BID DOCUMENT
FOR
OPTICAL FIBER CABLE CONSTRUCTION WORKS AND ALLIED WORKS IN BHUJ TELECOM DISTRICT

E - TENDER NO. BJ/PLG/RE-T-12/OFC/2016-17 DATED: 26.05.2017

AGM (PLG) SECTION
O/o The General Manager Telecom District, Haripar Road, Bhuj- 370001.
PH. (02832) 231381. Fax NO. 231608
Visit us at: www.gujarat.bsnl.co.in
Please find enclosed the tender document in respect of above mentioned tender which contains the following:

<table>
<thead>
<tr>
<th>Section No.</th>
<th>Item</th>
<th>Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Part A</td>
<td>Detailed NIT</td>
<td>3 to 5</td>
</tr>
<tr>
<td>1. Part B</td>
<td>Newspaper NIT</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>Tender Information</td>
<td>7</td>
</tr>
<tr>
<td>2 (Part-A)</td>
<td>Agency Details</td>
<td>8</td>
</tr>
<tr>
<td>2 PART B</td>
<td>Letter of Authorization for attending bid opening</td>
<td>9</td>
</tr>
<tr>
<td>2 PART C</td>
<td>Undertaking &amp; Declaration</td>
<td>10</td>
</tr>
<tr>
<td>2 PART D</td>
<td>Declaration regarding no relative working in BSNL</td>
<td>11</td>
</tr>
<tr>
<td>3 (Part-A)</td>
<td>Scope of work and jurisdiction of contract</td>
<td>12 to 13</td>
</tr>
<tr>
<td>3 (Part-B)</td>
<td>Optical Fiber cable construction practices</td>
<td>Annexure</td>
</tr>
<tr>
<td>4 (Part-A)</td>
<td>General instruction to bidders (GIB)</td>
<td>15 to 29</td>
</tr>
<tr>
<td>4 (Part-B)</td>
<td>E-tendering Instructions to Bidders</td>
<td>30 to 33</td>
</tr>
<tr>
<td>5 (Part-A)</td>
<td>General (Commercial) Conditions of the contract (GCC)</td>
<td>34 to 45</td>
</tr>
<tr>
<td>5 (Part-B)</td>
<td>Special Conditions of Contract (SCC)</td>
<td>46 to 52</td>
</tr>
<tr>
<td>7 (A)</td>
<td>Bid Security / EMD Guarantee</td>
<td>53</td>
</tr>
<tr>
<td>7 (B)</td>
<td>Performance Security Bond Form</td>
<td>54</td>
</tr>
<tr>
<td>7 (D)</td>
<td>Agreement</td>
<td>55</td>
</tr>
<tr>
<td>7 (E)</td>
<td>Material Security Bond Form</td>
<td>56</td>
</tr>
<tr>
<td>8 (Part-B)</td>
<td>Rate of Empty Cable Drums</td>
<td>57</td>
</tr>
<tr>
<td>8 (Part-C)</td>
<td>Standard Schedule of Rates</td>
<td>58 to 60</td>
</tr>
<tr>
<td>9 (Part-B)</td>
<td>FINANCIAL BID</td>
<td>61</td>
</tr>
<tr>
<td></td>
<td>CHECK LIST</td>
<td>62</td>
</tr>
</tbody>
</table>

If interested, kindly submit your offers by means of online bids only for Electronic E-Tendering at the portal detailed in ‘Special Instructions to Bidders for E-Tendering’ on or before date & time specified in Clause 6 of Detailed NIT.

Assistant General Manager (PLG)
Bhuj Telecom District.
Ph. No. (02832) 231381
Fax No. (02832) 231608
Email: bharwanibj@gmail.com
Detailed Notice Inviting Tender

Sealed Tender (Digitally) is invited by General Manager, Bhuj, on behalf of BHARAT SANCHAR NIGAM LIMITED from prospective bidders for a period of one Year on ‘Rate Running Contract’ basis from the date of final acceptance of tender in Bhuj Telecom District

TABLE - A

<table>
<thead>
<tr>
<th>Name &amp; Scope of Work</th>
<th>OPTICAL FIBER CABLE CONSTRUCTION WORKS AND ALLIED WORKS IN BHUJ TELECOM DISTRICT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration of contract</td>
<td>One year from date of award</td>
</tr>
<tr>
<td>Performance Security Deposit</td>
<td>5 % of Total cost of tender</td>
</tr>
<tr>
<td>Time &amp; last date of submission of Bid</td>
<td>Up to 14.30 Hrs. on 19.06.2017</td>
</tr>
<tr>
<td>Time of Bid opening</td>
<td>At 15.30 Hrs. on 19.06.2017</td>
</tr>
<tr>
<td>Place of opening of Tender at</td>
<td>O/o. General Manager Telecom District, Haripar Road, Bhuj-370001</td>
</tr>
<tr>
<td>AREA</td>
<td>Route in Km (approx.)</td>
</tr>
<tr>
<td>Area under GMTD Bhuj</td>
<td>Cost of bid document (Non Refundable)</td>
</tr>
<tr>
<td></td>
<td>Estimated cost of work in Rs.</td>
</tr>
<tr>
<td></td>
<td>Bid Security /EMD@2% in Rs.</td>
</tr>
<tr>
<td></td>
<td>Material Security in Rs.</td>
</tr>
<tr>
<td>60 Km. (max HDD 25%)</td>
<td>2000/-</td>
</tr>
</tbody>
</table>

1. Deleted.

2. **Purchase of Tender Document**: Tender document can be obtained by downloading it from the website “[www.gujarat.bsnl.co.in](http://www.gujarat.bsnl.co.in)”. The official copy of tender document for participating in E-tender shall be available for downloading from [https://eprocurement.synise.com/bsnl1/gujarat](https://eprocurement.synise.com/bsnl1/gujarat).

2.1 The bidders downloading the tender document are required to submit the tender fee amount Rs.2000/- through DD/ Banker’s Cheque along with their tender bid failing which the tender bid shall be left archived unopened/ rejected.

   The DD/ banker’s cheque shall be drawn from any Nationalized/ Scheduled Bank in favour of AO (Cash), BSNL, O/o GMTD, Bhuj and payable at Bhuj.

2.2 The tender documents shall be issued free of cost to MSE bidders on production of requisite proof in respect of valid certification from MSME for the tendered item.

3. **Availability of Tender Document**: The tender document shall be available for downloading from 29.05.2017, 17:00 Hrs, onwards up to 19.06.2017, 12:00 Hrs on all working days of this office.

3.1 BSNL has decided to use process of e-tendering process for inviting this tender and thus the physical copy of the tender would not be sold.

**Note 3: Deleted**
4A. Eligibility Criteria: The bidder should have

<table>
<thead>
<tr>
<th>Sl</th>
<th>Particular</th>
<th>Details</th>
<th>Minimum requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>i.</td>
<td>Experience</td>
<td>The certificate in support of having completed the minimum required work of Normal trenching / HDD / combination of both or Similar work for the tender of underground cable laying work of electricity Dept./ OF Cable work / FTTH Work / Sewage pipe laying work / Underground gas/ water etc. pipe laying work during last three financial years in BSNL / MTNL / Central / State Govt. / PSUs / Private Operator / Any Reputed Private Ltd Company. Relevant experience of current financial year may also be added if applicable. Experience Certificate should be issued by an officer not below the rank of Divisional Engineer / Chief Account Officer or equivalent in case of BSNL / MTNL / Central / State Govt. / PSU and by authorized signatory in case of any Private operator / Reputed Private firm.</td>
<td>Quantum of work done:- 25% of estimated cost of this tender during last three years</td>
</tr>
<tr>
<td>ii.</td>
<td>Criteria for Educational order</td>
<td>Contractor /agencies having minimum Two years experiences of executing labour intensive work like road construction / building construction / electrical works / selavage work, canal works, etc.</td>
<td>Cost of such works to be Rs. 2 Lac in each case</td>
</tr>
<tr>
<td>iii.</td>
<td>Tax registration</td>
<td>Sales Tax / TIN No /Service tax registration certificates</td>
<td></td>
</tr>
</tbody>
</table>

5. Bid Security/EMD:

5.1 The bidder shall furnish the bid EMD in one of the following ways:-
   (a) Demand Draft/ Banker’s cheque drawn in favour of AO (Cash) BSNL,GMTD, Bhuj and payable at Bhuj.
   (b) Bank Guarantee / FDR from a Nationalized/scheduled bank drawn in favour of AO (Cash), BSNL, GMTD, Bhuj which should be valid for 180 days from the tender opening date.

5.2 The MSE units shall be exempted from submission of Bid Security deposit on production of requisite proof in respect of valid certification from MSME for the tendered item.

6. Date & Time of Submission of Tender bids: As above in table.

Note 4: In case the date of submission (opening) of bid is declared to be a holiday, the date of submission (opening) of bid will get shifted automatically to next working day at the same scheduled time. Any change in bid opening date due to any other unavoidable reason will be intimated to all the bidders separately.

7. Opening of Tender Bids: As above in table.

8. Place of opening of Tender bids:

8.1 In case of tenders invited through e-tendering process, the tenders shall be opened through ‘Public Online Tender Opening Event (POTOE)’. BSNL’s Tender Opening Officers as well as authorized representatives of bidders can attend the Public Online Tender Opening vent (TOE) from the comfort of their offices. Kindly refer clause 8 of Section-4 Part B of Tender document for further instructions.

8.2 In addition & in case of tenders invited through manual bidding process, authorized representatives of bidders (i.e. vendor organization) can attend the TOE at the office of GMTD, Haripar Road, BHUJ – 370 001, where BSNL’s Tender Opening Officers would be conducting Public Online Tender Opening Event (TOE).

9. Tender bids received after due time & date will not be accepted by the system or physically.

10. Incomplete, ambiguous, Conditional, unsealed tender bids are liable to be rejected.
11. GMTD Bhuj reserves the right to accept or reject any or all tender bids without assigning any reason. He is not bound to accept the lowest tender.

12. The official copy of tender document for e-bidding process of E-tender shall be available for downloading from https://eprocurement.synise.com/bsnl1/gujarat from 29.05.2017, 17:00 Hrs onwards. This will, however, be same as available on BSNL website.

12.1 The bidder shall furnish a declaration that no addition / deletion / corrections have been made in the downloaded tender document being submitted and it is identical to the tender document appearing on E-tender Portal https://eprocurement.synise.com/bsnl1/gujarat

12.2 In case of any correction/ addition/ alteration/ omission in the tender document, the tender bid shall be treated as non responsive and shall be rejected summarily.

13. The bidder shall furnish a declaration in his tender bid that his firm has not blacklisted by any SSA/ Circle of BSNL/ MTNL

Note 5: All documents submitted in the bid offer should be preferably in English. In case the certificate viz. experience, registration etc. is issued in any other language other than English, the bidder shall attach an English translation of the same duly attested by the bidder & the translator to be true copy in addition to the relevant certificate.

Note 6: All computer generated documents should be duly signed/ attested by the bidder/ vendor organization.
SECTION – 1 (Part B)

NEWS PAPER N.I.T. (NNIT)
BHARAT SANCHAR NIGAM LIMITED
Office of the General Manager
BHUJ TELECOM DISTRICT
NOTICE INVITING TENDER No. E - TENDER NO. BJ/PLG/RE-T-12/OFC/2016-17

E-Tenders are invited from the prospective bidders for “OPTICAL FIBER CABLE CONSTRUCTION WORKS AND ALLIED WORKS IN BHUJ TELECOM DISTRICT”. Last date of receipt of tender is 19.06.2017 up to 14:30 Hrs.

For further details kindly visit our website www.gujarat.bsnl.co.in and follow “Link for E-tenders”

Assistant General Manager (PLG)
Bhuj Telecom District.
PH. 02832-231381 Fax No. 231608
SECTION – 2
Tender Information

1. Type of Tender:
   a) No. of Bid Submission Stages for tender: Single Stage.
   b) No. of Envelopes for submission of Bids: Two Nos. (The bidders shall submit Techno-commercial & financial bid simultaneously) (Opening stages)
   c) E-reverse auction: if required by Business Unit / Planning cell after opening of the Financial bids

Note 1: In case of 1(b) above, the bidder shall submit Techno-commercial & Financial bid simultaneously. The bids will be evaluated techno-commercially first and thereafter financial bids of techno commercially compliant bidders only shall be opened.

2. Bid Validity Period / validity of Bid offer: 150 days from the tender opening date and Validity of bid Offer for acceptance by BSNL can be extended.

3. Bid must be submitted by bidder through E-tendering mode only. Manual (OFFLINE) submission of bids should not be considered. The following documents are required to be submitted offline to AGM (PLG), O/o GMTD, Haripar Road, Bhuj-370001 on or before the date & time of submission of bids in a sealed envelope.
   - The envelope shall bear the tender number, name of work and the phrase: "Do Not Open Before (due date & time of opening of tender).
   - i) EMD - Bid security (original copy)
   - ii) DD/ Banker's cheque of Tender fee
   - iii) Power of Attorney in accordance with clause 14.3 of section 4 Part A and authorization for executing the power of Attorney.
   - iv) Latest and valid MSME / NSIC Certificate duly certified by NSIC if applicable

The purchaser shall not be responsible if the envelop is delivered elsewhere or late.

In case of tenders invited under two envelopes system, the first envelope will be named as techno commercial & will contain documents of bidder’s satisfying the eligibility / Technical & commercial conditions and 2nd envelope will be named as financial envelope containing financial quote.

   a) Techno-commercial part of the bid shall contain one set of the following documents only:-

   i) Certificate(s) showing fulfillment of the eligibility criteria. The bidder shall furnish, as part of his bid documents establishing the bidder's eligibility, all the following documents or whichever is required as per terms and conditions of bid documents.

<table>
<thead>
<tr>
<th>Sl</th>
<th>Particular</th>
<th>Documents to be submitted</th>
</tr>
</thead>
<tbody>
<tr>
<td>i.</td>
<td>Registration Certificate</td>
<td>Firm Registration Certificate/ Certificate of Incorporation / Shop &amp; Establishment Certificate / Service Tax Registration</td>
</tr>
<tr>
<td>ii.</td>
<td>In case of Proprietorship</td>
<td>Proprietorship firms an affidavit of that effect should be submitted along with the bid</td>
</tr>
<tr>
<td>iii.</td>
<td>Partnership / Company</td>
<td>Partnership Deed or Articles/Memorandum of Association as the case may be &amp; Power of Attorney (if applicable) should be made older than the date of submission of bid.</td>
</tr>
<tr>
<td>iv.</td>
<td>Experience</td>
<td>Experience Certificate as mentioned in the eligibility criteria</td>
</tr>
<tr>
<td>v.</td>
<td>EMD &amp; Tender Fee</td>
<td>As per Table A &amp; clause 1 &amp; 2 OR Copy of Latest &amp; valid MSE / NSIC Certificate. (if applicable)</td>
</tr>
<tr>
<td>vi.</td>
<td>EPF</td>
<td>Copy of Registration Certificate of EPF (if applicable)</td>
</tr>
<tr>
<td>vii.</td>
<td>ESIC</td>
<td>ESIC Registration (if applicable)</td>
</tr>
<tr>
<td>ix.</td>
<td>Taxes</td>
<td>Service tax / sales tax registration certificate (TIN No.)</td>
</tr>
<tr>
<td>x.</td>
<td>PAN Card</td>
<td>Copy of PAN Card</td>
</tr>
</tbody>
</table>

   All documents submitted will also be self attested by the bidder.

   ii) Power of Attorney & authorization for executing the power of Attorney in accordance with clause 14.3 of Section 4 Part A

   iii) The complete Bid document duly signed on end of each section at least.

   iv) Agency details, letter for authorization of bid, Undertakings, Undertakings, Non-Relation Certificate as given vide Section 2(A) to 2(D) of this Bid form

   b) Financial envelope shall contain Electronic Form- financial along with Price Schedule (Section 9 Part-B with all relevant bid annexure (in case of tenders invited through e-tendering process)}
SECTION -2 (Part-A)
AGENCY DETAILS

(Including performance records, financial viability etc.)

| Name of firm |  |
|Registered Address |  |

<table>
<thead>
<tr>
<th>Status of the Bidder</th>
<th>(i) Proprietorship concern</th>
<th>(ii) Partnership firm</th>
<th>(iii) HUF</th>
<th>(iv) Limited Company</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Name of person or authorized signatory for submitting the tender, other documents and empowered for correspondence with BSNL</th>
<th></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Service Tax registration particulars</th>
<th></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>PAN Card particulars</th>
<th></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Telephone numbers (with STD Code) of authorized signatory</th>
<th>Office:</th>
<th>Residence:</th>
<th>Mobile:</th>
<th>E-mail:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Name(s) of Proprietor/ all Partners / all Directors</th>
<th></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Infrastructure capabilities</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Capacity of trenching per day (in meters)</td>
<td>A.</td>
</tr>
<tr>
<td>B. Capacity of laying HDPE/PLB/RCC/DWC et. per day (in meter)</td>
<td>B.</td>
</tr>
<tr>
<td>C. Capacity of pulling cable through duct per day (in meters)</td>
<td>C.</td>
</tr>
<tr>
<td>D. Capacity of engaging mazdoors per day</td>
<td>D.</td>
</tr>
<tr>
<td>F. Particulars of other machines possessed by the contractor which can help in Trenching, cable laying and cable pulling;</td>
<td>F.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Signature of Tenderer</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Name of Tenderer</td>
<td></td>
</tr>
<tr>
<td>Along with date &amp; Seal</td>
<td></td>
</tr>
</tbody>
</table>
SECTION- 2 PART B

LETTER OF AUTHORISATION FOR ATTENDING BID OPENING
(To be typed preferably on letter head of the company)

Subject: Authorization for attending Bid opening

I/ We Mr. /Ms. …………………………………………… have submitted our bid for the tender no. ………………………………………………………………………………………………………………… (Item of work) which is due to open on …………………. (date) in the Meeting Room, O/o …………………………………………………………………………………………………………………

We hereby authorize Mr./ Ms. …………………………..& Mr. / Ms………………………………… (alternative) whose signatures are attested below, to attend the bid opening for the tender mentioned above on our behalf.

………………………….…………… Signature of the Representative
………………………………… Signature of Bidder/ Officer authorized to sign
Name of the Representative on behalf of the Bidder

……………………………………
Signature of the alternative Representative

…………………………………………..
Name of the alternative Representative

Above Signatures Attested

Note 1: Maximum two representatives will be permitted to attend the Bid opening. In cases where it is restricted to one, first preference will be allowed. Alternate representative will be permitted when regular representatives are not able to attend.

2. Permission for entry to the hall where bids are opened may be refused in case authorization as prescribed above is not received.
SECTION-2 PART C
UNDERTAKING & DECLARATION

a) Certified that:
1. I/ We ……………………………………. have read, understood and agree with all the terms and conditions, specifications included in the tender documents & offer to execute the work at the rates quoted by us in the tender form.
2. If I/ We fail to enter into the agreement & commence the work in time, the EMD/ SD deposited by us will stand forfeited to the BSNL.

b) The tenderer hereby covenants and declares that:
1. All the information, Documents, Photo copies of the Documents/ Certificates enclosed along with the Tender offer are correct.
2. If anything is found false and/or incorrect and/or reveals any suppression of fact at any time, BSNL reserves the right to debar our tender offer/ cancel the LOA/ Purchase/ work order if issued and forfeit the EMD/ SD/ Bill amount pending with BSNL. In addition, BSNL may debar the contractor from participation in its future tenders.

c) DECLARATION REGARDING INTERNET DOWNLOADED BID SUBMISSION as per clause no 12, Section – 1A.
I / We declare that no addition / deletion / corrections have been made in the downloaded tender document being submitted and it is identical to the tender document appearing on the website.

d) CERTIFICATE REGARDING FIRM HAS NOT BLACK LISTED BY ANY SSA/CIRCLE OF BHARAT SANCHAR NIGAM LIMITED / MTNL as per Clause No. 13, Section – 1(Part A)
I,……………………………………………………….……S/o………………………………………
r/o…………………………………………………..……hereby certify that we or our firm ………………………………………………………………………… has not been BLACK LISTED by any SSA/Circle of MTNL/BSNL In case at any stage, it is found that the information given by me is false/incorrect, BSNL shall have the absolute right to take any action as deemed fit/without any prior intimation to me.

e) Clause by Clause Compliance
It is to certify that the tender document is carefully read & understood and all the sections and clauses are complied unconditionally & unequivocally. There is no deviation from the terms & conditions of the tender.

f) Declaration for EPF & Misc Provisions Act 1952
I _____________________________ (Name of the bidder / agency) hereby declare compliance towards conditions of the EPF and Misc Provisions Act 1952 and authorize BSNL to recover any payment that arises due to failure to comply with any of the Labour legislations and statutory conditions viz. Labor, EPF, ESI etc. or any other acts dealing with the same and all other acts mentioned in the tender document.

Date: ……………………..
Place: ……………………..

…………………………
Signature of Tenderer
Name of Tenderer
Along with date & Seal
SECTION- 2 PART D
DECLARATION REGARDING NO RELATIVE WORKING IN BSNL

I ___________________________Son of / W /O ____________________________
R/O _________________________here by certify that none of my relative(s) as defined in tender document
is/are employed in BSNL unit as per details given in tender document. In case at any stage, it is found that
the information given by me is false/ incorrect, BSNL shall have the absolute right to take any action as
deemed fit/ without any prior intimation to me.

Signed ___________________
For and on behalf of the Agency
Name (Capitals) ___________________________
Position ____________________________
Date ____________________________

Note: - In case of proprietorship firm certificate will be given by the proprietor, for partnership firm
certificate will be given by all the partners and in case of limited company by all the Directors of the
Company. Any breach of these conditions by the company or firm or any other person, the tender/ work will
be cancelled and earnest money / security deposit will be forfeited at any stage whenever it is so noticed.
BSNL will not pay any damages to the company or firm or the concerned person. The company or firm or
the person will also be debarred for further participation in the concerned unit.
SECTION- 3 (Part-A)

SCOPE OF WORK AND JURISDICTION OF CONTRACT

1. SCOPE OF WORK

1.1 MAIN Optical FIBER CABLE CONSTRUCTION ACTIVITIES: The Optical Fiber Cable is laid through HDPE Pipes buried at a nominal depth of 165 cms. The steps involved in OF Cable construction are as under:

1.2 Excavation of trench up to a nominal depth of 165 cms., according to Construction specifications along National/State Highways/other roads and also in city limits as mentioned in the notice inviting tender.

1.2.1 Laying of HDPE pipes/PLB pipe coils coupled by HDPE sockets in excavated trenches, on bridges and subverts, drawing of 6mm Polypropylene para pro rope (P.P. rope) through the HDPE pipes/PLB Pipe coils as per Construction Specifications and sealing of pipe ends at every manhole by end caps of suitable size.

1.2.2 Providing of mechanical protection by R.C.C. Pipes/GI pipes and/or concreting/chambering according to construction specifications, wherever required.

1.2.3 Fixing of GI pipes/troughs with clamps at culverts/bridges and/or chambering or concreting of G.I. Pipes/troughs, wherever necessary.

1.2.4 Back filling and compacting of the excavated trenches according to construction specifications and removal of excess earth from the site.

1.2.5 Opening of manholes (of size 3 meters x 1 meters x 1.65 meters depth) replacing existing 6mm P.P. ropes, if required (from manhole to manhole) for ensuring smooth passage for pulling the cable. Pulling of Optical Fiber Cable with proper tools and accessories as per construction specifications. Sealing of both ends of the manholes by hard rubber bush of suitable size to avoid entry of rodents into the HDPE pipes, putting split HDPE pipes and split RCC pipes with proper fixtures offer cable in the manhole to protect the bare cable n the pulling manhole. Back filling and dressing of manholes

1.2.6 Digging of pit of size 2 meter x 2 meter x 1.8 meter (depth) for construction of jointing chamber at approximately every two kilometers of internal size of 1.5 meter x 1.5 meter x 1.2 meter using bricks and mortar or fixing pre-cast jointing chamber of internal diameter of 1.2 meter filling of jointing chamber with clean sand, placing either pre-cast RCC cover or stone of suitable size on jointing chamber to protect the joint and back filling of jointing chamber with excavated soil

1.2.7 Digging of pits 1 meter towards jungle side at every manhole and jointing chamber to a depth of 60cms., fixing of route indicator/joint indicator, concreting and back filling or pits. Painting of route indicators with yellow colour and joint indicator by red colour and sign writing denoting route/joint indicator number, as per construction specifications

1.2.8 Fixing, Painting and Sign Writing of Route and Joint Indicators.

1.2.10 For PLB Pipes blowing practice: To lay the pipe, place jack stand along the side of trench and mount the coil with the help of strong iron shaft passing through the collapsible reel. Drive the reel slowly to avoid over spinning of reel while pulling, unrolled pipe can be laid to the trench by placing worker after every 15-20 meter. The arrangement for horizontal Jack and associated other accessories should be arranged by contractor at his cost.

1.3 ALLIED ACTIVITIES:

1.3.1 Transportation of Materials: The materials required for executing the work entrusted to the contractors against a work order shall be made available at Field Unit Telecom Store. The contractor shall be responsible for transporting the materials, to be supplied by the BSNL or otherwise to execute the work under the contract, to site at his/their own cost. The costs of transportation are subsumed in the standard Schedule Rates and therefore no separate charges are payable on this account.
1.3.2 **Disposal of Empty Cable Drums:** The contractor shall be responsible to dispose of the empty cable drums after laying of the cables. The cost of various sizes of empty cable drums recoverable from the contractor has been fixed taking into account the prevailing market rates as mentioned in this document.

1.3.3 It shall be obligatory on part of the contractor to dispose of the empty cable drums at his/their level and the amount fixed for various empty cable drums shall be recovered from the bill for the work for which the drum(s) was/were issued or from any other amount due to the contractor or the Security Deposit.

1.3.4 The contractor shall not be allowed to dump the empty cable drums in Govt./ Public place which may cause inconvenience to the BSNL / public. If the contractor does not dispose of the empty cable drums within 3 days of becoming empty, the BSNL shall be at liberty to dispose of the drums in any manner deemed fit and also recover the amount fixed in this contract form the bill/ security deposit / any other amount due to the contractor.

1.3.5 **Supply of Materials :**

There are some materials required to be supplied by the contractor for execution of works under this contract like Bricks, Cement, Wire Mesh and Steel for protection, etc., besides using other consumables which do/don’t become the part of the asset. The contractor shall ensure that the materials supplied are of best quality and workmanship and shall be strictly in accordance with the specifications.

