) (EDAX) for element Analysis of surface.
- (f) Surface analysis by optical spectrograph.
- (g) FTIR Signature analysis.

**(B) Type tests:-**

The following tests shall be performed as per clause 11 of IEC 61109 Edition 2.0 2008-05 & IEC 60383-2: (Certified test reports (not older than 5 years) based on tests performed prior to award of this contract may be accepted provided that the test requirements and product design have not changed).

- (i) Dry lightning impulse withstand voltage test (IEC 61109 Edition 2.0 2008-05 clause 11.1)
- (ii) Wet power-frequency test (IEC 61109 Edition 2.0 2008-05 clause 11.1)
- (iii) Wet switching impulse withstand voltage test (highest voltage: above 300 KV) (IEC 61109 Edition 2.0 2008-05 clause 11.1)
- (iv) Damage limit proof test & test of the interface between end fittings & insulator housing (IEC 61109 Edition 2.0 2008-05, clause 12.2)
- (v) Radio interference voltage test (IEC 61109 Amendment 1 clause 6.5)
- (vi) Salt-fog pollution withstand test
- (vii) All the electrical tests shall be performed on insulators with grading ring (s) if applicable. The type test must have been conducted on the offered insulator from a recognized test lab not earlier than 2012. The offer received without type test report shall be treated as non-responsive.



**(C) Sample tests:-**

As a rule, the manufacturer shall carryout sample tests as the witness test as per IEC 61109 Edition 2.0 2008-05 clause 12. The following tests shall be performed on insulators taken at random from lots offered for acceptance. (IEC 61109 Edition 2.0 2008-05 clause 12.6 is applicable to the manufacturer)

- (i) Verification of dimensions (IEC 61109 Edition 2.0 2008-05 clause 12.2)
- (ii) Verification of the locking system (IEC 61109 Edition 2.0 2008-05 clause 12.3)
- (iii) Verification of tightness of the interface between end fittings and insulator housing (E2) and of the specified mechanical load, SML (E1) (IEC 61109 Edition 2.0 2008-05 clause 12.4) Galvanizing test (IEC 61109 Edition 2.0 2008-05 clause 12.5)

**(D) Routine tests:-**

The following tests shall be performed on every insulator offered for acceptance.

- (i) Mechanical routine test (IEC 61109 Edition 2.0 2008-05 clause 13.1)
- (ii) Visual examination (IEC 61109 Edition 2.0 2008-05 clause 13.2)

**(E) Tests during Manufacture:-**

- (i) Chemical analysis of zinc used for galvanizing.
- (ii) Chemical analysis, mechanical, metallographic test and magnetic particle inspection for castings.
- (iii) Chemical analysis hardness tests and magnetic particle inspection for forgings
- (iv) Autoclave Test on Cement

**(F) For FTIR** Signature analysis specified, the Engineer shall withdraw the insulators at some locations on a mutually agreed schedule as per International practices and sent those used insulators to the bidder for various tests to have a clear understanding of any evolving defects and more importantly to track the variation in signature values of key parameters of the product. The bidder shall associate the original manufacturers of Silicone and E-CR fiber rod and others and also share the complete report. The Engineer reserves the right to witness any or all the tests. The bidder shall be responsible for performing this analysis and giving the test reports.

**(G) Random Repetition of Routine and Acceptance tests:-**

- (i) The Engineer may repeat any test mentioned above once for each lot by drawing random samples from the site at no extra cost. Bidder shall arrange to receive the sample and arrange for testing. The Engineer shall also check the mechanical soundness through ultrasound or other suitable techniques of 10% of the insulators selected randomly at site in coordination with the bidder.
- (ii) E&M test on 5 nos. for composite insulator of samples from whole lot received at site shall be conducted by Engineer. The bidder will give 100% co-operation in this regard. This testing will be done only when type testing is done at testing laboratory other than M/s CPRI, Bangalore.
- (iii) In case of failure, it will be repeated on double no. of samples and if it again fails, the whole lot should be rejected and shall be replaced by the bidder. The samples have to be taken at random after segregating insulators damaged in transportation or taken at random after segregating insulators damaged in transportation or otherwise.



**2.5.11 Inspection:-**

The Engineer's representatives shall have access to the manufacturer's works for purpose of inspection of the manufacture of the materials covered by this specification. 15 days' notice shall invariably be given to the Engineer/DFCCIL for arranging inspection of the materials. The Engineer/DFCCIL will not be responsible for any delay if notice of 15 days is not given.

**2.5.12 Packing:-**

All insulators shall be packed in strong seasoned wooden crates or boxes suitable for easy but rough handling acceptable for rail and sea transport and durability for short-time outdoor storage. The packaging procedure to be used shall be submitted for acceptance.

**2.5.13 Guaranteed Technical Particulars (GTP):-**

The number of insulators used on suspension and tension strings and the Electro-mechanical strength are given at para 2.5.16 (Annexure-A). Full guaranteed particulars including dry and wet flashovers, puncture and impulse voltages, corona formation voltages, creepages, distances, length, voltage distribution on strings etc., shall be furnished.

**2.5.14 Drawings:-**

Drawing of the existing 245kV suspension & tension insulator string with end fitting are attached at para 2.5.17 (Annexure-B).

**2.5.15 List of Likely Manufacturers/Vendors for Supply of Silicon Rubber Composite & Polymer Long Rod Insulator:-**

- (1) M/s WS Industries (India) Limited, Chennai.
- (2) M/s BHEL, Jagdishpur.
- (3) M/s Aditya Birla Insulators, Rishra (Hooghly).
- (4) M/s Goldstone Infratech Ltd., Hyderabad.
- (5) M/s DECCAN Enterprises Pvt. Ltd., Hyderabad.
- (6) M/s CYG Insulator Co. Ltd., China.
- (7) M/s Xiangfan Guowang Composite Insulator Co. Ltd., China.

Bidder shall submit vendor for approval of Engineer, before procurement of material, along with latest copies of existing approval from the State/Centre owned Power Utilities.

## 2.5.16 **ANNEXURE-A:-**

### **Required Rating and Electrical Characteristics:-**

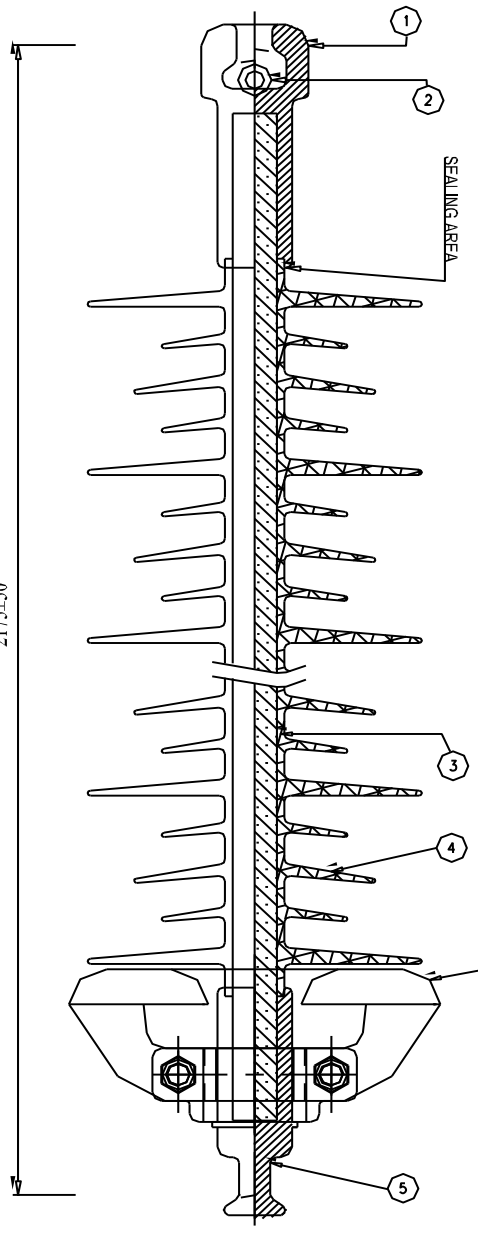
Sr. No.	Characteristics	For Silicone Rubber Composite Insulators String	
		220 KV	
		90 KN	120 KN
1	Type description Silicone Rubber Composite Insulators suitable for B	Silicone Rubber Composite Insulators suitable 95 couplings at the line & tower ends.	
2	Colour & surface of Rubber portion.	Grey	
3	Ferrous parts	IEC 61109 Edition 2.0 2008-05 & ASTM A 153	
4	Check clip provided in the socket.	'M' Clip	
5	Ball pin	Drop forged steel	
6	Socket fitting	Malleable Ductile Iron	
7	Ball pin designation	16mm	20mm
8	a) Diameter and spacing  b) Tolerances	AS PER IEC 61109 Edition 2.0 2008-05(As these insulators are required for the replacement of existing porcelain insulator strings. The tolerance to be kept as minimum as possible)	
9	Minimum failing Load of Insulator (strings)	>90 KN	>120 KN
10	Minimum total creepage distance in mm	8600	8600
11	Combined Mechanical and Electrical strength in KN	90KN	120KN
12	One minute power Frequency Withstand Voltage (kV) Dry	460	460
13	One minute power Frequency withstand Voltage (kV) Wet	460	460
14	One minute power Frequency Flashover Voltage Dry/Wet(KV)	460	460
15	i) AC wet withstand Voltage: KV ii) L.I. Pos. with stand Voltage: KV iii) S.I. Wet WSV: KV	460 1050 Not applicable	460 1050
16	Visible discharge Voltage (kV)	187	187
17	Impulse flash over Voltage (kV) (min): Positive: Negative:	1050 1050	1050 1050
18	Flashover Power Frequency voltage (kV) Dry: Wet:	460 460	460 460
19	Standards according to Which the rubber insulator Shall be manufactured and Tested.	IEC 61109 Edition 2.0 2008-05/ ANSI C 29-11, 29-12	
20	Mechanical breakings Strength.	7000 Kg	11500 Kg
21	Routine Mechanical Load	60 KN	80 KN
22	Net weight of strings (Approx.)	7 KG	9 KG

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For & on behalf of DFCCIL

## 2.5.17 Drawings (Annexure-B):-

### (A) 90 KN Suspension String with Guard ring:



**GURANTEED TECHNICAL PARTICULARS:**

DIMENSIONS:		
1	MINIMUM CREEPAGE DISTANCE	mm 8600
2	ARCING DISTANCE	mm 1970
2	COUPLING DESIGNATION IEC:60120/IS:2486	mm 168




MECHANICAL CHARACTERISTICS:		
1	SPECIFIED MECHANICAL LOAD	kN 90
2	ROUTINE TEST LOAD	kN 45

1	NOMINAL SYSTEM VOLTAGE	kV	220
2	HIGHEST SYSTEM VOLTAGE	kV	245
3	SYSTEM FREQUENCY	HZ	50
4	WET 1 MINUTE POWER FREQUENCY WITHSTAND VOLTAGE	kV(rma)	460
5	DRY LIGHTNING IMPULSE WITHSTAND VOLTAGE	kVp	1050

APPLICABLE STANDARDS		
1	INSULATOR	IEC: 61109-2008
2	GALVANISATION	IS: 2633-1986

SL.	DESCRIPTION	MATERIAL	QTY.	REMARKS
6	CORONA RING LIVE SIDE	AL' ALLOY	1 NO	
5	BALL FITTING	FORGED STEEL	1 NO	H.D.G
4	POLYMER HOUSING	SILICON RUBBER	--	
3	CORE ROD	FIBER GLASS	1 NO	
2	SECURITY CLIP (R)	STAINLESS STEEL	1 NO	
1	SOCKET FITTING	SGCI	1 NO	H.D.G

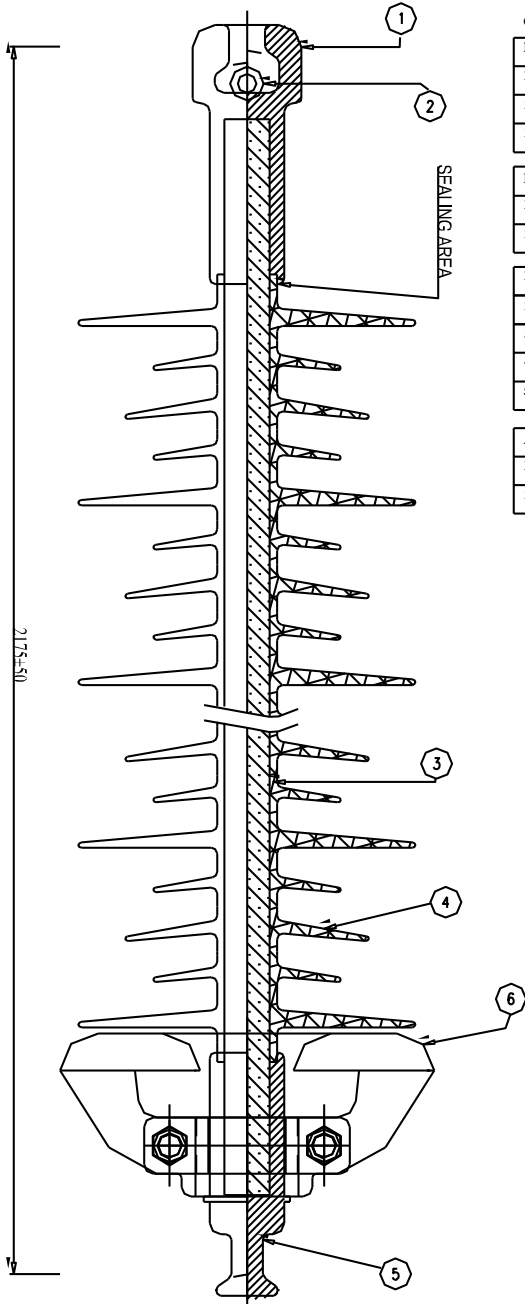
**FOR TENDER PURPOSE ONLY**

<b>PROJECT:</b>	ENGINEERING OF DIVERSION OF TWO NOS. OF 220 KV D/C TRANSMISSION LINES AT FOUR DIFFERENT LOCATIONS			
<b>OWNER:</b>		RELIANCE INFRASTRUCTURE LTD. 220kv Aarey Receiving Station, D. D. Road, Aarey Colony, Opp. Unit No. 19, Goregaon (E), Mumbai 400065		
<b>CLIENT:</b>		DEDICATED FREIGHT CORRIDOR CORPORATION LTD. 7th floor, Central Railway New Administrative Building D. N. Road, Mumbai-400001		
<b>DFCCIL'S CONSULTANT:</b>		<b>TAKALKAR POWER ENGINEERS &amp; CONSULTANTS PVT.LTD.</b> 424-430, B-WING, MONALISA BUSINESS CENTRE, RD. MANJALPUR RAILWAY CROSSING, MANJALPUR, VANDRA - 200 911		
<b>IPC DRG. NO.:</b>	MUM/EL/UTILITY/REL-A-CONSULT/239/2015/5.2.1/4B/SLSI			
<b>VENDOR</b>	<b>DATE</b>	<b>NAME</b>	<b>SIGN</b>	<b>TITLE:</b>
PREPARED	18.09.2016	AL		
CHECKED	18.09.2016	MCJ		
APPROVED	23.09.2016	KGG		
<b>DEPARTMENT</b>				
<b>SCALE:-</b>	N.T.S	<b>SPEC. NO.:</b>		
SHT: 01 OF 01				

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

**(B) 120 KN Tension String with Guard Ring:-**



**GURANTEED TECHNICAL PARTICULARS:**

**DIMENSIONS:**

1	MINIMUM CREEPAGE DISTANCE	mm	8600
2	ARCING DISTANCE	mm	1900
2	COUPLING DESIGNATION IEC:60120/TS:2486	mm	20

**MECHANICAL CHARACTERISTICS:**

1	SPECIFIED MECHANICAL LOAD	kN	120
2	ROUTINE TEST LOAD	kN	60




1	NOMINAL SYSTEM VOLTAGE	kV	220
2	HIGHEST SYSTEM VOLTAGE	kV	245
3	SYSTEM FREQUENCY	HZ	50
4	WET 1 MINUTE POWER FREQUENCY WITHSTAND VOLTAGE	kV(rma)	460
5	DRY LIGHTNING IMPULSE WITHSTAND VOLTAGE	kVp	1050

**APPLICABLE STANDARDS**

1	INSULATOR	IEC: 61109-2008
2	GALVANISATION	IS: 2633-1986

6	CORONA RING LIVE SIDE	AL' ALLOY	1 NO	
5	BALL FITTING	FORGED STEEL	1 NO	H.D.G
4	POLYMER HOUSING	SILICON RUBBER	--	
3	CORE ROD	FIBER GLASS	1 NO	
2	SECURITY CLIP (R)	STAINLESS STEEL	1 NO	
1	SOCKET FITTING	SGCI	1 NO	H.D.G
SL.	DESCRIPTION	MATERIAL	QTY.	REMARKS

FOR TENDER PURPOSE ONLY

<b>PROJECT:</b>	ENGINEERING OF DIVERSION OF TWO NOS. OF 220 KV D/C TRANSMISSION LINES AT FOUR DIFFERENT LOCATIONS		
<b>OWNER:</b>		RELIANCE INFRASTRUCTURE LTD. 220kv Aarey Receiving Station, D. D. Road, Aarey Colony, Opp. Unit No. 19, Goregoan (E), Mumbai 400065	
<b>CLIENT</b>		DEDICATED FREIGHT CORRIDOR CORPORATION LTD. 7th floor, Central Railway New Administrative Building D. N. Road, Mumbai-400001	
<b>DFCCIL'S CONSULTANT</b>		TAKALKAR POWER ENGINEERS & CONSULTANTS PVT.LTD 484-490, 8-WING, MONALISA BUSINESS CENTRE, NR. MANALPUR RAILWAY CROSSING, MANALPUR,VADODARA - 390 011	
<b>IPC ORG. NO.:</b>	MUM/EL/UTILITY/REL-A/CONSULT/239/2015/5.2.1/4B/SLTI		
<b>VENDOR</b>	<b>DATE</b>	<b>NAME</b>	<b>SIGN.</b>
PREPARED	9.09.2016	A.L.	
CHECKED	9.09.2016	MGJ	
APPROVED	23.09.2016	HGG	
<b>DEPARTMENT</b>			
<b>SCALE:-</b>	<b>N.T.S</b>	<b>SPEC. NO.:</b>	

220kV-120kN COMPOSITE SILICONE RUBBER LONG ROD TENSION INSULATOR

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

**PART-II**

**CHAPTER-VI**

**TECHNICAL SPECIFICATION**

**FOR**

**AAAC ZEBRA CONDUCTOR**

**STRINGING HARDWARE AND**

**ACCESSORIES**

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

## **PART-II**

### **CHAPTER-VI**

#### **TECHNICAL SPECIFICATION** **FOR** **AAAC ZEBRA CONDUCTOR STRINGING HARDWARE** **AND ACCESSORIES**

##### **CONTENTS:**

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**PART-II**  
**CHAPTER-VI**  
**TECHNICAL SPECIFICATION**  
**FOR**

**AAAC ZEBRA CONDUCTOR STRINGING HARDWARE AND ACCESSORIES**

**2.6.1 Scope:-**

**2.6.1.1 General:-**

- (A) The scope of supply shall include design, manufacture, assembly, testing at manufacturer's works, loading at works, transportation to site in a properly packed condition, unloading storage, preservation, handling at site, insurance of supplied material from works up to handing over to site as detailed herein with all accessories along with mandatory and recommended spares and/or special tools and tackles for efficient and trouble free operation.
- (B) Timely procurement and transportation to site in properly packed condition of all materials and miscellaneous items is required to complete the erection work under this specification.

**2.6.1.2 Scope of Supply:-**

This section covers the supply of the following items.

- (A) Single/Double Tension Hardware assembly suitable for AAAC Zebra conductor.
- (B) Single/Double Suspension Hardware assembly suitable for AAAC Zebra Conductor.
- (C) Vibration Dampers for AAAC Zebra conductor.
- (D) Tension & Dead end clamp assembly for AAAC Zebra conductor.
- (E) Armour rod, Mid Span Joint, Repair Sleeves for AAAC Zebra conductor.
- (F) Tower Accessories & Earthing material.

**2.6.1.3 Scope of Services:-**

The scope of services includes but not limited to:-

- (A) Loading/unloading of all equipment/materials at site under scope of supply.
- (B) Complete checking of materials at site and advising the Engineer of any discrepancy thereof.
- (C) Arrangement of transport vehicle necessary for efficient transportation of equipment from site stores at site to site of erection.
- (D) Opening of packing in the presence of Engineer's representatives and inspection of the equipment and materials and reporting damages, shortages etc. if any, immediately after opening to the DFCCIL.
- (E) Proper storing arrangement at site with suitable enclosure for protection from weather and pilferage of items under their scope of supply and materials issued by the DFCCIL.
- (F) Maintaining and managing of bidder/contractor's own store and reconciliation of free issue items whenever desired by Engineer.
- (G) Arranging to repair and/or re-order all damaged and short supply items.

**2.6.2 Codes, Standards & Regulations:-**

- 2.6.2.1 All materials shall be designed, manufactured & supplied in accordance with the latest applicable Indian Standards (IS) and IEC standards except where specifically supplemented by this specification. The equipment shall comply with the following standards.



- (A) Stringing Hardware : IS 2486  
(B) Specification for conductor/Earth wire accessories  
for overhead Power line : IS 2121  
(C) Vibration Damper : IS 9708

2.6.2.2 Material conforming to any other standards, which ensure equal or better quality, may be accepted subject to prior approval by the Engineer. In such case, copies of the English version of the standard adopted shall be submitted along with the bid.

### 2.6.3 **Conductor Stringing Hardware:-**

#### 2.6.3.1 **Technical Specification:-**

- (A) The stringing hardware shall include following;
- (i) Single/Double Tension Hardware assembly suitable for AAAC Zebra conductor.
  - (ii) Single/Double Suspension Hardware assembly suitable for AAAC Zebra conductor.
  - (iii) The insulator strings shall comprise long rod polymer insulators, anchor shackles, ball-link, ball clevis, socket-clevis, arcing horn, grading rings, yoke plates, tension clamps, suspension clamps, twisted shackles, turn buckle, sag compensation springs as necessary.
- (B) Long rod polymer insulators string shall be used for 220 kV Transmission line system.
- (C) Insulator strings shall be anchored to the tower cross arms at suitable heights and shall be used with AAAC Zebra conductors on the Transmission Line for 220 kV system.
- (D) Clamps for insulator strings and Corona Control rings shall be of aluminium alloy as stipulated for clamps and connectors.
- (E) In general, all hardware shall be rated for 2000 Amps.
- (F) Insulator hardware shall be of forged steel. Malleable cast iron shall not be accepted except for insulator disc cap. The surface of hardware must be clean, smooth, without cuts, abrasion or projections. No part shall be subjected to excessive localized pressure. The metal parts shall not produce any noise generating corona under operating conditions.
- (G) The tension insulator hardware assembly shall be designed for 11500 kg tensile load.
- (H) All hardware shall be bolted type.
- (I) Hardware fittings shall be so designed as to ensure uniformity, high strength, freedom from corona and high resistance against corrosion.
- (J) Shackles, eyes, fasteners, suspension, tension clamps and other fittings for attaching insulators to the tower or line conductor shall be designed such as not to cause any damage to conductor, insulator or fitting arising from conductor vibration.
- (K) Suitable anchor shackles shall be supplied for tension string as per requirement.
- (L) All metal parts shall be hot dip galvanized and coated with anti-corrosive paint.
- (M) For tension application, double insulator strings and for suspension purpose single suspension insulator string shall use for 220 kV system.

#### 2.6.3.2 **Clamps & Connectors:-**

- (Dead End clamp for AAAC Zebra conductor)

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(A) The clamps and connectors shall be made of materials listed below:

(i)	For connecting AAAC Zebra conductor	Aluminium alloy casting
(ii)	Bolts, nuts, plain washers	Stainless steel
(iii)	Spring washers for above	Phosphor Bronze.

- (B) Aluminium or aluminium alloy used in the manufacture of clamps and terminal connector shall meet requirements of specified standards. Steel bolts & nuts and shall be of reputed/approved make.
- (C) Terminal connector/clamp shall carry full rated current continuously and its temperature shall not exceed 85°C.
- (D) The connector/clamp for each conductor shall have 6 bolts complete with nuts, check nuts and washers. The connectors shall have ratings required as per the circuit requirement and be designed most liberally to comply in all respects with temperature rise, resistance, tensile strength, short circuit current withstand capacity as specified.
- (E) All castings shall be free from blow holes, surface blisters, cracks and cavities. All sharp edges and corners shall be debarred and rounded off.
- (F) No part of the connector/clamp shall be less than 10mm thick.
- (G) Bolts shall be located as close to the conductor as possible and shall be opposite each other. Bolt diameter shall be such as to give the desired clamping and contact pressure.
- (H) A check nut shall be provided over nut on each bolt to avoid loosening of nuts due to vibration.
- (I) Ferrous bolts, nuts, washers and check nuts shall be made of non-magnetic stainless steel having appropriate strength.

#### 2.6.3.3 Type tests:-

- (A) All tests shall be conducted in accordance with latest edition of IS 2121/IS 9708 and any other applicable standards.
- (B) Type test certificate from an accredited laboratory shall be submitted by the bidder along with the Bid. Type test certificate should not be older than 5 years from the date of submission of Bid.
- (C) Following Type Test Certificates of Conductor hardware are to be furnished.

In accordance with the stipulation of specification, the following type tests reports shall be submitted for approval.

- (i) Visual examination
- (ii) Verification of dimensions
- (iii) Slip strength test
- (iv) Ultimate Strength test
- (v) Electrical resistance test
- (vi) Heating cycle test
- (vii) Galvanizing Test
- (viii) Mechanical Test
- (ix) Chemical composition test

#### 2.6.3.4 Acceptance Test:-

- (A) Following Acceptance tests shall be conducted as per relevant standards in the presence of the DFCCIL/Engineer's representative.
- (B) All the below mentioned tests shall be carried out as applicable.
- (i) Visual examination
  - (ii) Verification of dimensions
  - (iii) Ultimate Strength Test
  - (iv) Electrical resistance Test
  - (v) Heating cycle Test
  - (vi) Galvanizing Test
  - (vii) Mechanical Test
  - (viii) Chemical composition Test

#### 2.6.3.5 Routine Tests:-

Following test shall be witnessed by Engineer.

- (i) All acceptance tests as mentioned above to be carried out on each lot.
- (ii) The bidder shall offer material for selection of samples for testing, only after getting quality assurance plans approved from Engineer. The sample shall be manufactured strictly in accordance with the Quality Assurance Plan approved by Engineer.

#### 2.6.4 Stringing Accessories:-

##### 2.6.4.1 Technical Specification:-

- (A) All parts of fittings shall be suitable for use in atmospheric condition indicated elsewhere in the specification inherently resistant to atmospheric corrosion or be suitably protected against corrosion both during storage and in service.
- (B) All ferrous metal parts except those made of stainless steel shall be protected by hot dip galvanizing. Spring washers shall be electro galvanized.
- (C) All castings shall be free from blowholes and other casting defects such as cracks etc. The surface shall be as smooth as possible.
- (D) The tension joints shall be so designed that strength of complete joints shall not be less than 95% of the minimum breaking load of the conductor under tension.
- (E) In case of rods, wire or tape no joints shall be permitted except those in the base rod or wire before final drawings.

##### 2.6.4.2 Mid Span Compression Joints for AAAC Zebra Conductor:-

- (A) This shall be suitable for jointing the two ends of the power conductor. The joint shall have a conductivity of an equivalent length of the conductor. The joint shall not permit slipping of, damage to or failure of the complete conductor or any part thereof at a load of not less than 95% of the ultimate tensile strength of the conductor. The electrical resistance of the joint after installation shall not exceed 75% of the measured resistance of the equivalent length of the conductor.
- (B) The components of the joint shall consist of aluminium alloy sleeves for joint compression of the aluminium conductor. The aluminium alloy sleeve shall not crack or fail during compression. The aluminium sleeve shall be manufactured and extruded out of EC grade aluminium with a purity of not less than 99.5%. Tapered aluminium filler plugs shall be provided at the line of demarcation between compression and non-compression zone.

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- (C) The dimensions and dimensional tolerances of this mid span compression joint shall be as per relevant IS. Reference drawing is attached as Annexure with this specification.

**2.6.4.3 Repair Sleeves for Power Conductor:-**

- (A) Repair sleeves to be used shall be for repairing the conductor when a few strands of the aluminium conductor in the outermost layer are damaged with scratches, kinks abrasions, nicks or cuts. They shall be of the compression type. The sleeve shall be manufactured and extruded out of EC grade aluminium having a purity of 99.5%. The sleeve shall be in two halves with a seat provision for sliding of the keeper piece. The edges of the seat as well as of the keeper piece shall be so rounded that the conductor strands are not damaged during installation. The outer body of the sleeve shall be smooth even and with rounded off edges.
- (B) The compressed conductor with the repair sleeve shall not permit damage or failure of the conductor at a load of not less than 95% of the ultimate tensile strength of the conductor. The electrical resistance of the repaired portion of the conductor shall not exceed 75% of the measured resistance of an equivalent length of the conductor.
- (C) The dimensions and dimensional tolerances of the repair sleeves shall be as per relevant IS.

**2.6.4.4 Vibration Dampers for Power Conductor:-**

- (A) The vibration dampers shall be of the stock bridge 4R type for being used at all suspension and tension points at each and every span to damp out the vibrations of the conductors to the level specified hereinafter. These shall conform to the relevant IS. Reference drawing is attached as Annexure with this specification
- (B) The clamp of the vibration damper shall be made of aluminium alloy. It shall be capable of supporting the damper during installation and prevent damage or chafing of the conductor during erection or continued operation. The clamp shall have sufficient grip to maintain the damper in position on the conductor without damaging the strands or causing premature fatigue of the projections grit or other materials, which could cause damage to the conductor when the clamp is installed. Clamping bolts shall be provided with self-locking nuts and designed to prevent corrosion of the threads or loosening during service.
- (C) The messenger cable of the damper shall be made of high strength steel with a minimum strength of 136 kg/mm. It shall be pre-formed and post formed in order to prevent subsequent drop of weights and to maintain consistent flexural stiffness cable while in service. The messenger cable shall be suitably and effectively sealed to prevent corrosion.
- (D) The damper mass shall be made of hot dip galvanized mild steel/cast iron or a permanent mould cast zinc alloy. All castings shall be free from defects such as cracks, shrinkage, inclusions and blowholes etc. The inside and outside surfaces of the damper masses shall be smooth.
- (E) The damper assembly shall be electrically conductive to reduce radio interference. The vibration damper shall be capable of being installed and removed from energized line by means of hot line technique. In addition, the clamp shall be capable of being removed and reinstalled on the conductor at the design torque without shearing or damaging of bolts, nuts or cap screws.
- (F) The vibration analysis of the system with and without damper, dynamic characteristic of the damper shall have to be submitted by the Bidder along with the bid.

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(G) The bidder shall recommend the number of vibration dampers of the type offered by them and their points of fixation for spans of 200-250 M.

#### 2.6.4.5 Type Tests:-

Type test certificate from a Government owned or NABL accredited laboratory shall be submitted by the bidder before starting supply of AAAC Zebra Conductor Stringing Hardware & Accessories. Type test certificate should not be older than 5 years from the date of submission of Bid.

Following Type Test Certificates of Conductor accessories are to be furnished.

##### (A) For Mid Span compression joints and repair sleeves:-

- (i) Visual examination
- (ii) Dimensional verification
- (iii) Failing load test
- (iv) Electrical resistance test
- (v) Heating cycle test
- (vi) Galvanizing test

##### (B) For Vibration dampers:-

- (i) Visual examination
- (ii) Verification of dimension
- (iii) Resonance frequency test
- (iv) Fatigue test
- (v) Mass pull off test
- (vi) Dynamic characteristic test
- (vii) Damping efficiency test
- (viii) Clamp slip test
- (ix) Torque test
- (x) Galvanizing electroplating test
- (xi) Magnetic power loss test
- (xii) Radio interference voltage test

#### 2.6.4.6 Acceptance Tests:-

Following Acceptance tests shall be conducted as per IS 2121/IS 9708 and any other relevant standards in the presence of the Engineer's representative.

##### (A) For Mid span compression joints and repair sleeves:-

- (i) Visual examination
- (ii) Dimensional verification
- (iii) Failing load test
- (iv) Galvanizing test

##### (B) For Vibration dampers:-

- (i) Visual examination
- (ii) Verification of dimensions
- (iii) Resonance frequency test
- (iv) Fatigue test
- (v) Mass pull off test
- (vi) Galvanizing/electroplating test

**2.6.4.7 Routine Tests:-**

Following Routine tests shall be conducted for mid span compression joints and repair sleeves, vibration dampers;

- (A) Visual examination
- (B) Dimensional verification
- (C) Galvanization test

**2.6.4.8 Earth Bonds (Copper/Aluminium Braided type):-**

Earth bonds shall be supplied in length of 300 mm and 450 mm for use on suspension and tension towers respectively. These earth bonds shall be designed to carry a minimum current of 100 Amps.

**2.6.5 Packaging & Delivery:-**

**2.6.5.1 General:-**

All accessories shall be supplied in strong wooden case all packages shall be marked on the sides as follows:

- (A) Name and designation of the consignee
- (B) Ultimate destination as required by the Engineer.
- (C) The items and the respective quantities contained in it or the number of places and the respective sub parts, as the case may be
- (D) The net and gross weights of the materials
- (E) The markings shall be indelible ink on each package/drum

**2.6.6 List Of Drawings:-**

Standard Drawings for following are attached at para 2.6.8 below (Annexure-A).

- (i) Double Tension Hardware assembly suitable for AAAC Zebra conductor
- (ii) Double Suspension Hardware assembly suitable for AAAC Zebra conductor.
- (iii) Vibration Dampers for AAAC Zebra conductor.
- (iv) Tension & Dead end clamp assembly for AAAC Zebra conductor.
- (v) Armour Grip Suspension Clamp.
- (vi) Mid span joint for AAAC Zebra conductor.
- (vii) Repair Sleeves for AAAC Zebra conductor.
- (viii) Pilot Hardware assembly suitable for AAAC Zebra conductor.

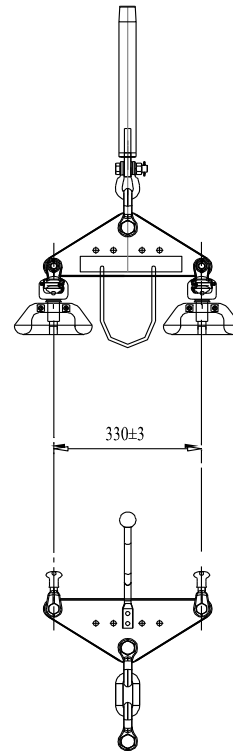
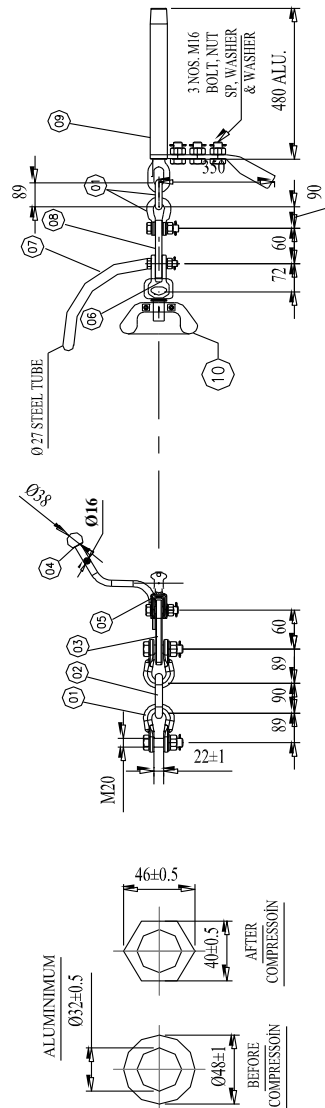
**2.6.7 List of Likely Manufacturers/Vendors for AAAC ZEBRA Conductor Stringing Hardware & Accessories:-**

- (1) M/s EMI, Mumbai.
- (2) M/s ITP, Bhandup (Mumbai).
- (3) M/s IAC Electricals Pvt. Ltd., Howrah.
- (4) M/s SUPREME & Co. Ltd., Howrah.
- (5) M/s TAG Corporation, Chennai.
- (6) M/s ASBESCO India Pvt. Ltd., Howrah.
- (7) M/s Jainco Transmission Ltd., Howrah.



