TENDER DOCUMENT FOR

PROVIDING AMC SERVICES FOR OFC BASED NLD AND ACCESS LINKS ACROSS THE STATE OF UTTRAKHAND

Tender No: TCIL/15/1777/I/17-MM/024E

Date: 1st March, 2018

Issued By:

Material Management Division
Fourth Floor,
Fax: +91 (11) 26242266
Tel: +91 (11) 26202422, 26202410
Email: mmdiv@tcil-india.com
Visit us at http://www.tcil-india.com

Telecommunications Consultants India Ltd.
(A Govt. of India Enterprise)
TCIL Bhawan, Greater Kailash-I
New Delhi – 110048 (India)
Telephone no.: 011-26202020, Fax: 011-26241865
website: www.tcil-india.com
Email: tcil@tcil-india.com CIN No.: U74999DL1978GOI008911
## INDEX

<table>
<thead>
<tr>
<th>SECTION</th>
<th>DESCRIPTION</th>
<th>PAGE NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>NOTICE INVITING TENDER</td>
<td>3-9</td>
</tr>
<tr>
<td>2</td>
<td>INSTRUCTIONS TO BIDDERS</td>
<td>10-20</td>
</tr>
<tr>
<td>3</td>
<td>GENERAL (COMMERCIAL) CONDITIONS OF THE CONTRACT</td>
<td>21-28</td>
</tr>
<tr>
<td>4</td>
<td>SPECIAL CONDITIONS OF CONTRACT</td>
<td>29-34</td>
</tr>
<tr>
<td>5</td>
<td>TECHNICAL SPECIFICATIONS</td>
<td>35-68</td>
</tr>
<tr>
<td>6</td>
<td>FORMAT OF BID BOND /EMD</td>
<td>69</td>
</tr>
<tr>
<td>7</td>
<td>FORMAT OF PERFORMANCE BANK GUARANTEE (PBG)</td>
<td>70-71</td>
</tr>
<tr>
<td>8</td>
<td>BID SUBMISSION FORM</td>
<td>72-75</td>
</tr>
<tr>
<td>9</td>
<td>NO CONVICTION FORMAT</td>
<td>76</td>
</tr>
<tr>
<td>10</td>
<td>INTEGRITY PACT FORMAT</td>
<td>77-85</td>
</tr>
<tr>
<td>11</td>
<td>FORMAT OF AGREEMENT</td>
<td>86-87</td>
</tr>
<tr>
<td>12</td>
<td>PRICE SCHEDULE</td>
<td>88-89</td>
</tr>
<tr>
<td></td>
<td>PART- A</td>
<td>90-91</td>
</tr>
<tr>
<td></td>
<td>PART-B</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>OTHER CONDITIONS &amp; SPECIFICATIONS</td>
<td>92-210</td>
</tr>
<tr>
<td>14</td>
<td>NDA FORMAT</td>
<td>211-213</td>
</tr>
</tbody>
</table>
Section-1

NOTICE INVITING TENDER

1.1 INTRODUCTION: TCIL is looking for professional and experienced OFC maintenance agencies for providing preventive and corrective AMC services in the state of Uttarakhand as per specifications and scope of work given in this tender document in line with the requirements of TCIL’s client M/s Bharat Sanchar Nigam Ltd.

E-Tenders are invited from eligible and competent contractors / agencies for Maintenance of the OFC based network and related activities in the state of Uttarakhand as per specifications and scope of work given in the tender document.

Submission of Online Bid is mandatory for this tender, detailed instructions about the same are given in Section-2 of the tender document.

Complete tender documents are available on CPP Portal, TCIL’s website: [http://www.tcil-india.com](http://www.tcil-india.com) and TCIL’s e-procurement Portal: [https://www.tcil-india-electronictender.com](https://www.tcil-india-electronictender.com)

1.2 Important Dates

<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date of Posting of NIT on TCIL’s e-Tendering Portal</td>
<td>01.03.2018</td>
</tr>
<tr>
<td>Start Date &amp; Time of Procurement of tender documents</td>
<td>01.03.2018, 18:00 hrs.</td>
</tr>
<tr>
<td>Last Date of request for queries</td>
<td>12.03.2018</td>
</tr>
<tr>
<td>Date of Training to Bidders</td>
<td>15.03.2018</td>
</tr>
<tr>
<td>Last date &amp; time of procurement of tender documents</td>
<td>22.03.2018, 13:00 hrs.</td>
</tr>
<tr>
<td>Last date &amp; time for online submission of Bids</td>
<td>22.03.2018, 15:00 hrs.</td>
</tr>
<tr>
<td>Online Opening of Technical Part (Part-I)</td>
<td>22.03.2018 15:30 hrs.</td>
</tr>
<tr>
<td>Online Opening of Financial Part (Part-II)</td>
<td>To be notified later</td>
</tr>
</tbody>
</table>

Downloading of official copy of tender documents from TCIL’s e-procurement Portal is mandatory for online participation in the e-tender. **Bidders are advised to visit the TCIL’s e-procurement Portal regularly for updates/amendments, if any.**

1.3 SIGNING OF NON DISCLOSURE AGREEMENT

Tender document can be downloaded from TCIL’s website mentioned above. However, agencies interested to participate in the tender and to bid, have to sign a NON DISCLOSURE AGREEMENT with the TCIL, and the required tender document fee has to be deposited with the TCIL to get the list/ details of locations in which works are to be executed, after this exercise only, they will be able to procure/download the official Tender Document from TCIL e-Tender Portal and submit the Bid Online. Participation without compliance to above shall be invalid, and the bids shall not be considered for opening.

**Note:-** NDA duly signed has to be submitted on a non-judicial stamp paper of Rs 100/- NDA Format given at Section 14. The bidders are advised to obtain the detail list at the earliest to survey the links with in time, and TCIL will not be responsible for any delay caused by the bidder in obtaining the detailed list.
The Signed NDA must be submitted at the below mentioned address before due date and time of submission of bid:

Mr. Joydeep Sinha, GGM (Defence),
Room No.403, 4th Floor, TCIL Bhawan
Greater Kailash-I, New delhi-110048
Tel no.: 011-26202403, 26242412

1.4 BROAD SCOPE OF THE WORK

The primary scope of work includes:

1. Deployment of maintenance teams for each 80 KMs of route length on an average with the team constitution, tools and other resources like vehicles as per details given in Section 5.16 of this tender document.
2. Routine inspection, viz, patrolling on the NLD OFC / Access routes, to identify areas where OFC / Duct is exposed due to natural wear and tear etc.
3. Prevent third party damages viz, theft, damage by other U/G utility bidder etc.
4. Fault rectification of OFC cuts along NFS NLD OFC / Access routes.
5. Replacement of OFC due to multiple cuts/high transmission loss.
6. Ensure availability of OFC route marker along the route at regular intervals.
7. Maintain proper condition of joint closures.
8. Maintain condition of OFC with casing or with special arrangements near critical areas viz, major bridges, railway crossing, pipe line crossing etc.
9. Visual inspection of joint closure to check ingress of water, foreign particles etc.
10. Periodic measurement of the link attenuation loss to ensure that the link is free from any splice loss or point loss defects etc.
11. Maintenance and updating of as-built drawing, information along the OFC route.
12. Maintaining history of events, analysis and reporting.
13. Arrange RoW permissions from concerned authorities for repair works.
14. Liaisoning with concerned authorities

1.5 ELIGIBILITY CRITERIA

The bidder should fulfill the following eligibility conditions:

i. The bidder should be an Indian Registered Company under Companies Act 1956 / Proprietorship Company/Partnership Company or a consortium of any of these. Copy of
Certificate of Incorporation/Registration/Partnership Deed or any other relevant document, as applicable, should be submitted along with a copy of address proof.

ii. The bidder should have experience of having successfully completed at least one similar work during last seven years ending 28.02.2018. The cost of such work should not be less than the value for the Region as detailed below at Para (xi)

Or

Two similar works in last seven years ending 28.02.2018. The cost of each completed work should not be less than the value for the Region as detailed below at Para (xi)

Or

Three similar works in last seven years ending 28.02.2018. The cost of each completed work should not be less than the value for the Region as detailed below at Para (xi)

(Similar works would mean construction of OFC Network comprising of trenching and ducting, blowing of cables, splicing, testing and commissioning or preventive and corrective maintenance of OFC based Network.)

The bidder should submit necessary documents such as copy of Work/Purchase Order along with the completion certificate issued by the client in support of their claim of experiences.

One Similar Work means a Single Work/Purchase Order of value as listed at Para (xi).

iii. Average annual financial turnover during the last 3 years ending 31.03.2017 should not be less than the amount as detailed below at Para (xi). Bidder should submit the Annual Report containing duly audited Balance Sheet and Profit & Loss Account for the last three years ending 31.03.2017.

iv. The bidder’s Net-worth should be positive as on 31.03.2017 and it should not be in loss for last three consecutive years ending on 31.03.2017.

v. Net-worth (NW) as on 31.03.2017, Sanctioned Cash Credit (SCC) Limit and Sanctioned Bank Guarantee (SBG) Limit as per accounts of the bidder as on or after 31.03.2017 should not be less than total amount of NW+SCC+SBG taken together as detailed below at Para (xi).

vi. The bidder should submit affidavit along with the technical bid that they shall be able to arrange funds required for execution & shall not ask TCIL for any interim/advance payment with or without interest.

vii. The bidder should have a valid PAN and GST Registration in Uttarakhand. Copy of PAN card and GST Registration certificate should be submitted in the bid.

viii. The bidder should not be insolvent, in receivership, bankrupt or being wound up, not have had their business activities suspended and not be the subject of legal proceedings for any of the foregoing. An undertaking by the bidder should be submitted.

ix. The bidder should not have been blacklisted by Central/State Government Departments/Public Sector Undertakings or other institutions. “No-Conviction Certificate” duly signed should be submitted.

x. The bidder should give an undertaking on the company’s letter head that all the documents/certificates/information submitted by them against the tender are genuine. In case
any of the documents/certificates/information submitted by the bidder is found to be false or forged, action as deemed fit may be initiated by TCIL at its sole discretion.

xi. Eligibility and experience details for OFC works (all figures in INR in Crores) other than MSEs.

<table>
<thead>
<tr>
<th>Sl.</th>
<th>Region</th>
<th>Single similar work</th>
<th>Two similar work</th>
<th>Three similar work</th>
<th>Annual average turnover</th>
<th>NW +SCC+SBG</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Uttarakhand Region</td>
<td>7.91</td>
<td>4.96</td>
<td>3.97</td>
<td>4.96</td>
<td>4.96</td>
</tr>
</tbody>
</table>

Eligibility details for OFC works (all figures in INR in Crores) for MSEs (Micro and Small Enterprises) registered vendors:-

<table>
<thead>
<tr>
<th>Sl.</th>
<th>Region</th>
<th>Single similar work</th>
<th>Two similar work</th>
<th>Three similar work</th>
<th>Annual average turnover</th>
<th>NW +SCC+SBG</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Uttarakhand Region</td>
<td>6.94</td>
<td>3.97</td>
<td>2.98</td>
<td>3.97</td>
<td>3.97</td>
</tr>
</tbody>
</table>

xii. A Consortium must comply the following requirements:

a) The consortium agreement must be submitted clearly identifying the “Lead Partner”. This authorization shall be evidenced by submitting with the bid a Power of Attorney signed by legally authorized signatories of all the partners. Application in consortium is permitted subject to a maximum of three (03) agencies. Qualifications and credentials of each partner shall be added for the purpose of eligibility criteria. “Lead Partner” of the consortium must have at least 50% of the experience criteria. In case Lead Partner nominated by the consortium does not meet the experience criteria, submitted bid shall not be considered. Each consortium partner shall be jointly and severally responsible for completing the task as per the contract. TCIL, in any case, will deal with the lead partner, who shall be responsible for execution of work. Payment shall be made to the Consortium and it shall submit valid PAN and GST Registration Number.

b) The bid may be signed by all members of the consortium. Alternatively, the leader may sign the bid. In such a case, the Power of Attorney from each member authorizing the leader for signing and submission of bid on behalf of individual member must accompany the bid offer.

c) The formation of consortium or change in the consortium character/partners after submission of the bid and any change in the bidding regarding consortium will not be permitted.

d) The bid submission must include documentary evidence to the relationship between consortium partners in the form of Consortium Agreement to legally bind all partners jointly and severally for the proposed agreement, which should set out the principles for the constitution, operation, responsibilities regarding work and financial arrangements, participation (percentage share in the total) and liabilities (jointly and severally) in respect of each and all of the firms in the consortium. Such consortium agreement must evidence the commitment of the parties to bid for the facilities applied for (if pre-qualified) and to execute the contract for the facilities if their bid is successful.
e) The consortium agreement must provide that the lead partner shall be authorized to incur liabilities and receive instructions for and on behalf of any and all partners of the consortium and the entire execution of the contract shall be done with active participation of the lead partner.

f) The contract agreement should be signed by each consortium partners so as to legally bind all partners jointly and severally and bid shall be submitted with a copy of the consortium agreement providing the joint and several liabilities with respect to the contract. Subsequent declarations/letters/documents shall be signed by lead partner authorized to sign on behalf of the consortium or authorized signatory on behalf of consortium.

g) The consortium agreement must specifically state that it is valid for the project for which bidding is done. If consortium breaks up midway before award of work and during bid validity period, bid will be rejected. If consortium breaks up midway before award of work and during bid validity/after award of work/during pendency of contract, in addition to normal penalties as per provision of tender document, all the partners of the consortium shall be debarred from participating in future bids for a minimum period of twelve (12) months.

h) Consortium agreement shall be registered in accordance with law so as to be legally valid and binding on the members before making any payment.

In case of separate entity by way of JV etc., then eligibility of the entity only shall be considered

1.6 PARTICIPATION IN THE TENDER

Vendors, whose Purchase Order(s) for Defence/ Navy Projects of TCIL was/were cancelled on risk & cost basis for non-performance or non-submission of performance guarantee, are not allowed to participate in the Tender. Bid submitted by such vendors shall be summarily rejected.

1.7 EARNEST MONEY AND TENDER DOCUMENT COST:

Earnest Money/Bid security should be Rs 5 Lacs in the form of Demand Draft payable at New Delhi/Delhi or Bank

Guarantee in the prescribed format from a Scheduled Bank having branch in New Delhi/Delhi, in favour of “Telecommunications Consultants India Limited” shall be submitted along with the tender valid for a period of 180 days from date of opening of tender.

Micro and Small Enterprises registered with the NSIC/MSME are exempted from submission of tender document fee on production of requisite proof in the form of valid certification from NSIC/MSME etc. for the tendered item/services in accordance to the MSME Act. Micro and Small Enterprises having Udhyog Aadhaar Memorandum are also entitled for the above exemption for which submission of valid Memorandum certificate is mandatory.

Note: Bidders must ensure regarding the exemption on their certificate from the concerned organisation. Bid received with MSME/NSIC certificate which in not valid for exemption of EMD will be summarily rejected.
1.8 TENDER DOCUMENT FEE:

Tender document fee is Rs. 20,000/- (Rupees Twenty Thousand only). In case bidder has downloaded the tender document, the same has to be submitted in form of Demand Draft in favour of “Telecommunications Consultants India Ltd.” Payable at New Delhi.

Micro and Small Enterprises registered with the NSIC/MSME are exempted from submission of tender document fee on production of requisite proof in the form of valid certification from NSIC/MSME etc. for the tendered item/services in accordance to the MSME Act. Micro and Small Enterprises having Udhyog Aadhaar Memorandum are also entitled for the above exemption for which submission of valid Memorandum certificate is mandatory.

Note: Bidders must ensure regarding the exemption on their certificate from the concerned organisation. Bid received with MSME/NSIC certificate which in not valid for exemption of Tender Fee will be summarily rejected.

1.9 INTEGRITY PACT:

“This tender is covered under Integrity Pact Programme of TCIL and Contractors are required to sign the Integrity Pact Document and submit same to TCIL along with the bids”.

Bidders may read the integrity pact and fill it properly including witness part of the document. Tender received without signed copy of the Integrity Pact document as instructed in section 2 will be liable to be rejected. In case of consortium agreement, all the partners will sign the integrity pact.

1.10 CONTACT INFORMATION:

<table>
<thead>
<tr>
<th>TCIL Contact-1</th>
<th>-</th>
<th>Mr. Joydeep Sinha, GGM (Defence), Telephone: 011-26202403, 26242412 E-mail ID: <a href="mailto:joysinha@tcil-india.com">joysinha@tcil-india.com</a></th>
</tr>
</thead>
<tbody>
<tr>
<td>TCIL Contact-2</td>
<td>-</td>
<td>Mr. S.K.Tata, GM (MM) Telephone: 011-2620 2410, 26241140 E-mail ID: <a href="mailto:srikrishna.tata@tcil-india.com">srikrishna.tata@tcil-india.com</a></td>
</tr>
<tr>
<td>E-Tendering</td>
<td>-</td>
<td>+91-11-26241790 (Multiple lines)</td>
</tr>
<tr>
<td>Help Desk Emergency</td>
<td>-</td>
<td>Mob: +91-9868393775, 9868393717, 9868393792 E-mail ID: <a href="mailto:ets_support@tcil-india.com">ets_support@tcil-india.com</a></td>
</tr>
</tbody>
</table>

The Contractor must officially procure/download the tender documents from TCIL before the last date and time of sale of tender document in order to bid for this tender.

The price Offers of only those parties who qualify in the first stage shall be opened at time and date to be notified separately.
TCIL reserves the right to accept or reject any or all the tenders without assigning any reason.

( P. Verma)
Group General Manager (MM)

-END OF SECTION-1-
SECTION-2

INSTRUCTIONS TO BIDDERS

2.1 INTRODUCTION

a. The “Purchaser” means Telecommunications Consultants India Ltd. (TCIL).
b. Purchaser’s representative means any officer of the purchaser appointed time to time by the purchaser to perform the duties, as shall be notified in writing to the bidder by the purchaser.
c. “Bidder” means the individual or firm or corporate body or Consortium or association of persons who participates in the tender and submits its bid. After acceptance of the bid & award of contract by the purchaser, he will be known as “contractor”.
d. “Client” means Bharat Sanchar Nigam Limited, Jan path, New Delhi also known as BSNL and PICG (Project Implementation Core Group).
e. The “Work” means all the works, which the bidder is required to carry out for the purchaser under the scope of this contract.
f. ”Letter of Intent” means the communication of the intention of the purchaser to the bidder to place the purchase order for the former’s offered goods/services.
g. “Purchase/Work Order (PO)” means the order placed by the Purchaser on the Supplier/service provider duly signed by the Purchaser’s authorized representative to purchase certain goods &/ or services from the vendor/contractor.
h. “Contract Price” means considerations payable to the supplier/contractor as stipulated in the Purchase or Work Order for performance of specified contractual obligations.

2.2 BIDDER TO BEAR COST OF PURCHASE OF TENDER

The Bidder shall bear all costs associated with the preparation and submission of the bid. The Purchaser in any case will not be responsible or liable for these costs regardless of the conduct of the bidding process.

2.3 BID DOCUMENTS

BID Document includes: -

Section 1 Notice Inviting Tender
Section 2 Instructions to Bidders
Section 3 General (Commercial) Conditions of the Contract
Section 4 Special Conditions of Contract
Section 5 Technical Specifications
Section 6 Format of Bid Bond/EMD
Section 7 Format of Performance Bank Guarantee (PBG)
Section 8 Bid Submission Form
Section 9 No Conviction Format
Section 10 Integrity Pact Format
Section 11 Format of Agreement
Section 12 Price Schedule
  Part- A
  Part- B
Section 13 Other Conditions and Specifications
Section 14 NDA Format
2.4 AMENDMENT TO BID DOCUMENTS

2.4.1 At any time, prior to the date of submission of bids, the Purchaser may for any reason, whether at its own initiative or in response to a clarification requested by a prospective bidder, modify the bid documents by amendments.

2.4.2 The amendments/Corrigendum will be notified on TCIL Website and CPP portal and these amendments will be binding on them. Bidders are advised to visit TCIL Website/their intimated e-mail regularly for updates on this Tender.

2.5. EXTENSION OF TIME

In order to give prospective bidders required time in which to take the amendments into action in preparing their bid, the Purchaser may at its discretion extend the deadline for submission of bid suitably.

2.6 BID PRICE

The prices quoted by the bidder shall remain firm during the entire period of the contract and shall not be subject to variation on any account. The bid submitted with a variation clause (unless asked by the Purchaser) will be treated as non-responsive and rejected.

2.7 BID SECURITY

2.7.1 The Bidder shall submit, as part of bid security as mentioned in the NIT. The bid security shall be in one of the following forms:-

(a) A Bank Guarantee as per enclosed format issued by a Scheduled Bank in favor of Purchaser valid for a period of 180 days from the date of tender opening.

(b) Demand Draft or Pay Order from a Scheduled Bank in favor of M/s Telecommunications Consultants India Ltd., payable at Delhi.

2.7.2 The bid not secured in accordance with the above shall be rejected by the Purchaser as non-responsive.

2.7.3 The bid security of the unsuccessful bidder will be discharged/ returned as promptly as possible as but not later than 30 days after expiry of the bid validity period prescribed by the Purchaser.

2.7.4 The successful bidder’s bid security will be discharged upon the bidder’s submission of the Performance Guarantee.

2.7.5 The bid security may be forfeited under the following circumstances:-

a) If a bidder withdraws his bid during the period of bid validity specified by the bidder on the bid form or modifies his bid/offer in a manner unacceptable to the TCIL during the period of validity of tender.

b) In case of a successful bidder, if he fails to submit the Performance Guarantee within the time prescribed or

c) If he fails to supply the materials/services in terms of the project or Commence the work, in accordance with the terms of the Contract.

2.7.6 No interest is payable on EMD.
2.7.7 In case of inadequacy or non-submission of prescribed EMD, the tender shall be deemed to be disqualified and shall be summarily rejected in the technical evaluation.

2.8 VALIDITY PERIOD OF BID

Bid shall remain valid for 120 days after the date of bid opening. The bid valid for a shorter period shall be rejected by the Purchaser as non-responsive.

In exceptional circumstances, the purchaser may request the consent of the bidder for an extension to the period of bid validity. The bid security as desire shall also be suitably extended. A bidder accepting the request and granting extension will not be permitted to modify his bid.

2.9 SIGNING OF THE BID

2.9.1 Each page of the bid document shall be signed by the contractor or a person duly authorized by him. The letter of authorization in the form of power of attorney shall be attached to the bid.

2.9.2 The bid shall not have any overwriting. In case of mistake, the matter is to be re-written a fresh after cutting the earlier one and it should be signed by the contractor.

2.10 CLARIFICATION OF BIDS:

2.10.1 During evaluation of bids, Purchaser may at its discretion ask the Bidder for clarifications/confirmations/deficient documents of its bid. The request for clarification and the response shall be in writing and no change in the price of substance of the bid shall be sought or permitted.

2.10.2 The Purchaser does not bind himself to accept the lowest or any tender and reserves to himself the right to accept the whole or any part of the tender and altering the quantities offered and tenderer shall supply the same at the rate quoted.

2.11 EVALUATION OF BIDS

2.11.1 The Purchaser shall evaluate the bids in respect to the substantive responsiveness of the bid or otherwise. The Purchaser shall carry out detailed evaluation of the substantially responsive bids. The Purchaser shall check the bid to determine whether they are complete, whether any computational errors have been made or required sureties have been furnished.

2.11.2 Arithmetical error shall be rectified on the following basis:-

a) If there is a discrepancy between the unit price and total price that is obtained multiplying the unit price and quantity, the unit price shall prevail and the total price shall be corrected by the Purchaser.

b) In case of discrepancy between words and figures, the amount in words shall prevail.

2.11.3 A bid determined as substantially non-responsive shall be rejected by the Purchaser.

2.11.4 The Purchaser may waive any minor infirmity or non-conformity or irregularity in the bid which does not constitute a material/service deviation.

2.11.5 The Purchaser shall evaluate in detail and compare the bids which are substantially responsive.
2.11.6 The evaluation of the ranking shall be carried out on the landed price of goods offered inclusive of all taxes.

2.11.7 The distribution of the tendered quantity amongst the technically and commercially complied bidders shall be based on the merits of each case.

2.11.8 TCIL shall have the sole discretion in deciding the number of parties on whom the orders shall be finally placed.

2.12 PURCHASER'S RIGHT TO VARY QUANTITIES

2.12.1 The Purchaser reserves the right any time to increase / decrease up to 25% of the quantity of the work mentioned in the work order issued to the Bidder depending upon the work requirement without any change in unit price of the ordered quantity.

2.12.2 The Purchaser reserves the right to subdivide the work among various contractors at L1 rates.

2.13 PURCHASER'S RIGHT TO ACCEPT ANY BID AND TO REJECT ANY OR ALL BIDS.

The Purchaser does not bind itself to accept lowest or any other tender/ bid and has the right to cancel the bidding process and reject all bids at any time prior to award of the contract without assigning any reason whatsoever and without thereby incurring any liability for the Purchaser’s action.

2.14 NOTIFICATION OF SUCCESSFUL BIDDER

Prior to the expiry of the validity of bid period, the Purchaser shall issue LOI to the successful Bidder and the bidder is required to confirm in writing that the offer has been accepted.

2.15 PURCHASER'S RIGHT TO AWARD THE WORK TO MORE THAN ONE BIDDERS

The Purchaser reserves the right to get this work done from more than one contractor at lowest (L-1) rate. Decision of the purchaser regarding splitting of work and award to more than one contractor at L-1 rate shall be final.

2.16 ISSUE OF WORK ORDER

The Purchaser reserves the right to issue the work order of whole the tendered quantities in one lot or in many lots after observing the performance of the contractor.

2.17 POST BID CLARIFICATIONS

No post bid clarification at the initiative of the bidders shall be entertained and any effort by the bidders to influence the Purchaser in the Purchaser’s bid evaluation, bid comparison or award of the contract shall result in rejection of the bid.

2.18 STANDARDS

The work done under the contract shall conform to the standard mentioned in the Technical Specifications of the bid document.
2.19  **SUB - LETTING**

Sub-Letting of the Contract is not permitted.

2.20  **SUBMISSION OF BID**

Bids shall be submitted online. Instructions regarding online submission are detailed in clause 2.22.

2.21  **MODIFICATION AND WITHDRAWAL OF BIDS**

2.21.1  The bidder may modify or withdraw his bid after bid submission, provided that written notice of the modification or withdrawal is received by the Employer prior to the deadline for submission of bids.

2.21.2  No bid shall be modified by the bidder after the deadline for submission of bids.

2.22  **INSTRUCTIONS REGARDING ONLINE BID SUBMISSION**

2.22.1  **Bidding Methodology:**

Single-stage Two-Bid System (Technical Part and Financial Part to be submitted at the same time) shall be followed.

2.22.2  **Broad outline of activities from bidders perspective:**

  i)  Procure Digital Signature Certificates (DSC) for users of the organization (if not procured earlier)
  ii) Register your organization on Electronic Tendering System® (ETS) Portal of TCIL (https://www.tcil-india-electronictender.com) if not already registered
  iii) Create Users and assign roles on ETS
  iv) Assign Tender to a department of your organization on ETS
  v) Download Official Copy of Tender Documents from ETS
  vi) Clarification to Tender Documents on ETS if permitted in Tender Document
      – Post query to TCIL (Optional)
      – View response to queries posted by TCIL
  vii) Online Bid-Submission on ETS
  viii) Attend Online Public Tender Opening Event (TOE) for Techno-Commercial Bid on ETS
       – Opening of Technical-Part
  ix)  Post-TOE Clarification on ETS (Optional)
      – Respond to TCIL’s Post-TOE technical queries
  x)  Attend Public Online Tender Opening Event (TOE) for Financial Bid on ETS
      – Opening of Financial-Part
      (Only for Technically Responsive bidders)

For participating in this tender online, the following instructions are to be read carefully. These instructions are supplemented with more detailed guidelines on the relevant screens of the ETS.
2.22.3 DIGITAL SIGNATURE CERTIFICATES

For integrity of data and its authenticity/non-repudiation of electronic records, and to become compliant with IT Act 2000, it is necessary for each user to have a Digital Signature Certificate (DSC), also referred to as Digital Signature Certificate (DSC), of Class 2 or above, issued by a Certifying Authority (CA) licensed by Controller of Certifying Authorities (CCA) [refer http://www.cca.gov.in].

2.22.4 REGISTRATION

To use the Electronic Tender® portal (https://www.tcil-india-electronictender.com) the Contractor need to register on the portal. Registration of Contractors organization is to be done by one of its senior persons who will be the main person coordinating for the e-tendering activities. In ETS terminology, this person will be referred to as the Super User (SU) of that organization. For further details, please visit TCIL’s e-procurement portal and click on the ‘Supplier Organization’ link under ‘Registration’ (on the Home Page), and follow further instructions as given on the site. Pay Annual Registration Fee as applicable:

Note: Annual Registration Fee is Rs. 3,000/- plus taxes for participating in TCIL’s tenders only. If the bidder/supplier wants to participate in e-tenders of all clients of TCIL’s e-procurement portal, the Annual Registration Fee is Rs. 6,000/- plus taxes. If a bidder/supplier is already registered on TCIL’s e-procurement portal, no further registration is required. The Annual Registration Fee can be submitted by the following modes:

i) Through online payment gateway of TCIL’s e-procurement portal.

ii) DD in favour of “Telecommunications Consultants India Limited” is to be submitted to Sr. Manager (F&A-IT), TCIL, TCIL Bhawan, 6th Floor, G.K.-I, New Delhi-110048.

Or

iii) Fee Amount can be deposited in TCIL’s Bank Account No. 000705038247 in ICICI Bank, Connaught Place Branch (IFSC Code: ICIC0000007) by electronic transfer and Transaction Details to be emailed to ets_support@tcil-india.com

2.22.5 ON-LINE SUBMISSION

The On Line Submission will have the following activities:

i) Submission of digitally signed copy of Tender Documents/ Addendum

ii) Submission of Acceptance/Rejection of General Terms & Conditions

iii) Submission of Acceptance/Rejection of Special Terms & Conditions

iv) Submission of particulars of EMD and Tender Fee

v) Submission of Technical Part as under:

- Submission of Electronic Form (Mandatory)
- Submission of Main Bid (Mandatory)
- Submission of Bid Annexure (Optional)
Technical Part must contain the following which is required to be submitted in the Main Bid/Bid Annexure:

i. Copy of the NDA duly signed with TCIL on a non-judicial stamp paper of Rs 100/-. NDA Format given at Section 14.

ii. Copy of valid PAN and GST Registration.

iii. The bidder should not be insolvent, in receivership, bankrupt or being wound up, not have had their business activities suspended and not be the subject of legal proceedings for any of the foregoing. Self certified document on company letter head in this regard may be submitted.

iv. Experience certificates along with the work orders & completion certificates issued by the client in support of their claim of experiences.

v. The Bidder should not have been blacklisted by Central /State Government Departments/ Public Sector Undertakings or other institutions. “No-conviction Certificate” duly signed on company letter head should be submitted.

vi. Bidder should submit the Annual Report containing duly audited Balance Sheet and Profit & Loss Account for the last three years as asked in the eligibility criteria’s head, Section-1 of the tender document.

vii. Company should not be in loss for last three consecutive years. The bidders are required to submit CA’s certified Net-worth (NW) Certificate as on 31.03.2017, Sanctioned Cash Credit (SCC) Limit and Sanctioned Bank Guarantee (SBG) Limit (both issued by the Bank) as per accounts of the bidder as on or after 31.03.2017

viii. Duly filled in Bid Submission Form

ix. Bidder shall submit affidavit (on non judicial stamp paper) along with the technical bid that he shall be able to arrange funds required for execution & shall not ask TCIL for any interim/advance payment with or without interest.

x. Copy of Certificate of Incorporation/Registration or any other relevant document, as applicable may be submitted along with a copy of address proof.

xi. In case of Bid in consortium, the consortium agreement must be submitted clearly identifying the “Lead Partner”.

xii. Contractors are also required to provide the self attested details of the available manpower, tools and machines with make n model like Splicing machines, OTDR, HDD, Power meter etc. for the execution of Maintenance Work.

xiii. Clause by clause acceptance to all the terms & conditions of the tender document.

xiv. Un-priced Price Bid Schedule duly stamped and signed by the authorized signatory.

xv. Any other document required for submission of the bid as asked in the tender document.

vi) Submission of Financial Part as under:

- Submission of Electronic Form (Mandatory)
- Submission of Main Bid (Mandatory)
- Submission of Bid Annexure (Optional)

Financial Part must contain the Price Bid Schedule as per Section-12.