2 **VALUE OF WORK:**

The estimated cost of work is as mentioned in the Notice Inviting Tenders which has been worked out based on standard scheduled rates mentioned in this tender document. The actual value of work may vary based on the actual requirement.
SECTION – 3 (Part-B)

Optical Fiber Cable Construction Specifications

Detail specification for Optical fiber cable construction practice, and EI for HDD method are placed as annexure to this NIT and are only for reference and information and do not constitute part of NIT.
SECTION- 4 (Part-A)

GENERAL INSTRUCTION TO BIDDERS (GIB)

1. DEFINITIONS

1. **BSNL:** The BSNL means the B.S.N.L. Bhuj Telecom Dist under the Ministry of Communications, which invites the tenders on behalf of the General Manager Bhuj Telecom District. Includes executives in the BSNL, whatever designations assigned to them from time to time, who may be the in-charge of direction, supervision, testing, acceptance and maintenance including their successor(s) in the office appearing in various clauses shall be taken to mean the BSNL, Bhuj Telecom District,

b. **(The SSA Head)** means the Head of SSA General Manager Bhuj Telecom District, Bhuj and his successors.

c. **The jurisdiction of (the SSA Head):** The jurisdiction of (the SSA Head) means Bhuj Telecom District, which coincides geographically with (Revenue District(s)).

d. **Representative of (the SSA Head):** Representative of (the SSA Head) means Officer and staff for the time being in Bhuj Telecom District, deputed by the General Manager Bhuj for inspecting or supervising the work of testing etc..

e. **Engineer – in - charge:** The Engineer – in - charge means the Engineering Officer nominated by the BSNL to supervise the work, under the contract. (Minimum Divisional Engineer level Officer).

f. **Site Engineer:** Site Engineer shall mean an SDE/SDO/JTO of the BSNL who may be placed by the General Manager, Bhuj Telecom District, Bhuj as in – charge of the work at site at any particular period of time.

g. **A/T Unit:** A/T Unit shall mean Acceptance and Testing unit of the BSNL.

h. **A/T Officer:** An officer authorized by General Manager – Bhuj Telecom Dist.

i. **Contract:** The term contract means, the documents forming the tender and acceptance thereof and the formal agreement executed between the competent authority on behalf of the BSNL and the contractor, together with the documents referred to therein including these conditions, the specifications, designs, drawings and instructions issued from time to time, by the engineer in – charge and all these documents taken together shall be deemed to form one contract and shall be complementary to one another. In the contract, the following expressions shall, unless the context otherwise requires have the meanings, hereby respectively assigned to them. The expression 'works' shall unless there be something either in the subject or context repugnant to such construction, be construed or taken to mean the works by or by virtue of the contract contracted to be executed whether temporary or permanent, and whether original, altered, substituted or additional.

j. **Contractor:** The contractor shall mean the individual, firm or company, enlisted or not enlisted with BSNL Department of Telecom in accordance with procedure for contractor, or registered for carrying out the work of cable laying, whether incorporated or not, undertaking the works and shall include the legal personal representative of such individual or the persons composing such firm or company, or the successors of such firm or company and the permitted assignees of such individual, firm or company.

k. **Work:** The expression ‘works’ shall unless there be something either in the subject or context repugnant to such construction be construct and taken to mean the works by or by virtue of the contract contracted to be executed whether temporary or permanent and whether original altered, substituted or additional.
1. **Schedule(s):** Schedule(s) referred to in these conditions shall mean the relevant schedule(s) or the standard schedule of rates mentioned in the document.

m. **Site:** The site shall mean the land / or other places on, into or through which work is to be executed under the contract or any adjacent land, path or street through which, the work is to be exacted under the contract or any adjacent land, path or street which may be allotted or used for the purpose of carrying out the contract.

n. **Normal time or stipulated time:** Normal time or stipulated time means time specified in the work order to complete the work.

o. **Extension of Time:** Extension of Time means the time granted by the BSNL to complete the work beyond the normal time or stipulated time.

p. **Date of Commencement of Work:** Date of Commencement of Work means the date of actual commencement of work or 7th day from the date of issue of work order, whichever is earlier. **However in case of Work Order given for attending the fault/for maintenance work, the work should commence within 4 hours or the time specifically given by the officer in charge.**

q. **Due date of completion:** Due date of completion shall be the date by which the work shall be completed at site including clearance of site

r. **Duration of completion of work:** The duration of completion of work or completion time shall be time specified in the work order plus extension of time granted, if any.

s. **Exceptional risk:** Exceptional risks are risk due to war(whether declared or not), invasion, act of foreign enemies, hostilities, civil war, rebellion, revolution, insurrection, military or usurped power, any acts of Government damages from aircraft, acts of God, such as earthquake, lightening and unprecedented floods and other causes over which, the contractor has no control and the same having been accepted as such, by the Accepting Authority or causes solely due to use or occupation by the government of the part of the work, in respect of which a certificate of completion has been issued.

2. **ELIGIBLE BIDDERS:** Kindly refer to clause 4 of Section – 1 Part A i.e. Detailed NIT

3. **COST OF BIDDING:**
   The bidder shall bear all costs associated with the preparation and submission of the bid. The BSNL, will in no case, be responsible or liable for these costs, regardless of the conduct or outcome of the bidding process.

4. **BID DOCUMENTS:**
   4.1 The goods/ services required to be supplied, bidding procedures and contract terms are prescribed in the Bid Documents. The contents of the Bid documents are specified in the covering letter.
   4.2 The Bidder is expected to examine all instructions, forms, terms and specifications in the Bid Documents. Failure to furnish all information required as per the Bid Documents or submission of bids not substantially responsive to the Bid Documents in every respect will be at the bidder's risk and may result in rejection of the bid.

5. **CLARIFICATION OF BID DOCUMENTS:**
   5.1 A prospective bidder, requiring any clarification on the Bid Documents shall notify the User in writing by FAX or by Email of the User as indicated in the invitation of Bid. The User shall respond in writing to any request for the clarification of the Bid Documents, which it receives **7 days prior to the date of opening of the Tenders.** Copies of the query (without identifying the source) and clarifications by the User shall be uploaded on BSNL website as ‘Clarifications’ on e-procurement portal of Bhuj Telecom District portal, clarification shall be available as ‘Addendum’, for all the prospective bidders who have downloaded the official copy of tender documents from e-procurement portal of Bhuj Telecom District
5.2 Any clarification issued by BSNL in response to query raised by prospective bidders shall form an integral part of bid documents and it may amount to an amendment of relevant clauses of the bid documents.

6. **AMENDMENT OF BID DOCUMENTS:**
6.1 The BSNL may, for any reason, whether at its own initiative or in response to a clarification requested by a prospective Bidder, may modify bid documents by amendments prior to the date of submission of Bids with due notification to prospective Bidders.
6.2 The amendments shall be notified in writing or by Fax or by Addendum through e-tendering portal to all prospective bidders on the address intimated at the time of purchase of bid document from the BSNL and these amendments will be binding on them.
6.3 In order to afford prospective bidders reasonable time in which to take the amendments into account in preparing their bids, the BSNL may, at its discretion, extend the deadline for the submission of bids suitably.

7. **DOCUMENTS COMPRISING THE BID:**
The bid prepared by the bidder shall comprise the components specified in Section 2 of this Tender.

8. **BID FORM:**
The bidder shall complete the Bid Form and the appropriate Price Schedule furnished in the Bid Documents as per Section- 9 Part B.

9. **BID PRICES**
9.1 The bidder shall give the total composite price inclusive of all levies and taxes, packing, forwarding, freight and insurance in case of materials to be supplied and inclusive of all taxes and levies except service tax in case of works to be executed. Service Tax will be paid extra as applicable. The contractor shall be responsible for transporting the materials, to be supplied by the BSNL (At the field Unit Telecom Store or otherwise) to execute the work under the contract, to site at his/their own cost. The costs of transportation are subsumed in the standard Schedule Rates and therefore no separate charges are payable on this account. The offer shall be firm in Indian Rupees.
9.2 Prices shall be quoted by the bidder as percentage below/above/at par the schedule of rates given in schedule of rates (Financial Bid). Prices quoted at any other place shall not be considered. The service Tax will be paid extra as applicable.
9.3 The price quoted by the bidder shall remain fixed during the entire period of contract and shall not be subject to variation on any account. A bid submitted with an adjustable price quotation will be treated as non-responsive and rejected.
9.4 Discount, if any, offered by the bidders shall not be considered unless they are specifically indicated in the schedule of rates (financial Bid). Bidders desiring to offer discount shall therefore modify their offers suitable while quoting and shall quote clearly net price taking all such factors like Discount, free supply, etc. into account.

10. **DOCUMENTS ESTABLISHING BIDDER'S ELIGIBILITY AND QUALIFICATIONS**
Kindly refer to clause Section – 1 and 2 of this bid

11. **N/A**

12. **BID SECURITY/EMD:**
12.1 The bidder shall furnish, as part of its bid, a bid security one of the following ways:-
(a) Demand Draft/ Banker’s cheque from a Nationalized/scheduled bank drawn in favour of AO (Cash), BSNL O/o GMTD, Bhuj and payable at Bhuj.
(b) Bank Guarantee/FDR from a Nationalized/scheduled bank drawn in favour of AO (Cash) BSNL O/o GMTD, Bhuj which should be valid for 180 days from the tender opening date.
For educational order E.M.D to be submitted by bidder as 2.0% of 10% of estimated tender cost for each case in the form of cash / Demand Draft/ Banker’s cheque / Bank guarantee/FDR issued by a Nationalized/Scheduled bank, drawn in favour of AO (Cash) BSNL O/o GMTD, Bhuj. Bank Guarantee should be valid for 180 days from the tender opening date.
12.2 The MSE bidders are exempted from payment of bid security:
   a) A proof regarding valid registration with body specified by Ministry of Micro, Small & Medium Enterprise for the tendered items will have to be attached along with the bid.

17 Seal & Signature of Bidder
b) The enlistment certificate issued by MSME should be valid on the date of opening of tender.
c) MSE unit is required to submit its monthly delivery schedule.
d) If a vendor registered with body specified by Ministry of Micro, Small & Medium Enterprise claiming concessional benefits is awarded work by BSNL and subsequently fails to obey any of the contractual obligations, he will be debarred from any further work/contract by BSNL for one year from the date of issue of such order.

12.3 The bid security is required to protect the BSNL against the risk of bidder's conduct, which would warrant the bid security's forfeiture, pursuant to para 12.7.

12.4 A bid not secured in accordance with para 12.1 & 12.2 shall be rejected by the BSNL being non-responsive at the bid opening stage and archived unopened on e-tender portal for e-tenders.

12.5 The bid security of the unsuccessful bidder will be discharged/returned as promptly as possible as but not later than 30 days after the expiry of the period of bid validity prescribed by the BSNL, pursuant to clause 13.

12.6 The successful bidder's bid security will be discharged upon the bidder's acceptance of the advance Purchase Order satisfactorily pursuant to clause 27 and furnishing the performance security. The successful bidder's bid security may be converted to Part Performance Security Deposit in accordance with clause 28.

12.7 The bid security may be forfeited:
   a) If the bidder withdraws or amends its bid or impairs or derogates from the bid in any respect during the period of bid validity specified by the bidder in the bid form or extended subsequently; or
   b) If the bidder does not accept the APO/ AWO and/ or does not submit PBG & sign the contract/agreement in accordance with clause 28.

Note: - The bidder shall mean individual company/ firm or the front bidder and its technology/ consortium partner, as applicable.

13. PERIOD OF VALIDITY OF BIDS:

13.1 Bid shall remain valid for 150 days from the date of bid opening prescribed by the BSNL. A bid valid for a shorter period shall be rejected by the BSNL as non-responsive.

13.2 In exceptional circumstances, the BSNL may request the bidder's consent for an extension to the period of bid validity. The request and the responses thereto shall be made in writing. The bid security provided under Clause 12 shall also be suitably extended. A bidder may refuse the request without forfeiting his bid security. A bidder accepting the request and granting extension will not be permitted to modify his bid.

14. FORMAT AND SIGNING OF BID:

14.1 The bidder shall submit his bid, online (in case of e-tendering) & through sealed envelopes physically (in case of tenders with manual bidding process), complying all eligibility conditions, other terms and conditions of tender document to be read along with the clarifications and amendments issued in this respect. All the documents must be authenticated, using Digital Signature (DSC) with Class 2 or above (in case of e-tendering) & by hand signatures (for manual bidding process), by the authorized person. The letter of authorization shall be indicated by written power-of-attorney accompanying the bid.

Note:- The BSNL may ask the bidder(s) to supply, besides original bid, additional copy of bids as required by him.

14.2 The bid shall contain no interlineations, erasures or overwriting except as necessary to correct errors made by the bidder in which case such corrections shall be signed by the person or persons signing the bid. All pages of the original bid, except for un-amended printed literatures, shall be digitally signed by the person or persons signing the bid.

14.3 Power of Attorney
   a) The power of Attorney should be submitted and executed on the non-judicial stamp paper of appropriate value as prevailing in the concerned states(s) and the same be attested by a Notary public or registered before Sub-registrar of the state(s) concerned.
   b) The power of Attorney be executed by a person who has been authorized by the Board of Directors of the bidder in this regard, on behalf of the Company/ institution/ Body corporate.
   c) In case of the bidder being a firm, the said Power of Attorney should be executed by all the
partner(s) in favour of the said Attorney.

(d) Attestation of the specimen signatures of authorized signatory by the Company’s/ firm’s bankers shall be furnished. Name, designation, Phone number, mobile number, email address and postal address of the authorized signatory shall be provided.

(e) Individual signing the tenders or other documents connected with the contract shall indicate the full name below the signature and must specify the capacity and authority under which he signs such documents and shall also submit documentary evidence of his authority in the form of Power of Attorney.

(f) The Power of Attorney is to be submitted in original, if it has been issued for the specific tender enquiry. If the power of attorney is issued in general irrespective of tender enquiry then photocopy duly certified by notary public can also be accepted.

(g) In case the representative of bidder company, who uploads the document on e-tender portal using his Digital Signature Certificates (DSC), which is different from the authorized signatory for the bid (Power of Attorney holder) then the representative who uploads the documents on e-tender portal using DSC issued in his name, shall also be one of the Power of Attorney holder by the bidder Company, in addition to the authorized signatory for the bid

15. SEALING AND MARKING OF BIDS:
The bid shall be submitted online using single stage bidding and Two Envelope Methodology.

15.1 The first envelope (Techno-commercial bid): This envelope shall contain documents of bidders satisfying the eligibility / Technical & commercial conditions requirements. Second envelope will be named as financial bid containing price Schedule as per section 9 Part B. All documents submitted will also be self attested by the bidder.

15.2 a) The envelopes for Tender Fee / EMD shall be addressed AGM (PLG), O/o. G.M.T.D. Haripar Road, Bhuj - 370001.
   b) The envelope for Tender Fee / EMD shall bear the name of the tender, the tender number and the words 'DO NOT OPEN BEFORE' (due date & time).
   c) The envelopes for Tender Fee / EMD shall indicate the name and complete postal address of the bidder to enable the User to return the bid unopened in case it is declared to be received 'late'.
   d) The envelopes for Tender Fee / EMD shall should be deposited in the tender box provided by tendering authority or sent by registered post or delivered in person on above mentioned address (address is given above). The responsibility for ensuring that the envelopes for Tender Fee / EMD shall are delivered in time would vest with the bidder.
   e) The envelopes for Tender Fee / EMD shall delivered in person/ registered post on the day of tender opening shall be delivered upto specified time & date as stated in NIT to O/o. G.M.T.D. Haripar Road, Bhuj - 370001. The User shall not be responsible if the envelopes for Tender Fee / EMD shall are delivered elsewhere.
   f) Venue of Tender Opening:
   Tender will be opened in O/o. G.M.T.D. Haripar Road, Bhuj - 370001 at specified time & date as stated in NIT. If due to administrative reason, the venue of Bid opening is changed, it will be displayed prominently on the above address.

15.3 If envelopes are not sealed and marked as required at para 15.1 and 15.2, the bid shall be rejected.
16. SUBMISSION OF BIDS:

16.1 Bids must be submitted by the bidders on or before the specified date & time indicated in Section-1 i.e. DNIT.

16.2 The BSNL may, at its discretion extend this deadline for the submission of the bids by amending the bid documents in accordance with Clause 6 in which case all rights and obligations of the BSNL and bidders previously subject to the deadline will thereafter be subject to the deadline as extended.

16.3 The bidder shall submit his bid offer against a set of bid documents purchased by him for all or some system/services / equipment as per requirement of the Bid Documents. He may include alternate offer, if permissible as per the bid. However not more than one independent and complete offer shall be permitted from the bidder.

16.4 Bid must be submitted by the bidder through E-Tendering mode only. Manual submission of bid shall not be needed.

17. LATE BIDS:

No bid shall be accepted either online by E-Tender Portal or physically in case of manual bidding process after the specified deadline for submission of bids prescribed by the purchaser.

18. MODIFICATION AND WITHDRAWAL OF BIDS:

18.1 The bidder may modify, revise or withdraw his bid after submission prior to deadline prescribed for submission of bid. If a bid is withdrawn, the same shall be archived unopened in the e-procurement portal of Bhuj Telecom District.

18.2 The bidder’s modification, revision or withdrawal shall have to be online and digitally authenticated as per clause 15.

18.3 Subject to clause 20, no bid shall be modified subsequent to the deadline for submission of bids.

19. OPENING OF BIDS BY BSNL:

19.1 The purchaser shall open bids online in the presence of bidders or their authorized representatives who chose to attend, at time specified in Clause 7 of Detailed NIT (Section-1) on due date. The bidder’s representatives, who are present, shall sign in an attendance register. Authority letter to this effect shall be submitted by the bidders before they are allowed to participate in bid opening (As per Format given in section 7(c)).

19.2 A maximum of two representatives for any bidder shall be authorized and permitted to attend the bid opening.

19.3 (i) The bids will be opened in two stages i.e. techno-commercial bid shall be opened on the date of tender opening given in NIT. The financial bid will not be opened on the date of opening of techno-commercial bids. The financial bids of those bidders who are approved to be techno-commercially compliant by the competent authority will be opened by TOC in front of techno-commercially eligible bidders/authorized representatives by sending them a suitable notice.

(ii) The bidder’s names, Item name, EMD amount & validity and acceptability, Information in respect of eligible bidders, Details of bid modification/withdrawal (if any), and such other details as the purchaser, at its discretion, may consider appropriate will be made available online at the time of techno-commercial bid opening.

(iii) The bidder’s names, Name of the Items, Quantities/prices quoted in the bid, discount, if offered, Taxes & levies and such other details as the purchaser, at its discretion, may consider appropriate will be made available online at the time of financial bid opening.

19.4 The date fixed for opening of bids, if subsequently declared as holiday by the BSNL, the revised date of schedule will be notified. However, in absence of such notification, the bids will be opened in the next working day, time and venue remaining unaltered.

20. CLARIFICATION OF BIDS:

20.1 To assist in the examination, evaluation and comparison of bids, the BSNL may, at its discretion ask the bidder for the clarification of its bid. The request for the clarification and the response shall be in writing. However, no post bid clarification at the initiative of the bidder shall be entertained.

20.2 If any of the documents, required to be submitted along with the technical bid is found wanting, the offer is liable to be rejected at that stage. However the BSNL at its discretion may call for any
clarification regarding the bid document within a stipulated time period. The BSNL at its discretion may also ask for the submission of any additional/missing document(s) within a stipulated time period. In such a case(s) the bidder shall have to comply the BSNL’s requirement within the specified time. In case of non-compliance to such queries, the bid will be out rightly rejected without entertaining further correspondence in this regard”. However, no post bid clarification at the initiative of the bidder shall be entertained.

21. **PRELIMINARY EVALUATION:**

21.1 BSNL shall evaluate the bids to determine whether they are complete, whether any computational errors have been made, whether required sureties have been furnished, whether the documents have been properly signed and whether the bids are generally in order.

21.2 Arithmetical errors shall be rectified on the following basis. If there is a discrepancy between the unit price and total price that is obtained by multiplying the unit price and quantity, the unit price shall prevail and the total price shall be corrected by the BSNL.

21.3 If there is a discrepancy between words and figures, the amount in words shall prevail. If the Supplier/Bidder does not accept the correction of the errors, his bid shall be rejected.

21.4 Prior to the detailed evaluation, pursuant to clause 22, the BSNL will determine the substantial responsiveness of each bid to the Bid documents. For purposes of these clauses, a substantially responsive bid is one which conforms, to all the terms and conditions of the Bid Documents without material deviations. The BSNL’s determination of bid’s responsiveness is to be based on the contents of the bid itself without recourse to extrinsic evidence.

21.5 A bid determined as substantially non-responsive will be rejected by the BSNL and shall not subsequent to the bid opening be made responsive by the bidder by correction of the non-conformity.

21.6 The BSNL may waive any minor infirmity or non-conformity or irregularity in a bid which does not constitute a material deviation, provided such waiver does not prejudice or affect the relative ranking of any bidder.

22. **EVALUATION AND COMPARISON OF SUBSTANTIALLY RESPONSIVE BIDS**

22.1 The Purchaser shall evaluate in detail and compare the bids previously determined to be substantially responsive pursuant to Clause 21.

22.2 The evaluation and comparison of responsive bids shall be on the percentage deviation (above/below/at par) offered and indicated in schedule of rates of the bid documents.

23. **CONTACTING THE BSNL:**

23.1 Subject to Clause 20, no bidder shall try to influence the BSNL on any matter relating to its bid, from the time of the bid opening till the time the contract is awarded.

23.2 Any effort by a bidder to modify its bid or influence the BSNL in the BSNL’s bid evaluation, bid comparison or contract award decisions shall result in the rejection of the bid.

24. **PLACEMENT OF ORDER:**

24.1 The BSNL may consider placement of orders to execute the contract on those bidders whose offers have been found technically, commercially and financially acceptable. The BSNL reserves the right to counter offer price(s) against price(s) quoted by any bidder.

The work against the tender is for one year’s requirement and the terms and conditions of this tender shall be operative for a period of one year from the date of signing of agreement between the Company and the contractor with an option of extension for a further period of one year at the same rates, terms & conditions.

**Distribution of Work:** Distribution of quantities for ordering to the selected bidders of a tender

<table>
<thead>
<tr>
<th>Table 1(A) (Without provisions for MSE Units)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>No. of Bidders to be approved (Col. 1)</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>One Bidder</td>
</tr>
<tr>
<td>Two Bidder</td>
</tr>
</tbody>
</table>
Table 1(B) (With provisions for MSME Units)

<table>
<thead>
<tr>
<th>No. of Bidders to be approved (Col. 1)</th>
<th>Quantity allotted to the respective bidder (Col. 2)</th>
<th>Qty Earmarked for MSME bidder(s)(Col. 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>L1</td>
<td>L2</td>
</tr>
<tr>
<td>One Bidder</td>
<td>80%</td>
<td>Nil</td>
</tr>
<tr>
<td>Two Bidder</td>
<td>48%</td>
<td>32%</td>
</tr>
</tbody>
</table>

1) In case L2 and MSE bidder accepts the L1 rate in prescribed time & do not submit MSD as per tender terms and conditions, the EMD will be forfeited. If MSE bidder exceeded more than one than 20% work at L1 rate distributed among them.

24.5 TERMS AND CONDITIONS FOR EDUCATIONAL ORDER

(a) 10% of the estimated quantity of work will be extended to inexperienced contractor for each Tender.
(b) Inexperienced Bidder has to apply separately for each Tender.
(c) In case there are more than one bidder, work will be distributed into the bidders
(d) The bidder shall not submit financial bid In case if the same is submitted then it will not be opened
(e) BSNL reserves a right to give any area to this bidder including that of other tender in which the bidder has not participated.
(f) The work to the inexperienced is a limited quantity (up to 2KM) in at a time further work will be done on the basis of evaluation of field unit. Additional quantity of work shall be given to such contractor only after completion of initial work.
(g) The payment for cable lying to such contractors shall be based on L1 rates finalized in the tender. The payment will be released only after verification of quantity & quality done as per the instruction mentioned in respect of work in the tender.
(h) All the other Terms & conditions will remain the same.

25. BSNL’S RIGHT TO VARY QUANTITIES AT TIME OF AWARD:

(a) BSNL reserves the right to vary up to 25% of the quantity of goods and services specified in the schedule of requirements without any change in the unit price or other terms and conditions at the time of award of contract.
(b) BSNL also reserves the right for placement of additional order or up to 50% of the additional quantities of goods and services contained in the running tender/contract in the tender at the same rate or a rate negotiated (downwardly) with the existing venders considering the reasonability of rates based on prevailing market conditions and the impact of reduction in duties and taxes etc and supplies to be obtained within delivery period scheduled afresh.

No guarantee can be given to actual quantity. The quantity mentioned in the tender is tentative only. No claim should entertained for less /not allotting the quantum of work for any reason.
(c) In exceptional situation where the requirement is of an emergent nature and it is necessary to ensure continued supplies from the existing venders, the purchaser reserves the right to place repeat order up to 100% of the quantities of goods and services contained in the running tender/contract at the same rate or a rate negotiated (downwardly) with the existing venders considering the reasonability of rates based on prevailing market conditions and the impact of reduction in duties and taxes etc. Exceptional situation and emergent nature should be spelt out clearly detailing the justification as well as benefits accrued out of it and loss incurred in case this provision is not invoked and approved by the authority competent to accord administrative and financial approval for the procurement calculated on the basis of total procurement i.e. initial and proposed add-on quantity.

26. BSNL’S RIGHT TO ACCEPT ANY BID AND TO REJECT ANY OR ALL BIDS:

The BSNL reserves the right to accept or reject any bid, and to annul the bidding process and reject all bids, at any time prior to award of contract without assigning any reason whatsoever and without thereby incurring any liability to the affected bidder or bidders on the grounds for the BSNL’s action.

27. ISSUE OF ADVANCE WORK ORDER:

27.1 The issue of an Advance Work Order (Letter of Intent) shall constitute the intention of BSNL to enter into the contract with the bidder.
27.2 The bidder shall within 14 days of issue of an advance work order, give his acceptance along with
Performance Security Deposit in conformity with section 7(B) & Material Security Deposit in
conformity with section 7(E) provided with the bid documents.

28. SIGNING OF CONTRACT:
28.1 The issue of FAT shall constitute the award of contract on the bidder.
28.2 As soon as the tender is approved by the competent authority, the Bid Security deposited by the
successful bidder may be converted into the Performance security deposit, which will be held by the
BSNL till the completion of warranty period.

29. ANNULMENT OF AWARD:
Failure of the successful bidder to comply with the requirement of Clause 27 & 28 shall constitute
sufficient ground for the annulment of the award and forfeiture of the bid security in which event the
BSNL may make the award to any other bidder at the discretion of BSNL or call for new bids.

30. N/A

31. REJECTION OF BIDS
31.1 While all the conditions specified in the Bid documents are critical and are to be complied, special
attention of bidder is invited to the following clauses of the bid documents. Non-compliance of any one of
which shall result in outright rejection of the bid.

(i) Clause 15 of Section 4 Part A: The bids will be recorded/ returned unopened if covers are not
properly sealed with ‘PERSONAL SEAL’ of the bidder.

(ii) Clauses 12.1, 12.2 & 13.1 of Section 4 Part A: The bids will be rejected at opening stage if Bid
security is not submitted as per Clauses 12.1 & 12.2 and bid validity is less than the period
prescribed in Clause 13.1 mentioned above.

(iii) Clause 2 & 10 of Section 4 Part A: If the eligibility condition as per clause 2 of Section 4 Part A is
not met and/or documents prescribed to establish the eligibility as per Clause 10 of section 4 Part A
are not enclosed, the bids will be rejected without further evaluation.

(iv) Clause 11.2 of Section 4 Part A: N/A.

(v) Section 5 Part A Commercial conditions, Section 5 Part B Special Conditions of Contract: Compliance
if given using ambiguous words like “Noted”, “Understood”, “Noted & Understood” shall not be
accepted as complied. Mere “Complied” will also be not sufficient, reference to the enclosed
documents showing compliances must be given.

(vi) Section 9 Part B Price Schedule: Prices are not filled in as prescribed in Financial Bid.

(vii) Section 4 Part A clause 9.4 on discount which is reproduced below:
“Discount, if any offered by the bidder shall not be considered unless specifically indicated in the
price schedule. Bidders desiring to offer discount shall therefore modify their offer suitably while
quoting and shall quote clearly net price taking all such factors like discount, free supply etc. into
account.”

31.2 Before outright rejection of the Bid by Bid-opening team for non-compliance of any of the
provisions mentioned in clause 31.1(i), 31.1 (ii) above the bidder company is given opportunity to
explain their position, however if the person representing the company is not satisfied with the
decision of the Bid opening team, he/they can submit the representation to Bid opening team
immediately but in no case after closing of the tender process with full justification quoting
specifically the violation of tender conditions if any.

31.3 Bid opening team will not return the bids submitted by the bidders on the date of tender opening
even if it is liable for rejection and will preserve the bids in sealed cover as submitted, by taking
signatures of some of the desirous representatives of the participating bidder/companies present on
the occasion.

31.4 The In charge of the Bid opening team will mention the number of bids with name of company
found unsuitable for further processing on the date of tender opening and number of representations
received in Bid opening Minutes and if Bid opening team is satisfied with the arguments of the
bidder/company mentioned in their representation and feel that there is prima-facie fact for
consideration, the in charge of the Bid opening team will submit the case for review to competent
authority i.e. GMTD BHUJ as early as possible preferably on next working day and decision to this
effect should be communicated to the bidder company within a week positively. Bids found liable
for rejection and kept preserved on the date of tender opening will be returned to the bidders after issue of P.O./final acceptance of tender against the instant tender.

31.5 If the reviewing officer finds it fit to open the bid of the petitioner, this should be done by giving three (working) days notice to all the participating bidders to give opportunity to desirous participants to be present on the occasion.

32. **ACTION BY PURCHASER AGAINST BIDDER(S)/ VENDOR(S) IN CASE OF DEFAULT.**

In case of default by Bidder(s)/ Vendor(s) such as
a) Does not supply the equipment / services in time;
b) Equipment / Services does not perform satisfactory in the field in accordance with the specifications;
c) Or any other default whose complete list is enclosed in Appendix-1.

Purchaser will take action as specified in Appendix-1 of this section.