### 2.6.8 ANNEXURE-A:-




#### 2.6.8.1 Double Tension Hardware for AAAC Zebra Conductor:-



**NOTE:-**

1. BALL & SOCKET DESIGNATION 20MM. AS PER IS:2486-1993
2. GALVANIZING WILL CONFORM TO IS:2633 -1986(R2006)/ IS:2629-1985
3. SLIP STRENGTH OF TENSION CLAMP 125KN
4. ALL FERROUS PARTS ARE HOT DIP GALVANIZED EXCEPT SPRING WASHER ELECTRO GALVANISED(IS:1573-1986).
5. SECURITY CLIP SHALL BE MADE OF S.S.(R' TYPE)
6. HARDWARE FITTINGS WILL CONSIST OF BOLTS-NUTS , WASHER, SPRING WASHER & SPLIT PIN WHERE EVER REQUIRED.
7. SPLIT PIN-STAINLESS STEEL
8. U.T.S OF HARDWARE -240KN. (EXCEPT CLAMP)

ITEM	QTY.	DESCRIPTION	MATERIAL/GRADE
10	--	GRADING RING (POLYMER INSULATOR)	ALUMINUM ALLOY
9	1 SET	DEAD END WITH JUMPER & STEEL EYE COPRESSION TYPE	ALUMINUM ALLOY & GALVANISED STEEL
8	1	YOKE PLATE (L.S)	GALVANISED STEEL
7	1 SET	HALF ARCING HORN (T.S)	MS TUBE, H.D.G
6	2	SOCKET CLEVIS	FORGED STEEL H.D.G
5	2	BALL CLEVIS	FORGED STEEL H.D.G
4	1 SET	HALF ARCING HORN (T.S)	MS BALL & ROD , H.D.G
3	1	YOKE PLATE (T.S)	GALVANISED STEEL
2	1	CHAIN LINK	FORGED STEEL H.D.G
1	4	ANCHOR SHACKLE	FORGED STEEL H.D.G

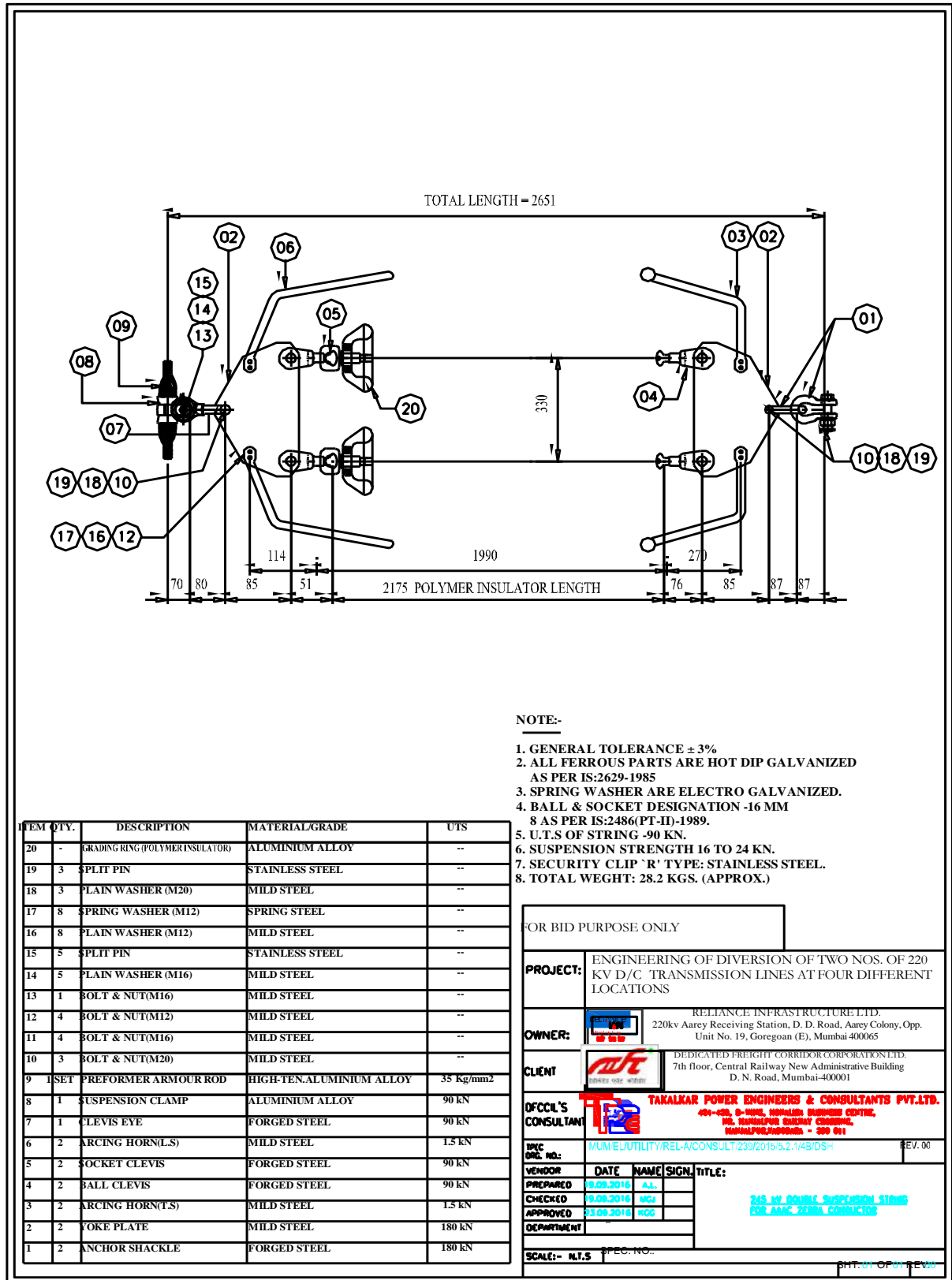
FOR BID PURPOSE ONLY				
PROJECT:	ENGINEERING OF DIVERSION OF TWO NOS. OF 220 KV D/C TRANSMISSION LINES AT FOUR DIFFERENT LOCATIONS			
OWNER:	 RELIANCE INFRASTRUCTURE LTD. 220kv Air Receiving Station, D. D. Road, Aarey Colony, Opp. Unit No. 19, Goregaon (E), Mumbai 400065			
CLIENT	 DEDICATED FREIGHT CORRIDOR CORPORATION LTD. 7th floor, Central Railway New Administrative Building D. N. Road, Mumbai-400001			
DFCCIL'S CONSULTANT	 <b>TAKALKAR POWER ENGINEERS &amp; CONSULTANTS PVT.LTD.</b> 424-430, B-WING, MONALISA BUSINESS CENTRE, NR. MANJAPUR RAILWAY CROSSING, MANJAPUR,YADODRA - 390 011			
TPIC DRG. NO.:	MUM/EL/UTILITY/REL-A/CONSULT/239/2015/5.2.148/DTH			REV.00
VENDOR	DATE	NAME	SIGN.	TITLE:
PREPARED	19.09.2016	A.L.		<b>245 KV DOUBLE TENSION HARDWARE FOR AAAC ZEBRA CONDUCTOR (61/3.31MM)</b>
CHECKED	19.09.2016	MGJ		
APPROVED	23.09.2016	KGK		
DEPARTMENT	--			
SCALE:- N.T.S	SPEC. NO.:			

Signature &amp; Stamp of Tenderer

For &amp; on behalf of DFCCIL



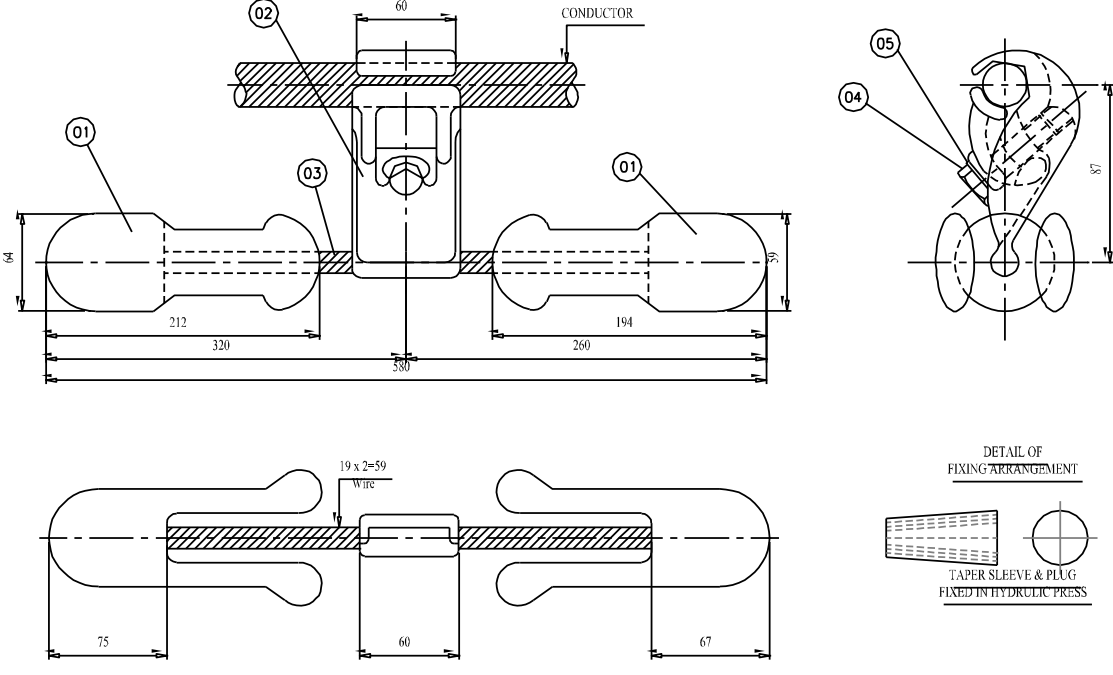
### 2.6.8.2 Double Suspension Hardware for AAAC Zebra:-



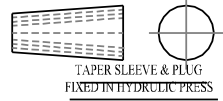
Signature & Stamp of Tenderer

For & on behalf of DFCCIL

### 2.6.8.3 4R Vibration Damper for AAAC Zebra Conductor:-



DETAIL OF  
FIXING ARRANGEMENT






TAPER SLEEVE & PLUG  
FIXED IN HYDRAULIC PRESS

**TECHNICAL PARTICULARS**

- General Tolerance : 3% unless otherwise specified
- Hot Dip Galvanized : as per IS Specifications
- Slip Strength : 2.5 kN before Fatigue Test  
: 2.0 kN after Fatigue Test
- Fatigue limit on highest resonant Frequencies  
10 million cycles = 25/f mm aptitude where f is frequency of vibration in Hz.
- Bolt torque : 7 kg.m
- Weight of Damper mass - Smaller mass 2.30 kg - 50gm  
- Bigger mass 3.20 kg - 50 gm
- UTS of messenger cable - 135 kg/mm<sup>2</sup>
- Lay ratio of messenger cable - 1st Layer 9-11  
- 2 nd Layer 9-11
- Mass pull off - 500 kg
- Resonance frequencies - 1st - 10±1, 2nd - 14±1  
- 3rd -20±2, 4th - 30±2
- Magnetic Power loss - Less than 1 watt 5- Amps
- All dimensions are in mm
- Galv. material shall withstand 6 nos. 1 min. dips
- No. of strands in messengers cable - 19

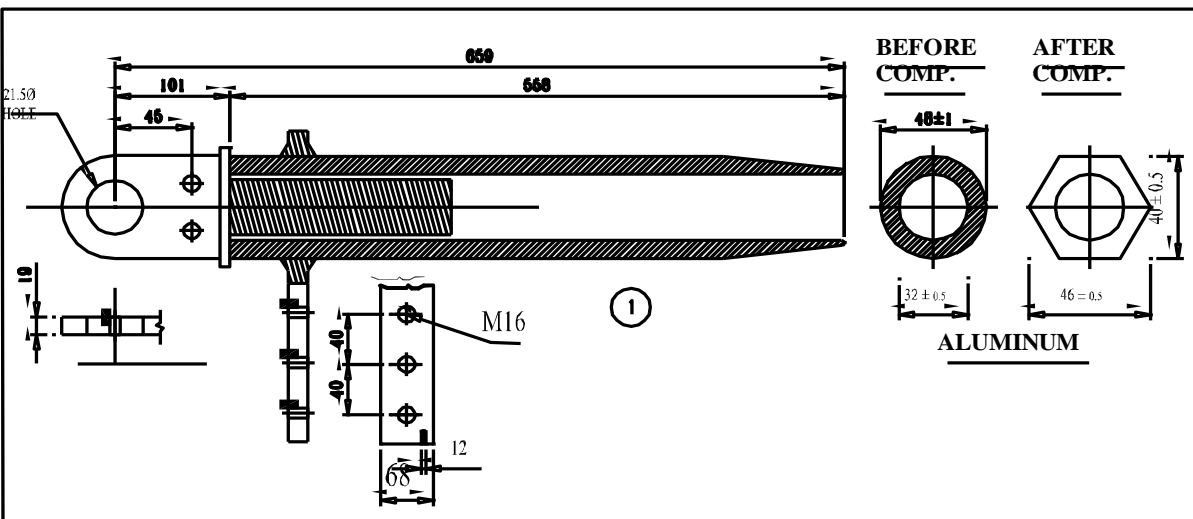
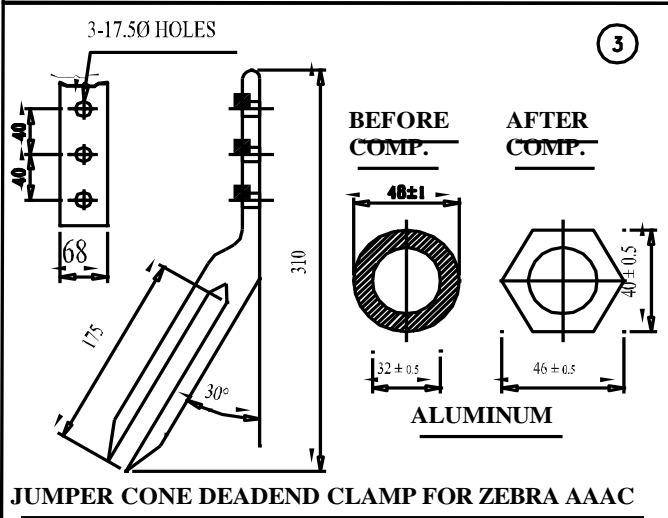
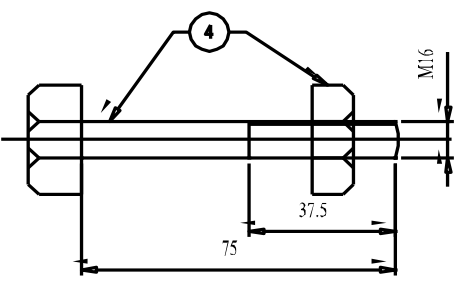
ITEM	QTY.	DESCRIPTION	MATERIAL/GRADE
5	1	Spring Washer	Sp.Steel (Electro.Galv.)
4	1 each	Bolt & Washer (M16x50)	Mild Steel
3	1	Messenger Cable	Hi-Ten. Standard St. wire H.D.G
2	1	Clamp	AL. Alloy dia cast A-6 IS:617
1	2	Damper Mass	Cast Iron H.D.G

FOR BID PURPOSE ONLY				
PROJECT:	ENGINEERING OF DIVERSION OF TWO NOS. OF 220 KV D/C TRANSMISSION LINES AT FOUR DIFFERENT LOCATIONS			
OWNER:	 <b>RELIANCE INFRASTRUCTURE LTD.</b> 220kv Aarey Receiving Station, D. D. Road, Aarey Colony, Opp. Unit No. 19, Goregoan (E), Mumbai 400065			
CLIENT:	 <b>DEDICATED FREIGHT CORRIDOR CORPORATION LTD.</b> 7th floor, Central Railway New Administrative Building D. N. Road, Mumbai-400001			
DFCCIL'S CONSULTANT:	 <b>TAKALKAR POWER ENGINEERS &amp; CONSULTANTS PVT.LTD.</b> 404-430, B-WING, MONALISA BUSINESS CENTRE, NR. MANALPUR RAILWAY CROSSING, MANALPUR,VADODARA - 390 011			
TPCC NO.:	MUM/EL/UTILITY/REL-A/CONSULT/239/2015/5.2.14B/WDC			REV. 00
VENDOR:	DATE	NAME	SIGN.	TITLE:
PREPARED	05.09.2016	AL.		4R VIBRATION DAMPER FOR AAAC ZEBRA (61/3.31) CONDUCTOR
CHECKED	09.09.2016	MCJ		
APPROVED	23.09.2016	KGG		
DEPARTMENT				
SCALE:-	N.T.S	SPEC. NO.:		
SHEET 01 OF 01 REV.00				

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

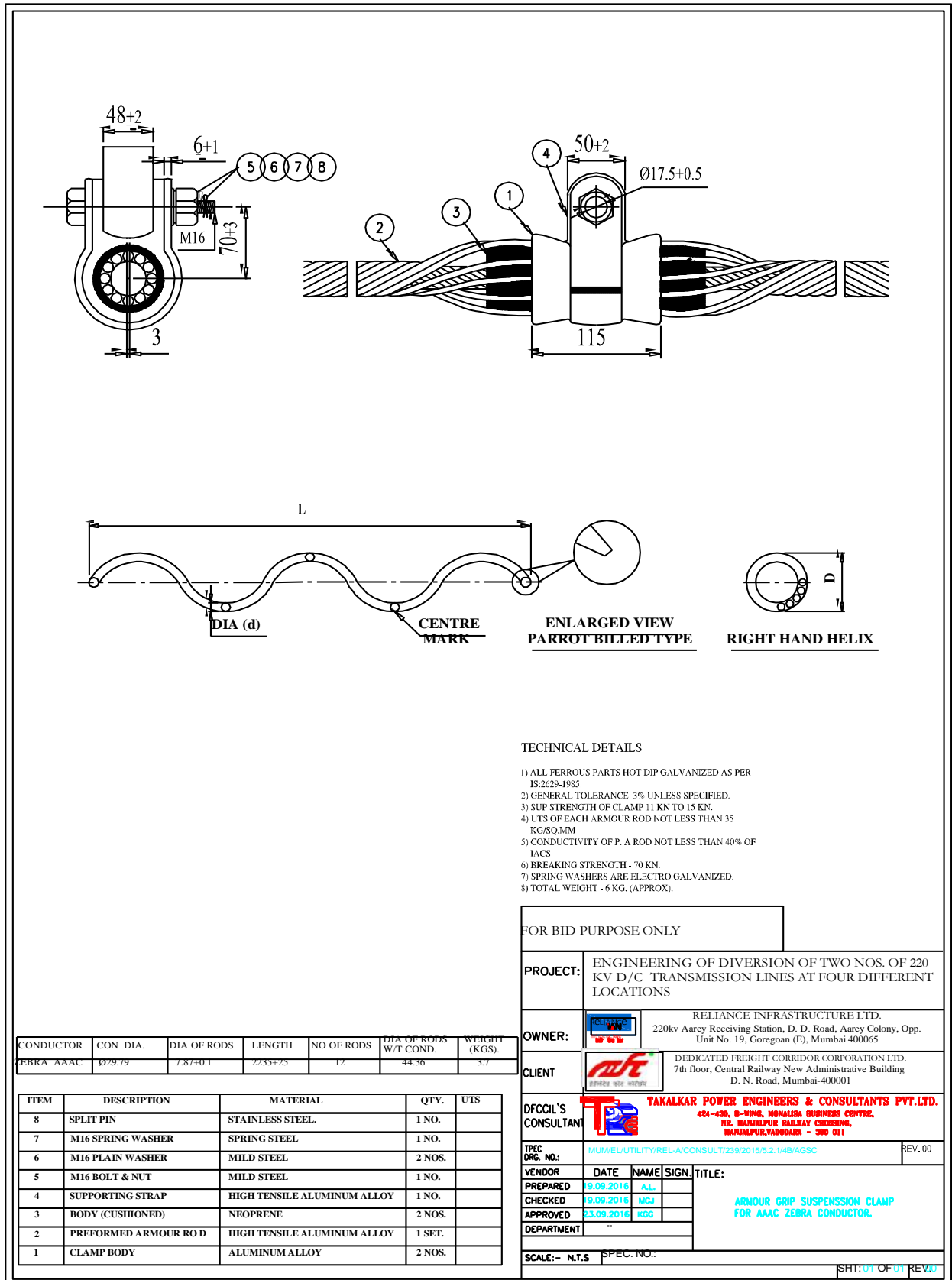
#### 2.6.8.4 Dead End Tension Clamps:-

 <p align="center"><b>COMPRESSION END TENSION CLAMP FOR ZEBRA AAAC :</b></p>				
 <p align="center"><b>JUMPER CONE DEADEND CLAMP FOR ZEBRA AAAC</b></p>		 <p align="center"><b>BOLT &amp; NUT FOR FIXING JUMPER CONE</b></p>		
<b>FOR TENDER PURPOSE ONLY</b>				
<b>PROJECT:</b> ENGINEERING OF DIVERSION OF TWO NOS. OF 220 KV D/C TRANSMISSION LINES AT FOUR DIFFERENT LOCATIONS		<b>OWNER:</b> RELIANCE INFRASTRUCTURE LTD. 220kv Aarey Receiving Station, D. D. Road, Aarey Colony, Opp. Unit No. 19, Goregoan (E), Mumbai 400065		
<b>CLIENT:</b> DFCCIL		<b>CLIENT:</b> DEDICATED FREIGHT CORRIDOR CORPORATION LTD. 7th floor, Central Railway New Administrative Building D. N. Road, Mumbai-400001		
<b>DFCCIL'S CONSULTANT:</b>		<b>TAKALKAR POWER ENGINEERS &amp; CONSULTANTS PVT.LTD.</b> 401-402, 8-ROAD, MARLBOROUGH SQUARE CENTRE, 100, KANUNPUR ROAD, KANUNPUR, UTTAR PRADESH - 200 001 MUMBAI OFFICE: REL/CONSULT/2392015/5.2.1/48/SLS/		
<b>SL</b>	<b>DESCRIPTION</b>	<b>MATERIAL</b>	<b>QTY</b>	<b>DFCCIL'S CONSULTANT:</b>
1	CLAMP DEAD END	EXTRUDED ALUM ALLOY	1	DEAD END TENSION CLAMPS  SCALE:- 1:1.5      SPEC. NO.: DPT. OF IN-TR-30
2	STEEL DEADEND	FORGED STEEL	1	
3	CONE JUMPER	EXTRUDED ALUM ALLOY	1	
4	BOLT & NUT M16	MILD STEEL	3	

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

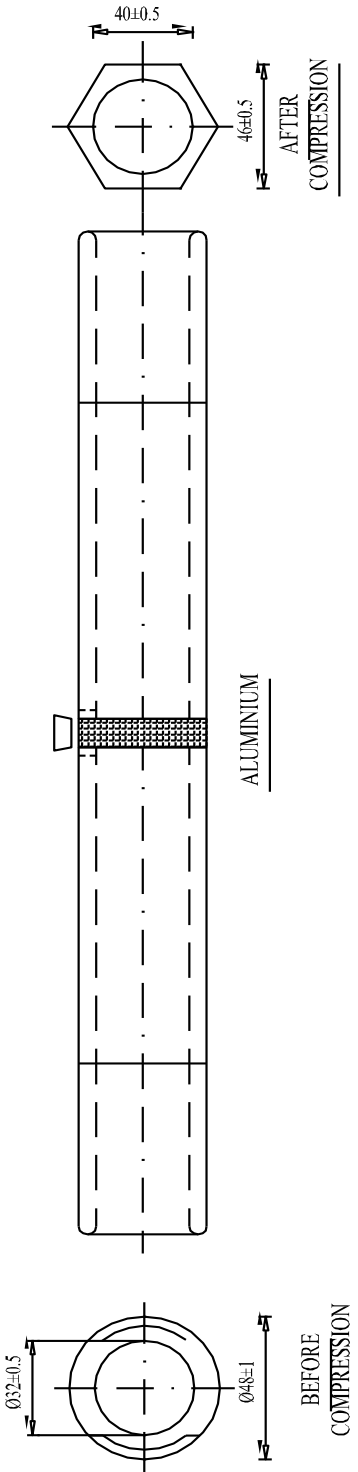
### 2.6.8.5 Armour Grip Suspension Clamp:-



Signature & Stamp of Tenderer

For & on behalf of DFCCIL




### 2.6.8.6 Mid span Joints:-



2	FILLER PLUG	ALUMINIUM	2
1	ALUMINIUM SLEEVE	EXT. ALU. ALLOY TUBE	1
SL.	DESCRIPTION	MATERIAL	QTY.

**TECHNICAL DATA :-**

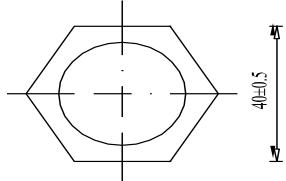
1) SLIP STRENGTH - 125 KN.

FOR BID PURPOSE ONLY			
PROJECT:	ENGINEERING OF DIVERSION OF TWO NOS. OF 220 KV D/C TRANSMISSION LINES AT FOUR DIFFERENT LOCATIONS		
OWNER:	 RELIANCE INFRASTRUCTURE LTD. 220kv Aarey Receiving Station, D. D. Road, Aarey Colony, Opp. Unit No. 19, Goregoan (E), Mumbai 400065		
CLIENT:	 DEDICATED FREIGHT CORRIDOR CORPORATION LTD. 7th floor, Central Railway New Administrative Building D. N. Road, Mumbai-400001		
DFCCIL'S CONSULTANT:	 <b>TAKALKAR POWER ENGINEERS &amp; CONSULTANTS PVT.LTD.</b> 404-405, 9-WING, MOKHARJIA BUSINESS CENTRE, NR. MANJALPUR RAILWAY CROSSING, MANJALPUR, VANDRA - 400 011		
TPEC DRG. NO.:	MUM/UTILITY/REL-A/CONSULT/239/2015/5.2.1/4B/MSJC		REV. 00
VENDOR	DATE	NAME	SIGN. TITLE:
PREPARED	19.09.2016	A.L.	
CHECKED	19.09.2016	MGJ	
APPROVED	23.09.2016	KGG	
DEPARTMENT			
MID SPAN COMPRESSION JOINT FOR AAAC ZEBRA CONDUCTOR (61./3.31MM)			
SCALE:-	N.T.S	SPEC. NO.:	
			SHT: 01 OF 01 REV: 00

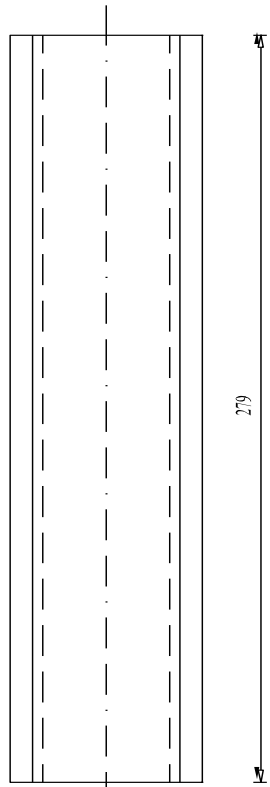
Signature & Stamp of Tenderer

For & on behalf of DFCCIL

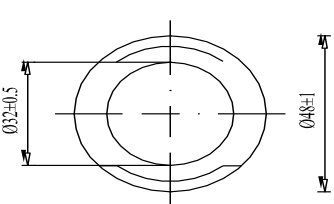
### 2.6.8.7 Repair Sleeve:-



40±0.5  
AFTER  
COMPRESSION






279



48±1  
BEFORE  
COMPRESSION  
32±0.5

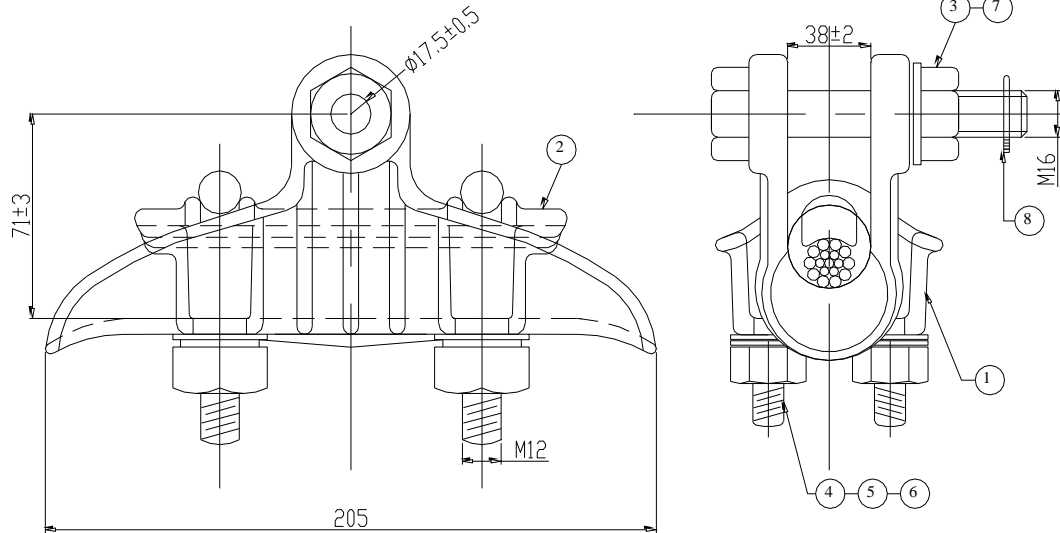
**TECHNICAL DATA :-**  
 1) MATERIAL ALUMINIUM ALLOY 99.5% PURITY  
 2) UTS/SLIP LOAD- 125 KN.

FOR BID PURPOSE ONLY				
PROJECT:	ENGINEERING OF DIVERSION OF TWO NOS. OF 220 KV D/C TRANSMISSION LINES AT FOUR DIFFERENT LOCATIONS			
OWNER:	 RELIANCE INFRASTRUCTURE LTD. 220kv Aarey Receiving Station, D. D. Road, Aarey Colony, Opp. Unit No. 19, Goregoan (E), Mumbai 400065			
CLIENT	 DEDICATED FREIGHT CORRIDOR CORPORATION LTD. 7th floor, Central Railway New Administrative Building D. N. Road, Mumbai-400001			
DFCCIL'S CONSULTANT	 <b>TAKALKAR POWER ENGINEERS &amp; CONSULTANTS PVT.LTD.</b> 424-430, B-WING, MONALISA BUSINESS CENTRE, NR. MANJALPUR RAILWAY CROSSING, MANJALPUR,VADODARA - 390 011			
TPCC DRG. NO.:	MUM/EL/UTILITY/REL-A/CONSULT/239/2016/5.2.1/4B/RS			REV.00
VENDOR	DATE	NAME	SIGN.	TITLE:
PREPARED	19.09.2016	A.L.		REPAIR SLEEVE FOR AAAC ZEBRA CONDUCTOR (61./3.31MM)
CHECKED	19.09.2016	MGJ		
APPROVED	23.09.2016	KGG		
DEPARTMENT	--			
SCALE:- N.T.S		SPEC. NO.:		SHT: 01 OF 01 REV:00

Signature & Stamp of Tenderer

For & on behalf of DFCCIL




### 2.6.8.8 Pilot String Suspension Clamp:-



8	SPLIT PIN	STAINLESS STEEL	1 NO.	
7	M15 PLAIN WASHER	MILD STEEL	1 NO.	
6	M12 SPRING WASHER	SPRING STEEL	4 NOS.	
5	M12 PLAIN WASHER	MILD STEEL	4 NOS.	
4	M12 U-BOLT & NUTS	MILD STEEL	2 SETS.	
3	M16 BOLT & NUT	MILD STEEL	1 NO.	
2	CLAMP KEEPER	ALUMINUM ALLOY	1 NO.	
1	SUSPENSION CLAMP BODY	ALUMINUM ALLOY	1 NO.	70 KN
<b>SL NO.</b>	<b>DESCRIPTION</b>	<b>MATERIAL</b>	<b>QTY</b>	<b>UTS</b>

#### TECHNICAL DATA:-

1. ALL FERROUS PARTS HOT DIP GALVANIZED AS PER IS:2629.
2. GENERAL TOLERANCE  $\pm 3\%$  UNLESS SPECIFIED.
3. SPRING WASHERS ARE ELECTRO GALVANIZED.
4. SLIP STRENGTH OF THE CLAMP : 16 TO 24 KN.
5. TOTAL WEIGHT - 1.3 KG. (APPROX.)
6. BREAKING STRENGTH - 70 KN.
7. MARKING - DUL.

FOR BID PURPOSE ONLY			
PROJECT:	ENGINEERING OF DIVERSION OF TWO NOS. OF 220 KV D/C TRANSMISSION LINES AT FOUR DIFFERENT LOCATIONS		
OWNER:	 RELIANCE INFRASTRUCTURE LTD. 220kv Aarey Receiving Station, D. D. Road, Aarey Colony, Opp. Unit No. 19, Goregoan (E), Mumbai 400065		
CLIENT:	 DEDICATED FREIGHT CORRIDOR CORPORATION LTD. 7th floor, Central Railway New Administrative Building D. N. Road, Mumbai-400001		
DFCCIL'S CONSULTANT:	 TAKALKAR POWER ENGINEERS & CONSULTANTS PVT.LTD. 424-430, B-WING, MONALISA BUSINESS CENTRE, NR. MANJALPUR RAILWAY CROSSING, MANJALPUR, VADODARA - 390 011		
TPEC DRG. NO.:	MUM/EL/UTILITY/REL-A/CONSULT/239/2015/2.6.7.5A/4B/ESC		REV. 00
VENDOR	DATE	NAME	SIGN.
PREPARED	8.01.2017	D.M.	
CHECKED	9.01.2017	MGJ	
APPROVED	30.01.2017	KGG	
DEPARTMENT	--		
TITLE: ENVELOPE TYPE SUSPENSION CLAMP SUITABLE FOR ZEBRA AAC CONDUCTOR			
SCALE:-	N.T.S	SPEC. NO.:	
			SHT: 01 OF 01 REV: 0

Signature & Stamp of Tenderer

For & on behalf of DFCCIL



**PART-II**

**CHAPTER-VII**

**SCOPE OF WORK**

**FOR**

**BYPASS ASSEMBLY FOR DOUBLE**

**TENSION STRING HARDWARE**

**PART-II**

**CHAPTER-VII**

**TECHNICAL SPECIFICATION**

**FOR**

**BYPASS ASSEMBLY FOR DOUBLE TENSION STRING**

**HARDWARE**

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2.7.2. Scope of Work:-.....	237
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2.7.4. Type Tests: - .....	239
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**PART-II**  
**CHAPTER-VII**  
**TECHNICAL SPECIFICATION**  
**FOR**  
**BYPASS ASSEMBLY FOR DOUBLE TENSION STRING HARDWARE**

**2.7.1. Introduction:-**

- 2.7.1.1 220kV Dahanu-Boisar-Versova-Aarey MIC & DIC Transmission lines of R-infra are constructed almost 20 years back. The lines are strung with AAAC ZEBRA conductors. Of Late, it is observed that the dead end compression type tension clamps are failing from the point near the jumper cone. This not only results into interruption of power supply but also causes a big threat to safety of public assets and human being since the portion of lines are in habitat area. There is always a danger of electrical fatal/nonfatal accidents due to snapping of the conductor after the failure of the dead end clamps.
- 2.7.1.2 R-Infra MT Engineering is therefore interested in providing parallel hardware components which will facilitate electrical and mechanical load transfer in case of failure of Double tension compression Dead End Hardware. This additional arrangement is termed as By-Pass Assembly (BPA) hereafter.
- 2.7.1.3 Since the requirement is of high importance and to get most effective solution, By-pass arrangement to facilitate the entire requirement worked out.
- 2.7.1.4 The proposed arrangement for Dead End By-pass is exhibited in drawing attached at para no. 2.7.10.1.
- 2.7.1.5 This document broadcasts the technical requirement for supply, fabrication and testing of By-Pass Assembly.

**2.7.2. Scope of Work:-**

- 2.7.2.1 The scope of entire work includes engineering, fabrication, testing of proto model at lab, loading and transportation of ordered By-Pass Assembly (BPA) quantity at site.
- 2.7.2.2 The work includes development of By-Pass Assembly (BPA) as per the drawing, using the material indicated in the text & the drawing. The vendor shall prepare the fabrication drawing and get the approval of same from Engineer. On approval of drawings, the vendor shall fabricate proto modeled assembly and offer for inspection to the Engineer.
- 2.7.2.3 After the approval of proto model from Engineer, the contractor shall proceed for testing of the same as detailed in this specification.
- 2.7.2.4 The BPA shall be subjected to mechanical and electrical tests as enumerated here after. The bidder/contractor shall be responsible for the correct testing and getting the sample type tested as enumerated here after.

- 2.7.2.5 All type of test on BPA proto model is to be carried at reputed test labs like, ERDA and the lab should have NABL accreditation where in vendor intend to carry test with prior intimation to Engineer. If the tests are not satisfactory, the BPA shall be redesigned, remodeled and retested till successful testing.
- 2.7.2.6 After the successful test and acceptance of the same by Engineer the bidder will have to supply quantity of assembly as indicated in the schedule of quantity and prices.

**2.7.3. Technical Requirements:-**

- 2.7.3.1 The Hardware's to be delivered under this contract shall be new and of high quality, suitable for the purpose it is intended for, free from defects and imperfections and of the classifications listed herein, or their equivalents, subject to acceptance by the Engineer.
- 2.7.1.6 The proposed arrangement of By-Pass Assembly is exhibited in drawing attached at para no. 2.7.10.1.

**2.7.3.2 BY-PASS ASSEMBLY USING TRIANGULAR PLATE, TURN BUCKLE, BYPASS CLAMP, MS PLATE, M-20 HEX HEAD NUT BOLT & M20 PLAIN AND SPRING WASHERS:-**

By pass Assembly (BPA) will be supplied by the contractor which will be installed on the major road and railway crossings for double tension insulator strings. The typical drawing for the same is exhibited in drawing attached at para no. 2.7.10.1. This assembly will prevent the conductor from snapping in case of damage to the compression dead end type clamp. The assembly will consist of following items.

**(A) M.S. Triangular Plate:-**

This shall be made of mild steel grade EN: 8, the plate will be 8mm thick, 200 mm wide and 170 mm in height. One side of this plate having one bolt will be free and other two ends will hold the turn buckle on the other side. The drawing of this part is shown as drawing attached at para no. 2.7.10.2. There will be two numbers of this flat as a part of assembly.

**(B) Turn Buckle (Clevis Eye Type):-**

This shall be made of GI material. It will be hollow inside and hexagonal shape in outer. This complete part shall be manufactured by forging and central drilling. This part is shown in drawing attached at para no. 2.7.10.3. One number of GI bolt clevis is to be connected to the turn buckle as a threaded bolt. The second will be connected as a threaded bolt to the turn buckle on the other side. The second GI bolt clevis piece shall be connected to the forged aluminum clamp of the conductor.

**(C) By-Pass Clamp:-**

This will be made out of aluminium alloy (4600, IS: 617) having very high conductivity and an EC grade of more than 99%. This shall be forged or extruded out of aluminium alloy plate or ingot. The clamp shall have a length of 250mm and a width of 200mm. The plate shall be bent with forging to make a semicircle (half circle) have an inner diameter of 28.62 mm. There will be two plates in mirror image with a total diameter of 28.62 mm covering the AAAC Zebra Conductor (having outer diameter 28.62 mm). The drawing is shown in drawing attached at para no. 2.7.10.4.

**(D) M.S. (Galvanized) Flat:-**

This shall be made of galvanized Iron 8mm thick\*48mm width\*315mm long flat. The grade of steel should be EN: 8. This will connect the bypass clamp and bolt clevis of the turn buckle. The drawing of this part is shown as drawing attached at para no. 2.7.10.5. There will be four numbers of this flat as a part of assembly.

**(E) Bolt-Nuts for Connecting the Assembly:-**

GI bolt nuts of 20mm diameter- 130 mm long with main and nut with each of them having one 2.5mm thick plain and 2.5mm thick spring washer (Both Electro-Galvanized) shall be used to connect various parts of the BPA as shown in the drawing. These bolts-nuts are shown in Drawings attached at para nos. 2.7.10.6 & 2.7.10.7 below. Bolts - nuts shall be hot dip galvanized.

**2.7.4. Type Tests:** - The entire By-Pass Assembly shall be subjected to the following tests.

2.7.4.1 Tensile test for a load of 15000 Kg as per IS 2486.

2.7.4.2 Mechanical slip test as per IS 2486.

2.7.4.3 Electrical resistance test as per IS 2486.

2.7.4.4 Magnetic power loss Test.

2.7.4.5 Heat cycle test as per IS 2486.

2.7.4.6 Further, all the above tests shall be carried out as per the standard relevant to the transmission line hardware.

2.7.4.7 Type test certificate from a Government owned or NABL accredited laboratory shall be submitted before supply of the BPA. Type test certificate should not be older than 5 years from the date of submission of Bid.

**2.7.5. Shipping, Handling and Storage:-**

2.7.5.1 Hardware assembly shall be shipped in packed for export to suit ease of handling for transportation and installation.

2.7.5.2 All the details of components and any specific requirement for handling and storage etc. shall be mentioned in the packing list.

2.7.5.3 The packing list shall be clearly marked on all faces of packing boxes.

2.7.5.4 Preparation for shipment shall protect the goods and accessories against corrosion, dampness, and breakage or vibration injury during transportation and handling.

**2.7.6. Warrantee:-**

2.7.6.1 The supplier shall guarantee / warrantee the performance of product up to 2 year after supply of hardware

2.7.6.2 Bidder and its sub vendors shall provide service support for repair/ replacement within 48 hours on request of DFCCIL/R-Infra. Failing to same, DFCCIL/R-Infra reserves the right to repair/ replace or carry out the work at bidder's risk and cost without prejudice to Warrantee.

**2.7.7. Qualifying Requirements:-**

2.7.7.1 The supplier should be Original Equipment Manufacturers (OEM) or their authorized channel partners in this field.

2.7.7.2 The supplier should have designed, manufactured, successfully type tested and supplied similar BPA hardware assembly to any State/Centre Power Utility or Private Power Utility in the past.

**2.7.8. Guaranteed Technical Particulars (GTP):-**

Sr. No	Particulars	Requirement	Bidders Data
1	Manufactures Name		
2	Standards to which product is confirming		
3	Application suitable for		
4	Material		
	(a) Triangular Plate	M.S. Grade – EN:8	
	(b) Turn Buckle	Forged Steel, Class -IV	
	(c) Bypass clamp	Aluminium Alloy 4600	
	(d) M S Plate	M.S Grade- EN:8	
	(e) M20 Hex Head Nut Bolt	M.S. H.D.G.	
	(f) M20 Plain and Spring washer	M.S. H.D.G	
5	Overall Weight	Vendor to Specify	
6	Service (Indoor / Outdoor)	Outdoor	
7	Type test Certificate (If Applicable)	Vendor To submit	
8	List of Acceptance test & Routine tests	Vendor to submit	
9	Past Performance details with R-Infra	Vendor to submit	
10	Vendor Experience in the field	Vendor to submit	

**2.7.9. List of Likely Manufacturers/Vendors for By-Pass Assembly for Double Tension String Hardware:-**

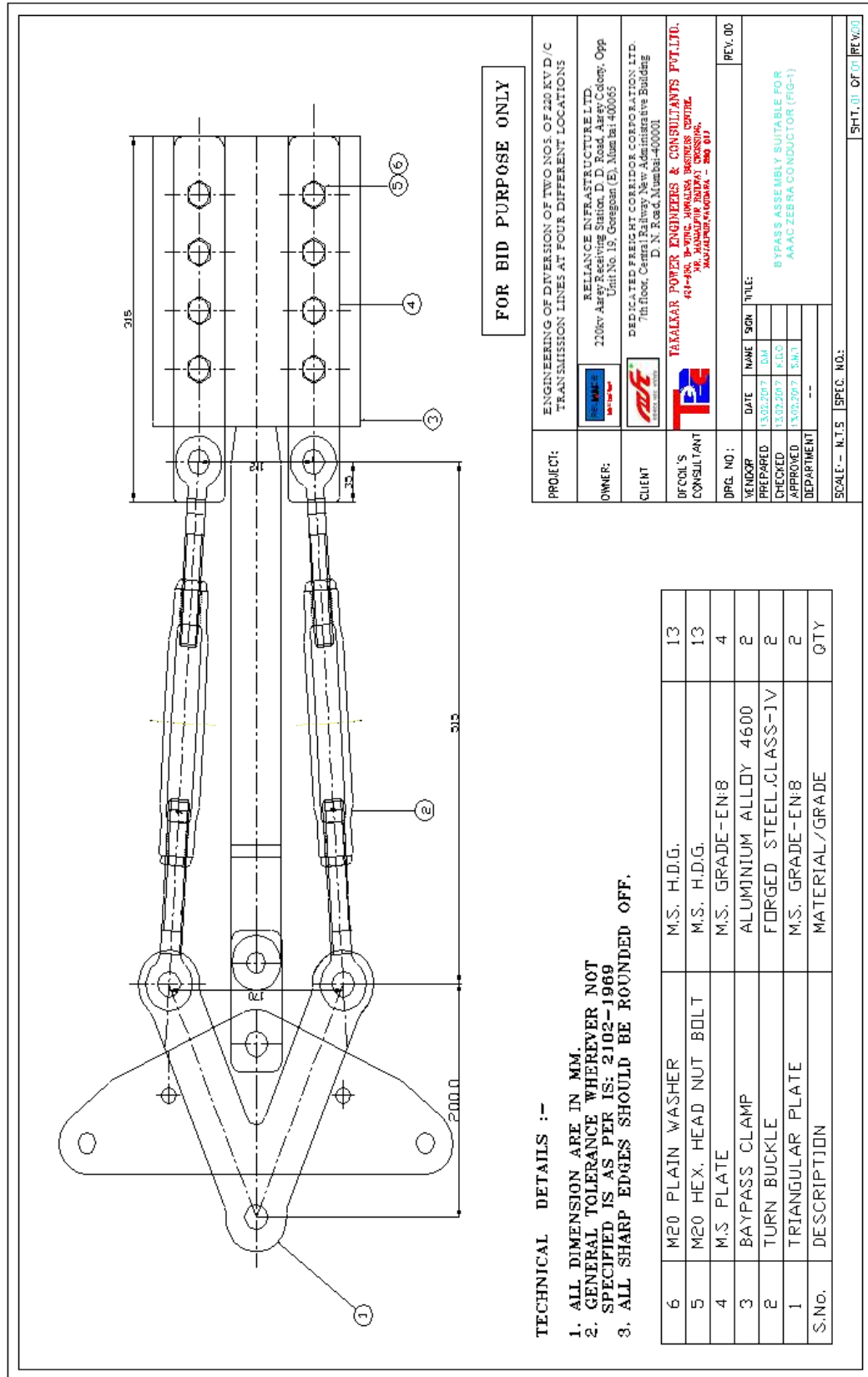
(1) M/s Ramelex, Pune.