The entire bid-submission as above would be online on ETS.

2.22.6 OFFLINE SUBMISSIONS:

The Bidder is requested to submit the following documents offline (i.e. physically) to GGM (MM), TCIL Bhawan, 4th Floor, Greater Kailash-I, New Delhi-110 048 before the due date & time of submission in a Sealed Envelope, the envelope shall bear, the Tender No. & Description and the words ‘DO NOT OPEN BEFORE’ (due date & time):

- Receiving of Tender Fee submitted.
- EMD in the form of Demand Draft/Bank Guarantee
Integrity pact duly stamped & signed complete including details & signature of the witness’s. 

Note:- In case of Consortium/JV, the Integrity Pact is to be signed by all the partners of Consortium/JV.

Original Power of attorney duly notarized

Affidavit on a non-judicial stamp paper to arrange funds required for execution & shall not ask TCIL for any interim/advance payment with or without interest should be submitted in original.

In case of Consortium/JV, original agreement copy shall be submitted.


2.22.7 SPECIAL NOTE ON SECURITY OF BIDS:

Security related functionality has been rigorously implemented in ETS in a multi-dimensional manner. Starting with 'Acceptance of Registration by the Service Provider', provision for security has been made at various stages in Electronic Tender's software. Specifically for Bid Submission, some security related aspects are outlined below:

As part of the Electronic Encrypter™ functionality, the contents of both the ‘Electronic Forms’ and the ‘Main-Bid’ are securely encrypted using a Pass-Phrase created by the Contractor himself. Unlike a 'password', a Pass-Phrase can be a multi-word sentence with spaces between words (eg. I love this World). A Pass-Phrase is easier to remember, and more difficult to break. It is recommended that a separate Pass-Phrase be created for each Bid-Part.

Typically, ‘Pass-Phrase’ of the Bid-Part to be opened during a particular Online Public Tender Opening Event (TOE) is furnished online by each Contractor during the TOE itself, when demanded by the concerned Tender Opening Officer. A bid cannot be opened without a correct Pass-Phrase.

It may also be noted that if a Contractor fails to furnish the correct Pass-Phrase during the TOE of Technical Part, the bid shall be rejected. If the Contractor fails to furnish the correct Pass-Phrase during the TOE of Financial Part, not only shall the bid be rejected but also the EMD shall be forfeited.

There is an additional protection with SSL Encryption during transit from the client-end computer of a Supplier organization to the e-tendering server/portal.

2.22.8 ONLINE PUBLIC TENDER OPENING EVENT (TOE)

ETS offers a unique facility for ‘Online Public Tender Opening Event (TOE)’. Tender Opening Officers as well as authorized representatives of Contractors can attend the Online Public Tender Opening Event (TOE) from the comfort of their offices. For this purpose, representatives of Contractors (i.e. Supplier organization) dully authorized are requested to carry a Laptop and Wireless Connectivity to Internet.

Every legal requirement for a transparent and secure ‘Online Public Tender Opening Event (TOE)’ has been implemented on ETS.

As soon as a Bid is decrypted with the corresponding ‘Pass-Phrase’ as submitted online by the Contractor himself (during the TOE itself), salient points of the Bids are simultaneously made available for downloading by all participating Contractors. The tedium of taking notes during a manual ‘Tender Opening Event’ is therefore replaced with this superior and convenient form of ‘Online Public Tender Opening Event (TOE)’.

ETS has a unique facility of ‘Online Comparison Chart’ which is dynamically updated as each online bid is opened. The format of the chart is based on inputs provided by TCIL for each Tender. The information in the Comparison Chart is based on the data submitted by the Contractors. A detailed Technical and/ or Financial Comparison Chart enhances Transparency. Detailed instructions are given on relevant screens.
ETS has a unique facility of a detailed report titled ‘Minutes of Online Tender Opening Event (TOE)’ covering all important activities of ‘Online Tender Opening Event (TOE)’. This is available to all participating Contractors for ‘Viewing/ Downloading’.

2.22.9 OTHER INSTRUCTIONS

For further instructions, the Contractor should visit the home-page of the portal (https://www.tcil-india-electronic Tender.com), and go to the User-Guidance Center The help information provided through ‘ETS User-Guidance Center’ is available in three categories – Users intending to Register / First-Time Users, Logged-in users of Buyer organizations, and Logged-in users of Supplier organizations. Various links are provided under each of the three categories.

**Important Note:** It is strongly recommended that all authorized users of Supplier organizations should thoroughly peruse the information provided under the relevant links, and take appropriate action. This will prevent hiccups, and minimize teething problems during the use of ETS.

The following ‘**FOUR KEY INSTRUCTIONS for CONTRACTORS**’ must be assiduously adhered to:

i) Obtain individual Digital Signature Certificate (DSC or DC) well in advance of tender submission deadline on ETS

ii) Register your organization on ETS well in advance of tender submission deadline on ETS

iii) Get your organization’s concerned executives trained on ETS well in advance of tender submission deadline on ETS

iv) Submit your bids well in advance of tender submission deadline on ETS (There could be last minute problems due to internet timeout, breakdown, etc.) While the first three instructions mentioned above are especially relevant to first-time users of ETS, the fourth instruction is relevant at all times.

2.22.10 MINIMUM REQUIREMENTS AT CONTRACTORS END

- Computer System with good configuration (Min P IV, 1 GB RAM, Windows XP SP3)
- Broadband Internet Connectivity.
- Microsoft Internet Explorer 6.0 or above
- Digital Certificate(s)

2.22.11 BIDDERS TRAINING PROGRAM

One day training (10:00 hrs. to 17:00 hrs.) is arranged on payment basis which is scheduled on 15.03.2018, at TCIL Bhawan, Greater Kailash-I, New Delhi-110048. Training is optional. Contractors opting for Training shall have to pay Rs. 2,500 + Taxes by Demand Draft in favor of “Telecommunications Consultants India Limited” payable at New Delhi and are required to carry a Laptop with device for Wireless Connectivity to Internet as TCIL will not provide Internet connectivity to the trainees. Contractors are required to inform number of participants from their organization latest 2 working days prior to training schedule to the email-id of e-Tendering Helpdesk mentioned in the Contact Information given in Section-1.

**Note:**--Bidders are advised to take training to make them familiar with the procedure of E-Tendering and download/upload the documents with in the scheduled time .In case of any failure of the bidder in downloading/uploading of the bids because of any of the reasons whatsoever is, TCIL will not be responsible for it.
2.23 DEADLINE FOR SUBMISSION OF BIDS

The Bid must be received by the TCIL at the below given address not later than 15:00 Hrs (IST) on the notified date of opening of the tender. Offers sent by hand delivery should be put in the Tender Box at the specified office not later than 1500 Hrs. (IST) on the specified date. All out-station tenders, if sent by post, should be sent under registered cover. The bidder is requested to submit the documents to GGM (MM), TCIL Bhawan, 4th Floor, Greater Kailash-I, New Delhi-110 048. The envelope shall bear, Tender No. & Description and the words ‘DO NOT OPEN BEFORE’ (due date & time).

2.24 LATE BIDS

2.24.1 Bidders are advised in their own interest to ensure that bid reaches the specified office well before the closing date and time of the bid.

2.24.2 Any bid received after dead line for submission of bid, will be rejected and returned unopened.

2.25. OPENING OF BIDS

The bid will be opened at 1530 Hrs. (IST) on the date of opening indicated in "Notice inviting tender". The Bidder or his authorized representative may be present at the time of opening of bid on the specified date. In case of unscheduled holiday on the closing/opening day of bid, the next working day will be treated as scheduled prescribed day of closing/opening of bid; however the time notified remaining the same. Financial bid of those bidders will be opened whose EMD, NDA and Integrity pact documents will be found submitted.

2.26 OPENING OF FINANCIAL BIDS

Price offers of only those bidders, who have participated in this tender and are found Techno commercially qualified, will be opened. Representative of the qualified parties may attend the Online Price Bid opening.

2.27. INTEGRITY PACT PROGRAMME

2.27.1 As a part of implementation of Integrity Pact Programme (IPP) in TCIL, all tenders with the estimate value equal to or exceeding the threshold value will be covered under the Integrity Pact Programme (IPP) and the vendors are required to sign the IP document and submit the same to TCIL before or along with the bids. The present threshold value is Rs. 1 Crore (Rupees One Crore).

2.27.2 Even in case of tenders with the estimated value less than the threshold value, the vendors would be required to sign the IP document if the total value of the Purchase Orders (POs) exceeds the threshold value in respect of:

- Multiple/repeat Pos on the single vendors against a tender
- POs placed on multiple vendors against a tender

2.27.3 Only those vendors who have purchased the tender document and signed the IP document can send their grievances, if any, to the Independent External Monitors (IEMs) through the nodal officer, i.e. Chief Vigilance Officer (CVO). TCIL in the prescribed proforma.

NAME OF IEMS WITH THEIR CONTACT DETAILS:

i) Shri. A.K.Garg, Independent External Monitor  
   E-mail ID: akgarg1654@gmail.com

ii) Shri V.V.R. Sastry, Independent External Monitor  
    Email ID: sastryvvr@gmail.com
NAME & CONTACT DETAILS OF NODAL OFFICER (IP) IN TCIL:
Ms. Hardeep Kaur, Chief Vigilance Officer
E-mail ID: hardeep@tcil-india.com

2.27.4 If the Order, with total value equal to or more than the threshold value, is split to more than one vendor and even if the value of PO placed on any/each vendor(s) is less than the threshold value, IP document having been signed by the vendors at bid stage itself, the Pact shall continue to be applicable.

2.27.5 In respect of tenders for Pre-bid tie up/Expression of Interest (EOI) : In case of TCIL getting the Order from the client, before placement of Purchase Order/Work Order on technically & commercially qualified vendor, the selected vendor is required to sign the IP document.

2.27.6 IP document shall be in plain white sheet and to be signed by the vendor and TCIL with two witnesses from each party. The name, designation, company etc. of the persons signing the IP document and the project/tender name shall be clearly mentioned. All pages of the IP document shall be initialled by both parties along with company seal.

2.27.8 Tender received without signed & stamped copy of the Integrity Pact document will be liable to be rejected, and the bidder himself will be responsible for that.

2.28 ADVICE TO BIDDERS FOR AVOIDING REJECTION OF THEIR OFFERS

TCIL has to finalize its purchase within a limited time schedule. Therefore, it may not be feasible for TCIL to seek clarifications in respect of incomplete offers. Prospective bidders are advised to ensure that their bids are complete in all respects and conform to TCIL’s terms, conditions and bid evaluation criteria of the tender. Bids not complying with TCILs requirement may cause for rejection of their bids.

2.29 SUBMISSION OF FORGED DOCUMENTS

Bidders should note that TCIL may verify authenticity of all the documents/certificate/information submitted by the bidder(s) against the tender. In case at any stage of tendering process or Contract/PO execution etc., if it is established that bidder has submitted forged documents/certificates/information towards fulfillment of any of the tender/contract conditions, TCIL shall immediately reject the bid of such bidder(s) or cancel/terminate the contract and forfeit EMD/SD submitted by the bidder.

The bidder shall be required to give an undertaking on the company’s letter head and duly signed by the signatory of the bid, that all the documents/certificates/information submitted by them against the tender are genuine. In case any of the documents/certificates/information submitted by the bidder is found to be false or forged, action as deemed fit may be initiated by TCIL at its sole discretion.

2.30 CANCELLATION OF LETTER OF INTENT/ PURCHASE ORDER

Failure of the successful bidder to comply with the requirement of submission of Performance Guarantee in time shall constitute sufficient ground for the cancellation of the acceptance of bid and forfeiture of the bid bond, in which case Purchaser may make the offer to any other bidder at the discretion of the Purchaser or call for new bids.

-END OF SECTION-2-
SECTION-3

GENERAL (COMMERCIAL) CONDITIONS OF THE CONTRACT

3.1 GENERAL OBLIGATIONS

3.1.1. The bidder shall, subject to the provisions of the contract, and with due care and diligence, execute the works and provide all labour, including the supervision thereof, materials and all other things, whether of a temporary or permanent nature, required in and for such execution, so far as the necessity for providing the same is specified in or is reasonably to be inferred from the contract.

3.1.2 The bidder shall take full responsibility for the adequate stability and safety of all site operations and methods of construction.

3.1.3 The bidder hereby agrees to execute the work according to the conditions of contract and agreement.

3.1.4 In case of damage to property e.g. Telephone/Electric Cables and Water/Sewer lines etc, the same shall be recovered from the contractor’s bills and responsibility of claims from the insurance, if any shall be that of the contractor.

3.1.5 The contractor shall use every reasonable means to prevent any of the highways or bridges communicating with or on the routes to the site from being damaged.

3.1.6 During the progress of the work the contractor shall keep the site reasonably free from all unnecessary obstructions and shall dispose the surplus materials to clear the site from any wreckage and rubbish.

3.1.7 On the completion of the works the contractor shall clear 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 workmen like condition to the satisfaction of the Company.

3.2 PRICE APPLICABILITY

Prices in the Purchase Order shall remain valid for the period of delivery schedule or extended delivery schedule. In case of delayed supplies, after delivery period, the advantage of reduction of taxes/duties shall be passed onto the Purchaser and no benefit of increase will be permitted to the Supplier.

3.3 INSURANCE

3.3.1 The purchaser shall not be liable in respect of any damages or compensation payable by law in respect or in consequence of any accident or injury to any machine, workman or other person in the employment of the contractor or any third person. The contractor shall indemnify and keep indemnified the purchaser against all such damages and compensation, save and except as aforesaid.

3.3.2 The contractor shall, and maintain throughout the period of his contract, public liability and property damages liability insurance with the coverage.

3.3.3 The vendor shall take insurance policy in its name for the Project.

In case, the purchaser decides to take project policy by them then contractor need not to take the insurance policy, however, the proportionate amount spent by TCIL in Purchase of that policy shall
be deducted from the contractor’s bill. Still the settlement of the case with insurance company shall be the responsibility of the contractor.

3.4 **COMMENCEMENT TIME AND DELAYS:-**

The AMC of thirty six months for an OFC Link shall be started by the successful bidder as per notification issued by TCIL to the bidder.

3.6 **LIQUIDATED DAMAGES**

No L.D. conditions are applicable in this tender.

3.6 **CHANGE ORDERS**

3.6.1 The Purchaser may at any time by written order given to the contractor make changes within the general scope of the contract in any one or more of the following:-

a) Drawings, designs or specifications where goods to be furnished under the contract are to be specifically manufactured for the Purchaser.

b) Method of transportation or packing.

c) Place of delivery.

d) Services to be provided by the contractor.

3.6.2 If any such change causes an increase or decrease in the cost or the time required for the execution of the contractor, an equitable adjustment shall be made in the contract price or delivery schedule or both and the contract shall accordingly be amended.

3.7 **PERFORMANCE BANK GUARANTEE (PBG):**

3.7.1 Within 15 days of the issue of the Letter of Intent (LOI), the Contractor shall furnish a Performance Security in the form of a Bank Guarantee for an amount equivalent to 10% of the contract value issued by a schedule Bank from its branch in Delhi in the prescribed format given in Section-7 of this tender and also sign the Contract Agreement within this period.

3.7.2 The proceeds of the performance security shall be payable to the purchaser as compensation for any loss resulting from the contractor’s failure to complete its obligations under the contract.

3.7.3 The performance security will be discharged by the purchaser after completion of contractor’s obligations, including any warranty obligations, under the contract.

3.7.4 PBG should be valid up to 6 (Six) months beyond the date of completion of the AMC/warranty period for the Region (3 years).

3.7.5 Failure of the successful bidder to submit the above mentioned Performance Security or signs the Contract Agreement or in case of bidders’ failure to complete its obligations under the contract shall constitute sufficient ground for the annulment of the award / cancellation of the award of work and forfeiture of the bid security.

3.7.6 Additionally, the purchaser reserves the right to debar such defaulting bidder from participating in future bids for a minimum period of 12 (twelve) months.
3.8 PAYMENT TERMS:

3.8.1 Fixed Charges

3.8.1.1 Annual Maintenance Charges for providing maintenance services for NFS OFC shall be paid in four equal installments at the end of each quarter after deduction of penalties, if any.

3.8.1.2 Maintenance team has to be deployed on as required basis as directed by TCIL, payment shall be made on per Kilometer basis.

3.8.1.3 The fixed charges for AMC shall be for Patrolling as well as providing Preventive and Corrective Maintenance.

3.8.1.4 The amount payable against the maintenance charges shall be calculated after deduction of any amount calculated based on the MTTR of faults taken by the Bidder for the restoration of all NFS OFC link cuts/faults as well as the number of faults that have occurred during each billing period of three months. Mean repair time does not include the down time taken for planned works like diversion of NFS OFC, re-termination etc.

3.8.1.5 Quarterly charges will be paid only after the submission of a relevant certificate by the concerned Client and TCIL officers stating that the NFS OFC maintenance has been carried out satisfactorily as per the contract agreement during the relevant quarter by the vendor.

3.8.1.6 Proformas to be submitted for claiming fixed charges on a quarterly basis are as given below:-

- Splice loss / dB loss Vs Km in section.
- OTDR measurements.
- Power measurements.
- Patrolling reports.
- Attendance report.
- Material check report.
- Failure / rectification report (Form-A & B).
- Availability of essential equipments.

3.8.2 Variable Charges

3.8.2.1 The bidder is required to replace/re route/repair the OFC routes (NLD / Access OFC) as per the specification given in the tender.

3.8.2.2 The bidder is required to provide only services for replacement/rerouting/repair of NLD OFC / Access route. The OFC, PLB and other accessories included in the supply component of this tender shall be provided by TCIL.

3.8.2.3 The variable charges for the services will be paid as per the rates contracted in this tender.

3.8.2.4 Variable charges for the replacement/re-routing of OFC shall be paid on back to back basis as and when corresponding payment is received from the Client.

3.8.2.5 ROW charges for re-routing paid by the vendor shall be reimbursed on actuals on submission of proof of payment on back to back basis when corresponding payment is received from client.
3.9 RECOVERY FOR LESSER DEPTH IN CASE OF RE-ROUTING / REPLACEMENT OF OFC:

Recovery for lesser depth shall be as per tender condition of client.

In case of lesser depth proportionate payment would be made for the portion of fresh Trenching & Ducting work as explained below:

Payable Amount = (Approved Rate) x (Actual Depth in cm) / 165.

In case vendor is not able to achieve full depth, the bidder shall take prior permission of BSNL/Client for digging lesser depth based on site constraints such as rocky area, presence of pipelines, power cables etc.

Note: All the above payments are subject to the deduction of tax.

3.10 TAXATION & DUTIES

Contractor’s prices shall be all inclusive of all taxes and duties.

3.11 RISK PURCHASE

3.11.1 In the event of Supplier’s failure to execute the contract to the satisfaction of the Purchaser, the Purchaser reserves the right:

(a) to reject any part of the Contract executed and withhold payment for such portion of the Contract till such time the defects are rectified to the satisfaction of the Purchaser.

(b) to terminate the Contract by giving 2 weeks’ notice in writing without assigning any reason and to get the Contract executed by other agency at the risk and cost of the Supplier.

3.12 APPLICABLE LAWS

This contract shall be interpreted, construed and governed by the laws of the Republic of India and the parties hereby submit to the exclusive jurisdiction of the Court at Delhi and to all Courts at Delhi having jurisdiction in appeal there from.

Any dispute in relation to the contract shall be submitted to the appropriate Court of the Republic of India for determination. The parties to the contract shall continue to fulfill their respective obligations under the contract during the currency of the contract pending the final decision of the Court.

3.13 GENERAL LIEN

Whenever under this contract any sum of money is recoverable from and payable by the contractor, the purchaser shall be entitled to recover such sum by appropriating in part or in whole the security deposit of the contractor, if a security is taken from the contractor. In the event of the Security being insufficient or if no security has been taken from the contractor, the balance or the total sum recoverable, as may be, shall be deducted from any sum due to the contractor or which at any time thereafter may become due to the contractor under this or any other contract with the purchaser. Should this sum be not sufficient to cover the full amount recoverable, the contractor, shall pay to the purchaser on demand the remaining balance due.
3.14 FORCE MAJEURE

Contractor shall be exempted from the responsibility for any non-performance arising from a case of force majeure or Act of God, hereinafter called force majeure (a) war and (b) earthquake. If such circumstances should arise, the contractor shall inform the purchaser within 72 hours in writing of the existence of the fact before suspending work without penalty on either side from the period of such suspension not exceeding 3 months. Likewise, it must proceed to inform the end of such fact. As soon as the facts constituting a force majeure cease in their effects, the contractor shall restart or continue the fulfillment of its obligations agreed upon. Should suspension of work as explained above exceed three months, the contract shall be violable at the option of either party without penalty on either side.

3.15 ARBITRATION

a) Reconciliation

Any dispute arising from or in connection with this contract be referred to conciliation according to the Part-III of the Arbitration and Conciliation Act, 1996. Any dispute not referred for conciliation or a dispute which exists after termination of the conciliation procedure shall be decided by arbitration. The conciliator is to be appointed by the Managing Director of TCIL.

b) Arbitration

All disputes or differences whatsoever arising among the parties under and/or in connection with and/or in respect of this tender shall be referred to and decided by a sole arbitrator, who shall be appointed by the CMD, TCIL. The arbitration shall be conducted in accordance with Arbitration and Conciliation Act of 1996 and the venue of the arbitration shall be in New Delhi. The proceedings of arbitration shall be in English language.

In case the contractor wants to take the dispute to a court of law after arbitration award as aforesaid, it is clearly understood that only courts in Delhi shall have the jurisdiction.

For Public Sector Undertaking/Government Departments: In the event of any dispute or difference relating to the interpretation and application of the provisions of the contract with any Public Sector Undertaking/Government Department, such dispute or difference shall be referred by either party for arbitration to the sole Arbitrator in the Department of Public Enterprises to be nominated by the Secretary to the Government of India in-charge of the Department of Public Enterprises. The Arbitration and Conciliation Act, 1996 shall not be applicable to arbitration under this clause. The award of the arbitrator shall be binding upon the parties to the dispute, provided, however, any party aggrieved by such award may make a further reference for setting aside or revision of the award to the Law Secretary, Department of Legal Affairs, Ministry of Law & Justice, Government of India. Upon such reference, the dispute shall be decided by the Law Secretary or the Special Secretary/Additional Secretary, when so authorized by the Law Secretary, whose decision shall bind the parties finally and conclusively. The parties to the dispute will share equally the cost of arbitration as intimated by the arbitrator.

3.16 PRICE BASIS:-

3.16.1 Price quoted should be in Indian Rupees, inclusive of all taxes. The Bidder shall give the total composite price in Indian Rupees inclusive of all Levies & Taxes as per the Section 12, Part-A, PRICE SCHEDULE. The offer shall be firm in Indian Rupees and detailed region wise pricing shall
be given as per Section 12, Part-B, PRICE SCHEDULE. Prices for both Fixed AMC and Rerouting have to be quoted.

3.16.2 A bid submitted with an adjustable price quotation will be treated as non responsive and rejected.

3.16.3 Price shall be inclusive of all taxes & firm during the currency of project. However, any reduction in taxes, has to be passed on to the purchaser. Any increase in taxes shall be on the part of the bidder.

3.16.4. Bidder shall indicate taxes separately in his invoice & submit Tax invoice only.

3.16.5. Evaluation of bid will be made based on total price inclusive of tax.

3.16.6. Bidder must have valid GST registration in the state where work is to be executed. In case GST registration is not available, the bidder shall give undertaking that it will get registered before start of work, if work is awarded to them.

3.17 HANDLING OF UNDERGROUND SERVICES

Utmost care should be taken to protect all underground services at work site. Contractor shall be responsible and indemnify TCIL against all the damages. If any claim is levied by the concerned Authority/Department or Individual, the same shall be recovered from the Contractor’s bills.

3.18 ISSUE OF MATERIALS

a) The Contractor will be responsible to check the quantity and quality of material at the time of issue and will be responsible for the materials including its quality from the time of issue onwards. He will take delivery of the required quantity only and no pile up of the store is allowed.

b) Transportation of machineries, tools and testers from TCIL/BSNL store/warehouse to the various sites and manpower etc required for the execution of the work shall be contractor’s responsibility.

c) Contractor is required to submit the material account at the end of each quarter, otherwise the cost of the material issued & not utilized shall be recovered from his bills.

3.19 HANDLING AND TRANSPORT

Contractor shall issue the material to the contractor from BSNL/TCIL Warehouse.

The material should be transported and handled by the contractor at his own cost in the proper manner so that the quality and functionality of the material are not affected.

3.20 DISCREPANCY

In case of any discrepancy between the nomenclature of the item, drawing, technical specifications, plant unit definition etc., the decision of the Company will be final & binding.

3.21 LABOUR LICENCE

The contractor shall be registered in Labour Department/ or any other department, as required by law, to carry out such works.
3.22 DISCIPLINE

CONTRACTOR shall carry out operations hereunder with due diligence and in a safe and workmanlike manner according to good practice. CONTRACTOR shall maintain strict discipline and good CONTRACT among its employees and its labor, and shall abide by and conform to all rules and regulations.

3.23 SAFETY AND LABOUR LAWS

CONTRACTOR shall comply with the provision of all laws including Labour Laws, rules, regulations and notifications issued there under from time to time. All safety and labour laws enforced by statutory agencies and by TCIL shall be applicable in the performance of this CONTRACT and CONTRACTOR shall abide by these laws.

3.24 THE BIDDER BECOMES DEFAULTER ON THE FOLLOWING CONDITIONS

3.24.1 If he fails to repair fault and make the NFS OFC link available within 12 hours.
3.24.2 Improper maintenance resulting in down time/ consumables/ loss of parts.
3.24.3 Loss or damage to PICG property due to the acts of Bidder.
3.24.4 In the event PICG receive notice from any statutory authorities or from external agencies on account of loss/damage to their property due to the acts of Bidder.
3.24.5 During the contract period, if the BIDDER has defaulted more than once or the defaulting case of the Bidder is severe, then PICG has the right to terminate the contract and forfeit the security deposit, if deemed required as per PICG’s opinion.

3.25 TERMINATION OF CONTRACT

TCIL reserves the right to interrupt and terminate the contract at any time after giving one month’s notice, should in TCIL opinion, the cessation of work become necessary, owing to paucity of funds of the Bidder, the Bidder’s apparent inability to perform, non possession of equipments and tools required for the work or defective and malfunctioning equipments, non-availability of proper/nominated instrumentation, inability to provide men and material, repeated slippages and payment of penalty thereof or for any other cause deemed reasonable.

The security deposit will be forfeited / Performance Bank guarantee shall be cashed in such case of termination, if deemed required as per TCIL opinion.

3.26 TERMINATION FOR DEFAULT

3.26.1 The Purchaser may, without prejudice to any other remedy for breach of contract, by written notice of default, sent to the Bidder, terminate this contract in whole or in part.

3.26.1.1 If the Bidder fails to deliver any or all of the goods/work within the time period(s) specified in the contract, or any extension thereof granted by the purchaser pursuant to implementation schedule.

3.26.1.2 If the Bidder fails to perform any other obligation(s) under the Contract; and

If the Bidder, in either of the above circumstances, does not remedy his failure within a period of 15
days (or such longer period as the purchaser may authorize in writing) after receipt of the default notice from the purchaser.

3.26.2 In the event the purchaser terminates the contract in whole or in part pursuant to the above Para, the purchaser may procure, upon such terms and in such manner as it deems appropriate, goods/works similar to those undelivered and the Bidder shall be liable to the Purchaser for any excess cost for such similar goods/works. However the Bidder shall continue the performance of the contract to the extent not terminated.

3.27 TERMINATION FOR INSOLVENCY
The Purchaser may at any time terminate the Contract by giving written notice to the Bidder, without compensation to the Bidder. If the Bidder becomes bankrupt or otherwise insolvent as declared by the competent court provided that such termination will not prejudice or affect any right of action or remedy which has accrued or will accrue thereafter to the purchaser.

-END OF SECTION-3-
Section- 4

SPECIAL CONDITIONS OF THE CONTRACT

4.1. Bidder’s special attention is invited to the fact that all SoR material (OFC cable of types A, B and C as per NFS specification, PLB duct, Electronic Route Markers, Electronic Route Locators, Warning Tape, Joint Closures, FDMS) shall be arranged /supplied by TCIL for Maintenance and Re-routing works and hence need NOT be included in the quoted cost of AMC. However the maintenance service and non-SoR material required for maintenance and re-routing works including CRM, Manhole/Handhole and any special protection materials needed as per specifications, have to be supplied by the bidder free of cost. The material used by bidder, in such cases, should be of approved quality failing which appropriate penalty shall be imposed to the extent of cost of getting the work done by other agency.

4.2. Warranty for a period of 18 months from date of commissioning of the Links for Non-SoR material (Manhole, Handhole and CRM) and services for faults due to workmanship rendered during commissioning of Links is responsibility of TCIL’s earlier vendor who has commissioned the Link, and the bidder shall not include cost of the same in its bid price, whereas warranty for these non-SoR items for the remaining period of 3 years warranty period shall be responsibility of the bidder. Link wise dates after which such warranty services for Non-SoR material and services will be required to be included in the scope of work of this bid shall be shared with bidders after they sign the Non-Disclosure Agreement with TCIL.

4.3. Before quoting, the bidders are advised to ascertain the nature of work involved. If required, site inspection can be undertaken.

4.4. Bid should be submitted for the maintenance and rerouting work during the entire AMC period of three year.

4.5. The Bidder as part of his bid is required to submit a detailed plan for the maintenance of the network including the details of the manpower and equipments proposed to be located at different sites to cover the jurisdiction. The plan shall include communication facilities, the planned maintenance bases and the detailed plans to fulfill the tender conditions.

4.6. Bidders are advised to submit their quotations strictly based on the terms, conditions, and specifications in the tender document and not to stipulate any deviations.

4.7. The submission of bid will be deemed to imply that the Bidder has studied and understood the requirement given in this section and the bidder is aware of the full scope of the maintenance work to be done and the conditions affecting the execution during AMC period.

4.8. While quoting, it is advisable that the prospective bidder shall make themselves fully conversant with the locations, NFS OFC routes and types of jobs in details to be carried out therein as per the tender requirement, so that they clearly understand the scope of work and assess the requirement of resources to complete the work in scheduled time.

4.9. The bidder is deemed to have understood the conditions of existing NFS OFC routes like terrains, various crossings, access details, on-route Client maintenance bases etc., by visiting the sites and collecting first hand information before submission of the offer. In case of any doubt, the clarification may be taken from the TCIL before submission of the offer.