33: **DELETED**

34. **NEAR-RELATIONSHIP CERTIFICATE**

34.1. The bidder should give a certificate that none of his/ her near relative, as defined below, is working in the units where he is going to apply for the tender. In case of proprietorship firm certificate will be given by the proprietor. For partnership firm certificate will be given by all the partners and in case of limited company by all the Directors of the company excluding Government of India/ Financial institution nominees and independent non-Official part time Directors appointed by Govt. of India or the Governor of the state and full time Directors of PSUs both state and central. Due to any breach of these conditions by the company or firm or any other person the tender will be cancelled and Bid Security will be forfeited at any stage whenever it is noticed and BSNL will not pay any damage to the company or firm or the concerned person.

34.2. The Company or firm or the person will also be debarred for further participation in the concerned unit.

34.3 The near relatives for this purpose are defined as:-
   (a) Members of a Hindu undivided family.
   (b) They are husband and wife.
   (c) The one is related to the other in the manner as father, mother, son(s) & Son’s wife(daughter in law), Daughter(s) and daughter's husband (son in law), brother(s) and brother's wife, sister(s) and sister's husband (brother in law).

34.4. The format of the certificate is given in Section -2(D)

35. **VERIFICATION OF DOCUMENTS AND CERTIFICATES**

The bidder will ensure that all the documents and certificates, including experience/ performance and self certificates submitted by him are correct and genuine before enclosing them in the bid. The onus of proving genuineness of the submitted documents would rest with the bidder. If any document/ paper/ certificate submitted by the participant bidder is found / discovered to be false / fabricated / tempered / manipulated either during bid evaluation or during award of contract or thereafter, then the Purchaser will take action as per Clause-1 of Appendix-1 of this section.
### Appendix-1 to Section - 4 (Part-A)

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Defaults of the bidder / vendor.</th>
<th>Action to be taken</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1(a)</td>
<td>Submitting fake / forged</td>
<td>i) Rejection of tender bid of respective Vendor.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ii) Banning of business for 3 years which implies barring further dealing with the vendor for procurement of Goods &amp; Services including participation in future tenders invited by BSNL for 3 years from date of issue of banning order.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>iii) Termination/ Short Closure of PO/WO, if issued. This implies non-acceptance of further supplies / work &amp; services except to make the already received material work/ complete work in hand.</td>
</tr>
<tr>
<td></td>
<td>a) Bank Instruments with the bid to meet terms &amp; condition of tender in respect of tender fee and/ or EMD;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b) Certificate for claiming exemption in respect of tender fee and/ or EMD;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>c) detection of default at any stage from receipt of bids till award of APO/ issue of PO/WO.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Note 1:- However, in this case the performance guarantee if alright will not be forfeited.</td>
<td></td>
</tr>
<tr>
<td>1(b)</td>
<td>Submitting fake / forged documents towards meeting eligibility criteria such as experience capability, supply proof, registration with Sales Tax, Income Tax departments etc and as supporting documents towards other terms &amp; conditions with the bid to meet terms &amp; condition of tender :</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(i) If detection of default is prior to award of APO</td>
<td>i) Rejection of Bid &amp; ii) Forfeiture of EMD.</td>
</tr>
<tr>
<td></td>
<td>(ii) If detection of default after issue of APO but before receipt of PG/ SD (DD,BG etc.)</td>
<td>i) Cancellation of APO , ii) Rejection of Bid &amp; iii) Forfeiture of EMD.</td>
</tr>
<tr>
<td></td>
<td>(iii) If detection of default after receipt of PG/ SD (DD,BG etc.)</td>
<td>i) Cancellation of APO ii) Rejection of Bid &amp; iii) Forfeiture of EMD. However on realization of PG/ SD amount, EMD, if not already released shall be returned.</td>
</tr>
<tr>
<td></td>
<td>(iv) If detection of default after issue of PO/ WO</td>
<td>i) Termination/ Short Closure of PO/WO and Cancellation of APO ii) Rejection of Bid &amp; iii) Forfeiture of PG/ SD. However on realization of PG/ SD amount, EMD, if not released shall be returned.</td>
</tr>
<tr>
<td></td>
<td>Note 3:- However, settle bills for the material received in correct quantity and quality if pending items do not affect working or use of supplied items.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Note 4:- No further supplies are to be accepted except that required to make the already supplied items work.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Special Note 1:- Authority competent to take final decision: GMTD Bhuj</td>
<td></td>
</tr>
</tbody>
</table>

2 If vendor or his representative uses violent/ coercive means viz. Physical / Verbal means to threatens BSNL Executive / employees and/ or obstruct him from functioning in discharge of his duties & responsibilities for the following |
<p>|        | a) Obstructing functioning of tender opening executives of BSNL in receipt/ opening of tender bids from prospective Bidders, suppliers/ Contractors. |
|        | Banning of business for 3 years which implies Barring further dealing with the vendor for procurement of Goods &amp; Services including participation in future tenders invited by BSNL for 3 years from date of issue of banning order. |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>b) Obstructing/ Threatening other prospective bidders i.e. suppliers/ Contractors from entering the tender venue and/ or submitting their tender bid freely.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Special Note 1:</strong> Authority competent to take final decision: GMTD Bhuj</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Non-receipt of acceptance of APO/ AWO and SD/PG by L-1 bidder within time period specified in APO/ AWO.</td>
<td>Forfeiture of EMD.</td>
</tr>
<tr>
<td><strong>Special Note 1:</strong> Authority competent to take final decision: GMTD Bhuj</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 4.1 | Failure to supply and/ or Commission the equipment and /or execution of the work at all even in extended delivery schedules, if granted against PO/ WO. | i) Termination of PO/ WO.  
ii) Under take purchase/ work at the risk & cost of defaulting vendor.  
iii) Recover the excess charges if incurred from the PG/ SD and outstanding bills of the defaulting Vendor. |
|   |   |   |
| 4.2 | Failure to supply and/ or Commission the equipment and /or execution of the Work in full even in extended delivery schedules, if granted against PO/ WO. | i) Short Closure of PO/ WO to the quantity already received by and/ or commissioned in BSNL and/ or in pipeline provided the same is usable and/or the Vendor promises to make it usable.  
ii) Under take purchase/ work for balance quantity at the risk & cost of defaulting vendor.  
iii) Recover the excess charges if incurred from the PG/ SD and outstanding bills of the defaulting Vendor. |
| **Special Note 1:** Authority competent to take final decision for 4.1 & 4.2 by DGM |   |   |
| 5.1 | The supplied equipment does not perform satisfactory in the field in accordance with the specifications mentioned in the PO/ WO/Contract. | i) If the material is not at all acceptable, then return the non-acceptable material (or its part) & recover its cost, if paid, from the o/s bills/ PG/ SD.  
OR  
ii) If the material is inducted in network & it is not possible to return it and/ or material is acceptable with degraded performance, the purchaser may determine the price for degraded equipment (Financial penalty = Price – price determined for degraded equipment) himself and/ or through a committee.  
Undertake recovery of financial penalty from outstanding dues of vendor including PG/ SD. |
|   |   |   |
| 5.2 | Major quality problems (as established by a joint team / committee of User unit(s) and QA Circle) / performance problems and non-rectification of defects (based on reports of field units and QA circle). | i) If the material is not at all acceptable, then return the non-acceptable material (or its part) & recover its cost, if paid, from the o/s bills/ PG/ SD;  
OR  
ii) If the material is inducted in network & it is not possible to return it and/ or material is acceptable with degraded performance, the purchaser may determine the price for degraded equipment (Financial penalty = Price – price determined for degraded equipment) himself and/ or through a committee.  
Undertake recovery of financial penalty from outstanding dues of vendor including PG/ SD; and  
iii) Withdrawal of TSEC/ IA issued by QA Circle. |
| **Special Note 1:** Authority competent to take final decision for 5.1 & 5.2 by DGM |   |   |
| 6 | Submission of claims to BSNL against a contract (a) for amount already paid by BSNL | i) Recovery of over payment from the outstanding dues of Vendor including EMD/ PG & SD etc. and by invoking ‘Set off’ clause 18 of Section 5 Part A or by any other legal |
(b) for Quantity in excess of that supplied by Vendor to BSNL.

c) for unit rate and/or amount higher than that approved by BSNL for that purchase.

tenable manner.

ii) Banning of Business for 3 years from date of issue of banning order or till the date of recovery of over payment in full, whichever is later.

Note 5: The claims may be submitted with or without collusion of BSNL Executive/employees.

Note 6: This penalty will be imposed irrespective of the fact that payment is disbursed by BSNL or not.

Special Note 1: Authority competent to take final decision: GMTD Bhuj

7 Network Security/Safety/Privacy: If the vendor tampers with the hardware, software/firmware or in any other way that

a) Adversely affects the normal working of BSNL equipment(s) and/or any other TSP through BSNL.

b) Disrupts/Sabotages functioning of the BSNL network equipments such as exchanges, BTS, BSC/MSC, Control equipment including IN etc., transmission equipments but not limited to these elements and/or any other TSP through BSNL.

c) tampers with the billing related data/invoicing/account of the Customer/User(s) of BSNL and/or any other TSP(s).

d) hacks the account of BSNL Customer for unauthorized use i.e. to threaten others/spread improper news etc.

e) undertakes any action that affects/endangers the security of India.

Special Note 1: Authority competent to take final decision GMTD Bhuj

8 If the vendor is declared bankrupt or insolvent or its financial position has become unsound and in case of a limited company, if it is wound up or it is liquidated.

i) Termination of PO/WO.

ii) Banning of Business for 3 years which implies barring further dealing with the vendor for procurement of Goods & Services including participation in future tenders invited by BSNL for 3 years from date of issue of banning order.

iii) Recovery of any loss incurred on this account from the Vendor from its PG/SD/O/s bills etc.

iv) Legal action will be initiated by BSNL against the Vendor if required.

Special Note 1: Authority competent to take final decision GMTD Bhuj
| 9 | In the event of the vendor, its proprietor, Director(s), partner(s) is / are convicted by a Court of Law following prosecution for offences involving moral turpitude in relation to the business dealings. | i) Termination/Short Closure of the PO/ WO.
ii) Settle bills for the material received in correct quantity and quality if pending items do not affect working or use of supplied items.
iii) No further supplies are to be accepted except that required to make the already supplied items work.
iv) In case of turnkey projects, If the material is commissioned and is usable without any degradation of performance, then settle bills for the acceptable equipment/ material (or its part).
v) In case of turnkey projects, If the material is inducted in network & it is not possible to return it and/ or material is acceptable with degraded performance, the purchaser may determine the price for degraded equipment (Financial penalty = Price – price determined for degraded equipment) himself and/ or through a committee.
Undertake recovery of financial penalty from outstanding dues of vendor including PG/ SD. |
| Special Note 1:-- Authority competent to take final decision GMTD Bhuj |
| 10 | If the vendor does not return/ refuses to return BSNL’s dues: | i) Take action to appoint Arbitrator to adjudicate the dispute.

a) in spite of order of Arbitrator. | i) Termination of contract, if any.
ii) Banning of business for 3 years which implies barring further dealing with the vendor for procurement of Goods & Services including participation in future tenders invited by BSNL from date of issue of banning order or till the date by which vendor clears the BSNL’s dues, whichever is later.
iii) Take legal recourse i.e. filing recovery suite in appropriate court. |
| b) in spite of Court Orders. | i) Termination of contract, if any.
ii) Banning of business for 3 years which implies barring further dealing with the vendor for procurement of Goods & Services including participation in future tenders invited by BSNL from date of issue of banning order or till the date by which vendor clears the BSNL’s dues, whichever is later. |
<p>| Special Note 1:-- Authority competent to take final decision GMTD Bhuj |
| 11 | If the Central Bureau of Investigation/ Independent External Monitor (IEM) / Income Tax/ Sales Tax/ Excise / Custom Departments recommends such a course | Take Action as per the directions of CBI or concerned department. |
| Special Note 1:-- Authority competent to take final decision GMTD Bhuj |
| 12 | The following cases may also be considered for Banning of business: | i) Banning of business for 3 years which implies Barring further dealing with the vendor for procurement of Goods &amp; Services including participation in future tenders invited by BSNL for 3 years from date of issue of banning order. |
| (a) If there is strong justification for believing that the proprietor, manager, MD, Director, partner, employee or representative of the vendor/ supplier has been guilty of malpractices such as bribery, corruption, fraud, substitution of tenders, interpolation, misrepresentation with respect to the contract in question. | |
| (b) If the vendor/ supplier fails to execute a contract or fails to execute it satisfactorily beyond the provisions of Para 4.1 &amp; 4.2. | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(c)</td>
<td>If the vendor/ supplier fails to submit required documents/ information, where required.</td>
</tr>
<tr>
<td>(d)</td>
<td>Any other ground which in the opinion of BSNL is just and proper to order for banning of business dealing with a vendor/ supplier.</td>
</tr>
</tbody>
</table>

**Special Note 1:** Authority competent to take final decision GMTD Bhuj

13 **Circumstances for rescission of contract**

- **a)** If the contractor commits breach of any item of terms and conditions of the contract.
- **b)** If the contractor suspends or abandons the execution of work completely in contract and SSA head comes to conclusion that works awarded to contractor could not be completed by due date for completion or the contractor had already failed to complete the work by that date.
- **c)** If the contractor had been given by the officer-in-charge of work a notice in writing to rectify/replace any defective work and he/she fails to comply with the requirement within the specified period.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>i)</td>
<td>Termination of contract, if any.</td>
</tr>
<tr>
<td>ii)</td>
<td>Banning of business for 3 years which implies barring further dealing with the vendor for procurement of Goods &amp; Services including participation in future tenders invited by BSNL from date of issue of banning order or till the date by which vendor clears the BSNL’s dues, whichever is later.</td>
</tr>
</tbody>
</table>

**Special Note 1:** Authority competent to take final decision GMTD Bhuj

**Note 7:** The above penalties will be imposed provided it does not clash with the provision of the respective tender.

**Note 8:** In case of clash between these guidelines & provision of invited tender, the provision in the respective tender shall prevail over these guidelines.

**Note 9:** Banning of Business dealing order shall not have any effect on the existing/ ongoing works/ AMC / CAMC which will continue along with settlement of Bills.
SECTION- 4(Part-B)
E-tendering Instructions to Bidders

General
These Special Instructions (for e-Tendering) supplement 'Instruction to Bidders', as enclosed in Sec 4 Part A of the tender Documents. Submission of Bids only through online process is mandatory for this tender.

E-Tendering is a new methodology for conducting Public Procurement in a transparent and secured manner. Suppliers/ Vendors will be the biggest beneficiaries of this new system of procurement For conducting electronic tendering, BSNL Bhuj Telecom District is using the portal https://eprocurement.synise.com/bsnl1/gujarat

1. Tender Bidding Methodology:
   Sealed Bid System – Single Stage – Two Envelopes’,
   Followed by 'e-Reverse Auction' (if required by Business Unit / Planning cell) after opening of the Financial bids. In case of two envelope system Financial & Techno-commercial bids shall be submitted by the bidder at the same time.

2. Broad outline of activities from Bidders prospective:
   Procure a Digital Signing Certificate (DSC) Class 2 or above
   a) Register on Electronic Tendering System® (ETS) on e-procurement portal of Bhuj Telecom District.
   b) Create Users and assign roles on ETS
   c) View Notice Inviting Tender (NIT) on ETS
   d) Download Official Copy of Tender Documents from ETS
   e) Clarification to Tender Documents on ETS
   f) Query to BSNL (Optional)
   g) View response to queries posted by BSNL, as addenda
   h) Bid-Submission on ETS
   i) Attend Public Online Tender Opening Event (TOE) on ETS Opening of Techno-commercial Part
   j) View Post-TOE Clarification posted by BSNL on ETS (Optional) Respond to BSNL's Post TOE queries
   k) Attend Public Online Tender Opening Event (TOE) on ETS Opening of Financial-Part (Only for Technical Responsive Bidders)
   l) Participate in e-Reverse Auction on ETS if applicable
   For participating in this TENDER online, the following instructions need to be read carefully. These instructions are supplemented with more detailed guidelines on the relevant screens of the ETS.

3. Digital Certificates
   For integrity of data and its authenticity/ non-repudiation of electronic records, and be compliant with IT Act 2000, it is necessary for each user to have a Digital Certificate (DC). 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].

4. Registration
   To use the Electronic Tender® portal https://eprocurement.synise.com/bsnl1/gujarat vendor needs to register on the portal. Registration of each 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 the website/portal, https://eprocurement.synise.com/bsnl1/gujarat (on the Home Page), and follow further instructions as given on the site.
   Pay Annual Registration Fee as applicable.

Note: After successful submission of Registration details and Annual Registration Fee (as applicable). Please contact e-Procurement Technologies Ltd. Helpdesk (as given below), to get your registration epted/activated.

M/s Synise Helpdesk Contact Details
Contact Person: Indrajeet, Ashok
Email : helpdesk@synise.com
Telephone Nos: +91 020-30277517,516, 522
Mobile nos.: 7774013248, 7774013247,
[between 10:00 hrs. to 18:00 hrs on working days Monday To Saturday ]
BSNL Contact:

<table>
<thead>
<tr>
<th>BSNL Contact - 1</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>BSNL's Contact Person</td>
<td>Shri B J Bharwani</td>
</tr>
<tr>
<td>Telephone/ Mobile</td>
<td>02832 - 231381</td>
</tr>
<tr>
<td>[between 10:30 hrs to 17:00 hrs on working days]</td>
<td></td>
</tr>
<tr>
<td>E-mail ID</td>
<td><a href="mailto:bharwanibj@gmail.com">bharwanibj@gmail.com</a></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BSNL Contact - 2</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>BSNL's Contact Person</td>
<td>Shri. Lalit Kumar</td>
</tr>
<tr>
<td>Telephone/ Mobile</td>
<td>02832 - 231653</td>
</tr>
<tr>
<td>[between 10:30 hrs to 17:00 hrs on working days]</td>
<td></td>
</tr>
<tr>
<td>E-mail ID</td>
<td><a href="mailto:sdemmbhuj@gmail.com">sdemmbhuj@gmail.com</a></td>
</tr>
</tbody>
</table>

5. **Bid related Information for this tender (Sealed Bid)**

The entire bid-submission would be online on e-procurement portal of Gujarat Circle.

Broad outline of submissions are as follows:

- Submission of Bid Security/ Earnest Money Deposit (EMD)
- Submission of digitally signed copy of TENDER Documents/ Addendum/addenda
- Two Envelopes
  - Techno-commercial – Part
  - Financial-Part

Each of the above electronic envelopes consists of Main bid and Electronic form (both mandatory) and bid Annexure (Optional).

NOTE: Bidder must ensure that after following above the status of bid submission must become “Complete”

6. **Offline Submissions:**

The bidder is requested to submit the following documents offline to A.G.M. (PLG), O/o. G.M.T.D. Haripar Road, Bhuj - 370001 on or before the date & time of submission of bids specified in covering letter of this tender document, in a Sealed Envelope. The envelope shall bear (name of the work), the tender number and the words 'DO NOT OPEN BEFORE’ (due date & time).

1. EMD-Bid Security in Original.
2. DD/ Bankers cheque drawn in favour of AO(Cash), BSNL, O/o GMTD, Bhuj, payable at Bhuj against payment of tender fee.
3. Power of attorney in accordance with clause 14.3 of Section 4 Part A
4. Latest and valid MSME / NSIC Certificate (if applicable)

7. **Special Note on Security of Bids**

Security related functionality has been rigorously implemented in e-procurement portal 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. Security related aspects as regard Bid Submission 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 Bidder himself. Unlike a 'password', a Pass-Phrase can be a multi-word sentence with spaces between words (e.g. 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. This method of bid-encryption does not have the security and data- integrity related vulnerabilities which are inherent in e-tendering systems which use Public-Key of the specified officer of a Buyer organization for bid-encryption. Bid- encryption in ETS is such that the Bids cannot be decrypted before the Public Online Tender Opening Event (TOE), even if there is connivance between the concerned tender opening officers of the Buyer organization and the personnel of e-tendering service provider.

Typically, 'Pass-Phrase' of the Bid-Part to be opened during a particular Public Online Tender Opening Event (TOE) is furnished online by each bidder during the TOE itself, when demanded by the concerned Tender Opening Officers who will open the bid. Else Tender Opening Officer may authorize the bidder to open his bid himself.
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.

8. Public Online Tender Opening Event (TOE)
ETS offers a unique facility for 'Public Online Tender Opening Event (TOE)'. TENDER Opening Officers as well as authorized representatives of bidders can attend the Public Online Tender Opening Event (TOE) from the comfort of their offices. For this purpose, representatives of bidders (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 'Public Online 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 bidder himself (during the TOE itself), salient points of the Bids are simultaneously made available for downloading by all participating bidders. The work of taking notes during a manual 'Tender Opening Event' is therefore replaced with this superior and convenient form of 'Public Online 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 the Buyer for each TENDER. The information in the Comparison Chart is based on the data submitted by the Bidders in electronic forms. 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 bidders for 'Viewing/ Downloading'.

There are many more facilities and features on ETS. For a particular Tender, the screens viewed by a Supplier will depend upon the options selected by the concerned Buyer.

NOTE: In case of internet related problem at a bidder's end, especially during 'critical events' such as- a short period before bid-submission deadline, during online public tender opening event, during e-auction, it is the bidder's responsibility to have backup internet connections. In case there is a problem at the e-procurement/ e-auction service- provider's end (in the server, leased line, etc) due to which all the bidders face a problem during critical events, and this is brought to the notice of BSNL by the bidders in time, then BSNL will promptly re-schedule the affected event(s).

9. Clause Deleted

10. Other Instructions
For further instructions, the vendor should visit the home-page of the portal https://eprocurement.synise.com/bsnl1/gujarat 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.
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 BIDDERS' must be assiduously adhered to:

1. Obtain individual Digital Signing Certificate (DSC or DC) well in advance of your first tender submission deadline on ETS.
2. Register your organization on ETS well in advance of your first tender submission deadline on ETS
3. Get your organization's concerned executives trained on ETS well in advance of your first tender submission deadline on ETS
4. Submit your bids well in advance of tender submission deadline on ETS as 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.

11. Minimum Requirements at Bidders end
- Computer System with good configuration (Min P IV, 1 GB RAM, Windows XP)
- Broadband connectivity.
- Microsoft Internet Explorer 6.0 or above
- Digital Certificate(s) for users.
12. **Vendors Training Program**

One day training (10:00 to 17:00) would be provided. Training is optional. Vendors may please send their request for training to AGM (MM) O/o. G.M.T.D. Haripar Road, Bhuj - 370001 by Email. Vendors are requested to carry a Laptop and Wireless Connectivity to Internet.

<table>
<thead>
<tr>
<th>Tentative Dates</th>
<th>Date of uploading of Tender document + 7 days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Venue</td>
<td>O/o G.M.T.D. Haripar Road, Bhuj 370001</td>
</tr>
<tr>
<td>Vendors Training Charges (Per Participant) per training day</td>
<td>Rs. 5000/- <em>(Including Service Tax)</em></td>
</tr>
<tr>
<td>Mode of Payment of Fees</td>
<td>DD drawn in favour of <em>M/s Synise Technologies Ltd.</em></td>
</tr>
</tbody>
</table>
SECTION – 5 (Part-A)

GENERAL (COMMERCIAL) CONDITIONS OF THE CONTRACT (GCC)

1. **APPLICATION:**
The General conditions shall apply in contracts made by the BSNL for the execution of cable construction works.

2. **STANDARDS:**
The works to be executed under the contract shall conform to the standards prescribed in the Optical Fiber Cable construction practices.

3. **PRICES:**
Prices charged by the Contractor for the works performed under the contract shall not be higher from the price quoted by the Contractor in his Bid.

Price once fixed will remain valid for the period of contract. Increase and decrease of taxes/duties will not affect the price during this period. However Service tax as applicable will be paid extra.

4. **SUBCONTRACT:**
The Contractor shall not assign, sub contract or subject the whole or any part of the works covered by the contract, under any circumstances.

5. **SECURITY:**

**Material Security**

a. The successful tenderer will have to deposit Material Security as mentioned in the Scope of Work, subject to a minimum of Rs. 2 Lakhs in the form of Bank Guarantee (valid up to and including six months after, the period of the contract from a Nationalized /scheduled bank and in the Material Security bond form provided in the bid document, Section-7 (E). Material Security can also be submitted in the form of Crossed Demand Draft drawn in favour of Accounts Officer (Cash) O/o. G.M.T.D. Bhuj, a non interest bearing deposit, for any period what so ever.

b. The contractor at any point of time will not be issued stores costing more than Material Security. If due to any reason more store has to be issued to the contractor than the Material Security will be suitably enhanced accordingly. In this regard the decision of the (GMTD BHUJ) shall be final and binding.

c. The proceeds of the Material Security shall be payable to the department as a compensation for any loss resulting from the contractor’s failure to handle properly the material issued to the him under the contract.

d. The Material Security shall be released/refunded within a fortnight from the date of the payment of the last final bill of the work under the contract or final settlement of material account whichever is later on production of "no dues certificate" from “Engineer- in-charge”

**PERFORMANCE SECURITY:**

a. All suppliers (including MSEs who are registered with the designated MSME bodies, like National Small Scale Industries Corporation etc.) shall furnish performance security to the BSNL for an amount equal to 5% of the value of Advance work order within 14 days from the date of issue of Advance Work Order by the BSNL.

b. The proceeds of the performance security shall be payable to the BSNL as compensation for any loss resulting from the contractor's failure to complete its obligations under the contract.
c. The performance security deposit shall be refunded after expiry of warranty period of last work executed provided there are no recoveries to be made arising out of poor quality of work, incomplete work and/or violation of any terms and conditions of the contract as stipulated in the bid document.
d. No interest will be paid to the contractor on the security deposit.

6. ISSUES OF WORK ORDER (ERP P.O.) AND TIME LIMIT:

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>6.1</td>
<td>ERP PO (work orders)</td>
<td>Shall be issued by the DE/AGM on approval of DGM after examining the technical and planning details of the works to be executed.</td>
</tr>
<tr>
<td>6.2</td>
<td>Time limit for work execution</td>
<td>DE/AGM shall mention the time limit to execute the work order after seeing the quantum of work and store availability position.</td>
</tr>
<tr>
<td>6.3</td>
<td>Cancel or modify the scope of work</td>
<td>To cancel or modify the scope of work stipulated to be carried out against the work order in the event of change of plan necessitated on account of technical reasons or in the opinion of work order issuing authority on approval of DGM concerned the contractor is not executing the work at the required pace.</td>
</tr>
</tbody>
</table>

7. EXTENSION OF THE TIME UNIT:

7.1 General

7.1.1. In each work order, the work order issuing authority shall specify the time allowed for completion of work consistent with the magnitude and urgency of work. The time allowed for carrying out the work is to be strictly observed by the contractor and shall be reckoned from seventh day from the date of issue of work order.

7.1.2 In as much as "the time being deemed to be the essence of contract", throughout the stipulated period of contract, the work is to be proceeded with all due diligence on the part of the contractor.

7.2 Application for extension of the time and sanction of Extension of time (EOT)

7.2.1 There may be some hindrances, other than covered under force majors, while execution of work and in such cases the contractor shall apply in writing in the prescribed Form (Part-A) to the engineer-in-charge for extension of time (EOT), on account of which he desires such extension within three days of occurrence of hindrance. The Engineer-in-charge shall forward the request to the competent authority (an officer of the rank of DGM level in-charge of cable construction work) with his detailed report, in the prescribed Form (Part-B) within three days of receipt of request from the contractor. The competent authority is empowered to grant extension of time for completion of work on certain conditions. He shall exercise such powers, if the following conditions are satisfied.

7.2.1.1 The application contains the ground(s) which hindered the contractor in execution of work.

7.2.1.2 The Engineer-in-charge is of the opinion that the grounds shown for extension of time are reasonable.

7.2.2 The competent authority shall consider the request keeping all the facts and circumstances in view and shall grant extension of time, If In his opinion, there are reasonable and sufficient grounds for granting such extension and the reasons for delay are not ascribable to the contractor.

7.2.3 The competent authority may also grant extension of time for completion of work in cases where reasons for delay are ascribable to the contractor, but such extension of time shall be with LD charges as per clause dealing with penalty for delays in execution of works. The extension of time with LD charges shall be issued under the signature of DGM level Telecom Officer competent to grant the extension of time.

7.2.4 The competent authority shall grant EOT with time period for completion of work expressly mentioned. The sanction of the competent authority of EOT shall be issued under the signature of Engineer in charge.