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

## 2.7.10. Drawings:-

### 2.7.10.1 By-pass Assembly:-

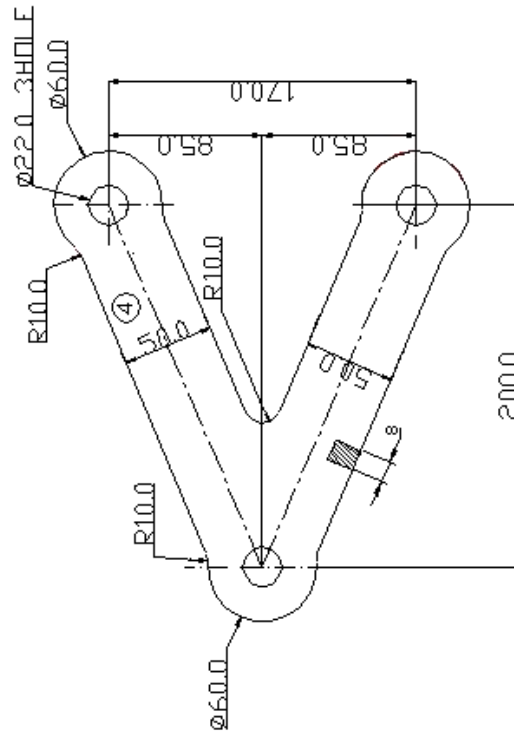


Signature & Stamp of Tenderer

For & on behalf of DFCCIL






#### 2.7.10.2 Triangular Plate:-



**TECHNICAL DETAILS :-**










1. ALL DIMENSION ARE IN MM.
2. GENERAL TOLERANCE WHEREVER NOT SPECIFIED IS AS PER IS: 2102-1983
3. ALL SHARP EDGES SHOULD BE ROUNDED OFF.

**FOR BID PURPOSE ONLY**

PROJECT:	ENGINEERING OF DIVERSION OF TWO NOS. OF 220 KV D/C TRANSMISSION LINES AT FOUR DIFFERENT LOCATIONS									
OWNER:	 <b>RELIANCE INFRASTRUCTURE LTD.</b> 22 New Army/Receiving Station, D. D. Road, Army Colony, Opp. Unit No. 19, George St (E), Mumbai 400 065									
CLIENT:	 <b>DEDICATED FREIGHT CORRIDOR CORPORATION LTD.</b> 7th floor, Central Railway-New Administrative Building D. N. Road, Mumbai - 400001									
DESIGN CONSULTANT:	 <b>TAKALAKAR POWER ENGINEERS &amp; CONSULTANTS PVT.LTD.</b> 1st-4th, 8-10th, BOMBAY PARTNERS COMPLEX, 7th FLOOR, PATEL PARKWAY CROSSING, MAROLLI NAGAR, MUMBAI - 400 051									
DRG. NO.:			REV. 00							
VENDOR	DATE	NAME	SDH	TITLE						
PREPARED	13.02.2017	DH								
CHECKED	13.02.2017	A.G.G								
APPROVED	13.02.2017	S.H.T								
DEPARTMENT	--									
SCALE:-- N:1.5 SPEC. NO.:										
										SHT. OF 01 FROM 01

1	TRIANGULAR PLATE	M.S. GRADE-EN8	1
SNO:	DESCRIPTION	MATERIAL /GRADE	QTY

### 2.7.10.3 Turn Buckle (Clevis Eye Type):-

<p align="center"><b>TECHNICAL DETAILS :-</b></p> <ol style="list-style-type: none"> <li>1. ALL DIMENSION ARE IN MM.</li> <li>2. ALL FERROUS PARTS HOT DIP GALVANISED AS PER IS: 2633/2629.</li> <li>3. APPLICABLE STANDARD: IS: 2486.</li> <li>4. GENERAL TOLERANCE <math>\pm 2\%</math> UNLESS SPECIFIED.</li> <li>5. WEIGHT : 2.2 KG. (APPROX.)</li> <li>6. IDENTIFICATION MARK(EMBOSSED) - RPL</li> <li>7. U.T.S - 120 KN.</li> </ol> <div style="border: 1px solid black; padding: 5px; text-align: center; margin-top: 10px;"> <b>FOR BID PURPOSE ONLY</b> </div>	<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:20%;">PROJECT</td> <td colspan="5">ENGINEERING OF DIVERSION OF TWO NOS. OF 220 KVD /C TRANSMISSION LINES AT FOUR DIFFERENT LOCATIONS</td> </tr> <tr> <td>OWNER</td> <td colspan="5">  <b>RELIANCE INFRASTRUCTURE LTD.</b>                  220kv Aarey Receiving Station, D. D. Road, Aarey Colony, Opp Unit No. 19, Goregaon (E), Mumbai 400065             </td> </tr> <tr> <td>CLIENT</td> <td colspan="5">  <b>DEDICATED FREIGHT CORRIDOR CORPORATION LTD.</b>                  7th floor, Central Railway New Administrative Building D. N. Road, Mumbai-400001             </td> </tr> <tr> <td>DFCCIL'S CONSULTANT</td> <td colspan="5">  <b>TAKALAP POWER ENGINEERS &amp; CONSULTANTS PVT.LTD.</b>                  408 - 409, 3RD FLOOR, 3RD CROSSING, 100, MARATHI RAILWAY CROSSING, MARATHI RAILWAY STATION - 400 017             </td> </tr> <tr> <td>DFCC NO.</td> <td colspan="5">811101-101</td> </tr> <tr> <td>VENDOR</td> <td>DATE</td> <td>NAME</td> <td>SIGN.</td> <td colspan="2">TITLE:</td> </tr> <tr> <td>PREPARED</td> <td>13.02.2017</td> <td>D.M.</td> <td></td> <td colspan="2"></td> </tr> <tr> <td>CHECKED</td> <td>13.02.2017</td> <td>K.G.</td> <td></td> <td colspan="2"></td> </tr> <tr> <td>APPROVED</td> <td>13.02.2017</td> <td>S.M.T</td> <td></td> <td colspan="2"></td> </tr> <tr> <td>DEPARTMENT</td> <td colspan="5">---</td> </tr> <tr> <td colspan="6">                 SCALE:- N.T.S    SPEC. NO.:    SHT: 01 OF 01    REV:01             </td> </tr> </table>	PROJECT	ENGINEERING OF DIVERSION OF TWO NOS. OF 220 KVD /C TRANSMISSION LINES AT FOUR DIFFERENT LOCATIONS					OWNER	 <b>RELIANCE INFRASTRUCTURE LTD.</b> 220kv Aarey Receiving Station, D. D. Road, Aarey Colony, Opp Unit No. 19, Goregaon (E), Mumbai 400065					CLIENT	 <b>DEDICATED FREIGHT CORRIDOR CORPORATION LTD.</b> 7th floor, Central Railway New Administrative Building D. N. Road, Mumbai-400001					DFCCIL'S CONSULTANT	 <b>TAKALAP POWER ENGINEERS &amp; CONSULTANTS PVT.LTD.</b> 408 - 409, 3RD FLOOR, 3RD CROSSING, 100, MARATHI RAILWAY CROSSING, MARATHI RAILWAY STATION - 400 017					DFCC NO.	811101-101					VENDOR	DATE	NAME	SIGN.	TITLE:		PREPARED	13.02.2017	D.M.				CHECKED	13.02.2017	K.G.				APPROVED	13.02.2017	S.M.T				DEPARTMENT	---					SCALE:- N.T.S    SPEC. NO.:    SHT: 01 OF 01    REV:01					
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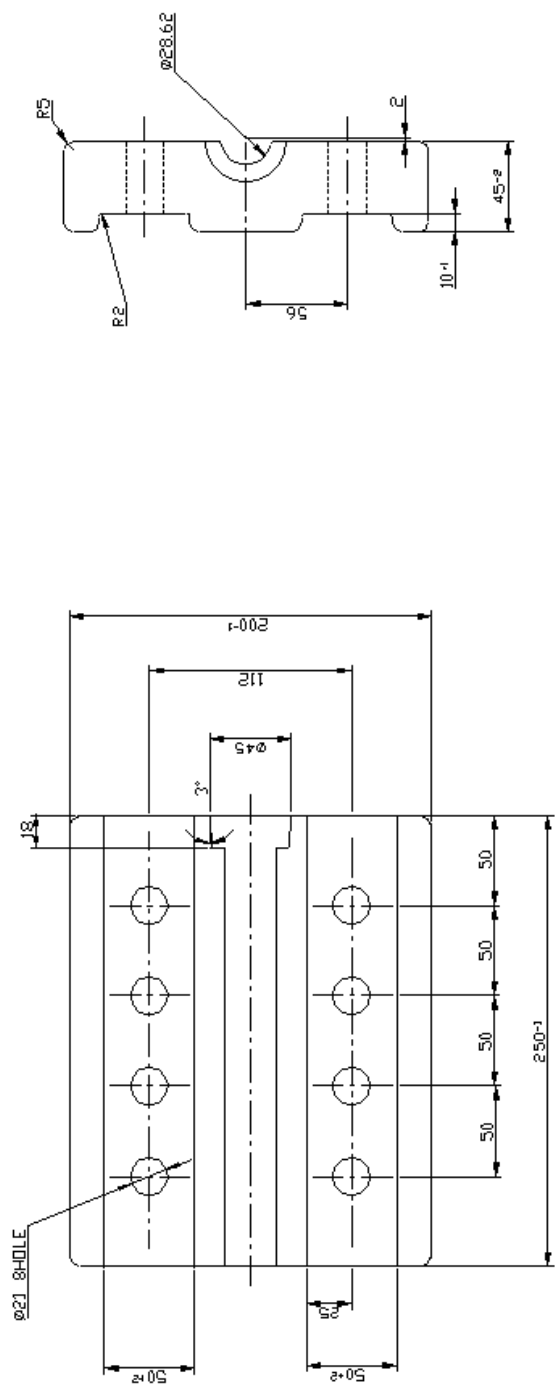









  

S.No.	DESCRIPTION	MATERIAL /GRADE	UTS(KN)	QTY
7	M20 CHECK NUT	MILD STEEL Fe410 IS: 2062	13	13
6	M20 CLEVIS BOLT	FORGED STEEL, CL-IV, IS: 2004	13	13
5	M20 EYE BOLT	FORGED STEEL, CL-IV, IS: 2004	13	13
4	SPLIT PIN	STAINLESS STEEL AISI-304	4	4
3	M20 PLAIN WASHER	MILD STEEL Fe410 IS: 2062	2	2
2	M20 BOLT & NUT	MILD STEEL Fe410 IS: 2062	120	2
1	TURN BUCKLE BODY	FORGED STEEL CL-IV, IS: 2004	120	2
MATERIAL /GRADE				

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

### 2.7.10.4 By-pass Clamp:-

	<div style="border: 1px solid black; padding: 5px; display: inline-block;">FOR BID PURPOSE ONLY</div>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">PROJECT:</td> <td colspan="3">ENGINEERING OF DIVISION OF TWO NOS. OF 22 KV D/C TRANSMISSION LINES AT FOUR DIFFERENT LOCATIONS</td> </tr> <tr> <td>OWNER:</td> <td style="text-align: center;"></td> <td colspan="2">RELIANCE INFRASTRUCTURE LTD. 220kv Aayr Receiving Station, D. N. Road, Aayr Colony, Opp Unit No. 19, Goregaon (E), Mumbai 400065</td> </tr> <tr> <td>CLIENT:</td> <td style="text-align: center;"></td> <td colspan="2">DEDICATED FREIGHT CORRIDOR CORPORATION LTD. 7th floor, Central Railway New Administrative Building D. N. Road, Mumbai-400001</td> </tr> <tr> <td>DFCCIL'S CONSULTANT:</td> <td style="text-align: center;"></td> <td colspan="2">TAKALKAR POWER ENGINEERS &amp; CONSULTANTS PVT.LTD. 414-108, 8-TH FLOOR, MIDLAND BUSINESS CENTRE, 107 MARLBOROUGH RAILWAY CROSSING, KEMURJIPORE, KOLKATA - 700 011</td> </tr> <tr> <td>DRG. NO.:</td> <td colspan="3">REV. 00</td> </tr> <tr> <td>VENDOR:</td> <td>DATE</td> <td>NAME</td> <td>INITIAL</td> </tr> <tr> <td>PREPARED</td> <td>13.02.2017</td> <td>D.P.</td> <td></td> </tr> <tr> <td>CHECKED</td> <td>13.02.2017</td> <td>K.O.G.</td> <td></td> </tr> <tr> <td>APPROVED</td> <td>13.02.2017</td> <td>S.N.T.</td> <td></td> </tr> <tr> <td>DEPARTMENT</td> <td colspan="3">---</td> </tr> <tr> <td colspan="4">SCALE:- N.T.S. SPEC. NO.:</td> </tr> <tr> <td colspan="4" style="text-align: right;">SHT. 01 OF 01 REV.00</td> </tr> </table>	PROJECT:	ENGINEERING OF DIVISION OF TWO NOS. OF 22 KV D/C TRANSMISSION LINES AT FOUR DIFFERENT LOCATIONS			OWNER:		RELIANCE INFRASTRUCTURE LTD. 220kv Aayr Receiving Station, D. N. Road, Aayr Colony, Opp Unit No. 19, Goregaon (E), Mumbai 400065		CLIENT:		DEDICATED FREIGHT CORRIDOR CORPORATION LTD. 7th floor, Central Railway New Administrative Building D. N. Road, Mumbai-400001		DFCCIL'S CONSULTANT:		TAKALKAR POWER ENGINEERS & CONSULTANTS PVT.LTD. 414-108, 8-TH FLOOR, MIDLAND BUSINESS CENTRE, 107 MARLBOROUGH RAILWAY CROSSING, KEMURJIPORE, KOLKATA - 700 011		DRG. NO.:	REV. 00			VENDOR:	DATE	NAME	INITIAL	PREPARED	13.02.2017	D.P.		CHECKED	13.02.2017	K.O.G.		APPROVED	13.02.2017	S.N.T.		DEPARTMENT	---			SCALE:- N.T.S. SPEC. NO.:				SHT. 01 OF 01 REV.00			
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1	BYPASS CLAMP	AA 4600 IS:617	2
S.No.	DESCRIPTION	MATERIAL / GRADE	QTY

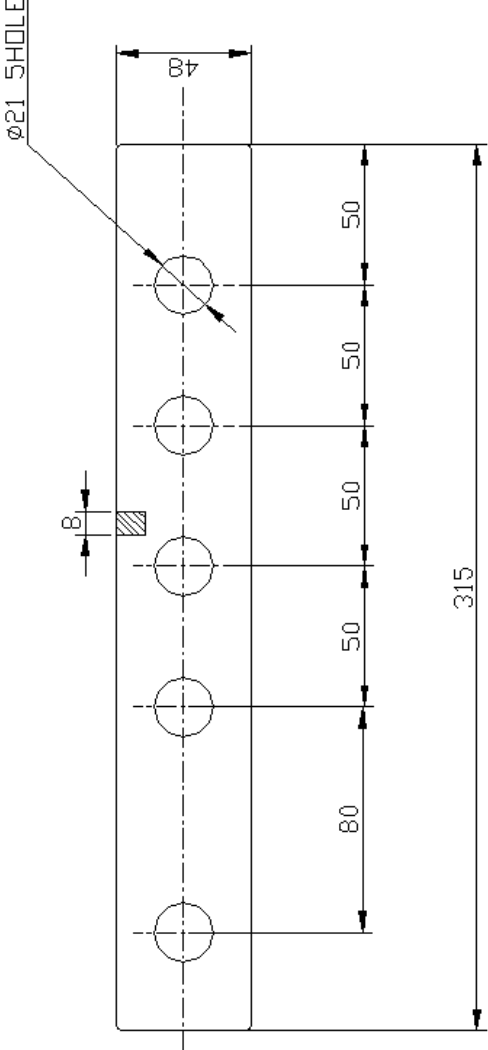









**TECHNICAL DETAILS :-**

1. ALL DIMENSION ARE IN MM.
2. GENERAL TOLERANCE WHEREVER NOT SPECIFIED IS AS PER IS: 2102-19693
3. ALL SHARP EDGES SHOULD BE ROUNDED OFF.

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

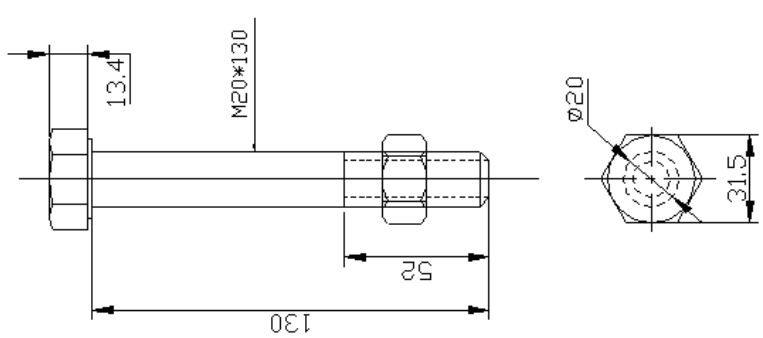
### 2.7.10.5 M.S. Flat for By-Pass Clamp:-

	<div style="border: 1px solid black; padding: 5px; text-align: center; margin-bottom: 10px;">FOR BID PURPOSE ONLY</div> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p><b>TECHNICAL DETAILS :-</b></p> <ol style="list-style-type: none"> <li>1. ALL DIMENSION ARE IN MM.</li> <li>2. GENERAL TOLERANCE WHEREVER NOT SPECIFIED IS AS PER IS: 2102-19693</li> <li>3. ALL SHARP EDGES SHOULD BE ROUNDED OFF.</li> </ol> </div> <div style="width: 50%;"> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 5%;">1</td> <td style="width: 40%;">M.S. PLATE</td> <td style="width: 35%;">M.S GRADE-EN:8</td> <td style="width: 20%;">1</td> </tr> <tr> <td>S.No.</td> <td>DESCRIPTION</td> <td>MATERIAL/GRADE</td> <td>QTY</td> </tr> </table> </div> </div> <div style="margin-top: 20px;"> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">PROJECT:</td> <td colspan="3">ENGINEERING OF DIVERSION OF TWO NOS. OF 220 KV D/C TRANSMISSION LINES AT FOUR DIFFERENT LOCATIONS</td> </tr> <tr> <td>OWNER:</td> <td colspan="3">  <b>RELIANCE INFRASTRUCTURE LTD</b>                  220kv Aarey Receiving Station, D. D. Road, Aarey Colony, Opp. Unit No. 19, Goregaon (E), Mumbai 400065             </td> </tr> <tr> <td>CLIENT:</td> <td colspan="3">  <b>DEDICATED FREIGHT CORRIDOR CORPORATION LTD.</b>                  7th floor, Central Railway New Administrative Building, D. N. Road, Mumbai-400001             </td> </tr> <tr> <td>DFCC'S CONSULTANT:</td> <td colspan="3">  <b>TAKALKAR POWER ENGINEERS &amp; CONSULTANTS PVT.LTD.</b>                  484-408, B-WING, MIDCULUS BUSINESS CENTRE, NO. MANALPUR RAILWAY CROSSING, MANALPUR-VANDRABARA - 400 011             </td> </tr> <tr> <td>DWG. NO.:</td> <td colspan="3">REV 00</td> </tr> <tr> <td>VENDOR PREPARED</td> <td>DATE</td> <td>NAME</td> <td>SCALE</td> </tr> <tr> <td>CHECKED</td> <td>13/02/2017</td> <td>D.N.</td> <td></td> </tr> <tr> <td>APPROVED</td> <td>13/02/2017</td> <td>K.G.C.</td> <td></td> </tr> <tr> <td>DEPARTMENT</td> <td colspan="3">---</td> </tr> <tr> <td colspan="2">SCALE:- N.T.S</td> <td colspan="2">SPEC. NO.:</td> </tr> <tr> <td colspan="2"></td> <td colspan="2" style="text-align: right;">SHT-01 OF 01 (REV00)</td> </tr> </table> </div>	1	M.S. PLATE	M.S GRADE-EN:8	1	S.No.	DESCRIPTION	MATERIAL/GRADE	QTY	PROJECT:	ENGINEERING OF DIVERSION OF TWO NOS. OF 220 KV D/C TRANSMISSION LINES AT FOUR DIFFERENT LOCATIONS			OWNER:	 <b>RELIANCE INFRASTRUCTURE LTD</b> 220kv Aarey Receiving Station, D. D. Road, Aarey Colony, Opp. Unit No. 19, Goregaon (E), Mumbai 400065			CLIENT:	 <b>DEDICATED FREIGHT CORRIDOR CORPORATION LTD.</b> 7th floor, Central Railway New Administrative Building, D. N. Road, Mumbai-400001			DFCC'S CONSULTANT:	 <b>TAKALKAR POWER ENGINEERS &amp; CONSULTANTS PVT.LTD.</b> 484-408, B-WING, MIDCULUS BUSINESS CENTRE, NO. MANALPUR RAILWAY CROSSING, MANALPUR-VANDRABARA - 400 011			DWG. NO.:	REV 00			VENDOR PREPARED	DATE	NAME	SCALE	CHECKED	13/02/2017	D.N.		APPROVED	13/02/2017	K.G.C.		DEPARTMENT	---			SCALE:- N.T.S		SPEC. NO.:				SHT-01 OF 01 (REV00)	
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Signature & Stamp of Tenderer

For & on behalf of DFCCIL

2.7.10.6 Bolt:-

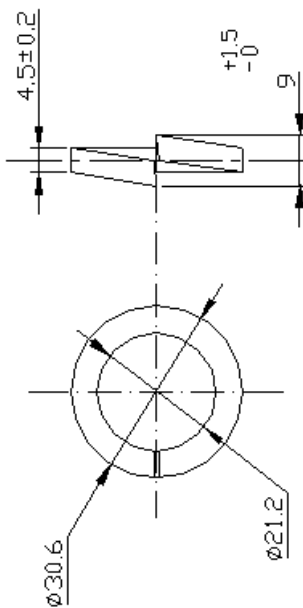
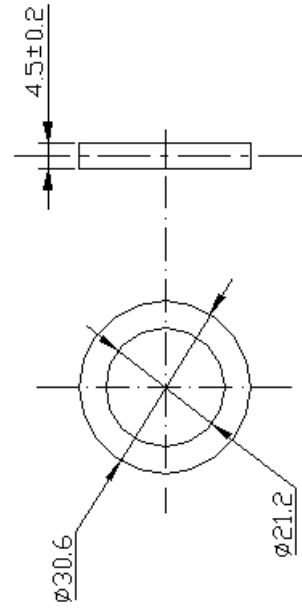









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<p><b>TECHNICAL DETAILS :-</b></p> <p>1. ALL DIMENSION ARE IN MM.</p> <p>2. GENERAL TOLERANCE WHEREVER NOT SPECIFIED IS AS PER IS: 2102-19693</p> <p>3. ALL SHARP EDGES SHOULD BE ROUNDED OFF.</p>			
<p><b>PROJECT</b></p>			
<p>ENGINEERING OF DIVERSION OF TWO NOS. OF 220 KVD/C TRANSMISSION LINES AT FOUR DIFFERENT LOCATIONS</p>			
<p><b>OWNER:</b></p>			
<p>RELIANCE INFRASTRUCTURE LTD. 220kv Aarey Receiving Station, D.D. Road, Aarey Colony, Opp. Unit No. 19, Goregaon (E), Mumbai 400065</p>			
<p><b>CLIENT</b></p>			
<p>DEDICATED FREIGHT CORRIDOR CORPORATION LTD. 7th floor, Central Railway New Administrative Building D. N. Road, Mumbai-400001</p>			
<p><b>DFCCIL'S CONSULTANT</b></p>			
<p>TAKALKAR POWER ENGINEERS &amp; CONSULTANTS PVT.LTD. 402-403, B-400C, MANJESHA BUSINESS CENTRE, 7th, NARAYAN RAILWAY CROSSING, NARAYANPURA/VAHURDA - 390 011</p>			
<p><b>DRG. NO.:</b></p>			
<p>---</p>			
<p><b>REV.00</b></p>			
<p>---</p>			
<p><b>VENDOR</b></p>			
<p>---</p>			
<p><b>PREPARED</b></p>			
<p>13.02.2017 D.H.</p>			
<p><b>CHECKED</b></p>			
<p>13.02.2017 E.C.G.</p>			
<p><b>APPROVED</b></p>			
<p>13.02.2017 S.W.1</p>			
<p><b>DEPARTMENT</b></p>			
<p>---</p>			
<p><b>SCALE:-</b></p>			
<p>N.T.S</p>			
<p><b>SPEC. NO.:</b></p>			
<p>---</p>			
<p><b>SHT: 01 OF 01 REV.00</b></p>			

1	BOLT	M.S. H.D.G.,	1
S.No.	DESCRIPTION	MATERIAL/GRADE	QTY

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

### 2.7.10.7 Spring & Pack Washer:-

 <p style="text-align: center;"><b>SPRING WASHER</b></p>	 <p style="text-align: center;"><b>PACK WASHER</b></p>	<p><b>TECHNICAL DETAILS :-</b></p> <ol style="list-style-type: none"> <li>1. ALL DIMENSION ARE IN MM.</li> <li>2. GENERAL TOLERANCE WHEREVER NOT SPECIFIED IS AS PER IS: 2102-19693</li> <li>3. ALL SHARP EDGES SHOULD BE ROUNDED OFF.</li> </ol> <div style="border: 1px solid black; padding: 5px; text-align: center; margin-top: 10px;"> <b>FOR BID PURPOSE ONLY</b> </div>																																												
<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:15%;">PROJECT:</td> <td colspan="3">ENGINEERING OF DIVERSION OF TWO NOS. OF 220 KV D/C TRANSMISSION LINES AT FOUR DIFFERENT LOCATIONS</td> </tr> <tr> <td>OWNER:</td> <td style="width:15%; text-align: center;">  </td> <td style="width:30%;">                 RELIANCE INFRASTRUCTURE LTD.                  220kv Aray Receiving Station, D. D. Road, Aray Colony, Opp. Unit No. 15, Goregaon (E), Mumbai-400065             </td> <td style="width:40%;"></td> </tr> <tr> <td>CLIENT:</td> <td style="text-align: center;">  </td> <td>                 DEDICATED FREIGHT CORRIDOR CORPORATION LTD.                  7<sup>th</sup> floor, Central Railway New Admin Building                  D. N. Road, Mumbai-400001             </td> <td></td> </tr> <tr> <td>DFCCIL'S CONSULTANT:</td> <td style="text-align: center;">  </td> <td> <b>TAKALKAR POWER ENGINEERS &amp; CONSULTANTS PVT.LTD.</b>                  #31-480, B-WING, BHIMABAI BURSNESS CENTRE,                  100, ANANDAPUR RAILWAY CROSSING,                  JAMNAGAR-389011             </td> <td></td> </tr> <tr> <td>DRG. NO.:</td> <td colspan="3">REV. 00</td> </tr> <tr> <td>VENDOR:</td> <td>DATE:</td> <td>NAME:</td> <td>SIGN:</td> </tr> <tr> <td>PREPARED</td> <td>13.02.2017</td> <td>U. H.</td> <td></td> </tr> <tr> <td>CHECKED</td> <td>13.02.2017</td> <td>K. G. G.</td> <td></td> </tr> <tr> <td>APPROVED</td> <td>13.02.2017</td> <td>S. H. A. I.</td> <td></td> </tr> <tr> <td>DEPARTMENT:</td> <td colspan="3"></td> </tr> <tr> <td colspan="4" style="text-align: center;">                 SCALE:- N.T.S.    SPEC. NO.:             </td> </tr> </table>			PROJECT:	ENGINEERING OF DIVERSION OF TWO NOS. OF 220 KV D/C TRANSMISSION LINES AT FOUR DIFFERENT LOCATIONS			OWNER:		RELIANCE INFRASTRUCTURE LTD. 220kv Aray Receiving Station, D. D. Road, Aray Colony, Opp. Unit No. 15, Goregaon (E), Mumbai-400065		CLIENT:		DEDICATED FREIGHT CORRIDOR CORPORATION LTD. 7 <sup>th</sup> floor, Central Railway New Admin Building D. N. Road, Mumbai-400001		DFCCIL'S CONSULTANT:		<b>TAKALKAR POWER ENGINEERS &amp; CONSULTANTS PVT.LTD.</b> #31-480, B-WING, BHIMABAI BURSNESS CENTRE, 100, ANANDAPUR RAILWAY CROSSING, JAMNAGAR-389011		DRG. NO.:	REV. 00			VENDOR:	DATE:	NAME:	SIGN:	PREPARED	13.02.2017	U. H.		CHECKED	13.02.2017	K. G. G.		APPROVED	13.02.2017	S. H. A. I.		DEPARTMENT:				SCALE:- N.T.S.    SPEC. NO.:			
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Signature & Stamp of Tenderer

For & on behalf of DFCCIL

**PART-II**

**CHAPTER-VIII**

**SCOPE OF WORK**

**FOR**

**SERVICES, CONSTRUCTION AND ERECTION**



## **PART-II**

### **CHAPTER-VIII**

#### **SCOPE OF WORK** **FOR** **SERVICES, CONSTRUCTION AND ERECTION**

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**PART-II**  
**CHAPTER-VIII**  
**SCOPE OF WORK**  
**FOR**  
**SERVICES, CONSTRUCTION AND ERECTION**

**2.8.1 Scope of Constructional Work for Diversion:-**

**2.8.1.1 Scope:-**

(A) The scope of work include erection, dismantling, testing and commissioning activities for diversion work of 2Nos. of 220 kV D/C Tr. Lines (owned by R-Infra) to facilitate the passage of rail track being constructed by the Dedicated Freight Corridor Corporation of India Limited (DFCCIL) at the crossing points near Village - Agwan (Dahanu Taluka); Village - Shirgaon (Vasai Taluka); Village Bilalpada (Vasai Taluka) & Village Gokhivare (Vasai Taluka) in Maharashtra.

- Bidders may please note that the accounting of newly procured items (AAAC Zebra conductor, OPGW 48C, Polymer Silicon Rubber Insulators, Insulator hardware & conductor accessories, OPGW hardware/accessories, Earthing materials etc.) should be done after completion of the diversion works. The balance unused conductor, OPGW & line materials etc. shall be taken back by the contractor and requisite rebate for the returned material, if any, shall be accounted for and given during final bill.

**Any other items not specified or mentioned in this specification and/or in other part of complete bid document but are necessarily required for successful installation, testing and commissioning of complete transmission lines, unless specifically excluded in the specifications will be in the scope of the bidder.**

(B) Engineer/DFCCIL shall provide to the successful bidder, the route alignment marked on drawings, approved profiles, structural drawings, shop drawings & foundation drawings for 220 kV D/C towers and tentative BOQ of tower, foundation, insulators, hardware assemblies, AAAC Zebra conductor/OPGW accessories, AAAC ZEBRA conductor/OPGW, tower accessories, tower earthing system etc. for bidding purpose.

(C) Structural drawings, shop drawings & Bill of Materials of all type of transmission line towers, as required shall be verified by the successful bidder before commencement of works suiting the project requirement.

- (D) The rates quoted shall include details which are obviously and fairly intended, and which may not have been included in these documents but are essential for the satisfactory completion of various works.
- (E) The rates quoted shall be inclusive of all plant equipment, men, material skilled and unskilled labours, tools and tackles etc. essential for satisfactory completion of various works under this contract.
- (F) All measurements for payment shall be in SI units, lengths shall be measured in meters corrected to two decimal places. Areas shall be computed in square meters & volume in cubic meters rounded off to two decimals.
- (G) The bidder shall submit his offer taking into consideration that the tower and foundation designs/drawings developed/provided by DFCCIL shall be verified by bidder. Bidder shall quote the rates for various items of towers, foundations, benching, pitching and rubble masonry as per units mentioned in appropriate schedule.
- (H) The payment to be made for towers/foundations shall be worked out based on the rates and approved Bill of Materials (BOM) for towers and quantities/volumes as per approved tower/foundation drawings.
- (I) All the raw materials such as reinforcement steel, cement, coarse and fine aggregates for tower foundation, coke and salt for tower grounding etc. are included in the contractor's scope.
- (J) Bidder shall get approval of sources from Engineer/DFCCIL for fasteners, anti-theft fasteners, step bolts, hangers, D-shackles, tower accessories & aviation signal etc. (if required).
- (K) The entire stringing work of conductor and OPGW shall be carried out by standard stringing practice. The bidder shall indicate in the offer, the detailed description of the procedure to be deployed for stringing operation for both.
- (L) The contractor shall deploy appropriate tools/equipment/machinery to ensure that the stringing operation is carried out without causing damage to conductor/OPGW and conductor/OPGW is installed at the prescribed sag-tension as per the approved stringing charts.
- (M) Insulated ropes shall be used while carrying out tower erection as well as stringing activities involve in diversion works under this project to avoid any accident due to the energized conductors of nearby live circuits of existing 220 kV D/C Transmission Lines.
- (N) Contractor shall verify the detailed survey carried out by Engineer using GPS/Total stations, digital theodolite etc. along the approved route alignment.

(O) Bidders may however visit the sites of diversion work of the existing line route to acquaint themselves with terrain conditions and associated details of the proposed transmission lines before submission of their offer. For this purpose they are requested to contact the following address:

Chief Project Manager/South/Mumbai,  
Dedicated Freight Corridor Corporation of India Ltd.,  
(A Govt. of India Enterprise),  
7<sup>th</sup> floor, Central Railway New Administrative Building,  
D. N. Road, Mumbai-400001,  
MAHARASHTRA, INDIA  
Ph. No: +91-22-22634185; Fax: +91-22-22634184

(P) The details collected through detailed survey viz. route alignment maps, detailed survey reports, detailed feasibility report etc. will be given to the successful contractor during execution stage.

(Q) It is the responsibility of the Contractor for complete way leave clearance for execution of work including estimation of the damages to the crop / trees, payments for such damages.

## **2.8.2 Preliminary Work:-**

### **2.8.2.1 Survey:-**

(A) Plan and profile drawing showing tower locations and all points of reference such as angle points etc. has been prepared by Engineer. However, Preliminary survey has been carried out recently and drawings have been prepared subsequently. Route alignment of proposed line is marked on drawing attached with this bid. Copy of key plan & plan & profile drawings is available with the Engineer for bidder's reference and will be issued to the successful bidder.

(B) Contractor after award of contract shall review and carry out the check survey as appropriate.

### **2.8.2.2 Check Survey:-**

The contractor shall perform all necessary check survey work, which consists of determination, checking and layout of the accurate center line and elevation of all the reference points, based on the profile drawings. Contractor shall verify the tower spotting on the plan & profile drawings and also check the exact location of towers, minimum clearances of conductors crossing the proposed DFCCIL tracks, power lines etc.

### 2.8.2.3 Staking:-

- (A) Contractor shall stake the locations of the tower as spotted on the plan and profile drawings.
- (B) Three stakes will be provided on the center line of the transmission line. One stake at the proposed tower location and other two as reference stakes located on the center line of transmission line, approximately 10 meters on either side to tower location.
- (C) During staking of tower locations, if the site of any tower as spotted in the plan and profile drawings is not suitable by reasons of topography or geological or any other condition, the contractor shall be required to recommend the proper locations of towers to the Engineer for consideration and then carry out the work as per Engineer's decision.
- (D) The check survey and staking work shall be performed by qualified surveyor. The contractor shall submit qualifications of surveyor(s) at least 15 days prior to commencement of work.
- (E) The contractor shall be required to complete the check survey and staking work under this contract as soon as possible, but not later than one month after the award of Contract.
- (F) Two (2) prints of updated plan and profile drawings and structure list, including diagonal profile and plan drawings of hillside towers, if any, shall be submitted to the Engineer with final survey data, for approval. Field activities shall commence only after approval is obtained in writing. After approval contractor shall submit three (3) copies of approved drawing and its soft copy on compact disc to the Engineer /DFCCIL for record.

### 2.8.3 Soil Investigations:-

The soil investigation for the obligatory points shall be carried out by the successful bidder as suggested by the consultant.

### 2.8.4 Clearing of Right of Way and Danger Trees:-

- 2.8.4.1 All statutory clearances and permissions from various statutory bodies/Govt. authorities like Forest Department, Railway, Aviation Authority, Maritime Board, National Highway Authority, etc. wherever required Engineer/DFCCIL will co-ordinate, along the route of the diversion of 220 kV D/C Transmission lines, however the complete responsibility lies with the contractor for submission of the required details, follow up with statutory bodies etc. for obtaining the approval.

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- 2.8.4.2 For necessary forest clearance, the DFCCIL will do the processing and the payment to the central government/state government for compensation of forest clearance will be paid by the DFCCIL as necessary. For permission from other Govt. authorities like Railways, National highway authority etc., the payment, if required, shall be made by the DFCCIL on demand from the authority concerned.
- 2.8.4.3 For clearances, permissions etc. from various authorities, the Bidder shall not remain contended by simply informing the DFCCIL, but shall have to arrange for personal follow up to overcome the difficulties in the interest of progress of the work.
- 2.8.4.4 The Bidder shall instruct his labours and staff to use minimum area while executing the work where there are standing crops. No persons of the Bidder should pick up any items from the standing crops or fruit. The Bidder should take all possible steps to avoid or minimize damages to the standing crops. On completion of the work, bidder shall make the surrounding soil to its original condition.
- 2.8.4.5 For clearance of way leave permission/obstruction etc. The Bidder is solely responsible including any payments required to be made thereof including that for crop/tree compensation. The bidder shall be responsible for mapping the route and location of towers with Survey No. of land on Tikka Map and name of the land owner from Revenue records (7/12). Based on these data, Notice shall be issued to respective land owners for tower erection works.
- 2.8.4.6 Removing of trees, tree cutting and crop/ tree compensation thereof shall be organized and paid by the Bidder. The cost of cutting the trees shall also be borne by the Bidder. Engineer/DFCCIL's representative shall render necessary helps for fixing the compensation through concerned Department or other local revenue authority like Talathi, Sarpanch/Mamlatdar. Such Payments are to be given immediately after foundation, tower erection and stringing stages and recorded in the 'Panch-Nama'. The amount to be paid shall also be informed to the Engineer/DFCCIL's representative, however, bidder should not claim for the delay in work on account of the above. The record register of location wise payment shall be maintained.
- 2.8.4.7 It is the Bidder's responsibility to take appropriate action for way leave etc. as indicated above well in advance so that objections from the land owners could be addressed well in time. In the event of any objection from landowners, work shall be carried out by taking an order from District Magistrate location wise. This order of District Magistrate shall also cover provision of police protection and SRP. As per this, State Police or SRP protection for any activity of transmission line is to be sought only after permission from District Magistrate in all such cases wherever and whenever objection is raised by land owner for laying of transmission line in their land.



- 2.8.4.8 The right of way for the proposed diversion work shall be got cleared from the landowners wherever necessary by the contractor. Contractor shall carry out cutting of trees, clearing of undergrowth or removing other obstructions, if any, within the right of way. The contractor shall provide and maintain during the entire contract period all access road connecting existing public road system and the right of way for the transmission line. This road shall be adequate for the transportation of construction loads only. The key map provided shows the approximate location of some of the roads in the vicinity of the work. This data, however, is not intended as a representation of warranty but is furnished for information only. It should be understood that the DFCCIL will not be responsible for any interpretation or conclusion drawn from this information. During the terms of the Contract, the contractor shall comply with all national and local regulations and also the Engineer's guidelines regarding barricades, detour arrangements and warning sign etc. The cost of the access roads shall be included by contractor in his rates and in no case extra amount for the same shall be paid by the DFCCIL.
- 2.8.4.9 While clearing of right of way in general, all trees, bushes and stumps within 8 meters of any tower member shall be cut off as close to the ground as practical and in no case shall they be cut off at a height of more than 30 cm above the ground. All trees, bushes and stumps in other areas to be cleared, shall be cut off at not more than 50 cm above the ground.
- 2.8.4.10 The clearing shall also include the cutting or trimming of all trees outside the right of way if such trees, upon falling, would come within 3 meters of a point underneath the outside conductor in falling.
- 2.8.4.11 The contractor shall, upon completion of the entire diversion work and prior to the work being delivered to the Engineer/DFCCIL for acceptance, recut and clear the entire right of way. This work shall be done as part of the clearing of right of way and the contractor shall include it in bid prices in the Schedule.
- 2.8.4.12 Where the right of way is through well-developed areas such as orchards and garden areas, clearing will be confined to the tower sites, except that the contractor will require trimming or removal of all trees and obstruction that interfere with operation of the transmission lines. The contractor shall make provision for maintaining of normal irrigation throughout these areas. The construction operations must be performed in a manner to reduce damage to property to a minimum and in a manner approved by the Engineer/DFCCIL.