4.10. Submission of monthly & emergency report as desired by Network Manager in the Performa
specified by TCIL will also be a part of maintenance contract.

4.11. The BIDDER shall be totally responsible for the successful execution of the NFS OFC route maintenance contract.

4.12. The Bidder shall not sub-contract whole or any part of the work without explicit clearance from TCIL.

4.13. The data provided in the Tender document shall be used by the Bidder for reference and information purpose only. It shall be the bidder’s responsibility to verify the data & satisfy himself in regard to accuracy of data.

4.14. The bidder shall be responsible for making an arrangement at each maintenance station for excavation works, testing, measuring, splicing equipments, unskilled/skilled manpower, transport facilities for their teams & other logistic supports required to maintain end-to-end NFS OFC connectivity in physical layer as per the contract.

4.15. Before deployment of maintenance team the bidder should furnish the details of personnel i.e Name, technical qualification, and experience along with attested signature. No manpower or equipment can be changed without prior ascertaining the suitability by Rep of TCIL approval. Each such change shall be reported in writing prior to changing to Rep of TCIL.

4.16. The responsibility of the bidder shall include provision of preventive measures of NFS OFC routes to avoid damage and cut, deployment of manpower, supply of required materials, erection, installation, testing, documentation, including the related civil works necessary for ensuring the complete end-to-end NFS OFC connectivity in physical layer as described in the tender document at no extra cost.

4.17. The material used & workmanship shall satisfy the standard specifications given in this tender.

4.18. SoR Material (as a supply part of this contract) shall be supplied by TCIL at their warehouses. From Warehouse to actual site of place of execution contractor/bidder shall make his own arrangement for transportation and storage of material at his own cost.

4.19. TCIL/Client shall be entitled to reject the goods, materials and work executed by the bidder, which may not be conforming to the specifications within a reasonable time of installation of the said goods and materials and charge the bidder for all expenses direct and consequential, incurred thereby.

4.20. Where it is mentioned in the specifications that the bidder shall perform certain work for completing the job in totality, it is understood that the bidder shall do so at his own cost and contract price shall be deemed to have included cost of such performances and provisions so mentioned.

4.21. The bidder shall be totally responsible for the calibration & functionality of test equipment to be used at site. All the Tools & Test instruments shall be duly certified by the authorized agency. Bidder should not shift the test instruments from the site and is liable to be penalized if found so.

4.22. The Bidder to provide safety appliances like: dust masks, safety belt, safety shoes, helmet, hand gloves, safety goggles, rain gears etc to their personnel working.

4.23. During any construction work in public places, all precautionary caution boards, barricading sheets as per standard laws & rules to be used by the Bidder.
4.24. During the course of execution of the work, if any discrepancy or inconsistency, error or omission in any of the provisions of the contract is discovered which needs to be clarified, the matter shall be referred to TCIL who shall give his decision in the matter and his decision shall be final and conclusive.

4.25. Entry pass shall be issued to the representatives of the bidder by respective Client headquarters from the respective maintenance stations for handling all maintenance work in Client area. The bidder should ensure that the team employed by him shall not move or trespass to areas other than the site(s) required for the execution of the work. Under no circumstances the Bidder should infringe and carry out the work which hamper the Operations and Safety of the Client, its movements and damage to NFS assets. The bidder is responsible for the safety of team members while executing the work in the Client areas.

4.26. The work is subjected to inspection at all times by TCIL officials. The bidder shall carry out all instructions given by him or his representatives during inspection.

4.27. Any work not confirming to the execution plans, standard specification codes or engineering practices shall be rejected forthwith and the bidder shall carry out the rectification at his own cost.

4.28. Inspection and acceptance of the work shall not relieve the bidder from any of his responsibilities under this contract.

4.29. By entering into the maintenance contract with TCIL, the bidder shall agree to maintain the secrecy of all documents/information/drawings etc provided by TCIL during the period of contract and shall handover all the documents back immediately after the termination of the contract.

4.30. In case TCIL feels that the bidder is not able to execute the work to the satisfaction of TCIL/Client, then Rep of TCIL shall at his own discretion engage other agencies to ensure the smooth execution of the job at the risk and cost of the bidder.

4.31. The bidder shall depute experienced and competent representative(s) at site during the execution of any job. Any instructions given to such representative(s) shall be construed as having been given to the BIDDER.

4.32. The bidder shall be solely responsible for making available, all requisite construction equipment, special aids, tools, tackles and testing equipment and appliances. Such construction equipment etc. shall be subject to examination by the TCIL/Client representatives and approval for the same. Any discrepancies pointed out by the TCIL/Client representatives shall be immediately got rectified, repaired or the equipment replaced altogether, by the bidder.

4.33. The accessing of Client network facilities shall be allowed to authorized person from bidder’s side with the prior intimation to TCIL. Within the Client premises, the representative of the bidder shall take care not to tamper with the Client network installed equipments.

4.34. All faults shall be intimated to the bidder’s supervisor/ authorized person by network management center or the Engineer-in-charge as indicated through telephonic communication, e-mail or through fax. For this the BIDDER shall provide NOCs/SOCs with the contact number, landline and Mobile & e-mail address / Fax no. 14 days prior to start of maintenance.

4.35. The locations of repeater/cable route are indicated on the as-built drawings to be supplied by tender awardee after giving contract to a successful Bidder. However, bidder is advised to visit the sites and ascertain the conditions/route under which the work shall be actually performed.

4.36. It is advisable that bidders must visit site to familiarize themselves with all constraints,
restrictions, access requirements and available infrastructure. The BIDDER shall not be eligible for any adjustment in cost and time, on account of any lack of data regarding above. The Bidder shall visit the NFS OFC route and satisfy himself before quoting the rate.

4.37. The as-built drawings of NFS OFC route shall be given to the BIDDER for maintenance. The information contained therein shall be considered as reference only. Any changes found in the as-built with respect to the site condition shall not become a reason for the delay in execution of the job & any extra claim by the BIDDER. As-built drawings of NFS OFC route, handed over to the bidder shall be updated regularly by the bidder. Soft copy shall be submitted every quarter and Hard copy shall be submitted every year to NOC incorporating the various changes occurred during the intervening period.

4.38. While executing the job at site by the bidder, penalty claimed against any damage caused to the infrastructure of Client & other parties shall be borne by the Bidder.

4.39. PENALTY FOR DEFICIENCY IN SERVICES:

4.39.1 Penalties towards Payment of Fixed Charges

4.39.1.1 If cuts are greater than 6 per 500 km in a quarter, then penalty of Rs 5000 per additional cut shall be charged.

4.39.1.2 If cuts are greater than 8 per 500 km in a quarter, then penalty of Rs 10000 per additional cut shall be charged.

4.39.1.3 In case Restoration Time exceeds the prescribed restoration time for the section (6 Hrs / 8 Hrs.), then penalty for hours exceeding the restoration time shall be imposed at the rate of Rs 5000/- per two hours or part thereof.

4.39.2 If the splice loss of all the fibers are not within the prescribed limit, the bidder has to re-do the splice till the value is achieved failing which TCIL will carry out the work by itself deducting Rs.6000/- per instance from the monthly bills. If any failure/fault occurs in the rectification work done by the bidder within six months from rectification, due to defective workmanship/supply, the Bidder shall make good of the defects at his own cost and it should be done within six hours and no further media outages are permitted.

4.39.3 For non – compliance / deficiencies in maintenance activity, penalty will be imposed at the following rates:

<table>
<thead>
<tr>
<th>Ser No</th>
<th>Description of deficiencies</th>
<th>Penalty</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Non-submission / non-modification of As Built Drawing</td>
<td>Rs. 1,000/- per fault</td>
</tr>
<tr>
<td>2.</td>
<td>On obtaining no response from maintenance team members on an attempt to contact</td>
<td>Rs 2000/- per incident</td>
</tr>
<tr>
<td>3.</td>
<td>Non-provisioning of brick chamber for joints as indicated by TCIL</td>
<td>Rs. 3,000/- per joint.</td>
</tr>
<tr>
<td>4.</td>
<td>If the contractor has not patrolled a particular stretch</td>
<td>Rs 1000/- per incident</td>
</tr>
<tr>
<td>5.</td>
<td>Swapped fibers not restored (involving at least one joint)</td>
<td>Rs. 5,000/-</td>
</tr>
<tr>
<td></td>
<td>Description</td>
<td>Amount</td>
</tr>
<tr>
<td>---</td>
<td>-----------------------------------------------------------------------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td>6</td>
<td>If any of the resources (manpower/equipment/vehicle) is not available without intimation or replacement</td>
<td>Rs 5000/- per day</td>
</tr>
<tr>
<td>7</td>
<td>Cable laid temporarily which leads to subsequent failure.</td>
<td>Rs. 10,000/-</td>
</tr>
<tr>
<td>8</td>
<td>Unreasonable degradation of OFC parameters in one year</td>
<td>Rs 2,50,000/- per dB per span length of 80 km</td>
</tr>
</tbody>
</table>

### 4.40. ROW PERMISSIONS FOR OFC INSTALLATION, COMMISSIONING AND REPAIR:

The contractor should be capable to obtain ROW permissions providing storage, undertake laying & Installation, jointing, testing and commissioning including all related civil work of OFC network over a large geographical area. The contractor has to obtain the ROW permissions from central/stage/local authorities as applicable. Payment of ROW charges shall be made by Contractor. The same shall be reimbursed to Contractor after receipt of corresponding payment from TCIL’s client on back to back basis. There will be no ROW charges in Type A1 Defense Land (land in possession of defense forces). However all restoration and reinstatement work within defense area will be carried out by the Bidder at his own cost. Further, contractor shall give an undertaking that in case, the work is not completed in given period mentioned in the permission, and the permission expires, ROW charges so paid shall be recoverable from the Contractor.

### 4.41. WARRANTY

Warranty shall be applicable only in case of New Work done during the warranty period. The contractor shall warrant that the material/services supplied for the new work (e.g. re-routing) shall be new and free from all defects and faults in materials used, workmanship and manufacture and shall be of the highest grade and consistent with the established and generally accepted standards for materials of the type ordered and shall perform in full conformity with the specifications and drawings. The contractor shall be responsible for any defects that may develop under the conditions provided by the contract and under proper use, arising from faulty materials, design or workmanship such as corrosion of the cable, inadequate quantity of materials etc. and shall remedy such defects at his own cost when called upon to do so by the Purchaser who shall state in writing in what respect the stores/services are faulty. If any defect is not remedied by the contractor within reasonable time, the purchaser may proceed to get the defects remedied from other agency at the contractor’s risk and expenses, but without prejudice to any other rights which the purchaser may have against the contractor in respect of such defects.

Replacement under warranty shall be made by the contractor free of all charges at site including freight, insurance and other incidental charges.

The warranty for new work in the Region will be up to 3 years from the date of commissioning of the awarded work.

### 4.42. PRICE APPLICABILITY

Prices in the Purchase Order shall remain valid for the period of delivery schedule or extended delivery schedule. In case of delayed supplies, after delivery period, the advantage of reduction of taxes/duties shall be passed on to the Purchaser and no benefit of increase will be permitted to the Supplier.
4.43. **SET OFF:**

Any sum of money (including refundable security deposit) due and payable to the Bidder/Contractor, under this contract or any other contract entered between the parties herein whether continuing or completed may be appropriated by TCIL and set off against any claim of TCIL of any nature whatsoever, arising under this contract or any other contract entered into between the parties, herein whether continuing or completed.

4.44. **DEPLOYMENT OF SKILLED/SEMI SKILLED TRADESMEN AT PROJECT SITE:**

The contractor shall, at all stages of work deploy skilled/semi skilled tradesmen who are qualified and possess certificate in particular trade from CPWD Training Institute/Industrial Training Institute/National Institute of Construction Management and Research (NICMAR), National Academy of Construction, CIDC or any similar reputed and recognized Institute managed/certified by State/Central Government. The number of such qualified tradesmen shall not be less than 20% of total skilled/semi skilled workers required in each trade at any stage of work. The Contractor shall submit number of man, days required in respect of each trade, its scheduling and the list of qualified tradesmen along with requisite certificate from recognized Institute to a Engineer-in-Charge for approval. Notwithstanding such approval, if the tradesmen are found to have inadequate skill to execute the work of respective trade, the contractor shall substitute such tradesmen within two days of written notice from Engineer-in-Charge. Failure on the part of contractor to obtain approval of Engineer-in-Charge or failure to deploy qualified tradesmen will attract a compensation to be paid by contractor at the rate of Rs. 100 per such tradesmen per day. Decision of Engineer-in-Charge as to whether particular tradesman possesses requisite skill and amount of compensation in case of default shall be final and binding.

Provided always, that the provisions of this clause shall not be applicable for works with estimated cost put to tender being less than Rs. 5 Crores.

4.46. **PUBLIC PROCUREMENT POLICY FOR MICRO AND SMALL ENTERPRISES (MSE):**

The participating MSEs quoting price within price band of L1+15% may be awarded a portion up to 20% of requirement by bringing down their price to L1 price, where L1 is non-MSE. TCIL reserves the right to take decision regarding award of work under this clause and this decision shall be binding on L1 bidder (non-MSE).

-**END OF SECTION 4**-
Section- 5

TECHNICAL SPECIFICATIONS

Work shall be done as per technical specification requirements of TCIL’s of Client, i.e. M/s Bharat Sanchar Nigam Ltd..

The broad technical specifications are mentioned below. For more details, bidders may refer BSNL’s Tender No. CA/CNP/NFS OFC/T-441/2013 dated 21-06-2013.

DESCRIPTION OF WORK

5.1 The BIDDER shall be responsible for the maintenance of the OFC based network in the physical layer to ensure the OFC Network availability of highest order, considering there is no failure in the equipment level of the network. This shall include but not limited to undertake all required corrective and preventive measures of the NFS OFC route, rectification of faults and restoration jobs required in achieving the NFS OFC link availability of highest order.

The selected bidder shall deploy maintenance team along with all necessary resources at the designated location within a period of 15 days of receiving intimation from TCIL for start of maintenance of a segment of the network.

5.2 The bidder shall carry out any NFS OFC related works like additional protection works, splicing, termination, tightening of nuts/bolts, provision of complete clamps for supporting the protected work over culverts/bridges and wiring as directed by the TCIL Network Manager of the section. No additional payment on account of these technical works will be applicable.

5.3 Any refusal of team for taking up maintenance and preventive maintenance work for NFS OFC and associated equipments shall be treated as failure of team to attend failure in network and penalty shall be imposed accordingly.

5.4 The maintenance bidder is planned to be fixed for a period of three years. However, the contract may be terminated by giving 30 days notice, in case performance of the bidder is not found satisfactory or as and when required by TCIL without assigning any reasons.

5.5 SoR MATERIALS TO BE PROVIDED BY TCIL AS A PART OF SUPPLY COMPONENT OF THIS CONTRACT.

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Item Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Type A : Intrusion Proof Fiber Optic Cable [(24F Ribbon G.655 + 24F Ribbon G.652D) + 8F G.652D Sensory Fibers] for NLD Routes</td>
</tr>
<tr>
<td>2.</td>
<td>Type B: Non Intrusion Proof Fiber Optic Cable [24F Ribbon G.655 + 24F Ribbon G.652D] for NLD Routes</td>
</tr>
<tr>
<td>3.</td>
<td>Type C: Intrusion Proof Fiber Optic Cable [48F Ribbon G.652D + 8F G.652D Sensory Fibers] for Access Network</td>
</tr>
</tbody>
</table>
4. Permanently Lubricated HDPE duct along with associated accessories

5. Fiber Distribution Management System (FDMS) consisting of
   5.1 Standard 4.39U Rack with 2 x Splicing cum Patching Shelf.
   5.2 Splicing cum patching shelf.

6. Electronic Route Locator

7. Electronic Route Marker

8. Joint Closure

9. Warning Tape

5.6. SERVICE LEVEL AGREEMENTS (SLA’S)

5.6.1 Maintenance function involves 24x7 duties for operation and maintenance of total passive NFS Optical infrastructure for NLD and access networks.

5.6.2 Maintenance includes checks and measures that are to be taken at pre-defined periodicity to ensure network availability.

5.6.3 Approved MTTR shall be adhered to for speedy rectification of faults.

5.6.4 Maximum individual fiber splice loss of 0.2 db and average fiber splice loss per ribbon should not exceed 0.1dB.

5.6.5 In order to achieve the above results the successful bidder should mobilize maintenance teams with resources viz, T&M Instruments, Testing Engineers, Technicians, helpers and vehicle as given at clause no. 5.16.

5.7. DETAILED SCOPE OF WORK.

The scope of work shall include but not limited to the following for the maintenance of NFS OFC network in the physical layer (up to the FDMS at NFS node) of Client Optical Fiber Cable Network.

5.7.1 Preventive Maintenance for cable protection.

The BIDDER shall undertake all preventive measures with information to respective TCIL Site Incharge for maintaining the end-to-end continuity of NFS OFC cable, which shall include but not limited to the following:

5.7.1.1 Regular patrolling and surveillance of NFS OFC route to have proactive check to prevent NFS OFC link disruptions. It will be done by dedicated and exclusive team who will not be assigned any other work. There should be at least one patrolman on approximately every 80 kms beat. Each patrolman has to be equipped with a mobile phone number. The successful bidder shall have to give a detailed list of patrolmen along with their mobile numbers before deployment of the team.

5.7.1.2 Maintenance team will deployed at 80 Km each, However, the length may vary depending on ground realities.

5.7.1.3 Patrolling of the entire section has to be done by way of ‘Window Inspection’ from any
motor vehicle and the entire section has to be covered at least four times a week during daytime. If any activity is observed which may affect the NFS OFC, the patrolling team should get down and reach the suspected spot by foot or by any means and prevent any damage to the NFS OFC. The matter must be reported to the Network Management Officials nominated by Client/TCIL. The time-to-time movement of the patrolling team shall be kept informed on daily basis so that they can be contacted during emergencies.

5.7.1.4 Part of the team shall also go on foot/bi-cycle along the entire route so that **minimum two block sections every day** are covered and the condition of the NFS OFC is observed. It is expected that the entire section under the contract will be covered by foot/window patrolling at least 3 times every month. Therefore, for effective patrolling of the entire section by motor vehicle as well as by foot/bicycle, as above, sufficient number of persons are to be engaged by the bidder.

5.7.1.5 Attending to/ safe-guarding against any signs of damage or potential damage of NFS OFC network rolled out as part of this project, which come to light during patrolling.

5.7.1.6 Collecting information & accordingly coordinate with other agencies before the execution of work, who shall carry out any work in the vicinity of NFS OFC route, to safe-guard against the damages to NFS OFC cable. The bidder shall effectively co-ordinate with other agencies working along the NFS OFC route to prevent damage to NFS OFC link.

5.7.1.7 Liaison shall be maintained with other department like NHAI, Municipal corporations, Nagar Palikas, Urban Development Authorities etc regarding the permission being given or shall be given to other parties for any type of construction works along the optical fiber route.

5.7.1.8 The minimum down time shall include time taken in restoration of fault/cut caused by the miscreant activity at day or night, due to work done by Railway or any other organization, due to development of high losses / break at existing joints, fault caused due to rodent, ant etc.

5.7.1.9 In case of partial damage of the cable or development of high loss in the working fiber, the responsibility of repairing the defective fiber lies with the bidder. The preventive maintenance should be carried out with prior approval and during planned shutdown period generally during night time between **00:00 to 05:00** hrs. Additional shutdown is not guaranteed.

5.7.1.10 Daily patrolling schedule shall be sent to the NOC and any unusual incidence shall be reported to NOC immediately. Also, manpower shall be placed at all the places to coordinate the ongoing works of other agencies, to avoid damage/cut to NFS OFC. A report on weekly basis about such works and action taken thereof shall be generated & sent to Manager.

5.8 **ROUTE REPLACEMENT**

In a situation, where in the vicinity of NFS OFC network any construction activities such as road widening / repair etc going on or are to start and necessitates re-routing through a new safe route of NFS OFC to avoid damage, Bidder shall explore feasibility of alternate routes & provide detailed route plan for new location, where re-routing is proposed. The job of shifting & laying of NFS OFC will be carried out at the discretion of Client/TCIL. All SoR Material for re-routing (as per supply component of this contract) shall be provided by TCIL. All services (including accessories not listed in supply component of SoR) has to be done by the bidder.
5.9 TESTING OF NFS OFC FOR PREVENTIVE MAINTENANCE

5.9.1 Bidder shall also carry out testing of existing joints and NFS OFC repairs along with testing of NFS OFC route for improvement in the performance with link margin.

5.9.2 All measurements for preventive maintenance shall be carried out as per prior agreed time schedule which will be given by the TCIL. The testing of all fibers shall be done, as once in three month for each of the block sections and reports shall be submitted. Any defects observed in the Optical Fiber Cable or in any of the associated equipments shall be attended in consultation with the TCIL In charge at site. TCIL maintenance supervisor will also accompany the teams as and when required.

5.9.3 Testing consists of OTDR reading and Power Meter reading of all dark fibers. Node to Node testing is required for spare fibers terminated at nodes in both the directions. Run through fibers may be tested from end to end only. While testing, working fibers shall not be disturbed. The periodicity of testing is once in three month for all block sections, in case the agency fails to complete the measurement schedule and measurement report is not submitted, payment for AMC for that quarter will not be released.

5.9.4 Test Reports.
The reports consist of the following:-

a. Section-wise tabulation of all events reported by OTDR of more than 0.1 dB over the section fiber wise for all fibers tested in the given Performa in print and in Excel worksheet.

b. Tabulation of power loss from A-B & B-A direction, average and loss per km in both 1310, 1550 & 1625nm for all the fibers tested.

c. The OTDR traces should be submitted in both soft and hard copy.

5.10. FAULT RESTORATION SERVICES

5.10.1 The bidder shall deploy Maintenance Teams at the designated locations as decided by the TCIL. The Maintenance teams shall comprise of manpower, logistics, required tools/tackles/machinery & equipments etc, and shall be placed at NFS Communication Nodes. The exact locations for placement of maintenance teams will be intimated after award of contract before the links are commissioned.

5.10.2 The Bidder shall provide NFS OFC maintenance service on round the clock basis for attending & rectifying the NFS OFC fault in minimum downtime (including travel time) from the time of lodging the complaint to the representative of Bidder at their designated office. The maintenance bidder shall provide all assistance including providing manpower, transportation of men and materials etc. if required in the event of link failure due to any other reason.

5.10.3 On all working days the members of team with team equipments should be present at NFS communication node responsible and report to Network Manager for maintenance of the
section during office period unless assigned work in the section. The movement of team members should be in the knowledge of Network Manager responsible for Maintenance of the section. The attendance of all team members shall be marked in the Performa accordingly. Daily diary of the works and movement of all staff shall be submitted along with the bill duly verified by the Network Manager responsible for maintenance of the section.

5.10.4 The list of resources including manpower & tools etc required to constitute maintenance team shall at the minimum scale be maintained as per details given in Clause No. 5.16. The supervisor of maintenance team shall make available all the resources to Rep of Client for inspection, maintenance and corrective measures as and when required.

5.10.5 The Bidder shall provide conveyance facilities for maintenance, for transporting the manpower, tools/tackles, Test/Measuring equipments and consumables like: NFS OFC cable, Joint Closures, Jointing Pit, duct, couplers, etc. Suitable vehicle shall be available round the clock with each of the maintenance team. Vehicle should be in good working condition and shall not be more than five years old.

5.10.6 The Bidder shall provide communication facilities to the maintenance teams. This shall include landline phone at office location and mobile phone to members of the maintenance teams for the purpose of contacting on an urgent need basis. The team-in-charge should have mobile phone of mobile operator whose coverage is available in the desired section and it should be always be on.

5.10.7 The bidder will be required to carry out maintenance activities which include identification of NFS OFC fault/cut on ground, obtaining permission from local authorities if required, excavation of earth to expose cable, laying of required length of NFS OFC with protection wherever required, splicing of NFS OFC, installation of Jointing pit & back filling of pit with sand, supply and installation of cable Route Markers and Joint Markers as per specification, testing of NFS OFC and updating of NFS OFC as-built drawings etc.

5.10.8 The bidder shall arrange for logistics to provide facilities such as AC/DC power source, lighting arrangement, dewatering facility, DG sets etc, which may be required during the execution of maintenance job at site.

5.10.9 Optimum functionality of maintenance teams is a prime necessity to carry out day to day maintenance of NFS OFC links. NFS OFC and accessories spares to cater for repair of at least 10 fiber cuts shall be maintained with each of these teams at all times.

5.10.10 Bidder shall take insurance for all the workmen engaged under this contract and as per labour laws applicable from time to time.

5.11 METHODOLOGY FOR FAULT RESTORATION/FIBER CUTS

Under NFS OFC link cut condition, the following minimum activities shall have to be taken up by the BIDDER for its restoration for the end-to-end restoration of the network traffic/service:

5.11.1 On receipt of information of fault in NFS OFC the team stationed at the NFS Communication Node shall move immediately for locating and rectifying fault as per the response time given below. The working fibers shall be restored first. Sufficient labour shall be engaged for speedy restoration. Adequate care shall be taken not to damage any other cable if laid in the same trench.
5.11.2 For the identification of exact fault location on immediate basis, the OTDR measurement of spare fiber shall be made from the nearest telecom station/Node. For better clarity, the OTDR measurement on spare fiber shall be taken at Nodes / nearest NFS OFC joints situated at both ends of cut and using dummy fiber spool of 1km, in case required.

5.11.3 After the OTDR measurement, the as-built drawing shall be referred and the physical site of fault on ground shall be located. It may be possible that data in as-built document may not be correct for the accuracy purpose. As-built drawing shall be taken as reference only. No claim of bidder will be entertained on account of this. Accordingly, locating the NFS OFC fault, the job of excavation in all types of soil, identification of NFS OFC, blowing of cable, construction of jointing pits, splicing of NFS OFC, back filling of trench & jointing-pit shall be taken up as per the standard procedure as briefly indicated in laying practices of this tender documents (Clause No. 5.21). This should be incorporated in the cable route plan also. The splicing of fibers is to be carried out in line with the installed fiber and measurements are to be taken on spare fibers. In case the active fibers are to be used, precautions are to be taken with regard to the power launched on to the fiber. Restoration of site shall be done to the entire satisfaction of Client.

5.11.4 In case of NFS OFC cut where it is not possible to pull the cable from either end, the bidder has to make two pits/ splicing joints between the required length of new OFC to be laid between the two joints. The spacing of joints/ pits shall be depending up on situation at site and shall be as decided by Site Engineer. Remaining NFS OFC has to be coiled in both the pits.

5.11.5 Wherever new joint is provided or existing joint is attended for rectification during the maintenance period joint shall be buried to the depth of 1.2 Mtr. from the ground level in joint chamber as per specifications given in the tender documents.

5.11.6 After the completion of site activities, the BIDDER shall ensure the restoration of the traffic from the associated Fiber Network Operations Center (FNOC) and thereafter fresh OTDR measurement & traces (for 1310nm, 1550nm & 1625nm) shall be taken for all fibers & submitted to Client/TCIL representative.

5.11.7 After the completion of site activities & hop test, the As-built drawing shall be updated by incorporating the new details like NFS OFC loop used, Joint-pit location, etc. The length of loop in joint pit after fault restoration shall be incorporated in as built drawings.

5.11.8 After attending the fault & permanent restoration a Fault-Rectification report, jointly signed by Client, TCIL & BIDDER, shall be generated for the closure of the complaint.

5.11.9 Any other job required for the restoration of the NFS OFC fault/cut in totality is to be taken up by the Bidder.

5.11.10 In case the site condition is not favorable for the immediate restoration of the fault, the temporary restoration of the service fibers shall be taken up immediately with the approval of Rep of Client/TCIL. Permanent restoration work will not be considered in breakdown time unless there is again link break during restoration job. Permanent restoration of joint pits is to be carried out by bidder within 48/ 96 hrs from time of fault /NFS OFC cut. In case the site is not conducive for permanent restoration some arrangement of manpower has to be done by bidder for safeguarding exposed NFS OFC till permanent restoration. No extra payment shall be given to bidder on account of deployment of additional manpower. In case of further cuts at exposed NFS OFC location bidder will be accountable for this additional downtime of
NFS OFC link.

5.11.11 Only the OFC issued by TCIL representative to the bidder, for use at NFS OFC fault locations, should be used and must be checked & tested before use at site.

5.11.12 It is mandatory for the bidders to install the jointing chambers after permanent restoration is done.

5.11.13 In case of any breakdown in the OFC network, Bidder shall be responsible for obtaining approval at his own cost from statutory authorities like Municipal Corporation, Development Authorities, Electricity Department PWD, NHAI and any other concerned authority as required for carrying out the repair.

5.11.14 Drains, pipes, cables, overhead wires and similar services encountered in the course of the works shall be guarded by the bidder at his own cost, so that they may continue in full and uninterrupted use to the satisfaction of the Owners thereof.

5.11.15 Should any damage be done by the BIDDER to any AC Power mains, utility pipelines cables or lines (whether above or below ground etc) whether or not shown on the drawings, the BIDDER must make good or bear the cost of making good the same without delay to the satisfaction of the Engineer-in-Charge.

5.11.16 BIDDER shall observe all national and local laws, ordinances, rules and regulations and requirements pertaining to the work and shall be responsible for extra costs arising from violations of the same.

5.11.17 BIDDER shall have at all times during the performance of the WORK, a competent supervisor on the site. Any instruction given to such Supervisor shall be considered as having been given to the BIDDER.

5.11.18 The BIDDER shall employ as many personnel as required to comply with the local rules and administrative orders governing the Working Hours of Employment. The bidder shall be responsible for compliance with all statutory requirements including personnel related matters.

5.11.19 Night Work: The bidder shall also work during night time and is required to complete the work in all respects within the stipulated time. Sufficient lighting arrangements and precautionary steps shall be provided to safeguard the workmen and public assets and to afford adequate facilities for properly placing and inspecting the material and the work when the night work is in progress.

5.11.20 In the event of urgency the team has to move to the adjacent section, if desired by TCIL. However, payment for the work will be made as per respective item of SoR.

5.11.21 The minimum down time shall include time taken in restoration of fault/cut caused by any means like miscreant activity at day or night, due to work done by any other organization, due to development of high losses / break at existing joints, fault caused due to rodent, ant etc.

5.11.22 In case of partial damage of the cable or development of high loss in the working and spare fiber or cable cut at any time (day/night) by miscreants or by any agency, the responsibility of repairing the defective fiber lies with the bidder.

5.11.23 In case bidder fails to completely restore (as per original condition) or submit OTDR & test (power level in live equipments) records to establish completion of work a penalty shall be levied for the work involved at site.
5.11.24 Examination of Finished Work: When finished work is taken down for the purpose of inspection for any reason, the bidder shall bear the entire expenses incidental thereto in the event that the said work is found to be defective. This situation may be applicable to both planned work as also to emergency restoration.

5.12 TIME TO RESTORE FIBER CUTS

5.12.1 Response Time. The maximum response time is 30 minutes from the time Client/TCIL informs the team about the failure through any communication means. It is required that the maintenance team should start moving towards the location of fault within this time.

5.12.2 Restoration Time

5.12.2.1 The maximum restoration time is response time plus vehicle travel time including 1 hour for localization.

5.12.2.2 In any case, the restoration period including excavation & splicing should not exceed six hours wherever easy approach roads are available and it should not exceed eight hours in rural and remote areas where approach roads are difficult.