7.2.5 If the competent authority is of the opinion that the grounds shown by the contractors are not reasonable and sufficient and declines to grant the extension of time, the contractor cannot challenge the soundness of the opinion by reference to arbitration. The decision of the competent authority on period of extension of time or refusal for extension of time shall be final & binding on the contractor.
7.3 GRANT OF EXTENSION OF TIME WITHOUT APPLICATION:
There are at times practical difficulties like non-availability of material, delay in providing permission / right of way etc. reasons of which are ascribable to the BSNL. In such cases, the Engineer-in-charge with the approval of competent authority (DGM) to sanction EOT may issue extension of time suo moto without waiting for contractor to make an application for EOT. The BSNL will, however, not be liable to the contractor for any losses or damages, costs, charges, or expenses that the contractor may in any way sustain/suffer due to delay in making the above available.

8 MEASUREMENT, INSPECTION, TESTING AND ACCEPTANCE TESTING:
8.1 Measurement:
8.1.1 The measurement books are to be maintained by the officer in-charge of the work or his immediate engineering subordinate not below the rank of Junior Telecom Officer. The entry shall be made in ink. No entry shall be erased. If a mistake is made, it should be corrected by en-marking circle the incorrect words or figures and inserting the corrections, the corrections thus made shall be initialed & dated by the officer concerned.

8.1.2 Responsibility of taking and recording measurements: The measurement of various items of work shall be taken and recorded in the measurement book. The Officer directly responsible for supervision of work, shall be responsible for accuracy of 100% of measurements. The Sub Divisional Engineer where junior Telecom Officer is supervising officer shall be responsible for conducting test check of 20% of measurements. The Divisional Engineer shall be responsible for conducting test check of 10% of measurements.

8.1.3 Method of recording of nomenclature of items: Complete nomenclature of items, as given in the agreement need not be reproduced in the measurement book for recording the measurements but corresponding Item Code as provided, shall be used.

8.1.4 Method of measurements: The measurements of the work shall be done for activity wise as and when the item of work is ready for measurement. The methods of measurement of various items are enumerated as under:
- Measurement of depth of trenches

The cable routes of one work order shall be divided into a number of segments each of maximum 100 meters length bounded by identifiable landmarks at both the ends of the segments. If landmarks are not available, length of segment may be maintained at 100 meters. One segment shall cover only one type of trench. The measurement of depth shall be recorded at each point of measurement (POM) in the measurement book in meters up to two decimal points. For example, 97 cms. depth shall be records as 0.97 m. The points of measurements shall be at a distance of 10 meters starting from 0 (Zero) Meter. For example, if the length of segments is 75 meters, the POMs shall be at 0M, 10M, 20M, 30M, 40M, 50M, 60M, 70M. The last POM shall be at 75th M to be recorded against Residual POM. For each segment average dept shall be worked out by dividing the total depth by number of POMs. The measurements of depth shall be recorded in measurement book.

The efforts required to excavate trenches is not proportionate especially with reference to depth. Therefore, normally the workers tend to dig shallow trenches. As standard depth of the trench is important for future life and protection of cables, this tendency has to be discouraged. In order to encourage the contractor to achieve best possible depth in the face of site constraints, the following scale of payment shall be applied for digging trenches of lesser depths, subject to condition that relaxation has been granted by the competent authority for lesser depths.

<table>
<thead>
<tr>
<th>Depth between</th>
<th>Reduction in rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;165 Cms. to ≥150 Cms.</td>
<td>5%</td>
</tr>
<tr>
<td>&lt;150 Cms. to ≥130 Cms.</td>
<td>12.5% of approved rates.</td>
</tr>
<tr>
<td>&lt;130 Cms. to ≥100 Cms.</td>
<td>25% of approved rates.</td>
</tr>
<tr>
<td>Below 100 Cms.</td>
<td>40% of approved rates</td>
</tr>
</tbody>
</table>
If the area is predominantly rocky or full of hindrances or there is difficulty in getting permissions from PWD or local agencies involved resulting in difficulty to achieve full depth or for full section/route, it is suggested to call for tenderer for curtailed depth of 140/120 cms. of trench. The rate reduction schedule is given below:

**DEPTH OF TRENCH 140 cms.**

<table>
<thead>
<tr>
<th>Depth between</th>
<th>Reduction in rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;140 Cms. to ≥125 Cms.</td>
<td>5%</td>
</tr>
<tr>
<td>&lt;125 Cms. to ≥105 Cms.</td>
<td>15% of approved rates.</td>
</tr>
<tr>
<td>Below 105 Cms.</td>
<td>40% of approved rates</td>
</tr>
</tbody>
</table>

**DEPTH OF TRENCH 120 cms.**

<table>
<thead>
<tr>
<th>Depth between</th>
<th>Reduction in rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;120 Cms. to ≥105 Cms.</td>
<td>5%</td>
</tr>
<tr>
<td>Below 105 Cms.</td>
<td>40% of approved rates</td>
</tr>
</tbody>
</table>

The payment for subnormal depth will be calculated as per formulae given below:

\[ P = (100 - ROR) \times RA \times D / ND \]

- **P** = Payment for one meter
- **ROR** = Reduction in rate in % as given above
- **RA** = Approved rate of trenching per meter
- **D** = Actual depth in cms.
- **ND** = Nominal depth of trench 165/140/120 cms. for which the tender has been floated.

- **Measurement of Length and profiles of strata and protection**
  The measurements of length of trenches are on running meter basis for particular category of surface strata viz. non-surfaced strata and surfaced strata irrespective of type of soil encountered while digging.
  The length of trenches dug indifferent strata in a segment shall be measured and recorded item code-wise in the measurement book. The segment length from POMs and total of item code-wise length should match.
  The type of protection provided (item code-wise) in a segment shall be recorded in the measurement book in the sheet provided for this purpose.

- **Measurement of length of cable:**
  The length of cables laid in trenches, through pipes and through ducts shall be measured by use of RODO Meter/Measuring Tape. The length should be cross verified with the marking of lengths on the cables. The lengths shall be recorded in sheet provided in the measurement book.

- **Measurement of other :-**
  items the measurement/numerical details of other items shall be recorded in the sheets provided for respective items viz.

  - Digging of joint pit and preparation of joint chambers along with its type i.e. Brick chamber or Pre Cast RCC type.
  - Fixing, Painting and sign writing of route/joint indicators.
  - Termination of Cable in equipment room and no. of joints

8.1.5 The contractor shall sign all the measurement recorded in the measurement book. This will be considered as an acceptance by the contractor, of measurements recorded in the MB. In case
contractor fails to attend at the measurements or fails to countersign or to record the difference with in a week, than in any such events the measurements taken by Engineer-in-charge or by the subordinate as the case may be shall be final and binding on the contractor and the contractor shall have no right to dispute the same.

8.1.6 The Divisional Engineer before passing the bill for sections covered by each set of measurement may carry out test check by re-opening trench at as many locations as necessary as specified in document procedures for underground cable construction and bills will be passed only when he is personally satisfied of the correctness of entries in the “measurement Book” and also when he is satisfied of other aspects of the work as per the terms of the contract. The contractor shall provide the necessary assistance of labour for re-opening of trench for test check by the Divisional Engineer. Separate payment shall not be made to the contractor for excavation of such test checks; however such test pits shall not be more than 10% of the cable laying work.

8.1.7 Measurement of the work of cable pulling through pipe/duct will be taken equal to the length of the pipe/duct through which the cable has been pulled and not the total length of the cable pulled through pipe/duct.

8.1.8 Deleted.

8.2 Inspection, and Quality Control:

8.2.1 The Quality of Works: The importance of quality of Optical Fiber cable Construction works cannot be over-emphasized. The quality of Telecom Service largely depends on the network of which Optical Fiber cable Component covers the major portion. The Optical Fiber cables are vulnerable to damages due to work of other agencies.

8.2.2 The quality of Optical Fiber cable network depends upon the quality of individual items of work involved viz Depth of Cables laid, care while paving & laying, Protection, Jointing of Cables and Termination at last but not the least on documentation of cable network. In order to ensure quality in Cable Construction Work, each component of work needs attention. The works shall be carried out strictly in accordance with specifications laid down to achieve the requisite quality aim.

8.2.3 It is imperative that the contractor(s) is/are fully conversant with the construction practices and shall be fully equipped to carry out the work in accordance with the specifications. The contractors are expected and bound to ensure quality in construction works in accordance with specifications laid down. The contractor shall engage adequate and experienced supervisors to ensure that works are carried out as per specifications and with due diligence and in a professional; manner. The contractors shall satisfy himself/themselves that the work conforms to the quality specifications before offering the same to A.T. Office Wing for Acceptance and Testing.

8.2.4 An assessment of extent of interest shown by the contractors in executing the works, with requisite quality shall be recorded and used in evaluating the Contractor’s Performance Rating (CPR).

8.2.5 In addition to Acceptance Testing being carried out by A.T. Wing and supervision by Construction Officers, all works at all times shall be open to inspection of the BSNL. The contractors shall be bound, if called upon to do so to offer the works for inspection without any extra payment.

8.2.6 Deleted

8.3 Testing and Acceptance Testing:

8.3.1 The work shall be deemed to have been completed only after the same has been accepted by the A.T. Officer. However, the date of actual completion for the purpose of PO shall be the date of actual physical completion of work. The contractor shall make test pits at the locations desired by A.T. Office for conducting test checks without any extra payment. The contractor shall restore the
pits after test measurements to its original shape. The contractor shall be responsible to provide test/measurement tools and testers for conducting various tests.

8.3.2 **Scope of Acceptance and Testing**: The purpose of acceptance and testing is to verify integrity of measurement and quality of work done. The A.T. Officer shall not be responsible for recording of measurements for the purpose of billing and contractual obligations. However, if the measurements taken by A.T. Officer are found to be lesser than the measurements recorded by the officer responsible for recording the measurements, the measurements taken by A.T. Officer shall prevail without prejudice to any punitive action against the contractor as per provisions of the contract and the officer recording the measurement. The contractor shall be obligated to remove defects/deficiencies pointed out by the A.T. Officer without any additional cost to the BSNL.

8.3.3 **Offering the work for acceptance and testing**: The Sub Divisional Engineer responsible for construction, after having satisfied himself of completion of work ready for A.T., shall offer the work to A.T. Officer for conducting Acceptance and Testing. The work shall be offered for A.T. as soon as work of primary cable from MDF to Pillar or works of distribution cable form Pillar to DPs are completed in all respects. The work against any work order can be offered for A.T. in number of such stages.

8.3.4 The contractor shall provide labour, if demanded by the A./T officer for digging of test pits and other necessary infrastructure for carrying out the A/T work, No extra payment will be made for the digging of test pit.

9. **WARRANTY :**

9.1 The contractor shall warrant that the material supplied for the work shall be new and free from all defects and faults in material, 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 equipment, inadequate quantity of materials etc. and shall remedy such defects at his own cost when called upon to do so by the BSNL who shall state in writing in what respect the stores are faulty. This warranty shall survive inspection or payment for, and acceptance of goods, but shall expire except in respect of complaints notified prior to such date, twelve months after the acceptance testing.

9.2 If it becomes necessary for the contractor to replace or renew any defective portion/portions of the material under this clause, the provisions of the clause shall apply to the portion / portions material so replaced or renewed or until the end of the above mentioned period of twelve months, whichever may be later. If any defect is not remedied within a reasonable time, as prescribed by the BSNL, the BSNL may proceed to do the work at the contractor’s risk and costs, but without prejudice to any other rights which the BSNL may have against the contractor in respect of such defects.

9.3 The **Cable joint shall be guaranteed for a period of ONE year from the date of closing of joint.** In case of failure of the joint die to poor workmanship i.e. failure of joint without external damage, with in the stipulated period of guarantee the contractor shall repair the joint(s) at his own cost within 24 hours of informing him, **failing which the department may carry out the repairs and penalty equivalent to five times of the approved rate of the joining work** plus the cost of materials used shall be recovered from the contractor from his pending bill/SD or any amount due to him without prejudice to any other action as per terms and conditions of the tender. The cost of jointing kit, supplied by the department, so used to revive the joint shall be deducted from the running bills of the contractor pending for payment of from security if all bills have been settled.
9.4 Replacement under warranty clause shall be made by the contractor free of all charges at site including freight, insurance, cost of works and other incidental charges.

9.5 If any irregularity is pointed out by any investigation agency even after warranty period. The contractor will be responsible for the same.

10. **AUDIT AND TECHNICAL EXAMINATION**

10.1 BSNL shall have the right to cause an audit and technical examination of the work and the final bills of the contractor including all supporting vouchers, abstract etc. to be made after payment of the final bill and if as result of such audit and technical examination any sum is found to have been overpaid in respect of any work done by the contractor under the contract or any work claimed by him to have been done by him under the contract and found not to have been executed, the contractor shall be liable to refund the amount of over payment and it shall be lawful for BSNL to recover the same from him in the manner prescribed in clause with the heading payment of bills (same chapter), or in any other manner legally permissible and if it is found that the contractor was paid less than what was due to him under the contract in respect of any work executed by him under it, the amount of such under payment shall be duly paid by BSNL to the contractor.

10.2 Provided that BSNL shall be entitled to recover any sum overpaid, nor the contractor shall be entitled to payment of any sum paid short where such payment have been agreed upon between the Divisional Engineer or his subordinate officer on one hand and the contractor on the other under any term of the contract permitting payment for work after assessment by the DGM or his subordinate officer.

10.3 Any sum of money due and payable to the contractor (including security deposit returnable to him) under this contract may be appropriate by the BSNL for the Payment of a sum of money arising out or under any other contract made by the contractor with the BSNL.

11. **PAYMENT TERMS**

Procedure for Preparation and settlement of bills:

11.1.1 On completion of the work as per the work order and terms and condition of tender, the contractor shall prepare final bill. **However the DGM may permit payment of running bill** (prepared without completing the work end-to-end for that unit of work due to departmental reason) to the extent of 70% or below.

11.1.2 **Procedure for preparation, processing and payment of bill:**

The contractor shall prepare the bill and submit the same to S.D.E. in-charge of work within 30 days of completion. The contractor shall prepare the bill containing the following details:

- The bill for all the quantities as per Measurements at the approved rates
- Store reconciliation statement furnishing account of stores received against the work order and returned to the designated Store to go down as surplus with requisite verifications from store in-charge/S.D.E. in-charge of work.
- Letters of grant of E.O.T. (s) If work could not be completed within stipulated time. E.O.T. should be approved prior to the submission of bill.
- Relaxation approval from competent authority & enclosed in original if applicable
- OFC route diagram
- The claim bill of contractors must accompany the list showing the details of
  (i) laborers/employees engaged (ii) Duration of their engagement (iii) The amount of wages paid to such laborers/employees for duration in the question (iv) Amount of EPF contribution ( Both employer’s & employees contribution) for the duration of engagement (v) Copies of authenticated
11.1.2.1 The S.D.E. in-charge of work shall scrutinize the final bill against the works entrusted and accord necessary certificates stating that the work has been executed satisfactorily in accordance with specifications and terms and conditions of the contract. The S.D.E. shall verify the quantities of items of work with reference to measurements recorded in the measurement book (and also A/T reports in case of any deviations noted by A/T officer). The S.D.E. in-charge of work shall submit the final bills, along with other documents mentioned above, with the documents as mentioned hereunder to the Divisional Engineer, in-charge of work.

- Bill prepared by the contractor.
- Measurement Book.
- A/T Certificates.
- Details of recoveries/penalties for delays, damages to BSNL/Third properties as per provisions of the contract.
- Details of empty cable drums cost of which needs to be recovered from the bill.

11.1.2.2 The Divisional Engineer shall exercise the prescribed checks on the bills and accord necessary certificates on the bills. The Divisional Engineer shall submit the bills as per BSNL instructions.

11.2 Procedure for Payment for sub standard works:

11.2.1 The contractors are required to execute all works satisfactorily and in accordance with the specifications. If certain items of work are executed with unsound, imperfect or unskilled workmanship or with materials of any inferior description or that any materials or articles provided by him for execution of work are unsound or of a quality inferior to that contracted for or otherwise not in accordance with the contract (referred to as substandard work hereinafter), the Divisional Engineer in-charge shall make a demand in writing specifying the work, materials or articles about which there is complaint.

11.2.2 Timely action by Construction Officers: Timely reporting and action, to a great extent, can prevent occurrence of sub standard work, which will be difficult or impossible to rectify later on. It is incumbent on the part of Construction Officers to point out the defects in work in time during progress of the work. The Junior Telecom Officer/Sub Divisional Engineer responsible for execution and supervision of work shall without any loss of time submit a report of occurrence of any sub standard work to the Divisional Engineer in-charge. A notice in respect of defective work shall be given to the contractor by Divisional Engineer in-charge in writing during the progress of work asking the contractor to rectify/replace/remove the sub standard item of work and also definite time period within which such rectification/removal/replacement has to be done. After expiry of the notice period, if the contractor fails to rectify/replace/remove the sub standard items/the defects shall be got rectified/ replaced/removed departmentally or through some other agency at the risk and cost of the contractor.

11.2.3 Non-reporting of the sub standard work in time on the part of Construction Officer (s) shall not in any way entitle the contractor to claim that the defects were not pointed out during execution and as such the contractor cannot be absolved of the responsibility for sub standard work and associated liabilities.

11.2.4 Authority and Procedure to accept sub standard work and payment thereof: There may be certain items of work pointed out as sub standard which may be difficult to rectify and in the opinion of the Head of S.S.A., the items in question will not materially deteriorate the quality
of service provided by the construction, the head of S.S.A. shall appoint committee to work out the reduced rates payable to the contractor for such sub standard work. The committee shall constitute one Divisional Engineer other than the one who is directly in-charge of Cable Construction involving sub standard items of work, as Chairman and one S.D.E. (Planning) and an Accounts Officer as members. The committee shall take into account the approximate cost of material/work pointed out as sub standard and recommend the rates payable for sub standard work which shall not exceed 60% of the approved rates of the item in question.

11.2.5 Record of sub standard work: The items adjudged as sub standard shall be entered into the measurement book with red ink.

12. DISPOSAL OF EMPTY CABLE DRUMS:

12.1 The contractor shall be responsible to dispose off the empty cable drums after laying of the cable. The cost of empty cable drums shall be deducted from the bill for the work on which the cable along with the drum has been issued or any other amount due to the contractor or from security deposit.

12.2 Rates fixed for various types of empty cable drums are given in Tender Document (Technical bid). The rates are fixed and there is no percentage above or below applicable on these rates.

13 PENALTY CLAUSES:

13.1 Delays in the contractor’s performance:

13.1.1 The time allowed for completion of the work as entered in the Work Order (PO) is the essence of contract and shall be strictly adhered by the contractor. The time shall be reckoned from Seventh day from issue of work order. The work shall, throughout the stipulated period of contract, be proceeded with all due diligence to achieve the desired progress uniformly, and the contractor shall pay as penalty an amount equal to 1.0 (one) percent of the amount (minimum Rs. One thousand per week) of the incomplete work for every one week of delay in completion of work, subject to a maximum of 10 (ten) percent of the cost of the work done.

13.1.2 Penalty for delay in completion of the work shall be recoverable from the bills of the contractor and/or adjustment from the security deposit or from the bills of any other contract. However, adjustment from security deposit will be made only when the contract has been terminated or at the time of final settlement of bills on completion of work.

13.1.3 In case of slow progress of the work in a section which has been awarded to a particular contractor, the concern DGM will have the full right to order that the scope of the contractor may be restricted to such fraction of the whole of the work and get the balance executed at the risk and cost of the contractor. Additional cost incurred for getting balance work done at risk and cost shall be recovered from the contractor’s pending bills or security deposit. (Appendix-1, Section 4 Part A)

13.1 Penalty for causing inconvenience to the Public:

13.2.1 To ensure progress during the execution of work and to cause minimum inconvenience to the public, the contractor shall not dig a trench of more than 200 meters at a stretch in a route at a time. He shall cause to lay HDPE/PLB/RCC/DWC and close such trenches expeditiously. Under any circumstances a stretch of trench of maximum 200 meters shall not be kept open for more than 4 days in case of laying by digging paved surfaces. In the event of contractor falling to comply with, these conditions, a penalty of recovery up to Rs. 300/- per day the trench is kept open beyond the time limit allowed may be imposed by the BSNL. This penalty will be in addition to that payable for delay or slow work.

13.2.2 The contractor 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 contractor does not dispose off the empty cable drums/waste materials with in 3 days of becoming empty, the BSNL is at liberty to dispose off the drum in any manner deemed fit and also recover the amount fixed in this contract for
empty cable drums/waste materials from the bill/security deposit/along with the costs incurred by the BSNL in disposing off such materials. The BSNL may also levy a penalty up to Rs One thousand for each such default.

13.2.3 If any such penalty is levied on a contractor for more than 2 occasions, then his/her contract could be terminated. In this regard the decision of concern GMTD BHUJ shall be final and binding.

13.3 **Penalty for cutting/damaging the old cable**:

13.3.1 During excavation of trench utmost care is to be taken by the contractor, 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 contractor or the amount will be deducted from his running bills:

<table>
<thead>
<tr>
<th>Size of existing cables Cut/damaged</th>
<th>Amount of penalty per Cut / damage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 100 pairs cable</td>
<td>Rs. 500.00 (Five Hundred)</td>
</tr>
<tr>
<td>Above 100 pairs &amp; up to 400 pairs</td>
<td>Rs. 1,000.00 (One thousand)</td>
</tr>
<tr>
<td>Above 400 pairs</td>
<td>Rs. 2,000.00 (Two thousand)</td>
</tr>
<tr>
<td>Optical Fiber Cable of any type</td>
<td>Rs. 5000.00 (Five thousand)</td>
</tr>
</tbody>
</table>

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

*Any penalty imposed due to damaged to public property will be the responsibility of agency & BSNL shall have no liabilities on this account*

13.4 **Penalty to damage stores/materials supplied by the BSNL while laying**:

13.4.1 The contractor while taking delivery of materials supplied by the BSNL at the designated place shall thoroughly inspect all items before taking them over. In case of execution of the work, if any material is found damaged/working unsatisfactorily, then a penalty equivalent to the cost of material +10% as penalty shall be recovered from the contractor’s payments/securities.

13.4.2 In case of damage to PIJF cables, while laying, the cost of number of pairs damaged (including laying charges, transportation/storage charges) adding 10 % as penalty shall be recovered from the contractor’s bills securities.

13.4.3 However, contractor will not be penalized for any defect in workmanship of the materials, which shall be taken up separately with the supplier of the stores.

14. **Rescission/Termination of contract**

14.1 **Circumstances for rescission of contract: As per the Appendix-1, Section 4 Part A**

14.2 Upon rescission of the contract, the security deposit of the contractor shall be liable to be forfeited and shall be absolutely at the disposal of the BSNL as under

14.2.1 Measurement of Works executed since the date of last measurement and up to the date of rescission of contract shall be taken in the presence of the contractor or his authorized representative who shall sign the same in the MB. If the contractor or his authorized representative do not turn up for joint measurement, the measurement shall be taken by the officer authorized for this purpose after expiry of due date given for joint measurement. The measurement taken by the officer so authorized shall be final and no further request for joint measurement shall be entertained.

14.2.2 The unused material (Supplied by the BSNL) available at site shall be transported back by BSNL to the Field Unit Telecom Store at the risk and cost of the contractor. If any such material is found damaged/lost then the penalty shall also be recovered from the contractor as per conditions in tender documents/bid.

14.2.3 The un-executed work shall be got executed through the qualified bidder from amongst the bidders, who participated in the bidding process, by giving them offer in their order of ranking (L2,L3) at their quoted rates. The BSNL shall get the unexecuted work completed through any other contractor
approved in Bhuj Telecom District. at the approved rates of that particular section or to execute the
work . BSNL as is convenient or expedient to the BSNL at the risk and cost of the contractor. In such
a event no compensation shall be payable by the BSNL to the contractor towards any
inconvenience/loss that he may be subjected to as a result or such an action by the BSNL. In this
regard the decision of GMTD BHUJ shall be final and binding. In all these cases, expenses which
may be incurred in excess of the sum which would have been paid to the original contractor if the
whole work had been executed by him shall be borne and paid by the original contractor and shall be
deducted from any money due to him by the BSNL under the contract or any other account
whatsoever any where in the BSNL or from a security deposit.

14.2.4 The certificate of the Divisional Engineer in-charge of work as to the value of work done shall be
final and conclusive against the contractor, provided always that action shall only be taken after
giving notice in writing to the contractor.

14.3 Deleted

14.4 Optional Termination by BSNL (Other than due default of the Contractor):
14.4.1 The BSNL may, at any time, at its option cancel and terminate this contract by written notice
to the contractor, in which event the contractor shall be entitled to payment for the work done
up to the time of such cancellation and a reasonable compensation in accordance with the
contract prices for any additional expenses already incurred for balance work exclusive of
purchases and/or whole of material, machinery and other equipment for use in or in respect of
the work.

14.4.2 In the event of the termination of the contract, the contractor shall forthwith clear the site of all
the contractor’s materials, machinery and equipment’s and hand over possession of the work /
operations concerned to the BSNL or as the BSNL may direct.

14.4.3 The BSNL may, at its option, cancel or omit the execution of one or more items of work
under this contract and may part of such items without any compensation whatsoever to the
contractor.

15. INDEMNITITES:
15.1 The contractor shall at all times hold the Government harmless and indemnify from against all
action, suits, proceedings, works, cost, damages, charges claims and demands of every nature
and descriptions, brought or procured against the Government, its officers and employees and
forthwith upon demand and without protest or demur to pay to the Government any and all
losses and damages and cost (inclusive between attorney and client) and all costs incurred in
endorsing this or any other indemnity or security which the Government may now or at any
time have relative to the work or the contractors obligation or in protecting or endorsing its
right in any suit on other legal proceeding, charges and expense and liabilities, resulting from
or incidental or in connection with injury, damages of the contractor or damage to property
resulting from or arising out of or in any way connected with or incidental to the operations
causes by the contract documents. In addition the contractor shall reimburse the Government
or pay to the BSNL forthwith on demand without protect or demur all cost, charges and
expenses and losses and damages otherwise incurred by it in consequences of any claim,
damages and actions which may be brought against the Government arising out of or
incidental to or in connection with the operation covered by the contractor.

15.2 The contractor shall at his own cost at the BSNL’s request defend any suit or other proceeding
asserting a claim covered by this indemnity, but shall not settle, compound or compromise any
suit or other finding without first consulting the BSNL.

16. FORCE MAJEURE:
16.1 If any time, during the continuance of this contract, the performance in whole or in part by either
party or any obligation under this contract shall be prevented or delayed by reason of any war, or
hostility, acts of the public enemy, civil commotion sabotage, fires, floods, explosions, epidemics,
quarantine restrictions, strikes, lockouts or act of God (Herein after referred to as events) provided
notice of happenings, of any such eventuality is given by either party to the other within 21 days
from the date of occurrence thereof, neither party shall by reason of such event be entitled to terminate this contract nor shall either party have any such claim for damages against the other in respect of such non-performance and work under the contract shall be resumed as soon as practicable after such event may come to an end or cease to exist, and the decision of the BSNL as to whether the work have been so resumed of not shall be final and conclusive, provided further that if the performance, in whole or part of any obligation under this contract is prevented or delayed by reason of any such event for a period exceeding 60 days either party may, at his option terminate the contract.

16.2 Provided also that if the contract is terminated under this clause, the BSNL shall be at liberty to take over from the contractor at a price to be fixed by the BSNL, which shall be final, all unused, undamaged and acceptable materials, bought out components and stores in the course of execution of such portions thereof as the BSNL may deem fit excepting such materials bought out components and stores as the contracts may with the concurrence of the BSNL elect to retain.

17. ARBITRATION:

17.1 Except as otherwise provided elsewhere in the contract, in the event of any disputes, controversy, or differences arising out of or relating to this agreement, or the breach, termination or invalidity thereof between the parties, such party or parties shall make a request to the other party or parties to amicably settle such differences or disputes and parties shall thereupon make every effort to settle the same amicably within a period of 60 (sixty) days from the date of making of such request.