- 2.8.4.13 The contractor shall tackle any local problems related to right of way through hutments, private property, government land etc. at his cost. The original receipts of payments to statutory bodies shall be submitted to the Engineer/DFCCIL. However additional assistance for liasoning may be provided by the DFCCIL, if required, depending upon case to case basis.

## **2.8.5 Methodology & Sequence of Constructional Activities:-**

### **2.8.5.1 Methodology and Sequence of Constructional Activities to be adopted for Diversion Works at Dahanu Crossing Site (At Village - Aagvan) as under:-**

- (A) **Step-1:-** To construct the foundations of all the temporary and permanent locations.
- (B) **Step-2:-** To erect all temporary towers of both lines, i.e. LS TEMP-10, LS TEMP-11, LS Temporary cum Permenent-12A, LS TEMP 13, SS TEMP 08 and SS TEMP 12. The erection work at all these locations can be done without any shutdown.
- (C) **Step-3:-** To finish the stringing work between three spans of temporary LS line (i.e. between location LS TEMP-10 to LS TEMP-11, LS TEMP-11 to LS-Temporary cum Permenent-12A and LS-Temporary cum Permenent-12A to LS TEMP-13). There is no necessity of shutdown for doing stringing work between these three locations.
- (D) **Step-4:-** To take shutdown of one circuit of LS line and perform the stringing work between proposed temporary location LS TEMP-10 to Existing location LS-9 and between proposed temporary location LS TEMP-13 Existing locations LS-14 simultaneously. It is proposed to carry out the de-stringing work of same circuit between existing locations LS-9 to LS-14 of existing LS line. It is also proposed to provide the stays on existing location LS-9 and LS-14 to avoid any damage to these locations, as these are suspension locations.
- (E) **Step-5:-** To take shutdown of another circuit of LS line and perform the stringing work between proposed temporary location LS TEMP-10 to Existing location LS-9 and between proposed temporary location LS TEMP-13 Existing locations LS-14 simultaneously. It proposed to carry out the de-stringing work of same circuit between existing locations LS-9 to LS-14 of existing LS line. It is also proposed to provide the stays on existing location LS-9 and LS-14 to avoid any damage to these locations, as these are suspension locations.
- (F) **Step-6:-** To dismantle the tower locations LS-11, LS-12 & LS-13 and then demolish their foundations. It is also proposed to erect new tension towers locations LS-11, LS-12, SS-11A & LS-13. The location no LS-11 & LS-13 will be adjacent to the existing suspension location respectively and new towers location LS-11, LS-12 & LS-13 will be in the same alignment (ROW) of the existing Tr. Line.

- (G) Step-7:-** To finish the stringing work between five spans of temporary SS line (i.e. between locations SS TEMP-08 to SS Temporary cum Permanent SS-11A, via LS-10, proposed LS-11, LS Temporary cum Permanent LS-12 and between SS-Temporary cum Permanent-11A to SS TEMP-12). There is no necessity of shutdown for doing this stringing work.
- (H) Step-8:-** To take shutdown of one circuit of SS line and perform the stringing work between proposed temporary location SS TEMP-08 to Existing location SS-07 and between proposed temporary location SS TEMP-12 Existing locations SS-13 simultaneously. It is proposed to carry out the de-stringing work of same circuit between existing locations SS-07 to SS-13. It is also proposed to provide the stays on existing location SS-07 as well as SS-13 to avoid any damage to existing locations.
- (I) Step-9:-** To take shutdown of another circuit of SS line and perform the stringing work between proposed temporary location SS TEMP-08 to Existing location SS-07 and between proposed temporary location SS TEMP-12 Existing locations SS-13 simultaneously. It is proposed to carry out the de-stringing work of same circuit between existing locations SS-07 to SS-13. It is also proposed to provide the stays on existing location SS-07 as well as SS-13 to avoid any damage to existing locations.
- (J) Step-10:-** To erect the tension towers at proposed tension location SS-10 and SS-12 adjacent to existing suspension location SS-10 & SS-12 in the same alignment for permanent diversion of SS line.
- (K) Step-11:-** To dismantle existing location SS-10, SS-11 and SS-12 and thereafter demolish the foundations of these existing locations.
- (L) Step-12:-** To take shut down of one circuit of SS line for carrying out the stringing work of permanent diversion of that circuit of SS line, between existing location SS-07 to existing location SS-13, through existing location SS-08, SS-09, proposed tension location SS-10, proposed locations SS-11, SS-11A and proposed tension location SS-12. It is also proposed to carry out the de-stringing work of same circuit of temporary diversion portion of line, between existing location number SS-07 to SS-13, through locations, SS TEMP-08, LS-10, LS-11, LS-12, SS temporary cum permanent location SS-11A and SS TEMP-12.
- (M) Step-13:-** To take shut down of another circuit of SS line for carrying out the stringing work of permanent diversion of that circuit of SS line, between existing location SS-07 to Existing/proposed location SS-13, through existing location SS-08, SS-09, proposed tension location SS-10, proposed locations SS-11, SS-11A and proposed tension location SS-12. It is also proposed to carry out the de-stringing work of same circuit of temporary diversion portion of line, between Existing location number SS-07 to SS-13, through locations, SS TEMP-08, LS-10, LS-11, LS-12, SS temporary cum permanent location SS-11A and SS TEMP-12.

- (N)**Step-14:-** To dismantle the tower locations SS TEMP-08 and SS TEMP-12 and demolish the foundations of both the locations. Thereafter, erection activities at proposed location LS-13 shall be completed.
- (O)**Step-15:-** To take shut down of one circuit of LS line for carrying out the work of permanent diversion of that circuit of LS line, between existing location LS-09 to existing location LS-14, through existing locations LS-10, LS-11 (Tension tower), proposed location LS-12, LS-12A, LS-13 (Tension tower). It is also proposed to carry out the de-stringing work of same circuit of temporary diversion portion of line between Existing location number LS-09 to LS-14 through temporary locations LS TEMP-10, LS TEMP-11, LS temporary cum permanent location LS -12A and LS TEMP-13.
- (P)**Step-16:-** To take shut down of another circuit of LS line for carrying out the work of permanent diversion of that circuit of LS line, between existing location LS-09 to existing location LS-14, through existing locations LS-10, LS-11 (Tension tower), proposed location LS-12, LS-12A, LS-13 (Tension tower). It is also proposed to carry out the de-stringing work of same circuit of temporary diversion portion of line between Existing location number LS-09 to LS-14 through temporary locations LS TEMP-10, LS TEMP-11, LS temporary cum permanent location LS -12A and LS TEMP-13.
- (Q)**Step-17:-** To remove the stays provided at existing locations LS-09 and LS-14.
- (R)**Step-18:-** To dismantle the tower locations LS TEMP-10, LS TEMP-11 and LS TEMP-13 and demolish the foundations of all the three locations.

**2.8.5.2 Methodology and Sequence of Constructional Activities to be adopted for Diversion Works at Virar Crossing (At Village - Shirgaon) Site as under:-**

- (A)**Step-1:-** To construct the foundations of all the proposed temporary and permanent locations.
- (B)**Step-2:-** To erect all the six towers of proposed temporary line diversion arrangement of LS line and SS line (i.e. LS TEMP-192, LS TEMP-192A, LS TEMP-193, SS TEMP-194, SS TEMP-194A and SS TEMP-195 towers). The erection work at all the six locations can be done without any shutdown.
- (C)**Step-3:-** To finish the stringing work between four spans i.e. between locations LS TEMP-192 & LS TEMP-192A, LS TEMP-192A & LS-TEMP -193, SS TEMP-194 & SS TEMP-194A and SS TEMP-194A & SS-TEMP -195. There is no necessity of shutdown for doing stringing work between these four locations.
- (D)**Step-4:-** To take shutdown of one circuit of LS line and perform the stringing work of that circuit between proposed temporary location LS TEMP-192 & existing location LS-191 and between proposed temporary locations LS TEMP-193 & existing locations LS-194 simultaneously.

It is proposed to carry out the de-stringing work of same circuit between existing locations LS-191 & LS-194 of existing LS line. It is also proposed to provide the stays on those locations wherever it is required.

- (E) Step-5:-** To take shutdown of another circuit of LS line and perform the stringing work of that circuit between proposed temporary location LS TEMP-192 & existing location LS-191 and between proposed temporary locations LS TEMP-193 & existing locations LS-194 simultaneously. It is proposed to carry out the de-stringing work of same circuit between existing locations LS-191 & LS-194 of LS line. It is also proposed to provide the stays on those locations wherever it is required.
- (F) Step-6:-** To take shutdown of one circuit of SS line and perform the stringing work of that circuit between proposed temporary location SS TEMP-194 & Existing location SS-193 and between proposed temporary locations SS TEMP-195 & Existing locations SS-196 simultaneously. It is proposed to carry out the de-stringing work of same circuit between existing locations SS-193 & SS-196 of LS line. It is also proposed to provide the stays on those locations wherever it is required.
- (G) Step-7:-** To take shutdown of another circuit of SS line and perform the stringing work of that circuit between proposed temporary location SS TEMP-194 & Existing location SS-193 and between proposed temporary locations SS TEMP-195 & Existing locations SS-196 simultaneously. It is proposed to carry out the de-stringing work of same circuit between existing locations SS-193 & SS-196 of LS line. It is also proposed to provide the stays on those locations wherever it is required.
- (H) Step-8:-** To dismantle existing suspension location LS-192, LS-193, SS-194 and SS-195 and demolish their foundations. Thereafter erect all the six towers of proposed diverted LS and SS line (i.e. LS Permanent crossing location 192, LS Permanent crossing location 192A, proposed LS-193, SS Permanent crossing location SS-194, SS Permanent crossing location SS-194A and proposed SS-195). The erection work at all the six locations can be done without any shutdown.
- (I) Step-9:-** To finish the stringing work between four spans i.e. between locations LS - 192 & LS-192A, LS-192A & LS-193 and SS-194 & SS-194A, SS-194A & SS-195 of proposed diversion of LS & SS line. There is no necessity of shutdown for doing stringing work between these three locations. It is also proposed to provide the stays on those locations wherever it is required.
- (J) Step-10:-** To take shut down of one circuit of SS line for carrying out the stringing work of permanent modification of that circuit of SS line, between existing location SS-193 & proposed permanent location SS-194, and between proposed tension locations SS-195 & Existing location-SS-196.

It is also proposed to carry out the de-stringing work of same circuit of temporary diversion portion of line, between existing location number SS-193 & SS-196, through temporary locations SS TEMP-194, SS TEMP-194A and SS TEMP-195. It is also proposed to provide the stays on those locations wherever it is required for temporary stability.

**(K) Step-11:-** To take shut down of another circuit of SS line for carrying out the stringing work of permanent modification of that circuit of SS line, between existing location SS-193 & proposed permanent location SS-194, and between proposed tension locations SS-195 & Existing location-SS-196. It is also proposed to carry out the de-stringing work of same circuit of temporary diversion portion of line, between existing location number SS-193 & SS-196, through temporary locations SS TEMP-194, SS TEMP-194A and SS TEMP-195. It is also proposed to provide the stays on those locations wherever it is required for temporary stability.

**(L) Step-12:-** To dismantle the tower locations SS TEMP-194, SS TEMP-194A, SS TEMP-195 and demolish the foundations of all the three locations.

**(M) Step-13:-** To take shut down of one circuit of LS line for carrying out the stringing work of permanent diversion of that circuit of LS line, between existing location LS-191 & proposed permanent location LS-192, and between proposed tension location LS-193 & existing location-LS-194. It is also proposed to carry out the de-stringing work of same circuit of temporary diversion portion of line, between existing location LS-191 & LS-194, through temporary locations LS TEMP-192, LS TEMP-192A and LS TEMP-193. It is also proposed to provide the stays on those locations wherever it is required for temporary stability.

**(N) Step-14:-** To take shut down of another circuit of LS line for carrying out the stringing work of permanent diversion of that circuit of LS line, between existing location LS-191 & proposed permanent location LS-192, and between proposed tension location LS-193 & existing location-LS-194. It is also proposed to carry out the de-stringing work of same circuit of temporary diversion portion of line, between existing location LS-191 & LS-194, through temporary locations LS TEMP-192, LS TEMP-192A and LS TEMP-193. It is also proposed to provide the stays on those locations wherever it is required for temporary stability.

**(O) Step-15:-** To dismantle the tower locations LS TEMP-192, LS TEMP-192A and LS TEMP-193 and also demolish the foundations of all the three locations.

2.8.5.3 Methodology and Sequence of Constructional Activities to be adopted for Diversion Works at Nalasopara (At Village - Bilalpada) Crossing Site as under:-

**(A) Step-1:-** To construct the foundations of all the proposed temporary and permanent locations.



- (B) Step-2:-** To erect all the five towers of proposed temporary line diversion arrangement of LS line and SS line (i.e. LS TEMP-211, LS -211A, LS TEMP-212, SS TEMP-213, and SS TEMP-214 towers). The erection work at all the five locations can be done without any shutdown.
- (C) Step-3:-** To finish the stringing work between three spans. Between locations LS TEMP-211 to LS -211A, LS -211A to LS-TEMP -212 and , SS TEMP-213 to SS TEMP-214. There is no necessity of shutdown for doing stringing work between these three locations. It is also proposed to provide the stays on those locations wherever it is required.
- (D) Step-4:-** To take shutdown of one circuit of LS line and perform the stringing work of that circuit between proposed temporary location LS TEMP-211 to Existing location LS-210 and between proposed temporary locations LS TEMP-212 to Existing locations LS-213 simultaneously. It is proposed to carry out the de-stringing work of same circuit between existing locations LS-210 to LS-213 of existing LS line. It is also proposed to provide the stays on those locations wherever it is required.
- (E) Step-5:-** To take shutdown of another circuit of LS line and perform the stringing work of that circuit between proposed temporary location LS TEMP-211 to Existing location LS-210 and between proposed temporary locations LS TEMP-212 to Existing locations LS-213 simultaneously. It is proposed to carry out the de-stringing work of same circuit between existing locations LS-210 to LS-213 of existing LS line. It is also proposed to provide the stays on those locations wherever it is required.
- (F) Step-6:-** To take shutdown of one circuit of SS line and perform the stringing work of that circuit between proposed temporary location SS TEMP-213 to Existing location SS-212 and between proposed temporary locations SS TEMP-214 to Existing locations SS-215 simultaneously. It is proposed to carry out the de-stringing work of same circuit between existing locations SS-212 to SS-215 of existing LS line. It is also proposed to provide the stays on those locations wherever it is required.
- (G) Step-7:-** To take shutdown of another circuit of SS line and perform the stringing work of that circuit between proposed temporary location SS TEMP-213 to Existing location SS-212 and between proposed temporary locations SS TEMP-214 to Existing locations SS-215 simultaneously. It is proposed to carry out the de-stringing work of same circuit between existing locations SS-212 to SS-215 of existing LS line. It is also proposed to provide the stays on those locations wherever it is required. This will provide stability to the temporary arrangement.



- (H) Step-8:-** To dismantle existing locations LS-211, LS-212, SS-213 and SS-214 and thereafter demolish the foundations of existing locations LS-211, LS-212, SS-213 and SS-214.
- (I) Step-9:-** To erect all the five towers of proposed modified/diverted SS line and LS line (i.e. SS-213, SS Permanent crossing location SS-213A and SS Permanent crossing location SS-214, LS Permanent crossing location LS-211 and LS Permanent location LS-212). The erection work at all the five locations can be done without any shutdown.
- (J) Step-10:-** To finish the stringing work between two spans, SS -213 & SS-214 via SS-213A of proposed modification of SS line. There is no necessity of shutdown for doing stringing work between these locations. It is also proposed to provide the stays on those locations wherever it is required for stability.
- (K) Step-11:-** To take shut down of one circuit of SS line for carrying out the stringing work of permanent modification of that circuit of SS line, between proposed permanent location SS-213 to existing location SS-212 and between proposed permanent locations SS-214 to Existing location-SS-215. It is also proposed to carry out the de-stringing work of same circuit of temporary diversion portion of line, between Existing location number SS-212 to SS-215, through temporary locations SS TEMP-213, and SS TEMP-214. It is also proposed to provide the stays on those locations wherever it is required. This will provide stability to the temporary arrangement.
- (L) Step-12:-** To take shut down of another circuit of SS line for carrying out the stringing work of permanent modification of that circuit of SS line, between proposed permanent location SS-213 to existing location SS-212 and between proposed permanent locations SS-214 to Existing location-SS-215. It is also proposed to carry out the de-stringing work of same circuit of temporary diversion portion of line, between Existing location number SS-212 to SS-215, through temporary locations SS TEMP-213, and SS TEMP-214. It is also proposed to provide the stays on those locations wherever it is required for stability.
- (M) Step-13:-** To dismantle the tower locations SS TEMP-213 & SS TEMP-214 and demolish the foundations of all these locations.
- (N) Step-14:-** To take shut down of one circuit of LS line for carrying out the stringing work of permanent modification of that circuit of LS line, between existing location LS-210 to existing location LS-213 via proposed permanent locations LS-211, LS-211A and LS-212. It is also proposed to carry out the de-stringing work of same circuit of temporary diversion portion of line, between existing location number LS-212 to LS-215, through locations LS TEMP-211, LS -211A and LS TEMP-212. It is also proposed to provide the stays on those locations wherever it is required for temporary stability.

**(O) Step-15:-** To take shut down of another circuit of LS line for carrying out the stringing work of permanent modification of that circuit of LS line, between existing location LS-210 to existing location LS-213 via proposed permanent locations LS-211, LS-211A and LS-212. It is also proposed to carry out the de-stringing work of same circuit of temporary diversion portion of line, between Existing location number LS-212 to LS-215, through locations LS TEMP-211, LS -211A and LS TEMP-212. It is also proposed to provide the stays on those locations wherever it is required.

**(P) Step-16:-** To dismantle the tower locations LS TEMP-211 and LS TEMP-212 and also demolish the foundations of all the three locations.

2.8.5.4 Methodology and Sequence of Constructional Activities to be adopted for Diversion Works at Vasai (At Village - Gokhivare) Crossing Site as under:-

**(A) Step-1:-** To construct the foundations of all the proposed temporary and permanent locations except at existing location LS-224.

**(B) Step-2:-** To erect four towers of proposed temporary diversion arrangement of SS line (i.e. SS TEMP-225, SS TEMP-226, SS-TEMP-227 and SS TEMP-227A). The erection work at all the four locations can be done without any shutdown.

**(C) Step-3:-** To finish the stringing work between three spans of temporary diversion portion of SS line. (Between locations SS TEMP-225 to SS TEMP-226, SS TEMP-226 to SS TEMP-227 and SS TEMP-227 to SS TEMP-227A.) There is no necessity of shutdown for doing stringing work between these locations. It is also proposed to provide the stays on those locations wherever it is required.

**(D) Step-4:-** To take shutdown of one circuit of SS line and perform the stringing work of that circuit between proposed temporary location SS TEMP-225 to existing location SS-224 and between proposed temporary locations SS TEMP-227A to existing locations SS-228 simultaneously. It is proposed to carry out the de-stringing work of same circuit between existing locations SS-224 to SS-228 of existing SS line. It is also proposed to provide the stays on those locations wherever it is required.

**(E) Step-5:-** To take shutdown of another circuit of LS line and perform the stringing work of that circuit between proposed temporary location SS TEMP-225 to Existing location SS-224 and between proposed temporary locations SS TEMP-227A to Existing locations SS-228 simultaneously. It is proposed to carry out the de-stringing work of same circuit between existing locations SS-224 to SS-228 of existing SS line. It is also proposed to provide the stays on those locations wherever it is required.

- (F) Step-6:-** To construct the new foundation adjacent to the existing location for crossing tower SS-226. Then dismantle the existing tower location SS-226 and demolish the foundation of same locations. In same step erection of proposed towers SS-225A, proposed SS-226 and LS TEMP -225A have to be completed.
- (G) Step-7:-** To take shutdown of one circuit of LS line and perform the stringing work of that circuit between existing location LS-223 to Existing location LS-226 via diverting the line thorough proposed permanent locations SS-225A, SS-226, SS-227 and LS TEMP-225A. It is proposed to carry out the de-stringing work of same circuit between existing locations LS-223 to LS-226 of existing LS line. It is also proposed to provide the stays on those locations wherever it is required.
- (H) Step-8:-** To take shutdown of another circuit of LS line and perform the stringing work of that circuit between existing location LS-223 to Existing location LS-226 via diverting the line thorough proposed permanent locations SS-225A, SS-226, SS-227 and LS TEMP-225A. It is proposed to carry out the de-stringing work of same circuit between existing locations LS-223 to LS-226 of existing LS line. It is also proposed to provide the stays on those locations wherever it is required.
- (I) Step-9:-** To dismantle the existing tower location LS-224 and demolish the foundation of same locations. After demolishing the foundation it is proposed to construct the new foundation at same location for crossing tower. In same step erection of proposed towers LS-223A and LS-224 has to be completed.
- (J) Step-10:-** To complete stringing work between proposed permanent locations LS-223A and LS-224. The stringing work can be carried out without any shutdown. It is also proposed to provide the stays on those locations wherever it is required.
- (K) Step-11:-** it is proposed to take shut down of one circuit of LS line for carrying out the stringing work of permanent modification of that circuit of LS line, between existing location LS-223 and proposed permanent location LS-223A, and between proposed permanent locations LS-224 to existing location LS-226 through existing location LS-225. It is also proposed to carry out the de-stringing work of same circuit of temporary diversion portion of line, between existing location number LS-223 to LS-226, through proposed permanent locations SS -225A, new SS-226, existing SS -227 and LS TEMP-225A. It is also proposed to provide the stays on those locations wherever it is required.
- (L) Step-12:-** To take shut down of another circuit of LS line for carrying out the stringing work of permanent modification of that circuit of LS line, between existing location LS-223 and proposed permanent location LS-223A, and between proposed permanent locations LS-224 to existing location LS-226 through existing location LS-225.

It is also proposed to carry out the de-stringing work of same circuit of temporary diversion portion of line, between existing location number LS-223 to LS-226, through proposed permanent locations SS-225A, SS-226, SS -227 and LS TEMP-225A. It is also proposed to provide the stays on those locations wherever it is required.

**(M) Step-13:-** To dismantle the proposed LS TEMP-225A along with foundation.

**(N) Step-14:-** To take shut down of one circuit of SS line for carrying out the stringing work of permanent modification of that circuit of SS line, between existing location SS-224 to existing location SS-228 via existing location SS-225, proposed permanent locations SS-225A, SS-226 and existing location SS-227. It is also proposed to carry out the de-stringing work of same circuit of temporary diversion portion of line, between existing location number SS-224 to SS-225, through locations SS TEMP-225, SS TEMP-226, SS TEMP-227 and SS TEMP-227A. It is also proposed to provide the stays on those locations wherever it is required.

**(O) Step-15:-** To take shut down of another circuit of SS line for carrying out the stringing work of permanent modification of that circuit of SS line, between existing location SS-224 to existing location SS-228 via existing location SS-225, proposed permanent locations SS-225A, SS-226 and existing location SS-227. It is also proposed to carry out the de-stringing work of same circuit of temporary diversion portion of line, between Existing location number SS-224 to SS-225, through locations SS TEMP-225, SS TEMP-226, SS TEMP-227 and SS TEMP-227A. It is also proposed to provide the stays on those locations wherever it is required.

**(P) Step-16:-** To dismantle the tower locations SS TEMP-225, SS TEMP-226, SS TEMP-227 and SS TEMP-227A and also demolish the foundations of all these locations.

2.8.5.5 Pile type foundation is considered for all towers pertaining to Permanent Diversion arrangement. However, actual foundation type will be advised by contractor as per soil investigation report and approved by Engineer/DFCCIL before start of work. Payment shall be done as per actual type of foundation made.

## **2.8.6 Transportation at Site:-**

2.8.6.1 The GI material for Stubs & Stub setting Template, Towers and Line materials required for diversion work of 220 kV D/C Tr. lines shall be transported to various sites by the contractor from his site store. (It may be noted that all the required Towers, Stubs, Stub setting Template, AAC Zebra Conductor, OPGW 48C, Insulators, Hardware & Accessories, Earthing Materials and Tower accessories will be dispatched to the contractor site store).

- 2.8.6.2 The quantities of towers and line materials will be arranged by the successful contractor for diversion work of 220 kV D/C Transmission Lines as per Bidding Schedule (Schedule of Prices & Total Prices attached as Form No.- 4 of Part-III)

**2.8.7 Tower Foundations:-**

- 2.8.7.1 Foundations for various tower types & all their extensions shall be constructed as per the approved drawing by the contractor based on subsoil parameters at site. Reinforced Cement Concrete foundations shall be used for all of towers for temporary diversion works. However, Pile type foundation (In Situ) shall be adopted for permanent diversion works.

- 2.8.7.2 Concrete shall be designated as grade M10, M15, M20 & M25 etc. for shallow foundations. However, grade M10 (for PCC) & the design mixed concrete i.e. M30 shall be used for Pile foundation.

**2.8.7.3 Shallow Foundations:-**

All open cast type foundations shall be termed as shallow foundations, the total depth of foundation except Hard Rock type below the ground level shall not be more than 3.0 meters. Following are the types of shallow foundations;

**(A) Normal Dry Soil:-**

Tower locations where normal dry cohesive or non-cohesive soils are met. Foundations in areas where surface water encountered from rain runoff or agriculture fields (except paddy fields) shall also be classified as normal dry.

**(B) Fully Submerged Soil:-**

Tower locations where sub-soil water table is met at less than 0.75 meter below the ground level

**(C) Black Cotton Soil:-**

Tower locations where soil is clayey type, not necessarily black in colour, which shrinks when dry and swells when wet, resulting in differential movement. For designing foundations, for such locations the soil is to be considered submerged in nature.

**(D) Fissured – Rock:-**

Tower locations where decomposed or fissured rock, hard gravel, kankar, limestone, laterite or any other soil of similar nature is met. Under cut type foundation is to be used for fissured rock locations.

(E) Wet Fissured – Rock:-

In case of fissured rock locations, where water table is met at 1.5M or more below ground level, wet fissured rock foundations shall be adopted. In case of dry locations dry fissured rock foundations shall be adopted.

(F) Hard Rock:-

Tower locations where chiseling, drilling and blasting is required for excavation, Hard rock type foundations are to be used. For these locations rock anchoring is to be provided to resist uplift forces.

2.8.7.4 Specifications for Construction of Foundations:-

(A) Codes and Standards:-

Following IS codes and standards used for design and to be used for construction of all tower foundations. The list of IS codes given below are only indicative and the contractor shall always refer to relevant and latest editions of IS codes and standards.

IS: 1200	Method of Measurement of Building and Engineering works.
IS: 3764	Safety code for excavation work.
IS: 3385	Code of practice for measurement of civil Engineering work.
IS: 1080	Codes of practice for design and construction of simple spread foundations
IS: 1489	Specification for Portland pozzolana cement. (Part 1 & Part 2)
IS: 4031	Methods of physical tests for hydraulic Cement. (Part 1 to Part 15)
IS: 650	Specification for standard sand for testing of cement
IS: 383	Specification for coarse and fine Aggregates from natural sources for concrete.
IS: 2386	Methods of test for aggregates for Concrete. (Part I to VIII)
IS: 516	Method of test for strength of concrete
IS: 1199	Method of sampling and analysis of concrete
IS: 3025	Methods of sampling and test (physical and chemical) water used in industry
IS: 456	Code of practice for plain and Reinforced concrete.
IS: 2502	Code of practice for bending and fixing of bars for concrete reinforcement
IS: 3558	Code of practice for use of immersion Vibrators for consolidating concrete
IS: 3696	Safety code for scaffolds and ladders(Part I & II)
IS: 1786	Specification for high strength deformed steel bars and wires for concrete reinforcement.

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IS: 4990	Specification for plywood for concrete Shuttering work.
IS: 1904	Code of practice for design and construction of foundations in soil– General requirements
IS: 875	Code of practice for design loads
IS: 2505	Specification for concrete vibrators Immersion type.
IS: 2911	Code of practice for design and construction of pile foundations
IS: 1893	Criteria for earth quake resistance structure
IS: 4091	Code of practice for design and construction of foundations for transmission line towers and poles
IS: 2722	Specification for portable swing weigh batchers for concrete (single and double bucket type)

- (B) In addition to this IS standards CBIP Manual Publication no – 323 Chapter no – 10 should be referred.
- (C) The type of foundation to be used for a particular tower location shall be decided from the properties of sub-surface material for that location. Foundation type to be adopted shall be established with the concurrence of the Engineer/DFCCIL. The most economical solution shall be decided upon. Approval or concurrence of the Engineer/DFCCIL shall not absolve the contractor of the responsibility to establish the most appropriate foundation type for the location/stretch.
- (D) Immediately upon the receipt of the award of the contract, the contractor shall inform the Engineer/DFCCIL the exact location of the sources of the acceptable materials which he proposes to use and get the materials approved. The mix with the actual approved materials to be used shall be got designed in a Government owned or NABL accredited laboratory by the contractor to give the specified strength. These proportions shall be used so long as the materials continue to be of the same quality and from the same sources.
- (E) If during the progress of the work there is change in the source of material, the contractor has to inform the Engineer/DFCCIL and take approval for the same. Before using the concrete the contractor has to again design the mix for required strength of concrete as specified in specifications of material and shall take approval from the Engineer /DFCCIL.

**2.8.7.5 Excavation:** - This item includes excavation in all types of soil/rock.

- (A) The excavation work for foundations shall be taken up by the contractor progressively stretch wise/section wise after obtaining approval from Engineer for the proposed stretch wise/section wise tower schedule, profile etc. as per check survey along the approved route alignment.

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- (B) The site shall be cleared and all obstructions, loose stones, materials and rubbish of all kinds, stumps, brush wood and shrubs shall be conveyed and properly stacked as directed within the specified lead, disposed of as directed by the DFCCIL.
- (C) After clearing the site, the center lines have to be marked. The contractor shall assume full responsibility for the accuracy of the exact location and orientation of each tower foundation. The orientation shall be such that the position of the longitudinal axis of the tower cross arm shall lie:
- (i) In a plane perpendicular to the route line for towers in straight line section.
  - (ii) In a plane bisecting the interior angle formed by the intersection of adjacent route line traverse, for the towers at right angle.
  - (iii) In a plane perpendicular to the route line for dead end towers except where indicated otherwise on the drawing.
- (D) Foundation excavation shall include removal of all materials of whatever nature and whether wet or dry, necessary for the construction of foundation and substructure exactly in accordance with the lines, levels, grades and curves shown on the plans or as directed by the Engineer. It shall be taken to the exact width of the lowest step of the footing and the sides shall be left plumb where the nature of soil admits it. The contractor shall notify the before starting excavation to enable him to take cross sectional levels for purposes of measurements before the ground is disturbed.
- (E) Trial Pits shall be taken at every Tower location for determination of soil properties. No extra payment for Trail pits shall be paid to the contractor.
- (F) The bottom of foundation shall be leveled both longitudinally and transversely. The bottom of tower foundation for all legs shall be at one level. Before footing is laid, final surface shall be slightly watered and rammed. If any soft patches come to light in inspection or ramming, theses shall be dug out and dealt with as ordered by the Engineer. No footing will be allowed to bring the foundation to level. If by the contractor's mistake, excavation is made deeper than shown on the plans or ordered by the Engineer, the extra depth shall be made up with the concrete of foundation grade as directed by the Engineer and at the cost of the contractor. All rock or other hard foundation shall be cleaned of all soft and loose material and cut to a firm approximate only and the Engineer may order such changes in the dimensions and elevation of the foundation as may be deemed necessary to secure foundation.
- (G) After each excavation is completed the contractor shall notify the Engineer to that effect and no PCC/Footing will be allowed to be laid until the Engineer has approved the depth and dimensions of excavation and the nature of the foundation material and the levels and/ or measurements are recorded.

- (H) The contractor would be responsible for the design of shoring for the excavation to be properly upheld. Shoring shall be of sufficient strength to resist side pressure and ensure safety from slips and blows and to prevent damage to work and property and injury to persons. It shall be removed as directed after all the items for which it is required are completed. Providing, fixing, maintaining and removing shoring, bracing, etc. will not be paid separately; the cost will be included in the item.
- (I) Foundation pits, well pits and similar excavation shall be strongly fenced and marked with red lights and night and deploy watchmen to avoid accidents. Adequate protective measures shall be taken to see that the foundation excavation does not affect or damage adjoining structures. All measures required for the safety of the excavation, the people working in and near the foundation trenches, properly and the people in the vicinity shall be taken by the contractor at his own cost, he being entirely responsible for any injury to life and damage to property caused by his negligence or accident due to his constructional operations.
- (J) Materials excavated from foundation trenches of whatever kind shall be stacked beyond 10.0 m from the outer edge of excavation. The contractor shall duly preserve all gold, silver, oil, mineral, archeological and other findings of importance, or other materials of any description and all precious stones, coins, treasures, relics, antiques and other similar objects to the satisfaction of Engineer. From time to time the same shall be delivered to the person authorized by the Engineer. Excavation includes sorting out of useful materials and stacking them separately as directed.
- (K) Materials suitable and useful for backfilling or other use shall be stacked in convenient places but not in such a way as to obstruct free movement of men, animals and vehicles or encroach on the area required for constructional purposes. It shall be used to the extent required to completely backfill the structure to original ground level or the elevation shown on the plans or as directed by the Engineer.
- (L) Bailing or pumping out all water which may accumulate in the excavation during the progress of the work either from seepage, springs, rain or any other cause and diverting surface flow if any, by bunds or other means. The bunds shall be removed after their purpose is served. Bailing of water shall not be paid separately.
- (M) If there are any slips or blows in the excavation they shall be removed by the contractor without any extra cost so as to provide the correct dimensions required for the foundations.
- (N) All timber shoring shall be removed after their necessary ceases and trash of any sort shall be cleaned out from the excavation. All spaces between foundation masonry or concrete and the sides of excavation must be refilled to the original surface with approved materials, in layers of 15 cm. to 20 cm. in thickness water and rammed.

(O) The soil to be excavated for tower foundations shall be classified as follows depending upon the physical state of the soil at the time of excavation irrespective of the type of foundation installed.

(i) Normal Dry Soil:-

These shall include all kinds of soils containing kankar, sand, silt, soft murrum, dry black cotton soil, shingle, gravel, clay, loam, peat, ash, slate, boulders etc. which can generally be excavated by shovel, pick axe and spade and which is not classified under “fissured rock” and “hard rock” defined below. This shall also include embedded rock boulders not longer than 1 meter in any direction and boulders mixed with soil. Soil removable either manually, by means of a spade and shovel or mechanically by poclains, excavators etc. Excavation done in dry soil for wet, partially submerged, fully submerged and dry/wet black cotton type of foundations shall also be covered under this.

(ii) Wet Soil:-

Above dry soil where the water table is encountered within the range of foundation depth or land where pumping or bailing out of water is required due to presence of surface water shall be treated as wet soil.

The excavation done in wet soil in case of wet, partially submerged, fully submerged and wet black cotton type of foundation shall also be covered under this.

(iii) Dry Fissured Rock:-

This type shall include rock, large boulders, shale, chalk, hard mica, schist, Limestone, laterite, hard conglomerate, weathered basalt rock or other soft/fissured rock in dry condition which does not need blasting, and could be quarried or split with crowbars, wedges, pickaxes, pneumatic breaking equipment etc. However, if required, light blasting may be resorted to for loosening the material but this will not in any way entitle the material to be classified as hard rock.

(iv) Wet Fissured Rock:-

Above fissured rock, where the water table is encountered within the range of foundation depth or land where pumping or bailing out of water is required, shall be treated as wet fissured rock.

(v) Hard Rock:-

Any rock excavation, other than specified under fissured rock above, harder varieties of rock with or without veins and secondary minerals occurring in continuous masses such as basalt rock which cannot be removed except by loosening it for which blasting, drilling, chiseling are required in consultation of Engineer shall be considered as hard rock.

(vi) All scaffolding, hosting arrangements and ladders etc. required for the facility of concrete shall be provided by the contractor at his own expenses and removed on the completion of work. The scaffolding, hoisting arrangement and ladders, etc. shall be strong enough to withstand all live, dead and impact loads expected to act and shall be subject to the approval of the Engineer. However the contractor shall be solely responsible for the safety of the scaffolding, hoisting arrangements, ladders, work and workman. The contractor shall pay all the necessary compensations arising out of the use of the scaffolding hoisting arrangements and ladders and for damages to work, property and injuries to persons. The scaffolding, hoisting arrangement and ladders shall allow easy work spot and afford easy inspection.

(vii) Benching in all types of soil and Rock:-

When the towers are to be installed in an uneven ground, leveling the ground may be required for casting of tower footings. All such activities shall be termed benching and shall include cutting of soil/rock. Benching shall be resorted to only after approval from Engineer. The excavated soil may be required for filling/ leveling of tower location, disposal of excess soil shall be carried out by the contractor with no extra cost.

(P) Blasting shall be carried out only with the written permission of the Engineer without extra cost to DFCCIL. Strictly Controlled blasting has to be carried out. All the laws, regulations, rules, etc. pertaining to the acquisition, transport, storage, handling and use of explosives shall be followed. The magazine for the storage of explosives shall be built to the designs and specifications of the explosives department and located at the approved site. No unauthorized person shall be admitted into the magazine and when not in use shall be kept securely locked. No matches or inflammable material shall be allowed in the magazine. The magazine shall have an effective lighting conductor. The following shall be hung in the lobby of the magazine.

- (i) A copy of rules both in English and in the languages with which the workers concerned are familiar.
- (ii) A statement of up-to-date stock in the magazine.
- (iii) A certificate showing the last date of testing of the lighting conductor.
- (iv) A notice that smoking is strictly prohibited.
- (v) In addition or these, the contractor shall also observe the following instructions and any further additional instructions which may be given by the Engineer and shall be responsible for damage to property and any accident which may occur of workmen or the public due to any and all operations connected with storing and handling or use of explosives and blasting. The Engineer shall frequently check the contractor's compliance with the precautions.

- (Q) The black powder, explosives detonators, fuses, tamping materials, electrical firing equipment, if used, tools for drilling holes and tamping shall be subject to the approval of the Engineer. The Engineer may specify type of explosives to be allowed in special cases. The fuse to be used in wet locations shall be sufficiently water resistant as to be unaffected when immersed in water for 30 minutes. The rate of burning of the fuse shall be uniform and definitely known to permit such a seafoed length being cut as will permit sufficient time to the firer to reach safety before explosion takes place. Detonators shall be capable of giving effective blasting of the explosives. The blasting powder, explosives, detonators, fuses, etc. shall be fresh and not damaged due to damp, moisture or any other cause. They shall be inspected before use to damaged articles shall be discarded totally and removed immediately.
- (R) The blasting operation shall remain in charge of competent an experienced supervisor and workmen who are thoroughly acquainted with the details of handling explosives and blasting operations.
- (S) The blasting shall be carried out during fixed hours of the day preferably during the midday lunch hour or at the close of the work as ordered in writing by the Engineer. The hours shall be made known to the people in the vicinity. All the charges shall be prepared by the man in charge only.
- (T) Red danger flags shall be displayed prominently in all directions during the blasting operations. People except those who actually light the fuse shall be prohibited from entering into this area. The flags shall be stationed at 200m from the blasting site in all directions and all persons including workmen shall be excluded from the flagged area at least 10 minutes before the firing, a warning whistle being sounded for the purpose.
- (U) The charge holes shall be drilled to required depths and in suitable places.
- (V) When blasting is done with powder, the fuse cut to the required length shall be inserted into the hole and the powder dropped in. The powder shall be gently tamped with copper rods with rounded ends. The explosive powder shall then be covered with tamping material which shall be tamped lightly but firmly.
- (W) When blasting is done with dynamite and other high explosives, dynamite cartridges are prepared by inserted the square cut end of a fuse into the detonator and finishing it with nippers at the open end, the detonator gently pushed into the primer leaving 1/3rd of the copper tube exposed outside. The paper of the cartridges is then closed up and securely bound with wire or twine. The primer shall be housed into the explosives. Bore holes shall be such size that the cartridge can easily pass down. The holes shall be cleared of all debris and explosive inserted. The space for about 20 cm. above the charge is then gently filled with dry clay, pressed home and the rest of the tamping is formed of any convenient material gently packed with wooden rammer.

- (X) At a time not more than 10 such charges will be prepared and fired. The man in charge shall count the number of explosives. He shall satisfy himself all the charges have been exploded before allowing the workmen to go to the work site.
- (Y) The contractor shall be solely responsible for any accident during the entire procedure of handling explosive and blasting and shall pay necessary compensation to persons affected or damage to lands or property, etc. due to blasting without extra claims.
- (Z) A careful and day-to-day account of the explosive shall be maintained by the contractor in an approved register and in an approved manner and shall be open to inspection of the Engineer at all times. Surprise visit may also be paid by the Engineer to the storage and in case of any unaccountable shortage or unsatisfactory account the contractor shall be liable to be penalized by forfeiture of part or whole of his security deposit or by cancellation of tender in which case he shall not be entitled for any compensation.
- (AA) In rock type foundations the contractor shall arrange, fix rock anchors, grouts and allied equipment, plants, tools etc. required for drilling in rock this cost shall not be paid extra by the DFCCIL.
- (BB) Indian Standard IS: 3764 shall be followed regarding safety of excavation work.