5.12.2.3 The maximum restoration time, in specific cases, shall be as decided by Client/TCIL, if conditions of force majeure are invoked.

5.13 RECORD OF FAULT REPAIR TIME.

Time taken by the Bidder from the time of lodging the complaint to the representative of Bidder at their designated office/Head Quarter up to the time of restoration of end-to-end traffic after rectification of NFS OFC cut(s)/fault(s) including the traveling time. The repair time of any fault occurred shall be calculated by collecting data from respective NOCs of Client/TCIL. After restoration of the link, a fault report is to be generated by bidder and obtain signature of Client and TCIL site representative for records.

During the maintenance or fault rectification work, should any damage occur to the other cables, bidder is liable to pay compensation as demanded by the respective authorities.

5.14 SUPPLY OF NFS OFC AND ACCESSORIES.

For making good any break/loss in fiber, the NFS OFC and other accessories as included in the supply component of this tender shall be supplied by TCIL to the bidder at the nearest network storage depot. The material shall be picked up by the bidder in advance from nearest depot and shall be accounted with reference to the specific incidence of fiber cuts. All other materials shall be arranged by the bidder free of cost and shall meet the specifications laid down in this tender.

The detail address of Network stores shall be provided to the successful bidder prior to establishment of maintenance teams. The bidder has to draw the material from designated store, if not available, the same may be arranged from other Network store.

The material issued to the bidder and remaining unutilized after completion of the job shall be returned back to representative of designated stores at the end of contract period. A monthly material statement shall be submitted to TCIL by the bidder.

5.15 TAKING OVER THE SECTION FOR MAINTENANCE

5.15.1 The bidder shall complete the OTDR measurement of all the block sections for all the fibers and submit a joint statement duly signed by the bidder, TCIL and bidder indicating the faults
to be attended for making good of all the non-working fibers. This process shall be completed within 15 days from the date of deployment.

5.15.2 Any fault found in the link shall be rectified by Purchaser before handover to the bidder.

5.15.3 Subsequently, the maintenance of all the fibers shall be the sole responsibility of the bidder.

5.15.4 On completion of the contract, the OTDR measurement shall be carried out on spare fibers to ascertain the condition of cable, which should be same or better than the condition of the cable taken over by the contract at the beginning of the contract period. Beside this, NFS OFC route drawings handed over to the bidder at the time of award of work shall be updated fully and submitted to TCIL/Client, both in Hard and Soft copy incorporating the various changes occurred during the contract period.

5.16 MINIMUM RESOURCES TO BE DEPLOYED IN A MAINTENANCE TEAM

5.16.1 Experienced Supervisor. (Preferably Diploma Holder in Electronics or Graduate with relevant experience).

5.16.2 Technician for Splicing & Measurements.

5.16.3 Technician for splicing support, wiring of circuits, testing, fault rectification etc.

5.16.4 Manpower for surveillance, liaison and foot patrolling and train patrolling (one Man for about 50-60 kms beat). However the bidder has to deploy extra manpower for as and when needed during any work or other agencies work in the section (No extra payment will be paid for providing extra manpower for surveillance).

5.16.5 Manpower for surveillance in city area.

5.16.6 Un-skilled manpower for trenching etc.

5.16.7 OTDR for measurement at 1310, 1550 and 1625nm.

5.16.8 1 km length dummy fiber spool.

5.16.9 Fusion Splicing Machines (Ribbon and Single Fiber) with cleavers.

5.16.10 Optical Light Source and Optical Power Meter.

5.16.11 Tata Sumo/Qualis/Scorpio or equivalent Air Conditioned Vehicle for transportation of men, machines and stores. Vehicle shall be in good working condition and should not be more than five years old.

5.16.12 Communication Gadgets: As required (Telephone, Walkie Talkie, Cell phone etc.).

5.16.13 Tool/Tackles kit.

5.16.14 All sorts of patch-cords and connectors for the purpose of measurement.

5.16.15 Cable Splitter for vertical cutting of HDPE sheath.

5.16.16 Duct Cutter.

5.16.17 Rodo meter.

5.16.18 NFS Cement and Electronic Route Markers.

5.16.19 NFS OFC electronic route marker detector.

5.16.20 Spare battery with charger for splicing machine.

5.16.21 Blow lamp/ hot air gun for sealing joint closure.
5.16.22 Generator set, lighting arrangement like emergency Light/ Gas Light, Dewatering facilities etc.

5.16.23 Manpower and equipments should be available with the maintenance teams round the clock as listed above. However bidder can add more manpower & equipments for speedy maintenance & minimizing downtime without extra cost implications to TCIL.

5.17 TOOLS

The Contractor shall provide all the necessary tools, trucks, machinery and labour etc. to complete the work in the prescribed time frame as per the defined specifications. If specific tools & machinery are necessary to complete the work, they might be explicitly mentioned in this document. However, ensuring that the work to be performed remains the responsibility of the Contractor; the Company shall not be held responsible for work that has been delayed because of the absence of a given tool/machinery.

Minimal recommended set of tools for civil work:

- Picks
- Shovels
- Hammer 2kg and 4kg
- Crowbars, Axes
- Cable Jacks
- Mechanical jack hammer (for rocky area)
- Compressor 10 bars (for duct pressure tests)
- Compactors - manual or mechanical
- HDD machines, JCB machines, OFC Cable blowing machine, Concrete mixture machine,
- OTDR, Slicing machine & Power meter etc.
- Any other tool/machine/tester not referred above but are required to complete the work in time would be responsibility of contractor.

5.18 MATERIAL

The material specified in company’s supply list is to be provided by the Company. All other material such as consumable or not specified in company’s supply list required during execution shall be provided by the Contractor at its own cost.

The material to be supplied by the company shall be picked by the contractor from the BSNL/TCIL warehouse. Material handling and its transportation to the site is Contractor’s responsibility. The warehouse details are to be notified in Work order.

5.19 SAFETY AND SECURITY

On site security remains the full responsibility of the Contractor.

The on-site activity might be stopped by the Company for lack of compliance to these security measures, until actions are taken to remedy the non compliance to the safety rules.

5.19.1. The safety & security for civil works
The minimal following security measures shall be provided by the contractor while performing civil works:

- The Contractor shall minimize the time during which the trench or any area remains open.
- Hazard tape of red colour shall be used for cordonning wherever areas are left opened, especially in city and built-up areas.
- Warning cones and hazard tape shall be used along the trench for proper identification for the incoming traffic from a distance.
- Road signs (e.g. danger, caution, men at work)
- Reflection signs at night
- Flags (red and green) for traffic

5.19.2. The safety & security for duct/ cable work

The minimal following security measures shall be provided by the contractor while performing duct/ cable work:

- Nobody shall stand in front of the ducts when air/shuttle transmitters are blown.
- Couplers shall not be removed before air is released completely.
- Hazard tape shall be used for cordonning wherever MH/HH are opened, especially in city and built up areas.
- Warning cones and tape shall be used around the compressor for proper identification for the incoming traffic from a distance
- Before entering in MH/ HH, it should be checked for poisonous gases.

5.20. PREPARATORY WORK

(i) The Contractor shall ensure that all the necessary permits have been obtained from the relevant authorities before carrying out the work.
(ii) Once the job is completed, all drawings given to the Contractor for carrying out the work shall be updated as per the actual.
(iii) Clearly mark the route for duct/ cable laying and the location of MH’s /HH’s.

5.21 LAYING PRACTICES FOR OFC CONSTRUCTION WORK

5.21.1 EXCAVATION OF TRENCHES

5.21.1.1 Location and Alignment of the Trench. In city areas, the trench will normally follow the foot-path of the road except where it may have to come to the edge of the carriage way cutting across road with specific permissions from the concerned authorities maintaining the road (such permissions shall be obtained by the department). Outside the city limits the trench will normally follow the boundary of the roadside land. However, where the road side land is full of burrow pits or afforestation or when the cable has to cross culverts/ bridges or streams, the trench may come closer to the road edge or in some cases, over the embankment or shoulder of the Road. The alignment of the trench will be decided by a responsible PICG official. Once the alignment is marked, no deviation from the alignment is permissible except with the approval of Engineer-in-charge PICG and BSNL. While marking the alignment only the centre line will be marked and the Contractor shall set
out all other work to ensure that, the excavated trench is as straight as possible. The Contractor shall provide all necessary assistance and labour, at his own cost for marking the alignment. Contractor shall remove all bushes, undergrowth, stumps, rocks and other obstacles to facilitate marking the centre line without any extra charges. It is to be ensured that minimum amount of bushes and shrubs shall be removed to clear the way and the contractor shall give all, consideration to the preservation of the trees.

5.21.1.2 Line-Up The line-up of the trench must be such that HDPE/PLB pipe(s) shall be laid in a straight line, both laterally as well as vertically, except at locations where it has to necessarily take a bend because of change in the alignment or gradient of the trench, subject to the restrictions mentioned elsewhere.

5.21.1.3 Method of Excavation The contractor shall ensure that no damage is caused to any underground or surface constructions belonging to other public utility services and/or private parties.

5.21.1.3.1 HDD/Molling shall be the preferred means for duct laying rather than excavation for quick completion of the project. There shall be no objection to resort to mechanical means to bore a hole of required size and to push through HDPE/PLB duct through horizontal bore at road crossing or rail crossing or small hillocks etc. HDD is allowed in NLD routes as well as in city, urban areas, built up areas etc.

5.21.1.3.2 All excavation operations shall include excavation and ‘Getting out’. ‘Getting out’ shall include throwing the excavated materials at a distance of at least one meter clear off the edge of excavation.

5.21.1.3.3 In Rocky strata excavation shall be carried out by use of electro mechanical means like breakers or by blasting wherever permissible with express permission from the competent authority. If blasting operations are prohibited or not practicable, excavation in hard rock shall be done by chiseling.

5.21.1.3.4 Trenching shall as far as possible be kept ahead of the laying of pipes. Contractor shall exercise due care that the soil from trenching intended to be loose for back filling is not mixed with loose debris. While trenching, the Contractor should not cause damage to any underground constructions belonging to other agencies and any damage caused should be made good at his own cost and expense.

5.21.1.3.5 Necessary barricades, night lamps, warning board and required watchman shall be provided by the contractor to prevent any accident to pedestrians or vehicles. While carrying out the blasting operations, the contractor shall ensure adequate safety by cautioning the vehicular and other traffic. The contractor shall employ sufficient manpower for this with caution boards, flags, sign writings etc.

5.21.1.3.6 The contractor should provide sufficient width at the trench at all such places, where it is likely to cave in due to soil conditions without any extra payment. A minimum free clearance of 15 cms should be maintained above or below any existing underground construction. No extra payment will be made towards this.

5.21.1.3.7 In order to prevent damage to HDPE/PLB pipes over a period of time, due to the growth of tree roots, bushes, etc., the contractor shall cut them when encountered in the path of alignment of trench without any additional charges.

5.21.1.3.8 In large burrow pits, excavation may be required to be carried out for more than 165 cms in depth to keep gradient of bed less than 15 degrees with horizontal. If not
possible as stated above, alignment of trench shall be changed to avoid burrow pit completely.

5.21.1.4 **Depth and Size of the Trench** The depth of the trench from top of the surface shall not be less than 165 cms unless otherwise relaxation is granted by competent authority of BSNL and PICG under genuine circumstances. In rocky terrain, the depth of the trench may be restricted to a depth of 100 to 140 cms. However, Engineer-in-charge in exceptional cases due to adverse site conditions encountered, may allow to lay HDPE/PLB pipes at a lesser depth with additional protection. In all cases, the slope of the trench shall not be less than 15 degrees with the horizontal surface. The width of the trench shall normally be 45 cms at the top & 30 cms at the bottom. In case, additional pipes (HDPE/GI/RCC Pipes) are to be laid in some stretches, the same shall be accommodated in this normal size trench.

5.21.1.4.1 When trenches are excavated in slopes, uneven ground, inclined portion, and the lower edge shall be treated, as top surface of land and depth of trench will be measured accordingly. In certain locations, such as uneven ground, hilly areas and all other places, due to any reason whatsoever it can be ordered to excavate beyond standard depth of 165 cms to keep the bed of the trench as smooth as possible. Near the culverts, both ends of the culverts shall be excavated more than 165 cms. to keep the gradient less than 15 degree with horizontal.

5.21.1.4.2 If excavation is not possible to the minimum depth of 165 cms, as detailed above, full facts shall be brought to the notice of the Engineer in charge PICG and BSNL in writing giving details of location and reason for not being able to excavate that particular portion to the minimum depth. Approval shall be granted by the competent authority in writing under genuine circumstances. The decision of the competent authority shall be final and binding on the contractor.

5.21.1.5 **Dewatering** The Contractor shall be responsible for all necessary arrangements to remove or pump out water from trench. The Contractor should survey the soil conditions encountered in the section and make his own assessment about dewatering arrangement that may be necessary. No extra payment shall be admissible for this.

5.21.1.6 **Wetting** Wherever the soil is hard due to dry weather conditions, if watering is to be done for wetting the soil to make it loose, the same shall be done by the contractor. No extra payment shall be admissible for this.

5.21.1.7 **Blasting for excavation** In hard rock conditions, where blasting operations are considered necessary, the contractor shall inform BSNL rep prior to resorting to any blasting operation. The contractor shall obtain license from the competent authority for undertaking blasting work as well as for obtaining and storing the explosive as per the Explosive Act, 1884 as amended up to date and the explosive Rules, 1983. Alternatively, a sub contractor already having license may be employed for blasting work. The contractor shall purchase the explosives fuses, detonators, etc. only from a licensed dealer. Transportation and storage of explosive at site shall conform to the aforesaid Explosive Act and Explosive Rules. The contractor shall be responsible for
the safe custody and proper accounting of the explosive materials. Fuses and detonators shall be stored separately and away from the explosives. The Engineer-in-Charge PICG and BSNL or their authorized representatives shall have the right to check the contractor’s store and account of explosives. The contractor shall provide necessary facilities for this.

5.21.1.7.1 The contractor shall be responsible for any damage arising out of accident to workmen, public or property due to storage, transportation and use of explosive during blasting operation.

5.21.1.7.2 Blasting operations shall be carried out under the supervision of a responsible authorized agent of the contractor (referred subsequently as agent only), during specified hours as approved in writing by the competent authority. The agent shall be conversant with the rules of blasting. All procedures and safety precautions for the use of explosives drilling and loading of explosives before and after shot firing and disposal of explosives shall be taken by the contractor as detailed in IS: 4081 safety code for blasting and related drilling operation.

5.21.2 Lay of Overhead Cables

In case after route survey it is ascertained that the optical fiber cable cannot be laid underground due to terrain constraints or miscellaneous reasons, then the cable may be planned to be laid overhead after obtaining due approval from reps of BSNL/PICG. In case approval is granted for laying overhead cable for certain sections of the route then the following would be adhered to by the Bidder.

5.21.2.1 BSNL construction practice for laying of overhead cables in that region would be followed to include span length, construction of poles, fastening and securing of cables etc.

5.21.2.2 The cable to be laid for these sections would be separately designed and manufactured to provide the necessary tensile strength. The essential design specifications for overhead optical fiber cable would include the following:

5.21.2.2.1 The cable shall be subjected to Tensile Strength Test procedure as enumerated in IEC 60794-1-2-E1. It should withstand up to $6 \times W \times 9.81 \text{ N}$ where $W$ is the weight of the cable per km.

5.21.2.2.2 The cable shall be constructed using Aramid yarn instead of Glass Roving yarn to provide the necessary tensile strength.

5.21.3 Trenching Near Culverts/ Bridges

The HDPE/PLB pipes shall be laid in the bed of culvert at a depth not less than 165 cms protected by G.I. pipes and concreting as decided by Engineer- in charge PICG and BSNL. Both ends of culverts shall be excavated more than 165 cms in depth to keep the gradient of not less than 15 degree with horizontal. The bed of trench should be as smooth as possible.

5.21.3.1 While carrying out the work on bridges and culverts, adequate arrangement for cautioning the traffic by way of caution boards during day time and danger lights at night shall be provided.

5.21.3.2 In case of small bridges and culverts, where there is a likelihood of their subsequent expansion and remodeling, the cable should be laid with some curve on both sides of the culvert or the bridge to make some extra length available for
readjustment of the cable at the time of reconstruction of culvert or the bridge.

5.21.4 Laying of HDPE/PLB Pipes

5.21.4.1 Optical Fiber Cables should be blown through Permanently Lubricated HDPE Duct of 40 mm-OD and 33 mm ID Pipe of 500/1000 meter coil which meets the specification as given in G/R No-G/CDS-08/02 Nov 2004 with latest amendments shall only be used for laying the OFC. Wherever DWC pipe or GI pipes or R.C.C. pipes are used for protection, the two ends of the pipes should be properly sealed to protect HDPE pipe from sharp edge of GI pipe and to bar the entry of rodents. For providing additional protection Split RCC/GI pipes should be used from top instead of full RCC/GI pipes. The method of duct laying will be as per client guidelines with appropriate method being used as per BSNL construction manual and OFC laying practices as per soil conditions.

5.21.4.2 After the trench is excavated to the specified depth, the bottom of the trench has to be cleared of all stones or pieces of rock and leveled up properly. A layer of soft soil/or sand (in case the excavated material contains sharp pieces of rock/stones) of not less than 5 cms is required for leveling the trench to ensure that the cable when laid will follow a straight alignment. Adequate care shall be exercised while laying so that the optical fiber cables are not put to undue tension/pressure after being laid as this may adversely affect the optical characteristics of cables with passage of time. The contractor shall ensure that trenching and pipe laying activities are continuous, without leaving patches or portions incomplete in between. In case intermediate patches are left, measurement of the completed portions will be taken only after work in such left over patches are also completed in all respects. Preparatory to aligning the pipe for jointing, each length of the HDPE/PLB pipe shall be thoroughly cleaned to remove all sand, dust or any other debris that may clog, disturb or damage the optical fiber cable when it is blown at a later stage. The ends of each pipe and inside of each socket shall be thoroughly cleaned of any dirt or other foreign materials.

5.21.4.3 After the trench is cleaned the HDPE/PLB pipes/Coil shall be laid in the cleaned trench, jointed with couplers at every 500/1000m or at bends or turns, the HDPE end caps shall be used for sealing the HDPE/PLB pipes to avoid entry of rodents/mud etc. At the end of each days work, the open ends of the pipes sections shall be tightly closed with end caps to prevent the entry of dirt/mud, water or any foreign matter into HDPE/PLB pipes until the work is resumed.

5.21.4.4 In City, Town, Urban area falling within Municipal/Corporation limits, the HDPE/PLB pipes shall be laid with protection using RCC/G.I. Pipes/ Concreting reinforced with weld mesh. Moreover, in cross country routes, if depth is less than 1.2 Meters, protection by using RCC/G.I. Pipe/ Concreting reinforce with weld mesh shall be provided. Engineer-in-Charges PICG and BSNL shall decide about such stretches and type of protection to be provided in view of the site requirements. Normally 100 mm ID RCC Pipes shall be used for protecting HDPE/PLB pipe but if more than one HDPE/PLB pipe is to be laid and protected, RCC Pipe of suitable size to accommodate the required number of HDPE Pipes shall be used.

5.21.4.5 The HDPE/PLB pipes shall be laid in RCC Full Round spun Pipes/GI Pipes as required at road crossings. The RCC pipes/GI pipes shall extend at least 3 Meters on either side of the road at road crossings. At road crossings, extra GI/HDPE/PLB
pipes may be laid as per the direction of the Engineer-in-charge PICG and BSNL. On Rail bridges and crossings, the HDPE/PLB pipes shall be encased in suitable cast iron as prescribed by the Railway Authorities.

5.21.4.6 Wherever RCC pipes are used for protection, the gaps between the RCC collars and the RCC pipes shall be sealed using cement mortar 1:3 (1 part 53 grade cement of reputed brand, 3 parts of fine sand without impurities) to bar entry of rodents. Every third collar of RCC pipes (normally of 2 Meters length) and also both ends of RCC Pipes will be embedded in a concrete block of size 40 cms (L) x 40 cms (W) x 25 cms (H) of 1:2:4 cement concrete mix (1 part 53 grade cement of reputed brand, 2 part coarse sand, 4 part stone aggregate of nominal size of 20 mm) so that the alignment of RCC pipes remain firm and intact and to avoid entry of rodents. Wherever GI pipes are used, special care should be taken to ensure that G.I. Pipes are coupled properly with the sockets so as to avoid damage to HDPE/PLB pipe and eventually the OFC in the event of pressure coming on the joint and G.I. Pipe joint giving its way. Rubber bushes shall be used at either ends of the GI pipes to protect HDPE/PLB pipe. Both the ends of G.I. Pipe will be embedded in a concrete block of size 40 cms (L) x 40 cms (W) x 25 cms (H) of 1:2:4 cement concrete mix (1 part 53 grade cement of reputed brand, 2 part coarse sand, 4 part stone aggregate of nominal size of 20 mm) so that the alignment of G.I. Pipes remain firm and intact and to avoid entry of rodents. In case of protection by concreting at site, the nominal dimension of concreting shall be 250 mm x 250 mm section. Cement Concrete Mixture used shall be of 1:2:4 composition (1 part 53 grade Cement of a reputed company, 2 part Coarse Sand, 4 part Graded Coarse Stone aggregate of 20 mm nominal size, reinforced with MS weld mesh. As the RCC is cast at site, it is imperative to ensure that special care is taken to see that proper curing arrangements are made with adequate supply of water. The contractor shall invariably use mechanical mixer at site for providing RCC protection, to ensure consistency of the mix.

5.21.4.7 For carrying out concreting work in trenches, yellow PVC sheets of width not less than 1.0 M and of weight not less than 1 kg. Per 8 sq. meters shall be spread and nailed on sides of the trench to form trapezoidal section for concreting in the cleaned trench, to avoid seepage of water into the soil. A bed of cement concrete mixture of appropriate width and 75 mm thickness shall be laid on the PVC sheet, before laying HDPE pipes. The HDPE/PLB pipes shall then be laid above this bed of concrete. After laying the HDPE/PLB pipes, MS weld mesh is wrapped around and tied and concrete mix is poured to form the cross sectional dimensions as instructed by the Engineer-in-charge. The strength of RCC is dependent on proper curing; therefore, it is imperative that water content of RCC mix does not drain out into the surrounding soil. Portions where cement concreting has been carried out shall be cured with sufficient amount of water for reasonable time to harden the surface. After curing, refilling of the balance depth of the trench has to be carried out with excavated soil.

5.21.4.8 The HDPE/PLB pipes/RCC/GI Pipes shall be laid only in trenches accepted by Engineer-in-Charge PICG and BSNL or their representatives. The Contractor shall exercise due care to ensure that the HDPE/PLB pipes are not subjected to any damage or strain. Water present in the trench at the time of laying the HDPE/PLB pipes shall be pumped out by the contractor before laying the pipes in the trench to ensure that no mud or water gets into the pipes, thus choking it.

5.21.4.9 In case of nallahs, which are dry for nine months in a year, the HDPE/PLB pipes shall be laid inside the RCC Pipes/ or GI Pipes and concrete laid at a minimum depth of 165 cms, as instructed by the Engineer-in-charge PICG and BSNL. The mechanical protection
shall extend at least 5 meters beyond the bed of nallah on either side.

5.21.4.10 Notwithstanding anything contained in clauses referred above, the Engineer-in-charge PICG and BSNL may order, based on special site requirements, that the HDPE Pipes may be encased in reinforced cement concrete, as detailed, ibid.

5.21.4.11 While laying the pipes, a gap of 2 M is to be kept at convenient locations approx. 200 m apart and at the bends and turns, which will be used as manholes during OF cable blowing. Ends of the HDPE/PLB pipes at the manholes shall be sealed using end caps after tying the PP rope to the end caps to avoid choking of the pipes. In a similar manner, manholes shall be kept while approaching bridges, road crossings etc., as instructed by the Engineer-in-charge PICG and BSNL.

5.21.5 Laying Protection Pipes on Bridges and Culverts.

In case trenching and pipe laying is not possible in the beds of the culverts, the pipes shall be laid over the culverts/bridges after getting due permission from the competent authority. Of late the bridge construction authorities are providing ducts below the footpaths on the bridges for various services. In such ducts, G.I. Pipes can be coupled and laid for blowing the cables. However, for laying cables on existing bridges, where duct arrangement does not exist, one of the following methods may be adopted.

5.21.5.1 Normally in the Bridges/Culverts, where there are no ducts and where the cushion on the top of the Arch is 50 cm to 100 cm or more, G.I. Pipe (Carrying HDPE/PLB pipe and cable) may be buried on the top of the arch adjoining the parapet wall, by digging close to the wheel guards. Every precaution shall be taken to see that no damage occurs to the arch of the culvert. After burying the GI pipe, the excavated surface on the arch shall be restored. Where the thickness of arch is less than 50 cms, the pipe must be buried under the wheel guard masonry and the wheel guard rebuilt.

5.21.5.2 If neither of the two methods is possible, the G.I. Pipes/GI Troughs must be clamped outside the parapet wall with suitable clamps. If necessary, the pipes may be taken through the parapet wall at the ends where the wall diverges away from the road.

5.21.5.3 In case where the methods explained in clauses referred above are not possible, the G.I. Pipe/GI Troughs can be fixed on the top of the road kerb close to the inside face of the parapet wall by means of clamps supplied, using raw plugs and wood screws or small diameter bolts, without damaging the concrete and limiting the external diameter of the bolts to 7.5 mm. The permission for carrying out this work will be obtained from the Road Authorities by the Bidder.

5.21.5.4 Methods cited in above clauses should be carried out under close supervision of Road authorities. The surface to be concreted should be thoroughly cleaned and leveled before concreting. At both ends of the Bridges/Culverts, where the GI Pipes/GI Troughs slope down and get buried, the concreting should be extended to ensure that no portion of the GI Pipes/GI Troughs is exposed as ordered by the Engineer-in-charge PICG and BSNL to protect the pipe/Trough from any possible damage externally caused. Where white wash/colour wash exists on the Bridges/Culverts, the same should also be carried out on the concreted portion to ensure uniformity.
5.21.6 Back Filling and Dressing of the Trench

Back Filling activity would commence only after due measurements have been recorded in the measurement book and duly verified by BSNL /PICG reps. The earth used for filling shall be free from all roots, grass, shrubs, vegetation, trees, saplings and rubbish. Provided that the HDPE/PLB pipes have been properly laid in the trench at the specified depth, the back filling operation shall follow as closely as practicable. The back filling operation shall be performed in such a manner so as to provide firm support under and above the pipes and to avoid bend or deformation of the HDPE/PLB pipes when the pipes get loaded with the back filled earth.

5.21.6.1 At locations where the back filled materials contains stones/sharp objects which may cause injury to the HDPE/PLB pipes and where the excavated or rock fragments are intended to refill the trench in whole or in part, the trench should be initially filled, with a layer of ordinary solid or de-rocked loose earth of not less than 10 cms above the pipes.

5.21.6.2 The electronic route marker should be placed such that it is at a depth of maximum three feet from the surface. The electronic route markers will be placed every 200m and shall be staggered along with RCC route markers.

5.21.6.3 Back filling on public, private roads, railway crossings, footpaths in city areas shall be performed immediately after laying the HDPE pipes. Back filling at such locations shall be thoroughly rammed, so as to ensure original condition and made safe for traffic. All excess soil/ material left out on road/ footpath/railway crossing shall be removed by contractor. However, along the high way and cross-country, the dug up material left out should be kept as heap above the trench while refilling.

5.21.6.4 In city limits, no part of the trench should be kept open for more than the minimum distance as specified by local authorities at any time and in all places where excavation has been done, no part of the trench should be kept open over night to prevent any mishap or accident in darkness.

5.21.6.5 Duct through test of the PLB laid and pressure test shall be carried out after successful completion of backfilling and compaction and shall be completed before blowing of optical cable.

5.21.7 Duct integration Test (DIT) for HDPE ducts

5.21.7.1 Ensure that the trench does not have any sharp bend and the couplers are tightened to the maximum.

5.21.7.2 Ensure the backfilling and the compaction of the trench are satisfactory prior to start of DIT.

5.21.7.3 Pass the compressed air at 8Kg/Sq.cm and clean the duct from deposits like mud and small stones.

5.21.7.4 Insert a medium density sponge into the duct and push it with compressed air of 8Kg/Sq.cm. The sponge should eject with full force.

5.21.7.5 The mandrill made of hard rubber or polished wood in the shape of cylinder of diameter 0.75 x D in diameter of HDPE duct and 75 mm long shall be used.

5.21.7.6 On completion of test seal the ends with end plugs.

5.21.7.7 Ensure that there is no pressure leakage during DIT.
5.21.8 Cable Blowing and Joining/Splicing

5.21.8.1 Cable Blowing. Manholes shall be marked during HDPE/PLB pipe laying of approx. size of 2m X 2m x 2m shall be excavated for blowing the cables. There may be situations where additional manholes are required to be excavated, for some reasons, to facilitate smooth blowing of cable. Excavation of additional manholes will be carried out, without any extra cost. De-watering of the manholes, if required, will be carried out without any extra costs. De-watering/De-gasification of the ducts, if required, will be carried out without any extra costs.

The Optical fiber cables are available in drums in lengths of approx. 2/4 ± 5% kms. The cables shall be blown by blowing machine through already laid HDPE/PLB. This work is to be carried out under the strict supervision of site in-charge. Only blowing of cables is permitted and pulling of cables shall not be resorted to by the bidder, as tension applied on cable may lead to deterioration/breaking of fibers. Every instance of cable pulling reported will attract a penalty of Rs 1 Lakh. In addition, the bidder will be required to replace the cable at his own cost.

After blowing of the drum is completed, both ends of the HDPE/PLB pipe in each joint chamber should be sealed by hard rodent resistant rubber bush, to avoid entry of rodents/mud into HDPE/PLB pipes.

The Manholes are prepared by providing 65 mm split HDPE/PLB pipe of 2.5 to 3m length and closing the split HDPE/PLB pipes by providing necessary clamps/ adhesive tape as per the directions of Engineer-in-charge. Afterwards, the split/cut HDPE/PLB pipe are covered with 100 mm split RCC pipe of 2m length and sealing the ends of RCC pipe with lean cement solution for protecting bare cable in the manhole . After fixing of HDPE/RCC Split Pipes necessary back filling/reinstatement and dressing of manholes should be carried out as referred under trenching (brickwork/RCC chambers are not required for manholes). The location of the blowing manhole should be recorded for preparation of documentation.

Method of Blowing of Fiber Optic Cable through HDPE duct

- Ensure the duct Integrity test has been completed.
- Drum should be kept approximately at the center of two adjacent chambers. (I.e. if drum length is 4 Km, at 2 Km.) So that on either side 2 Km blowing can be done.
- Cable drum should be mounted on jack, which shall be kept on a plain surface.
- Cable blowing to be done with the help of compressor, hydraulic power pack and blowing Machine. Anti twist tool can be used to avoid twisting of cable while blowing.
- It is then necessary to coil the cable in the figure of 8 to facilitate installation.

5.21.8.2 Jointing/ Splicing. The OFC drums are of 2/4 ± 5% Kms in length hence optical fiber joints will be approx. at every 2/4 Kms. The fibers are to be spliced at every 2/4 Kms. & at both ends (Terminations) in the equipment room as directed by the Engineer-in-charge PICG and BSNL. Min distance between joint chambers for NLD routers should be 2/4 Kms.
The jointing of 08 (eight) sensory fibers will be done along with 48 fiber OF cable.