17.2 Where parties are unable to settle the disputes through conciliation, the same shall be referred to sole arbitration of the Chief General Manager, Ahmedabad or in case his designation is changed or his office is abolished then in such case to the sole arbitration of the officer for the time being entrusted whether in additional to the function of the Chief General Manager, Gujarat Telecom Circle, Ahmedabad or by whatever designation such officers may be called (herein after referred to as the said officer) and if the Chief General Manager or the said officer is unable or unwilling to act as such the sole arbitration or some other person appointed by the Chief General Manager or the said office for referral of such disputes to a sole arbitrator (chosen from the name(s) provided by BSNL), to be mutually decided by the parties, as per the provisions of the Arbitration and Conciliation Act, 1996 & Act, 2015 any amendment thereof, and any notification issued or rules made thereunder from time to time.

17.3 The arbitrator may from time to time with the consent of parties enlarge the time for making and publishing the award. Subject to aforesaid Arbitration and Conciliation Act, 1996 & Act, 2015 and the Rules made thereunder, any modification thereof for the time being in force shall be deemed to apply to the arbitration proceeding under this clause.

17.4 The venue of the Arbitration proceeding shall be the office of the Chief General Manager, Gujarat Telecom Circle at Ahmedabad or such other places as the arbitrator may decide. All disputes involving litigation arising with regard to this agreement/contract shall be subject to jurisdiction of the competent court at Bhuj only.

17.5 The award of the sole Arbitrator shall be final and binding on all the parties to the dispute.

18. SET OFF:

18.1 Any sum of money due and payable to the contractor (Including security deposit refundable to him) under this contract may be appropriated by the BSNL or the BSNL or any other person or persons contracting through the BSNL and set off the same against any claim of the BSNL or BSNL or such other person or persons for payment of a sum of money arising out of this contract made by the Contractor with BSNL or Govt. or such other person or person contracting thought BSNL.
SECTION – 5 (Part-B)

SPECIAL CONDITIONS OF CONTRACT (SCC)

1. GENERAL :

No official of Gazetted rank or other Gazetted officer employed in Engineering or administrative duties in an Engineering BSNL or any other BSNL of the BSNL is allowed to work as a contractor for a period of two years after his retirement from BSNL service without the previous permission of BSNL. This contract is liable to be cancelled if either the contractor or any of his employee is found at any time to be such a person who hadn't obtained the permission of BSNL as aforesaid before submission of the engagement in the contractor’s service as the case may be.

2. STORES SUPPLIED BY THE BSNL :

2.1 At no point of time the contractor shall be issued stores of value more than the contractor’s Material Security as per clause number 5 of section 5 Part A. If the work requires more amount of materials to issued to the contractor, then the security shall suitably be revised before the issue of the store and the contractor will not have any objection to it.

2.2 The contractor shall transport (including loading and unloading) all stores issued to him from Field Unit Telecom Store, to the site of work at his own cost. The BSNL shall not pay any transportation charges to the contractor.

2.3 All materials supplied to the contractor by the BSNL shall remain the absolute property of BSNL and shall not be removed form site of the work except for use in the work and shall be at all times open to inspection by the Representative of GMTD BHUJ. In-case the materials like cable and accessories are taken delivery of by the contractor and stored to the site office/store of the contractor such site office/store will also be treated “as site” for this purpose. Any such materials remaining unused at the time of the abandonment, completion or determination the contract shall be returned to the BSNL at the place informed to him by the BSNL, failing which the cost of the unused materials shall be deducted from the contractor’s security deposit or any of his pending bills or from any other security.

2.4 The contractor shall be responsible for the transportation of store, storage and safe custody of all material supplied to him by the BSNL, which in the contractor’s custody whether, or not installed in the work. The contractor shall satisfy himself regularly the quantity and quality of the materials supplied to him and he will be responsible for any subsequent deterioration and discrepancy (inclusive of theft) in the quantity/ quality the materials.

2.5 The contractor shall submit a proper account every month of all the materials supplied to him by the BSNL and those consumed for items of work any discrepancy of difference between the materials issued to the contractor and those consumed in the work as per the “BSNL’s calculation” (which shall be final) will be charged to the contractor or deducted from his bills at 1.5 times of prevailing standard price including freight, handling charges, storage charges etc.

2.6 The contractor shall ensure that only required materials are issued to him. Upon completion of work, the contractor shall return to the BSNL at the later designated store in good condition, free of charges, any unused materials that were supplied by the BSNL.
3. EASEMENTS, PERMITS, LICENCES AND OTHER FACILITIES

3.1 The contractor shall assist to obtain / provide all easements, permits and license necessary to do its work. BSNL will pay to the respective Road/Rail/forest departments the ROW usage charges.

3.2 The contractor shall be fully responsible for angling and obtaining all necessary easements, permits and licenses, for moving all construction equipment, tools supplied materials and men across Railways and Highways, across public or private road as well as premises of any public utility within the right of user.

3.3 The contractor is to confine his operation to the provided construction “Right of User” unless it has made other arrangement with the particular property owners and / or tenants such other arrangements shall be entirely at the responsibility of the contractor as to cost and arrangement as also breach and claim and shall be entitled with a copy to the Divisional Engineer.

3.4 The contractor will not be entitled to extra compensation for hardship and increase in cost by the cable trench being routed adjacent to or across other pipeline, Highways, Railways telephones or poser poles and wires or guy wires, embankments, diff's, streams or other obstructions which may physically or otherwise in any manner, restrict or limit the use of the construction “Right of User”. Some construction and such contingency shall be deemed to have been providing for in the rates.

3.5 At location where the cable trench is routed across or along railways or roads the contractor shall without extra cost provide and maintain such detours and road controls as are required by the railways or government or local agencies having jurisdiction.

4. PROTECTION OF LIFE AND PROPERTY AND EXISTING FACILITIES:

4.1 The contractor is fully responsible for taking all possible safety precaution during preparation for and actual performance of the works and for keeping the construction site in a reasonable safe condition. The contractor shall protect all life and property from damage or losses resulting from his construction operations and shall minimize the disturbance and inconvenience to the public.

4.2 If the excavation of trench alters the contours of the ground around road and highway crossing in such locations dangerous to traffic, the contractor shall at his own cost, take all necessary precautions to protect public and shall comply with all the BSNL regulations as to placing of warning boards (Minimum size 3’ x 2’), traffic signals, Barricades, flags etc, at such location. If the contractor does not put the warning signal as per above directions, then a penalty of Rs 500/- per day shall be levied on the contractor, till the directions are complied by the contractor. The contractor shall take due precautions to avoid damages to other pipe lines, water mains, sewers telephones, telegraphs and power conduits, laid wires poles and guy wires, railways, highways, bridges or other underground or above ground structure and /or property crossing or adjacent to the cable trench being excavated.

4.3 Attention of the contractor is drawn to the rules regarding laying of cables at road crossing, along Railways Bridges, Highways safety precautions while working in Public Street. The contractor in writing shall obtain the detailed engineering instructions from the Divisional Engineer of the area.

4.4 The contractor shall be solely responsible for location through approved non-destructive means and ensuring the safety of all existing underground pipeline, electrical cables, and or other structures.

4.5 The contractor shall be solely liable for all expense for and in respect of repairs and/or damage occasioned by injury of or damage to such underground and above structures or other properties and under take to indemnify the BSNL from and against all actions, cause of acts, damages claims and demands what-so-ever, either in law or in equity and all losses and damages and costs (inclusive between attorney and client), charges and expenses in connection therewith and/ or incidental thereto. The contractor shall take all responsibilities and risk in crossing other pipelines and cables and shall be responsible for protecting all such existing pipelines, poles, electric lines, sewers, cables or other facilities from damage by the contractor’s
operation in connection with the work. The contractor without cost of the BSNL shall promptly repair any damage incurred.

4.6 The current market value of any commodities lost as a result of any damage to the aforesaid existing facilities shall be paid by the contractor together with such additional sums necessary to liquidate the personal of property damages, resulting there from.

5 LABOUR WELFARE MEASURES AND WORKMAN COMPENSATION:

5.1 Obtaining License before commencement of work:
The contractor shall obtain a valid labour license (if applicable) under the Contact Labour (R&A) Act 1919 and the Contract Labour (Regulation and Abolition) Central Rules 1971, before commencement of the work, and continue to have a valid license until the completion of work. The contractor shall also abide by the provisions of the Child Labour (Prohibition and Regulation) Act 1986. Any failure to fulfill this requirement shall attract the penal provisions of this contract arising out of the resultant non-execution of work.

5.2 Contractors labour Regulations:

5.2.1 Working Hours

5.2.1.1 Normally working hours of an employee should not exceed 9 hours a day. The working day shall be so arranged the inclusive of interval for rest, if any, it shall not spread over more than 12 hours on any day.

5.2.1.2 When a worker is made to work for more than 9 hours on any day or for more than 48 hours in any week he shall be paid over time for the extra hours put in by him.

5.2.1.3 Every worker shall be given a weekly holiday normally on a Sunday, in accordance with the provisions of minimum Wages (Central Rules 1960, as amended from time to time, irrespective of whether such worker is governed by the Minimum Wages Act or not

5.2.1.4 Where the minimum wages prescribed by the Government, under the Minimum Wages Act, are not inclusive of the wages for the weekly day of rest, the worker shall be entitled to rest day wages, at the rate applicable to the next preceding day, provided he has worked under the same contractor for a continuous period of not less than 6 days.

5.2.1.5 Where a contractor is permitted by the Engineer-in-Charge to allowed a worker to work on a normal weekly holiday, he shall grant a substituted holiday to him for the whole day, on one of the five days, immediately before or after the normal weekly holiday, and pay wages to such worker for the work performed on the normal weekly holiday at the overtime rate.

5.2.2 Display of Notice Regarding Wages Etc.
The contractor shall, before he commences his work on contract, display and correctly maintain and continue to display and correctly maintain in a clear and legible condition in conspicuous places on the work, notices in English and in local Indian languages spoken by the majority of the workers, giving the minimum rates of the wages fixed under Minimum Wages Act, the actual wages being paid, the hours of work for which such wage are earned, wages periods, dates of payments of wages and other relevant information.

5.2.3 Payment of Wages.

5.2.3.1 The contractor shall fix wage periods in respect of which wages shall be payable.

5.2.3.2 No wage period shall exceed one month.

5.2.3.3 The wages of every person employed as contract labour in an establishment or by a contractor, where less than one thousand such persons are employed, shall be paid before the expiry of seventh day and in other cases before the expiry of tenth day after the last day of the wage period in respect of which the wages are payable.
5.2.3.4 Where the employment of any worker is terminated by or on behalf of the contractor, the wages earned by him shall be paid before the expiry of the second working day from the date on which his employment is terminated.

5.2.3.5 All payment of wages shall be made on a working day at the work premises and during the working time and on a date notified in advance and in case the work is completed before the expiry of the wage period, final payment shall be made within 48 hours of the last working day.

5.2.3.6 Wages due to every worker shall be paid to him direct or to other person authorized by him in this behalf.

5.2.3.7 All wages shall be paid in current coin or currency or in both.

5.2.3.8 Wages shall be paid without any deductions of any kind except those specified by the Central Government by general or special order in this behalf or permissible under the Payment of Wages Act 1956.

5.2.3.9 A notice showing the wages period and the place and time of disbursement of wages shall be displayed at the place of work and a copy sent by the contractor to the Engineer-in-Charge under acknowledgement.

5.2.3.10 It shall be the duty of the contractor to ensure the disbursement of wages in presence of the site Engineer or any other authorized representative of the Engineer-in-Charge who will be required to be present at the place and time of the disbursement of wages by the contractor to workmen.

5.2.3.11 The contractor shall obtain from the site Engineer or any other authorized representative of the Engineer-in-Charge, as the case may be, a certificate under his signature at the end of the entries in the “Register of Wages” or the “Wage-cum-Muster Roll”, as the case may be, in the following form:

“Certified that the amount shown in the column No…………has been paid to the workman concerned in my presence on ……………….. at …………………………..”

5.2.3.12 Fines and deductions which may be made from wages

A. The wages of a worker shall be paid to him without any deduction of any kind except the following:

(b) Fines

c) Deductions for absence from duty i.e. from the place or the places where by the terms of his employment he is required to work. The amount of deduction shall be in proportion to the period for which he was absent.

d) Deductions for damage to or loss of goods expressly entrusted to the employed person for custody, or for loss of money or any other deductions which he is required to account, where such damage or loss is directly attributable to his neglect or default.

e) Deduction for recovery of advances or for adjustment of over payment of wages, advances granted shall be entered in register.

(f) Any other deductions, which the Central Government may form time to time, allow.

B. No fines should be imposed on any worker save in respect of such acts and omissions on his part as have been approved of by the Labour Commissioner.

C. No fine shall be imposed one worker and no deduction for damage or loss shall be made from his wages until the worker has been given an opportunity of showing cause against such fines or deductions.

D. Every fine shall be deemed to have been imposing on the day of the act or omission in respect of which it was imposed.

E.
5.2.3.13 **Labor records:**

1. The contractor shall maintain a Register of Persons employed on work on contract in Form XIII of the Contract Labour (R&A) Central Rules 1971.

2. The contractor shall maintain a Muster Roll register in respect of all workmen employed by him on the work under Contract in Form XVI of the CL (R&A) Rules 1971.

3. The contractor shall maintain a Wage Register in respect of all workmen employed by him on the work under contract in From XVII of the CL (R&A) Rules 1971.

4. **Register of accidents:** The contractor shall maintain a register of accidents in such form as may be convenient at the work place but the same shall include the following particulars:
   - (a) Full particulars of the laborers who met with accident.
   - (b) Rate of wages.
   - (c) Sex
   - (d) Age
   - (e) Nature of accident and cause of accident
   - (f) Time and date of accident
   - (g) Date and time when admitted in hospital
   - (h) Date of discharge from the hospital
   - (i) Period of treatment and result of treatment
   - (j) Percentage of loss of earning capacity and disability as assessed by Medical officer
   - (k) Claim required to be paid under Workmen’s Compensation Act.
   - (l) Date of payment of compensation
   - (m) Amount paid with details of the person to whom the same was paid
   - (n) Authority by whom the compensation was assessed
   - (o) Remarks.

5. The contractor shall maintain a **Register of Fines** in the Form XII of the CL(R&A) Rules 1971 the Contractor shall display in a good condition and in a conspicuous place of work the approved list of acts and commission for which fines can be imposed.

6. The contractor shall maintain a **Register of deductions for damage or loss** in Form XX of the CL (R&A) Rules 1971.

7. The contractor shall maintain a **Register of Advances** in Form XXIII of the CL (R&A) Rules 1971.

8. The contractor shall maintain a **Register of Overtime** in Form XXIII of the CL (R&A) Rules 1971.

9. **Attendance card-cum wage slip**
   - a. The contractor shall issue an Attendance card cum wage slip to each workman employed by him.
   - b. The card shall be valid for each wage period.
   - c. The contractor shall mark the attendance of each workman on the card twice each day, once at the commencement of the day and again after the rest interval, before he actually starts work
   - d. The card shall remain in possession of the worker during the wage period under reference
   - e. The contractor shall complete the wage slip portion on the reverse of the card at least a day prior to the disbursement of wages in respect of the wage period under reference.
   - f. The contractor shall obtain the signature or thumb impression of the worker on the wage slip at the time of disbursement of wages and retain the card with him.

10. **Employment card**
The contractor shall issue an Employment Card in the Form XIV of CL (R&A) Central Rules 1971 to each worker within three days of the employment of the worker.
11. Service certificate
On termination of employment for any reason whatsoever the contractor shall issue to the workman whose services have been terminated, a Service Certificate in the Form XV of the CL (R&A) Central Rules 1971.

12. Preservation of labour records
The labour records and records of Fines and deductions shall be preserved in original for a period of three years from the date of last entries made in them and shall be made available for inspection by the Engineer-in-Charge or Labour Officer or any other officers authorized by the Ministry of Communication in this behalf.

13. Power of labour officer to make investigations or enquiry
The labour officer or any person authorized by the Central Government on their behalf shall have power to make enquiries with a view to ascertaining and enforcing due and proper observance of Fair Wage Clauses and provisions of these Regulations. He shall investigate into any complaint regarding the default made by the contractor in regard to such provision.

14. Report of Investigating officer and action thereon
The labour Officer or other persons authorized as aforesaid shall submit a report of result of his investigation or enquiry to the Engineer in-Charge indicating the extent, if any, to which the default has been committed with a note that necessary deductions from the contractor’s bill be made and the wages and other dues be paid to the labourers concerned. The Engineer in-Charge shall arrange payments to the labour concerned within 45 days from the receipt of the report from the Labour Officer or the authorized officer as the case may be.

15. Inspection of Books And slips
The contractor shall allow inspection of all the prescribed labour records to any of his workers or to his agent at a convenient time and place after due notice is received or to the Labour Officer or any other person, authorized by the Central Government on his behalf.

16. Submission of Returns
The contractor shall submit periodical returns as may be specified from time to time.

17. Amendments
The Central Government may from time to time add to or amend the regulations and on any question as to the application/interpretation or effect of those regulations. Contractor must fulfill the terms and condition towards fulfillments/compliance of the provision of EPF & Misc.provision act 1952 & Employment provident Fund Scheme 1952 in respect of laborers/employees engaged by the contractor. Contractor must submit declaration form regarding compliance of the condition of EPF act 1952.

5.2.4 INSURANCE:
Without limiting any of his other obligations or liabilities, the contractor shall, at his own expense, take and keep comprehensive insurance including third party risk for the plant, machinery, men, materials etc. brought to the site and for all the work during the execution. The contractor shall also take out workmen’s compensations insurance as required by law and under take to indemnify and keep indemnified the Government from and against all manner of claims and demands and losses and damages and cost (including between attorney and client) charges and expenses that may arise in regard the same or that the Government may suffer or incur with respect to end/or incidental to the same. The contractor shall have to furnish originals and/ or attested copies as required by the BSNL of the policies of insurance taken within 15 (fifteen) days of being called upon to do so together with all premium receipts and other papers related thereto which the BSNL may require.
5.2.5 COMPLIANCE WITH LAWS AND REGULATION:
During the performance of the works the contractor shall at his own cost and initiative fully comply with all applicable laws of the land and with any and all applicable by-laws rules, regulations and orders and any other provisions having the force of law made or promulgated or deemed to be made or promulgated by the Government, Governmental agency or BSNL, municipal board, Government of other regulatory or Authorized body or persons and shall provide all certificates or compliance therewith as may be required by such applicable law. By-laws, Rules, Regulations, orders and / or provisions. The contractor shall assume full responsibility for the payment of all contributions and pay roll taxes, as to its employees, servants or agents engaged in the performance of the work specified in the contractor documents. If the contractor shall require any assignee or sub-contract to comply with the provisions of the clause and in this connection the contractor agrees as to undertake to save and hold the Government harmless and indemnified from and against any / all penalties, actions, suits, losses and damages, claims and demands and costs (inclusive between attorney and client) charges and expenses whatsoever arising out or occasioned, indirectly or directly, by failure of the contractor or any assignee or sub-contractor to make full and proper compliance with the said by-laws, Rules, Regulations, laws and Order and provisions as aforesaid.

6. TOOLS and PLANTS
The contractor shall provide at his own cost all tools, plants appliances, implements etc. required for proper execution of works. The contractor shall also supply without charge the requisite number of persons with the means and materials necessary for the purpose of setting out works, counting, weighing and assisting the measurements for examination at any time and from time to time. The contractor shall be responsible to make all arrangements, at his own cost for de-watering of trenches/ducts and degasification of the ducts before carrying out the work. The contractor shall also be responsible to make arrangements, at his own cost, for water required for carrying of works at sites including curing of CC/RCC works. Failing his so doing the same may be provided by the Engineer-in-charge at the expense of the contractor and the expenses shall be deducted from any money due to the contractor under this contract or otherwise.

- As per Para 3.67 of the recommendation/observation of Tenth Report of parliamentary standing committee on labour, Contractor would provide the same social security to the labours engaged by him as is available to regular employees.
- As per Para 3.68 of the recommendation/observation of Tenth Report of parliamentary standing committee on labour, Contractor shall ensure implementation of equal pay for equal work and also equal remuneration to men and women.
SECTION – 7
PROFORMAS

7 (A) BID SECURITY/ EMD Guarantee
(To be typed on Rs.100/- non-judicial stamp paper)

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 Bharat Sanchar Nigam Limited (herein after 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 as specified in clauses 12 and 28.2 of section 4 Part A of the Bid Document 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
Signed in Capacity of

Name & Signature of witness Full address of Branch
Address of witness Tel No. of Branch
Fax No. of Branch

Seal & Signature of Bidder
7 (B) PERFORMANCE SECURITY BOND FORM
(To be typed on Rs.100/- non-judicial stamp paper)

Dated:………………

Sub: Performance guarantee.

Whereas General Manager Telecom, Bhuj Telecom District, Bhuj (hereafter referred to as BSNL) has issued an AWO no. ………………………………Dated ……/……/20….. awarding the work of ………………………………………………………………………………….. to M/s …………..……………………………R/o………………………………………………………………… (hereafter referred to as “Bidder”) and BSNL has asked him to submit a performance guarantee in favour of AO(Cash), BSNL, O/o GMTD BHUJ of Rs. …………………/ (hereafter referred to as “P.G. Amount”) valid up to ……/……/20……… (hereafter referred to as “Validity Date”)

Now at the request of the Bidder, We ……………………………………Bank ……………………………………………….
Branch having .......................................... ...................... (Address) and Regd. office address as ……… …………...…………………………………………………………………… (Hereinafter called ‘the Bank”) agreed to give this guarantee as hereinafter contained:

2. We, “the Bank” do hereby undertake and assure to the BSNL that if in the opinion of the BSNL, the Bidder has in any way failed to observe or perform the terms and conditions of the said agreement or has committed any breach of its obligations there-under, the Bank shall on demand and without any objection or demur pay to the BSNL the said sum limited to P.G. Amount or such lesser amount as BSNL may demand without requiring BSNL to have recourse to any legal remedy that may be available to it to compel the Bank to pay the same.

3. Any such demand from the BSNL shall be conclusive as regards the liability of Bidder to pay to BSNL or as regards the amount payable by the Bank under this guarantee. The Bank shall not be entitled to withhold payment on the ground that the Bidder had disputed its liability to pay or has disputed the quantum of the amount or that any arbitration proceeding or legal proceeding is pending between Bidder and BSNL regarding the claim.

4. We, the Bank further agree that the guarantee shall come into force from the date of its issue and shall remain in full force and effect up to its Validity date.

5. The Bank further agrees that the BSNL shall have the fullest liberty without the consent of the Bank and without affecting in any way the obligations hereunder to vary any of the terms and conditions of the said agreement or to extend the time for performance of the said agreement from any of the powers exercisable by BSNL against the Bidder and to forebear to enforce any of the terms and conditions relating to the said agreement and the Bank shall not be relieved from its liability by reason of such failure or extension being granted to Bidder or through any forbearance, act or omission on the part of BSNL or any indulgence by BSNL to Bidder or any other matter or thing whatsoever which under the law relating to sureties would but for this provision have the effect of relieving or discharging the guarantor.

6. Notwithstanding anything herein contained;
(a) The liability of the Bank under this guarantee is restricted to the P.G. Amount and it will remain in force up to its Validity date.

(b) The guarantee shall stand completely discharged and all rights of the BSNL under this Guarantee shall be extinguished if no claim or demand is made on us in writing on or before its validity date.

7. In case BSNL demands for any money under this bank guarantee, the same shall be paid through banker’s Cheque in favour of “AO(Cash), BSNL, O/o GMTD BHUJ ” payable at Bhuj.

8. The Bank guarantees that the below mentioned officer who have signed it on behalf of the Bank have authority to give this guarantee under its delegated power.

Place: ……………………………
Date: ……………………………

(Signature of the Bank Officer)

Authorized Power of Attorney Number: ……………
Name of the Bank officer: ……………………………
Designation: ……………………………
Complete Postal address of Bank: ……………………………
            …………………………………………………………………
Telephone Numbers ……………………………
Fax numbers ……………………………

Seal & Signature of Bidder

54
7 (D) AGREEMENT

The successful tenderer shall have to execute the following agreement;

This agreement made on this ___________________day of (month) ___________________
(year) Between M/s ______________ herein after called “The Contractor “(Which expression shall
unless excluded by or repugnant to the context, include its successors, heir, executors, administrative representative and
assignee) of the one part & the BSNL, of other part.

Where as the contractor has offered to enter into contract with the said BSNL for the execution of work of OFC Cable
construction and allied works in Bhuj Telecom Dist. On the terms and conditions herein contained and the rates approved by the
BSNL (copy of Rates annexed have been duly accepted and where as the necessary security deposits have been furnished in
accordance with the provisions of the tender document and whereas no interest will be claimed on the security deposits.

Now these presents witness and it is hereby agreed and declared by and between the parties to these presents as follows.

1) The Contractor shall, during the period of this contact that is to say from ……………………………… to
…………………………………. Or completion of work for Rs _________________________(In words)
……………………………….whichever is earlie
r or during the further extended period of the contract or until this
contact shall be determined by such notice as is hereinafter mentioned, safely carryout, by means of lab ours employed at
his own expenses and by means of tools, implements and equipment etc. to be supplied by him to his labor at his own
expenses, all trenching, cable laying, cable jointing, and other associated works as described in tender documents
(annexed to the agreement), when the GMTD BHUJ or any other persons authorized by GMTD BHUJ in that behalf
require. It is understood by the contractor that the quantity of work mentioned on the schedule is likely to change as per
actual requirements as demanded by exigencies of service.

2) The NIT (notice inviting tender), Bid documents (Qualifying and Financial), letter of intent, approved rates, annexed
hereto and such other additional particulars, instructions, drawings, work orders as may be found requisite to be given
during execution of the work shall be deemed and taken to be an integral part of the contract and shall also be deemed to
be included in the expression “The Agreement” or “The Contract” wherever herein used.

3) The contractor shall also supply the requisite number of workmen with means & materials as well as tools, appliances,
machines, implements, vehicles for transportation, cartage etc. required for the proper execution of work within the time
prescribed in the work orders.

4) The contractor hereby declares that nobody connected with or in the employment of the BSNL is not/shall not
ever be admitted as partner in the contract.

5) The contractor shall abide by the terms and conditions, rules, guidelines, construction practices, safety precautions etc.
stipulated in the tender document including any correspondence between the contractor and the BSNL having bearing on
execution of work and payments of work to be done under the contract.

In witness whereof the parties present have here into set their respective hands and seals the day and year in

Above written: Signed sealed & Delivered by the above named Contractor in the presence of.

Witness :  

1.  

2.  

Signed & Delivered on behalf of the BSNL the

Witness :  

1.  

2.
7 (E) MATERIAL SECURITY BOND FORM

Whereas……………….(hereinafter called “the Contractor”) has been awarded the contract of cable construction work, as per tender number ______________________________________________

KNOW ALL MEN by these Presents that WE…….OF………… having our registered office at ________________(hereinafter called the “the Contractor”) are bound unto ……………….(hereinafter called “the Department”) in the sum of ……………….for which payment will and truly to be made of the said Department, the Bank binds itself, its successors and assigns by these presents.

THE CONDITIONS of the obligation are:

1. If the Contractor is unable to keep stores issued to him, properly, i.e. the store provided to the contractor, by the Department are damaged or

2. The stores issued to the contractor by the Department are stolen or

3. The Contractor is not able to provide proper account of the stores issued to him/her/them by the Department.

We undertake to pay to the Department up the above amount upon receipt of its first written demand without the Department having to substantiate its demand, provided that units demand, the Department will note that the amount claimed by it is due to it owing to the occurrence of one or two or all of three conditions specifying the occurred condition or conditions.

This guarantee will remain in force up to and including One hundred and eight (180)Days after the Period of Contract validity, and any demand in respect thereof should reach the Bank not later than the above date.