**2.8.7.6 Backfilling, Disposal and Removal of Stub Templates:-**

After opening of form work and removal of shoring, timbering, etc., back- filling shall be started after repairs, if any, to the foundation concrete. Backfilling shall normally be done with the excavated soil, unless it is a clay type or it consists of large boulders/stones, in which case the boulders shall be broken to a maximum size of 80-mm. At locations where borrowed earth is required for backfilling, contractor shall bear the cost irrespective of lead & lift.

- (A) Backfilling shall be done in 200 mm layers compacted up to 95% of proctor density.
- (B) The backfilling materials shall be clean, free from organic or other foreign materials. Backfilling material shall be got approved from Engineer.
- (C) After backfilling is completed the excess soil shall be disposed of by the contractor.
- (D) Backfilling and disposal of excess earth shall not be paid extra.
- (E) After backfilling 200 mm high, earthen embankment (bund) will be made along the sides of excavation pits sufficient water will be poured in the backfilling earth for at least 24 hours. After the pits have been backfilled to full depth the stub template can be removed.



**2.8.7.7 Setting of Stubs and Cleats:-**

- (A) For all towers the contractor shall submit for approval the proposed method for setting of stubs.
- (B) Transportation of stubs up to tower location shall be carried by contractor without any extra cost to DFCCIL. The stubs shall be set correctly and precisely in accordance with approved method at the exact location, alignment and levels with the help of stub setting templates and leveling instruments. Stubs shall be set-in the presence of Engineer's representative available at site where required and for which adequate advance intimation shall be given to Engineer by contractor. Tolerances as per provisions of IS: 5613 shall be allowed for stub-setting.
- (C) Setting of stub at each location shall be approved by Engineer.

**2.8.7.8 Stub Setting Templates:-**

- (A) Stub setting templates shall be provided by the contractor for all types of towers. Stub templates shall be of adjustable type and galvanized.
- (B) One set of each type of stub setting template in good working condition shall be handed over to DFCCIL/R-Infra by the contractor at Dahanu crossing site.

**2.8.7.9 Concrete Work:-**

- (A) The Cement Concrete used for the foundation shall be Designed Mix Concrete of grade M-25 for RCC and M-10 grade for PCC work. Contractor has to adopt the Concrete Mix for required grade meeting the requirements stipulated in IS 456:2000 and submit the Mix adapted by him to the Engineer for Approval. Concrete work shall not be started without approval of Engineer.
- (B) All the properties of concrete regarding design, strength under compression, tension, shear, punching and benching etc. as well as workmanship shall confirm to IS 456:2000.
- (C) Concrete work item shall include supply and providing of concrete including all materials, labour, equipment, plants, tools, tackles, curing etc. complete.
- (D) A special requirement for item has been laid down in this specification, IS 456-2000 shall apply except for deviations laid down in this specification.
- (E) Contractor shall take written permission from Engineer for Ready Mix Concrete if proposed to be used.

**2.8.7.10 Concrete for Shallow foundations:-**

The minimum Quantity of cementitious material and maximum water cement ratio for 28 days characteristic compressive strength of concrete to be used in different types shall be as follows:



Sr. No	Grade of Concrete	28 days minimum compressive strength N/mm <sup>2</sup>	Minimum quantity of Cementious kg/cum	Maximum Cement Water Ratio
1	M25	25	380	0.40
2	M20	20	380	0.40
3	M 15	15	280	0.5

#### 2.8.7.11 Materials:-

##### (A) Cement:-

- (i) Cement used shall be Portland Pozzolana Cement conforming to IS-1489:1991.
- (ii) The contractor shall submit the manufacturer's certificate, for each consignment of cement procured, to the Engineer. However Engineer reserves the right to direct the contractor to conduct tests for each batch/lot of cement used by the contractor and contractor will conduct those tests free of cost at the laboratory so directed by the Engineer. The contractor shall also have no claim towards suspension of work due to time taken in conducting tests in the laboratory. Changing of brand or type of cement within the same structure shall not be permitted without the prior approval of the Engineer. Sulphate Resistant Cement shall be used if Sulphate content is more in the soil than the limits specified in IS:456: 2000.
- (iii) Cement manufactured by reputed manufacturer shall be used for all types of concrete work.
- (iv) Tests are to be carried out as indicated in IS 1489-1991. The contractor shall ensure that the cement is of sound and required quality before using it.
- (v) Arrangement for Storage of Cement shall be done by contractor at his own cost. Cement required for use shall be as fresh as possible and Stored on planks raised 15 to 20 cm. above the floor and stacked 30 cm. away from the walls in suitable closed weather-proof buildings at the work site or at the selected approved site, in such a manner as to prevent deterioration by dampness or moist atmosphere or intrusion of foreign matter. Cement shall be stored in such a way as to allow the removal and use of cement in chronological receipt of material i.e. first received being first used. Not more than 15 bags shall be stacked vertically in one pile and maximum width of the piles shall not be more than 3 meters. Any cement which has deteriorated caked or which has been damaged shall not be used. Cement concreting which there is doubt shall not be used pending testing and satisfactory results. Cement that is condemned shall be immediately removed from the work site.

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When temporarily stored in the open or use within 48 hours, it shall be kept on a platform of planks about 15 cm. to 20 cm. above ground and covered with a tarpaulin. Ordinary cement stored for more than 2 months from the date of manufacture shall be subjected to test and used only if found satisfactory. The cost of tests shall be borne by the contractor responsible for storage after two months. Different kinds or brands of cement or cement of the same brand from different mills shall be stored in separate groups and shall not be mixed during use except when writing by the Engineer. A board indicating stock and daily transactions of cement shall be kept in each room of the cement store. Daily account of receipt and use of cement bags shall be maintained by the contractor in the Performa approved by the Engineer. This shall be kept in the store for verification. Copies of the records shall be supplied to the Engineer regularly.

- (vi) The cement shall not be stored for unduly long periods. It shall not be handled in such a way as to impair its strength or useful characteristics.
- (vii) Acceptance criteria for cement shall be as per IS- 1489:1991.

**(B) Water:-**

- (i) Water for mixing and curing for cement mortar or concrete shall not be salty or brackish and shall be clean reasonably clear and free from objectionable quantities of silt and traces of soil, acid and injurious alkali, salts, organic matter and other deleterious material which will either weaken the mortar or concrete or cause efflorescence or attack the steel in R.C.C. water shall be obtained from sources approved by the Engineer, sources of water shall be maintained at such a depth and the water shall be withdrawn in such a manner as to exclude silt, mud, grass or other foreign material. Containers for transport, storage and handling of water shall be clean.
- (ii) Water shall not be too acidic or too alkaline. It shall have PH value ranging from 6.5 to 8.5. Hard and bitter water containing more than 100 p. p. m. of sulfates shall not be used.
- (iii) If required by the Engineer, it shall be tested by comparison with distilled water, comparison shall be made by means of standard cement tests for soundness, time of setting and mortar strength as specified in IS 1489-1991. Any indication of unsoundness, change in time of setting by 30 minutes or more, or decrease of more than 10 per cent. In strength of mortar prepared with distilled water shall be sufficient cause for rejecting of water tested. Sea water shall not be used. All cost for testing is to be borne by contractor.
- (iv) Potable water shall be used for mixing and curing of cement mortar or concrete and shall conform as per IS-456:2000.

(C) Fine Aggregates:-

- (i) All Fine Aggregate shall confirm to I.S. 383-1970 and as directed by the Engineer.
- (ii) Sand for use in concrete work shall be natural sand. Sand shall be clean, well graded, hard strong, durable and gritty particles free from injurious amounts of dust, clay, kankar, nodules, soft or flaky particles, shale, alkali, salts, organic matter, loam, mica or other deleterious substances and shall be approved by the Engineer. When the quality of fine aggregate is doubtful, it shall be tested for clay, organic impurities and other deleterious materials in such quantity as to reduce the strength or durability of the mortar or concrete or to attack the reinforcement in the case of reinforced concrete work. Sea sand not to be used.
- (iii) Fine Aggregate shall be tested in approved laboratory by Engineer; the cost for testing has to borne by the contractor.
- (iv) The Acceptance Criteria for Fine Aggregate shall be as per IS 383-1970.
- (v) The gradation of materials from any one source shall not vary in composition beyond the range of values that governs, in selection source of supply. For determining the degree of uniformity, determining the degree of uniformity, determination of fineness modulus shall be made upon representative samples furnished by the contractor from such source as he proposes to use. Fine aggregate from any one source having a variation in fineness modulus greater than (+/- 0.20) from average fineness modulus of the representative samples submitted by the contractor shall be rejected or may be accepted subject to such changes in the proportion of aggregate as the Engineer may direct.
- (vi) The fine aggregate shall be stacked carefully on a clean, hard surface so that it will not get mixed up with deleterious foreign material. Sand shall not be stacked in high conical heaps so that segregation of heavier particles by sliding down may be prevented. It shall be placed in layers not thicker than those resulting from lorry loads dumped on the same pane.
- (vii) Sand to be used for a particular item shall be approved by the Engineer who shall keep it in his office for reference.
- (viii) The contractor shall be responsible for observing the laws, rules and regulations imposed under Minor Minerals act and such other laws and rules prescribed by Government Departments such as Forest and revenue and by competent Local Authorities Royalty, etc. payable for securing the material shall be paid by the contractor.

- (ix) The bulmage of sand due to moisture actually present at the time of mixing shall be taken into account in controlling the mixing water. The proportions once fixed by preliminary tests shall not be changed so long as the materials are the same, subject only to the quantities of fine aggregate and water being adjusted to compensate for bulmage due to the moisture in sand and free water in fine aggregate at the time of use.

(D) Coarse Aggregate:-

- (i) Coarse aggregate shall consist of crushed or broken stone and be hard, strong, dense, durable, clean, of proper gradation and free from skin and coating likely to prevent proper adhesion of mortar. The aggregate shall generally be cubical in shape and as far as possible flaky, elongated pieces shall be avoided. Unless special stones of particular quarries are mentioned in the special provisions, aggregates shall be broken from the best trap/granite/quartzite/gneiss stones in that order available in the region and approved by the Engineer. Stone shall have no deleterious reaction with cement.
- (ii) The aggregate proportions shall give maximum density to the concrete. The maximum size shall be as large as possible within the above limit but shall not exceed  $\frac{1}{4}$  of the minimum thickness of the member, provided however this size presents no difficulty in the case of RCC to surround the reinforcement thoroughly and fill up the corners of the form work. The minimum size of aggregate shall be restricted to 6mm. less than the minimum lateral clear distance between bars or 6mm less than the cover, whichever is smaller. The crushing strength of aggregate will be such as to allow the concrete in which it is used to build up the specified strength of concrete.
- (iii) Testing of Fine Aggregate shall be tested in a Government owned or NABL accredited laboratory by Engineer/DFCCIL; the cost for testing has to borne by the contractor.
- (iv) Acceptance criteria for coarse aggregates shall be as per IS -383:1970.
- (v) Grading tests shall be taken in the beginning and at change of source or machinery or type of metal. Where required by the Engineer, tests indicated in IS 383-1970 and IS 456-1964 shall be got carried out in an approved laboratory at the contractor's cost.
- (vi) Coarse aggregate of a porous nature where absorption of water after 24 hours immersion in water, is more than 5 percent by weight shall not be used.

- (vii) The contractor shall be responsible for observing the laws, rules and regulations imposed under Minor Minerals act and such other laws and rules prescribed by Government Departments such as Forest and revenue and by competent Local Authorities Royalty, etc. payable for securing the material shall be paid by the contractor.

**2.8.7.12 Admixtures for concrete:-**

Admixtures may be used in concrete as per manufacturer's instructions only with the approval of Engineer based on the evidence that, with the passage of time, neither the compressive strength nor its durability is reduced. Calcium chloride shall not be used for accelerating set of the cement for any concrete containing reinforcement or embedded steel parts. Admixtures shall conform to IS-456:2000.

**2.8.7.13 Formwork:-**

- (A) Forms shall comply with IS 456-2000 and relevant Codes.
- (B) The detailed designs of the form work shall be prepared by the contractor and got approved by the Engineer well in time. Such an approval, however, will not relieve the contractor of his responsibility for the adequacy and strength of the formwork and false work.
- (C) The formwork shall be made of wood or metal, the timber planks and scantlings of the designed dimensions shall be used in the formwork with appropriate spacing of studs, yokes, joists, girders, etc. as provided in the drawing.
- (D) Formwork shall be provided, transported and fixed in position as per detail drawings. No separate rate for formwork shall be paid by the DFCCIL. Before placing concrete, the inside of the forms which comes in contact with the concrete shall be coated with mineral oil or any other suitable material approved by the Engineer. Care shall be taken to see that reinforcement does not come in contact with the coating. All chippings saw dust and other rubbish shall be removed from the interior of the forms before concreting.
- (E) No shuttering or temporary props shall be removed without permission of the Engineer.

**2.8.7.14 Mixing, transporting and placing of Concrete:-**

- (A) The concrete shall be mixed in the mechanical mixer and water for mixing concrete shall conform to specification of water as per clause no. 2.8.7.11 (B) above.

- (B) Mixing shall be continued until there is uniform distribution of material and mixes uniform in color and consistent, but in no case the mixing being carried out for less than two minutes. Normal mixing shall be done close to the foundation but exceptionally the concrete may be mixed at the nearest convenient place. The concrete shall be transported from the place of mixing to the place of final deposit as rapidly as practicable by methods which shall prevent the segregation or loss of any ingredient. The concrete shall be placed and compacted before setting commences.
- (C) The concrete shall be handled from the place of mixing to the final position as quickly as practicable by methods which will prevent segregation and loss of ingredients. In no case shall the operation take more than 15 minutes. The concrete which is partially hardened shall not be re-tempered or re-mixed or reuse but shall be destroyed or thrown away.
- (D) The concrete shall be placed into its final position, compacted and finished within 30 minutes of mixing the water and before setting commences. The method of placing shall be such as to avoid segregation. Placing shall be done in a balanced manner to avoid eccentric loads on formwork.
- (E) To avoid the possibility of reinforcement rods being exposed due to unevenness of the bottom of the excavated pit, a pad of lean concrete 75mm thick be provided at the bottom of the pad.
- (F) The concrete shall be laid down in 300mm layers and compacted/vibrated well. A mechanical vibrator shall be employed for compaction of the concrete. Vibrators shall be worked in one place for only such time as will allow formation of dense concrete without sinking and segregation of the coarse aggregate. Over vibration shall be avoided.
- (G) Monolithic casting of foundations must be carried out. However, in case of unavoidable circumstances, a key construction joint can be provided at the chimney-pad interface subject to approval of the Engineer. After concreting the chimney portion to the required height, the top surface shall be finished smooth with a slight slope towards the outer edge for draining rain water. However nothing extra shall be paid to the contractor for providing such construction joints.
- (H) Since supervision at night becomes difficult, concreting shall be carried out only in daylight without hampering the progress of the work.

- (I) Wet locations shall be kept completely dewatered, both during and 24 hours after placing the concrete, without disturbance of the concrete.
- (J) No concrete shall be placed in wet weather or on a water covered surface. Any concrete that has been washed by heavy rains shall be entirely removed, if there is any sign of cement and sand having been washed away from the concrete mixture the contractor has to borne the total cost. To guard against damage which may be caused by rains, the works shall be covered with tarpaulins immediately after the concrete has been placed and compacted before leaving the work unattended.

**2.8.7.15 Curing of Concrete:-**

The concrete shall be cured by maintaining the concrete wet for a period of at least 10 days after placing. Once the concrete has set for 24 hours the pit may be backfilled with selected moistened soil and well consolidated in, layers not exceeding 200mm thickness and thereafter both the backfill earth and exposed chimney shall be kept wet for the remainder of the prescribed 10 days. The exposed concrete chimney shall also be kept wet by covering with wet sacking, hessian cloths or similar absorbent materials. On holidays & days of cessation of work, arrangement shall be made to keep the continuously watered.

- 2.8.7.16 Immediately after removal of forms any undulations, Depressions, cavities, honeycombing, broken edges or corners, high spots and other defects shall be made good with cement grout. But the necessity of such finishing must be exceptional and the total surface requiring finishing shall not exceed 1 percent on an average. If the initial experience shows that this percentage is exceeded the methods of working it shall be changed to get the required cast finish.

- 2.8.7.17 A day-to-day record of all materials for concreting shall be maintained by the representative of contractor in standard pro-forma approved by Engineer. On completion of the work all record to be handed over to the DFCCIL.

**2.8.7.18 Testing of Concrete:-**

- (A) Sampling of materials and concrete shall be done carefully by the contractor under the direct supervision of Engineer as per IS 456-2000. All necessary labour, materials, equipment, etc. for sampling, preparing test cubes, curing, etc., shall be provided by the contractor.
- (B) Testing of materials and concrete will be arranged by the contractor at his own cost in a Government owned or NABL accredited laboratory approved by Engineer/DFCCIL.



(C) The test results for compressive strength for concrete shall be as follows:

Sr. No.	Grade of Concrete	7days minimum compressive strength N/mm <sup>2</sup>	28 days minimum compressive strength N/mm <sup>2</sup>
1	M25	17	25
2	M20	13.5	20
3	M 15	10	15

2.8.7.19 Acceptance Criteria based on 28 DAYS compressive strength of Concrete shall be as per IS - 456:2000.

2.8.7.20 Shall the test prove unsatisfactory, or the structure shows sign of weakness, undue deflection or faulty construction contractor shall remove and rebuild the member or members involved, the total cost involved shall be borne by contractor.

2.8.7.21 Consistency and workability of concrete:-

(A) Slump tests shall be performed as per IS-1199: 1959 at intervals established by the Engineer at contractor's cost in such a way as to check that the degree of consistency established by the Engineer for work in progress is maintained. The following slump range to be followed for various types of construction unless otherwise shown on drawings or instructed by the Engineer.

Sr. No.	Types of Construction	Slump in mm	
		Maximum	Minimum
1	Reinforcement concrete for open foundations	75	25

(B) The workability test by means of compaction factor tests as per IS-1199:1959 shall also be carried out by contractor at his cost.

2.8.7.22 Reinforcement Steel and Binding Wire:-

(A) Contractor shall supply, fabricate and place reinforcement to shapes and dimensions as indicated in the approved drawings. Lap length shall be specified in the drawings.

(B) Only TMT reinforcement bars shall be used for construction.

(C) TMT bar reinforcement for RCC work shall be of Fe415 or Fe 500 grade and confirm to IS-1786:1985.

(D) All the reinforcement shall be clean and free from dirt, oil, paint, grease, mill scale or loose or thick rust at the time of placing.

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- (E) Contractor shall produce a test certificate of the manufacturer for every supplied lot of Steel.
- (F) Steel manufactured by reputed manufacturers shall be used.
- (G) Reinforcement steel shall be stored above ground surface upon platforms, skids or other supports to avoid desertion and sags of long lengths and shall be protected as far as practicable, from surface deterioration by direct contact with undesirable elements or by expose to conditions producing rust and corrosion. All bars of the same designation shall be stacked separately in racks and distinctly marked.
- (H) Mild steel wire shall be of 18 gauges and shall confirm to IS-280-2006.
- (I) The wire coils shall be stored above ground platform or other supports and protected from surfaces deterioration by direct contact with harmful elements or by exposure to conditions producing rust or corrosion.
- (J) No measurements will be taken of the wire used for tightening reinforcement bars. The rate of reinforcement steel and its fabrication shall include the cost of binding wire.

2.8.7.23 Bitumen Painting:-

Providing and applying one coat or as specified by manufacturer bituminous paint shall be applied to all concrete surfaces. Bitumen paint shall be approved from the Engineer. All the surfaces shall be cleaned of dirt, grit or any other objectionable material before painting is started.

2.8.7.24 Reinforced Concrete Piles Foundations (IN-SITU):-

(A) Scope:-

- (i) This specification establishes the material specification of reinforced cement concrete to be used in pile foundation. Any special requirements as shown or noted on the drawings shall govern over the provisions of these specifications.
- (ii) For specific work requirements concerning design and construction or otherwise modifying or supplementing the provision of this specification, refer to the specific requirements. In case of conflict between specific requirements and provision of this specification, former shall govern.
- (iii) The Pile Type (i.e. In-Situ Foundations) Foundation shall be adopted for all towers pertaining to **Permanent Diversion arrangement**.

(B) Definitions:-

Reference to Indian Standard Codes shall always mean reference to the latest issue of the relevant standards including all its amendments up to date.

(C) Codes:-

All design and construction shall be performed in accordance with the Indian Standard Code of Practice for Plain and Reinforced Concrete IS: 456 & IS: 2911

(D) Materials for Concrete:-

All materials which may be used in the Plain or Reinforced Cement Concrete work shall be of Standard quality conforming to IS or equivalent and shall have IS certification mark as far as possible unless otherwise approved by the Engineer. The contractor shall get all materials approved by Engineer prior to its procurement and before actual use. The Engineer shall have the right to determine whether all or any of the materials offered or delivered for use in the works are acceptable. Any material brought to site and not conforming to specification and instruction of Engineer shall be rejected and the contractor shall have to remove the same immediately from site at his own expense.

(E) Cement:-

(i) General:-

The cement used shall be OPC cement manufactured by reputed manufacturer conforming to IS latest version and the same shall be approved by Engineer/DFCCIL.

(ii) Tests after Delivery:-

Each consignment of cement may, after delivery on the site at the discretion of the Engineer, be subjected to any or all of tests and analysis required by the relevant Indian Standard Specifications. Facilities for testing shall be provided by contractor at his own cost.

(iii) Storage on the Site:-

The cement shall be stored in a suitable weather-tight building and in such a manner as to permit easy access for proper inspection to prevent deterioration due to moisture and to minimize warehouse deterioration. Cement of different type and brands shall be kept in separate storage. All accepted cement stored on the site shall be arranged in batches, and used in the same order as received from the manufacturer. The contractor shall maintain a cement register, in which all entries shall be completed day to day showing the quantities received, date of receipt, source of dispatch, type of cement, etc. and also the daily cement consumption on site. The register shall be accessible to the Engineer for his verification.

(iv) Rejection of Cement:-

The Engineer may reject any cement as a result of any tests thereof, notwithstanding the manufacturer's certificate. He may also reject cement which has deteriorated owing to inadequate protection from moisture or due to intrusion of foreign matter or other causes. Any cement which is considered defective by the Engineer shall not be promptly removed from the site of the work by the contractor at his own expense.

**(F) Aggregates for Concrete:-**

**(i) General:-**

Coarse and fine aggregates for concrete shall conform in all respect to IS: 383, “Specification for Coarse and Fine Aggregates from Natural Sources for Concrete”. Aggregates shall be obtained from a source known to produce those satisfactory for concrete. Aggregates shall consist of naturally occurring sand and granite/basalt trap stone, crushed or uncrushed, or a combination thereof. They shall be chemically inert, hard, strong, dense, durable, clean and free from veins, adherent coatings and shall be of limited porosity. Flaky and elongated pieces shall not be used. The source of aggregates shall be approved by the Engineer and shall not be changed during the course of the job without his approval. Rejected aggregates shall be removed from the work site by the contractor at his own expense.

**(ii) Deleterious Materials:-**

Aggregates shall not contain any harmful materials such as iron pyrites, coal, mica, shale or similar laminated materials, clay, alkali, soft fragments, sea shells, organic impurities etc. in such quantities as to affect the strength or durability of the concrete. In addition to the above, for reinforced concrete, any material which might cause corrosion of the reinforcement and aggregates which are chemically reactive with the alkalis of cement shall not be used. The maximum quantities of deleterious materials in the aggregates, as determined in accordance with IS: 2386 (Part-II) “Methods of Test for Aggregates for Concrete”, shall not exceed the limits given in Table-I of IS: 383. The sum of the percentages of all deleterious materials shall not exceed five. Deleterious materials also include material passing 75 micron IS sieve.

**(iii) Coarse Aggregates:-**

Coarse aggregate is aggregate most of which is retained on 4.75 mm IS sieve. These may be obtained from crushed or uncrushed granite/basalt trap stone as per Cl. 2.3.1 and may be supplied as single sized or graded aggregates given in Table-II of IS: 383. The Engineer may allow all-in-Aggregate to be used provided they satisfy the requirements of clause 4.4 and table-IV of IS 383.

**(iv) Fine Aggregates:-**

Fine aggregate is aggregate most of which passes 4.75 mm IS Sieve but not more than 10% pass through 150 microns IS Sieve. These shall comply with the requirements of grading zones I, II and III and given in Table-III of IS: 383. Fine aggregate conforming to grading zone IV shall not be normally used in reinforced concrete unless tests have been made by the contractor to ascertain the suitability of the proposed mix proportion and approved by the Engineer. Fine aggregate shall consist of natural sand resulting from natural disintegration of rock and which has been deposited by streams or glacial agencies, or crushed stone sand or crushed gravel sand.

(v) Sampling and Testing:-

In case of doubt the Engineer may require the contractor to carry out tests, at the contractor's expense in accordance with IS: 516- Method of Tests for Strengths of Concrete and IS: 2386- Method of Tests for Aggregates for Concrete.

(vi) Storage of Aggregates:-

The contractor shall at all times maintain at the site of work such quantities of aggregate as are considered by the Engineer to be sufficient to ensure continuity of work. Each type and grade of aggregate shall be stored separately on hard firm ground having sufficient slope to provide adequate drainage to rain water. Any aggregate delivered to site in a wet condition or becoming wet at site due to rain shall be kept in storage for at least 24 hours to obtain adequate drainage, before it is used for concreting, or the water content of mix must be suitably adjusted as directed by Engineer.

(G) Water:-

Water used for concrete shall be clear and free from injurious amounts of Oil, Acid Alkali, Organic matters or other harmful substances in such amount that may impair the strength or durability of structure. Potable water shall generally be considered satisfactory for mixing and curing concrete. Engineer may require the contractor to prove at latter's expense, that the concrete mixed with water proposed to be used should not have a compressive strength, lower than 90% of the strength of concrete mixed with distilled water. Engineer may require the contractor to get the water tested from an approved laboratory at his own expenses and in case the water contains any sugar or an excess of acid, alkali, any injurious salts, etc. the Engineer may refuse to permit its use.

(H) Admixtures:-

Admixtures such as CICO Grade-I or KIM (KRYTON make) or equivalent may be used in concrete only with the approval of Engineer.

(I) Reinforcement:-

(i) Corrosion resistant Steel reinforcement

(ii) The reinforcement shall confirm to IS: 1786, Fe-500 grade. The reinforcement shall be Corrosion resistant steel and it shall be either "TISCO CRS" from TISCO or HSCR-M from Vizag Steel or HCR from SAIL-M normally be mild steel in the form of round bars, conforming to IS: 432-Grade 1 unless specified otherwise.

(iii) Hard-Drawn Steel wire Fabric:-

When specified in the drawings, hard drawn steel wire fabric shall be used conforming to IS: 1566, It shall be of approved type and of the weights and dimensions shown in the drawings.

(J) Welding:-

Field welding of reinforcing bars will not be permitted without the written consent of the Engineer. Where welding is permitted it must be at staggered locations. Tests shall be made to provide that the joints are of the full strength of bars connected. Welding of reinforcement shall be done in accordance with the recommendation of IS: 2751.

(K) Storage:-

The steel reinforcement shall be stored in such a way as to avoid distortion and to prevent deterioration and corrosion.

(L) Other Specifications:-

General construction details and workmanship relative to reinforcement including bar bonds, lap splices and installation shall be in accordance with IS:2502-Code of Practice for Bonding and Fixing of Bars for concrete reinforcement, as well as the detailing of reinforcement given in IS:456.

(M) Hot bending of bars shall not be allowed.

(N) The number of sizes, shape and position of all the reinforcement shall, unless otherwise directed or authorized by the Engineer, be strictly in accordance with the drawings. The reinforcement shall be adequately secured and held in position by metal chairs and spacers. Ties of inter-sections shall be made with 16 SWG soft black annealed binding wire.

(O) The contractor must obtain the approval of the Engineer for the reinforcement placed, before any concrete is placed in the forms. The reinforcement of this time shall be free from loose rust or scale or other coating that will destroy or reduce bond.

(P) Concrete spacer blocks of the same strength as parent concrete shall be used to ensure correct cover to the reinforcement. This clear cover shall be as shown on the drawings or as per instructions of the Engineer.

(Q) All the reinforcing bars shall be so tied as to form a rigid cage to prevent displacement before or during concreting.

(R) Equipment and Accessories:-

(i) The equipment and accessories for installation of bored case-in-situ piles shall be selected giving due consideration to the subsoil conditions and the method of installation, etc. These shall be of standard type and shall have the approval of the Engineer.

(ii) The capacity of the rig shall be adequate so as to reach the desired depth.

(iii) Provision shall be kept for chiseling within the borehole in case of any underground obstruction/hard strata. However, chiseling shall be carried out only with the approval of Engineer.

- (iv) In case pile is required to be socketed in medium or good quality rock strata, the equipment mobilized shall have adequate capability to do so up to the required socket length. For the purpose of classification of rock for the determination of length of socketing, pilot drill holes shall be carried out in the areas to be piled.
- (v) Pilot drill hole shall be of Nx or Bx size as per specific requirements. Rock drilling shall be carried out using double tube core barrel. Drilling and storing of rock cores shall conform to relevant IS codes. Rock quality shall be classified as under depending upon the RQD.

RQD (%)	ROCK QUALITY
<25	Poor
25 to 75	Medium
>75	Good

(S) Piling Installation:-

(i) Control of Alignment:-

The piles shall be installed as accurately as possible as per the designs and drawings. The permissible positional deviations shall be governed by IS: 2911 (Part-I /Sec.2). In case of piles deviating beyond such permissible limits, the piles shall be replaced or supplemented by additional piles, as directed by Engineer.

(ii) Boring:-

The boring shall be done by one of the following methods:

- Direct mud circulation
- Reverse mud circulation
- Bailer bentonite

The actual method of construction to be followed shall be as per specific requirements.

- (iii) In very soft soil a permanent liner shall be installed to ensure stability of borehole. A liner shall be used to protect the green concrete where a high hydrostatic pressure exists in the subsoil or where an underground flow of water exists and which is likely to damage the concrete on withdrawal of casing.
- (iv) Use of temporary liner only in lieu of bentonite to stabilize sides of boreholes shall not be permitted.
- (v) Properties of bentonite used and quality control shall be as per IS: 2911 (Part-I /Sec.2).



**(T) Concreting of Piles:-**

**(i) Reinforcement:-**

- (a) The reinforcements shall be made into cages sufficiently rigid to withstand handling without damage. In case the reinforcement cage is made up more than one segment, the same shall be assembled by providing necessary laps preferably by welding.
- (b) Stirrups to the main bars shall be tack welded.
- (c) Care shall be taken to ensure that the reinforcement bars do not come closer while the cage is lowered down the hole.
- (d) Proper cover and central placement of the reinforcement shall be ensured by use of suitable concrete spacers or rollers, case specifically for the purpose.

**(ii) Concreting:-**

- (a) Concreting shall not be commenced until the Engineer satisfies himself that at final borehole depth the soil is not weaker than that taken as the basis for pile design. If necessary, SPT or similar test shall be conducted to ensure the above.
- (b) Borehole bottom shall be thoroughly cleaned to make it free from sludge or any foreign matter before lowering the reinforcement cage. The full length of reinforcement cage shall be in position before start of concreting.
- (c) Concreting shall be done by tremie method. The operation of tremie concreting shall be governed by IS: 2911 (Part-I / Sec.2).
- (d) The concrete placing shall not proceed if specific gravity of fluid near about the bottom of borehole exceeds 1.2. Determination of the specific gravity of the drilling mud from the base of the borehole shall be carried out by taking samples of fluid by suitable slurry sampler approved by the Engineer, in first few piles and at a suitable interval of piles thereafter and the results recorded. Control of consistency of drilling mud shall be carried out throughout boring as well as concreting operations.
- (e) Care shall be exercised to preserve correct cover and alignment of reinforcement and avoid any damage to it throughout the complete operation of placing the concrete.
- (f) Top of the pile shall be brought up above the cut off level minimum by 0.75 m so as to permit removal of all laitance and weak concrete before capping and to ensure good and sound concrete at the cut off level for proper embedment into the pile cap. Any defective concrete in the head of the completed piles shall be cut-away and made good with new concrete.

**2.8.7.25 Protection of Tower Foundation:-**

- (A) The work shall include all necessary stone revetments, concreting and earth filling above ground level, the clearing from site of all surplus excavated soil, special measures for protection of foundation close to or in nallah, river bed, undulated terrain, etc., including suitable revetment or galvanized wire netting and meshing packed with boulders. The top cover of stone revetment shall be sealed with M-15 concrete (1:2:4 mix). Contractor shall recommend protection at such locations wherever required. Details of protection of tower footing are given in drawing enclosed with these specifications for reference purpose only.
- (B) Stone to be used in the masonry and pitching work shall be trap, granite, quartzite, gneiss, laterites or any other type of good stones that may be specified in the item. The stone shall stand weathering well and when immersed in water for 24 hours shall not absorb water more than 3% of its dry weight when tested according to IS:1124-1974. The stone of the required quality shall be obtained from quarries approved by the Engineer. All stones shall generally be freshly quarried.
- (C) The stones to be used in the face shall be tough, hard, dense, sound and durable, resistant to weathering action, reasonably fine graded uniform in color texture and free from seams cracks or other defects which would adversely affect the strength, durability or appearance. They shall also be free from weathered portion and skin. The exposed faces shall entirely free from any type discoloration. Preferably stone shall be from a quarry the product of which is known to be satisfactory quality in use. Stones shall generally be freely quarried with clean faces and sharp edges shall be of such a character that it can be wrought to such lines and surfaces, whether curved or plane as may be required. Size and shape of stones shall be as per the requirements of each item.
- (D) Rubble stones shall be of approved quality, free from segregation, seams, cracks, weathered portions and other structural defects or imperfections tending to affect their soundness and strength. Stones shall generally be freshly quarried with sharper edges and clean faces. They shall be free from rounded, worn or weathered surfaces or skin or coating which prevents the adherence of mortar. Size and shape of stone shall be as per the requirement of each item.
- (E) Stones to be used as headers, pin-headers, quoins, coping etc. shall comply with the requirements of facing and hearing stone as may be relevant and shall further comply with the requirement of size and shape stipulated under the relevant item.
- (F) Samples of stone so to be used in the work shall be got approved by the Engineer before the work is started and such samples shall be maintained in the Engineer's office.

(G) The contractor shall be responsible for observing the laws, rules and regulations imposed under Minerals act and such other laws and rules prescribed by Government Departments such as Forest and revenue and by competent Local Authorities Royalty etc. payable for securing the material shall be paid by the contractor.

(H) Random Rubble Masonry:-

- (i) Building stones shall be as per specifications. Proper arrangement for drainage shall be provided with PVC pipes (the diameter of pipe shall be finalized as per site condition or by the Engineer). Rate of weep holes shall be included in the rate if masonry and shall not be paid separately.
- (ii) Mortar to be used shall be of the proportion 1:5. The cement, sand and water shall be used as per specifications.
- (iii) All masonry built in cement mortar shall be initially protected from sun, rain, etc., by wet hessian or straw till set and thereafter kept continuously wet for 14 days from the date of construction.
- (iv) A 100 mm thick. Coping layer With 1:2:4 proportion shall be provided on top of masonry and plastered with cement mortar 1:4. No separate rate for, PCC, coping and plastering shall be paid.
- (v) The design for rubble masonry shall be provided by the contractor and approved by the Engineer.
- (vi) Pointing to rubble masonry shall be carried out on both the face by cement mortar 1:3. No separate rate for pointing shall be paid.
- (vii) Excavation for the rubble masonry in all types of soil, rock included in the rubble masonry item. No separate rate for excavation shall be paid. In case of Wet foundations, or other situation where water is met with, the work space shall be kept free of water by the contractor while the masonry is in progress and until the Engineer considers the mortar has sufficiently set. Dewatering will be included in the rate of masonry.

(I) Pitching:-

- (i) All stones shall generally be fresh quarried. Pitching shall be done with 230mm thick vertically placed layer. No voids shall be remaining in pitching, all voids shall be filled with broken stones and proper compaction shall be done to achieve the leveled surface.
- (ii) Quality of pitching stones shall comply with the specification.
- (iii) The pitching shall be carried in proper line and level. Voids/ gaps between the pitching stones shall be filled by broken stones. Proper arrangement for drainage shall be made.

- (J) The following activities which may be required to perform the work included in above items as per good engineering practice:
- (i) Clearing Site.
  - (ii) Setting out works, profiles, etc. according to sanctioned plan or as ordered and setting up bench marks and other reference marks.
  - (iii) Providing and subsequently removing shoring and strutting.
  - (iv) Cutting of shrubs.
  - (v) Bailing and pumping out water with pumps etc.
  - (vi) Excavation in all types of soil/ rock of whatever nature wet or dry and necessary for the construction of foundation and trail pits including materials like explosives, removal of blows and slips and use of tools, plant and equipment necessary for satisfactory completion of the item and preparing bed for foundation.
  - (vii) Sorting out of useful excavated materials, conveying them up to the specified lead clear beyond the surface and stacking them neatly for backfilling or reuse and wasting useless materials as directed by the Engineer.
  - (viii) Backfilling the excavated pits, alongside masonry or concrete with approved material up to the natural ground level.
  - (ix) Necessary protection including labour, materials and equipment to ensure safety and protection against risk and accident.
  - (x) Supply of facilities for inspection and measurements at any time by the Engineer.
  - (xi) Compensation for injury to life and damage to property if any caused by the contractor's operations with this item.
  - (xii) Blasting and items related to it.
  - (xiii) All equipment, machineries etc. required for completion of job.
  - (xiv) Supply, erection and all labour for formwork.
  - (xv) Supply and placement of reinforcement steel, stirrups, wire for binding the reinforcement, chairs and spacers etc. as required to complete the foundation work as per the drawing.
  - (xvi) Providing, placing and curing of concrete of various grades including all material and labour.
  - (xvii) Providing and applying Bitumen paint to concrete surface.
  - (xviii) Head loading of all required materials for all lifts and leads up to tower locations.

- (xix) Providing, fixing and removal of Supporting structure for stub template including all labour.
- (xx) Transporting, fixing/ setting of stubs and templates including all labour.
- (xxi) Rock anchors, grouts and allied equipment, plants, tools, labours etc. required for drilling in rock.
- (xxii) Dressing and grouting of concrete surfaces.
- (xxiii) Disposal of all excess soil/ Earth.
- (xxiv) Testing of all construction materials.
- (xxv) All other activities required to complete the job but not specially mentioned.

### **2.8.8 Preliminary Measurement of Ground Resistance:-**

- 2.8.8.1 The contractor is required to perform ground resistance test at every tower location. Method of measurement, tools and instruments shall be submitted to the Engineer for approval.
- 2.8.8.2 The measurement of ground resistance shall be performed at every meter depth from ground surface to the specified depth or to maximum depth of sub-soil tests. Where ground resistance value of 10 ohms or less is obtained at any adjacent levels, no further measurement is required.
- 2.8.8.3 One or Two legs of tower as required shall be earthed through separate earth electrodes as per approved drawing.
- 2.8.8.4 The contractor shall recommend the type of earth electrodes in accordance with the results of ground resistance obtained. Selection of earth electrode type shall be suitable for each tower and its particular site conditions. The data obtained shall be prepared in an approved form and submitted to the Engineer for approval.

### **2.8.9 Earthing of Towers:-**

#### **2.8.9.1 Installation of Counterpoise/Rod type Earthing:-**

##### **(A) Counterpoise earth:-**

Counterpoise earth consists of four lengths of galvanized steel stranded wires, each fitted with a lug for connection to the tower leg at one end. The wires are connected to arch of the legs and taken radially away from the tower and embedded horizontally 450 mm below ground level. The length of earth wire is normally limited to 15 M. The size of the galvanized steel stranded wire may be taken equal to sizes of the earth conductor. The counterpoise type earthing of tower shall be accordance with IS 5613.

**(B) Solid rod type Earthing:-**

Solid rod type earthing system shall consist of MS 40mm Dia. solid rod of 3000mm length which shall be hot deep galvanized. This rod shall be install inside earth pit of depth 3000mm and filled with treated material like charcoal, salt etc. which shall further lower the earth resistance. Entire Solid rod arrangement shall connect to Tower leg using Galvanized MS flat of size 50x6mm. Earthing arrangement provided at tower locations shall have earth resistance less than 5 ohms after installation.

**2.8.9.2 Measurement of Ground Resistance:-**

(A) Contractor shall measure the ground resistance of individual tower foundation with measuring instruments and method approved by Engineer. The results of measurement shall be recorded in approved form and submitted to Engineer for consideration.

(B) The initial ground resistance shall be that obtained with Counter Poise Earthing is installed. The final ground resistance shall be that obtained after improving tower ground connection and/or the tower foundation completed.

**2.8.9.3 Improvement of Tower Ground Resistance:-**

Where the initial ground resistance as mentioned in above is higher than 5 Ohm, contractor shall notify Engineer and carry out improvements as directed by him by either of the following or both.

(A) Driving additional ground electrodes;

(B) Installing radial or continuous counterpoise;

The revised ground resistance shall be measured and submitted for Engineer's approval.

**2.8.10 Erection of Towers:-**

**2.8.10.1 General:-**

(A) The contractor shall erect the towers (for Temporary & Permanent arrangement of diversion work) in accordance with the approved detail drawings. Towers shall be complete with all members in place and bolts including step bolts and ladder, if any, securely tightened before any stringing work is started. No erection of steel tower shall be taken up on foundation until at least seven (7) days after the last placing of concrete in the footing and completion of backfilling.