5.21.8.2.1 Preparation of Cable for Jointing

- Necessary road traffic signs, barriers etc shall be put up at site.

- During the installation, a minimum of 20 meters of cable of each end is coiled in the jointing pit to provide for jointing to be carried out at convenient location as well as spare length to be available for future use in case of failures.

- Bracket to support the cable coil are also fixed on the wall of the pit.

- The cable is then coiled on to the pit wall in the same position as required after the joint is complete. The marking is done on all the loops so that it will be easier to install it later.

- The distance from the last centre to the end of the cable must be at least 1.8 meter. This is being the minimum to be stripped for preparation of joint.

- Sufficient cable at each end upto the jointing vehicle/enclosure is then uncoiled from the pit for jointing.

5.21.8.2.2 Stripping/Cutting of the Cable

- The cable is stripped of their outer and inner sheath with each sheath staggered approximately 10mm from the one above it.

- Proper care must be taken when removing the inner sheath to ensure the fibers are not scratched or cut with the stripping knife or tool to prevent this, it is best to only score the inner sheath twice on opposite sides of the cable, rather than cut completely through it. The two scores marking on either side of the cable are then stripped of the inner sheath by hand quite easily.

- The fibers are then removed from cable one by one and each fiber/ribbon is cleaned individually.

5.21.8.2.3 Preparation of Cable Joint Closure for Splicing

- The strength members of each cable are joined to each other and/or the central frame of the joint closure.

- The joint closure is assembled around the cable.

- The mechanical sealing is applied to the cables and closure or prepared for application after splicing is complete.

- Tags which identify the fibers Nos are attached at suitable locations on the fibers.

- Splice protectors are slipped over each fiber in readiness for splicing over the bare fiber after splicing.

5.21.8.2.4 Stripping and Cleaving of Fiber

- Prior to splicing each fiber must have approximately 50mm of its primary protective U.V. cured coating removed, using fiber stripper.

- The bare fiber is then wiped with a lint free tissue doused with ethyl alcohol.
Cleaving of the fiber is then performed to obtain as close as possible to a perfect $90^0$ face on the fiber.

5.21.8.2.5 Splicing of the Fibers.

- Wash hands thoroughly prior to connecting this procedure.
- Place the bare fiber inside ‘V’ groove of the splicing machine by opening clamp handle such that the end of fiber is app.1 mm. over the end of the ‘V’ groove towards the electrodes.
- Repeat the same procedure for other fiber; however first insert heat shrink splice protector.
- Press the start button on the splice controller.
- The machine will pre fuse, set align both in ‘X’ and ‘Y’ direction and then finally fuse the fiber.
- Inspect the splice on monitor if provided on the fusion splicing machine and assure no nicking, bulging is there and cores appear to be adequately aligned if the splice does not visually look good repeat the above procedure.
- Slide the heat shrink protector over the splice and place in tube heater. Heat is complete when soft inner layer is seen to be ‘oozing’ out of the ends of the outer layer of the protector.
- Repeat the same procedure for all the other fibers.

5.21.8.2.5 Organising Fiber and Finishing Joints

- After each fiber is spliced, the heat shrink protection sleeve must be slipped over the bare fiber before any handling of fiber takes place, as uncoated fibers are very brittle and cannot withstand small radius bends without breaking.
- The fiber is then organized into its tray by coiling the fibers on each side of the protection sleeve using the full tray side to ensure the maximum radius possible for fiber coils.
- The tray is placed in the position.
- OTDR reading taken for all splices in this organized state and recorded on the test sheet to confirm that all fibers attenuation are within 0.1 db per splice. This OTDR test will confirm fibers were not subjected to excessive stress during the organizing process.
- After this the joint can be closed with necessary sealing etc and ready for placement in the pit.

5.21.8.2.5 Placing of Completed Joint In Pit

- Joint is taken out from the vehicle and placed on the tarpaulin provided near the pit.
- The cable is laid on the ground, loop the cable such that pen mark previously placed on the cable line up. Tape these loops together at the top of the coil.
- The joint can now be permanently closed and sealed mechanically. However, before closing, silica gels to be kept inside for moisture protection.
• Now the joint closure is fixed to the bracket on the pit wall and pit is closed.

5.21.8.2.6 Splicing Requirements

• Suitable infrastructure needs to be catered for by the bidder to carry out splicing at his own cost. The Infrastructure required for cable splicing is as given below:-
  1. Splicing machine.
  2. Air Conditioned Van.
  3. OTDR.
  4. Optical talk set.
  5. Tool kit
  6. Any additional accessories, e.g. DG set.

• BSNL/PICG rep would accompany the Site-in-charge and would be taken along with the jointing team to supervise the quality of work.

• The optical fiber cable thus jointed end-to-end will be tested by during Acceptance Testing for splice losses and transmission parameters. The OFC should meet all the parameters specified and no relaxation will be granted.

• It should also be ensured that during jointing no fibers are interchanged or broken. The number of joints should not be more than 10% of the theoretical value calculated for the length of OFC laid.

5.21.9 Construction of Jointing Chamber/Handhole

The joint chambers are provided at every joint to keep the OFC joint well protected and also to keep extra length of cable, which may be, required to attend the faults at a later date. The location is finalized by Engineer-in-charge PICG and BSNL. The jointing chambers will preferably be of pre-cast RCC type as per where not possible, bidder may construct brick chamber. The damaged Joint chambers and Handhole also need to be replaced by bidder.

The detailed specification and drawing of Manhole and hand hole is given below.
SPECIFICATION

SPLICE/ JOINTING CHAMBERS [PRE-CAST TYPE]

1. RCC Joint Protection chamber consists of a) RCC ring / collar of inner dia 108 cm. Height 80 cm, Thickness 6 cm; b) a bottom circular RCC slab (bottom plate) of thickness 6 cm and 120 cm dia; c) two semi circular RCC plates (top plates) of 60 cm radius (120 cm dia) with two handles for each plate, and 6 cm thickness or One circular RCC plate (top plate) of 60 cm radius (120 cm dia) with two handles with 6 cm thickness.

2. Reinforced cement concrete should conform to NP2 class reinforcement. The weight of the chamber should be as prescribed in IS-458.

3. The reinforced Chambers should be machine made.

4. All the materials used should be capable of withstanding the effect of water mud & other chemical & corrosive effects of the soil.

5. The quality of material used for cement concrete work etc. shall be got approved by the Purchaser / authorized representative of the Department.

6. Mild steel bars used for the work shall be of tested quality.

7. The materials used shall be of the best quality of material kinds procurable.

8. Sand used shall be of fine quality.

9. Reinforcement used should be of 6 mm GI wire (as prescribed in IS-458).

10. Cement concrete proportion should be 1:2:3 (1 cement ; 2 sand ; 3 Jelly)

11. Ballast used should be of 6 mm size. 12 gauge GI wire needs to be wrapped before reinforcing the concrete.

12. Dimension should confirm to the enclosed drawings.

13. Curing period shall not be less than 21 (Twenty One) days in any case. Curing should be carried out by immersing the pipes completely in water tank.

14. A break test should be conducted after the curing of the item and before acceptance of the same. When the item is dropped from a height of five feet, it should not break and should not develop any cracks. The sampling rate for break test shall be 1% of the batch size.
SPLICING / JOINTING CHAMBERS (PRE-CAST RCC CYLINDRICAL TYPE NP2 CLASS)

TOP PLATE:

RCC RING / COLLAR:

BOTTOM PLATE:

PRE-CAST RCC CYLINDRICAL TYPE NP2 CLASS CHAMBERS

RCC RING / COLLAR:
- Inner Diameter: 108 cm
- Outer Diameter: 120 cm
- Thickness: 6 cm
- Height: 80 cm

2 Nos of 60 mm dia semi-circular holes for cable entry dimensionally opposite to each other at bottom end of the collar.

TOP PLATE:
- 2 Nos of semi-circular plates of 120 cm dia (60 cm radius) with two handles and 6 cm thickness.
  - or
- 1 No of circular plate of 120 cm dia (60 cm radius) with two handles and 6 cm thickness.

BOTTOM PLATE:
- 2 Nos of semi-circular plates of 120 cm dia (60 cm radius) and 8 cm thickness.
  - or
- 1 No of circular plate of 120 cm dia (60 cm radius) and 8 cm thickness.

DRAWING:
SPLICING / JOINTING CHAMBERS

Bharat Sanchar Nigam Limited
SPECIFICATION

MANHOLES/ HANDHOLES FOR BLOWING

1. RCC Joint Protection chamber consists of a) RCC ring / collar of inner dia 88 cm. Height 60 cm, Thickness 6 cm; b) a bottom circular RCC slab (bottom plate) of thickness 6 cm and 100 cm dia; c) two semi circular RCC plates (top plates) of 50 cm radius (100 cm dia) with two handles for each plate, and 6 cm thickness or One circular RCC plate (top plate) of 50 cm radius (100 cm dia) with two handles with 6 cm thickness.

2. Reinforced cement concrete should conform to NP2 class reinforcement. The weight of the chamber should be as prescribed in IS-458.

3. The reinforced Chambers should be machine made.

4. All the materials used should be capable of withstanding the effect of water mud & other chemical & corrosive effects of the soil.

5. The quality of material used for cement concrete work etc. shall be got approved by the Purchaser / authorized representative of the Department.

6. Mild steel bars used for the work shall be of tested quality.

7. The materials used shall be of the best quality of material kinds procurable.

8. Sand used shall be of fine quality.

9. Reinforcement used should be of 6 mm GI wire (as prescribed in IS-458).

10. Cement concrete proportion should be 1:2:3 (1 cement ; 2 sand ; 3 Jelly)

11. Ballast used should be of 6 mm size. 12 gauge GI wire needs to be wrapped before reinforcing the concrete.

12. Dimension should confirm to the enclosed drawings.

13. Curing period shall not be less than 21 (Twenty One) days in any case. Curing should be carried out by immersing the pipes completely in water tank.

14. A break test should be conducted after the curing of the item and before acceptance of the same. When the item is dropped from a height of five feet, it should not break and should not develop any cracks. The sampling rate for break test shall be 1% of the batch size.
FIG-4(a) HANDHOLE FOR DFC

SPLICING / JOINTING CHAMBER

FIG-4 (b)

NOTE:— AT SOME PLACES ONLY ONE RCC RING OF HEIGHT 1' IS USED (INSTEAD OF TWO RINGS AS SHOWN IN ABOVE FIGURE.)
heading i.e. loading, unloading and fixing at site. The two entry points as mentioned in the drawing for facilitating entry of OF cable.

Figure: Drawing for Pre cast RCC Chamber with Base Plate and Cover

6. General Technical Requirements

6.1 The minimum diameter of the roll in hand hole should be 80 cm. (safe limit of bending radius is about 15 times the diameter of cable)

6.2 Approximate length of cable to be kept in hand hole should be 20 m or 8 rolls.

6.3 The OF cable rolls will be kept horizontally as being done in joint pits. (to keep cable vertically fixers are to be provided which will increase the cost of hand hole)

6.4 There will be no clamp and fixers at entry point. The entry and exit will be same as in joint pit.

6.5 The depth should be sufficient so that the hand hole is safe i.e. not damaged by normal city activities. The top of the hand hole should about 60 cm +/- 10 cm. This depth will be neither too much for maintenance work nor too less.
5.21.10 Electronic Route Markers.

- The electronic route markers are to be re-placed where it has been damaged or become unfunctional.
- The electronic route markers should be placed in the trench after partial backfilling of earth and should be aligned directly over the PLB duct such that it is not more than 3 feet deep from the surface.
- In case horizontal boring is resorted to then the placement of route markers (Electronic / RCC Type) shall be done at every point of use of the machine.
- The exact location of the electronic route marker should be recorded as part of the ABD documentation and in the measurement book.

5.21.11 Construction and Installation of RCC Route /Joint Indicators.

- Joint Indicators Pits shall be dug 1m. towards jungle side at every manhole and jointing chamber for fixing of Route/Joint Indicator. In addition, Route Indicators are also required to be placed where OFC changes directions like road crossing etc. These RCC route indicators have to be re placed where damaged physically.
- The pits for fixing the indicator shall be dug for a size of 60 cms x 60 cms and 75 cms (Depth). The indicator shall be secured in upright position by ramming with stone and minimum upto a depth of 60 cms and concreting in the ratio of 1:2:4 (1: cement, 2: coarse sand, 4: stone aggregate 20 mm nominal size) for the remaining portion of 15 cms. Necessary curing shall be carried out for the concreted structure with sufficient amount of water for reasonable time to harden the structure.
- Depth of pit for fixing the route indicator should be 50 cm for hilly terrain. The route/joint indicator shall protrude at least 18 inches above ground level for easy identification. The route /joint indicator made of pre-cast RCC should have the following dimensions:
  - Base-250 mm x 150 mm
  - Top-200 mm x 75 mm
  - Height-1250 mm
- The route and joint indicator shall be painted with primer before painting with oil paint. The material used should bear ISI mark. The size of each written letter should be at least 3.5 cms. The colors of painting and sign writing is as under :
  - For Joint Indicator Red.
  - For Route Indicator Dark Blue.
  - For Letters White
- The word ‘NFS OFC’ should be engraved on the route/joint indicators. The engraved word “NFS OFC” should be further painted in white over the specified background colour.
The numbering scheme for route indicators will be Joint No./Route Indicators No. for that joint. For example 2/6 indicator means 6th route indicator after 2nd joint. Additional joints on account of faults at a later date should be given number of preceding joint with suffix A, B, C and D. For example sign writing 2A on a joint indicator means, additional joint between Joint No. 2 and 3. The numbering existing route/joint indicator should not be disturbed on account of additional joints.

The details specification of Joint and Route indicator is given below
SPECIFICATION

JOINT / ROUTE INDICATOR FOR NFS PROJECT

1. Dimensions and specification of Route/ Joint Indicator shall be as per clause 136 of Section IV, Part-B of the tender.

2. All the materials used should be capable of withstanding the effect of water, mud & other chemical & corrosive effects of the soil & atmosphere.

3. The quality of material used for cement concrete work etc., shall be got approved by the Purchaser/ authorized representative of the Department.

4. Mild steel bars used for the work shall be of tested quality.

5. The materials used shall be of the best quality of several kinds procurable.

6. Sand used shall be of fine quality.

7. Reinforcement used should be of MS rods as given below:
   (a) 4 Nos. Vertical MS rods of 8 mm dia.
   (b) 8 rings of MS rods of 6 mm dia placed at an internal of 150 mm c/c.

8. Cement concrete proportion should be 1:2:4. (1 cement : 2 sand : 4 Jelly)

9. Dimension should confirm to the clause 136.2 of the tender which is reproduced below:
   - Base: 250 mm x 150 mm
   - Top: 200 mm x 75 mm
   - Height: 1250 mm

10. Curing period shall not be less than 21 days in any case. Curing should be carried out by immersing the pipes completely in water tank.

11. A break test should be conducted after the curing of the item, and before acceptance of the same. When the item is dropped from a height of five feet, it should not break and should not develop any cracks. The sampling rate for break test shall be 1% of the batch size.
5.21.12 Specifications of Material to be used during OFC Route Construction.

The specifications of protection material to be utilized during the OFC route construction. For lesser depths requiring mechanical protection as per specifications and in built up areas, in towns and cities falling within the municipal limits, suitable mechanical protection is provided to HDPE/PLB pipes/coils using RCC/DWC full round/split RCC/DWC pipes or GI pipes or concreting of size 25 cms x 25 cms reinforced with MS weld mesh or a combination of any of these as per the written instructions of the Engineer-in-charge.

5.21.12.1 DWC HDPE Duct The DWC HDPE Ducts required for the construction of the OFC shall be from the TSEC approved manufacturer conforming to GR No. GR/DWC-34/01 SEP 2007 with latest amendment, if any, issued by TEC, DOT for DWC HDPE Ducts of required size(s) (for preferably Orange & Blue colours mentioned against each Package for which supply is to be offered and executed. The full DWC HDPE Ducts shall have OD of 75-90mm and ID of 56 mm (min). DWC HDPE Full Ducts are to be supplied in length of 6 Meters (± 1%) each. DWC HDPE Full Pipe required as part of all the packages is to be supplied preferably in orange and blue colours. These ducts shall be joined by suitable DWC couplers with rubber ‘O’ ring to meet IP 67 requirements.

5.21.12.2 RCC Full Round Pipes Reinforced cement concrete pipes (spun type) coupled with RCC collars sealed with cement mortar are used to provide mechanical protection to HDPE/PLB pipes/coils. The RCC pipes/collars should be of NP-3 class for 100 mm /150mm full round, conforming to IS standard 458-1988 revised upto date. The pipes should have a nominal length of 2 Meters. The RCC collars should be properly sealed using cement mortar 1:3 (1 part grade 53 cement of reputed brand, 3 part fine sand without Impurities). If the mechanical protection is provided by RCC pipes, every third joint will be embedded in a concrete block of size 60 cms (L) x 40 cms (W) x 25 cms (H) of 1:2:4 cement concrete mix 1:2:4 (1: cement, 2: coarse sand, 4: stone aggregate of 20 mm nominal size) so that the alignment of RCC pipes remain firm and intact. Both ends of RCC / GI pipes will be sealed by providing concrete block of size 40 cm (L) x 40 cm (W) x 25 cm (H) of 1:2:4 cement concrete mix to avoid entry of rodents.

5.21.12.3 RCC Full Split Pipes Reinforced cement concrete pipes (spun type) with in-built collars are used to provide mechanical protection to HDPE/PLB pipes/coils. The RCC pipes should be of 100mm internal dia. (Spigotted), Class--NP-3, Thickness: 25mm, Length: 2 Meters with inbuilt collar at one end, conforming to ISI Specification IS: 458, 1988 with latest amendment.

5.21.12.4 G.I. Pipes G.I. pipes should be of Class B having diameter of 76mm. The G.I. Pipes should conform to IS 554/1985 (revised upto date) IS 1989 (Part-I), 1900 Sockets (revised upto date) & IS 1239 (Part-II) 1992 (revised upto date). Wherever protection by G.I. pipe is provided, it is preferable to use HDPE coils. If space on parapet wall on Bridges/culverts is limited, 40 mm GI pipes may be used with 32 mm HDPE coil drawn inside.

5.21.12.5 M.S. Weld Mesh The HDPE/PLB pipes can also be protected by embedding it in concrete of size of 25 cms x 25 cms reinforced with MS weld mesh. The MS weld mesh used should be of 50 mm x 100 mm size, 12 SWG, 120 cms in width in rolls of
50m each. One Meter of MS weld mesh caters to approx. 3 Meters of concreting. The strength of RCC/CC is dependent on proper curing therefore, it is imperative that water content of CC/RCC mix does not drain out into the surrounding soil. In order to ensure this, the RCC/CC work should be carried out by covering all the sides by yellow PVC sheets of weight not less than 1 kg per 8 sq. m. to avoid seepage of water into the soil.

5.21.12.6 Rubber Bush. To prevent entry of rodents into HDPE/PLB pipes, the ends of HDPE/PLB pipes are sealed at every manhole and joint using rodent resistant hard rubber bush (cap) after optical fiber cable is pulled/blown. The rubber bush should be manufactured from hard rubber with grooves and holes to fit into 40/33 mm HDPE/PLB pipe (class V), so that it should be able to prevent the entry of insects, rodents, mud, and rainwater into the HDPE/PLB pipe. It should weigh 150 gms (with a tolerance of ± 5%). It should conform to specification No. G/CDS-05/01 dated December. 1994 and revised upto date.

5.21.13 Type of Protection to be installed for lesser Depth

In case of lesser depth the bidder shall compulsorily provide adequate protection to offset the reduced depth in the following manner:

i. **0 Cms. to 30 Cms.** No Permission

ii. **30 Cms. to 60 Cms.** GI Pipe class B (nominal bore 65 mm) with Concrete Work.

iii. **60 Cms. to 120 Cms.** DWC

iv. **> 120 cm.** No protection

5.21.14 PENALTY FOR CAUSING INCONVENIENCE TO THE PUBLIC.

The Bidder shall not be allowed to dump the empty cable drums/waste materials in Govt/public place, which may cause inconvenience to Govt/ Public. If the Bidder does not dispose off the empty cable drums/waste materials within 3 days of becoming empty, BSNL is at liberty to dispose off the drum in any manner deemed fit and the costs incurred by BSNL in disposing off such materials shall be borne by the Bidder. BSNL may also levy a **penalty up to Rs One Thousand for each such default.**

5.21.15 PENALTY FOR CUTTING/DAMAGING THE OLD CABLE.

During excavation of trench utmost care is to be taken by the Bidder, so that the existing underground cables are not damaged or cut. In-case any damage/ cut is done to the existing cables, a penalty as per the schedule given below will be charged from the Bidder or the amount will be deducted from his running bills. Penalty shall not be levied subject to verification of repair of damages and submission of No Objection Certificate from the operator/user within 10 days of occurrence.

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Size of existing UG/OF cables Cut/ Damaged</th>
<th>Amount of penalty per cut/ Damage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Up to 100 pairs cable</td>
<td>Rs 50,000.00 (Fifty Thousand)</td>
</tr>
<tr>
<td>2.</td>
<td>Above 100 pairs &amp; up to 400 pairs</td>
<td>Rs 1,000,00.00 (One lac)</td>
</tr>
</tbody>
</table>
### Table:

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Above 400 pairs</td>
<td>Rs 1,50,000.00 (One lac Fifty thousand)</td>
</tr>
<tr>
<td>4</td>
<td>OFC of any size</td>
<td>Rs 2,00,000 (two Lakh)</td>
</tr>
<tr>
<td>5</td>
<td>Misc (to include electrical cable, drainage/sewage pipe, water pipe etc.)</td>
<td>Rs 1,50,000 (One Lakh fifty thousand) per cut</td>
</tr>
</tbody>
</table>

- Besides the above penalty, the Bidder shall carry out such repairs for restoration of the damaged cable free of charge. The cost of jointing kit shall also be borne by the Bidder. If Bidder fails to repair the damage, the cost of repair (including cost of labour + Jointing kit) shall be recovered from the Bidder.

- END OF SECTION -5-
SECTION-6

FORMAT OF BID BOND (EMD)

Whereas ……………………. (hereinafter called “the Bidder”) has submitted its bid dated …………… For the supply of …………… Vide Tender No. ……………………….. dated …………… KNOW ALL MEN by these presents that WE ……………………. OF ………………. Having our registered office at …………… (hereinafter called “the Bank”) are bound unto Telecommunications Consultants India Limited (hereinafter called “the Purchaser”) in the sum of Rs. ………………… for which payment will and truly to be made of the said Purchaser, the Bank binds itself, its successors and assigns by these present.

THE CONDITIONS of the obligation are:

1. If the Bidder withdraws his bid during the period of bid validity specified by the Bidder on the Bid form or

2. If the Bidder, having been notified of the acceptance of his bid by the Purchaser during the period of bid validity

   (a) fails or refuses to execute the Contract, if required; or

   (b) fails or refuses to furnish the Performance Security, in accordance with the instructions to Bidders.

We undertake to pay to the Purchaser up to the above amount upon receipt of its first written demand, without the purchaser having to substantiate its demand, provided that in its demand, the purchaser will note that the amount claimed by it is due to it owning to the occurrence of one or both of the two conditions, specifying the occurred condition or conditions.

This guarantee will remain in force upto and including THIRTY (30) days after the Period of bid validity and any demand in respect thereof should reach the Bank not later than the specified date/dates.

Signature of the Bank Authority.

Name

Name & Signature of witness

Signed in Capacity of

Address of witness:

Full address of Branch

Tel No. of Branch

Fax No. of Branch

-END OF SECTION -6-
SECTION-7

FORMAT OF PERFORMANCE BANK GUARANTEE (PBG)

M/s Telecommunications Consultants India Ltd.,
TCIL Bhawan, Greater Kailash-I

New Delhi – 110 048 (INDIA)

(With due stamp duty if applicable)

OUR LETTER OF GUARANTEE No. : __________________________

In consideration of TELECOMMUNICATIONS CONSULTANTS INDIA LIMITED, having its office at
TCIL Bhawan, Greater Kailash-I, New Delhi – 110 048 (INDIA) (hereinafter referred to as “TCIL,” which
expression shall unless repugnant to the content or meaning thereof include all its successors,
administrators and executors) and having entered into an agreement dated

_______ /issued Purchase Order No. ____________________________ dated
_______ with/on M/s ____________________________ (hereinafter
referred to as “The Supplier” which expression unless repugnant to the content or meaning thereof, shall
include all the successors, administrators, and executors).

WHEREAS the Supplier having unequivocally accepted to supply the materials as per terms and
conditions given in the Agreement dated

/Purchase Order No.
shall furnish to TCIL a Performance Guarantee for the faithful performance of the entire contract, to the extent of 5% (five per cent) of the value of the Purchase Order i.e. for

We, (“The Bank”) which shall include OUR successors, administrators and executors herewith establish an irrevocable Letter of Guarantee No. ___________ in your favour for account of (The Supplier) in cover of performance guarantee in accordance with the terms and conditions of the Agreement/Purchase Order.

Hereby, we undertake to pay up to but not exceeding (say only) upon receipt by us of your first written demand accompanied by your declaration stating that the amount claimed is due by reason of the Supplier having failed to perform the Agreement and despite any contestation on the part of above named supplier.

This Letter of Guarantee will expire on ________ including 30 days of claim period and any claims made hereunder must be received by us on or before expiry date after which date this Letter of Guarantee will become of no effect whatsoever whether returned to us or not.

Authorized Signature
Manager
Seal of Bank

-END OF SECTION -7-
To

Group General Manager (MM)
Telecommunications Consultants India Limited
TCIL Bhawan, Greater Kailash-I
New Delhi-110 048 (INDIA)

Dear Sir,

In response to your above Tender, we hereby submit our offer herewith.

1. Bidder Name : ________________________________
2. Website Address : ________________________________
3. Email Address : ________________________________
4. Address for Communication : ________________________________

5. Telephone Number : ________________________________
6. Fax/Tele fax Number : ________________________________

7. Authorized Person - Name : ________________________________
   Designation : ________________________________
   Mobile No. : ________________________________
   Email ID : ________________________________

8. Alternate Person - Name : ________________________________
   Designation : ________________________________
   Mobile No. : ________________________________
   Email ID : ________________________________

9. PAN Number : ________________________________
10. TIN Number : ________________________________
11. GST Regn. No. with address : ____________________________________

12. ECC Number : ____________________________________

13. Beneficiary’s complete bank details in case payment through LC is approved

   Bank Account No. : ____________________________________
   IFSC / NEFT Code : ____________________________________
   Name of the Bank : ____________________________________
   Address of the Branch : ____________________________________

14. Particulars of EMD

   Amount : Rs. _________________________________
   Mode of Payment (DD/BG) : ____________________________________
   DD/BG No. : ____________________________________
   Date : ____________________________________
   Name of the Bank : ____________________________________
   Address of the Bank : ____________________________________
   Validity of BG : ____________________________________

15. Particulars of Tender Fee

   Amount : Rs._________________________________
   DD No. : ____________________________________
   Date : ____________________________________
   Name of the Bank : ____________________________________
   Address of the Bank : ________________________________


<table>
<thead>
<tr>
<th>Year</th>
<th>Annual Report attached at Page No.</th>
<th>Turnover in Rs. (Lakh)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Average Turnover
17. Details of similar work / order executed during last 7 years ending 28.02.2018

(Please submit copy of completion certificate from the client.)

<table>
<thead>
<tr>
<th>Description of the Work/Order Executed</th>
<th>Value of Work/Order Executed</th>
<th>Name of the Client</th>
<th>Start Date</th>
<th>Finish Date</th>
<th>Doc. Evidence at Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

18. Are you a MSE Unit. If yes, please furnish Registration Details, Name of the DIC / State, whether SC/ST or not. All details are mandatory.
_________________________________________ ______________________________

19. Company’s Net worth as on 31.03.2017 (Rs in crores):
_________________________________________

20. Sanctioned Cash Credit Limit and Sanctioned BG Limit as on or after 31.03.2017 (Rs. in Crores):
_________________________________________

21. Information on current commitments /Ongoing Projects. Work orders are required to be attached for reference.

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Brief Details of Project/Work Order</th>
<th>Contract Date</th>
<th>Contract Value(lakhs)</th>
<th>Contract Completion Date</th>
<th>Value of outstanding work (lakhs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
22. Following Documents are submitted to substantiate other eligibility criteria.

i)  

ii)  

iii)  

DECLARATION

1) We have read and understood the terms & conditions of the above mentioned tender and comply to all Terms & Conditions of your Tender.

   (In case of any deviation the Contractor must attach a separate sheet clearly mentioning the Clause No. of the Tender and Deviation thereto)

2) We certify that the information mentioned above are true and correct to best of our knowledge.

3) In case of receipt of order we confirm that payment shall be received through e-Banking / Electronics Transfer.

4) This offer contains _______ No. of pages including all Annexure and Enclosures.

Place:  

Signature of Authorized Signatory

Date:  

Name:  

Designation:  

Seal:  

-END OF SECTION -8-
No-Conviction Certificate

[On the letterhead of the Organization]

This is to certify that ____________________ (Name of the organization), having registered office at ____________________________________________

(Address of the registered office) has never been blacklisted or restricted to apply for any such activities by any Central / State Government Department or Court of law anywhere in the country.

Signature:

Name of the Authorized Signatory: Designation:

Contact details (including E-mail):

Date:

Note: In case of consortium agreement all the partners have to sign the No conviction certificate separately.

-END OF SECTION -9-
INTEGRITY PACT

General

This Agreement (hereinafter called the Integrity Pact) is made on ______ day of the ___________ month of 2018, between on one hand, Telecommunications Consultants India Ltd. (TCIL) acting through Sh._________________________________________ (Name & Designation of the officer) (Hereinafter called the “BUYER” which expression shall mean and include, unless the context otherwise requires, his successors in office and assigns) of the First Part and M/s.____________________________________________ (Name of the Company) represented by Sh.___________________________________ (Name of the 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 BUYER invites bid against Tender/RFO/EOI/RFP/RFQ for the __________________________________________________________________________ (Name of the Stores/Equipment/Services, Ref No. & Date) and the BIDDER/Seller is willing to submit bid for the same and WHEREAS the BIDDER is a Private Company/ Public Company/ Government Undertaking/ Partnership Firm/Proprietorship Firm/ Registered Export Agency, constituted in accordance with the relevant law in the matter and the BUYER is a Public Sector Undertaking.

NOW, THEREFORE

To avoid all forms of corruption by following a system that is fair, transparent and free from any influence/prejudiced dealings prior to, during and subsequent to the currency of the contract to be entered into with a view to :

- Enabling the BUYER to obtain the desired said stores/equipment/Services at a competitive price in conformity with the defined specifications by avoiding the high cost and the distortionary impact of corruption on public procurement, and Enabling BIDDERs to abstain from bribing or indulging in any corrupt practice in order to secure the contract(s) by providing assurance to them that their competitors will also abstain from bribing and other corrupt practices and the BUYER will commit to prevent corruption, in any form, by its officials by following transparent procedures.

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

1. Commitments of the BUYER

1.1 The BUYER undertakes that no official of the BUYER, connected directly or indirectly with the contract(s), will demand, take a promise for or accept, directly or through intermediaries, any bribe, consideration, gift, reward, favour or any material or immaterial benefit or any other advantage from the BIDDER, either for themselves or for any person, organization or third party related to the contract(s) in exchange for an advantage in the bidding process, bid evaluation, contracting or implementation process related to the contract(s).
1.2 The BUYER 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 BIDDER in comparison to other BIDDERs.