Signature of the Bank

Signature of the Witness

Name of Witness
Address of Witness
SECTION – 8 (Part-B)

RATES OF EMPTY CABLE DRUMS

These are the rates of the empty cable drums which have to be deducted from contractor’s bills as per terms and conditions or the tender document.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Size of drum</th>
<th>Rate of disposal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Optical Fiber cable drum 6F/12F/24F/96F</td>
<td>Rs 200 per drum.</td>
</tr>
</tbody>
</table>

Note: These are fixed rates and no variation shall be acceptable from these rates.
**E - TENDER NO. BJ/PLG/RE-T-12/OFC/2016-17**  
**DATED: 26.05.2017**  
**SECTION – 8 (Part-C)**

### A. STANDARD SCHEDULE OF RATES

**Note**: Service tax shall be paid extra.

<table>
<thead>
<tr>
<th>SN</th>
<th>Item code</th>
<th>Description of item</th>
<th>Unit</th>
<th>Schedule Rate in Rs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>1OFCT</td>
<td>Through rate (See notes) for excavating trenches up to a depth of 165 cms and back filling the excavated trenches after laying the HDPE/PLB HDPE pipe with or without protection.</td>
<td>Per meter</td>
<td>152.14</td>
</tr>
<tr>
<td>2.0</td>
<td>2HDPE</td>
<td>Laying of HDPE/PLB HDPE Pipes/Coils, coupled with HDPE sockets and drawing 6 mm/ 8mm PP rope (in trenching)</td>
<td>Per meter</td>
<td>4.10</td>
</tr>
<tr>
<td>2.1</td>
<td>2.1HDPE</td>
<td>Pulling/ Blowing of cable in pipes/coils</td>
<td>Per meter</td>
<td>4.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td>i) Upto 48F cable</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ii) 96F and above</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.2</td>
<td>2.2HDPE</td>
<td>Laying of Overhead low count OF cable (Material required except OFC will be arranged by contractor)</td>
<td>Per meter</td>
<td>7.00</td>
</tr>
</tbody>
</table>

*The BSNL will supply HDPE/PLB HDPE Pipes in size of 5 meters or coils, HDPE Sockets, PP rope, End caps.*

| 3.0 | HDD 150   | Horizontal Boring by HDD method with bore 150 mm dia. Inserting maximum 3 HDPE/3 PLB pipes for depth at 165 cms.                      | Per meter | 275.88               |

*The BSNL will supply HDPE Pipes in sizes of 5 meters or PLB pipe coils, HDPE Sockets, End caps.*

| 5.0 | 01FRPMH   | Installation of FRP manhole, excavation of FRP M/H pit (1.5 M x 1.5 M x 1.5 M), CC base for FRP M/H 6 inch thick, transportation of FRP M/H from store, fixing of FRP M/H in pit and refilling of pit up to road level with cementing. | Per FRP M/H | 4000.00 |

**BNSL will supply FRP manhole**

| 5.1 | 5JCBR     | Digging of pit for jointing chamber, Construction of brick chamber or supply and Fixing of Pre-cast RCC chamber, filling of bricks/RCC chamber with clean sand, supply and placing of Pre-cast RCC slabs on joint chamber, and back filling of jointing pit. | Per jointing chamber | 2700.00 |

*All materials required for construction of brick chamber and pre-cast RCC chamber shall be arranged by the contractor.*

| 6.0 | 2GIPT     | Laying and fixing of 65mm/40mm G.I. Pipes / DWC/Poles/ G.I. troughs on Bridges and Culverts for extra protection for HDPE pipe/PLB HDPE pipes/coils already laid. | Per meter     | 12.43   |

| 6.1 | 2GICT     | Laying and fixing of 65mm/40mm G.I. Pipes / DWC/Poles/ G.I. troughs embedded in cement concrete of ratio 1:2:4 on Bridges and Culverts for extra protection for HDPE pipe/PLB HDPE pipes/coils already laid (63mm/40mm) | Per meter     | 27.00   |

*The BSNL will supply Trough/ GI Pipes/DWC/Clamps/Coupler/PLB coils*

| 6.2 | 2RCCT     | Laying of full round 100mm inner dia RCC/DWC pipes in trenches for extra protection for HDPE pipe/PLB HDPE Pipes/coils already laid. | Per meter     | 14.48   |

| 6.2.1 | 2RCCS     | Supply of ISI Mark 100mm inner dia. full round RCC pipes in trenches as extra protection for HDPE pipe/PLB HDPE Pipe/Coils already laid. | Per meter     | 275.00  |

*The supply of full round RCC pipes in lengths of 2M with collars and Materials required for sealing work to protect the HDPE/PLB HDPE Pipe/Coil/ OF Cable, shall be arranged by contractor.*

| 6.3  | 2PCCT     | Providing RCC protection at site to HDPE/PLB HDPE or G.I. Pipes / Poles reinforced by Weld Mesh. | Per meter     | 175.00  |

*The G.I. pipes, Weld Mesh shall be arrange by the Contractor. The materials required for concreting including water for curling required for the work shall be arranged by the contractor.*

| 6.4  | 2GIHB     | Road/Rail crossing through horizontal boring method and inserting g HDPE/PLB pipes/coils inside and drawing 6mm/ 8mm PP rope. | Per meter     | 488.00  |
The BSNL will supply, HDPE/PLB HDPE pipes/coils and PP rope

| 7.3 | 3OFCPD | Searching of existing old ducts, including opening on Manholes, cleaning of existing duct pipe, insertion of 8mm rope. | Per meter | 6.87 |
| 8.0 | 8OFSPLT | Splicing/ Termination of Optical Fiber Cable laid and fixing of joint chamber  
  i) Upto 2F/4F  
  ii) Upto 6 F  
  iii) Upto 12F  
  iv) Upto 24 F  
  v) Upto48 F  
  vi) Above 48F | Per joint/ Per cable termination | 1000.00 | 1220.00 | 2440.00 | 4270.00 | 6100.00 | 6100.00+ | 100.00 per ribbon |

The BSNL will supply jointing kit only. All other materials required for the work shall be arranged by the contractor.

| 8.0 | 6ORJF | Digging of pit 1 meter towards jungle side on each manhole/joint chamber for fixing of route/joint indicator, fixing and concreting of routes/joint indicator. Painting and sign writing of route/joint indicators. **Route/Joint indicator will be supply by contractor (As per specification given in tender document)** | Per indicator | 361.33 |

The All materials required for the work shall be arranged by the contractor.

| 9 | 7DOCT | Documentation for each work order (one set duly signed by contractor + one soft copy). PDF computerized documentation to be prepared through AUTO CAD soft ware and plotted on Google Map showing latitude and longitudinal of the route/joint/section. One soft copy in CD from should be provided by contractor | Per set | 2500.00 |

10. Cutting different type of strata for laying

| 10.1 | 10OCC | Cement Concrete | Per meter | 30.00 |
| 10.2 | 10OA | Asphalt | Per meter | 12.00 |
| 10.3 | 10OTS | Tiles/Stone | Per meter | 20.00 |

11.0 Resurfacing including all material

| 11.1 | 11ORCC | Cement Concrete | Per meter | 40.00 |
| 11.2 | 11ORA | Asphalt | Per meter | 20.00 |
| 11.3 | 11ORTS | Tiles/Stone | Per meter | 60.00 |

12.1 12OFVR1 | Fixing Horizontally/ vertically up to 12 feet OF cables /PLB / Flexible pipe on wall with Clamps at maximum interval of 50 cm. | Per meter | 20.00 |

12.2 12OFVR2 | Laying GI Pipe/ PLB/ Flexible Pipe/ OFC vertically above 12 feet by providing proper support with the help of proper clamp at maximum every 50 cm interval throughout the length of pipe. The clamp should be installed by fitting base of clamp on the wall with expansion bolt first and then clamp should be fixed on the base with nut and bolt. | Per meter | 121.00 |

(Clamps, bolts, base etc. (i.e. clamping material) to be provided by the contractor on his cost.)

| 13.1 | 13OFCF | Cutting, repairing and entering PLB/OFC/Flexible pipe floor to floor through holes. (Inclusive of material) | Per hole | 80.00 |
| 13.2 | 13OFCW | Cutting, repairing and entering PLB/OFC/Flexible pipe through wall. (Inclusive of material) | Per hole | 40.00 |
| 13.3 | 13OFCD | Cutting, repairing and entering PLB/OFC/Flexible pipe through holes in window/ door etc. (Inclusive of material) | Per hole | 20.00 |
| 14 | 14OFWP | Laying of Warning Tape 01 ft above laid cable | Per meter | 4.10 |
### Rate of Assistance for Miscellaneous Work not specified in schedule of work

<table>
<thead>
<tr>
<th></th>
<th>Providing unskilled labour for whole day in Bhuj SSA (U.A. &amp; R.A.) i.e. Category “C” Area</th>
<th>Rate per labour Per day</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td><strong>Minimum wages plus 12% additional for EPF and other charges</strong></td>
</tr>
</tbody>
</table>

**Note:**
The rate for “Assistance for Miscellaneous Work” is dynamic and not a part of SOR hence it should be the same as the minimum wages act of RLC and modified from time to time. Thus the rate for this item should be changed whenever there is a revision from the Regional Labour Commissioner Office. The minimum wages applicable to be paid to unskilled Labour through contractor will be Basic rate as per the notification of Labour Commissioner plus additional charges 12% i.e. the EPF, and Service charges components.

**While submitting bill for payments the details of work carried out by labour will be recorded in the MB by SDO/JTO Incharge.**
To, The GMTD BHUJ

SUB: Our Financial Bid for optical Fiber Cable Construction Works in area of Bhuj SSA

Ref: ……………………………………………

Dear Sir,

Having examined the tender documents, terms and conditions stipulated therein, specifications of work etc. we the under signed offer to execute the Cable Construction Works in conformity with the said specifications and conditions of contract at the percentage (Below / at par / above) on standard schedule rates quoted as under:

In figure ………………………………………… %
In words ……………………………………… percent

OR

In figure ………………………………………… %
In words ……………………………………… percent

OR

In figure ………………………………………… %
In words ……………………………………… percent

Note :- Service Tax will be payable extra on quoted rates.

If our Bid is accepted, we shall submit the securities as per the conditions mentioned in the contract.

We agree to abide by this Bid for a period of 180 days from the date of opening of financial bid and it shall remain binding upon us and may be accepted at any time before the expiry of that period.

Date : Signature of Tenderer
<table>
<thead>
<tr>
<th>Sl No.</th>
<th>Description</th>
<th>Tender Clause</th>
<th>Mode of Submission</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Tender Fee</td>
<td>Section 1 (part A) Para 2.1, 2.2</td>
<td>Off-line</td>
</tr>
<tr>
<td>2</td>
<td>EMD</td>
<td>Section 1 (part A) Para 5.1, 5.2</td>
<td>Off-line</td>
</tr>
<tr>
<td>3</td>
<td>Power of Attorney</td>
<td>Section 4 (Part A) clause 14.3</td>
<td>Off-line</td>
</tr>
<tr>
<td>4</td>
<td>Latest and Valid MSME/ NSIC certificate</td>
<td></td>
<td>Off-line</td>
</tr>
<tr>
<td>5</td>
<td>Experience</td>
<td>Section 1 (part A) Para 4A</td>
<td>ON-Line</td>
</tr>
<tr>
<td>6</td>
<td>Tax Registration (service/Sale) as applicable</td>
<td>Section 1 (part A) Para 4A</td>
<td>ON-Line</td>
</tr>
<tr>
<td>7</td>
<td>Registration certificate</td>
<td>Section 2 Para 3 (a) (i)</td>
<td>ON-Line</td>
</tr>
<tr>
<td>8</td>
<td>Partnership / proprietorship</td>
<td>Section 2 Para 3 (a) (i)</td>
<td>ON-Line</td>
</tr>
<tr>
<td>9</td>
<td>EPF (If applicable)</td>
<td>Section 2 Para 3 (a) (i)</td>
<td>ON-Line</td>
</tr>
<tr>
<td>10</td>
<td>ESIC (If applicable)</td>
<td>Section 2 Para 3 (a) (i)</td>
<td>ON-Line</td>
</tr>
<tr>
<td>11</td>
<td>PAN Card</td>
<td>Section 2 Para 3 (a) (i)</td>
<td>ON-Line</td>
</tr>
<tr>
<td>12</td>
<td>Agency Detail</td>
<td>Section 2 (part-A)</td>
<td>ON-Line</td>
</tr>
<tr>
<td>13</td>
<td>Letter of Authorization</td>
<td>Section 2 (part-B)</td>
<td>ON-Line</td>
</tr>
<tr>
<td>14</td>
<td>Under taking &amp; declaration</td>
<td>Section 2 (part-C)</td>
<td>ON-Line</td>
</tr>
<tr>
<td>15</td>
<td>Declaration regarding no relative working in BSNL</td>
<td>Section 2 (part-D) {To be submitted by proprietor or separately by each partner/Director}</td>
<td>ON-Line</td>
</tr>
</tbody>
</table>
OPTICAL FIBRE CABLE CONSTRUCTION PRACTICES

The guidelines in the form of Engineering Instructions (E.Is.) on Construction Practices of Optical Fibre Cables are issued by T & D wing of the Department, from time to time. However, the present practices are summarized here under, from the point of view of describing scope of work under various items of work. This document will need revision as and when practices undergo any revision.

1.0 General
The Optical Fibre Cable is planned considering the following objectives of the scheme.

i) Minimum possible route length vis-a-vis route having maximum number of towns with potential telecom growth.

ii) Linking of small exchanges off main road by leading in O.F.C. vis-a-vis routing the main cable itself via such exchanges.

After deciding above mentioned issues, a detailed measurement of lengths of cable route along with details of rail/road crossing, culverts, causeways, etc. may be recorded in the detailed survey register. The probable locations of joints, terminations and re-generators may also be decided and marked on the route map.

On the basis of surveys, general permission from road and rail authorities for laying the Optical Fibre Cable along the decided routes and permission for rail/road crossings will have to be obtained. Generally, O.F.C. is laid straight as far as possible along the road near the boundaries, away from the burrow pits. The O.F.C. is laid along the roads at a minimum distance of 15 meters from the centre line of the road or in accordance with the permission from the concerned road authorities in view of their road widening plan. As the O.F.C. carries high capacity traffic and is planned for 40 years of life, it is imperative that the cable is laid after obtaining due permission from all the concerned authorities to avoid any damage/shifting at a later stage and also disruption of services/revenue loss.

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.

The Optical Fibre Cable is laid through PLB Pipes buried at a nominal depth of 165 cms. The steps involved in OF Cable construction are as under:

Excavation of trench upto a nominal depth of 165 cms., according to Construction specifications along National/State Highways/other roads and also in city limits as mentioned in the notice inviting tender.

Laying of PLB pipes/coils coupled by PLB sockets in excavated trenches, on bridges and culverts, drawing of 6 mm Polypropylene para pro rope (P.P. rope) through the PLB pipes/coils as per Construction Specifications and sealing of PLB pipe ends at every manhole by PLB end caps of suitable size.

Providing of mechanical protection by R.C.C. Pipes/GI pipes and/or concreting/chambering according to construction specifications, wherever required.

Fixing of GI pipes/troughs with clamps at culverts/bridges and/or chambering or concreting of G.I. Pipes/troughs, wherever necessary.

Back filling and dressing of the excavated trenches according to construction specifications.

Opening of manholes (of size 3 meters x 1 meter x 1.65 meters depth), replacing existing 6mm P.P. ropes by 8mm P.P. rope (from manhole to manhole) for ensuring smooth passage for pulling the cable. Pulling of Optical Fibre Cable with proper tools
Optical fibre cable construction practices

and accessories as per construction specifications. Sealing of both ends of the manholes by hard rubber bush o. suitable size to avoid entry of rodents into the PLB pipes, putting split PLB pipes and split RCC pipes with proper fixtures over cable in the manhole to protect the bare cable in the pulling manhole. Back filling and dressing of manholes.

Digging of pit of size 2 meter x 2 meter x 1.8 meter (depth) for construction of jointing chamber at approximately every two kilometres of internal size of 1.5 meter x 1.5 meter x 1.2 meter using bricks and mortar or fixing pre-cast jointing chamber of internal diameter of 1.2 meter filling of jointing chamber with clean sand, placing either pre-cast RCC cover or store of suitable size on jointing chamber to protect the joint and back filling of jointing chamber with excavated soil. Digging of pits 1 meter towards jungle side at every manhole and jointing chamber to a depth of 60 cms., fixing of route indicator/joint indicator, concreting and back filling of pits. Painting of route indicators with yellow colour and joint indicator by red colour and sign writing denoting route/joint indicator number, as per construction specifications. Documentation.

Specifications of Materials used: PLB PIPE/COILS

The Optical Fibre Cable is pulled through 40mm outer diameter PLB Pipes/Coils having strength of 10 Kg/sq. cm. 50 mm PLB pipes of 5 meters length or 50 meters coil, should meet the specifications as given in GR no. G/CDS-OS/01 Dated December 1994 and revised up to date.

HOPE Socket

For coupling PLB Pipes/coils, PLB sockets as per IS 4984-1995 (O 'ring type) made of High Density Polyethylene 5010 or equivalent injection grade material should be used. The PLB socket, should be black in colour and should be fitted with hard rubber rings at both ends and should confirm to GR No.G/CDS-05/01 dated December, 1994 and revised upto date. 5mm x 5mm projections inside at the centre of the socket should be provided to prevent the pipes from passing through. It should weigh 150 gms. (with a tolerance of +/- 5%) and should be able to withstand a pressure of 10 kg per sq. cms. without any damage/deterioration in performance. (See figure 'I' for details)

PP Rope

6mm PP rope is drawn through the PLB pipes/coils and safely tied to the end caps at either ends with hooks to facilitate pulling of the OF cables at a later stage. The PP rope used is 3 strand Polypropylene Para Pro rope having yellow colour and shall be of 6 mm diameter and it should have a minimum breaking strength of 550 kgs. The length of each coil of rope should be 205 meters and it should conform to (i) BS . 4928 Part-II of 1974 (ii) IS 5175 of 1982 (Hi) It should be of special grade and should have ISI certificate mark (iv) It should be manufactured out of industrial quality Polypropylene.

• PLB end caps

For pulling the cable through the pipes, it is necessary to have suitable manholes at every 200M length and also at bends and corners suitably located. The pipes are laid for 200M or less at a time for the distance between two manholes. The ends of the PLB pipes/coils are closed with PLB End Caps. The End Caps used should be suitable for closing 50mm outer diameter PLB pipes. The end cap should be manufactured from High Density Polyethylene, should withstand internal pressure of 10 kg per sq. cms., should be black in colour, should have a weight of 100 gms. (with a tolerance of +/-5%) and should conform to G/CDS-05/01 dated December,
1994 and revised up to date. (See figure ‘2’ for details). A suitable arrangement should be provided in the End Cap to tie PP Rope.

MATERIALS FOR MECHANICAL PROTECTION

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 PLB pipes/coils using RCC full round 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.

i) 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 PLB pipes/coils. The RCC pipes/collars should be of NP-2 class for 100 mm / 150 mm (internal diameter) full round, conforming to IS standard 458 1988 revised up to date. The pipes should have a nominal length of 2 meters.

The RCC collars should be properly sealed using cement mortar 1:3 (1 : 53 grade cement of reputed brand, 3: 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: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.

ii) G.I. PIPES

G.I. pipes should be of medium duty class having diameter of 65 mm./40mm. The G.I. Pipes should conform to IS 554/1985 (revised up to date) IS 1989 (Part-I), 1900 Sockets (revised up to date) & IS 1239 (Part-II) 1992 (revised up to date). Wherever protection by G.I. pipe is provided, it is preferable to use HOPE coils. As space on parapet wall on Bridges/culverts is limited, 40 inm GI pipes may be used with 32 mm HOPE coil drawn inside.

iii) M.S. WELD MESH

The 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 50 m each. One meter of MS weld mesh caters to approx. 3 meters of concreting. (See figure ‘3’ for details)

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 of not less than 1 kg per 8 sq.m. to avoid seepage of water into the soil.

JOINT CHAMBER

The joint chamber is provided at every joint normally at a distance of 2 kms to keep the O.F.C. joint well protected and also to keep extra length of cable which may be required in the event of faults at a later date. The joint chambers are made at site using bricks and mortar or are of pre-cast RCC type.
Optical fibre cable construction practices

i) Construction of brick chamber at site

For constructing brick chamber, first a pit of size 2mx2mx1.8m depth is required to be dug. Then, base of the chamber is made using concrete mix of 1:S:10 (I: cement, 5: coarse sand, 10: graded stone aggregate 40 mm nominal size) of size of 1.7 m x 1.7 m x 0.15 m (thickness). Walls of brick chamber having internal dimensions of 1.2 m x 1.2 m x 1 m (H) should be constructed on this base having wall thickness of 9” using cement mortar mix of 1:5 (1: cement, 5: fine sand). The bricks to be used for this purpose should be of size 9”x4.5”x3”, best quality available and should have smooth rectangular shape with sharp corners and shall be uniform in colour and emit clear ringing sound when struck. The joint chamber should be so constructed that HOPE pipe ends remain protruding minimum 5 cm inside the chamber on completion of plastering. The PLB pipes should be embedded in wall in such a way so that, the bottom brick should support the pipe and upper brick should be provided in a manner that PLB pipe remains free from the weight of the construction. The joint chamber should be plastered on all internal surfaces and top edges with cement mortar of 1:3 (1: cement, 3:coarse sand), 12 mm thick finished with a floating coat of complete cement as per standard. Pre-cast RCC slab with two handles to facilitate easy lifting, of size 0.7 m x 1.4 m and thickness of 5 cm having one handle for each half in centre and word ‘OFC’ engraved on it are to be used to cover the joint chamber. Two numbers of such slabs are required for one joint chamber. This pre-cast slab should be made of cement concrete mix of 1:2:4 (1: cement, 2: coarse sand, 4:stone aggregate 6 mm nominal size) reinforced with steel wire fabric 75 X 25 mm mesh of weight not less than 7.75 Kg per sq. meter. The joint chamber is filled with clean sand before closing. Lastly, back filling of joint chamber pit with excavated soil is carried out.

ii) Pre cast RCC chamber

For fixing pre cast RCC chamber, first a pit of size 2 m x 2 m x 1.8 m depth is required to be dug. Pre cast RCC chamber consists of three parts (I) round base plate in two half of 140 cm dia and 5 cm thickness (II) full round RCC joint chamber with dia of 120 cm and height of 100 cm and thickness of 5 cm (III) round top cover will be in two halves with dia of 140 cm and thickness of 5 cm having one handle for each half in centre and word ‘OFC’ engraved on it. (See figure ‘4’). After, fixing the pre cast RCC joint chamber, the joint chamber is fitted with clean sand before closing. Lastly, back filling of joint chamber pit with excavated soil is carried out.

RUBBER BUSH

To prevent entry of rodents into PLB pipes, the ends of PLB pipes are sealed at every manhole and joint using rodent resistant hard rubber bush (cap) after optical fibre cable is pulled. The rubber bush should be manufactured from hard rubber with grooves and notes to fit into 50 mm PLB pipe (dass V), so that it should be able to prevent the entry of insects, rodents, mud, and rainwater into the 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. (Please see Figure No.5).

ROUTE/JOINT INDICATOR

The route/joint indicators are co-located with each manhole/joint chamber. In addition route indicators are also to be placed where route changes direction like road crossings etc. The route/joint indicators made of pre-cast RCC should have the following dimensions:

| Base       | 250 mm x 150 mm |
| Top        | 200 mm x 75 mm  |
| Height     | 1250mm          |

The word ‘DOT OFC’ should be engraved on the route/joint indicators.
The route indicators are painted yellow and the same are placed at 2 ft. away from the centre of the trench towards jungle side. The joint indicators are placed at OFC joints and placed 1 ft. away from wall of the joint chamber facing jungle side and are painted red. The engraved word "DOT OFC' should be painted in white, on route as well as joint indicators. Numbering of route indicators/joint indicators should also be done in white paint. The numbering scheme for route indicators will be Joint No./Route Indicator No. for that joint. For example, 2/6 marking on a route 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, D. For example sign writing 2A on a joint indicator means, additional joint between Joint No. 2 and 3. The numbering of existing route/joint indicator should not be disturbed on account of additional joints. Enamel paints of reputed brand should be used for painting and sign writing of route as well joint indicators.

3.0 EXCAVATION OF TRENCHES

3.1 Trenching

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 when 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 (Permissions for such deviations for cutting the embankment as well as shoulder of the road shall be obtained by the department).

The alignment of the trench will be decided by a responsible departmental official, not below the rank of a Junior Telecom Officer. Once the alignment is marked, no deviation from the alignment is permissible except with the approval of Engineer-in-charge. 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.

The line up of the trench must be such that 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 else where.

Line-Up:
The line-up of the trench must be such that PLB pipe(s) shall be laid in a straight line 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.

Method of Excavation:
In city limits as well as in built up areas, the contractor shall resort to use of manual labour only to ensure no damage is caused to any underground or surface installations belonging to other public utility services and/or private parties.
However, along the Highways and cross country there shall be no objection to the Contractor resorting to mechanical means of excavation, provided that no underground installations exist in the path of excavation, if any, are damaged.

There shall be no objection to resort to horizontal boring to bore a hole of required size and to push through G.I. Pipe (65mm/40mm dia) through horizontal bore at road crossing or rail crossing or small hillocks etc.

All excavation operations shall include excavation and 'getting out' 'Getting out' shall include throwing the excavated materials at a distance of at least one metre or half the depth of excavation, whichever is more, clear off the edge of excavation. In all other cases 'getting out shall include depositing the excavated materials as specified.

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.

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 installations belonging to other agencies and any damage caused should be made good at his own cost and expense.

Necessary barricades, night lamps, warning boards 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 man-power for this with caution boards, flags, sign writings etc.

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 Installations. No extra payment will be made towards this.

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

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.

**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 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 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 and 30 cms. at the bottom. In case, additional pipes (PLB/GI/RCC Pipes) are to be laid in some stretches, the same shall be accommodated in this normal size trench.

When trenches are excavated in slopes, uneven ground, inclined portion, the tower 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
Optical fibre cable construction practices

places, due to any reason whatsoever it can be ordered to excavate beyond standard depth of 165 cms to keep the bee 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. For additional depth in excess of 165 cms., additional payment of pro rata basis shall be applicable.

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 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.

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 arrangements that may be necessary. No extra payment shall be admissible for this.

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.

Blasting:

For excavation in hard rock, where blasting operations are considered necessary, the contractor shall obtain approval of the Engineer-In-Charge in writing for resorting to blasting operation.

The contractor shall obtain licence 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 upto date and the explosive Rules, 1983. 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 or his authorised representative shall have the right to check the contractor's store and account of explosives. The contractor shall provide necessary facilities for this.

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

Blasting operations shall be carried out under the supervision of a responsible authorised agent of the contractor (referred subsequently as agent only), during specified hours as approved in writing by the Engineer-in-Charge. 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.

Trenching Near Culverts/Bridges:

The PLB pipes shall be laid in the bed of culvert at the depth not less than 165 cms protected by G.I. pipes and concreting as decided by Engineer-in-charge.
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.

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.

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.

4.0 LAYING OF PLB. PIPES:

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 OF 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 PLB pipe shall be thoroughly cleaned to remove all sand, dust or any other debris that may clog, disturb or damage the optical fibre cable when it is pulled at a later stage. The ends of each pipe and inside of each PLB Socket shall be thoroughly cleaned of any dirt or other foreign materials.

After the trench is cleaned the PLB Pipes/Coil shall be laid in the cleaned trench, jointed with "O" ring type PLB Sockets & 6 mm PP rope should be drawn through the PLB Pipes at the time of laying the pipes to facilitate cable pulling at a later stage. At every manhole approximately at every 200m or at bends or turns the PP rope will be tied to the PLB end caps used for sealing the PLB pipes, to avoid entry of rodents/mud etc.

At the end of each day work, the open ends of the pipes sections shall be tightly dosed with end caps to prevent the entry of dirt/mud, water or any foreign matter into PLB pipes until the work is resumed.

In City, Town, Urban area fading within Municipal/Corporation limits, the 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 reinforced with weld mesh shall be provided. Engineer-in-Charge shall decide about such stretches and type of protection to be provided in view of the site requirements. Normally 100mm RCC Pipes shall be used for protecting PLB Pipe but if more than one PLB Pipe is to be laid and protected, RCC Pipe of suitable size to accommodate the required number of PLB Pipes shall be used.

The 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/PLB Pipes may be laid as per the direction of the Engineer-in-charge. On Rail bridges and crossings, the PLB Pipes shall be encased in suitable cast iron as prescribed by the Railway Authorities.
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 (1:53 grade cement of reputed brand, 3: 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 (1:53 grade cement of reputed brand, 2: coarse sand, 3: stone aggregate of nominal size of 20mm; 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 socket? so as to avoid damage to PLB Pipe and eventually the OF Cable in the event of pressure coming on the joint and G.I. Pipe joint giving its way. Rubber bushes shall be y-eo at either ends of the GI pipes to protect 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 (1:53 grade cement of reputed brand, 2: coarse sand, 3: stone aggregate of nominal size of 20mm) so that the alignment of G.I. Pipes remain firm and intact and to avoid entry of rodents.