(B) In storage and at tower site, all tower steel shall be stored 300 mm clear of ground on suitable packing in a clean and tidy condition. Contact with drain water or other substances which are likely to attack galvanizing shall be avoided. The members shall be stored in the order required for erection, with erection marks clearly visible.

All storage areas shall be prepared and maintained by contractor. Steel shall not be stored in the vicinity of areas where excavation will be done and if so stored temporarily this shall be removed by the contractor well before such excavation commences, to a safe distance to avoid burial under debris.

- (C) Care shall be taken during handling and storage to prevent structural injury to members or damage to galvanizing. Steel members shall not be dragged over the ground surface or handled in such a manner as to damage the galvanized surfaces. Dumping of tower steel into piles on conveyances onto the ground or skidding of steel members over each are not permitted.
- (D) All superficial rust stains, corrosive salts and other corrosive foreign materials deposited prior to or during installation of tower shall be removed without causing any damage to galvanized surfaces. Any foreign material that may tend to adhere permanently to the structures shall be removed.

#### 2.8.10.2 Erection of Towers:-

- (A) Towers may be erected by assembling in sections on the ground and hoisting successive sections in place. Contractor shall submit the tower erection procedure in advance of actual erection, to Engineer for approval.
- (B) The slings and other equipment used for picking up members or portion of assembled towers shall be protected in such a manner as to prevent cutting into the corners of members, damage the galvanized surfaces, distort or overstress the members which are lifted. Members or portion of assembled towers shall be raised in such a manner that dragging on the ground surface or against portion of tower already erected shall be avoided. Contact surfaces of members forming joint shall be cleaned before members are assembled.
- (C) As erection progresses the work shall be securely bolted to take care of all the dead load, wind or seismic and erection stresses.
- (D) Towers shall be erected plumb and true such that the vertical axis through the center of gravity shall not be out of plumb as compared to the tolerances applicable.

#### 2.8.10.3 Bolts & Nuts:-

- (A) In the complete tower the nuts and bolts shall be tightened to the following torque:

Size of Bolt (mm)	Tightening Torque (kg.cm)
12	450
16	800-1050
20	1400-1800



- (B) Torque wrenches used for tightening the bolts shall be subject to the approval of the Engineer. The use of any wrench which may deform the nut or cut or flake the galvanizing will not be permitted.
- (C) All the nuts shall be locked in place with locknuts or other approved means. The bolts shall be installed in such a manner that locknuts and nuts are in “up” or “out” position.
- (D) All bolts up to waist level of tower shall be tack welded after final erection and checking of tower erected

### **2.8.11 Defects:-**

- 2.8.11.1 Any shop error in steel members when discovered shall be notified to Engineer by contractor. Similarly any fouling of members with each other when assembled shall be brought to the notice of Engineer. Engineer will decide whether error/fouling may be corrected in the field or the members to be rejected and returned to contractor for rectification or replacement. All such rectifications or replacements will be done by contractor at no extra cost to the DFCCIL.
- 2.8.11.2 No reaming for correction of mismatched holes due to shop errors will be permitted. However, a reasonable amount of drifting will be allowed in the assembly of tower. Drifts shall be used only for drawing the work to proper position and must not be used to such an extent as to damage the holes. Size of drift larger than the nominal diameter of hole shall not be used.
- 2.8.11.3 Members that are bent, twisted or otherwise deformed in storage, transportation, and handling or erection operation shall be straightened or replaced by contractor at no extra cost to the DFCCIL. Straightening shall be done only by use of methods which will not damage the galvanizing of the members. Tolerances for lateral variations of straightened members shall be as follows:

Members	Tolerances
Compression	±1.5/1000
Tension	±5/1000

Members that are damaged during repair work causing reduction in their strength shall be replaced.

- 2.8.11.4 All damages caused to the galvanizing as a result of handling, transportation, storage, repair operation of deformed or bent members, field drilling/cutting or erection operation shall be repaired by contractor. The damaged area shall be cleaned by wiping with clean rags saturated with mineral spirits of xylene followed by wire brushing. After wire brushing the area shall be cleaned again with a solvent to remove residue and shall be sprayed or given one heavy coat of zinc rich/galvanizing repair paint. The percentage of pure zinc by weight in the dry film of galvanizing repair paint shall not be less than 85 %.

2.8.11.5 If damage to the galvanized coating of members cannot be repaired at the site, contractor shall re-galvanize the damaged member at his factory or in other places approved by the Engineer.

**2.8.12 Tower Accessories:-**

Contractor shall install all the tower signs and accessories on the tower in a manner described hereunder and as shown on drawings.

**2.8.12.1 Tower Number Sign:-**

Contractor shall install the number plate on each tower on the face of tower indicated by the Engineer, at a height of about 5 M above the ground level.

**2.8.12.2 Phasing Sign & Circuit Plate:-**

Phasing signs along with circuit name in short form shall be installed on every tower on the bottom member of each cross arm, or as directed by Engineer.

**2.8.12.3 Danger Sign:-**

Danger signs shall be installed on each tower. They shall be installed at a suitable height in such a manner as can be seen easily by the passers-by.

**2.8.12.4 Anti-Climbing Devices (ACD):-**

Minimum four continuous lines of barbed wire shall be provided around tower from outside and minimum two lines from inside of tower. Spacing between two barbed wire lines shall not exceed 100 mm. Drawing showing detailed arrangement of ACD shall be prepared by the contractor and approved by the Engineer. Height of such arrangement shall not be less than 5 meters from ground level. Additional anti-climbing arrangement shall be provided as per site requirements if any.

**2.8.13 Methodology for Installation and Termination of OPGW:-**

2.8.13.1 All optical fiber cable termination, installation, stringing and handling plans, guide and procedures and engineering analysis shall be submitted to the Engineer for review and approval in the engineering phase/design phase of the project prior to establishing the final cable lengths of each sections.

2.8.13.2 OPGW installation crew shall be experienced and certified for Hot Line OPGW installation since proposed work will be very close to energized power lines / circuits.

2.8.13.3 Installation procedures including details of personnel and time required shall be documented and submitted for approval.

2.8.13.4 Installation procedures shall ensure protection of the personnel installing against induced voltage and current caused by energized lines.

2.8.13.5 Installation procedures shall ensure protection of the personnel against hazards which can be result of accidental line energization.

2.8.13.6 Installation procedure shall ensure adequate protective earthing system is being done.

2.8.13.7 Installation procedure shall ensure use of correct work methods and specialized training.

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For & on behalf of DFCCIL

2.8.13.8 Installation procedures shall ensure use of proper equipment and devices to protect the person from all the hazards such as electromagnetic induction, electrostatic field induction, switching error, accidental contact of the conductor or ropes being installed and lightning strikes in the vicinity or on the conductor being installed.

2.8.13.9 OPGW Stringing Method and equipment:-

- (A) Tension Stringing method or alternate proven methods shall be used for stringing of the OPGW cable.
- (B) It shall ensure to keep conductor from contacting the earth surface or other obstacles between the towers to avoid surface damage.
- (C) It shall ensure to keep conductor to easily pass over the energized circuits, DFCCIL tracks or major roads without contacting them.
- (D) Stringing equipment used during the process such as tensioners ,puller, reel winders, reel stands, pilot rope puller, pilot rope, pulling rope, stringing blocks, stringing block earth, running earth shall minimum suffice the criteria mentioned in IEC-61238.
- (E) Requirement for Installation of pilot or pulling rope, stringing of conductors, splicing of conductors, sagging of conductors, dead ending and installation of jumper loops shall be met detailed in IEC-61238.
- (F) Type test of earth clamps, earth cable shall be in accordance to IEC 61230.

2.8.13.10 Communications:-

- (A) Tension stringing methods shall ensure availability of proper communication system for puller operator, tensioner puller, supervisors.
- (B) Communication system shall be a radio system with a channel that is free from outside interference and is located at their operating position.
- (C) The radio or telecommunication system used by the puller operator or tensioner operator shall be portable set with earphones and microphone but with no conductive wire connection to the machine.

2.8.13.11 Special Earthing requirement:-

- (A) Maximum earthing requirements shall be ensured during installation as recommended in IEC-61328.
- (B) Use of running earths, earth mats at work sites and stringing block earth shall be sized and designed for a fault current where direct contact with an energized line is possible.
- (C) Minimum recommended earthing procedure for conductor stringing sequence shall be complied in accordance to IEC-61328.

- (D) The size of the earth cables and clamps for bonding and earthing shall be adequate for the maximum steady state induced currents as well as the largest fault currents to which they are likely to expose.
- (E) All equipment used in the process of stringing conductors should have at least one earth attachment point at some convenient point on the frame.
- (F) All conductors stringing equipment shall have a special earthing bar welded to the frame for attachment of the earth clamp.

2.8.13.12 All cable segments shall include service loops as specified in this specification.

2.8.13.13 The maximum allowable stringing tension, maximum allowable torsional shear stress, crush strength and other physical parameters of the cable shall not be exceeded.

2.8.13.14 Optical fiber attenuation shall be measured after installation and before splicing.

2.8.13.15 Any increase in attenuation or step discontinuity in attenuation shall not be acceptable and shall constitute a cable segment failure.

Note: - In the event of cable damage or fiber damage the complete section shall be replaced without any mid span joints.

**2.8.14 Installation of OPGW H/W Assemblies:-**

The OPGW H/W set shall be assembled and attached by the contractor in accordance with the manufacturer's instructions / recommendations.

**2.8.15 Dismantling of OPGW AND OPGW Assemblies:-**

The dismantling work of OPGW and its assemblies in respect of the existing 220 kV Tr. Lines as well as in respect of dismantling of OPGW and its assemblies for Temporary Diversion arrangement shall be done in line with the methodology specified in Clause 2.8.13 & 2.8.14 of this Section.

**2.8.16 Installation of Insulators:-**

**2.8.16.1 Handling and Transportation:-**

(A) The polymer long rod insulators shall be handled carefully to avoid damage of any kind. All insulator string or strings shall be properly cradled or supported during installation to prevent chipping or bending of pins. All insulators shall be clean and all other parts shall be free from dirt and dust. Only clean rags free from any abrasive materials shall be used for cleaning insulators. Wire brushes shall not be used for the cleaning of any parts, metal or otherwise. Workmen shall not climb on insulators strings at any time.

(B) If the insulators are damaged in any way, the contractor shall replace the damaged insulators as directed by the Engineer at no additional cost.

**2.8.16.2 Insulator Assemblies:-**

- (A) The insulator strings shall be assembled properly and due care shall be taken to avoid any damage to insulator and its hardware. Insulators and hardware shall be locked properly by fully insertion of R-clip/W clip into its position. Each complete suspension insulator string shall be so installed that it will be in a vertical position.
- (B) All cotter pins shall be carefully installed and checked to ensure that they are properly seated. All insulator cotter key eyes shall face top up and in position. While lifting the insulator string, the bending or straining the ball pins of the insulators shall be avoided.
- (C) For transposition, where called for by the Engineer, the use of special hardware and fittings must be made available by the contractor. Necessary hardware is to be supplied by the contractor at no additional cost.

**2.8.17 Stringing of Conductor:-**

**2.8.17.1 General:-**

Conductor shall be strung with utmost care during handling and transportation. Quantity furnished will be the actual horizontal distance of the section to be installed after check survey and staking have been performed plus a fixed extra 1.0 % to cover sag, terrain irregularities and wastage.

**2.8.17.2 Stringing Method:-**

Any of the methods for stringing the conductors described here under may be used by the contractor.

**(A) Running Lines Method:-**

The conductor shall be pulled into position through the snatch blocks by powered puller. The running line shall be of sufficient length to avoid applying undue strain to the insulators and structures. The running lines shall be connected to the conductors with swivel connectors and stocking type grips. The end of the grips shall be taped to the conductor so that the grips will run freely in the sheaves. Conductor splices shall not be passed through a sheave except as specifically permitted by the Engineer.

- (B) Stringing of conductor shall, in no case, be performed until 10 days after concrete foundation has been placed and until assembly and tightening of bolts of tower have been completed and inspected by the Engineer.
- (C) Stringing of conductor and related operation shall be performed during daylight hours.
- (D) Particular care shall be taken at all times to ensure that the conductors do not become kinked, twisted or abraded in any manner. The conductor shall not be dragged over the ground, water, rock, fence wire or any object which may damage the conductor.

Suitable guards or sheaves or running wood rollers shall be used to protect the conductor from coming into contact with objects which may injure the conductor. Guards shall consist of material over which the conductors may slide without injury and shall be subject to the approval of the Engineer.

(E) The contractor shall repair or replace the damaged sections, including the furnishing of necessary additional materials, in a satisfactory manner and at no additional cost to the DFCCIL.

(F) The snatch-blocks, when suspended on the towers for sagging, shall be so adjusted that the conductor will lie in the sheave at the same level as the suspension clamps to which the conductor is to be secured.

**2.8.17.3 Stringing Plan:-**

Not later than one month before commencing installation work, the contractor shall submit the stringing plan to the Engineer for approval. The plan shall describe the work schedule, method of stringing, temporary guying, scaffolding, personnel required in performing the work and list of tools and equipment to be employed together with printed instruction.

In addition, not later than one week before commencing stringing work of any section of the line, the contractor shall submit the details of unreeling section, location of reel, winch, temporary guying and scaffolding and length of conductor to be strung to the Engineer for approval.

**2.8.18 Dismantling of AAAC Zebra Conductors and its Hardwares & Accessories:-**

The dismantling work of AAAC Zebra conductor and hardware / accessories in respect of the existing 220 kV Tr. Lines as well as in respect of dismantling of AAAC Zebra conductor and hardware/accessories for Temporary Diversion arrangement shall be done in line with the methodology specified in Clause 2.8.17 of this Section.

**2.8.19 Tools & Equipments:-**

2.8.19.1 Tools and equipment shall be inspected at the site by the Engineer after the approval of the stringing plan but prior to commencing the stringing work.

**2.8.19.2 Snatch-block:-**

(A) Snatch-block shall be designed especially for stringing the conductors and shall have grooves of a shape and size in accordance with the manufacture's printed instructions for the conductor size used.

(B) The sheaves shall be equipped with high quality ball or roller bearings. The material of the sheaves shall be aluminum alloy or material lined with bonded neoprene or equivalent as approved by the Engineer.

(C) The sheaves shall have free and easy movement in the blocks and be free of any damage to the conductor contact surface. Sheaves which do not run freely or which hinder the stringing operation shall be immediately replaced.

**2.8.19.3 Reel Stands:-**

Reel stands shall be sturdy and provision shall be made for breaking the reels.

**2.8.19.4 Running Lines:-**

Running lines shall be made of steel or manila hemp or nylon or other material approval by the Engineer. The running line shall be strong enough for stringing work.

**2.8.19.5 Come-Along:-**

Come-along shall be of the type that it can be installed anywhere on the conductor to grip it more firmly when the holding power grows automatically as the tension of the conductor increases.

**2.8.19.6 Compressors for Joints and Dead-End Connector Assemblies:-**

Suitable hydraulic compressors equipped with pressure gauge and dies shall be used for tension joints and compression dead-end connector assemblies of the conductor and shall also possess functions thoroughly satisfying the jointing of the conductor as required in these specifications.

**2.8.19.7 Scaffolding:-**

- (A) The contractor shall be responsible for acquiring permission to execute the work from administrators of facilities over which the transmission line is to pass, such as roads, DFCCIL, communication lines and power distribution lines. In addition, the contractor shall be responsible for all necessary procedures involved, including the application for the permission.
- (B) The contractor shall, at his own expenses, provide suitable scaffolding at the place where his work may incur injuries or damage to persons, livestock or property of value of a third party.
- (C) The scaffolding shall be of sufficient strength to withstand wind pressure, vertical loads and all loads which may be anticipated, and shall be of such structure as to prevent the conductor from coming within 5 m from railroad tracks and roads and 1m from telecommunication lines and distribution lines up to 33 kV during unreeling of the conductor. The scaffolding itself shall also have the aforementioned clearance.

**2.8.20 Jointing & Repairing of Conductor:-**

- 2.8.20.1 Jointing of all conductors shall be performed as practicable at the same position. Tension sleeves, and repair sleeves shall be installed to the conductor in accordance with the recommendations of the manufacturers. All compression joints shall be filed and finished with emery cloth to produce a smooth surface, free of flash and sharp points which might be a source of corona or radio interference.
- 2.8.20.2 The contractor shall furnish all necessary tools, including compression tools, required for installing tension sleeves, and repair sleeves.



2.8.20.3 All conductor joints and repairs shall be located in the span at least 15 m away from suspension clamps or tension clamp or compression dead/end. The minimum distance between two conductor joints shall not be less than 600 m unless otherwise directed/approved by the Engineer. No conductor shall contain more than one joint or repair in any one span.

2.8.20.4 Jointing and repairing shall not be permitted in single span of tension towers and crossing and adjoining the following objects.

- (A) Highways.
- (B) Rail / roads.
- (C) Rivers, major canals and creek water ways.
- (D) Public utility lines.
- (E) Telecommunication lines.

2.8.20.5 In addition, conductor jointing and repairing shall conform to the following requirements.

2.8.20.6 Jointing of Conductor:-

Jointing shall not be performed in the rain or in the dark. Jointing shall be performed by a method approved by the Engineer using approved tools and equipment to develop rated mechanical strength and electrical conductivity. The installation of compression joints shall be carefully supervised to ensure that the sleeves are centered properly.

2.8.20.7 Repairing of Conductor:-

Compression type repair sleeves may be used to repair minor damage to the conductor provided that;

- (A) There is no broken strand.
- (B) Not more than one third of the strands in the outer layer are damaged over a length of not more than 10 cm and.
- (C) The cross sectional area of any of the strands is not reduced by more than 25 percent.

Each such repair shall be subject to the approval of the Engineer.

**2.8.21 Sagging of Conductors:-**

2.8.21.1 All conductors sagging shall be performed during daylight hours. Sagging operations shall not be permitted during high wind, or other adverse weather conditions which would impair the accuracy of the sagging.

2.8.21.2 The conductor shall be installed in accordance with the stringing chart (sag and tension tables) to be obtain by the contractor from the Engineer. The stringing sag and tension calculation have been prepared based on the equivalent span method and cover the prevailing temperatures and span. The 10 years creep have been considered and the effect of creep during paying out and during hanging in snatch blocks before sagging shall be taken into account for new conductor.

2.8.21.3 After being pulled into the sheaves, the conductor shall not be allowed to hang in the snatch-blocks for more than 48 hours, before being pulled to the specified sag. The length of the conductor sagged in one operation shall be limited to the length that can be sagged satisfactorily. After the conductors have been pulled to the required sag, intermediate spans shall be checked to determine the sags are correct.

## **2.8.22 Measurement of Sag:-**

2.8.22.1 For several spans in each sagging section, the sag shall be measured selecting one near each end and one or two near the center. The total number of spans to be measured shall be as follows;

<b>Sagging Section Span</b>	<b>Number of Measurements</b>
1	1
2-6	2
7-15	3

2.8.22.2 The sag of all spans in excess of 500 m shall be measured separately. At any sharp vertical dip angle spans, the sag shall be measured on both sides of the angle of the spans.

2.8.22.3 The contractor shall provide suitable dynamometer, sighting boards, theodolite, and other suitable devices to measure sagging, as well as thermometers to measure the ambient temperature to determine the conductor sag. Dynamometers are to be tested and if necessary recalibrated.

### **2.8.22.4 Tolerance of Sag:-**

A tolerance of plus or minus 15 cm in the sag in any one span will be permitted, provided that;

- (A) The maximum difference in sag between the phases in any span shall not exceed 5 cm.
- (B) The necessary ground clearance is obtained.
- (C) The conductor tension between successive sagging operations is equalized so that the suspension insulator assemblies will hang in the vertical position in the transverse plane to the tower when the conductor is clipped-in.

## **2.8.23 Measurement of Sagging Temperature:-**

The Conductor or overhead ground wire temperature shall be determined by mounting thermometer at every sag span as follows;

- (A) Pull the core from 0.6 M length of conductor, removing sufficient strands to insert the thermometer into the vacant space. Expose the length of conductor or overhead ground wire to the full sun at the approximate sagging height above ground. Ensure the conductor is located in free air and is not in the shade not protected from the sun, wind or rain.

(B) Read the temperature after it reaches its final value at each sag open. Select the mean temperature to decide sags to be adopted and this temperature shall be agreed with the Engineer.

#### **2.8.24 Clipping of Conductors:-**

- 2.8.24.1 The conductor shall be clipped-in by the contractor after the conductors have been sagged in accordance with these specifications. After being sagged, all conductors shall be accurately marked for clipping-in at all structures on the same day that the conductors are sagged. Clipped-in marks shall be made on all conductors in the vertical plane through the transverse center line of the tower. Where offsets, are required, the conductors shall be marked at the point of suspension clamp attachment by measuring the distance of the required off set along the conductor from the vertical plane through the centerline of the tower at the time of clipping-in.
- 2.8.24.2 The total time which the conductor is allowed to remain in the snatch-blocks before clipping-in shall not exceed 72 hours
- 2.8.24.3 After clipping-in, the contractor shall check to insure that all bolts, nuts, cotter keys and all items of insulator assemblies are installed as required to avoid any point of radio noise or corona generation.
- 2.8.24.4 If it becomes necessary to change the point of attachment of the suspension clamp by more than 7 cm either ways from the mid-point of the armour rods after they are installed, the rods shall be removed and installed so as to center on the point of attachment. Under such circumstances the armour rods may be reused if not damaged. The contractor will not be allowed any additional compensation for such removal, re-installation, or replacement or armour rods where required.

#### **2.8.25 Installation of Vibration Dampers:-**

The contractor shall install vibration dampers as per the approved manufacturer's recommendation. Dampers shall be fastened securely so that all dampers will hang in a vertical plane. Vibration damper shall be installed within 24 hours after the conductor has been clipped-in.

#### **2.8.26 Accounting of Towers & Line Materials:-**

- 2.8.26.1 On completion of constructional works for diversion (Temporary as well as Permanent arrangements) against this contract, the successful bidder (contractor) shall submit the complete account for all the Towers and Line materials to Engineer for approval. The same should include the quantities issued, quantities consumed for diversion works and balance quantities shall be taken back by the contractor and requisite rebate for the returned material, if any, shall be accounted for and given during final bill. Further, quantities of dismantled Towers and Line materials shall be retained by the contractor.
- 2.8.26.2 DFCCIL will recover the amount towards non-returned materials at the prevailing market rates.

- 2.8.26.3 The permissible wastage @ 0.5 % against AAAC Zebra Conductor and OPGW will be allowed towards sag & wastages.
- 2.8.26.4 No wastage will be allowed on any other items except for items indicated in sub clause 2.7.26.3 (i.e. GI Tower materials, Stubs, Templates, Bolts/Nuts/Washers, Insulators, Hardware & Accessories and Earthing Materials etc.).

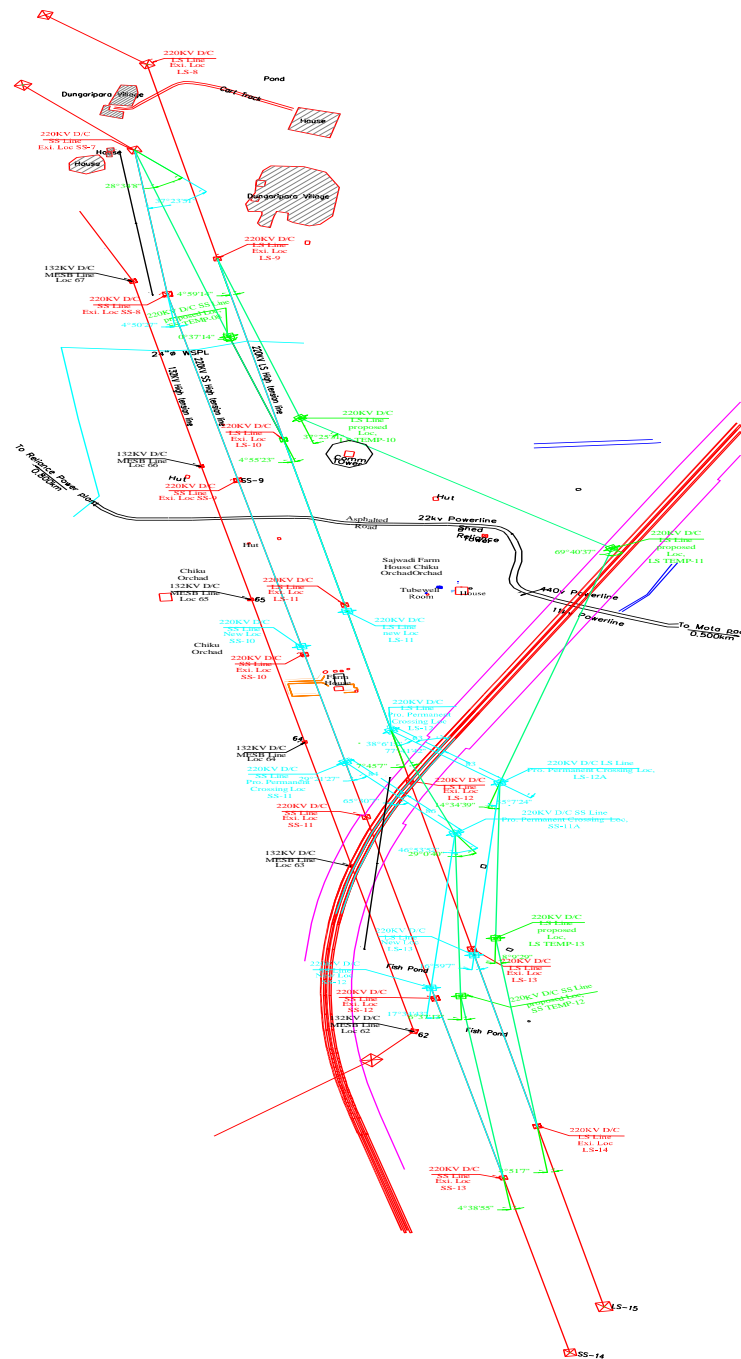
**2.8.27 Final Checking, Testing and Commissioning:-**

After completion of the diversion works, final checking of the diverted lines shall be done by the contractor to ensure that all the foundation works, tower erection, and stringing have been done strictly according to the specifications and as approved by Engineer. All the works shall be thoroughly inspected keeping in view of the following main points;

- 2.8.27.1 Sufficient back filled earth is lying over each foundation pit and it is adequately compacted.
- 2.8.27.2 Concrete chimneys and their copings are in good finely shaped conditions.
- 2.8.27.3 All the tower members are correctly used, strictly according to final approved drawing and are free of any defect or damage whatsoever.
- 2.8.27.4 All bolts are properly tightened and punched. Also tack welded up to waist level of tower.
- 2.8.27.5 The stringing of the conductors and earth wire has been done as per the approved sag and tension charts and desired clearances are clearly available.
- 2.8.27.6 All conductor and earth wire accessories are properly installed.
- 2.8.27.7 All other requirements to complete the work like fixing of danger plate, phase plate, number plate, anti-climbing device, and aviation signal (wherever required) etc. are properly installed.
- 2.8.27.8 Wherever required it should be ensured that revetment is provided.
- 2.8.27.9 The original tracings of profile route alignment and tower, design, structural drawings, bill of material, shop drawings of all towers other than the towers designed by Engineer/DFCCIL are submitted to Engineer/DFCCIL for reference and record.
- 2.8.27.10 The insulation of line as a whole is tested by the contractor by providing his own equipment, labour etc. to the satisfaction of Engineer.
- 2.8.27.11 All towers are to be properly grounded.
- 2.8.27.12 The line is tested satisfactorily for commissioning purpose using Off-Line Testing equipment.
- 2.8.27.13 Statutory Clearance by the relevant State Govt. Authority: - The successful Bidder shall prepare the case for submission to the relevant authority and arrange for the Clearance. Bidder shall make good all the points / observations made by such authority and arrange for the clearance for charging and commissioning of the diverted Line/ Lines.

## 2.8.28 Diversion Plans (Annexure-A):-

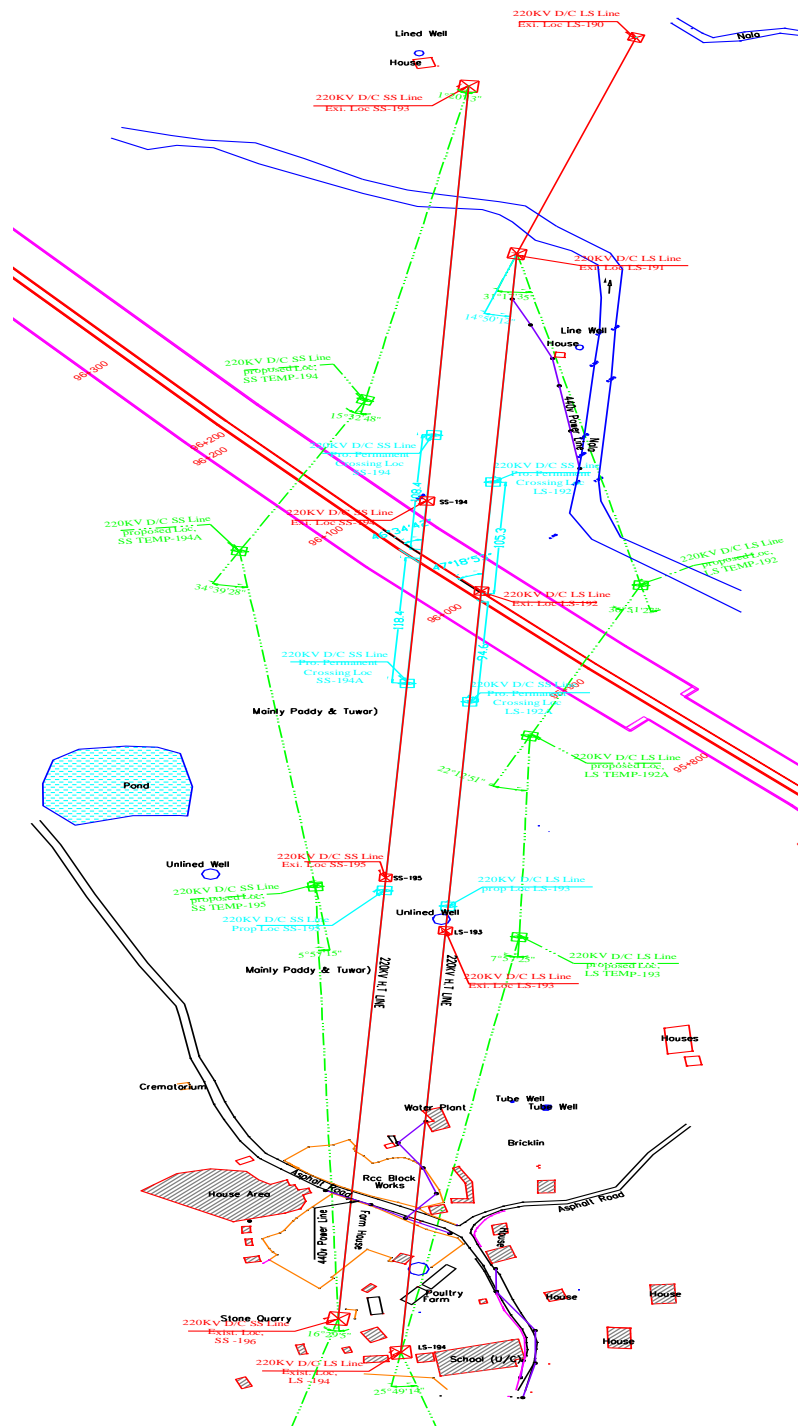
### 2.8.28.1 Diversion Plan for DFC Corridor Crossing at Dahanu Site:-



Signature & Stamp of Tenderer

For & on behalf of DFCCIL

#### 2.8.28.2 Diversion Plan for DFC Corridor Crossing at Virar Site:-



Signature & Stamp of Tenderer

For & on behalf of DFCCIL

This is a detailed technical drawing of a cadastral map for a village, showing property boundaries, roads, and infrastructure. The map includes various colored lines (red, blue, green, orange) representing different types of boundaries and features. Text labels in Vietnamese are scattered throughout, identifying specific locations and features. The map is oriented with North at the top.

Key features and labels include:

- Top Labels:** 22001 PhungThay, 22001 PhungThay, 15-209.
- Left Side:** 14 MienThay, 14 MienThay, 14 MienThay.
- Right Side:** 14 MienThay, 14 MienThay, 14 MienThay.
- Center:** 14 MienThay, 14 MienThay, 14 MienThay.
- Bottom:** 14 MienThay, 14 MienThay, 14 MienThay.

The map shows a complex network of property boundaries and roads, with various colored lines indicating different types of boundaries and features. The text labels are in Vietnamese and provide specific information about the locations and features shown on the map.

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#### 2.8.28.4 Diversion Plan for DFC Corridor Crossing at Vasai Site:-



Signature & Stamp of Tenderer

For & on behalf of DFCCIL

# **PART-III**

# **TENDER FORMS**

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

### **PART- III**

#### **TENDER FORMS**

<b><u>FORM No.</u></b>	<b><u>SUBJECT</u></b>
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Form No. 1	Offer Letter
Form No. 2	Tenderer's Credentials
Form No. 2A	Technical Eligibility Criteria Details
Form No. 2B	Financial Eligibility Criteria Details
Form No. 2C	Applicant's Party Information Form
Form No. 3	Summary of Prices
Form No. 4	Schedule of Prices and Total Prices
Form No. 5	Contract Agreement
Form No. 6	Performance Guarantee Bond
Form No. 7	Standing indemnity bond for on account payment.
Form No. 8	ECS / NEFT / RTGS
Form No. 9	Draft MOU for Joint Venture Participation
Form No.10	Draft Agreement for JV
Form No.11	Pro-forma of Participation from each partner of JV
Form No.12	Power of Attorney for authorized signatory of JV Partners
Form No.13	Power of Attorney to lead partner of JV
Form No.14	Pro-forma for Time Extension
Form No.15	Certificate of Fitness
Form No. 16	Pro-forma of 7 days' Notice
Form No.17	Pro-forma of 48 Hours' Notice
Form No.18	Pro-forma of Termination Notice
Form No.19	Format of Bank Guarantee for Mobilization Advance

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

**FORM NO. – 1**

**OFFER LETTER**

**E-Tender No.:-** MUM/N/EL/239/UTILITY/77/REL-F (TENDER)

**Name of work:-** Supply of towers & line materials and erection, testing & commissioning work for diversion of two numbers of 220 KV double circuit transmission lines (owned by R-Infra), to facilitate the passage of rail track being constructed by the Dedicated Freight Corridor Corporation of India Limited (DFCCIL) at four different crossing locations near Village Aagvan (Dahanu Taluka); near Village Shirgaon (Vasai Taluka); near Village Bilalpada (Vasai Taluka) & near Village Gokhivare (Vasai Taluka) in Maharashtra.

To,  
CPM/S/Mumbai,  
DFCCIL,  
Mumbai.

We, the undersigned, declare that:

- (a) We have examined and have no reservations to the Bidding Documents, including Addenda;
- (b) We offer to execute the Works in conformity with the Bidding Documents;
- (c) Our bid shall be valid for a period of 120 days from the date fixed for the bid submission deadline in accordance with the Bidding Documents, and it shall remain binding upon us and may be accepted at any time before the expiration of that period;
- (d) We have not been blacklisted/banned in accordance with para.1.3.13 (ii) (v) (a) of Preamble and General Instructions to bidders (Chapter-III of Part-I);
- (e) We are neither Bankrupt/Insolvent nor in the process of winding-up nor there is a case pending before any Court on deadline of submission of the Bid in accordance with para. 1.3.13 (ii) (v) (b) of Preamble and General Instructions to bidders. (Chapter-III of Part-I)

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

- (f) If our bid is accepted, we commit to obtain a Performance Guarantee in accordance with the Bidding Documents;
- (g) If our bid is accepted, we commit to deploy key equipment and key personnel consistent with the requirements of the work.
- (h) We understand that this bid, together with your written acceptance thereof included in your notification of award/Letter of Acceptance (LOA), shall constitute a binding contract between us, until a formal contract is prepared and executed; and
- (i) All information, statements and description in this bid are in all respect true, correct and complete to the best of our knowledge and belief and we have not made any tampering or changes in the bidding documents on which the bid is being submitted and if any tampering or changes/incorrect information are detected at any stage, we understand the bid will invite summarily rejection and forfeiture of bid security, the contract will be liable to be terminated along with forfeiture of performance security, even if LOA has been issued.
- (j) We understand that you are not bound to accept the lowest bid or any other bid that you may receive.

**Name:** .....

**In the capacity of:** .....

**Signed:** .....

**Duly authorized to sign the Bid for and on behalf of:** .....

**Date:** .....

**FORM NO. - 2**

**TENDERER'S CREDENTIALS**

<b>Sr. No.</b>	<b>Description</b>
1	For technical experience/competence, give details of similar completed works during the last three financial years (i.e. current Financial year and three previous Financial Years) in the pro-forma given in Form-2A.
2	For financial capacity and organizational resources, give details of contractual payments received for the last three financial years (i.e. current Financial year and three previous financial years) as per Form 26AS or audited balance sheet certified by Chartered Accountant in the pro-forma given in Form-2B.
3	Give constitution of your firm. Attach certified copies of legal documents in support thereof. Form-2C.

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

**FORM No. - 2A**

**TECHNICAL ELIGIBILITY CRITERIA DETAILS**

**Details of the similar works completed [as per Para 1.3.13 (i) of  
Preamble and General Instructions to Bidders (Chapter-III of Part-I)]**

<b>Similar Contract No.:</b>		
Contract Identification:		
Award date:		
Completion date:		
Role in Contract:	<b>Prime Contractor</b> <input type="checkbox"/>	<b>Member in JV</b> <input type="checkbox"/>
Original Contract Agreement Value (Rs.): (A)		
Sanctioned Quantity Variation Value (Rs.): (B)		
Total Completion Value (Rs.): [(A) + (B)]*		
If member in a JV , specify participation in total Contract amount:	<i>[insert a percentage amount]</i>	<i>Total contract amount in Rs.</i>
Employer's Name:		
Address:		
Telephone/fax number:		
E-mail:		
<b>Description of the similarity in accordance with Criteria at para 1.3.13(i) (A) of Preamble and General Instructions to Bidders (Chapter-III of Part-I).</b>		

**The bidder shall attach certified completion certificates issued by the client duly attested by Notary as per Eligibility Criteria of the tender documents.**

**\*Note: - Price Variation Amount shall not be included in the completion value.**

Signature of the  
Tenderer with Seal

Signature & Stamp of Tenderer

For & on behalf of DFCCIL



**FINANCIAL ELIGIBILITY CRITERIA DETAILS**

**Each Bidder or each member of JV must fill in this form separately.**

**Name of Bidder/JV Partner:**

**Details of contractual payments received during the last three financial years and current financial year [as per Para 1.3.13 (i) of Preamble and General Instructions to Bidders]**

Contractual payments received	
Year	Value of payment received in Rs. (Contract Receipts)
Current Year (2018-2019)	
2017-2018	
2016-2017	
2015-2016	
Total Contractual Payment	

**Note:** The details should be extracted from Form 26AS or the audited balance sheet Certified by the Chartered Accountant as per Para 1.3.13 of Preamble and General Instructions to Bidders (Chapter-III of Part-I).

**The bidder shall attach necessary documents in support of the above.**

**Signature of authorized signatory  
Or Finance Head of the company  
With Company Seal**

**FORM No. - 2C**

**APPLICANT'S (BIDDER'S) PARTY INFORMATION FORM**

Applicant name: [insert full name]
Applicant's Party name: [insert full name of Applicant's Party]
Applicant's Party country of registration: [indicate country of registration]
Applicant Party's year of constitution: [indicate year of constitution]
Applicant Party's legal address in country of constitution: [insert street/ number/ town or city/ country]
Applicant's Party ISO Certification, if any (If yes, please furnish details):
Applicant's Party PF/EPF/ESIC Registration No.:
Applicant's Party GST Registration No.:
Applicant's Party PAN No. :
Applicant Party's authorized representative information  Name: [insert full name] Address: [insert street/ number/ town or city/ country]  Telephone/Fax numbers: [insert telephone/fax numbers, including country and city codes] E-mail address: [indicate e-mail address]
<p>1. Attached are copies of original documents of</p> <p><input type="checkbox"/> Articles of Incorporation (or equivalent documents of constitution or association), and/or registration documents of the legal entity named above.</p> <p><input type="checkbox"/> In case of a Government-owned enterprise or institution, documents establishing legal and financial autonomy, operation in accordance with commercial law, and absence of dependent status.</p> <p>2. Included are the organizational chart, a list of Board of Directors, and the beneficial ownership.</p>

**Signature of authorized signatory  
Or HR Head of the company  
With Company Seal**

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

**SUMMARY OF PRICES**

**(Summary of Prices has been separately attached in Financial Packet "B")**

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

**SCHEDULE -1**  
**SCHEDULE OF PRICES & TOTAL PRICES**

**(Schedule of Prices & Total Prices has been separately attached in Financial Packet "B")**

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

**FORM No. - 5**

**SAMPLE**

**AGREEMENT**

**CONTRACT AGREEMENT**

THIS AGREEMENT ("Agreement") is made at Mumbai on the \_\_\_\_\_ day of \_\_\_\_\_ BETWEEN

(1) Dedicated Freight Corridor Corporation of India Limited, incorporated under the laws of India and having its principal place of business at Pragati Maidan Metro Station Building Complex, New Delhi, India -110001 (hereinafter called '**the DFCCIL**'), and (2)-----  
-----, a company/corporation incorporated under the laws of-----having its principal place of business at ----- (hereinafter called "**the Contractor**").