1.3 All the officials of the BUYER will report to the CMD, TCIL 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 BIDDER to the BUYER with full and verifiable facts and the same is prima facie found to be correct by the BUYER, necessary disciplinary proceedings, or any other action as deemed fit, including criminal proceedings may be initiated by the BUYER and such a person shall be debarred from further dealings related to the contract(s) process. In such a case while an enquiry is being conducted by the BUYER the proceedings under the contract(s) would not be stalled.

3. Commitments of BIDDERs

The BIDDER commits itself to take all measures necessary to prevent corrupt practices, unfair means and illegal activities during any stage of its bid or during any pre-contract or post-contract stage in order to secure the contract(s) or in furtherance to secure it and in particular commit itself to the following :-

3.1 The BIDDER 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 BUYER, connected directly or indirectly with the bidding process, or to any person, organization or third party related to the contract(s) in exchange for any advantage in the bidding, evaluation, contracting and implementation of the contract(s).

3.2 The BIDDER 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 BUYER or otherwise in procuring the contract(s) or forbearing to do or having done any act in relation to the obtaining or execution of the contract(s) or any other contract(s) with TCIL for showing or forbearing to show favour or disfavour to any person in relation to the contract(s) or any other contract(s) with TCIL.

3.3 BIDDERs shall disclose the name and address of agents and representatives and Indian BIDDERs shall disclose their foreign principals or associates.

3.4 BIDDERs shall disclose the payments to be made by them to agents/brokers or any other intermediary, in connection with this bid/contract(s).

3.5 The BIDDER further confirms and declares to the BUYER that the BIDDER has not engaged any individual or firm or company whether Indian or foreign to intercede, facilitate or in any way to recommend to the BUYER or any of its functionaries, whether officially or unofficially to the award of the contract(s) to the BIDDER, 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 BIDDER, either while presenting the bid or during pre-contract negotiations or before signing the contract(s) shall disclose any payment he has made, is committed to or intends to make to officials of the BUYER or their family members, agents brokers or any other intermediaries in connection with the contract(s) and the details of services agreed upon for such payments.
3.7 The BIDDER will not collude with other parties interested in the contract(s) to impair the transparency, fairness and progress of the bidding process, bid evaluation, contracting and implementation of the contract(s).

3.8 The BIDDER will not accept any advantage in exchange for any corrupt practice, unfair means and illegal activities.

3.9 The BIDDER shall not use improperly, for purposes of competition or personal gain, or pass on to others any information provided by the BUYER as part of the business relationship, regarding plans, technical proposals and business details, including information contained in any electronic data carrier. The BIDDER also undertakes to exercise due and adequate care lest any such information is divulged.

3.10 The BIDDER commits to refrain from giving any complaint directly or through any other manner without supporting it with full and verifiable facts.

3.11 The BIDDER shall not instigate or cause to instigate any third person to commit any of the actions mentioned above.

3.12 If the Bidder or any employee of the BIDDER or any person acting on behalf of the BIDDER, either directly or indirectly, is a relative of any of the officers of the BUYER, or alternatively, if any relative of an officer of the BUYER has financial interest/stake in the BIDDER’s firm, the same shall be disclosed by the BIDDER at the time of filing of tender.

The term ‘relative’ for this purpose would be as defined in Section 6 of the Companies Act 1956.

3.13 The BIDDER 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 BUYER.

3.14 The BIDDER will not bring any Political, Governmental or Diplomatic influence to gain undue advantage in its dealing with BUYER.

3.15 The BIDDER will promptly inform the Independent External Monitor (of BUYER) if he receives demand for a bribe or illegal payment/benefit and

i. If comes to know of any unethical or illegal practice in BUYER.

ii. If he makes any payment to any BUYER Associate.

3.16 The BIDDER will undertake to demand from all sub-contractors a commitment in conformity with this Integrity Pact.

3.17 The Bidder will not enter with other Bidders into any undisclosed agreement or understanding, whether formal or informal. This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelisation in the bidding process.

4. Previous Transgression

4.1 The BIDDER declares that no previous transgression occurred in the last three years immediately before signing of this Integrity Pact, with any other company in any country in respect of any corrupt practices envisaged hereunder or with any Public Sector Enterprise in India or any Government Department in India that could justify BIDDER’s exclusion from the tender process.

4.2 The BIDDER agrees that if it makes incorrect statement on this subject, BIDDER can be disqualified from the tender process or the contract(s), if already awarded, can be terminated for such reason.
5. Sanctions for Violations

5.1 Any breach of the aforesaid provisions by the BIDDER or any one employed by it or acting on its behalf (whether with or without the knowledge of the BIDDER) shall entitle the BUYER to take all or any one of the following actions, wherever required:

i) To immediately call off the pre contract negotiations without assigning any reason or giving any compensation to the BIDDER. However, the proceedings with the other BIDDER(s) would continue.

ii) The Earnest Money Deposit (in pre-contract stage) and/or Security Deposit/Performance Bond (after the contract(s) is/are signed) shall stand forfeited either fully or partially, as decided by the BUYER and the BUYER shall not be required to assign any reason therefore.

iii) To immediately cancel the contract(s), if already signed, without giving any compensation to the IDDER.

iv) To recover all sums already paid by the BUYER, and in case of an Indian BIDDER with interest thereon at 5% higher than the prevailing Base Rate of State Bank of India, while in case of a BIDDER from a country other than India with interest thereon at 5% higher than the LIBOR. If any outstanding payment is due to the BIDDER from the BUYER in connection with any other contract(s), such outstanding payment could also be utilized to recover the aforesaid sum and interest.

v) To encash the advance Bank Guarantee and performance bond/warranty bond, if furnished by the BIDDER, in order to recover the payments, already made by the BUYER, alongwith interest.

vi) To cancel all or any other Contracts with the BIDDER. The BIDDER shall be liable to pay compensation for any loss or damage to the BUYER resulting from such cancellation/rescission and the BUYER shall be entitled to deduct the amount so payable from the money(s) due to the BIDDER.

vii) To debar the BIDDER from participating in future bidding processes of TCIL for a minimum period of five years, which may be further extended at the discretion of the BUYER.

viii) To recover all sums paid in violation of this Pact by BIDDER(s) to any middleman or agent or broker with a view to securing the contract(s).

ix) In cases where irrevocable Letters of Credit have been received in respect of any contract(s) signed by the BUYER with the BIDDER, the same shall not be opened.

x) Forfeiture of Performance Bond in case of a decision by the BUYER to forfeit the same without assigning any reason for imposing sanction for violation of this Pact.

xi) Any other action as decided by CMD, TCIL based on the recommendation by Independent External Monitors (IEMs).

5.2 The BUYER will be entitled to take all or any of the actions mentioned at para 5.1(i) to (xi) of this Pact also on the Commission by the BIDDER or any one employed by it or acting on its behalf (whether with or without the knowledge of the BIDDER), of an offence as defined in Chapter IX of the Indian Penal Code, 1860 or Prevention of Corruption Act 1988 or any other statute enacted for prevention of corruption.

5.3 The decision of the BUYER to the effect that a breach of the provisions of this Pact has been committed by the BIDDER shall be final and conclusive on the BIDDER. However, the BIDDER can approach the Independent External Monitor(s) appointed for the purposes of this Pact.
5.4 For any breach of the provisions of Clauses 1.1 to 1.3 by the Buyer, action as mentioned at Clause 2 shall be applicable.

6. Independent External Monitor (IEMs)

6.1 The BUYER has appointed Independent External Monitors (IEMs) for this Pact in consultation with the Central Vigilance Commission. Names and email addresses of the IEMs are given on TCIL Website.

6.2 The task of the IEMs shall be to review independently and objectively, whether and to what extent the parties comply with the obligations under this Pact.

6.3 The IEMs shall not be subject to instructions by the representatives of the parties and perform their functions neutrally and independently. They report to the CMD, TCIL.

6.4 Both the parties accept that the IEMs have the right to access all the documents relating to the project/procurement, including minutes of meetings.

6.5 As soon as the IEM notices, or has reason to believe, a violation of this Pact, he will so inform the CMD, TCIL. The IEM can in this regard submit nonbinding recommendations. If TCIL has not, within the reasonable time, taken visible action to proceed against such offence, the IEM may inform directly to the Board of Directors, TCIL.

6.6 The BIDDER(s) accepts that the IEM has the right to access without restriction to all Project documentation of the BUYER including that provided by the BIDDER. The BIDDER will also grant the IEM, upon his request and demonstration of a valid interest, unrestricted and unconditional access to his project documentation. The same is applicable to Subcontractors. The IEM shall be under obligation to treat the information and documents of the BIDDER / Subcontractor(s) with confidentiality.

6.7 The BUYER will provide to the IEM 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 IEM the option to participate in such meetings.

6.8 The IEM will submit a written report to the CMD, TCIL within 8 to 10 weeks from the date of reference or intimation to him by the BUYER/BIDDER and, should the occasion arise, submit proposals for correcting problematic situations.

6.9 The word 'IEM' would include both singular and plural.

7. Facilitation of investigation

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

8. Law and Place of jurisdiction

This Pact is subject to Indian Law. The place of performance and jurisdiction is the seat of the BUYER (i.e. New Delhi).

9. Other Legal Actions

9.1 The actions stipulated in this Integrity Pact are without prejudice to any other legal action that may follow in accordance with the provisions of the extant law in force relating to any civil or criminal proceedings.
9.2 The arbitration clause provided in the tender document/contract shall not be applicable for any issue/dispute arising under Integrity Pact.

10. Validity

10.1 The validity of this Integrity Pact shall be from the date of its signing and extend up to 5 years or the complete execution of all the contracts to the satisfaction of both the BUYER and BIDDER/Seller, including warranty period, whichever is later. In case BIDDER is unsuccessful, this Integrity Pact shall expire after six months from the date of the signing of the contract.

10.2 Should one or several provisions of this Pact turn out to be invalid; the remainder of this Pact shall remain valid. In this case, the parties will strive to come to an agreement to their original intentions.

10.3 If any claim is made / lodged during this time, the same shall be binding and continue to be valid despite the lapse of this pact as specified above, unless it is discharged / determined by CMD, TCIL.

10.4 Changes and supplements need to be made in writing.

10.5 If the Contractor is in a partnership or a consortium, this agreement must be signed by all partners or consortium members.

11. The parties hereby sign this Integrity Pact at ___________ on ___________ .

<table>
<thead>
<tr>
<th>BUYER</th>
<th>BIDDER/SELLER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signature</td>
<td>________________________</td>
</tr>
<tr>
<td>Name of the officer</td>
<td>________________________</td>
</tr>
<tr>
<td>Designation</td>
<td>________________________</td>
</tr>
<tr>
<td>Name of the Company</td>
<td>________________________</td>
</tr>
<tr>
<td>Address</td>
<td>________________________</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Dated:</td>
<td>________________________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Witness-1 (Buyer)</th>
<th>Witness-1 (Bidder/Seller)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signature</td>
<td>________________________</td>
</tr>
<tr>
<td>Name of the officer</td>
<td>________________________</td>
</tr>
<tr>
<td>Designation</td>
<td>________________________</td>
</tr>
<tr>
<td>Name of the Company1</td>
<td>________________________</td>
</tr>
<tr>
<td>Address</td>
<td>________________________</td>
</tr>
<tr>
<td>Dated:</td>
<td>________________________</td>
</tr>
</tbody>
</table>
Witness-2 (Buyer)  Witness-2 (Bidder/Seller)

Signature ______________________  ______________________
Name of the officer ______________________  ______________________
Designation ______________________  ______________________
Name of the Company ______________________  ______________________
Address ______________________  ______________________

Dated: ______________________  ______________________

“This tender is covered under Integrity Pact Programme of TCIL and Contractors are required to sign the Integrity Pact Document and submit same to TCIL before or along with the bids in the format given below.

TCIL reserves the right to accept or reject any or all the tenders without assigning any reason.
(REFERENCE TO INDEPENDENT EXTERNAL MONITOR)

To,

Sub: Tender No. / Contract No. ____________________________

1. No reference can be made to Independent External Monitor if the time to submit the tender / bid is less than 7 days. It may also be noted that no time extension will be allowed for submission of tender.

2. Reference of only those bidders who have purchased the tender document and signed the Integrity Pact will be entertained.

3. Application be made in triplicate - one shall be sent to TCIL and two copies of the same shall be sent to IEM.

A) PRE-TENDER STAGE

i) Please provide the following information:
   a) Whether tender document has been purchased. Yes / No  
      (If Yes, indicate the Receipt No.)
   b) If downloaded from website, whether fee for the same has been deposited. Yes / No
   c) Whether the query has been given to TCIL before submission to IEM. Yes / No  
      (If Yes, please state the date of submission of query).
   d) If reply has been received, please attach a copy of the reply.

   ii) Please state the query in clear terms giving reference to the clause in the tender.

ISSUES RELATING TO EVALUATION OF TENDERS:

i) Whether any reference has been made to TCIL. Yes / No  
   (If yes, reply received from TCIL be attached.)

II) Issue on which reference is being made.

III) Documentary proof with reference to query be attached.

C) IN CASE CONTRACT HAS BEEN SIGNED/EXECUTION STAGE

I) Date of signing of the contract.

II) Please state whether the Performance Guarantee has been submitted in terms of the contract. Yes / No

III) Agreement Clause No. against which the complaint is being made.

IV) Integrity Pact clause under which reference is being made.
D) **ISSUES REFERENCE**: (Please State the query)

I) Please state whether any reference was made to TCIL. Yes / No.
(If Yes, reply of TCIL be attached)

II) In case no reference is made, please note that first reference is required to be made to TCIL unless the issue relates to any corrupt practice.

Signature _________________

Name of the Company ____________

Address _________________

Tel. No. _________________

Mob. No. _________________

Fax No. _________________

E-mail _________________

(Please attach separate sheets for detailing the issues, if need be)

- **END OF IP DOCUMENT** –

-**END OF SECTION -10**-
ON 100 Rs Indian Non Judicial stamp paper

DRAFT AGREEMENT

This Agreement is made on this ________________.

Between

Telecommunications Consultants India Ltd., a Government of India Enterprise, having its Registered & Corporate Office at TCIL Bhawan, Greater Kailash-1, New Delhi-110048 (hereinafter called “TCIL”)

And

……………………………….., having its Registered & Corporate at………………………………. (hereinafter referred to as “agency”).

TCIL & Agency collectively referred as “Parties” & individually as “Party”.

Whereas TCIL has received a work order for………………. TCIL intends to subcontract the part of the work for ……………………..(hereinafter referred as “Work”).

Whereas TCIL had floated a NIT vide reference no. ………………………………………………………………….. inviting quotes for execution of the work and whereas Agency submitted its quote on dated …………………… wherein the agency had agreed to carry out the above works at …………………………………………………………………………………………………………………………………………………………………………………………………………………………………………..as per Price Bid copy attached herewith, which shall form part of this agreement.

NOW THIS AGREEMENT WITNESSED as follows:

It is agreed that the following documents and annexure attached herewith shall be deemed to form and be read and constructed as part of this agreement in order of priority

1. The submitted tender document of NIT reference no. …………………………………………………………………..dated …………………………………… issued by TCIL to ………………………………………..

2. Price bid submitted by the agency on dated …………………………….. and which was opened on dated ………………………………..

3. Letters of Acceptance (LOA) issued by TCIL to ……………………………….. dated ………………………………..

4. TCIL awarded letter to …………………………………………………..
In consideration of the covenant for payments to be made as per payment terms defined in Clause No. 3.8 of Section-3 of Tender Document

……………………………………………………………………………………………………………………………………

………………… for the works carried out by the agency in accordance with this agreement, the agency hereby covenant with TCIL to execute the works in conformity in all respects with the provisions of this agreement.

This agreement shall be deemed to have come into force with effect from the issuing date of LOA issued by TCIL to Agency i.e. from ………………………………………...

In witness whereof the parties hereto have hereunto set their respective hands the day and year first above written.

For and on behalf of

M/s Telecommunications Consultants India Ltd ………………………………………

( ) ( )

PROPRIETOR

Witness

1. 1.

2. 2.

-END OF SECTION -11-
SECTION 12

PRICE SCHEDULE PART-A

CONTRACTOR’S CORRESPONDANCE ADDRESS ______________________

CONTRACTOR’S TELEPHONE No.: _____________________________

FAX No.: __________________________________________________

E-mail _____________________________________________

FROM______________________________

To

The GGM (MM),

TCIL, TCIL Bhawan , New Delhi.

Dear Sir,

I/We submit the sealed tender (encrypted e-bid) for Providing AMC Services for OFC based NLD And Access Links across the State of Uttrakhand, Tender No. TCIL/15/1777/I/17-MM/024E Dated 01-03-2018.

1. I/We have thoroughly examined and understood instructions to contractors, terms and conditions of the contract given in the notice inviting tender and those contained in the general conditions of contract and its appendices, and annexure and agree to abide by all the terms & conditions of the tender document and corrigendum etc.

I/We offer to carry out the work of following Regions of tender No. TCIL/15/1777/I/17-MM/024E dated 01-03-2018 at the price quoted in the price schedule Section – 12, Part-B. Our Region wise quoted prices are as below.

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Region Name</th>
<th>Value including all taxes (Rs.) in figure</th>
<th>Value including all taxes (Rs.) in words</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Uttarakhand Region</td>
<td>Fixed AMC Charges</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Re Routing Charges</td>
<td></td>
</tr>
</tbody>
</table>

It is confirmed that the rates quoted above are inclusive of all taxes, duties, GST or any other levies applicable, for this performance of contract.

2. I/We agree to keep the offer open for acceptance up to and inclusive of the date under clause 2.8 of Section-2. I/We shall be bound by communication of acceptance of the offer dispatched within the time.

3. I / We do hereby declare that the entries made in the tender and appendices attached therein are true and also that I/We shall be bound by the act of my/our duly constituted attorney Mr./Ms.___________________________ whose signature is appended here to in the space specified for the purpose and of any other person who in future may be appointed by me/ us to carry out the business of the firm.

_________________________________
(Signature of Constituted Attorney)

Yours faithfully

(Signature of contractor)

(Capacity in which signing along with seal)

*NOTE:
(1) If the discrepancy exists between figures & words in quotations, in that case the amount in words will prevail.

(2) Absurd / Abnormal rates will not be considered by the Company.

Name and address of Attorney/ Contractor

Name: __________________________

Address: __________________________

Date: ____________________________

Signatures of witness: ………………………

Name …………………………………………

Address ………………………………………

Date …………………………………………

## A. FIXED AMC CHARGES

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Name of the Region</th>
<th>Unit Rate Per KM per month (In Rs.) (A)</th>
<th>Total Route Length Km (apprx.) (B)</th>
<th>Duration in month (C)</th>
<th>Total Price for 36 Months (In Rs.) (D)=(A)(B)(C)</th>
<th>Taxes (In Rs.) (E)</th>
<th>Total Price including Taxes (In Rs.) (F)=(D)+(E)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Uttarakhand Region</td>
<td></td>
<td>942</td>
<td>36</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# B. RE-ROUTING CHARGES (AS & WHEN REQUIRED)

### (i) Uttarakhand Region

<table>
<thead>
<tr>
<th>Item description</th>
<th>Qty (Km)</th>
<th>Unit Price per KM</th>
<th>Total Price (In Rs.)</th>
<th>Taxes (In Rs.)</th>
<th>Total Price (Inclusive of taxes) (In Rs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Services inclusive of the services mentioned below at S. No: A,B,C,D,E,F,G and H</td>
<td>160</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| **A** • Excavation, Backfilling, Reinstatement, Compaction & Installation of materials such as GI Pipes & clamps, DWC with couplers, Full/Half round RCC Pipes, RCC Slabs and RCC Route/Joint Indicators whenever required.  
  • Road / Bridge Crossing including materials such clamps, DWC with couplers, Full/Half round RCC Pipes, and RCC Slabs  
  • Duct Laying |          |                   |                      |               |                                          |
| **B** Construction and Installation of Joint Chambers and Manhole                 |          |                   |                      |               |                                          |
| **C** Construction and Installation of Route/Joint Indicators                    |          |                   |                      |               |                                          |
| **D** OFC Laying / Blowing                                                      |          |                   |                      |               |                                          |
| **E** Splicing & Jointing                                                       |          |                   |                      |               |                                          |
| **F** Installation of FDMS to include termination with pigtails for termination Type A, Type B and Type C type OFC |          |                   |                      |               |                                          |
| **G** Acceptance Testing, Commissioning, Documentation, Preparation of As Built Drawings |          |                   |                      |               |                                          |
| **H** Any other required item as per technical specification and tender condition |          |                   |                      |               |                                          |

**Note:**

- Material for re-routing (as per supply component of this contract) shall be provided by TCIL.
- Although the total Price for re-routing of 160 Kms. is invited, the actual length of re-routing work during the Contract period shall vary as per requirement, as and when this arises. In Purchase Order, only the rates for re-routing shall be mentioned and not the quantity of work. However, Bid will be evaluated on the total price of fixed AMC and re-routing charges of 160 Kms.

---

- **END OF SECTION -12-**
SECTION-13

OTHER CONDITIONS & SPECIFICATIONS

Others BSNL tenders’ terms and conditions to be complied by Bidders

Guidelines in the form of Engineering Instructions (E.Is.) on Construction Practices of Optical Fiber Cables issued by BSNL are given in Section-13. In case of any conflict with regards to OFC route construction and laying practices then requirements/procedures given in Section-5 shall supersede.

- **Prices**

  In case of reduction of taxes and other statutory duties during the scheduled delivery period, purchaser shall take the benefit of decrease in these taxes/duties for the supplies made from the date of enactment of revised duties/taxes.

  In case of increase in duties/taxes during the scheduled delivery period, the purchaser shall revise the prices as per new duties/taxes for the supplies, to be made during the remaining delivery period as per terms and conditions of the purchase order.

- **Warehousing.** The contractors shall arrange their own Store/Warehouse for keeping the SOR materials issued by TCIL as well as the Non-SOR items required to be stocked by them at their own cost.

- **Penalty for cutting/damaging the old cable.**

  During excavation of trench utmost care is to be taken by the Bidder, so that the existing underground cables are not damaged or cut. In case any damage/cut is done to the existing cables, a penalty as per the schedule given below will be charged from the Bidder or the amount will be deducted from his running bills. Penalty shall not be levied subject to verification of repair of damages and submission of No Objection Certificate from the operator/user within 10 days of occurrence.

<table>
<thead>
<tr>
<th>Ser No</th>
<th>Size of existing UG/OF cables Cut/ Damaged</th>
<th>Amount of penalty per cut/ Damage</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.</td>
<td>Up to 100 pairs cable</td>
<td>Rs 50,000.00 (Fifty Thousand)</td>
</tr>
<tr>
<td>7.</td>
<td>Above 100 pairs &amp; up to 400 pairs</td>
<td>Rs 1,000,00.00 (One lac)</td>
</tr>
<tr>
<td>8.</td>
<td>Above 400 pairs</td>
<td>Rs 1,50,000.00 (One lac Fifty thousand)</td>
</tr>
<tr>
<td>9.</td>
<td>OFC of any size</td>
<td>Rs 2,00,000 (two Lakh)</td>
</tr>
<tr>
<td>10.</td>
<td>Misc (to include electrical cable, drainage/sewage pipe, water pipe etc.)</td>
<td>Rs 1,50,000 (One Lakh fifty thousand) per cut</td>
</tr>
</tbody>
</table>

  Besides the above penalty, the Bidder shall carry out such repairs for restoration of the damaged cable free of charge. The cost of jointing kit shall also be borne by the Bidder. If Bidder fails to repair the damage, the cost of repair (including cost of labour + Jointing kit) shall be recovered from the Bidder.

- **Acceptance Tests:**

  The re-routing works shall be deemed to have been completed only after the same has been accepted by the inspection teams. The Acceptance Testing will be undertaken jointly by the reps of BSNL and Client. The acceptance certificate will be jointly issued by BSNL and Client for release of second payment after successful...
• The Bidder shall make test pits at the locations desired by Inspection Officers for conducting test checks without any extra payment. The Bidder shall restore the pits after test measurements to its original shape. The Bidder shall be responsible to provide test/ measurement tools and testers for conducting various tests. It will by ensured by the Joint Acceptance Teams that there is no compromise on the network attributes with specific reference to mission critical requirements for NLD backbone and optical access networks.

• The Bidder, after having satisfied himself of completion of work, from FDMS at one end to FDMS at other end, shall offer the work to Inspection Officers for conducting Acceptance Testing. The work shall be offered for Inspection as soon as part of work is complete in all respects. The work against any P.O can be offered for Inspection in a number of stages. Scope of Acceptance Testing is as given at clause Error! Reference source not found..

• The Inspection Officers shall not be responsible for recording of measurements for the purpose of billing and contractual obligations. However, if the measurements taken by Inspection Officers are found to be lesser than the measurements recorded by the supervisor responsible for recording the measurements, the measurement taken by A.T Officers shall prevail without prejudice to any punitive action against the Bidder as per provisions of the contract and the officer recording the measurements.

• The Bidder shall be obligated to remove defects/deficiencies pointed out by the Inspection Officers without any additional cost. BSNL does not take any responsibility of return of defective used items.

• Miscellaneous

• The supply will be accepted only after Joint Quality Assurance tests are carried out by Quality Assurance Wing of BSNL and Quality Assurance Officers to be nominated by Client as per prescribed schedule and material passing the test successfully and after excise gate pass/ excise invoice or equivalent replacement are issued by the manufacturer for that purpose.

• Scope of Acceptance Testing
  - It is essential to verify the integrity and the capability of the Fiber Optic Cable and to assess its readiness for intended DWDM services. This scope defines the methodology for technical acceptance of fiber optic cable and accessories, duct and accessories. The purpose of acceptance and testing is to verify integrity of measurement and quality of work done.

  - Upto n 10% of the measurements recorded in the Measurement book would be verified by the AT teams for correctness as explained at Clause 96.3 above. The Joint Acceptance Teams will finalize the detailed methodology and procedure for AT in consultation with successful bidder after award of contract. The essential aspects to be checked for proper implementation of works are given in the clauses below:-

• . Fiber Optic Cable
  - For Cable with G.655 fiber
    - Attenuation measurements by OTDR at 1550nm and 1625nm.
    - Fiber continuity check.
    - Linked splice loss measurement at 1550nm and 1625nm.
    - Chromatic Dispersion at 1530-1565nm and 1565-1625nm.

• For Cable with G.652 D fiber
  - Attenuation measurements by OTDR at 1310nm and 1550nm.
  - Fiber continuity check.
  - Linked splice loss measurement at 1310nm and 1550nm
  - Chromatic Dispersion at 1285-1330nm, 1550nm and 1625nm.
• **Link testing**
  - Once splicing and termination are completed OTDR traces from both terminal station of link shall be taken. Prepare event table, workout event averages and average splice losses of the link event table calculation.
  - Average splice losses at 1550 nm should be $\leq 0.1\text{dB}$. Net losses at event= (Sum of splice losses A to B & B to A) / 2 x No of splices.
  - After OTDR testing power meter link testing should be taken.
  - Power loss in link should be less than the value obtained by calculating using the formula given below:
    - Value in dB at 1310nm = No. of connectors X 0.5 + No of splices X 0.1 + distance in Km X 0.36.
    - Value in dB at 1550nm = No. of connectors X 0.5 + No of splices X 0.1 + distance in Km X 0.22.
  - For Chromatic Dispersion the change in attenuation of the fiber shall be $<0.05\text{dB}$ for G.652D ribbon at 1310nm, 1550nm and for G.655 ribbon at 1550nm, 1625nm wavelengths.

• **Civil AT**
  - OFC route constructions and laying practice of Section 5 is to be followed. The following aspects in this regard will be checked by the AT teams for quality of work done.

• **Excavation**
  - Ensure that trench is within ROW limits.
  - Marking with lime powder before digging for AT.
  - Trench depth should be as per the specification.
  - In case of low depth, prior permission should have been taken and approval obtained.
  - Duct alignment should be as per plan. All the ducts should be laid parallel. Jointing must be done properly by using the couplers.
  - Suitable protection should have been applied, wherever required, as per direction of Engineer-in-Charge using RCC/DWC/GI Pipes.

• **Warning Tape**
  - Warning tape should be placed on the trench at 0.75m depth from the ground.
  - Warning tape should be as per specification provided.

• **Railway /Road crossings**
  - G.I. pipes should be extended for 2m on both sides from the end of the road.
  - G.I. pipes should be joined by using G.I. Collars.
  - RCC pipes should be extended for 2m on both sides from the end of the road.
  - RCC full round should be joined by using RCC collars.

• **Bridge/culvert crossings**
  - G.I. pipes should be extended up to depth of 1.55m in case duct running on bridge.
  - G.I. pipes to be extended up to 2m length from both edges of the bridge/culvert in case the trench running through the bed of the bridge.
  - RCC pipes should be used parallel to dry culvert. For wet culvert G.I. protection and concrete encasement to be provided.
• Collars of RCC pipes to be jointed with RCC pipes with a cement mortar of 1:2.
• In case of duct in G.I. pipe placed on clamps outside the railing the clamps should be made up of strip thickness 6mm and width 50mm. The nuts bolts should be of 12mm diameter. All clamps should be tightened properly. Clamp should be placed at every 2m interval.
• In case of duct in G.I. pipe placed on bridge, the G.I. pipe should be encased with M20 concrete with 1:2:4 mix all around the G.I. pipes.

**Cement Route Markers**
• Route markers should be installed in a span of 200m and at every location where deviation placed. (From left to right of the road or vice versa.)
• Cement Route Markers should be placed alternatively with an electronic route marker as specified by the purchaser.
• Route markers should be straight and facing the road side.
• Route markers should be offset 1m from the trench towards the jungle side.
• Cement concrete dimensions should be as per specifications provided.
• Route markers should be fixed 0.5 m depth below ground level.
• Color separation should be maintained between splice chambers & blowing chambers.
• Route markers should be provided on both sides of bridge/culvert.

**Electronic Route Markers.** The electronic route markers should be placed every 200m. These would be staggered with reference to the RCC route markers in a manner that there should be a marker placed every 100m along the OFC route.
• The electronic route markers should be placed in the trench after partial backfilling of earth and should be aligned directly over the PLB duct such that it is not more than 3 feet deep from the surface.
• The exact location of the electronic route marker should be recorded as part of the ABD documentation and in the measurement book.

**Backfilling**
• Every layer of backfill about 25 to 30 cm should be compacted with sufficient quantity of water to achieve adequate compaction.
• It is essential to have compaction not less than 90%, when the excavation is carried out along and across the road shoulders and foot paths.
• A hump of 15cm shall be maintained over the trench to compensate the settlement of backfilled soil below the ground level.
• Housekeeping after removing all the debris should be complete.

**Restoration**
• If the trench comes under Asphalt, then 30 cm soil from the trench should have be removed and compacted. 10cm has to be backfilled by 40mm aggregate as first layer and compacted, 10cm has to be backfilled by 20mm aggregate Tar as second layer and compacted, 10cm seal coat as final layer and compacted.
If it is in concrete portion, then 15cm soil should be removed and compacted, pour concrete of M20 grade with the proper mix of 1:2:4.

If it is in Tiles, then 15cm soil should be removed and compacted, the tiles should be laid (of similar tiles and specify) by using the cement mortar in the ratio of 1:2.