In case of protection by concretion at site the nominal dimension of concreting shall be 250mm x 250 mm section Cement Concrete Mixture used shall be of 1:2:4 composition i.e. 1 : 53 grade Cement of a reputed company, 2 : Coarse Sand, 4 : 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.

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 PLB pipes. The PLB pipes shall then be laid above this bed of concrete. After laying the 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 have 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.

The PLB Pipes/RCC/GI Pipes shall be laid only in trenches accepted by Engineer-in-Charge or his representative. The Contractor shall exercise due care to ensure that the PLB Pipes are not subjected to any damage or strain.

Water present in the trench at the time of laying the 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.

In case of nallahs, which are dry for nine months in a year, the 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. The mechanical protection shall extend at least 5 Meters beyond the bed of nallah on either side.

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

White laying the pipes, a gap of 2M is kept at convenient locations approx.200m apart and at the bends and turns, which will be used as manholes during OF cable
pulling. Ends of the PLB pipes at the manholes shall be seated using PLB 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. The location of the manholes will be decided by the Engineer-in-charge.

**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. The telecom officers need to maintain good liaison with the concerned authority to get one side of the duct allotted for Telecom Cables. In such ducts, G.I. Pipes can be coupled and laid for pulling the cables. It would be pertinent to mention here that close liaison with bridge construction authorities would be of immense advantage in ensuring provision of ducts on one or both the sides of the bridges as per future requirements. However, for laying cables on existing bridges, where duct arrangement does not exist, one of the following methods may be adopted.

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 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 the Arch is less than 50 cms, the pipe must be buried under the wheel guard masonry and the wheel guard rebuilt.

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

In case where the methods explained in clauses referred above are not possible, the G.I. Pipes/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 7.5mm. The permission for carrying out this work will be obtained from the Road Authorities by the department.

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 to protect the Pipe/Trough from any possible damage externally caused.

Where white wash/colour wash is existing on the Bridges/Culverts, the same should also be carried out on the concreted portion to ensure uniformity.

**Back Filling and Dressing of the Trench:**

The earth used for filling shall be free from all roots, grass, shrubs, vegetation, trees, saplings and rubbish. Provided that the PLB Pipes have been property 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 PLB pipes when the PLB pipes get loaded with the back filled earth.
Optical fibre cable construction practices

At locations where the back filled materials contain stones/sharp objects which may cause injury to the 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 soil or de-rocked loose earth of not less than 10 cms above the pipes.

Back filling on public, private roads, railway crossings, footpaths in city areas shall be performed immediately after laying the PLB 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 ways and cross-country, the dug up material left out should be kept as near above the trench while refilling.

In city limits, no part of the trench should be kept open for more than 50 metre length 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.

6. CABLE PULLING AND JOINTING/SPLICING:

6.1 CABLE PULLING:

Manholes marked during PLB pipe laying of approx. size of 3m length x 1.0m. width x 1.65m. Depth shall be excavated for pulling the cables. There may be situations where additional manholes are required to be excavated, for some reasons, to facilitate smooth pulling 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/be-gasification of the ducts, if required, will be carried out without any extra costs.

The existing 6mm PP rope shall be replaced by PP rope of 8mm dia between the two consecutive manholes. This is to ensure that the PLB pipes are cleaned for pulling the cable without exerting undue tension on the OF cable. While cleaning, excessive pressure should not be put which may result in breaking of P.P. rope and thus require opening of additional manholes. However, in case the cleaning rope gets stuck up during pulling, the location of clogging of PLB Pipe should be measured and located accurately. The trench at that location should be opened and the PLB Pipe should be cleaned properly or if not possible it should be changed by a clean new PLB Pipe to facilitate easy cable pulling at a later stage without any breakage. If clogging of PLB Pipe is in the location where the pipes are protected either by RCC Pipe or by concreting and the protection is broken for cleaning/changing the PLB Pipe, the protection thus removed should be brought back to normal by the contractor without any extra cost. However, PLB Pipes, RCC Pipes required for this purpose will be supplied by the Department.

The Optical fibre cables are available in drums in lengths of approx. 2 kms. The cables shall be manually pulled through already laid PLB Pipes by using the 8 mm PP rope. This work is to be carried out under the strict supervision of site in-charge. At a time, maximum three persons at every manhole should be deployed to pull the cable as more tension to cable may lead to breaking of fibres. Cost of such damages will be recovered from the contractor.

After pulling of the drum is completed, both ends of the PLB Pipes in each manhole should be sealed by hard rodent resistant rubber bush, to avoid entry of rodents/mud into PLB Pipes.

The Manholes are prepared by providing 65mm split PLB pipe of 2.5 to 3m length and closing the split PLB pipes by providing necessary clamps/adhesive tape as per the directions of Engineer-in-charge. Afterwards, the split/cut PLB pipe are covered with 100mm split RCC pipe of 2m length and sealing the ends of RCC pipe.
Optical fibre cable construction practices

with lean cement solution for protecting bare cable in the manhole. After fitting of PLB Split Pipes necessary back filling/reinstatement and dressing of manholes should be carried out as referred under trenching. The location of the pulling manhole should be recorded for preparation of documentation.

6.2 Jointing/Splicing:

OFC cable drums are usually of 2 kms in length hence optical fibre joints will be approx. at every 2 kms. The 6 / 12 / 24 fibres are to be spliced at every 2 kms. and at both ends (Terminations) in the equipment room as directed by the Engineer-in-charge. The Infrastructure required for cable splicing i.e.

- Splicing machine
- Air Conditioned Van
- OTDR Optical talk set
- Tool kit etc.

Will be arranged by the bidder at his own cost and also any additional accessories. E.g. engine etc. required at site for splicing will also be arranged by the bidder at his own cost.

The optical fibre cable thus jointed end-to-end will be tested by an officer of A/T unit for splice losses and transmission parameters as specified by TCHQ and prevalent at that time. The OF cable should meet all the parameters, specified and no relaxation will be granted.

It should also be ensured that during jointing no fibres are interchanged or broken. The number of joints should not be more than 10% of the theoretical value calculated by the department.

Note: The jointing/splicing of optical fibre cable is an optional item. The DTS units which are equipped for this works should preferably carry out this work departmentally.

7.0 Construction of Jointing Chamber:

The joint chambers are provided at every joint to keep the O.F.C. joint well protected and also to keep extra length of cable, which may be, required to attend the faults at a later date. Jointing chambers are to be prepared normally at a distance of every 2 kms. Actual location of jointing chamber depends on length of cable drum and appropriateness of location for carrying out jointing work. The location is finalized by Engineer-in-charge. The jointing chambers are constructed either of brick masonry work at site & pre cast RCC slabs for covers or by way of fixing pre cast RCC chambers and covers as per the instructions from Engineer-In-charge.

7.1 Construction of brick chamber at site:

For constructing brick chamber, first a pit of size 2mx2mx1.8m depth is required to be dug. Then, base of the chamber is made using concrete mix of 1:5:10 (1: cement, 5: coarse sand, 10: graded stone aggregate 40 mm nominal size) of size of 1.7 m x 1.7 m x 0.15 m (thickness). Walls of brick chamber having internal dimensions of 1.2 m x 1.2 m x 1 m (H) should be constructed on this base having wall thickness of 9" using cement mortar mix of 1:5 (1: cement, 5: fine sand). The bricks to be used for this purpose should be of size 9"x4.5"x3", best quality available and should have smooth rectangular shape with sharp corners and shall be uniform in colour and emit clear ringing sound when struck. The joint chamber should be so constructed that PLB pipe ends remain protruding minimum 5 cms inside the chamber on completion of plastering. The PLB pipes should be embedded in-wall in such a way so that, the bottom brick should support the pipe and upper brick should be provided in a manner that PLB pipe remains free from the weight of brick.
construction. The joint chamber should be plastered on all internal surfaces and top edges with cement mortar of 1:3 (1: cement, 3 coarse sand) 12 mm thick finished with a floating coat of complete cement as per standard. Pre-cast RCC slab with two handles to facilitate easy lifting, of size 0.7 m x 1.4 m and of thickness of 5 cm having one handle for each half in centre and word 'OFC' engraved on it are to be used to cover the joint chamber. Two numbers of such slabs are required for one joint chamber. This pre-cast slab should be made of cement concrete mix of 1:2:4 (1: cement, 2: coarse sand, 4 stone aggregate 6 mm nominal size) reinforced with steel wire fabric 75 X 25 mm mesh of weight not less than 7.75 Kg per sq. meter. The joint chamber is filled with clean sand before closing. Lastly, back filling of joint chamber pit with excavated soil should be carried out up to normal ground level and compacted.

7.2 Pre cast RCC chamber

For fixing pre cast RCC chamber, first a pit of size 2 m x 2 m x 1.8 m depth is required to be dug. Pre cast RCC chamber consists of three parts (i) round base plate in two half of 140 cm dia and 5 cm thickness (ii) full round RCC joint chamber with dia of 120 cm and height of 100 cm and thickness of 5 cm (iii) round top cover will be in two halves with dia of 140 cm and thickness of 5 cm having one handle for each half in centre and word ‘OFC’ engraved on it. (See figure “A”). Pre cast RCC chamber (which is coming in part) should be placed in the pit and parts should be fixed by applying cement mortar. The pre cast RCC chamber will be supplied by the department. After, fixing the pre cast RCC joint chamber, the joint chamber is filled with clean sand before closing. Lastly, back filling of joint chamber pit with excavated soil should be carried out up to normal ground level and compacted.

The work of cable pulling includes the work of cable pulling up to exchange termination point and has to be carried out as per the directions of Engineer-in-charge.

8.0 Fixing Of Route Indicators/Joint Indicators:

Pits shall be dug 1 M. 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 O.F. Cable changes directions like road crossing etc.

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 murrum 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.

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 colours of painting and sign writing is as under:

(1) For Joint Indicator Red.
(2) For Route Indicator Yellow
(3) For Letters White.

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 0. 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.
9.0 **Documentation:**

The documentation, consisting of the following shall be prepared exchange to exchange for intra SSA OFC links and for each section in case of inter SSA/National Long distance routes.

**Route Index Diagrams - General:** This diagram shall consist of Cable Route Details on Geographical Map drawn to scale with prominent land marks and alignment of cable with reference to road. This shall be prepared on **A-3 sheets** of 80 GSM.

**Route Index Diagrams - Profile:** These diagrams will contain:
- Make and size of the cable.
- Offset of cable from centre of the road at every 10 meters;
- Depth profile of Cable at every 10 meter;
- Details of protection with type of protection depicted on it;
- Location of culvert and bridges with their lengths and scheme of laying of PLB Pipe thereon.
- Important landmarks to facilitate locating the cable in future;
- Location of Joints and pulling manholes.

These diagrams shall be prepared on **A-4 sheets** of 80 GSM. On one sheet profile of maximum 400 meters shall be given to ensure clarity.

**Joint Location Diagram:** This diagram will show:
- Geographical location of all the joints.
- Depth of Joint Chamber covers from ground level
- Type of chamber (Brick/Pre-cast)
- Length of O.F. Cable kept inside the Joint chamber from either direction.

This shall be prepared on **A-4 sheets** of 80 GSM.

All the diagrams (i), (ii) & (iii) shall bear the signatures of the contractor, the Engineer-in-charge as a proof of accuracy of the details. The diagrams shall be bound in A-4 size book with cover. The cover sheets shall be of 110 GSM and laminated. The front cover shall have the following details.

1. Name of the SSA/Project Organization.
2. Name of the OFC Link
3. Name of the Contractor
4. Date of commencement of work
5. Date of completion of work

For each route/section 6 sets of above mentioned document shall be submitted

10.0 **SAFETY PRECAUTIONS:**

10.1 **Safety Precautions when excavating or working in excavations close to electric cables**

The Engineer-in-Charge of the work should get full Information from Electricity undertaking regarding any electric cables, which are known or suspected to exist near the proposed excavation and unless this is done, excavation should not be carried out in the section concerned. The electricity undertaking should be asked to send a representative and work should be preceded with close consultation with them.
Only wooden handled hand tools should be used until the electric cables have been completely exposed. Power Cables, not laid in conduits, are usually protected from above by a cover slab of concrete, brick or stone. They may or may not be protected on the sides. It is safer, therefore, always to drive the point of the pickaxe downwards then uncovering a cable, so that there is less chance of missing such warning slabs. No workman should be permitted to work alone where there are electric cables involved. At least one more man should be working near by so that help can be given quickly in case of an accident. If disconnection of power could be arranged in that section it will be better. No electric cables shall be moved or altered without the consent of the Electric Authority and they should be contacted to do the needful. If an electric cable is damaged even slightly, it should be reported to the Electric Authority and any warning bricks disturbed during excavation should be replaced while back filling the trench. Before driving a spike into the ground, the presence of other underground properties should be checked. Information on plans regarding the location of power cables need not be assumed as wholly accurate. Full precautions should be taken in the vicinity until the power cable is uncovered. All electric cables should be regarded as being live and consequently dangerous. Any power is generally dangerous, even low voltage proving fatal in several cases.

10.1.1 Electric shock-Action and treatment:
Free the victim from the contact as quickly as possible. He should be jerked away from the live conductors by dry timber, dry rope or dry clothing. Care should be taken not to touch with bare hands as his body may be energised while in contact. Artificial respiration should begin immediately to restore breathing even if life appears to be extinct. Every moment of delay is serious, so, in the meanwhile, a doctor should be called for.

10.2 Safety precautions while working in public street and along railway lines
Where a road or footpath is to be opened up in the course of work, special care should be taken to see that proper protection is provided to prevent any accidents from occurring. Excavation work should be done in such a manner that it will not unduly cause inconvenience to pedestrians or occupants of buildings or obstruct road traffic. Suitable bridges over open trenches should be so planned that these are required for the minimum possible time. Where bridges are constructed to accommodate vehicular traffic and are done near or on railway property, it should be with the full consent and knowledge of the competent railway authorities.

10.2.1. Danger from falling material:
Care should be taken to see that apparatus, tools or other excavating implements or excavated materials are not left in a dangerous or insecure position so as to fall or be knocked into the trench thereby injuring any workman who may be working inside the trench.

10.2.2 Care when working in Excavations:
Jumping into a trench is dangerous. If it is deep, workmen should be encouraged to lower themselves. Workers should work at safe distance so as to avoid striking each other accidentally with tools. If the walls of the trench contain glass bits, corroded wire or sharp objects they should be removed carefully. If an obstruction is encountered, it should be carefully uncovered and protected if necessary. Care must be taken to see that excavated material is not left in such a position that it is likely to cause any accident or obstruction to a roadway or waterway. If possible the excavated material should be put between the workmen and the traffic without encroaching too much on the road.

10.2.3 Danger of cave in:
When working in deep trenches in loose soil, timbering up/shoring the sides will prevent soil subsidence. The excavated material should be kept at sufficient distance from the edge of the trench or pit. Vehicles or heavy equipment must not be permitted to approach too close to the excavation.
When making tunneled opening, it should be ensured that the soil is compact enough to prevent cave in even under adverse conditions of traffic. Extra care should be taken while excavating near the foundations of buildings or retaining walls. In such cases, excavation should be done gradually and as far as possible in the presence of the owners of the property.

10.2.4 Protection of Excavations:

Excavations in populated areas, which are not likely to be filled up on the same day should be protected by barriers or other effective means of preventing accidents and the location of all such openings must in any event be indicated by red Hags or other suitable warning signs. During the hours from dusk to dawn, adequate number of red warning lamps should be displayed. Supervisory officers should ensure that all excavations are adequately protected in this manner as serious risk and responsibility is involved. Notwithstanding adoption of the above mentioned precautions, works involving excavations should be so arranged as to keep the extent of opened ground and the time to open it to a minimum.

10.2.5 Precautions while working on roads:

The period between half an hour after sun-set and half an hour before sunrise, and any period of fog or abnormal darkness may also be considered as night for the purpose of these instructions, for the purpose of providing the warning signs. Excavation liable to cause danger to vehicles or the public must at all times be protected with fencing of rope tied to strong uprights or bamboo poles at a suitable height or by some other effective means. Any such temporary erection which is likely to cause obstructions and which is not readily visible should be marked by posts carrying red flags or boards with a red background by day and by continuously lighted lamps at night.

The flags and the lamps should be placed in conspicuous positions so as to indicate the pedestrians and drivers of vehicles the full expanse i.e. both width and length of the obstruction. The distance between lamps or between floors should not generally exceed 1.25m along the width and 6m along length of the obstruction in non-congested areas, but 4 metres along the length in congested areas. If the excavation is extensive, sufficient notice to give adequate warning of the danger, should be displayed conspicuously not less than 1.25m above the ground and close to the excavation. Where any excavation is not clearly visible for a distance of 25m in traffic approaching from any direction or any part of the carriageway of the road in which the excavation exists, a warning notice should be placed on the kerb or edge of all such roads from which the excavation or as near the distance as is practicable but not less than 10m from the junction of an entering or intersecting road in which the excavation exists. All warnings, in these should have a red background and should be clearly visible and legible. All warning lamps should exhibit a red light, but white lights may be used in addition to facilitate working at night. Wherever required a passage for pedestrians with footbridge should be provided. At excavations, cable drums, tools and all materials likely to offer obstructions should be properly folded round and protected. This applies to jointers tents as well. Leads, hoses etc. stretched and across the carriageway should be guarded adequately for their own protection and also that of the public.

10.2.6 Traffic Control:

The police authorities are normally responsible for the control of traffic and may require the setting up of traffic controls to reduce the inconvenience occasioned by establishment of a single line of traffic due to restriction in road width or any other form of obstruction caused by the work. As far as possible, such arrangements should be settled in advance. If there are any specific regulations imposed by the local authorities, these should be followed.
10.2.7 Work along Railway Lines:
Normally all works at Railway crossing is to be done under supervision of the railway authorities concerned, but it is to be borne in mind that use of white, red or green flags by the Departmental staff is positively forbidden to be used when working along a railway line as this practice may cause an accident through engine drivers mistaking them for railway signals. When working along a double line of railway, the men should be warned to keep a sharp look on both the "UP" and "DOWN' lines to avoid the possibility of any accident when trains pass or happen to cross one another near the work spot.

10.3. Procedure and Safety precautions for use of explosives during blasting for trenching:
In areas where the cable trench cannot be done manually on account of boulders and rocks, it is necessary to blast the rocks by using suitable explosives. "The quality of explosive to be used depends on the nature of the rocks and the kind of boulders. A few types of explosive uses and detonators normally used for making trenches for cable works are detailed below

i) Gun powder  
ii) Nitrate Mixture  
iii) Gelatin  
iv) Safety fuse  
v) Electric Detonator  
vi) Ordinary Detonator.

10.3.1 Procedure:
A detailed survey of the route is to be clone to assess the length of the section where trenching is to be done with the help of blasting. A route diagram of the rocky section may be prepared indicating the length of the route where the explosives are to be used. For the purpose of obtaining licence, a longer length of route should be given in the application as in many cases, after digging, rocks appear were Wasting was not initially anticipated.

Next a licence will have to be obtained for use and storing of explosive in that section. If the area falls under a police commissioner, the authority for granting such licence is the police commissioner of the concerned area. When the route does not fall in the jurisdiction of a police commissioner, the authority for issuing licence is the District Magistrate.

The concerned authority should be applied in prescribed form with a route map. The concerned authority will make an enquiry and issue a licence for using/storing explosives for cables trenching work. Such licence will be valid for 15 days only. The licence should be got renewed if the blasting operation need to be extended. Once the licence is granted, it is the responsibility of the holders of the licence for the proper use of explosives, its transportation and storing.

10.3.2 Method of using:
The safest explosive is the gelatin and electric detonator. Gelatin is in the form of a stick. Electric detonator is a type of fuse used for firing the explosive electrically. Holes are made at suitable intervals on rocky terrain or boulders either by air compressor or by manual chipping. The depth of the holes should be 2 to 3 ft. Fill up the holes with small quantity of sand for about 6". First the electric detonator is to be inserted into the gelatin and the gelatin to be inserted into the holes keeping the + ve and -ve wirings of electric detonators outside the holes. Again refill the holes with sand. These + ve and -ve insulated wires of detonator are than extended and finally connected to an EXPLODER kept at a distance of not less than 100m.

Now the explosive is ready for blasting. But, before connecting wires to exploder for blasting, all necessary precautions for stopping the traffic, use of red flags, exchange of caution signals, etc., should be completed and only then Exploder should be connected and operated.
10.3.3 Operation of exploder (IDL schaffler type 350 type exploder):
The type 350 Wasting machine consists of a bearing block with blasting machine system and the explosion proof light - alloy injection moulded housing. The exploder is held with the left hand. The twist handle is applied to the drive pin, clapped with the right hand turned in the dock wise direction in continuous measurements at the highest speed from the initial position until it reached to a stop. At this stage an indication lamp will glow. When the indication lamp glows, "press button switch" should be pressed. This will extend the electric current to detonator and gelatin will be detonated. The rock will be blasted cut of the trench. Number of holes can be blasted in a single stroke by connecting all such detonators in series connection and finally to the exploder. After blasting, again mazdoors are engaged on the work to clear the debris. If the result of the first blasting is not satisfactory, it should be repeated again on the same place.

10.3.4 Warning:
There may be two reasons for unsatisfactory results of the blasting:
(a) Misfire of gelatin due to leakage of current from detonator.
(b) Over loading because of overburdens.

Never pull the broken wire pieces from the holes in such cases. Attempt should not be made to re-blast the misfired gelatin. The safest way is to make a fresh hole by its side and put fresh gelatin in that hole and blast it.

10.3.5 Precautions:
The abstract of Explosives Rules 1983 which are relevant to our work is given below: Restriction of delivery and dispatch of explosives:
No person shall deliver or despatch any explosives to any one other than a person who.

(a) is the holder of a licence to possess the explosives or the agent of a holder of such a licence duly authorised by him in writing on his behalf.

(b) is entitled under these rules to possess the explosives without a licence.

The explosives so delivered or dispatched shall in no case exceed the quantity, which the person to whom they are delivered or dispatched is authorised to possess with or without a licence under these rules. No person shall receive explosives from any person other than the holder of a licence granted under these rules. No person shall receive from or transfer explosives to any person for a temporary storage or safe custody in a licensed premise unless prior approval is obtained from the Chief Controller.

A person holding licence for possession of explosives granted under these rules shall store the explosives only in premises specified in the licence.

Protection from Lightening During Storing:
Every magazine shall have attached there to one or more efficient lightening conductors designed and erected in accordance with the specification laid down in Indian Standard Specifications No. 2309 as amended from time to time. The connections to various parts of earth resistance of the lightening conductor terminal on the building to the earth shall be tested at least once in every year by a qualified electrical engineer or any other competent person holding a certificate of competency in this behalf from the State Electricity Department. A certificate showing the results of such tests and the date of the last test shall be hung up in conspicuous place in the building.
Optical fibre cable construction practices

Precautions during thunder-storm:
When a thunder-storm appears to be imminent in the vicinity of a magazine or store house every person engaged in or around such magazine and store house shall be withdrawn to a safe distance from such magazine or store house and the magazine and store house shall be kept closed and locked until the thunder storm has ceased or the threat of it has passed.

Maintenance of records:
Every person holding a licence granted under these rules for possession, sale or use of explosives shall maintain records in the prescribed forms and shall produce such record on demand to an Inspection Officer.

Explosives not to be kept in damaged boxes:
The licensee of every magazine or store house shall ensure that the explosives are always kept in their original outer package. In case, the outer package gets damaged so that the explosive contained therein cannot be stored or transported, such explosives shall be repacked only after the same are examined by controller of explosives.

Storage of explosives in excess of the licensed quantity:
The quantity of any kind of explosives kept in any licensed magazine or store house shall not exceed the quantity entered in the licence against such kind of explosives. No explosives in excess of the licensed quantity shall be stored in the magazine or store house unless a permit in this behalf is obtained from the licensing authority by a letter or telegram.

10.3.6 Precautions to be observed at Site:
The electric power at the blasting site shall be discontinued as far as practicable before charging the explosives. No work other than that associated with the charging operations shall be earned out within 10 metres of the holes unless otherwise specified to the contrary by the licensing authority.

When charging is completed, any surplus explosive detonators and fuses shall be removed from the vicinity of the hole and stored at a distance which should prevent accidental detonation in the event of a charge detonating prematurely in any hole. The holes which have been charged with explosives shall not be left unattended till the blasting is completed. Care shall be taken to ensure that fuse or wires connected to the detonation are not damaged during the placing of stemming materials and tamping.

• Suitable warning procedure to be maintained:
The licensee or a person appointed by the licensee to be in charge of the use of explosives at the site shall lay down a dear warning procedure consisting of warning signs and suitable signals and all persons employed in the area shall be made fully conversant with such signs and signals.

• Precautions to be observed while firing:
The end of the safety fuse (if used in place of a detonator should be freshly cut before being lighted. The exploders shall be regularly tested and maintained in a fit condition for use in firing. An exploder shall not be used for firing a circuit above its rated capacity. The electric circuits shall be tested for continuity before firing. All persons other than the shot-firer and his assistant, if any, shall be withdrawn from the site before testing the continuity.

For the purpose of jointing, the ends of all wires and cables should have the insulation removed for a maximum length of 5 cms. and should, then be made clear and bright for a minimum length of 2.5 cms. and the ends to be joined should be twisted together so as to have a positive metal contact. Then these should be taped with insulation to avoid leakage when in contact with earth.
In case of blasting with dynamite or any other high explosive, the position of all the bore holes to be drilled shall be marked in circles with white paint. These shall be inspected by the Contractor’s agent. Bore holes shall be of a size that the cartridge can easily pass down. After the drilling operation, the agent shall inspect the notes to ensure that drilling has been done only at the marked locations and no extra hole has been drilled. The agent shall then prepare the necessary charge separately for each bore note. The bore holes shall be thoroughly cleaned before a cartridge is inserted. Only cylindrical wooden tamping rods shall be used for tamping. Metal rods or rods having pointed ends shall never be used for tamping. One cartridge shall be placed in the bore note and gently pressed but not rammed down. Other cartridges shall then be added as may be required to make up the necessary charge for the bore hole. The top most cartridge shall be connected to the detonator which shall in turn be connected to the safety fuses of required length. All fuses shall be cut to the length required before being inserted into the holes. Joints in fuses shall be avoided. Where joints are unavoidable, a semi-circular niche shall be cut in one piece inserted into the niche. The two pieces shall then be wrapped together with string. All joints exposed to dampness shall be wrapped with rubber tape.

The maximum of eight bore holes shall be loaded and fired at one occasion. The charges shall be fired successively and not simultaneously. Immediately before firing, warning shall be given and the agent shall see that all persons have retired to a place of safety. The safety fuses of the charged holes shall be ignited in the presence of the agent, who shall see that all the fuses are properly ignited.

Careful count shall be kept by the agent and others of each blast as it explodes. In case all the charged bore holes have exploded, the agent shall inspect the site soon after the blast but in case or misfire the agent shall inspect the site after half an hour and mark with red crosses (X) over the holes which have not exploded. During his interval of half an hour, nobody shall approach the misfired holes. No driller shall work near such bore until either of the following operations have been done by the agent for the misfired boreholes.

a) The contractor’s agent shall very carefully (when the tamping is a damp clay) extract the tamping with a wooden scraper and withdraw the primer and detonator.

b) The holes shall be cleaned for 30 cm of tamping and its direction ascertained by placing a stick in the note. Another hole shall then be drilled 15 cm away and parallel to it. This hole shall be charged and fired. The misfired holes shall also explode along with the new one.

Before leaving the site of work, the agent of one shift shall inform the another agent relieving him for the next shift, of any case of misfire and each such location shall be jointly inspected and the action to be taken in the matter shall be explained to the relieving agent.

The Engineer-in-Charge shall also be informed by the agent of all cases of misfire, their causes and steps taken in that connection.

10.3.7 General Precautions:

For the safety of persons red flags shall be prominently displayed around the area where blasting operations are to be carried out. All the workers at site, except those who actually ignite the fuse, shall withdraw to a safe distance of at least 200 meters from the blasting site. Audio warning by blowing whistle shall be given before igniting the fuse.

Blasting work shall be done under careful supervision and trained personnel shall be employed. Blasting shall not be done within 200 meters of an existing structure, unless specifically permitted by the Engineer-in-Charge in writing.