WHEREAS in reference to a call for Tender for "Supply of towers & line materials and erection, testing & commissioning work for diversion of two numbers of 220 KV double circuit transmission lines (owned by R-Infra), to facilitate the passage of rail track being constructed by the Dedicated Freight Corridor Corporation of India Limited (DFCCIL) at four different crossing locations near Village Aagvan (Dahanu Taluka); near Village Shirgaon (Vasai Taluka); near Village Bilalpada (Vasai Taluka) & near Village Gokhivare (Vasai Taluka) in Maharashtra" at Annexure "A" hereto, the Contractor has submitted a Tender hereto and whereas the said Tender of the contractor has been accepted for "Supply of towers & line materials and erection, testing & commissioning work for diversion of two numbers of 220 KV double circuit transmission lines (owned by R-Infra), to facilitate the passage of rail track being constructed by the Dedicated Freight Corridor Corporation of India Limited (DFCCIL) at four different crossing locations near Village Aagvan (Dahanu Taluka); near Village Shirgaon (Vasai Taluka); near Village Bilalpada (Vasai Taluka) & near Village Gokhivare (Vasai Taluka) in Maharashtra" as per copy of the Letter of Acceptance of Tender No----- dated -----complete with enclosure at the accepted rates and at an estimated contract value of Rs.------(Rupees -----only). Now the agreement with witnesseth to that in consideration of the premises and the payment to be made by the DFCCIL to the Contractor provided for herein below the Contractor shall supply all materials & equipment and execute and perform all works for which the said Tender of the Contractor has been accepted, strictly according to the various provisions in Annexure 'A' and 'B' hereto and upon such supply, execution and performance to the satisfaction of DFCCIL, the DFCCIL shall pay to the contractor at the several rates accepted as per the said Annexure 'B' and in terms of the provisions therein.

IN WITNESS WHEREOF the parties hereto have caused their respective Common Seals to be hereunto affixed / (or have hereunto set their respective hands and seals) the day and year first above written.

For and on behalf of the Contractor

For and on behalf of the DFCCIL

Signature of the authorized official  
Name of the official

Signature of the authorized official  
Name of the official

Stamp/seal of the Contractor

Stamp/Seal of the DFCCIL

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

**SIGNED, SEALED AND DELIVERED**

By the said

\_\_\_\_\_Name

On behalf of the Contractor in the  
presence of:

Witness \_\_\_\_\_

Name \_\_\_\_\_

Address \_\_\_\_\_

By the said

\_\_\_\_\_Name

On behalf of the DFCCIL in the  
presence of:

Witness \_\_\_\_\_

Name \_\_\_\_\_

Address \_\_\_\_\_

**Enclosures:-**

1. Annexure 'A' - Tender Document No. \_\_\_\_\_

2. Annexure 'B' - Letter of Acceptance of Tender No. \_\_\_\_\_ Dated  
\_\_\_\_\_ along with Summary of Prices.

Pragati Maidan Metro Station Building Complex, New Delhi, India -110001

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

**SAMPLE**

Name of the Bank \_\_\_\_\_

DFCCIL Bank Guarantee Bond No. \_\_\_\_\_ Acting through \_\_\_\_\_  
(Designation Dated and address of contract signing authority)

**PERFORMANCE GUARANTEE BOND**

In consideration of the Managing Director/ DFCCIL acting through \_\_\_\_\_ (Designation & Address of Contract Signing Authority), Dedicated Freight Corridor Corporation of India Limited, New Delhi (hereinafter called "DFCCIL") having agreed under the terms and conditions of agreement/Contract Acceptance letter No. \_\_\_\_\_ Dated \_\_\_\_\_ made between (Designation & address of contract signing Authority) and (hereinafter called "the said contractor(s)") for the work \_\_\_\_\_ (hereinafter called "the said agreement") having agreed for submission of an irrevocable Bank Guarantee Bond for Rs. \_\_\_\_\_ (Rs. \_\_\_\_\_ only) as a performance security Guarantee Bond from the contractor(s) for compliance of his obligations in accordance with the terms & conditions in the said agreement.

1. We \_\_\_\_\_ (indicate the name of the Bank) hereinafter referred to as the Bank, undertake to pay to the DFCCIL an amount not exceeding Rs \_\_\_\_\_ (Rs. \_\_\_\_\_ only) on demand by the DFCCIL.
2. We \_\_\_\_\_ (indicate the name of the bank, further agree that (and promise) to pay the amounts due and payable under this guarantee without any demur merely on a demand from the DFCCIL through the Deputy Chief Project Manager/ Finance, Dedicated Freight Corridor Corporation of India Limited, Mumbai or \_\_\_\_\_ (Designation & Address of contract signing authority) DFCCIL, stating that the amount claimed is due by way of loss or damage caused to or would be caused or suffered by the DFCCIL by reason of any breach by the said contractor of any of the terms or conditions contained in the said agreement or by reason of the contractor failure to perform the said agreement. Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs. \_\_\_\_\_ (Rs. \_\_\_\_\_ only).
3. (a) We, \_\_\_\_\_ (indicate the name of Bank) further undertake to pay to the Government any money so demanded notwithstanding any dispute or dispute raised by the contractor (s) in any suit or proceeding pending before any court or Tribunal relating to liability under this present being absolute and unequivocal.  
(b) The payment so made by us under this bond shall be valid discharge of our liability for payment there under and the contractor(s) shall have no claim against us for making such payment.
4. We, \_\_\_\_\_ (indicate the name of bank) to further agree that the guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said agreement and that it shall continue to be enforceable till all the dues of the DFCCIL under or by virtue of the said agreement have been fully paid and its claims satisfied or discharged by \_\_\_\_\_ (Designation & Address of contract signing authority) on behalf of the DFCCIL, certify that the terms and conditions of the said

Signature & Stamp of Tenderer

For & on behalf of DFCCIL



- agreement have been fully and properly carried out by the said contractor (s) and accordingly discharges this guarantee.
5. (a) Notwithstanding anything to the contrary contained herein the liability of the bank under this guarantee will remain in force and effect until such time as this guarantee is discharged in writing by the DFCCIL or until (date of validity/extended validity) whichever is earlier and no claim shall be valid under this guarantee unless notice in writing thereof is given by the DFCCIL within validity / extended period of validity of guarantee from the date aforesaid.
- (b) Provided always that we \_\_\_\_\_ (indicate the name of the Bank) unconditionally undertakes to renew this guarantee to extend the period of guarantee form year to year before the expiry of the period or the extended period of the guarantee, as the case may be on being called upon to do so by the DFCCIL. If the guarantee is not renewed or the period extended on demand, we \_\_\_\_\_ (indicate the name of the Bank) shall pay the DFCCIL the full amount guarantee on demand and without demur.
6. We, \_\_\_\_\_ (indicate the name of Bank) further agree with the DFCCIL that the DFCCIL shall have the fullest liberty without our consent and without effecting in any manner out of obligations hereunder to vary any of the terms and conditions of the said contract from time to time or to postpone for any time or from time to time any to the powers exercisable by the DFCCIL against the said contractor (s) and to forbear or enforce any of the terms and conditions of the said agreement and we shall not be relieved from our liability by reason of any such variation, or extension being granted to the said contractor (s) or for any bearance act or omission on the part of the DFCCIL or any indulgence by the DFCCIL to the said contractor (s) or by any such matter or thing whatsoever which under the law relating to sureties for the said reservation would relive us from the liability.
7. This guarantee will not be discharged by any change in the constitution of the Bank or the Contractor (s).
8. We, \_\_\_\_\_ (indicate the name of the Bank) lastly undertake not to revoke this guarantee except with the previous consent of the DFCCIL in writing.
9. This guarantee shall be valid up to \_\_\_\_\_ (Date of completion plus 60 days beyond that). Unless extended on demand by DFCCIL. Notwithstanding anything to the contrary contained herein before, our liability under this guarantee is restricted to Rs. \_\_\_\_\_ (Rs. \_\_\_\_\_ only) unless a demand under this guarantee is made on us in writing on or before \_\_\_\_\_ we, \_\_\_\_\_ shall be discharged from our liabilities under this guarantee thereafter.

Dated \_\_\_\_\_ the day of \_\_\_\_\_ for \_\_\_\_\_ (indicate the name of bank)

Signature of Bank Authorized official]  
(Name):  
Designation:  
Full Address:

Witness:

1. \_\_\_\_\_

2. \_\_\_\_\_

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

**FORM No. - 7**

**SAMPLE**

**STANDING INDEMNITY BOND FOR “ON ACCOUNT” PAYMENTS**

**(On paper of requisite stamp value)**

We, M/s \_\_\_\_\_ hereby undertake that we hold at our stores Depot/s at \_\_\_\_\_ for and on behalf of the Managing Director/DFCCIL acting in the premises through Chief Project Manager/South/Mumbai/DFCCIL or his successor (hereinafter referred to as “The Employer”) all works for which “On Account” payments have been made to us against the Contract for “Supply of towers & line materials and erection, testing & commissioning work for diversion of two numbers of 220 KV double circuit transmission lines (owned by R-Infra), to facilitate the passage of rail track being constructed by the Dedicated Freight Corridor Corporation of India Limited (DFCCIL) at four different crossing locations near Village Aagvan (Dahanu Taluka); near Village Shirgaon (Vasai Taluka); near Village Bilalpada (Vasai Taluka) & near Village Gokhivare (Vasai Taluka) in Maharashtra” vide letter of Acceptance of Tender \_\_\_\_\_ dated \_\_\_\_\_ and material handed over to us by the DFCCIL for the purpose of execution of the said contract, untill such time the materials are duly erected or otherwise handed over to him.

We shall be entirely responsible for the safe custody and protection of the said materials against all risk till they are duly delivered as erected equipment to the DFCCIL or as he may direct otherwise and shall indemnify the DFCCIL against any loss / damage or deterioration whatsoever in respect of the said material while in our possession and against disposal of surplus materials. The said materials shall at all times be open to inspection by any officer authorized by the Chief Project Manager/South/Mumbai/DFCCIL (Whose address will be intimated in due course).

Should any loss, damage or deterioration of materials occur or surplus material disposed-off and refund becomes due, the DFCCIL shall be entitled to recover from us the entire cost of supply portion of “Schedule of Prices & Total Prices” (Form No.- 4) to the Contract (as applicable) and in respect of other material as indicated in contract and also compensation for such loss or damage if any along with the amount to be refunded without prejudice to any other remedies available to him by deduction from any sum due or any sum which at any time hereafter becomes due to us under the said or any other Contract.

**Dated this \_\_\_\_ day of \_\_\_\_\_ 2017**

**For and on behalf of**

**M/s \_\_\_\_\_ (Contractor)**

**Signature of witness:** \_\_\_\_\_

**Name of witness in Block letter:** \_\_\_\_\_

**Address:** \_\_\_\_\_

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

**FORM No. - 8**

**ECS / NEFT / RTGS**  
**MANDATE FORM**

Date: \_\_\_\_

To,

Dy. CPM/Finance/South  
DFCCIL, Mumbai-01.

**Sub: ECS / NEFT / RTGS payments.**

We refer to the ECS / NEFT / RTGS set up by DFCCIL for remittance of our payments using RBI's NEFT / RTGS scheme, our payments may be made through the above scheme to our under noted account.

Name of Bank	
Name of City	
Bank Code No.	
Name of Bank Branch	
Branch Code No.	
Address of Bank Branch	
Telephone Number of Bank Branch	
Fax No. of Bank Branch	
Name of Customer / Tenderer as per account	
Account Number of Tenderer appearing on cheque book	
Type of Account (Current / Cash credit)	
IFSC code for NEFT/RTGS	
9-Digit-code number of the bank and branch appearing on the MICR cheque issued by the bank	
Details of Cancelled Cheque leaf	
Telephone No. of tenderer	
Cell Phone Number of the tenderer to whom details with regard to the status of bill submitted to Accounts Office can be intimated through SMS	
Tenderer's E - mail ID	

Confirmed by Bank signature of tenderer.

With stamp and address

Enclose a copy of crossed cheque

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

**FORM No. - 9**

**DRAFT MEMORANDUM OF UNDERSTANDING (MOU) For**  
**JOINT VENTURE PARTICIPATION BETWEEN**

M/s ..... having its registered office at ..... (Hereinafter referred to as ..... ) acting as the Lead Partner of the first part,  
and  
M/s .....having its registered office at ..... (Hereinafter referred to as ‘.....’) in the capacity of a Joint Partner of the other part.  
and  
M/s .....having its registered office at ..... (Hereinafter referred to as ‘.....’) in the capacity of a Joint Partner of the other part.

The expressions of ..... and ..... shall wherever the context admits, mean and include their respective legal representatives, successors-in-interest and assigns and shall collectively be referred to as “the Parties” and individually as “ the Party”

**WHEREAS:**

Dedicated Freight Corridor Corporation of India Limited (DFCCIL) [hereinafter referred to as “Client”] has invited bids for “Supply of towers & line materials and erection, testing & commissioning work for diversion of two numbers of 220 KV double circuit transmission lines (owned by R-Infra), to facilitate the passage of rail track being constructed by the Dedicated Freight Corridor Corporation of India Limited (DFCCIL) at four different crossing locations near Village Aagvan (Dahanu Taluka); near Village Shirgaon (Vasai Taluka); near Village Bilalpada (Vasai Taluka) & near Village Gokhivare (Vasai Taluka) in Maharashtra”

**NOW, THEREFORE, THE PARTIES AGREE AS FOLLOWS:**

1. The following documents shall be deemed to form and be read and construed as an integral part of this MOU.
  - (i) Notice for Bid, and
  - (ii) Bidding document
  - (iii) Any Addendum/Corrigendum issued by Dedicated Freight Corridor Corporation of India Limited
  - (iv) The bid submitted on our behalf jointly by the Lead Partner.
2. The ‘Parties’ have studied the documents and have agreed to participate in submitting a ‘bid’ jointly.
3. M/s .....shall be the lead member of the JV for all intents and purpose and shall represent the Joint Venture in its dealing with the Client. For the purpose of submission of bid proposals, the parties agree to nominate ..... as the leader duly authorized to sign and submit all documents and subsequent clarifications, if any, to the Client. However M/s ..... shall not submit any such proposals, clarifications or commitments before securing the written clearance of the other partner which shall be expeditiously given by M/s.....to M/s.....
4. The ‘Parties’ have resolved that the distribution of responsibilities and their proportionate share in the Joint Venture is as under:
  - (a) Lead Partner;
    - (i) .....
    - (ii) .....
    - (iii) .....
  - (b) Joint Venture Partner

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

- (i) .....
- (ii) .....
- (iii) .....

[Similar details to be given for each partner]

## **5. JOINT AND SEVERAL RESPONSIBILITY**

The Parties undertake that they shall be jointly and severally liable to the Client in the discharge of all the obligations and liabilities as per the contract with the Client and for the performance of contract awarded to their JV.

## **6. ASSIGNMENT AND THIRD PARTIES**

The parties shall co-operate throughout the entire period of this MOU on the basis of exclusivity and neither of the Parties shall make arrangement or enter into agreement either directly or indirectly with any other party or group of parties on matters relating to the Project except with prior written consent of the other party.

## **7. EXECUTIVE AUTHORITY**

The said Joint Venture through its authorized representative shall receive instructions, payments from the Client. The management structure for the project shall be prepared by mutual consultations to enable completion of project to quality requirements within permitted cost and time.

## **8. BID SECURITIES**

Till the award of the work, JV firm/Lead Partner of JV firm shall furnish Bid Security to the Client on behalf of the joint venture which shall be legally binding on all the members of the Joint Venture.

## **9. BID SUBMISSION**

Each Party shall bear its own cost and expenses for preparation and submission of the bid and all costs until conclusion of a contract with the Client for the Project. Common expenses shall be shared by all the parties in the ratio of their actual participation.

## **10. INDEMNITY**

Each party hereto agrees to indemnify the other party against its respective parts in case of breach/default of the respective party of the contract works of any liabilities sustained by the Joint Venture.

- 11.** For the execution of the respective portions of works, the parties shall make their own arrangements to bring the required finance, plants and equipment, materials, manpower and other resources.

## **12. DOCUMENTS & CONFIDENTIALITY**

Each Party shall maintain in confidence and not use for any purpose related to the Project all commercial and technical information received or generated in the course of preparation and submission of the bid.

### 13. ARBITRATION

Any dispute, controversy or claim arising out of or relating to this agreement shall be settled in the first instance amicably between the parties. If an amicable settlement cannot be reached as above, it will be settled by arbitration in accordance with the Indian Arbitration and Conciliation Act 1996 or any amendments thereof. The venue of the arbitration shall be Mumbai.

### 14. VALIDITY

This MOU shall remain in force till the occurrence of the earliest to occur of the following, unless by mutual consent, the Parties agree in writing to extend the validity for a further period.

- a. The bid submitted by the Joint Venture is declared unsuccessful, or
- b. Cancellation/ shelving of the Project by the client for any reasons prior to award of work
- c. Execution of detailed JV agreement by the parties, setting out detailed terms after award of work by the Client.

15. This MOU is drawn in ..... number of copies with equal legal strength and status. One copy is held by M/s ..... and the other by M/s.....& .....M/s ..... and a copy submitted with the proposal.

16. This MOU shall be construed under the laws of India.

### 17. NOTICES

Notices shall be given in writing by fax confirmed by registered mail or commercial courier to the following fax numbers and addresses:

Lead Partner

.....  
(Name & Address)

Other Partner(s)

.....  
(Name & Address)

IN WITNESS WHEREOF THE PARTIES, have executed this MOU the day, month and year first before written

M/s.....  
.....  
(Seal)

M/s.....  
.....  
(Seal)

Witness

1..... (Name & Address)

2..... (Name & Address)

**Notes:** (1) In case of existing joint venture, the certified copy of JV Agreement may be furnished.

**DRAFT FORMAT OF JOINT VENTURE AGREEMENT**

**[To be executed on non-judicial stamp paper of appropriate value in accordance with relevant Stamp Act and to be registered with appropriate authority under Registration Act.]**

The JV agreement shall be structured generally as per contents list given below:

**A. CONDITIONS AND TERMS OF JV AGREEMENT**

- 1) Definitions and Interpretation
- 2) Joint Venture – Include Equity of members, transferability of shareholding of equity of a partner leaving during the subsistence of the contract.
- 3) Proposal Submission
- 4) Performance – To indicate scope of responsibility of each member
- 5) Language and Law
- 6) Exclusively
- 7) Executive Authority
- 8) Documents
- 9) Personnel
- 10) Assignment and Third Parties
- 11) Severability
- 12) Member in Default
- 13) Duration of the Agreement
- 14) Liability and sharing of risks
- 15) Insurance
- 16) Sharing of Promotion and Project Costs, Profits, Losses and Remuneration
- 17) Financial Administration and Accounting
- 18) Guarantees and Bonds
- 19) Arbitration
- 20) Notices
- 21) Sole Agreement and Variation

**B. SCHEDULES**

1. Project and Agreement Particulars
2. Financial Administration Services
3. Allocation of the obligations
4. Financial Policy and Remuneration

\*\*\*\*\*



**FORM No. - 11**

**PRO-FORMA LETTER OF PARTICIPATION FROM EACH PARTNER OF JOINT VENTURE (JV)**

(To be executed on non-judicial stamp paper of appropriate value in accordance with relevant Stamp Act and to be registered with appropriate authority under Registration Act.)

No.....

Dated.....

From:

.....  
.....

To

**The Chief Project Manager (South),  
DFCCIL,  
7<sup>th</sup> floor, Central Railway New Admin Building, D. N. Road,  
Mumbai-400001.**

Gentlemen,

Re: ...“[Insert name of work].....”

Ref: Your notice for Invitation for Bid No. \_\_\_\_\_ dated .....

1. We wish to confirm that our company/firm has formed a Joint Venture with (i)..... & ii)..... for the purposes associated with IFB referred to above.

(Members who are not the lead partner of the JV should add the following paragraph)\*.

2. ‘The JV is led by ... whom we hereby authorize to act on our behalf for the purposes of submission of Bid for ..... and authorize to incur liabilities and receive instructions for and on behalf of any and all the partners or constituents of the Joint Venture.’

OR

(Member(s) being the lead member of the group should add the following paragraph)\*

2. ‘In this group we act as leader and, for the purposes of applying for Bid, represent the Joint Venture:
3. In the event of our JV being awarded the contract, we agree to be jointly with i) & ii) ..... (names of other members of our JV) and severally liable to the Dedicated Freight Corridor Corporation of India Limited, its successors and assigns for all obligations, duties and responsibilities arising from or imposed by the contract subsequently entered into between Dedicated Freight Corridor Corporation of India Limited and our JV.

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

4. **\*I/We, further agree that entire execution of the contract shall be carried out exclusively through the lead partner.**

Yours faithfully,

(Signature)

(Name of Signatory).....

(Capacity of Signatory).....

Company Seal

\* Delete as applicable

Note: In case of existing joint venture, the certified copy of JV Agreement may be furnished.

**FORM No. - 12**

**FORMAT FOR POWER OF ATTORNEY FOR AUTHORISED SIGNATORY OF  
JOINT VENTURE (JV) PARTNERS**

**POWER OF ATTORNEY\***

**(To be executed on non-judicial stamp paper of the appropriate value in accordance with relevant stamp act. The stamp paper to be in the name of the company who is issuing the power of Attorney)**

Know all men by these presents, we .....do hereby constitute, appoint and authorize Mr. /Ms. .... who is presently employed with us and holding the position of .....as our attorney, to do in our name and on our behalf, all such acts, deeds and things necessary in connection with or incidental to our bid for the work of Including signing and submission of all documents and providing information / responses to Dedicated Freight Corridor Corporation of India Limited, representing us in all matters, dealing with Dedicated Freight Corridor Corporation of India Limited in all matters in connection with our bid for the said project.

We hereby agree to ratify all acts, deeds and things lawfully done by our said attorney pursuant to this Power of Attorney and that all acts, deeds and things done by our aforesaid attorney shall and shall always be deemed to have been done by us.

Dated this ..... day of ..... 2017.

**(Signature of authorized Signatory)**

**Signature of Lead Partner**

**Signature of JV Partner(s)**

.....

.....

**(Signature and Name in Block letters of Signatory)  
Seal of Company**

**Witness**

**Witness 1:**

Name:

Address:

Occupation:

**Witness 1:**

Name:

Address:

Occupation:

**\*Notes:**

- i) To be executed by all the partners jointly, in case of a Joint Venture.

**FORM No. - 13**

**FORMAT FOR POWER OF ATTORNEY TO LEAD PARTNER OF JOINT VENTURE  
(JV)**

**(To be executed on non-judicial stamp paper of the appropriate value in accordance with relevant stamp Act. The stamp paper to be in the name of the company who is issuing the power of Attorney)**

**POWER OF ATTORNEY\***

Whereas Dedicated Freight Corridor Corporation of India Limited has invited Bids for the work of “Supply of towers & line materials and erection, testing & commissioning work for diversion of two numbers of 220 KV double circuit transmission lines (owned by R-Infra), to facilitate the passage of rail track being constructed by the Dedicated Freight Corridor Corporation of India Limited (DFCCIL) at four different crossing locations near Village Aagvan (Dahanu Taluka); near Village Shirgaon (Vasai Taluka); near Village Bilalpada (Vasai Taluka) & near Village Gokhivare (Vasai Taluka) in Maharashtra”

Whereas, the members of the Joint Venture comprising of M/s. ..., M/s. ..., M/s....., and M/s. .... are interested in submission of bid for the work of ... [Insert name of work]... in accordance with the terms and conditions contained in the bidding documents.

Whereas, it is necessary for the members of the Joint Venture to designate one of them as the Lead Partner, 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 project, as may be necessary in connection the Joint Venture's bid for the project.

**NOW THIS POWER OF ATTORNEY WITNESSETH THAT;**

We, M/s. ...., hereby designate M/s. ...., being one of the partners of the Joint Venture, as the lead partner of the Joint Venture, to do on behalf of the Joint Venture, all or any of the acts, deeds or things necessary or incidental to the Joint Venture's bid for the contract, including submission of bid, participating in conferences, responding to queries, submission of information/ documents and generally to represent the Joint Venture in all its dealings with the DFCCIL or any other Government Agency or any person, in connection with the Bid/contract for the said work until culmination of the process of bidding till the contract agreement if successful, is entered into with the Dedicated Freight Corridor Corporation of India Limited and thereafter till the expiry of the contract agreement.

\*To be executed by all the members of the JV, except the lead member.

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.

We hereby agree to ratify all acts, deeds and things lawfully done by lead member, our said attorney, pursuant to this power of attorney and that all acts deeds and things done by our aforesaid attorney shall and shall always be deemed to have been done by us/ Joint Venture.

Dated this the ..... Day of ..... 2017

.....  
(Signature)

.....  
(Name in Block letters of Executants)  
Seal of Company

**Witness**

**Witness 1:**

Name:

Address:

Occupation:

**Witness 2:**

Name:

Address:

Occupation:

**FORM No. -14**

Registered Acknowledgement Due

**PRO-FORMA FOR TIME EXTENSION**

**No.** \_\_\_\_\_

**Dated:** \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

**Sub:** (i) \_\_\_\_\_ (name of work).  
(ii) Acceptance letter no. \_\_\_\_\_  
(iii) Understanding/Agreement no. \_\_\_\_\_

**Ref:** \_\_\_\_\_ (Quote specific application of Contractor  
for extension to the date received) \_\_\_\_\_

**Dear Sir,**

1. The stipulated date for completion of the work mentioned above is \_\_\_\_\_. From the progress made so far and the present rate of progress, it is unlikely that the work will be completed by the above date (or 'However, the work was not completed on this date').
2. Expecting that you may be able to complete the work, if some more time is given, the competent authority, although not bound to do so, hereby extends the time for completion from \_\_\_\_\_ to \_\_\_\_\_.
3. Please note that an amount equal to the liquidated damages for delay in the completion of the work after the expiry of \_\_\_\_\_ (*give here the stipulated date for completion with/without any penalty fixed earlier*) will be recovered from you as mentioned in Clause, 17-B of the Standard General Conditions of Contract for the extended period, notwithstanding the grant of this extension. You may proceed with the work accordingly.
4. The above extension of the completion date will also be subject to the further condition that no increase in rates on any account will be payable to you.
5. Please intimate within a week of the receipt of this letter your acceptance of the extension of the conditions stated above.
6. Please note that in the event of your declining to accept the extension on the above said conditions or in the event of your failure after accepting or acting upto this extension to complete the work by \_\_\_\_\_ (here mention the extended date), further action will be taken in terms of Clause 62 of the Standard General Conditions of Contract.

Yours faithfully

For and on behalf of the Employer  
Name of the Official:-  
Stamp/Seal of the Employer

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

**FORM No. - 15**

**CERTIFICATE OF FITNESS**

1. (a) Serial Number \_\_\_\_\_  
(b) Date \_\_\_\_\_
2. Name of person examined \_\_\_\_\_  
I certify that I have personally examined (name) \_\_\_\_\_
3. Father's Name: son/daughter of \_\_\_\_\_, residing at \_\_\_\_\_
4. Sex \_\_\_\_\_
5. Residence: \_\_\_\_\_
6. Date of birth, if available, and/or certified age \_\_\_\_\_
7. Physical fitness \_\_\_\_\_
8. Identification marks \_\_\_\_\_  
\_\_\_\_\_
9. Reasons for:  
(a) Refusal to grant certificate, or \_\_\_\_\_  
(b) Revoking the Certificate \_\_\_\_\_

Who is desirous of being employed in a factory or on a work requiring manual labour and that his / her age as nearly as can be ascertained from my examination, is \_\_\_\_\_ years and that he/she is fit for employment in a factory or on a work requiring manual labour as an adult/child.

\_\_\_\_\_  
Signature or Left Hand  
Thumb Impression of the  
Person Examined

\_\_\_\_\_  
Signature of Certifying Surgeon

**Note:** In case of physical disability, the exact details of the cause of the physical disability should be clearly stated



**FORM No. - 16**

Registered Acknowledgement Due

**PRO-FORMA OF 7 DAYS NOTICE**  
**DFCCIL**  
**(Without Prejudice)**

To  
M/s \_\_\_\_\_  
\_\_\_\_\_

Dear Sir,

Contract Agreement No. \_\_\_\_\_  
In connection with \_\_\_\_\_

1. In spite of repeated instructions to you by the subordinate offices as well as by this office in various letters of even no. \_\_\_\_\_, dated \_\_\_\_\_; you have failed to start work/show adequate progress and/or submit detailed program for completing the work.
2. Your attention is invited to this office/Chief Engineer's office letter no. \_\_\_\_\_, dated \_\_\_\_\_ in reference to your representation, dated \_\_\_\_\_.
3. As you have failed to abide by the instructions issued to commence the work/to show adequate progress of work you are hereby given 7 days' notice in accordance with Clause 62 of Standard General Conditions of Contract to commence works / to make good the progress, failing which further action as provided in Clause 62 of the Standard General Conditions of Contract viz. to terminate your Contract and complete the balance work without your participation will be taken.

Kindly acknowledge receipt.

Yours faithfully

For and on behalf of the Employer  
Name of the Official:-  
Stamp/Seal of the Employer

**FORM No. - 17**

Registered Acknowledgement Due

**PRO-FORMA OF 48 HRS NOTICE**  
**DFCCIL**  
**(Without Prejudice)**

**To**

**M/s** \_\_\_\_\_  
\_\_\_\_\_

**Dear Sir,**

Contract Agreement No. \_\_\_\_\_

In connection with \_\_\_\_\_

1. Seven days' notice under Clause 62 of Standard General Conditions of Contract was given to you under this office letter of even no., dated \_\_\_\_\_; but you have taken no action to commence the work/show adequate progress of the work.
2. You are hereby given 48 hours' notice in terms of Clause 62 of Standard General Conditions of Contract to commence works / to make good the progress of works, failing which and on expiry of this period your above contract will stand rescinded and the work under this contract will be carried out independently without your participation and your Security Deposit shall be forfeited and Performance Guarantee shall also be encashed and consequences which may please be noted.

Kindly acknowledge receipt.

Yours faithfully

For and on behalf of the Employer  
Name of the Official:-  
Stamp/Seal of the Employer

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

**FORM No. - 18**

Registered Acknowledgement Due

**PRO-FORMA OF TERMINATION NOTICE**  
**DFCCIL**  
**(Without Prejudice)**

No. \_\_\_\_\_ Dated \_\_\_\_\_

To  
M/s \_\_\_\_\_  
\_\_\_\_\_

Dear Sir,

Contract Agreement No. \_\_\_\_\_  
In connection with \_\_\_\_\_

Forty eight hours (48 hrs.) notice was given to you under this office letter of even no.,  
dated \_\_\_\_\_; but you have taken no action to commence the work/show adequate  
progress of the work.

Since the period of 48 hours' notice has already expired, the above contract stands rescinded in  
terms of Clause 62 of Standard General Conditions of Contract and the balance work under this  
contract will be carried out independently without your participation. Your participation as well  
as participation of every member/partner in any manner as an individual or a partnership  
firm/JV is hereby debarred from participation in the tender for executing the balance work and  
your Security Deposit shall be forfeited and Performance Guarantee shall also be encashed.

Kindly acknowledge receipt.

Yours faithfully

For and on behalf of the Employer  
Name of the Official:-  
Stamp/Seal of the Employer

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

**SAMPLE**

**FORMAT OF BANK GUARANTEE FOR MOBILIZATION ADVANCE**

**(Clause 1.5.46 of Chapter – V (B) of Part - I)**

Bank guarantee made on this ..... Between .....  
(Hereinafter called “the Bank”) of the One Part and Dedicated Freight Corridor Corporation of India Limited. (Hereinafter called “the Employer”) of the other Part.

WHEREAS Dedicated Freight Corridor Corporation of India Limited has awarded the Contract no..... for “.....” (Hereinafter called “the Contractor”), having its registered office at .....

AND WHEREAS vide Clause 1.5.46 of Chapter – V (B) of Part - I, Special Conditions of Contract, Mobilization Advance up to \_\_\_\_% (\_\_\_\_ percent) of the original contract value of Rs..... is payable to the contractor against Bank Guarantees, the contractor hereby applies for Mobilization Advance of \_\_\_\_% (\_\_\_\_ percent) amounting to Rs...../- (Rupees.....) of the Contract Price,

Now, we the undersigned, Bank of ....., being fully authorized to sign and to incur obligations for and on behalf of and in the name of Bank of .....hereby declare that the said Bank will guarantee the Employer the full amount of Rs...../- (Rupees.....) as stated above.

We, Bank of ....., do hereby unconditionally, irrevocably and without demur guarantee and undertake to pay the Employer immediately on demand any or all money payable by the contractor to the extent of Rs. ....-(Rupees.....) without any demur, reservation, context, 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 on 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 is valid till .....

At any time during the period in which this guarantee still valid of the contractor fails to fulfill its obligation under the Contract, it is understood that the Bank will extend this guarantee under the same condition for the required time on demand by the Employer at the cost of the contractor.

The Guarantee hereinbefore contained shall not be affected by any change in the constitution of the Bank or of the contractor.

The neglect or forbearance of the Employer in enforcement of payment of any money, the payment whereof is intended to be hereby secured or the giving of time by the Employer for the payment hereof shall in no way relieve the Bank of their liability under this Deed.

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

The expressions “the Employer”, “the Bank” and “the contractor” hereinbefore used shall include their respective successors and assigns.

Notwithstanding anything contained herein:

Our liability under this Bank Guarantee shall not exceed Rs..... /-  
(Rupees.....)

This bank Guarantee shall be valid up to.....

We are liable to pay the guaranteed amount or any part thereof under this Bank Guarantee only and only if you serve upon us a written claim or demand on or before .....(date of expiry of Guarantee).

In witness whereof we of the Bank have signed and sealed this Guarantee on the .....day of ..... being herewith duly authorized.

For and on behalf of the Bank of.....

Signature of Authorized Bank Official

Name .....

Designation .....

Stamp/Seal of the bank .....

Signed, sealed and delivered for and on Behalf of the bank by the above named .....  
in the presence of

Witness 1

Signature .....

Name .....

Address .....

Witness 2

Signature .....

Name .....

Address .....

**PART-IV**

**FIELD QUALITY & ASSURANCE PLAN**

**(FQAP)**

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

## **PART-IV**

### **FIELD QUALITY AND ASSURANCE PLAN (FQAP)**

#### 4.1 **Civil:-**

Indicative formats for FQAP are given below. Contractor will submit FQAP based on these indicative formats for approval of Engineer/DFCCIL. Execution of work will be done as per the approved FQAP.

##### 4.1.1 **Checklist Excavation:-**

**FORMAT NO.:** DFCC/R-INFRA/TLC/1/01

OHSAS Requirement	Ensure safety shoes, safety helmet, safety belt, Hand gloves & Mask are appropriately used before starting of work.
-------------------	---

Contractor:		Report Serial No:	
Project:		Date:	
Area/Location:			

Formats to be filled up for every 25m<sup>3</sup>/Per Day/ Location Wise work

Location:					Date:			
Sr. No.	Description	Yes	No	N. A.	Approved By			Remarks
					Contractor	DFCC/ TPEC	R- Infra	
<b>A.</b>	<b>General</b>							
1.	Is layout & Bench marking done (As per Approved Drawing).							
2.	Are existing structures and utilities adequately protected.							
3.	Is removed material properly stacked.							
4.	Proper dewatering arrangement done.							
<b>B.</b>	<b>Excavation of Trenching/ Foundation</b>							
1.	Placing And Compacting Fill							
(i)	All tower grounding installed and verified as per drawing.							
(ii)	Verify that the approved fill material is used (in WO).							
(iii)	Is fill being placed in level, layers within thickness limits (As per drawing).							
2.	Bedding And Backfill Of Tower Foundations							
(i)	Approved (by site in charge, Work Order) bedding and backfill material is used.							
(ii)	Is bedding fully compacted to support pipe or utility at line, grade, and slope required and verified by site in charge.							

Site Engineer  
(Contractor)  
Signature & Stamp of Tenderer

Site Engineer  
(DFCC/TPEC)

Site Engineer  
(R-infra)  
For & on behalf of DFCCIL



#### 4.1.2 Checklist for Reinforcement:-

**FORMAT NO.:** DFCC/R-INFRA/TLC/1/02

OHSAS Requirement	Ensure safety shoes, safety helmet, safety belt, Hand gloves & Mask are appropriately used before starting of work.
-------------------	---

Contractor:		Report Serial No :	
Project:		Date:	
Area/Location:			

Formats to be filled up for every floor/or location wise.

Location:				Date:				
Sr. No.	Description	Yes	No	N. A.	Approved By			Remarks
					Contractor	DFCC/ TPEC	R- Infra	
1.	Latest drawing issued by engineering checked.							
2.	Bar bending schedules checked as per BBS issued by Engineering.							
3.	Reinforcing steel material approved (As per WO).							
4.	Corrosion treatment of bars as per WO.							
5.	Bar sizes correct.							
6.	Bar spacing correct.							
7.	Bar lap lengths correct.							
8.	Bar lap at correct location.							
9.	Coupler is approved.							
10.	Torque is correct & checked.							
11.	Torque wrench is calibrated.							
12.	All Bend, hooks & development length are as per shop drawing / IS code.							
13.	Bar assembly rigid and adequately supported, & will not move or be dislodged during concrete placement (including spacers/chair supports). Binding wire specification—thickness and strength reviewed.							
14.	Cover to bottom bars correct (as per Approved Drawing).							
15.	Cover to side bars correct (as per Approved Drawing).							
16.	Cover to top bars correct (as per Approved Drawing).							
17.	Cover blocks as per work order specifications.							

Site Engineer  
(Contractor)

Site Engineer  
(DFCC/TPEC)

Site Engineer  
(R-infra)

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

4.1.3 Checklist for P.C.C:-

**FORMAT NO.:** DFCC/R-INFRA/TLC/1/03

OHSAS Requirement	Ensure safety shoes, safety helmet, safety belt, Hand gloves & Mask are appropriately used before starting of work.
-------------------	---

Formats to be filled up for every 10m<sup>3</sup> / or location wise

Contractor:		Report Serial No :	
Project:		Date:	
Area/Location:			

Checklist for P.C.C:-

Location:		Date:				
Sr. No.	Activity	Observation	Approved By			Remarks
			Contractor	DFCC/TPEC	R- Infra	
1.	(A) Mix Proportion	Ok / Not Ok				
	(B) Shuttering	Ok / Not Ok				
2.	(A) Material	Ok / Not Ok				
	(B) Dimensions	Ok / Not Ok				
3.	Thickness of P.C.C.					
4.	Compaction					
5.	Curing (Curing time should be minimum 10 days as per clause no. 2.8.7.15 of Chapter-VIII, Part-II)					
	(A) Start Date					
	(B) End Date					

Site Engineer  
(Contractor)

Site Engineer  
(DFCC/TPEC)

Site Engineer  
(R-infra)

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

#### 4.1.4 Checklist for Pre-Concreting:-

**FORMAT NO.:** DFCC/R-INFRA/TLC/1/04

OHSAS Requirement	Ensure safety shoes, safety helmet, safety belt, Hand gloves & Mask are appropriately used before starting of work.
-------------------	---

Formats to be filled up location wise

Contractor:		Report Serial No :	
Project:		Date:	
Area/Location:			

Location:				Date:				
Sr. No.	Description	Yes	No	N. A.	Approved By			Remarks
					Contractor	DFCC/TPEC	R- Infra	
1	Conc. Process is approved (RMC/Site mix)							
2	Water, sand, coarse aggregate, admixture, cement admixture approved.(mix design)							
3	Water, sand, coarse aggregate, admixture, cement stock sufficient.—Site Mix							
4	Form-work checked							
5	Reinforcement checked							
6	Concrete equipment in working order (Crane, vibrators etc.) Crane fitness certificate/Vibrator size ok							
7	Standby vibrators present							
8	Concrete gang present, including carpenter, steel mechanics and electricians— Availability of carpenter/Fitter/Electrician							
9	Access provided							
10	Ensure visibility with Lighting arrangements							
11	Communications between various points provided							
12	Arrangements for arranging suspension/stoppage of concrete provided							
13	Curing arrangement made							

Site Engineer  
(Contractor)

Site Engineer  
(DFCC/TPEC)

Site Engineer  
(R-infra)

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

#### 4.1.5 Checklist for Post-Concreting:-

**FORMAT NO.:** DFCC/R-INFRA/TLC/1/05

OHSAS Requirement	Ensure safety shoes, safety helmet, safety belt, Hand gloves & Mask are appropriately used before starting of work.
-------------------	---

Contractor:		Report Serial No :	
Project:		Date:	
Area/Location:			

Formats to be filled up for every pour.

Location:							
Date of pour:							
Sr. No.	Observation	S or NS (S= Satisfactory, NS = (Not Satisfactory))	Status	Approved By			Remarks
				Contractor	DFCC/ TPEC	R-Infra	
1.	Position/ Dimensions of the member;						
(A)	Alignment	S or NS					
(B)	Levels	S or NS					
(C)	Dimensions	S or NS					
2.	Surface Defects (honey combing/ sand streaks/ air bubbles/cold joints)		Type & extent of defect shall be noted.				
(A)	No defects	Yes / No					
(B)	Any other Defect	Yes / No	If yes, consult with Engineering/ Consultant along with sketches & photographs.				
3.	Class of Finish	S or NS					
4.	No Cracks/Nature of cracks	Yes / No	Date of first observed.				
5.	In case of liquid storage tank, verify the leakage test results.	S or NS	Refer test report.				