**Splice and Pull through Chambers**

- Splice chambers shall be placed at an interval as per planning to facilitate optical fiber splicing. One pull through chamber in between every two splice through chambers to facilitate blowing of fiber optical cable through HDPE ducts.
- The chamber should be built of bricks with mason work such that it has an inner dimension of at least 1.2m x 1.2m.
- In chambers duct entry hole should be sealed as a sealing with cement mortar 1:2 to avoid the entry of water into the chamber after duct laying.
- The duct length inside the chamber should be between 5-10 cm.
- Suitable length of cable loops up to 20m should be left in each direction within the chamber.
- Chamber cover should not fall down inside the chamber while opening.

**Splicing**

- The splice pit made at the time of cable laying shall be emptied of the soil, sand and stone.

**Splicing of Fibers.** The cable ends shall be prepared after the cable entry in to the closure. The strength member shall be fixed to its fixing mechanism provided in the closure. After fixing the cable in the splice closure, the bare fibers shall be guided to the fiber Organizer provided in the closure through transport tubes. The bare fibers shall be taken through transport tubes to the fiber organizer for splicing. These fibers shall be spliced as per standard procedures. The spliced fibers shall be made to rest on the concerned tray/cassette (fiber organizer).

**Sealing of Splice Closure.** After completion of splicing, the base and the dome of the closure and the cable entry shall be air sealed. It shall be ensured that the splice closures are air tight and water proof.

**Re-instatement of Pit.** After completion of splicing arrangements, the pit is to be filled with sand / soil incorporating warning bricks / stone etc. as per standard procedures.

**Termination**

- All fiber will be terminated on fiber distribution management system (FDMS).
- Proper racking and clamping of cable within the building is to be ensured.
- The fiber optic cable should be properly clamped to the FDMS.
- Fiber optic cable should be properly tagged for identification and every fiber to be identified when spliced to the pigtails and terminated on the frame.
- End to end testing can be carried out from the FDMS to FDMS using the connectors which are mounted on the FDMS.
ENGINEERING INSTRUCTIONS FOR OFC LAYING PRACTICES

Engineering Instructions by BSNL, i.e., TCIL’s client for this project, for OFC laying as given below or subsequent amendments, if any, shall be adhered to as part of the OFC construction practices.

CONTENTS

<table>
<thead>
<tr>
<th>Ser No</th>
<th>Name of Engineering Instruction</th>
<th>Reference No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Laying Practices of Optical Fibre Cable</td>
<td>D – 001</td>
</tr>
<tr>
<td></td>
<td>Local Area Network Optical fiber Cable</td>
<td>Issue No IV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dated 31 Jan 2007</td>
</tr>
<tr>
<td>2.</td>
<td>Installation Practice of Self Supporting Metal Free Aerial Optical Fibre Cable</td>
<td>TR/COFC/I-001</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Issue No 01</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dated 10 Jun 2011</td>
</tr>
<tr>
<td>3.</td>
<td>Laying Practices of Optical Fibre Cable by HDD (Horizontal Directional Drilling) Method</td>
<td>TR/OFCA-001</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Issue No 01</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dated 31 Jan 2007</td>
</tr>
<tr>
<td>4.</td>
<td>Provision of Hand Hole in Case of HDD on OFC Laying</td>
<td>TR/COFC/I-004</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Issue No 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>04 Oct 2011</td>
</tr>
<tr>
<td>5.</td>
<td>Micro-Tunnelling for Laying of O.F.Cable</td>
<td>TR/COFC/A-002</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Issue No 01</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dated 22 Feb 2010</td>
</tr>
</tbody>
</table>
LAYING PRACTICES OF OPTICAL FIBRE CABLE
LOCAL AREA NETWORK, OPTICAL FIBRE CABLE

(NO. D – 001)

All efforts have been made to incorporate all relevant up to date information available, any discrepancies or need for addition or deletion is felt necessarily may please be intimated to this office for further improvement, on E-Mail Id agmnt1_tnd@rediffmail.com.
LAYING PRACTICES OF OPTICAL FIBER CABLE

1. Scope. This Engineering instruction deals with the methods to be adopted in laying of HDPE pipes for Optical Fiber Cable and laying of optical Fiber Cable. The following laying practices are adopted by the field units.

2. General. BSNL Network has already introduced. Optical Fibre Transmission system for local junctions and for long distance routes. Various types of Cables such as 24 & 12 fibre non-metallic, 8 fibre nonmetallic 8 fibre with metallic strength member and 6 fibre non metallic, have been already introduced. Wherever, O.F. Cable with metallic conductors are to be used, they will fall within the purview of PTCC code and should be referred to PTCC.

3. Detailed Survey report provided by purchaser
   3.1 Following alternative would be considered after techno economic evaluation to meet the planned objectives of the scheme.
      3.1.1 Minimum possible route length vis - a - vis on a route having maximum number of towns with potential growth on O.F routes.
      3.1.2 Keeping various small exchange on the route under planned systems as against by-passing some of these exchanges by routing the Optical Fiber Cable on main road without leading in, in congested towns.
      3.1.3 Linking of small exchanges a little away from main road and routing the main cable itself via such small town.
      3.1.4 Linking intermediate main or repeater stations by spur routes vis-à-vis that from joint box nearest to the concerned exchange.
      3.1.5 Having new building for repeaters on main route or housing the repeaters in the existing exchange buildings on the routes.

   3.2 After getting survey report, a detailed measurement of lengths of cable route along with details of rail/road crossings, culverts, causeways etc. may be recorded in the detailed survey register. The probable location of joints, terminations and repeaters may also be decided and marked on the road map.

   3.3 On the basis of surveys, general permission from road and rail authorities for laying the Optical Fiber Cable along the suitable roads and at particular rail / road crossings will have to be obtained. Generally OFC may preferably be laid straight as far as possible along the road near the boundaries, away from the burrow pits. When the OFC is laid along the National Highways, Cable should run along the road land boundary or at a minimum distance of 15 meters from the center line of the road where the road land in wider. In special cases where it may be necessary to avoid burrow pits or low lying areas, the Cable may be run underneath the shoulders at a distance of 0.6 meter from the outer edge of the road embankment provided the same is located at least 4.5 meters away from centre line of road and 1.2 meter below the road surface.

4. General
   4.1 Soil Categorization. Soil is categorized only under two broad categories i.e. "Rocky" and “Non Rocky”, for purpose of, deciding the depth at & which the cable is to be laid. The soil is categorized as rocky if the cable trench cannot be dug without blasting and / or chiseling. All other types of soils shall be categorized as “Non rocky” including Murrum & soil mixed with stone or soft rock. However for the purpose of execution of trenching contracts, project
4.2 **Types of pipe to be used for Optical Fiber Cable.** Optical Fiber Cables should be blown through Permanently Lubricated HDPE Duct of 40 mm-OD and 33 mm ID Pipe in 500/1000 Meter Coil. Which meets the specification as given in G/R No-G/CDS-08/01 Dec 99 with latest amendments shall only be used for laying the OFC. Wherever DWC pipe or GI pipes or R.C.C. pipes are used for protection, the two ends of the pipe should be properly sealed to protect HDPE pipe from sharp edge of GI pipe and to bar the entry of rodents. For providing additional protection Split RCC/GI pipes should be used from top instead of full RCC/GI pipes. Use of normal duty DWC (Double walled corrugated) HDPE pipe – ISI marked and anti-rodent conforming to IS 14930 (Part - II) can also be utilized as preferable choice due to economic consideration for protection of optical fiber cable (choosing suitable DWC from nominal OD/ID dia 50/38, 63/50, 77/63, 90/76, 120/103, 145/126, 160/136, 175/148 mm). It is recommended that where ever OFC is passing over the ground surface (exposed outside) and more prone to damage, GI pipe may be used preferably. Depending upon the site conditions and cost consideration one of the protection viz DWC / GI / RCC pipe may be used.

4.3 All Depths should be measured from the top of pipe. However the depth is considered acceptable if it is not less by more than 8 cm from the specified depth of 1.5 m in non rocky soil and 0.9 mm in case of rocky soil. This margin of 8 cm is not applicable for the minimum depth prescribed for providing protection i.e. 1.2 min non rocky / rocky soil and 0.5 m in case of rocky soil.

5. **Trenching.** Major specifications for trenching are:

5.1 Normally depth of the trench should be more by 10 cm with respect to the depth which is required to be attained as prescribed in Para 6.

5.1.1 Top and bottom width of the trench should normally be 45 cm and 30 cm respectively. In loose soils it may be necessary to increase the width at the top to avoid collapsing of trench.

5.1.2 Trenching wherever possible, should be at the road boundary and as far as possible, straight.

5.1.3 Whenever curves or deviations are encountered it should be a very smooth curve, the radius of curvature should be more than 50cm. at least.

5.1.4 Bottom of the trenches should be at uniform level without any abrupt ups and downs. After the trenching is done for sufficient length, the bottom leveling should be inspected for uniformity to ensure that pipe should be laid without sharp bends.

5.1.5 In exceptional cases, the depth of the trench could be much more than 1.60 m due to undulating terrain as shown in figure (1).

5.1.6 In certain cases, in a uniform terrain a sudden burrow pit of short length might be encountered as in fig (2). In such cases, the HDPE pipe can be further protected by DWC / GI / RCC pipes of suitable size.

5.1.7 In water logged area digging should be done in shorter sections and dewatering should be got done before pipe laying.

5.1.8 When trenching is done close to power cables precautions detailed in EI lines & cables underground should be observed.

5.1.9 When trenching is undertaken along streets and railway lines, safety precautions given in EI lines & Cables underground.
A 0005 should be observed.

5.1.10 Caution boards should be provided at each end of the trench to caution the traffic. Red flags may also be planted at suitable intervals throughout the trench. If trench is to remain open at night red lamps or luminous caution boards on either ends should be provided.

5.1.11 After the trench is ready, bed of trench is prepared by even & soft layer of 5.0 cm sleeved earth and properly leveled. Now the trench is ready for laying the HDPE pipe.

6. Laying/Construction practices

6.1 In cross-country routes

6.1.1 Optical Fiber cables shall be laid through HDPE pipes at a depth of 1.5M as measured from top of HDPE pipe. Taking into account the diameter of the HDPE pipe and provision of soft soil below HDPE pipe, it will be desirable to have the trench dug to depth better than, 1.60 meters. In case of obstructions etc, the cables can be laid at a lesser depth provided.

6.1.1.1 A minimum depth of 0.90 is achieved in case of rocky soil. In case of non-rocky soil where due to any obstructions in built up areas it is not possible to dig deeper, a minimum depth of 1.00 meter from top of pipe shall be maintained. Wherever the minimum depth of 0.9M in rocky soil cannot be adhered to, depth can further be reduced up to 0.5M but for such cases CGM project should grant relaxation on specific recommendation of GM (Proj) and GM (Maintenance) concerned who have jointly visited the sites. In all such cases where the depth is less than 0.9m, mechanical protection by reinforced concrete casing 4” round should be provided.

6.1.1.2 Suitable mechanical protection by using DWC/ RCC/ GI pipes to be provided for all cables laid at a depth less than 1.2m. No protection, however, need be given if the cable depth is more than 1.2m.

6.1.1.3 The reasons for not laying the cable at stipulated depth of 1.5m are recorded “and certified by the D. E. I / C of cable laying.

Note. Where rocky soil is encountered for a distance of 50 meters or less, the cable depth will be maintained at 1.5m as in case of adjoining non-rocky soil.

6.2 In hilly areas (With reference to BSNL C.O. Decision vide letter No. 35-9/04-TPL (OF) (Pt.) Dated 16.10.06)

6.2.1 Optical Fiber cables shall be laid on the valley side where depth may be achievable, if the permission for laying the OF Cable on the valley side is available. If the permission for laying the OFC is not available, then OFC shall be laid on the hill side. The PLB pipe laid, in hilly areas at depths lower than one meter can be protected by direct concreting instead of using GI pipe and concreting thereafter. Laying of overhead OFC may be the third option. Laying of cable on valley side or overhead should be approved by GM concerned if the deviated trench is not more than 1km and in case stretches longer than 1km, CGM should approve it.

6.2.2 Normal standard of 25X25 cm of concreting cannot be followed in the hilly terrain as the groove/trench made in the rocks are generally not
of standard size of 25X25 cm. Hence the PLB pipe may be laid in the trench/groove of the requisite pipe width and at least 20 cm of concreting may be done above the pipe covering the entire width of the trench at 20 cm above the pipe.

6.3 In built up areas

6.3.1 City / Town, urban areas falling within municipal / Corporation limits shall normally fall under this category where the following laying/Construction practices shall be adopted. For other inhabited villages/towns etc. not falling under any municipal/corporation limits suitable cable depth/protection is to be decided jointly by Dy. GM (Project) and Director Dy. GM.

6.3.2 On Ducted Routes. Optical fiber cables may be laid through the existing ducts wherever the ducts are available. As far as possible the cable may be diverted to the new ducts laid subsequently. When the cables are laid in ducts, no particular depth is prescribed. End of the ducts should be properly sealed and necessary protection by way of DWC/ G.I. pipe / RCC pipe should be provided at the entry and exit of the duct till the cable is buried to a depth of 1.5m. The above is applicable in town or ‘any other’ ducts laid cross country.

6.3.3 On Non-ducted Routes. As the non-ducted routes in built up areas are more vulnerable to faults due to cables/pipes of other services laid close to DOT Cables, it is essential to take special care while laying optical fiber cables on these route. The OF cable shall be laid through HDPE pipes at a depth of 1.5m, and additional protection by using DWC/RCC/GI pipes shall be provided. If need be the OF cable can be laid below the cables and pipes of other agencies including local telephone cables and if required cable may be laid via alternate longer route. Only in exceptional cases the depth of cable laying may be relaxed to 1.00m in non rocky soil and 0.9m in rocky soil as in case of cross country routes, provided the reasons for not laying the cables at a stipulated depth of 1.5m are recorded and certified by D.G.M, l/c of cable laying. The minimum depth of 0.9m in rocky soil may further relaxed to 0.5m for location where permission for blasting is not granted by local authorities even after taking up for the same at G.M. (Project) level. In all such cases mechanical protection by reinforced concrete casing 4" round shall be provided.

6.4 On Culverts / bridges Nullahs

6.4.1 Nullahs dry for nine months in a year. The Cable shall be laid at 1.5m depth below the bed of nullah through HDPE pipe and protection provided by using DWC of suitable dia / RCC pipe of minum um internal dia of 100mm. The DWC / RCC pipe shall extend 2M minum um beyond the end Nullah on either side. Depth of 1.5m can further be reduced depending on nature of soil & other conditions in accordance with Para 6.1 & 6.2 with a view to minimize the damage to the OFC during flood season the cable should be laid on upstream side of causeway at an approximate distance of about 4 times than depth of the flow during high floods.

6.4.2 On culverts / bridges over other nullahs. Various options are available as depicted in figures 3a, 3b, 3c, 3d & 3e for laying the O. F. Cable along the parapet wall of the culverts / bridges. One of these option, may be adopted depending upon site conditions. On approach roads to these bridges / culverts also, protection by using DWC / RCC pipes shall be provided for 2M on both sides.

6.4.3 On rail bridges / crossings. On rail bridges/crossings the optical fiber cables shall be laid through HDPE pipe which shall be encased in suitable cast iron / RCC pipe as prescribed by Railway authorities.

Page 102 of 213
On road crossings.  The optical fiber cable shall be laid at a depth of 1.5m through HDPE pipe encased in DWE/RCC pipes which shall extend three meters on either side of the end road to take care of any future expansion. Depth of 1.5M can further be reduced depending on nature of soil & other conditions in accordance with Para 6.1 & 6.2.

7. Pipe Laying. For pulling the cable manually through the pipes, it is necessary to have suitable manhole of about 02 x 02m² made at every 200M length and at suitable bends and corners. The construction of manhole & jointing manhole is shown in fig. 4a and 4b. The pipes are laid for 200M or less, at a time, depending upon the distance between two manholes. For a 200M trench Single HDPE 40/33 mm is required. The HDPE pipe shall be sign written with indelible red paint as 'ITD' with a mark of telephone. In addition, for closing the ends of the two extreme end pipes 2 special type of caps are also needed (fig.4c). A 4m polypropylene rope could be drawn through the pipes and safely tied to the caps at either end with hooks. These 4mm ropes are, to be provided throughout the route which could, serve to pull the l2mm rope which is ultimately required to pull the cable. Single HDPE duct of 40/33 mm of 200 M length with 2 caps and 210M of 4mm polypropylene rope drawn through them and safely tied as shown in fig. (5) Would complete 200M of pipe laying. After the pipes are laid as mentioned above with ropes and leaving gaps for manholes, indicators are to provided at the 200M gap locations to identify the manholes. Necessary offset diagrams are also required indicating the distance from the center of the road. The depth of the trench is also to be recorded.

7.1 Laying of pipes on bridges, culverts, etc.

7.1.1 In small bridges and culverts across canals, different methods as given below could be followed.

7.1.2 If the bridge or culvert is broad and is having sufficient cushioning, the pipes can be buried inside, the cushioning as shown in fig. (6).

7.1.3 If the bridge/culvert is provided with raised and hollow foot - path or wheel guard, the pipe encased in GI can be buried inside the hollow foot - path or can be laid over the wheel guard and chambered as shown in fig. (7) and (8).

7.1.4 If the 'supporting pillars are having projections and between pillars the distance is less, then the pipes (HDPE with GI encasing could be laid over the pillar projections as shown in fig. (9)

7.1.5 If none of the solutions is possible, then outside the parapet wall, GI troughs can be fitted with suitable clamps. For smaller bridges, the HDPE pipes can be laid inside the trough. However, for long bridges, HDPE pipes need not be laid inside the trough. While laying the cable, glasswool or other cushioning items may be used. In either case, the gaps between two troughs after putting the lids should be thoroughly covered to prevent entry of rodents.

7.1.6 Special type of bridges such as cantilever type requires special type of troughs to be locally manufactured to withstand the vertical and horizontal movement of the joints of cantilever bridge.

7.2 Route Indicators. The G.I. indicators embedded in concrete of Trapezium shape with base of 30 x 30 cm and top of 15 x 15 cm may be provided at every 200 M or at suitable bends and corners as may be required. A minimum of 30 cm of its top portion should be kept above the ground level. The route indicators may be painted yellow and may be put along the road at a suitable distance away from the cable trench such that they are clearly visible from road side. In future electronic markers shall be used for route indicators.

7.3 Joint Indicators. The G. I. joint indicators embedded in concrete similar to that of RI may be
provided at joint locations & may be buried in ground with at least 30 cm of it above the ground level. The joint indicator may be kept along the road side clearly visible from road and may be painted red. In future electronic markers shall be used for joint indicators.

8. **Depth A/T**

8.1 Before the cable is actually pulled through the pipe, the project circle should offer the route for A/T of the depth and position of the cable and correctness of the route diagram. The best way should be to offer it in stretches of 10-20 kms soon after the HDPE pipe is buried.

8.2 The route diagram should be prepared and made over to the A/T unit in advance. The A/T unit will specify the spots roughly two per km for checking of depth and position of the cable, sound laying practice and prescribed protection. Wherever depths are prescribed the tolerance upto minus 8 cm is permissible. For checking accuracy of the route diagram and position of the cable, the permissible tolerance will be ± 0.5 meter. For checking position of the cable, standard survey tapes will be used.

8.3 If the pipe is found to be at depth than prescribed, OFC should not be drawn through HDPE pipe and pipe should be lowered to the proper depth at the locations where necessary relaxation of competent authority as mentioned in earlier Paras is not available.

9. **General Precautions**

9.1 **Handling of cable drums**

9.1.1 The optical fiber cable drums should be handled with utmost care. The drums should not be subjected to shocks by dropping etc. The drum should not be rolled along the road for long distances and when rolled, should be in the direction indicated by the arrow. The covering planks should be removed only at the time of actual laying.

9.1.2 The previously laid pipes manholes and portion of bends etc. on the cable route as records maintained at the time of laying pipes, should be got cleaned of earth and the pipes may be cleaned thoroughly before blowing of cable is stared.

9.1.3 Depending upon the length of the drum (2/4 ± 5% Kms) and coiling required for jointing purposes, chain measurement is taken from the starting end of section and exact joint location is marked. If it does not fall at the existing man hole location, a separate manholes of 2M x 2M is to be made to accommodate the joint box as well as coil.. All the joint locations are fixed in a similar manner. The intermediate manholes of 2M x 2M are also to be kept ready for blowing purposes.

9.1.4 As the drums are standardized for 2/4 ± 5% Kms for highways, it is preferable to lay the cable by placing the cable drum at the manhole point nearest to 1 km from the joint locations.

9.1.5 The standard practice to keep the clock wise end of the cable to the ‘A’ side of the route and the anti clock wise end to ‘B’ side. Also, it is the practice to have the clockwise end on top and anti clock wise at the bottom of the drum. With the above in view, cable drum is to be mounted on the jack and wheel with drum shaft (Axle) in horizontal position.

9.1.6 The rope end is to be fixed at one end of a swivel (Anti twist device) permanently or by means of a shackle. The other end of the swivel is tied to the pulling eye of the cable. If a pulling eye is not available, then a cable grip is to be used.

9.1.7 As the cable length is 4 km, during cable laying work, proper communication is to be established. This can be done with walkie talkies or magneto telephones with drop wire.
10. **Precaution against Damage by Termites & Rodents.** In the rodent prone areas Optical fiber cable joint closures should be applied with BHC 10% dust (Benzene Hydro chloride 10%) to prevent rodent & termite damage. The method suggested is "BHC 10% dust of 1Kg. is to be mixed in an approximate 2 Kg of sand and applied around the optical fiber cable joint enclosures”.

11. **Norms for Ribbon Optical Fiber Cable - being used in Overlay Access Network (With reference to BSNL C.O. Decision vide letter no. 35-15/2004-TPL (OF) Dated: 06.10.06)**

11.1 Limit of average splice loss for sections up to 15 Kms may be increased from 0.2 db to 0.3 db. The maximum number of splices that can have loss more than 0.3 db in a section, should not be more than 10% (from existing 5%) of total splices subject to the condition that per KM loss should not exceed the prescribed limit. However, no change in present A/T limit is recommended for distance exceeding 15 Kms.

11.2 Section length may be increased from 10 Kms to 15 Kms to overcome the difficulties being faced by the field units in commissioning of OAN. Since the time taken to splice ribbon OF cable is much longer, the same should not be used as a part of long distance network. Long distance cable presently carries up to 80 GB on DWDM and hence long outages cannot be tolerated.

12. **Cable Laying**

12.1 List of tools & other items required for cable laying is given below.

12.2 This can be taken as a check list.

12.2.1 Jack - one pair
12.2.2 Rope for unloading/loading. Metallic ramp for loading / unloading.
12.2.3 Cable winch.
12.2.4 Nylon rope drums of 1250M (For machine pulling).
12.2.5 4mm rope.
12.2.6 Swivel and Shackle.
12.2.7 Pulling socks or cable grip.
12.2.8 Lubricant.
12.2.9 Plastic bowls for lubricant.
12.2.10 Sponge.
12.2.11 Walkie-Talkie 6 Nos.
12.2.12 Magneto Telephone 6
12.2.13 Drop wire 2 kms. (for magneto).
12.2.14 Rubber 2/manhole.
12.2.15 Half round (split) pipes 2/manhole.
12.2.16 Polythene tape 5m/manhole.
12.2.17 Clamps 4/prs/manhole.
12.2.18 Cleaning brush for cleaning pipes.
12.2.19 Mandrill.
12.3 Sometimes there is considerable lapse of time between the pipe laying and cable laying. This intervening period could have heavy rains too. Therefore there is possibility of entering dissolved muddy water into the HDPE pipes. This dissolved muddy water may transform into a thick paste or solid mud. Cleaning of the pipes before the cable laying is absolutely necessary to remove any such obstructions. A 4 mm nylon rope is already laid in HDPE pipe. One end of this rope is connected to Mandrill. The other end of mandrill is connected to another rope of 4 mm size and suitable length to cover the distance between two manholes. The existing 4 mm rope is pulled from other manhole and thus the mandrill will clear the pipes. Similar operation is then done by replacing mandrill with nylon brush and rugs.

12.4 The pulling of the cable can be done in three ways:

12.4.1 By Cable winch

12.4.2 By cable winch assisted by manual pulling at intermediate manholes.

12.4.3 By manual pulling at all the manholes.

12.5 For manual pulling, the rope may be attached to 9 diameter and then to the pulling eye which is fixed to the cable end by supplier. The pulling may be done either manually under close supervision watching all the time. The pulling tension or by means of winch with automatic cut off at set tension monitored through dynamometer fitted in the pulling winch.

12.6 To reduce the friction between the cable and HDPE, a suitable lubricant may be continuously applied with a sponge to the cable surface during pulling at every intermediate manhole. The types of Lubricants with their frictional co-efficient are given in the table.

12.7 As soon as 1km cable or so is pulled towards one side of the route, sufficient overlap of cable may be kept at splicing location so that the ends may be taken into the Air conditioned splicing van placed at a convenient and nearby place. 15 meter cable may be the maximum requirement.

12.8 Laying the Remaining Half of the Cable

12.8.1 Take out the winch to the other end if, machine pulling is done.

12.8.2 Uncoil the cable and make the formation of 8. This should be done manually with sufficient care and minimum bending radius.

12.8.3 Repeat the process of connecting the end of the cable with eye or pulling grip to the swivel to which the pulling rope is attached.

12.8.4 Repeat the process of pulling the cable by winch or manual with special attention to lubricant super vision and coiling the overlapping length in the pit.

12.8.5 The mouth of the HDPE pipes at every man hole is closed by rubber bushing as shown in fig. (10). this is mainly required for prevention of rodent entry.

12.8.6 The cable at the intermediate man holes are to be covered by split 65mm OD 10kg/cm HDPE, 2 pipes, covered with polythene tapes and clamped at 4 places, as shown in fig. 4a. Thereafter re-instatement of the man holes is to be done.

Note. All Figures appearing in the document correspond to 40/33 mm size Permanently Lubricated HDPE Duct (in place of 50 mm OD HDPE Pipe) mentioned in the drawing/figures.
LAYING OPTICAL FIBRE CABLE IN 80 MM DIA G.I. PIPE IN EARTH CUSHION OF THE BRIDGE

FIG - 3 (a)

LAYING OPTICAL FIBRE CABLE IN G.I. PIPE 80 MM BELOW FOOT PATH OF THE BRIDGE

FIG - 3 (b)
LAYING OPTICAL FIBRE CABLE IN G. I. PIPE BY CUTTING THE EXISTING KERB OF THE BRIDGE

FIG - 3 (c)

LAYING OPTICAL FIBRE CABLE (IN G. I. PIPE PLACED ON THE KERB OF THE BRIDGE)

FIG - 3 (d)
LAYING OPTICAL FIBRE CABLE
DIA G. I. PIPE SUSPENDED BY MEANS OF CLAMPS OUTSIDE THE PARAPET WALL

FIG - 3 (e)
FIG-4(a) HANDBOILE FOR OFC

FIG-4 (b)

NOTE: AT SOME PLACES ONLY ONE RCC RING OF HEIGHT 1' IS USED INSTEAD OF TWO RINGS AS SHOWN IN ABOVE FIGURE.
FROM: A SIDE ELEVATION

PLAN

FIG - 4 C

FIG - 5

50 MM 8 KG HOPE PIPE
HOOK
CAP
GAP FOR MANHOLE

65 MM 10 KG COLLARS

4 MM NYLON ROPE TIED TO HOOK

GAP FOR MANHOLE

2 M
WHEEL GUARD WITH HDPE PIPE INSIDE

G.I. IS CHAMBERED

ROAD CARPET

PARAPET WALL

NORMAL WHEEL GUARD

FIG - 8
FIG. 10
ENGLISH INSTRUCTION
INSTALLATION PRACTICE OF SELF SUPPORTING METAL FREE AERIAL OPTICAL FIBRE CABLE

NO.: TR/COFC/I-001

Page No.: 28
Issue Number: 01
Issued By: Inspection Circle
Approved By: CGM Inspection Circle
Date of Issue: 10.06.2011
Amendment No.: Nil

All efforts have been made to incorporate all relevant up to date information available, any discrepancies or need for addition or deletion is felt necessarily may please be intimated to this office for further improvement, on E-Mail Id agmcfa@gmail.com.

Bharat Sanchar Nigam Limited
(A Govt. of India Enterprise)
Inspection Circle,
ISO 9001:2008 Certified
Sanchar Vikas Bhawan,
Residency Road, Jabalpur,
MP-482001
INSTALLATION PRACTICE OF
SELF SUPPORTING METAL FREE AERIAL OPTICAL FIBRE CABLE

1. **Scope.** This engineering Instruction (EI) deals with the guidelines and the installation practice for installing self supporting metal free aerial optical fibre cable.

2. **General.** Department Of Telecommunication has already introduced self supporting metal free aerial optical fibre cable for local junctions and short haul trunk working. This is particularly useful in situations where underground cable laying is not possible. It is also recommended for short term working.

3. **Over Head Alignment.** The existing route alignment wherever available should be used. On new routes, alignment should be erected. The span length must not exceed above 90 metres.

4. **Line Diagram.** A line diagram should be prepared to mark the poles & the actual distance between the poles in a splice section (Normally 15 poles per km are recommended). Additional poles should be erected if required to keep the span length within the specified limits. Care should be taken that the alignment is easily accessible from the road. It is necessary to keep the clear head way (Ground clearance) of 12 to 15 feet in a section. A complete line diagram should be prepared i.e. from station A to station B. The number of road crossings, canals or nullahs, electric lines should be clearly marked in the route diagram.

5. **Hilly Regions.** Line erection rules must be strictly followed. Additional poles may be erected for better support to optical fibre cable & to avoid sharp curves & bends. Span lengths should be reduced to avoid sags in case of steep slopes.

6. **Tension Poles.** Tension poles are dead end or termination poles. The tension poles shall have dead end fittings. The dead end fittings offer a continuous run of the aerial optical fibre cable. These fittings relieve the optical fibre cable of its compressive, bending & clamping stresses. The performed dead end fittings are suitably gritted for excellent tensile holding strength.

   6.1 **Selection of Tension Poles.** Selection of tension poles depends upon the actual site location of the route. Every fifth pole should be a tension pole in straight alignment. Splicing location poles should be tension poles or wherever alignment takes a sharp turn (more than 15 degrees) should also be a tension pole.

7. **Suspension Poles.** The suspension pole assembly is designed to offer cushion to aerial optical fibre cable against the dynamic stress of Aeolian vibration at the suspension point. They also reduce static stresses at the Support point.

   7.1 **Selection Poles.** Selection of suspension poles also depends upon actual site location of route. All the intermediate poles between two tension poles will be suspension poles.

8. **Selection of Splice Location.** The splice box of the aerial optical cable should be buried underground. Therefore it is necessary to fix & determine the splicing location as per the designated cable drum length.

9. **Aerial Optical Fibre Cable Specifications**

<table>
<thead>
<tr>
<th>Ser No</th>
<th>Description</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Maximum span length</td>
<td>100 metres</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>-----------------------------------------------------------------</td>
<td>------------------------------------------------------------------</td>
</tr>
<tr>
<td>2</td>
<td>Maximum ice loading</td>
<td>1 Kg per meter</td>
</tr>
<tr>
<td>3</td>
<td>Operational wind velocity</td>
<td>75Kms per hour</td>
</tr>
<tr>
<td>4</td>
<td>Maximum sag allowed (without excess load)</td>
<td>2% of span length</td>
</tr>
<tr>
<td>5</td>
<td>Maximum sag allowed (with excess load)</td>
<td>3% of span length</td>
</tr>
<tr>
<td>6</td>
<td>Temperature range</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>operation &amp; storage</td>
<td>-30 to +70 degree C</td>
</tr>
<tr>
<td>8</td>
<td>Installation</td>
<td>-15 to +50 degree C</td>
</tr>
<tr>
<td>9</td>
<td>Minimum bend radius</td>
<td>2D (D-Dia of cable)</td>
</tr>
<tr>
<td>10</td>
<td>Tensile force (where w is the mass of 1 km length of cable, in kg)</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>During installation</td>
<td>9.81 x 1.3 x w</td>
</tr>
<tr>
<td>12</td>
<td>Permanent with ice &amp; wind load</td>
<td>9.81 x 3 x w</td>
</tr>
</tbody>
</table>

### Types of Accessories and Fixtures

10.1 **Formed OFC Dead End and Termination Fittings.** These fittings are used at tension/termination poles (dead end poles), or poles where splices are located and the poles where the overhead alignment takes a turn, (angle exceeding more than 15 degrees) as shown in fig. 1.

10.1.1 **J-Shaped Tension Hook.** J-Shaped tension hook is for the installation on cross arm channel C (C-Bracket) of the poles as shown in fig. 2.

10.1.2 **Turn Buckle.** Galvanized forged steel turn - buckle is used at the dead end and at tension positions (for adjusting the sag & tension) as shown in fig. 3.

10.1.3 **Extension Link.** Galvanized steel extension link is used along with turn buckle as shown in fig. 4.

10.1.4 **Clevis Thimble.** Aluminium alloy die cast thimble is used to attach the extension link and for accommodating the loop of the helically formed terminating helix at the other and its smooth internal contour as shown in fig. 5.

10.1.5 **Protective Helix (T).** Set of aluminium alloy helically formed protective helix having predetermined spiral shape is used & making them conveniently applied on the optical fibre cable without excessive clamping pressure at any point. See fig. 6.

10.1.6 **Terminating Helix.** Helically formed terminating helix of Aluminized steel having a prefabricated loop shall be to fit into the grooved contour of the thimble and for fixing over protective helix over the optical fibre cable. See fig. 7.

10.1.7 **Jumper Cable Clamp.** Galvanized steel jumper cable clamp is used to support the through length of optical fibre cable at the intermediate tension poles as shown in fig. 8.

10.1.8 **Pole Mounted Stay Clamp (Tubular) OR Pole Mounted Stay Clamp (Rail).**

Galvanized mild steel pole mounted stay clamp should be used at the pole.
for the fixing with a twisted eye & turn buckle; see figs. 9 & 10. The selection of the type of stay clamp will depend upon the type of poles.

10.2 **OFC Suspension Fittings.** Helically formed suspension fittings along with the elastomeric pads inserts strapped by a galvanized steel eye-band is used to hang from the twisted eye-link connected to a pole mounted stay clamp or on the tension hook (J-shaped) installed on the C bracket at the intermediate poles as shown in fig. 11.

10.2.1 **Pole Mounted Stay Clamp (Tubular) OR Pole Mounted Stay Calmp (Rail).** Galvanized mild steel pole mounted stay clamp shall be for use at the pole for the fixing with a twisted eye & turn buckle. See figs. 9 & 10.

10.2.2 **Twisted Eye Link.** The twisted eye link is used for installing suspension fitting on stay clamp or on tension hook as shown in fig. 12.

10.2.3 **Protective Helix (S).** Set of aluminium alloy helically formed protective helix having predetermined spiral shape is used & making them conveniently applied on the optical fibre cable without excessive clamping pressure at any point. See fig. 13.

10.2.4 **Armour Grip Helix.** Set of aluminium alloy armour grip helix is used or fixing on the profile shaped elastomer pad for proper strut action, grip & bird caging as shown in fig. 14.

10.2.5 **Suspension Clipper With Elastomer Pad.** Set of suspension clipper (made of aluminium alloy permanent mould die cast split type clamp) is used to support the elastomer pad inserts & is strapped by a galvanised steel eye-band in order to hang from a twisted eye-link connected to a pole mounted stay clamp or tension hook as shown in fig. 14.

10.2.6 **Spiral Vibration Damper (SVD).** Helically formed spiral vibration dampers are used on both sides of suspension fittings as shown in fig. 15.

11. **Demountable Pulley.** Demountable pulleys are used during the installation of aerial optical fibre cables see fig.16. These are made from mild steel & the contour of the wheel is coated with rubber or any other suitable material for free movement of cable.

12. **Material Requirement of Installation Accessories and Fixtures**

12.1 **For Double Tension Poles**

<table>
<thead>
<tr>
<th>Ser No</th>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>J-shaped tension hook (For C-bracket)</td>
<td>2</td>
</tr>
<tr>
<td>2.</td>
<td>Turn buckle</td>
<td>2</td>
</tr>
<tr>
<td>3.</td>
<td>Extension link</td>
<td>2</td>
</tr>
<tr>
<td>4.</td>
<td>Clevis thimble</td>
<td>2</td>
</tr>
<tr>
<td>5.</td>
<td>Protective helix (T)</td>
<td>2 sets</td>
</tr>
</tbody>
</table>
6. Terminating helix

7. Jumper cable clamp

8. a) Pole mounted stay clamp (Tubular) 1 (Pole having C-bracket)

   b) Pole mounted stay clamp (Tubular) 2 (Pole without C-bracket)

   OR

   a) Pole mounted stay clamp (Rail) 1 (Pole having C-bracket)

   b) Pole mounted stay clamp (Rail) 2 (Pole having C-bracket)

12.2 For Suspension (Intermediate Poles)

<table>
<thead>
<tr>
<th>Ser No</th>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. a) Pole mounted stay clamp (Tubular)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) Pole mounted stay clamp (Tubular)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Pole mounted stay clamp (Rail)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) Pole mounted stay clamp (Rail)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Twisted eye link</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Suspension clamp consisting of the following</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.1 Protective Helix (S)</td>
<td>1 set</td>
<td></td>
</tr>
<tr>
<td>3.2 Armour grip helix</td>
<td>1 set</td>
<td></td>
</tr>
<tr>
<td>3.3 Suspension clipper with elastomer pad etc.</td>
<td>1 set</td>
<td></td>
</tr>
<tr>
<td>3.4 Spiral vibration damper</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3.5 J-shaped tension hook</td>
<td>1 (Pole with C-bracket)</td>
<td></td>
</tr>
<tr>
<td>4. Demountable pulley</td>
<td>One per pole in the splice section</td>
<td></td>
</tr>
</tbody>
</table>

13. **Entry of the O.F. Cable in the Building** Normal methods for leading in and precautions recommended for leading-in of the optical fibre cable should be followed. A conduit pipe should be laid for leading-in the O.F. cable. Inside the building; the cable may also be taken directly from the nearby O/H pole to inside of the building for termination.
14. **Preparation**

14.1 Before the installation the O.F. cable should be tested.

14.2 As per requirement install the additional new poles.

14.3 Each pole should be checked for its strength. Provide extra stays if more strength is required.

14.4 The Aerial O.F. Cable is recommended to be installed on the outermost hole of bracket towards road on the existing bracket/new bracket on the poles.

14.5 Replace weak and other poles for clear ground clearance and strength as per the field conditions.

14.6 Provide ground clearance of 12 feet in non-obstructing areas.

14.7 Raise the height to minimum 16 feet at all the road crossings.

14.8 Maintain the alignment as straight as possible.

14.9 Construct splice chambers.

15. **Splice Locations** The field splices should be buried underground. The cable should be brought down through a 40mm dia GI pipe clamped on the pole. Proper bends (120-135 degree) are recommended for negotiating the bend. Wooden/hard rubber bushes shall be used at the entry and exit points of the GI pipe to avoid damage to the cable. A splice chamber as per the standard practice shall be made. The selection of the splice point shall depend upon the availability of space and the cable length.

16. **Calculation of Section Length** Aerial O.F. cable is supplied as per TEC GR in a length of 2 Kms + 10%. To arrive at the section length and allocating a particular reel of the cable to a particular section following consideration are required.

16.1 **Section Length**

16.1.1 Actual section length measured.

16.1.2 Allowance for sag 2% for each span length.

16.1.3 Cable at each through tension pole (4 meters).

16.1.4 Drop length.

16.1.5 Extra spare cable for coiling at the splice location (10 meters).

17. **Installation Material Required During Installation**

<table>
<thead>
<tr>
<th>Ser No</th>
<th>Description</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Demountable pulleys</td>
<td>1 each for each pole in the installation section</td>
</tr>
<tr>
<td>2.</td>
<td>Jack for cable drum</td>
<td>1 set</td>
</tr>
<tr>
<td>3.</td>
<td>Ladders</td>
<td>For each pole</td>
</tr>
<tr>
<td>4.</td>
<td>Tools</td>
<td>Screw drivers C&amp;T pliers Spanner set &amp; hammer etc.</td>
</tr>
<tr>
<td>5.</td>
<td>Manila rope 12 mm dia</td>
<td>250 meters</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>-----------------------------------------------------------------</td>
<td>---</td>
</tr>
<tr>
<td>6.</td>
<td>Cable pulling winch machine with tension monitoring device</td>
<td>1</td>
</tr>
<tr>
<td>7.</td>
<td>Anti twist device</td>
<td>1</td>
</tr>
<tr>
<td>8.</td>
<td>Cable pole fork</td>
<td>10</td>
</tr>
<tr>
<td>9.</td>
<td>Flat twin open type cable grip</td>
<td>2</td>
</tr>
<tr>
<td>10.</td>
<td>Communication link to connect feeding, pulling and intermediate points.</td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>40 mm 61 pipe, bends, bushes &amp; clamps for fixing the pipe at the splice location.</td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>First aid box.</td>
<td></td>
</tr>
</tbody>
</table>

18. **Installation of Aerial Optical Fibre Cable.** The following steps are recommended: -

18.1 Install the accessories and fixtures as per the requirement of the individual poles it tension and suspension fittings.

18.2 Install the demountable pulley on all the poles in the section before pulling the cable.

18.3 Keep the cable drum over the jack near the 1st pole at the beginning of the section.

18.4 Attach anti twist device and the shackle hook along with the rope to the front and of the cable on pulling eye or on the cable grip. Carry the attached rope over the demountable pulleys for pulling the cable.

18.5 Depute one person at each pole to monitor and in case it is required to guide the cable over the demountable pulley during pulling operation.

18.6 The cable should be pulled till the cable reaches the last pole of the section.

18.7 Wherever in the pulling section; through pulling is difficult; half section or one fourth, action pulling method may be adopted by using figure of a techniques.

18.8 The feeding and pulling of the cable should be synchronized by using communication link. Care is required to be taken so that the cable is not accumulated at any one point during pulling operation and sharp bends are avoided.

18.9 Once the cable reaches the other end actual tensioning of the cable and fixing the installation of the accessories and fixtures shall be taken up with the help of cable pulling winch. The pulling tension must be monitored during tensioning.

18.10 Install the tension fittings and accessories at the 1st pole.

18.11 Fix a flat twin open type cable grip on the cable after tension pole for tensioning the cable in the preceding tension section.

18.12 The cable shall be tensioned to a tension of 1-3 to 1-6 times of the cable weight. The sag shall be monitored and kept between 0.25 to 0.5% of the span length.
18.13 The cable should be lifted between two poles by using cable pole fork during tensioning and fixing of the cable.

18.14 During the fixing operation the cable shall remain under required tension for minimizing the sag in the splice section.

18.15 Now install tension fitting and accessories at the all tensioned pole at the end of the tension section.

18.16 Install the suspension fitting and accessories on the intermediate poles in the tensioned section.

18.17 Similarly installation should be carried out in each tension pole in the entire section and the tension and suspension fittings are in stalled.

18.18 At the Through tension poles the cable shall be kept loose and shall be supported by cable jumper clamp.

18.19 At the end pole where the cable reel is kept; the cable to be taken through GI pipe (fixed to the pole) to the splice location. Extra care for the aerial O.F. cable may be taken at the bends and at entry and at the exit of the pipe. About 10 meters of cable shall be kept at the splice location for coiling (spare cable) and jointing requirement.

18.20 Test the installed OF cable.

18.21 Coil the OF cable and keep it safe in the splice location for splicing.

19. **Precautions**

19.1 Provide display boards.

19.2 Provide sufficient number of road sign and traffic cones.

19.3 Avoid sharp bending of the OF cable during installation.

19.4 The OF cable should not be given extra tension than the permissible tension limits.

19.5 While crossing the overhead electric installations, safety measures should be taken. Also provide guard wire.

19.6 To avoid man made damages, safety measures should be taken for each pole.

### Dimensions - Cable Size - 14.4 mm Dia

<table>
<thead>
<tr>
<th>Cable Dia</th>
<th>L1</th>
<th>L2</th>
<th>L3</th>
<th>L4</th>
<th>Colour Code</th>
<th>AGS Ref.</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.4</td>
<td>115</td>
<td>200</td>
<td>800</td>
<td>1400</td>
<td>BROWN</td>
<td>L356.01</td>
</tr>
</tbody>
</table>

**Note:** Dimensions for different cable sizes to be decided after type test approval.

**Insert Dimensions in mm**

<table>
<thead>
<tr>
<th>Inner Dia.</th>
<th>AT - A - A</th>
<th>AT - B - B</th>
</tr>
</thead>
<tbody>
<tr>
<td>33</td>
<td>22</td>
<td>22</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Description</th>
<th>Material</th>
<th>Ref. Spec</th>
<th>Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 CLAMP</td>
<td>ALUMINIUM ALLOY 6061</td>
<td>IS : 617</td>
<td>1 SET</td>
</tr>
<tr>
<td>2 INSERTS SUSP. CLIPPER</td>
<td>POLYCHLOROPRENE COMPOUNDED</td>
<td>1 PAIR</td>
<td>1 PAIR</td>
</tr>
<tr>
<td>3 STRAP</td>
<td>ALUMINIUM ALLOY</td>
<td>IS : 617</td>
<td>1</td>
</tr>
<tr>
<td>4 AGS HELIX</td>
<td>ALUMINIUM ALLOY 6061</td>
<td>1 SET</td>
<td></td>
</tr>
<tr>
<td>5 PROTECTIVE HELIX</td>
<td>ALUMINIUM ALLOY 6061</td>
<td>1 SET</td>
<td></td>
</tr>
<tr>
<td>6 RIVET M 16</td>
<td>MILD STEEL GALVANISED</td>
<td>IS : 2062</td>
<td>1</td>
</tr>
<tr>
<td>7 FLAT WASHER</td>
<td>MILD STEEL GALVANISED</td>
<td>IS : 2062</td>
<td>1</td>
</tr>
<tr>
<td>8 SPLIT PIN</td>
<td>STAINLESS STEEL</td>
<td>IS : 2016</td>
<td>1</td>
</tr>
<tr>
<td>9 TWISTED EYE</td>
<td>MILD STEEL GALVANISED</td>
<td>IS : 2062</td>
<td>1</td>
</tr>
</tbody>
</table>

**Armour Grip Suspension Set**

Not to Scale | Unit: mm

**Fig. 3**
POLE MOUNTED STAY CLAMP (RAIL)

<table>
<thead>
<tr>
<th>L1</th>
<th>L2</th>
<th>L3</th>
<th>L4</th>
<th>L5</th>
<th>L6</th>
<th>L7</th>
<th>L8</th>
<th>T1</th>
<th>T2</th>
<th>D1</th>
<th>W1</th>
</tr>
</thead>
<tbody>
<tr>
<td>270</td>
<td>170</td>
<td>251</td>
<td>151</td>
<td>20</td>
<td>32</td>
<td>50</td>
<td>120</td>
<td>5</td>
<td>20</td>
<td>16</td>
<td>60</td>
</tr>
</tbody>
</table>

NOTE: TOLERANCE SHALL BE AS PER IS : 2102
(DETAIL AS PER GR UNLESS UNTILL SPECIFIED)
HOT dIP Galvanised as per is : 2629

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>METAL</th>
<th>REF. Spec.</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 CLAMP</td>
<td>MILD STEEL GALVANISED</td>
<td>IS : 2062</td>
<td>1 SET</td>
</tr>
<tr>
<td>2 BOLT &amp; NUT M 16</td>
<td>MILD STEEL GALVANISED</td>
<td>IS : 1363</td>
<td>2</td>
</tr>
<tr>
<td>3 RIVET 16</td>
<td>MILD STEEL GALVANISED</td>
<td>IS : 2016</td>
<td>2</td>
</tr>
<tr>
<td>4 WASHER</td>
<td>MILD STEEL GALVANISED</td>
<td>IS : 2016</td>
<td>4</td>
</tr>
<tr>
<td>5 SPILT PIN</td>
<td>STAINLESS STEEL</td>
<td>IS : 540</td>
<td>4</td>
</tr>
</tbody>
</table>

POLE COLLAR CLAMP
NOT TO SCALE  UNIT - MM

FIG - 4
DIMENSIONS IN MM:
POLE MOUNTED STAY CLAMP TUBULAR

<table>
<thead>
<tr>
<th>L1</th>
<th>L2</th>
<th>D1</th>
<th>D2</th>
<th>T1</th>
<th>W</th>
</tr>
</thead>
<tbody>
<tr>
<td>210</td>
<td>20</td>
<td>150</td>
<td>16</td>
<td>5</td>
<td>30</td>
</tr>
</tbody>
</table>

NOTE: TOLERANCE SHALL BE AS PER IS : 2102
(DETAIL AS PER GR UNLESS UNTILL SPECIFIED)
HOT DIP GALVANISED AS PER IS : 2629

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>MATERIAL</th>
<th>REF. Spec</th>
<th>Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 CLAMP</td>
<td>MILD STEEL GALVANISED</td>
<td>IS : 2062</td>
<td>1 SET</td>
</tr>
<tr>
<td>2 BOLT &amp; NUT M 16</td>
<td>MILD STEEL GALVANISED</td>
<td>IS : 1363</td>
<td>4</td>
</tr>
<tr>
<td>3 RIVET 16</td>
<td>MILD STEEL GALVANISED</td>
<td>IS : 2016</td>
<td>4</td>
</tr>
<tr>
<td>4 WASHER</td>
<td>MILD STEEL GALVANISED</td>
<td>IS : 2016</td>
<td>8</td>
</tr>
<tr>
<td>5 SPILT PIN</td>
<td>STAINLESS STEEL</td>
<td>IS : 546</td>
<td>8 SET</td>
</tr>
</tbody>
</table>

POLE COLLAR CLAMP (R)
NOT TO SCALE | UNIT - MM

FIG - 5
DIMENSIONS IN MM:

<table>
<thead>
<tr>
<th>L1</th>
<th>L2</th>
<th>L3</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>177</td>
<td>75</td>
<td>50</td>
<td>12</td>
</tr>
</tbody>
</table>

NOTE: - TOLERANCE SHALL BE AS PER IS: 2102
(DETAIL AS PER OR, UNLESS UNTIL SPECIFIED)
TO BE USED HERE C-BRACKET IS AVAILABLE ON POLE FOR FITMENT OF TENSION HOOK
HOT DIP GALVANISED AS PER IS: 2629

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>MATERIAL</th>
<th>REF. Spec.</th>
<th>Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 BODY</td>
<td>ALLOY STEEL GALVANISED</td>
<td>IS: 2004</td>
<td>1</td>
</tr>
<tr>
<td>2 NUT</td>
<td>MILD STEEL GALVANISED</td>
<td>IS: 1363</td>
<td>1</td>
</tr>
<tr>
<td>3 PLAIN WASHER</td>
<td>MILD STEEL GALVANISED</td>
<td>IS: 2016</td>
<td>1</td>
</tr>
<tr>
<td>4 SPRING WASHER</td>
<td>SPRING STEEL GALVANISED</td>
<td>IS: 3063</td>
<td>1</td>
</tr>
<tr>
<td>5 SPILT PIN</td>
<td>STAINLESS STEEL</td>
<td>IS: 549</td>
<td>1</td>
</tr>
</tbody>
</table>

TENSION HOOK
NOT TO SCALE UNIT - MM

FIG - 6
DIMENSIONS IN MM:

<table>
<thead>
<tr>
<th>L1</th>
<th>L2</th>
<th>L3</th>
<th>D1</th>
<th>D2</th>
<th>D3</th>
</tr>
</thead>
<tbody>
<tr>
<td>170</td>
<td>100</td>
<td>140</td>
<td>18</td>
<td>18</td>
<td>12</td>
</tr>
</tbody>
</table>

NOTE: TOLERANCE SHALL BE AS PER IS : 2102
(DETAIL AS PER GR, UNLESS UNTILL SPECIFIED)

MIN. LENGTH : 290 MM
MAX. LENGTH : 400 MM
RANGE OF ADI. : 110 MM
HOT DIP GALVANISED AS PER IS : 2629

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>MATERIAL</th>
<th>REF. Spec</th>
<th>Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 BODY</td>
<td>MILD STEEL FORGED GLAV.</td>
<td>IS : 2004</td>
<td>1</td>
</tr>
<tr>
<td>2 NUT BOLT</td>
<td>MILD STEEL FORGED GLAV.</td>
<td>IS : 2062</td>
<td>2</td>
</tr>
<tr>
<td>3 NUT</td>
<td>MILD STEEL</td>
<td>IS : 1363</td>
<td>2</td>
</tr>
</tbody>
</table>

TURN BUCKLE
NOT TO SCALE
UNIT - MM

FIG - 7
DIMENSIONS IN MM:

<table>
<thead>
<tr>
<th></th>
<th>L1</th>
<th>T1</th>
<th>W1</th>
<th>W2</th>
<th>W3</th>
<th>D1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>465</td>
<td>5</td>
<td>14</td>
<td>16</td>
<td>30</td>
<td>16</td>
</tr>
</tbody>
</table>

NOTE: TOLERANCE SHALL BE AS PER IS : 2102
(DETAIL AS PER OR, UNLESS UNTILL SPECIFIED)

HOT DIP GALVANISED AS PER IS : 2629

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>MATERIAL</th>
<th>REF. Spec</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 STRAP</td>
<td>MILD STEEL GALVANISED</td>
<td>IS : 2067</td>
<td>1</td>
</tr>
<tr>
<td>2 RIVET &amp; WASHER</td>
<td>MILD STEEL GALVANISED</td>
<td>IS : 2016</td>
<td>1</td>
</tr>
<tr>
<td>3 SPLIT PIN</td>
<td>STAINLESS STEEL</td>
<td>IS : 549</td>
<td>1</td>
</tr>
<tr>
<td>4 BOLT &amp; NUT M 16</td>
<td>MILD STEEL GALVANISED</td>
<td>IS : 1363</td>
<td>1</td>
</tr>
</tbody>
</table>

EXTENSION LINK
NOT TO SCALE UNIT - MM

FIG - 8
DIMENSIONS IN MM:

<table>
<thead>
<tr>
<th></th>
<th>L1</th>
<th>L2</th>
<th>L3</th>
<th>T1</th>
<th>T2</th>
<th>R1</th>
<th>R2</th>
<th>R3</th>
<th>W1</th>
<th>W2</th>
<th>W3</th>
<th>D1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>102</td>
<td>42</td>
<td>15</td>
<td>4</td>
<td>9</td>
<td>23</td>
<td>15</td>
<td>8</td>
<td>92</td>
<td>40</td>
<td>18</td>
<td>16</td>
</tr>
</tbody>
</table>

NOTE: TOLERANCE SHALL BE AS PER IS: 2102
(DETAIL AS PER GR, UNLESS UNTIL SPECIFIED)

FEROUS PARTS ARE HOR DIP GALVANISED
AS PER IS: 2629

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>MATERIAL</th>
<th>REF. Spec</th>
<th>Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 CLAMP</td>
<td>ALUMINIUM ALLOY GDC.</td>
<td>IS: 617</td>
<td>1</td>
</tr>
<tr>
<td>2 RIVET M16 x 45</td>
<td>GALV. STEEL</td>
<td>IS: 2016</td>
<td>1</td>
</tr>
<tr>
<td>3 WASHER</td>
<td>GALV. STEEL</td>
<td>IS: 2016</td>
<td>1</td>
</tr>
<tr>
<td>4 SPLIT PIN</td>
<td>STAINLESS STEEL</td>
<td>IS: 549</td>
<td>1</td>
</tr>
</tbody>
</table>

CLEVIS THIMBLE
NOT TO SCALE UNIT - MM

FIG. 9
FOR EXAMPLE
DIMENSIONS (FOR CABLE SIZE, D - 14.4 MM)

I. DIA OF EACH WIRE - 3.2 ± 0.1
II. NO. OF SETS - 3
III. NO. OF WIRE PER SET - 5
IV. LENGTH OF HELIX - 1400

DIMENSION DETAILS FOR OTHER CABLE SIZE SHALL BE INDICATED BY THE MANUFACTURER INCLUDING THE PITCH OF HELIX

NOTE: ENDS OF RODS SHALL BE DEBURRED TOLERANCE SHALL BE AS PER IS: 2102
(DETAIL AS PER GR, UNLESS UNTILL SPECIFIED)

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>MATERIAL</th>
<th>REF Spec</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROTECTIVE HELIX</td>
<td>ALUMINIUM ALLOY 6061</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

PROTECTIVE HELIX (S)

NOT TO SCALE UNIT - MM

FIG - 10
FOR EXAMPLE
DIMENSIONS (FOR CABLE SIZE, D = 14.4 MM)

I. DIA. OF EACH WIRE - 3.2 ± 0.1
II. NO. OF SETS - 3
III. NO. OF WIRE PER SET - 6
IV. LENGTH OF HELIX - 1000

DIMENSION DETAILS FOR OTHER CABLE SIZE SHALL BE INDICATED BY THE MANUFACTURER INCLUDING THE PITCH OF HELIX

NOTE: ENDS OF RODS SHALL BE DEBURRED TOLERANCE SHALL BE AS PER IS : 2102 (DETAIL AS PER GR, UNLESS UNTILL SPECIFIED)

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>MATERIAL</th>
<th>REF. Spec</th>
<th>Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROTECTIVE HELIX</td>
<td>ALUMINIUM ALLOY 6081</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

PROTECTIVE HELIX (T)
NOT TO SCALE          UNIT - MM

FIG - 11
DIMENSIONS FOR EXAMPLE

<table>
<thead>
<tr>
<th>L1</th>
<th>T1</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000</td>
<td>2.2±0.1</td>
</tr>
</tbody>
</table>

D IS DIA OF EACH WIRE ROD
NO. OF WIRES USED 5

NOTE: TOLERANCE SHALL BE PER IS: 2102
(DETAIL AS PER GR, UNLESS UNTILL SPECIFIED)

DIMENSION DETAIL FOR DIFFERENT CABLE SIZES TO BE DECIDED AP TYPE TEST APPROVAL
FOR EXAMPLE CABLE SIZE
ENDS OF RODS SHALL BE DEBUR LENGTH OF TERMINATING HELIX 1000 MM,
TERMINATING HELIX TO BE USED WITH THIMBLE C DIA - 14.4 MM

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>MATERIAL</th>
<th>REF. Spec Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 DEADEHD GRIP</td>
<td>ALUMINISED STEEL</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TERMINATING HELIX</th>
<th>UNIT - MM</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOT TO SCALE</td>
<td></td>
</tr>
</tbody>
</table>

FIG - 12
DIMENSIONS IN MM

<table>
<thead>
<tr>
<th>L1</th>
<th>GL</th>
<th>DL</th>
<th>D1</th>
</tr>
</thead>
<tbody>
<tr>
<td>1346</td>
<td>446</td>
<td>900</td>
<td>12±1</td>
</tr>
</tbody>
</table>

NOTE: TOLERANCE SHALL BE AS PER IS : 2102
(DETAIL AS PER GR, UNLESS UNTILL SPECIFIED)

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>MATERIAL</th>
<th>REF. Spec Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 SPIRAL VIBRATION DAMPER</td>
<td>POLYVINYL COMPOUNDED</td>
<td></td>
</tr>
</tbody>
</table>

SPIRAL VIBRATION DAMPER

NOT TO SCALE   UNIT - MM

FIG - 13
DIMENSIONS IN MM

<table>
<thead>
<tr>
<th>L1</th>
<th>L2</th>
<th>W1</th>
<th>W2</th>
<th>DIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>138</td>
<td>100</td>
<td>27</td>
<td>38</td>
<td>18</td>
</tr>
</tbody>
</table>

NOTE: TOLERANCE SHALL BE AS PER IS: 2102
(DETAIL AS PER GR, UNLESS UNTIL SPECIFIED)
HOT DIP GAVANISED AS PER IS : 2829

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>MATERIAL</th>
<th>REF. Spec</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>LINK</td>
<td>MILD STEEL</td>
<td>IS : 2062</td>
<td>1</td>
</tr>
</tbody>
</table>

TWISTED EYE LINK
NOT TO SCALE UNIT - MM

FIG - 14
DIMENSIONS IN MM

<table>
<thead>
<tr>
<th>L1</th>
<th>L2</th>
<th>D1</th>
<th>D2</th>
<th>W</th>
</tr>
</thead>
<tbody>
<tr>
<td>105</td>
<td>65</td>
<td>17.5</td>
<td>5.6</td>
<td>35</td>
</tr>
</tbody>
</table>

DIMENSIONS IN MM OF INSERT PAD

<table>
<thead>
<tr>
<th>L</th>
<th>INNER DIA</th>
<th>OUTER DIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td>15</td>
<td>30</td>
</tr>
</tbody>
</table>

NOTE: TOLERANCE SHALL BE AS PER IS : 2102
(Detail as Per GR, Unless UNTILL SPECIFIED)
INSERT IN TOW HALVES D TO SUIT CABLE DIA FERROUS PARTS ARE HOT DIP GALVANIZED AS PER IS : 2629

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>MATERIAL</th>
<th>REF. Spec</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 STRAP</td>
<td>MILD STEEL GALYZ</td>
<td>IS : 2062</td>
<td>1</td>
</tr>
<tr>
<td>2 INSERT</td>
<td>POLYCHLORADPRENE COMPOUNDED</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>3 WING BOLT</td>
<td>MILD STEEL GALYZ</td>
<td>IS 2062</td>
<td>1</td>
</tr>
</tbody>
</table>

JUMPER CABLE CLAMP
NOT TO SCALE    UNIT - MM

FIG - 15
DIMENSIONS IN MM

<table>
<thead>
<tr>
<th>L1</th>
<th>W1</th>
<th>W2</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>280</td>
<td>50</td>
<td>92</td>
<td>12</td>
</tr>
</tbody>
</table>

NOTE: TOLERANCE SHALL BE AS PER IS: 2102
(DETAIL AS PER GR, UNLESS UNTILL SPECIFIED)
FEFFOUS PARTS ARE HOT DIP GALVANISED AS PER IS: 2629

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>MATERIAL</th>
<th>REF. Spec Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 HOOK</td>
<td>GALVANISED STEEL</td>
<td></td>
</tr>
<tr>
<td>2 BODY</td>
<td>GALVANISED STEEL</td>
<td>1 SET</td>
</tr>
<tr>
<td>3 SPOOL</td>
<td>ALUMINIUM COATED NEOPRENE</td>
<td></td>
</tr>
</tbody>
</table>

DEMONTFABLE PULLEY

NOT TO SCALE

UNIT - MM

FIG - 16
ENGINEERING INSTRUCTION
LAYING PRACTICES OF OPTICAL FIBRE CABLE BY HDD
(HORIZONTAL DIRECTIONAL DRILLING) METHOD

(No.: TR/OFCA-001)

All efforts have been made to incorporate all relevant up to date information available, any discrepancies or need for addition or deletion is felt necessarily may please be intimated to this office for further improvement, on E-Mail: dagmntl_tnd@rediffmail.com.