**Note:** Post concreting inspection shall be carried at various stages such as after stripping of side shuttering, each stage of pressurizing, decentering and/or as per designers stipulation.

Site Engineer  
(Contractor)

Site Engineer  
(DFCC/TPEC)

Site Engineer  
(R-infra)

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

#### 4.1.6 Checklist for Format for Cement Receipt & Test Frequency Record:-

**FORMAT NO.:** DFCC/R-INFRA/TLC/1/06

OHSAS Requirement	Ensure safety shoes, safety helmet, safety belt, Hand gloves & Mask are appropriately used before starting of work.
-------------------	---

Contractor:		Report Serial No.:	
Project:		Date:	
Area/Location:			

[illegible]

Name of Activity \_\_\_\_\_ Location of Store \_\_\_\_\_

Name of Contractor \_\_\_\_\_ Source of Supply \_\_\_\_\_

Date .....

**Note:**

- (1) Lab Test Report shall be available for every 50 MT/ lot or part thereof.
- (2) Cement should always be consumed as per FIFO (First In First Out) Rule.

Manufacturing test certificate to be available for every lot.

Lab test to be done for every 50MT or part thereof or change of manufacturer.

Site Engineer  
(Contractor)

Site Engineer  
(DFCC/TPEC)

Site Engineer  
(R-infra)

Signature &amp; Stamp of Tenderer

For &amp; on behalf of DFCCIL

#### 4.1.7 Checklist for Test Report of Cement Lab Test:-

**FORMAT NO.:** DFCC/R-INFRA/TLC/1/07

OHSAS Requirement	Ensure safety shoes, safety helmet, safety belt, Hand gloves & Mask are appropriately used before starting of work.
-------------------	---

Contractor:		Report Serial No.:	
Project:		Date:	
Area/Location:			

Name of Activity: \_\_\_\_\_

Source of Supply: \_\_\_\_\_

Name of Erection Agency: \_\_\_\_\_

Sample Identification Mark: \_\_\_\_\_

Test Report Ref. No.: \_\_\_\_\_

Date: \_\_\_\_\_

Sr. No.	Particulars	Required as per			Lab Test Results	Approved By			Remarks
		IS: 8112, 43 Grade OPC	IS: 12269, 53 Grade OPC	IS: 1489, I & II fly Ash or Clay based.		Contractor	DFCC/ TPEC	R-Infra	
(A)	<b>Chemical Properties</b>								
1.	Cao-0.7 SO3		0.66 to 1.02	0.8 to 1.02					
2.	2.8 SiO <sub>2</sub> + 1.2 Al <sub>2</sub> O <sub>3</sub> + 0.65 Fe <sub>2</sub> O <sub>3</sub>								
3.	2 O <sub>3</sub> % Fe <sub>2</sub> O <sub>3</sub>		0.66 MIN.	0.66 MIN.					
4.	Insoluble Residue (% by mass)		3.0 MAX.	3.0 MAX.					
5.	Magnesia (% by mass)		6.0 MAX.	6.0 MAX.					
6.	Sulphuric Anhydrite (% by mass)		3.0 MAX.	3.0 MAX.					
7.	Total loss of ignition (%)		5.0 MAX.	5.0 MAX.					
8.	Chloride (%)		0.05 MAX.	0.05 MAX.					
(B)	<b>Physical Properties</b>								
1.	Colour	Uniform & Greyish							
2.	Type/Grade	OPC/43/53							
3.	Fineness Test	Should feel silky smooth after rubbing.							
4.	Floating Test	It should sink and not float.							
5.	Adulteration	No change in colour after heating test.							
6.	Strength	(i) Difficult to convert in power form. (ii) No Crack.							

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

7.	Lump Test	No Lumps							
8.	Average Weight	50 Kg							
9.	Freshness Test	Printed week month and year.							
10.	Fitness (SOM/Kg.)	225 min.	225 min.	300 min					
11.	<u>Setting time:</u> (minutes) (i) Initial (ii) Final	30 min. 600 max	30 min 600 max	30 min 600 max					
12.	<u>Soundness:</u> (a) Le-chat Expansion (MM) (i) Un-aerated Cement (ii) After 7 days Aeration (b) Auto-clave Expansion (i) Un-aerated Cement (ii) After 7 days Aeration	10.0 max  5.0 max  0.8 max  0.6 max	10.0 max  5.0 max  0.8 max  0.6 max	10.0 max 5.0 max  0.8 max 0.6 max					
13.	<u>Compressive Strength (Mpa):</u> (a) 72-/-1 hour. (b) 168+/-2 hours (c) 672 +/- 4 hours	22 min. 33 min. 43 min.	27 min. 37 min. 53 min.	16 min. 22 min. 33 min.					

**Note:** Latest values may be seen by referring the latest IS code as amended.

**Certificate:** It is certified that test results meets all the requirements as per relevant IS & technical specification.

Sample is Approved/ Not Approved.

Manufacturing test certificate to be available for every lot.

Lab test to be done for every 50MT or part thereof or change of manufacturer.

Site Engineer  
(Contractor)

Site Engineer  
(DFCC/TPEC)

Site Engineer  
(R-infra)

Signature & Stamp of Tenderer

For & on behalf of DFCCIL



#### 4.1.8 Checklist for Test Report for Fine Aggregates:-

**FORMAT NO.:** DFCC/R-INFRA/TLC/1/08

OHSAS Requirement	Ensure safety shoes, safety helmet, safety belt, Hand gloves & Mask are appropriately used before starting of work.
-------------------	---

Contractor:		Report Serial No. :	
Project:		Date:	
Area/Location:			

		Site:	No.:
Material : Sand			
		Date:	
Test Taken By :			
Sr. No.	Field Test	Standard Results	Results Obtained
1.	Silt Content	It should not be more than 5% by volume.	
2.	Size of Particles	Not too coarse not too fine (as per visual inspection).	
3.	Organic Impurities		

#### Table for Silt content measurement:-

Sample No.	Sample Marks	Source of Sample	Volume of Sample (V)	Volume of fine aggregates in designated jar (V1)	Volume of Clay and Silt (V-V1)	% age clay and Silt (V-V1)/ V*100	Remarks

#### Bulking Table:-

#### Sieve Analysis:-

Sr. No.	Description of Test	Acceptable Limits As per IS 383				Test Results	Approved By			Remarks
		Percentage of passing Zone wise					Contractor	DFCC/ TPEC	R-Infra	
		Zone -I	Zone -II	Zone -III	Zone- IV					
1.	Sieve Analysis (only for RMC)									
(i)	10 mm	100	100	100	100					
(ii)	4.75 mm	90-100	95-100	90-100	95-100					

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

(iii)	2.36 mm	60-95	75-100	85-100	95-100					
(iv)	1.18 mm	30-70	55-90	75-100	90-100					
(v)	600 micron	15-34	35-59	60-79	80-100					
(vi)	300 micron	5-20	8-30	12-40	15-50					
(vii)	150 micron	0-10	0-10	0-10	0-15					
2.	Silt Content	5% max.	5% max.	5% max.	5% max.					
3.	Deleterious Material	5% max.	5% max.	5% max.	5% max.					

**Note:** Latest values may be seen by referring the latest IS code as amended.

**Certificate:** It is certified that the test results meet all the requirements as per IS 383.

**Note:** This document (Procedure) is for Information only in case of Ready Mix Concrete supply

**Remarks:** - Bulking of sand-25% acceptance norm.

Silt content and bulking to be carried out for every lot of fine aggregates.

Sieve analysis to be done for every 30 cubic meter or part thereof or change of source.

Site Engineer  
(Contractor)

Site Engineer  
(DFCC/TPEC)

Site Engineer  
(R-infra)

#### 4.1.9 Checklist for Test Report for Course Aggregates:-

**FORMAT NO.:** DFCC/R-INFRA/TLC/1/09

OHSAS Requirement	Ensure safety shoes, safety helmet, safety belt, Hand gloves & Mask are appropriately used before starting of work.
-------------------	---

Contractor:		Report Serial No. :	
Project:		Date:	
Area/Location:			

Name of Activity: \_\_\_\_\_

Source of Supply: \_\_\_\_\_

Name of Erection Agency Contractor: \_\_\_\_\_

Sample Identification Mark: \_\_\_\_\_

Name & Address of Test Lab: \_\_\_\_\_

Date: \_\_\_\_\_

Test Report Ref. No.: \_\_\_\_\_

Sr. No.	Description of Test	Acceptable Limits As per IS 383 Percentage Passing		Test Results		Approved By			Remarks
		40 mm	20 mm	40 mm	20 mm	Contractor	DFCC/ TPEC	R-Infra	
1.	Sieve Analysis								
	80 mm	100	100						
	40 mm	95-100	95-100						
	20 mm	30-70	25-55						
	10 mm	10-35	10-35						
	4.75 mm	0-5	0-10						
2.	Flakiness Index	25% max.	25% max.						
3.	Crushing/ Impact Value	45% max.	45% max.						
4.	Deleterious material	5% max.	5% max.						

**Note:** This document (Procedure) is for Information only in case of Ready Mix Concrete supply Latest values may be seen by referring the latest IS code as amended.

**Certificate:** It is certified that the test results meet all the requirements as per IS 383 & IS 2386.

**Remark:** Sieve analysis to be done for every 30 cubic meter or part thereof or change of source.

Site Engineer  
(Contractor)

Site Engineer  
(DFCC/TPEC)

Site Engineer  
(R-infra)

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

#### 4.1.10 Checklist for Reinforcement Steel Receipt & Test Frequency Record:-

**FORMAT NO.:** DFCC/R-INFRA/TLC/1/10

OHSAS Requirement	Ensure safety shoes, safety helmet, safety belt, Hand gloves & Mask are appropriately used before starting of work.
-------------------	---

Contractor:		Report Serial No. :	
Project:		Date:	
Area/Location:			

Name of Activity: ..... Location of Store: .....

Name of Erection Agency: ..... Source of Supply: .....

Sr. No.	Date of Receipt	Grade / type & Lot No.	Dia.	Quantity Received		Manufacturer's Test Certificate (MTC) No. & Date	Govt. approved/ NABL accredited Lab Test Report No. & Date	Test Results are As per Approved FQAP	Approved By			Remarks
				Qty. Reqd. in Lot (MT)	Cum. Qty. MT				Contractor	DFCC/ TPEC	R-Infra	

**Note:-**Manufacturing test certificate should be available for every lot of steel. Lab test shall be carried out for every 150MT or part thereof or change of manufacturer.

Site Engineer  
(Contractor)

Site Engineer  
(DFCC/TPEC)

Site Engineer  
(R-infra)

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

#### 4.1.11 Checklist for Test Report of Reinforcement Steel (Lab Test):-

**FORMAT NO.:** DFCC/R-INFRA/TLC/1/11

OHSAS Requirement:	Ensure safety shoes, safety helmet, safety belt, Hand gloves & Mask are appropriately used before starting of work.
--------------------	---

Contractor:		Report Serial No. :	
Project:		Date:	
Area/Location:			

Name of Activity: \_\_\_\_\_ Source of Supply: \_\_\_\_\_

Name of Executing Agency: \_\_\_\_\_ Sample Identification Mark: \_\_\_\_\_

Name & Address of Test Lab: \_\_\_\_\_ Date: \_\_\_\_\_

Test Report Ref. No.: \_\_\_\_\_

Sr. No.	Description of Test	Acceptable limit as			Test Results		Approved by			Remarks
		IS 432 MS Grade I below 20 mm dia.	Fe 500 as per IS 1786	IS 432 MS Grade I above 20 mm dia.			Contractor	DFCC/TPEC	R-Infra	
<b>1.</b>	<b>Chemical Analysis</b>									
(A)	Carbon (C) %	0.23 +/- 0.02 Max.	0.30 +/- 0.02 Max.	0.25 +/- 0.02 Max.						
(B)	Sulphar (S) %	0.055 +/- 0.005 Max.	0.055 +/- 0.005 Max.	0.05 +/- 0.005 Max.						
(C)	Phosphorous (P) %	0.055 +/- 0.005 Max.	0.055 +/- 0.005 Max.	0.05 +/- 0.005 Max.						
(D)	Sulphar & % Phosphorous	0.11 +/- 0.01 Max.	0.105 +/- 0.01 Max.	0.10 +/- 0.01 Max.						
<b>2.</b>	<b>Mechanical Properties</b>									
(A)	Tort Making	There is 'Tor' making on every meters length.								
(B)	Colour	Steel Grey								
(C)	Weight									
	8 mm Ø	0.39 kg/m								
	10mm Ø	0.62 kg/m								
	12mm Ø	0.89 kg/m								
	16mm Ø	1.58 kg/m								
	20mm Ø	2.47 kg/m								
	25mm Ø	3.85 kg/m								

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

(D)	Pitch or Twist of Bar (8/12 times of nominal dia. of bar)	8 to 12 time's nominal dia. Of bars.								
(E)	Bending for hardness	It should bend smoothly and should not develop any cracks while bending.								
(F)	Rusting	Should not be found.								
(G)	Diameter	As required.								
(H)	Length of Bar	Should be 11m. to 12m.								
(I)	0.2% proof stress N/SQ. MM	250 Min.	500 Min.	240 Min.						
(J)	Ultimate Tensile Stress N/SQ MM	410 Min.	545 Min.	410 Min.						
(K)	Elongation	23 Min.	12 Min.	23 Min.						
(L)	Bend Test	No crack / Fracture at Bend Visible	No crack / Fracture at Bend Visible	No crack / Fracture at Bend Visible						
(M)	Re bend Test	No crack / Fracture at Bend Visible	No crack / Fracture at Bend Visible	No crack / Fracture at Bend Visible						

**Notes:** (1) Practically Actual Weight Should Not Vary More Than 1.5%.  
(2) Latest values may be seen by referring the latest IS code as amended.

**Certificate:** It is certified that test results meet all the requirements as per IS and DFCCIL/R-Infra Technical Specifications.

Calibration certificates for weigh scale to be reviewed—Ref calibration certificate review form.

Lab used for testing of reinforced steel will be either IIT/VJTI/Govt. approved/NABL accredited Lab approved by Engineer for all tests. No deviation from IS code is allowed.

Manufacturing test certificate should be available for every lot of steel. Lab test shall be carried out for every 150MT or part thereof or change of manufacturer.

Site Engineer  
(Contractor)

Site Engineer  
(DFCC/TPEC)

Site Engineer  
(R-infra)

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

#### 4.1.12 Checklist for Formwork:-

**FORMAT NO.:** DFCC/R-INFRA/TLC/1/12

OHSAS Requirement	Ensure safety shoes, safety helmet, safety belt, Hand gloves & Mask are appropriately used before starting of work.
-------------------	---

Contractor:		Report Serial No. :	
Project:		Date:	
Area/Location:			

Formats to be filled up for every pour card.

LOCATION:						DATE:		
Sr. No.	DESCRIPTION	YES	NO	N. A.	Approved By			Remarks
					Contractor	DFCC/TPEC	R-Infra	
1.	Form-work as per approved drawing/sketch checked including de-shuttering arrangements.							
2.	Form-work alignment correct.							
3.	Form-work levels correct, including screeds.							
4.	Form-work dimensions correct.							
5.	In case of Slab / Raft, check the thickness as per RFC drawing & provision of slab marking.							
6.	Form-work member spacing correct.							
7.	Form-work member material quality acceptable.							
8.	Gaps between primary & secondary members closed/wedged.							
9.	Face boarding/plywood/metal thickness correct.							
10.	Panel flatness acceptable.							
11.	Tie rod spacing correct.							
12.	Tie rod tight.							
13.	Box outs, cast-in items, ducts fixed correct, securely.							
14.	Chamfers/fillets sizes, straightness, fixing acceptable.							
15.	Form-work clean.							
16.	Form-work release oil applied correctly.							
17.	Construction joint preparation satisfactory.							
18.	Safe access constructed.							
19.	Adequate work space provided for labour, equipment.							

Site Engineer  
(Contractor)

Signature & Stamp of Tenderer

Site Engineer  
(DFCC/TPEC)

Site Engineer  
(R-infra)

For & on behalf of DFCCIL



#### 4.1.13 Checklist for Compressive Strength of Mortar:-

**FORMAT NO.:** DFCC/R-INFRA/TLC/1/13

OHSAS Requirement	Ensure safety shoes, safety helmet, safety belt, Hand gloves & Mask are appropriately used before starting of work.
-------------------	---

Contractor:		Report Serial No. :	
Project:		Date:	
Area/Location:			

Site :													
Client :													
Engineer :													
Sr. No.	Location	Mix	Casting	Testing Date		Compressive Strength		Average Strength (Kg/cm. sq.)		Approved By			Remarks
										Contractor	DFCC/ TPEC	R- Infra	
				7 Days	28 Days	7 Days	28 Days	7 Days	28 Days				
Remarks :													

**Note:** At starting of project and for every change of source in cement/sand.

Site Engineer  
(Contractor)

Site Engineer  
(DFCC/TPEC)

Site Engineer  
(R-infra)

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

#### 4.1.14 Checklist for Test Report of Water:-

**FORMAT NO.:** DFCC/R-INFRA/TLC/1/14

OHSAS Requirement	Ensure safety shoes, safety helmet, safety belt, Hand gloves & Mask are appropriately used before starting of work.
-------------------	---

Contractor:		Report Serial No :	
Project:		Date:	
Area/Location:			

Name of Activity: \_\_\_\_\_

Source of Supply: \_\_\_\_\_

Name of Erection Agency: \_\_\_\_\_

Sample Identification Mark: \_\_\_\_\_

Test Report Ref. No.: \_\_\_\_\_

Date: \_\_\_\_\_

Sr. No.	Particulars	Permissible limits as per I.S. 456- 2000		Lab Test Result	Approved By			Remarks
	Chemical Analysis	Mixing and Curing Clause 5:4 Table 1	Ground water Clause 8:2:2:4 & Table 4		Contractor	DFCC/ TPEC	R -Infra	
1.	pH value	Not less than 6	From 6 to 9					
2.	Chlorides (mg/ltr)	Max 2000 (for plain concrete) 500 (for Reinforced concrete)	-					
3.	Sulphates (mg/ltr)	Max. 400	Less than 300					
4.	Organic Impurities (mg/ltr)	Max. 200						
5.	Inorganic Impurities (mg/ltr)	Max. 3000						
6.	Suspended matter	Max. 2000						
7.	Alkalinity (mg/ltr)	Max. 250						
8.	Total hardness (mg/ltr)							
9.	Acidity (mg/ltr)	Max. 50						

**Note:** Latest values may be seen by referring the latest IS code as amended.

**Certificate:** It is certified that test results meets all the requirements as per relevant IS & technical specification. Sample is approved.

Site Engineer  
(Contractor)

Site Engineer  
(DFCC/TPEC)

Site Engineer  
(R-infra)

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

#### 4.1.15 Checklist for Test Report for Concrete Blocks:-

**FORMAT NO.:** DFCC/R-INFRA/TLC/1/15

OHSAS Requirement	Ensure safety shoes, safety helmet, safety belt, Hand gloves & Mask are appropriately used before starting of work.
-------------------	---

Contractor:		Report Serial No.:	
Project:		Date:	
Area/Location:			

			Site:	Date :			
Material : Solid concrete blocks			Quantity :	Supplier:			
			Date:				
Test Conducted By :							
Sr. No.	Physical Test	Standard Results (As per IS:2185 part-1)	Results Obtained	Approved By			Remarks
				Contractor	DFCC/ TPEC	R-Infra	
1.	Grade	C(5.0) / C(4.0)					
2.	Density of block	Not less than 1800 kg/m <sup>2</sup>	Ok/Not ok				
3.	Minimum average compressive strength of units N/mm <sup>2</sup>						
	Grade C(5.0)	5.0N/mm <sup>2</sup>	Ok/Not ok				
	Grade C(4.0)	4.0N/mm <sup>2</sup>	Ok/Not ok				
4.	Minimum compressive strength of individual unit N/mm <sup>2</sup>		Ok/Not ok				
(A)	Grade C(5.0)	4.0N/mm <sup>2</sup>	Ok/Not ok				
(B)	Grade C(4.0)	3.2N/mm <sup>2</sup>	Ok/Not ok				
5.	Water Absorption	Should not be more than 10% by mass	Ok/Not ok				

**Note:** Manufacturing test certificate shall be available for every lot. Lab test shall be done for every 5000 blocks or part thereof.

Site Engineer  
(Contractor)

Site Engineer  
(DFCC/TPEC)

Site Engineer  
(R-infra)

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

4.1.16 Checklist for Pile Driving:-

**FORMAT NO.:** DFCC/R-INFRA/TLC/1/16

OHSAS Requirement	Ensure safety shoes, safety helmet, safety belt, Hand gloves & Mask are appropriately used before starting of work.
-------------------	---

Contractor:		Report Serial No :	
Project:		Date:	
Area/Location:			

<b>For Pre-Cast Driven Pile:</b>							
HAMMER	MAKE AND MODEL:		RATED ENERGY:		PILE	TYPE PILE:	
		DRIVING RIG NO.:	RAM WEIGHT:			TIP DIAMETER:	
	OPERATING PRESSURE:		AVG. BLOWS/MIN.:			LENGTH DRIVEN:	
<b>CAST-IN-SITU BORED PILE:</b>							
THICKNESS OF LINER:							
FOR FALLING HAMMER METHOD(CONVENTIONAL):						FOR HYDRAULIC ROTARY PIPE	
Sr. No.	Start Time	End Time	No. of Blows	Penetration in Meter		Remark/ Liner Details	

Site Engineer  
(Contractor)

Site Engineer  
(DFCC/TPEC)

Site Engineer  
(R-infra)

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

#### 4.1.17 Checklist for Concrete Delivery & Pour Record:-

**FORMAT NO.:** DFCC/R-INFRA/TLC/1/17

OHSAS Requirement	Ensure safety shoes, safety helmet, safety belt, Hand gloves & Mask are appropriately used before starting of work.
-------------------	---

Contractor:		Report Serial No :	
Project:		Date:	
Area/Location:			

Formats to be filled up for every pour:

Sr. No.	Observation	Details	Observation	Details	Approved By			Remarks
					Contractor	DFCC/TPEC	R- Infra	
(A)	<b>Concrete Batching Delivery Ticket No.</b>							
1.	Location of pour:		Date:					
2.	Concrete Grade:							
3.	W/C Ratio:		Slump:					
4.	Cement Contents:		No. of Cubes Taken:					
5.	Max. Aggregate size:							
6.	Admixture (Type & Dosage):							
7.	Batching Started, Hrs.:		Batching Finalized, Hrs.:					
8.	Quantity Batched(cum) :							
(B)	<b>Truck Arrived on Site(Hrs.)</b>		Truck No.:					
1.	Slump Test Result (S in mm):							
2.	Discharge Started(Hrs.):							
3.	Placement Completed(Hrs.):							
4.	No. of Site cubes Taken:							
5.	Weather Condition:							

**Note:** Cube moulds inspection—Ok/Not ok.

Site Engineer  
(Contractor)

Site Engineer  
(DFCC/TPEC)

Site Engineer  
(R-infra)

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

## 4.2 **Electrical:-**

### 4.2.1 **Soil Investigation Report:-**

**FORMAT NO.:** DFCC/R-INFRA/TLC/2/01

- (A) Purpose and Scope : Soil investigation report.
- (B) References : Quality Assurance Procedure.
- (C) OHSAS Requirements : (i) Knee length gumboots, hats, mask.  
(ii) Snake bite First Aid kit, List of nearest hospitals.

#### (D) **Details:-**

Sr. No.	Activity / Steps	As per Contract Documents	Remarks
1.	Bore holes at specified locations to obtain information about sub soil profile, its nature, strength & safe bearing capacity.		
2.	Collect soil samples for strata identification & conducting laboratory tests.		
3.	Identify all samples with date, bore hole & trial pit number, depth of sampling etc.		
4.	Conduct lab tests on soil & rock samples collected in the field.		
5.	Prepare soil investigation report as per site & lab tests.		

#### (E) **Records:-**

Sr. No	Format Name	Format Identification	Method of Indexing	Location	Retention Period
1.	Soil investigation report		Site wise	Site Office	Up to handing over of project

Site Engineer  
(Contractor)

Site Engineer  
(DFCC/TPEC)

Site Engineer  
(R-infra)

#### 4.2.2 Finalization of Tower Schedule:-

**FORMAT NO.:** DFCC/R-INFRA/TLC/2/02

- (A) Purpose and Scope : Finalization of tower schedule.
- (B) References : Quality Assurance Procedure.
- (C) OHSAS Requirements : (i) Knee length gumboots, hats, mask.  
(ii) Snake bite First Aid kit, List of nearest hospitals.
- (D) Details:-

Sr. No.	Activity / Steps	As per Contract Documents	Remarks
1.	Carry out check survey to locate & peg mark the locations on the field.		
2.	Give direction pegs for excavation of tower foundation.		
3.	Prepare tower schedule record.		

(E) Records:-

Sr. No	Format Name	Format Identification	Method of Indexing	Location	Retention Period
1.	Tower Schedule		Site wise	Site Office	Up to handing over of project

Site Engineer  
(Contractor)

Site Engineer  
(DFCC/TPEC)

Site Engineer  
(R-infra)

Signature & Stamp of Tenderer

For & on behalf of DFCCIL



#### 4.2.3 Evacuation and Pit Marking:-

**FORMAT NO.:** DFCC/R-INFRA/TLC/2/03

- (A) Purpose and Scope : Excavation & Pit marking.
- (B) References : Quality Assurance Procedure.
- (C) OHSAS Requirements : (i) Knee length gumboots, hats, mask.  
(ii) Snake bite First Aid kit, List of nearest hospitals.

#### (D) Details:-

Sr. No.	Activity / Steps	As per Contract Documents	Remarks
1.	Get the necessary site barricading permission from concerned RTO authorities.		
2.	Arrange Sign Board, Barricading, Traffic warden, reflectors as per guide lines of Local authority.		
3.	Arrange all required material, tools & tackles available with the contractors working group for attending excavation work of proposed tower location.		
4.	Excavate trial pits for tracing of other utilities.		
5.	Inform to all concern utilities running across the proposed route regarding excavation work.		
6.	Carry out pile/pit marking according to the RFC foundation drawing of the concerned tower.		
7.	Carry out excavation of tower foundation pits.		
8.	Enter details of excavation & type of soil in the excavation register.		

#### (E) Records:-

Sr. No	Format Name	Format Identification	Method of Indexing	Location	Retention Period
1.	Excavation Register		Site wise	Site Office	Up to handing over of project

Site Engineer  
(Contractor)

Site Engineer  
(DFCC/TPEC)

Site Engineer  
(R-infra)

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

4.2.4 Stub Setting:-

**FORMAT NO.:** DFCC/R-INFRA/TLC/2/04

- (A) Purpose and Scope : Stub Setting.
- (B) References : Quality Assurance Procedure.
- (C) OHSAS Requirements : (i) Knee length gumboots, hats, mask.  
(ii) Snake bite First Aid kit, List of nearest hospitals.

(D) Details:-

Sr. No.	Activity / Steps	As per Contract Documents	Remarks
1.	Assemble the template & place it on 4 sides of the location.		
2.	Lift and place the template on jacks.		
3.	Fix the stubs on the legs of the template.		
4.	Measure the back to back & diagonal of the template as per RFC drawing & correct it if necessary.		
5.	Check the level of the template & correct it if necessary.		
6.	Enter the dimensions & level readings of template in stub setting register.		

(E) Records:-

Sr. No	Format Name	Format Identification	Method of Indexing	Location	Retention Period
1.	Stub Setting Register		Site wise	Site Office	Up to handing over of project

Site Engineer  
(Contractor)

Site Engineer  
(DFCC/TPEC)

Site Engineer  
(R-infra)

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

#### 4.2.5 Foundation Casting:-

**FORMAT NO.:** DFCC/R-INFRA/TLC/2/05

- (A) Purpose and Scope : Foundation Casting  
 (B) References : Quality Assurance Procedure  
 (C) OHSAS Requirements : (i) Knee length gumboots, hats, mask.  
 (ii) Snake bite First Aid kit, List of nearest hospitals.

#### (D) Details:-

Sr. No.	Activity / Steps	As per Contract Documents	Remarks
1.	Dewater the location completely before starting the concreting work.		
2.	Prepare the reinforcement at site as per rod bending schedule.		
3.	Prepare base pad of required depth as per approved drawing & specified concrete mix & allow it to set.		
4.	Fix the reinforcement for frustum/pile cap as per approved drawing.		
5.	Fix form boxes of required dimensions & oil it before starting concreting work.		
6.	Apply sand slurry & water to the joints of the form boxes for sealing purpose to prevent cement slurry flowing out.		
7.	Pour the required concrete in the frustum/pile cap portion & vibrate it for proper compaction.		
8.	Make earthing connection to the designated stub & fix chimney form boxes.		
9.	Pour the concrete to the chimney portion up to the level as shown in RFC drawing.		
10.	After every 450 mm of concrete do the compaction with vibrator.		
11.	Do curing of concrete as per prescribed procedure.		
12.	Carry out testing of concrete as per approved FQAP plan.		

#### (E) Records:-

Sr. No	Format No	Format Name	Method of Indexing	Location	Retention Period
1.	DFCC/R-Infra/ TLC/1/02	Checklist for reinforcement.	Site wise	Site Office	Up to handing over project.
2.	DFCC/R-Infra/ TLC/1/12	Checklist for formwork.	Site wise	Site Office	Up to handing over project.
3.	DFCC/R-Infra/ TLC/1/04	Check list for pre-concreting.	Site wise	Site Office	Up to handing over project.
4.	DFCC/R-Infra/ TLC/1/05	Check list for post-concreting.	Site wise	Site Office	Up to handing over project.
5.	DFCC/R-Infra/ TLC/1/17	Check list for concrete delivery & pour record.	Site wise	Site Office	Up to handing over of project.

Site Engineer  
(Contractor)

Site Engineer  
(DFCC/TPEC)

Site Engineer  
(R-infra)

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

#### 4.2.6 Earthing:-

**FORMAT NO.:** DFCC/R-INFRA/TLC/2/06

- (A) Purpose and Scope : Earthing
- (B) References : Quality Assurance Procedure
- (C) OHSAS Requirements : (i) Knee length gumboots, hats, mask.  
(ii) Snake bite First Aid kit, List of nearest hospitals.

#### (D) Details:-

Sr. No.	Activity / Steps	As per Contract Documents	Remarks
1.	Earthing of each tower has to be done after foundation is casted as per 5613-1989 (Part-2/section-2).		
2.	Dig a pit of 3 meter depth outside the base of tower & put earthing Rod inside the pit.		
3.	Fill mixture of coke & salt in the earthing pit surrounding the Rod.		
4.	Connect earthing strip which was fitted to the stub of the tower leg to the earthing Rod.		
5.	Backfill the pit with the soil & compact it properly.		
6.	Measure the tower footing resistance of the earth pit & record the readings.		

#### (E) Records:-

Sr. No	Format Name	Format Identification	Method of Indexing	Location	Retention Period
1.	Tower footing resistance record.		Site wise	Site Office	Up to handing over of project

Site Engineer  
(Contractor)

Site Engineer  
(DFCC/TPEC)

Site Engineer  
(R-infra)

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

#### 4.2.7 Tower Erection:-

**FORMAT NO.:** DFCC/R-INFRA/TLC/2/07

- (A) Purpose and Scope : Tower Erection
- (B) References : Quality Assurance Procedure
- (C) OHSAS Requirements : (i) Knee length gumboots, hats, mask.  
(ii) Snake bite First Aid kit, List of nearest hospitals.

#### (D) Details:-

Sr. No.	Activity / Steps	As per Contract Documents	Remarks
1.	Sort out the tower members & keep all members in correct position on the ground.		
2.	Prepare main corner leg members by fitting all cleats/plates for joints, bracings & step bolts.		
3.	Erect four main leg members of first section & keep in position by fixing temporary Rope guys.		
4.	Raise Bracings & other support members one by one as a unit with the help of derrick pipe & bolted to the main legs.		
5.	Shift the derrick pole & place it on the corner of main leg of first section & hoist and assemble the legs of second section as per approved drawing.		
6.	Continue the procedure till the peak of the tower & lift & fix the cross arms already assembled on the ground.		
7.	Carry out tightening of the bolts progressively from top onwards.		
8.	Fix all tower accessories such as ACD, danger, phase, number plates, bird guard etc.		
9.	All bolts & Nuts are proper tack welded from GL up to Bottom cross arm.		

#### (E) Records:-

Sr. No	Format Name	Format Identification	Method of Indexing	Location	Retention Period
1.	Checklist for tower erection		Site wise	Site Office	Up to handing over of project

Site Engineer  
(Contractor)

Site Engineer  
(DFCC/TPEC)

Site Engineer  
(R-infra)

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

#### 4.2.8 Tower Dismantling, Foundation Demolishing & Conductor/OPGW De-stringing:-

**FORMAT NO.:** DFCC/R-INFRA/TLC/2/08

(A) Purpose and Scope : Tower Dismantling, Foundation Demolishing & Conductor/OPGW De-stringing

(B) References : Quality Assurance Procedure

(C) OHSAS Requirements : (i) Knee length gumboots, hats, mask.  
(ii) Snake bite First Aid kit, List of nearest hospitals.

(D) Details:-

Sr. No.	Activity / Steps	As per Contract Documents	Remarks
1.	De-stringing of OPGW 48C along with hardware & accessories.		
2.	De-stringing of AAAC Zebra conductor of one circuit at a time (under shutdown condition) along with hardware & accessories.		
3.	Dismantling of Hardware & Accessories along with jumpers of AAAC Zebra conductor of one circuit at a time (under shutdown condition).		
4.	Dismantling of Polymer long rod Insulators of one circuit at a time (under shutdown condition).		
5.	Dismantling of Tower super structures along with tower accessories after de-stringing of Conductor/OPGW/Insulators etc. for both the circuits of the line.		
6.	Demolishing of tower foundations (all the four legs) & removal of debris from site.		
7.	Crediting of dismantled tension towers & all hardware assemblies of existing lines to R-Infra store at Dahanu.		
8.	Removal of all the dismantled towers and line materials (Except for item no 7) from respective sites to be retained by the contractor.		

(E) Records:-

Sr. No	Format Name	Format Identification	Method of Indexing	Location	Retention Period
1.	Details for dismantled towers & line material.		Site wise	Site Office	Up to handing over of project

Site Engineer  
(Contractor)

Site Engineer  
(DFCC/TPEC)

Site Engineer  
(R-infra)

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

4.2.9 Stringing:-

**FORMAT NO.:** DFCC/R-INFRA/TLC/2/09

- (A) Purpose and Scope : Stringing
- (B) References : Quality Assurance Procedure
- (C) OHSAS Requirements : (i) Knee length gumboots, hats, mask.  
(ii) Snake bite First Aid kit, List of nearest hospitals.

(D) Details:-

Sr. No.	Activity / Steps	As per Contract Documents	Remarks
1.	Hoist all suspension insulator strings before starting paying out of conductors.		
2.	Assemble hardware fitting as per manufacturers drawings & connect their upper and lower parts to the corresponding sides of the insulator strings.		
3.	Fix rollers/running blocks for OPGW 48C and conductors.		
4.	Provide Stays at those suspension location from which Temporary Diversion is proposed for load balancing during stringing as well as put those stays as it is if required up to permanent diversion of line.		
4.	Provide stays/anchors to all tension/angle towers for load balancing during stringing.		
5.	Pay out the conductor & OPGW 48 C & do make up one side of the tension tower.		
6.	Take rough sag on the other end of the section.		
7.	Give final sag to the conductors and OPGW 48C one by one by referring sag tension chart.		
8.	Use dynamometer & sag board for giving correct tension on conductors.		
9.	Safety precautions to be adopted due to nearby power line being in live condition (Hot Line safety measures).		

(E) Records:-

Sr. No	Format Name	Format Identification	Method of Indexing	Location	Retention Period
1.	Sag tension calculation		Site wise	Site Office	Up to handing over of project

Site Engineer  
(Contractor)

Site Engineer  
(DFCC/TPEC)

Site Engineer  
(R-infra)

Signature & Stamp of Tenderer

For & on behalf of DFCCIL



**4.2.10 Testing and Commissioning:-**

**FORMAT NO.:** DFCC/R-INFRA/TLC/2/10

- (A) Purpose and Scope : Testing and Commissioning
- (B) References : Quality Assurance Procedure
- (C) OHSAS Requirements : (i) Knee length gumboots, hats, mask.  
(ii) Snake bite First Aid kit, List of nearest hospitals.

(D) Details:-

Sr. No.	Activity / Steps	As per Contract Documents	Remarks
1.	Carry out the insulation resistance test of the line by 5 kV motorized megger. Insulation resistance is measured between each phase and ground and between the phases. The ambient temperature & weather conditions are noted for future reference.		
2.	Carry out the conductor continuity test using wheat stone bridge instrument to verify each conductor of the line is properly connected electrically.		
3.	Obtain clearance for charging the line from the contractor after verifying all men, material and T&P are removed from the line.		
4.	Verify that the testing of the control & relay panels including line protection has been carried out by the protection department.		
5.	Obtain permission from load dispatch along with the charging code.		
6.	Charge the line from one end & check the following : (i) Phase sequence. (ii) Measurement of voltage of all three phases & across the phases.		

(E) Records:-

Sr. No	Format Name	Format Identification	Method of Indexing	Location	Retention Period
1.	Insulation resistance test record		Site wise	Site Office	Up to handing over of project.
2.	Phase sequence measurement record		Site wise	Site Office	Up to handing over of project.

Site Engineer  
(Contractor)

Site Engineer  
(DFCC/TPEC)

Site Engineer  
(R-infra)

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

**4.2.11 Stub Setting Register:-**

**FORMAT NO.:** DFCC/R-INFRA/TLC/2/11

220 kV SS/LS Line diversion Temporary/ Permanent from Location No. ....to.....

Date: .....

Sr. No.	Location No.	Type of Tower	Classification of Foundation	Template sides before concreting (mm)	Template diagonals before concreting (mm)	Template height above GL (mm)	Stub back to back distance (mm)	Template diagonals after concreting (mm)	Date of Back-filling	Remarks

Site Engineer  
(Contractor)

Site Engineer  
(DFCC/TPEC)

Site Engineer  
(R-infra)

**4.2.12 Tower Footing Register:-**

**FORMAT NO.:** DFCC/R-INFRA/TLC/2/12

Sr. No.	Location No.	Type of Tower	Date	Readings				
				Virtual impedance ZV (Ohms)	Actual Impedance ZA (Ohms)	Resistance R ac (Ohms)	Inductance L (Henry)	Count

Site Engineer  
(Contractor)

Site Engineer  
(DFCC/TPEC)

Site Engineer  
(R-infra)

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

#### 4.2.13 Tower Erection Checklist:-

**FORMAT NO.:** DFCC/R-INFRA/TLC/2/13

Location No.: \_\_\_\_\_ of Temporary/ Permanent Diversion.

Sr. No.	Description of Checks	OK	Not OK	Remarks
1.	Correct Bolts are used.			
2.	Nut-bolts are properly tightened.			
3.	Nut-bolts are properly tack welded from GL to Bottom Cross Arm level.			
4.	Dummy holes are left open.			
5.	Loose or missing member on the tower.			
6.	Hanger U-Bolt and bird guard are fixed on the suspension tower.			
7.	Anti-Climbing devices are fixed.			
8.	Danger Plate.			
9.	Phase Plate.			
10.	Number Plate.			
11.	Circuit identification plates.			

Site Engineer  
(Contractor)

Site Engineer  
(DFCC/TPEC)

Site Engineer  
(R-infra)

#### 4.2.14 Conductor Stringing Checklist:-

**FORMAT NO.:** DFCC/R-INFRA/TLC/2/14

Span between \_\_\_\_\_ to \_\_\_\_\_.

Sr. No.	Description of Checks	OK	Not OK	Remarks
1.	Final Tension.			
2.	Sag Length.			
3.	Ground clearance.			
4.	Damage to insulators.			
5.	Pins are properly fitted.			
6.	Jumper position is correct.			
7.	Jumper bolts are tightened.			
8.	Arcing horns are provided.			
9.	Conductor Damage.			
10.	Copper bond connection is tightened.			
11.	Suspension clamps.			
12.	Armor rods.			

Site Engineer  
(Contractor)

Site Engineer  
(DFCC/TPEC)

Site Engineer  
(R-infra)

Signature & Stamp of Tenderer

For & on behalf of DFCCIL

4.2.15 OPGW Stringing Checklist:-

**FORMAT NO.:** DFCC/R-INFRA/TLC/2/15

Span between \_\_\_\_\_ to \_\_\_\_\_.

Sr. No.	Description of Checks	Ok	Not Ok	Remarks
1.	Final Tension.			
2.	Sag Length.			
3.	Vertical clearance with Conductor.			
4.	Damage to Hardware/Accessories.			
5.	Bolts & Nuts are properly fitted.			
6.	Jumper position is correct.			
7.	Jumper bolts are tightened.			
8.	OPGW Damage.			
9.	Earth bond connection is tightened.			
10.	Suspension clamps/Tension clamps.			

Site Engineer  
(Contractor)

Site Engineer  
(DFCC/TPEC)

Site Engineer  
(R-infra)

Signature & Stamp of Tenderer

For & on behalf of DFCCIL