Precautions against misfire:

The safety fuse shall be cut in an oblique direction with a knife. All saw dust shall be cleared from inside of the detonator. This can be done by Wowing down the detonator and tapping the open end. No tools shall be inserted into the detonator for this purpose.
If there is water present or if the borehole is damp, the junction of the fuse and detonator shall be made water tight by means of tough grease or any other suitable material. The detonator shall be inserted into the cartridge so that about one-third of the copper tube is left exposed outside the explosive. The safety fuse just above the detonator shall be securely tied in position in the cartridge. Water proof fuse only shall be used in the damp borehole or when water is present in the borehole.

If a misfire has been found to be due to defective fuse, detonator or dynamite, the entire consignment from which the fuse, detonator or dynamite was taken shall be got inspected by the Engineer-in-Charge or his authorised representative before resuming the blasting or returning the consignment.

10.3.8 Precaution against stray currents:

Where electrically operated equipments is used in locations having conductive ground or continuous metal objects, tests shall be made for stray current to ensure that electrical firing can proceed safely.
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 I: dagmnt1_ind@rediffmail.com.
LAYING PRACTICES OF OPTICAL FIBRE CABLE BY HORIZONTAL DIRECTIONAL DRILLING (HDD) METHOD

1.0 SCOPE

1.1 This Engineering Instruction deals with the methods to be adopted in laying of PLB HDPE pipes for Optical Fibre Cable using Horizontal Directional Drilling (HDD - also called as the trench less technology or micro tunnelling) and laying of Optical Fibre Cable using the cable blowing method. The following laying practices may be adopted by the field units. This EI exclusively deals with the HDD only and only a few references are given with respect to conventional open trench method. However for regular open trench OF cable laying work involved in between HDD works, the EI issued by T&D circle vide ‘Local Area Network OF cable D-001 dated 11-07-2005’ along with the latest amendments may please be referred.

2.0 GENERAL

2.1 BSNL 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 non-metallic, 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.

2.2 Now BSNL corporate office has been deploying high count fibres with fibre count starting from 48F to 576F (48F/96F/144F/288F/576F). Large scale deployment is planned in the current year and in future as fibre is going to be the ultimate medium for most of the access technologies. Normally all these high count cables are ribbon fibre cables with 12Fibers in one ribbon.

2.3 These cables are being laid in the important cities under the Overlay Access Network Project, which is the fibre infrastructure project of BSNL. This shall support the Gigabit Passive Optical Network (GPON)/Gigabit Ethernet Passive Optical Network (GE-PON), the Fibre to the Home (FTTH) equipment being introduced in 2006-07. These cables are laid in multiple ducts using Horizontal Directional Drilling (HDD) or the conventional Open trenching method.

Fig-1

2.4 HDD may be deployed mainly within the corporation / municipality limits of the District Head Quarters. Further, deployment may be as per the local...
requirement as mentioned in para 2.6 also. The HDD deployment may be justified financially with reference to the right of charges to be paid to the local authorities for the open trenching and other associated expenditure.

2.5 Multiple ducts used in HDD should essentially have different colours. More than twelve different colours are prescribed for laying in the Overlay Access Network.

2.6 The HDD may also be used for the water canal crossings, highway crossings and railway crossings also. These crossings may be made as part of the open trench work itself after exactly assessing the crossing requirement.

2.7 The areas of the deployment of HDD and the Conventional open trenching should be indicated clearly in the preliminary survey report of the OF cable route proposed. Financial justification is to be incorporated in the survey reports. The SSA heads/GM (Projects) may approve the areas of the deployment as per the above guidelines.

2.8 PLB pipe coils of one Km length shall be economical and result in less wastage in HDD deployment.

2.9 **HDD Operation:** The operation of HDD is explained in the Annexure – II.

![HDD operation](image)

**Fig-2**

3.0 **DETAILED SURVEY:**

3.1 Following alternatives should be considered after techno-economic evaluation to meet the planned objectives of the scheme.

3.1.1. The HDD is normally deployed in the soft soils only. HDD deployment in rocky areas and laterite soils may be very expensive and hence may not be financially viable. In addition, HDD operation in rocky areas shall be extremely slow. Thus only in soft soil areas this technology may be deployed.
3.1.2. Deployment of HDD may be the choice in congested roads where open trenching is not possible (mainly in District Head Quarters). In addition, in some states/cities Black Top roads, Pre-stressed Cement Concrete roads are made from end to end leaving no margin for PLB pipe laying by open trenching.

3.1.3. Ease of obtaining the right of way by deployment of HDD for laying the OF cables may be another reason for deploying this method. Very low charges may need to be paid where this technology is deployed. The charges for the Manholes, which are being installed as part Overlay Access Network (OAN), may needs to be paid additionally. The OAN plan is as given below in Fig.3.

3.1.4. Survey may be done on the roads having maximum number of business buildings, commercially important customers and with a good number of potential customers.

3.1.5. The routes proposed can include various main exchanges/RSUs/RLUs/DLCs/GSM BTS sites/WLL sites/LAN Switches/DSLAMs/Broadband DLCs/STM-1 CPEs/Ethernet Media Converters etc.

3.1.6. The en-route Commercially Important Customers and the buildings of interest which are though little away from proposed main route may also be covered in the survey and dropping of OF cable may be planned through outdoor FDMS and Customer Premises FDMS.

3.1.7. Multiple ducts may be planned depending on the potential customers and bandwidth demand. Uniform number of ducts per city may be planned, instead of planning varying number of ducts in different routes in the same city.

3.1.8. High count fibres may be planned so that the ultimate capacity of the ducts and the cables to be laid shall meet the demands of the future access technologies.
3.1.9. Fibre to the home (FTTH) technologies such as GE-PON and GPON are being introduced in the network. Hence the planning of the fibres needs to be done as per the ultimate customer demand.

30 Mtr Coil for every cable in every Manhole

3.1.10. The route survey may be done by planning the manholes / new buildings for OF cable terminations on main route or housing the terminations in the existing exchange buildings on the routes.

3.1.11. Ground Probing Radar (GPR) may be used, to identify the Cable duct path and the proposed manhole locations, in the roads where the under ground assets are densely located.
3.1.12. The approximate location of the manhole and the length of the route should be clearly recorded in the report.

3.1.13. The number of coloured PLB pipes proposed to be laid should be recorded along with the approximate quantity required. 5% additional pipe length may be taken as the requirement for executing the work. Please refer the Annexure-IV for the details of the additional pipe requirement.

3.1.14. For maintenance purpose 5% more additional pipe provision may be made in the report.

3.2 Cable laying

3.3 After deciding above mentioned issues a detailed measurement of lengths of cable route along with the details of rail / road crossings, culverts, causeways etc. may be recorded in the detailed survey register. The probable location of joints, terminations and leading-in may also be decided and marked on the road map.

3.3 On the basis of surveys, general permission from road and rail/local authorities for laying the Optical Fibre Cable along the suitable roads and at particular rail/road crossings will have to be obtained. Generally OF Cable may preferably be laid straight as far as possible along the road near the boundaries, away from the burrow pits/when the OF Cable is laid along the National Highways, Cable should run along the road land boundary or at a minimum distance of 15 to 30 meters from the centre line of the road where the road land in wider.

3.4 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 the centre line of road and with standard depth below the road surface.

3.5 In the cities where the Overlay Access Network (OAN) is being planned, the OF cable alignment may be planned on the footpath or along the edge of the road. Manholes may also be located along the alignments.

4.0 Associated points:

4.1 Soil Categorisation:

Soil is categorized only under two broad categories i.e. “Rocky” and “non 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 chiselling. All other types of soils shall be categorised as “Non rocky” including Murrum & soil mixed with stone or soft rock. However for the purpose of execution of trenching contracts, project authorities may classify the soil in the more than one group and decide
contractual obligations suitably. HDD may be deployed in the soft soils only. Only in the exceptional cases the HDD technology may be used in other soils. This may be done with the consent of the head of the circle.

4.2 Types of pipe to be used for Optical Fibre Cable:

Optical Fibre Cables should be pulled or blown through 50mm/40 mm/32 mm (outer dia) PLB HDPE pipes having strength of 10 kg/cm². The HDPE PLB pipe meets the specification as given in GR No. G/CDS-05/01 DEC 94, shall only be used for laying the OF Cable. Wherever GI pipes or R.C.C. pipes are used for protection, the two ends of the pipe should be properly sealed to protect HDPE PLB 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.

4.3 All depths should be measured from the top of pipe. However the depth is considered acceptable if its is not less by more than 8 cm from the specified depth of 1.5 m in non rocky soil and 0.9 m 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 m in non-rocky / rocky soil and 0.5 m in case of rocky soil.

5.0 TRENCHING and DRILLING:

Major specifications for trenching are:-

(i) Normally depth of the drilled portion should be more than 250 cm. This depth may be achieved at a distance of 10 meters from the leading edge of the proposed Manhole.

(ii) Manhole to be opened for the entry pit and the exit pit shall be minimum of 1.5 x 1.5 x 1.7 mtrs. ( Fig 5). The general manhole design guidelines are available in Annexure-III. Both entry and exit pits are opened before drilling is commenced.

(iii) Drilling wherever possible, should be at the road boundary and as far as possible, straight.

Fig-6
(iv) Where 4 PLB pipes are less are to be laid, 100mm dia bore may be done by the HDD machine. Where 5 to 8 PLB pipes are to be laid, 200 mm dia bore may be done by the HDD machine.

(v) The machines should be capable of drilling for minimum 150 mtrs at a time without fail in the soft soil. The drill lengths of 200 to 250 mtrs are also desirable. In general, the machines with 10 tonnes or more thrust capacity are having the capability for this purpose.

(vi) The depth at the entry pit shall be 165 cms. For achieving this depth in the manhole a pilot entry pit shall be opened with min 20 cm depth for enabling the drill pilot to enter. (Figure-2 & 7). The pilot entry pit shall be at least 4 meters away from the manhole.

(vii) Whenever curves or deviations are encountered it should be a very smooth curve, the deviations should not be more than 100 cm from the mean line joining the centre of entry pit and the centre of the exit pit. A nylon wire shall be fixed between these two pits before the drilling operation commences, for identifying the deviations.

(viii) After the drilling operation commences, the depth and offset of the pilot is to be recorded at every 3 mtrs using the hand held tracker. The tracker should have been properly calibrated. The offset of the drill shall be recorded with reference to the edge of the road and also the deviation with reference to the mean line represented by the Nylon rope on the ground.

(ix) The depth, deviations and offset readings may be provided by the machine automatically, apart from the manual records made.

(x) 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 levelling should be inspected for uniformity to ensure that pipe could be laid without sharp bends.

(xi) In exceptional case, the depth of the trench could be less than 2.50 m due to undulating terrain. However, in no case it should be less than 1.20m.

(xii) In certain cases, in a uniform terrain a sudden burrow pit/old culvert of short length might be encountered. In such case, the HDPE pipe can be further protected by GI/RCC pipes of suitable size.

(xiii) In water logged area drilling should be done in the dry areas and dewatering should be got done before pipe laying.

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

(xv) When trenching is undertaken along streets and railway lines safety precautions given in EI lines and cables underground should be observed.
(xvi) Caution boards should be provided at each entry, exit and pilot pit of the trench to caution the traffic. Caution tapes/red flags may also be planted around the working area throughout the drilling path. This is essential to track the drill pilot with the tracker and to record the accurate depth and offset.

(xvii) If the manholes are to remain open at night red lamps or luminous caution boards on either ends should be provided.

(xviii) After the pipe laying is completed, bed of manhole may be prepared for constructing the RCC manhole (please refer the OAN guidelines issued in December 2003 also available on the intranet). After the manhole is constructed the PLB duct is ready for laying the OF cable.

(xix) It is very much necessary to use the ground penetrating radar to localizing other utilities in the absence of accurate documents depicting the position of other utilities. Hence, the ground penetrating radar is a must during survey and as well as while carrying out the job to follow the path of the horizontal drilling.

(xx) All the trenching drilling operations are to be continuously monitored by the SDE (Project). SDE(Mtce) should also visit the site during the execution.

6.0 Laying/Construction practices.

6.1 In cross-country routes: Open trenching

6.1.1 Optical Fibre Cables shall be laid in the trench through PLB 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 provisions 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.

6.1.2 HDD may not be deployed in the cross country areas. It may be deployed only for the water canal crossings, Highway crossings and Railway crossings. Exceptional cases where the HDD needs to be deployed may be decided by the DGM(Project) after recording the same suitably.

6.1.3 A minimum depth of 0.90 is achieved in case of rocky soil. In case of non-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 of 1.00 meter from top of pipe shall be maintained. Wherever the minimum depth of 0.9 M in rocky soil cannot be adhered to, depth can further be reduced up to 0.5 M but for such cases CGM projects should grant relaxation on specific recommendation of GM(Proj) concerned who have visited the site. In all such cases where the depth is less than 0.9m, mechanical protection by reinforced concrete casing should be provided. The size of concreting may vary as per the number of PLB ducts are being laid simultaneously.

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

6.1.5 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.
6.1.6 Where rocky soil is encountered for a distance of 50 meters or less, the cable depth will be maintained at 1.5m in case of adjoining non-rocky soil.

6.2 In built up areas

6.2.1 City/Town, urban areas falling within municipal /Corporation limits 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 DGM ( Project ) and DGM (Mtce Region). In case the works are being executed by the territorial circle, DGM(Planning) and DGM ( Circle Transmission Mtce) shall decide the protection.

6.2.2 On ducted routes
Optical fibre cables may be laid through the existing ducts wherever the concrete 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 W.I. pipe / RCC pipe should be provided at the entry and exit of the duct till the cable is buried to a depth of 1.5 m. The above is applicable in town or any other ducts laid cross country.

6.2.3 On Non-ducts routes

6.2.3.1 PLB pipe laying may be done as per the approved detailed survey report.

6.2.3.2 Open trenching: As the non-ducts routes in built up areas are more vulnerable to faults due to cables/pipes of other services laid close to BSNL cables, it is essential to take special care while laying optical fibre cables on these routes. The OF cable shall be laid through PLB HDPE pipes at a depth of 1.5m, and additional protection by suing 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 1.00 in non rocky soil and 0.9 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 DGM in-charge 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 of suitable size shall be provided.

6.2.3.3 HDD: The pipe laying shall be done as described in 5.0. Due to intangible underground hindrances / old buried structures, HDD work may be converted as the open trenching work. DET (Project) or the DET who is the in-charge of the work should inspect the site and record the reasons for the same. Where the PLB pipe is to be laid at deeper depths (more than 350 cm), DET in charge should inspect the site and record the reasons.

6.3 On Culverts / bridges over Nullahs:

6.3.1 Nullahs dry for nine months in a year:
The cable shall be laid at 1.5 m depth below the bed of nullah through HDPE pipe and protection provided by using RCC pipe of minimum internal dia of 100 mm. The RCC pipe shall extend 2 M minimum beyond the end Nullah on either side. Depth of 1.5 m can further be reduced depending on nature of soil and other conditions in accordance with para 6.1 & 6.2 with a view to minimize the damage to the OF cable 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.

6.3.2 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 options may be adapted depending upon side conditions. On approach roads to these bridges/culverts also, protection by using RCC pipes shall be provided for 2 M on both sides.

6.3.3 On rail bridges /crossings:
On rail bridges / crossings the optical fibre cables shall be laid through HDPE pipe which shall be encased in split able cast iron / RCC pipe as prescribed by Railway authorities.

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

7.0 PIPE LAYING:

7.1 PLB pipes are uncoiled from the PLB coils using the roller jack mechanism. Removing the pipes from the coil in this manner will avoid the coil effect, which makes the pipes to wind in curls even though the pipes are laid straight.

7.2 Pipes may be cut from the original coil using the duct cutter only.

7.3 The pipe may be laid in the most economical manner. The total length of the PLB pipes left unused may not be more than 5% of the length measured between the centre of the two manholes(entry pit and exit pit).

7.4 The start reading and the end reading for each PLB pipe shall be recorded by the Engineer-In-Charge.

7.5 The pipes may be laid in the manholes so that the bunch of pipes shall overlap on the pipes laid from the other side.

7.6 Push-fit couplers may be used for joining the PLB pipes.

7.7 Open Trenching:
For pulling the cable manually through the pipes, it is necessary to have suitable manhole made at every 200 M length and at suitable bends and corners. The construction of manhole hole and jointing man hole is shown below. Please refer annexure-III for the design guidelines of manhole for OAN works. The pipes are laid for 200 M or less, at a time, depending upon the distance between two manholes. For a 200 M trench 200 M length of 40 mm PLB pipes of continuous length and two end plugs are required for laying one duct. The PLB HDPE pipe shall be sign written with indelible red paint as
'TTD' with mark of telephone. In addition for closing the ends of the two extreme end pipes 2 special types of caps are also needed. A 4 mm polypropylene rope could be drawn through the pipes and safely tied to the caps at either end with hooks. These 4 mm ropes are to be provided throughout the route which could serve to pull the 12 mm rope which is ultimately required to pull the cable. Indicators are not required as the manhole provide the identity for the PLB ducts. Cuddapah slabs/ Stone Slabs/RCC slabs may be used as a protection measure for these multiple pipes. Necessary offset diagrams are also required indicating the distance from the centre of the road. The depth of the trench is also to be recorded.

7.8 HDD: The multiple PLB pipes are bunched together at the exit pit. At every one meter length, the pipes are bundled using the flexible iron wire tightly. The end plugs shall be tightly fixed on both ends. Chinese fingers are to be used as the pulling grips for all these bundled pipes. All the Chinese fingers shall be combined and tightened together to connect to the back reamer of the HDD machine. The machine pulls the pipes towards it. After the pipes are pulled out for about one and half meter from the drill entry point in the Entry pit which is near the HDD machine, the pipes may be de linked from the back reamer. The Chinese fingers may be detached from the PLB pipes. Leaving one and half meter length of the bunch of pipes in the exit pit, the additional pipes may be cut and necessary.

7.8.1 During execution, in many cities where soil is sandy or otherwise not compact, the maximum length of drilling and subsequent pipes pulling is less than even 100 meters. So, while execution all the lengths of pipes are brought to road surface, keeping them peep about 1 ft. when subsequently they are lowered down at the depth of the trench, they are cut and thus there is wastage of pipe.

**Leading out Arrangement in Manhole**

![Fig-8](image-url)
7.9 Duct Integrity Test: Continuity of the pipe is to be tested and ensured. It is quite possible that the pipe may get elongated and its bore may get reduced in the process of pulling up the pipe which may ultimately result into difficulty in pulling cables. The DIT should be conducted after the pipes are laid either in open trench method or in the HDD method for verifying this problem. The DIT involves two tests. In one test one side of the PLB pipe laid is sealed using the end plug. On the other side air compressor/blower is used to hold the 5 Kg/cm-cm pressure in side the pipe under test. The pressure should be held for 1 hour without any leakage. In the second test a wooden bullet having 80% of the diameter of inner diameter of PLB pipe and having a length of 2 inches may be blown from one side of the PLB pipe. The other side of the pipe shall be left open. The bullet should fly out without any blockage. Then the PLB pipe laying is successful. Care should be taken by covering the end of the PLB pipe with a nylon/wire mesh so that the flying bullet shall not hit any one.

7.10 Protection of ducts: No protection is required for pulling pipes in HDD method.

8.1 Laying of pipes on bridges, culverts, etc.

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

8.1.2 If the bridge or culvert is broad and is having sufficient cushioning, the pipes can be buried inside the cushioning.
8.1.3 if the bridges / 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.

8.1.4 If the supporting pillars are having projects and between pillars the distance is less, then the pipes (HDPE with GI encasing could be laid over the pillar projections.

8.1.5 If the 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, glass wool 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.

8.1.6 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 bridges.

8.2 ROUTE INDICATORS:

8.2.1 In the Overlay Access Network, since manholes are placed at every 200 mtrs, no route indicators and joint indicators are required. Indicators may be used where the manholes are below the road surface and cannot be identified. Usage of a small brass/steel plate (15 X 15 cm) with all the offset/route details embedded on it may be used to fix/clamp to the nearest road margin wall. Where manholes are not placed at every 200 mtrs are less, route indicators may be used. The manhole indicators as suggested in clause 7.7 above may be used.

8.2.2 The G.I. indicators in square plate shape with base of 10"x10" of suitable thickness may be provided at every manhole and as may be required. These plates may be fixed on the wall against the manhole. The route details, RID details of Manhole may be painted or embedded on the plate. Its bottom portion should be kept 30 cms mm above the ground level. In future electronic markers shall be used for route indicators.

8.3 JOINT INDICATORS:

8.3.1 The G.I. joint indicators embedded in concrete similar to that of RI may be provided at joint locations and may be buried is 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.

9.0 DEPTH A/T.
9.1 Two types of Depth AT are proposed. Traditionally Depth AT is done after PLB pipes are buried. While deploying HDD, it may be required to carry out the Depth AT simultaneously. In case the machine deployed is capable of providing the automatic depth, deviation and offset details depth AT can be conducted at a later date also. The DET A/T of the respective area shall decide on the method of A/T to be followed in consultation with the DGM A/T of the respective area.

**Traditional Depth AT**

9.2 Before the cable is actually pulled through the pipe, the project circle should offer the route for A/T of the depth and position for 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.

9.3 The route diagram should be prepared and made over to the A/T unit in advance. The HDD machine recording of the depth deviations authenticated by the division head is to be provided to the A/T unit. The A/T unit will specify the sports roughly two per km for checking of depth and position of the cable, sound laying practices 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 metre. For checking position of the cable, standard survey tapes will be used.

9.4 If the pipe is found to be at a depth less than prescribed, OF cable 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.

9.5 Duct Integrity test should be carried out as specified at 7.9.

9.6 Duct sealing is also to be tested. One end of each of the duct should be closed at the air pressure should be maintained at constant rate of 5Kg/mt2 for 5 mins. The pressure leakage should not be more than 1% in these 5 mins. All the laid pipes must be sealed used the end plugs.

9.7 Cable sealing plugs must be used for sealing the PLB pipes in which OF cables are laid. Cable sealing test is also conducted for the ducts where the cable is laid.

9.8 The duct integrity test and duct sealing test shall be carried out for all the ducts laid.

**Concurrent Depth AT**

10 At present there is no specification for conducting depth A/T for HDD. However acceptance testing is offered by considering the Depth graph given by the site incharge at entry / exit points of bore. Taking the test pits will be difficult as the Bore line is passing through tarred / concreted and congested areas. Test pits may be taken where ever feasible and earthen surface is available. For acceptance test pits may not be permitted in city areas since it involves digging to a depth of 2 mts. To 3 mts. Hence depth AT may also be done while the work is in progress. During the execution, on intimation, the
AT-incharge may inspect the site and measure the depths of the duct at four places which are at least 20 mtrs away from each other. This shall be in addition to the depth of the drill at the entry pit or the depth of the duct at the exit pit.

10.1 Duct Integrity test should be carried out as specified at 7.9.

10.2 Duct sealing is also to be tested. One end of each of the duct should be closed at the air pressure should be maintained at constant rate of 5Kg/mt2 for 5 mins. The pressure leakage should not be more than 1% in these 5 mins. All the laid pipes must be sealed using the end plugs.

10.3 Cable sealing plugs must be used for sealing the PLB pipes in which OF cables are laid. Cable sealing test is also conducted for the duct where the cable is laid.

10.4 The duct integrity test and duct sealing test shall be carried out for all the ducts laid.

11 General Instructions on AT of the OF cable laying by HDD are available at Annexure-I.

GENERAL PRECAUTIONS

10.1.1. The optical fibre cable drums should be handled with utmost care. The drums should not be subjected to shocks by dropping etc. The drum should not rolled along the road for long distance 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.

10.1.2 The previously laid pipes, manholes and portion of bends etc. on the cable route as per records maintained at the time of laying pipes, should be got cleaner of earth and the pipes may be cleaned thoroughly before pulling of cable is started.

10.1.3 Depending upon the length of the drum (1 km / 2 km) and cooling 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 manhole location, a separate manhole 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 2 M x 2M are also to be kept ready for pulling purposes.

10.4 As the cable drums are standardized for 2 km, it is preferable to lay the cable by placing the cable drum at the manhole point nearest to 1 km from the joint locations.

10.1.5 The standard practice is 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 clock wise 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.

10.1.6 The rope end is to be fixed at one end of a swivel ( Antitwist 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.

10.1.7 As the cable length is 2 km, during cable laying work, proper communication
is to be established. This can be done with walkie talkies or magneto
telephones with drop wire.

11.0 Precaution against damage by termites & rodents : in the rodent prone areas
Optical Fibre 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 1 kg. is to be mixed in an approximate
2 kg of sand and applied around the optical fibre cable joint enclosures.

12.0 CABLE LAYING:

12.1 Cable laying is proposed either by traditional Cable pulling method or by
Cable blowing method.

12.2 Cable pulling:
12.2.1 List of tools & other items required for cable laying is given below.

This can be taken as a check list.
a) Jack- One pair.
b) Rope for unloading / loading/unloading.
c) Cable winch.
d) Cable winch.
e) Nylon rope drum of 1250 M ( For machine pulling).
f) 4 mm rope.
g) Swivel and shackle.
h) Pulling socks or cable grip.
i) Lubricant.
j) Plastic bowls for lubricant.
k) Sponge.
l) Walkie-Talkie 6 Nos. or
m) Magneto
n) Drop wire 2 kms. ( for magneto).
o) Rubber 2 / manhole.
p) Half round (split) pipes 2 /manhole.
q) Polythene tape 5 m/manhole.
r) Clamps 4 /prs./manhole.
s) Cleaning brush for cleaning pipes.
t) Mandrill.
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.

12.2.2 The pulling of the cable can be done in three ways:

a) By cable winch.
b) By cable winch assisted by manual pulling at intermediate manholes.
c) By manual pulling at all the manholes.

12.2.3 For manual pulling, the rope may be attached to a 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.

12.2.4 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 man-hole. The standard lubricants with low frictional coefficient may be used.

12.2.5 As soon as 1 km 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 metre cable may be the maximum requirement.

12.2.6 Laying the remaining half of the cable:

a) Take out the winch to the other end if machine pulling is done.
b) Uncoil the cable and make the formation of 8. This should be done manually with sufficient care and minimum bending radius.
c) 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.
d) Repeat the process of pulling the cable by winch or manual with special attention to lubricant supervision and coiling the overlapping length in the pit.
e) The mouth of the HDPE pipes at every manhole is closed by rubber bushing. This is mainly required for prevention of rodent entry.
f) The cable at the intermediate manholes are to be covered by split 65 mm OD 10 kg/cm² HDPE pipes, covered with polythene tapes and clamped at 4 places. Thereafter re-instatement of the manholes is to be done.

12.3  Cable blowing:-

12.3.1 LAYING OF PERMANENTLY LUBRICATED HDPE TELECOM DUCT

BY BLOWING TECHNIQUE

SCOPE

This EI describes the procedure for lying of PLB HDPE TELECOM DUCT. Telecom Duct is an advanced pre-lubricated duct system. Lubricants are built into a durable polymer base. Duct has a low coefficient of friction and the built in lubricants do not diminish with age.

12.3.2 ADVANTAGES OF DUCT SYSTEMS

Duct systems may provide several significant advantages:

HDPE Telecom Duct provides the mechanical protection to the Optic Fibre Cable and eliminates the need for armoured cable, which is more expensive. The combination of the un-armoured cable and the HDPE duct offers a better cable protection system as compared to the armoured configuration.

- Empty ducts can be placed during initial construction for future use when more fibre optic capacity is needed, this eliminates the entire re-digging / construction process against and again. This reducing future upgrade costs.
- With HDPE duct it is possible to access the cable from manhole at any time. It is therefore not necessary to re-dig and block off streets and pathways, which is both time consuming and expensive.

It is possible to install longer cable lengths into HDPE Telecom Duct with fewer splicing points in the network. This saves money and time on installation. Fewer splicing points along the cable route also offers better transmission parameters. Fewer splices mean less down time during the network's lifetime. Most faults requiring maintenance appear at splice points. Significant savings, both immediate and long term, are achieved by limiting the number of splice points. Limiting the no. of splice points increase the transmission quality of the fibre optic network.

- When encountering defective cable or if the cable does not meet the capacity of one's bandwidth needs, it is possible to withdraw existing cables and replace them with different cable. Removed cables can be reused in other parts of the network with lower bandwidth needs. With HDPE Telecom ducts this process can successfully be executed without digging the earth. This can be achieved simply by opening two manholes. HDPE Telecom Ducts ensures the same technical
conditions related to the ease with which cable can be inserted or withdrawn from the system regardless of whether this action is taken after 10 days or 10 years of the proper installation of the duct system.

12.3.3 DUCT UNLOADING AND LOADING

Different ways of unloading the HDPE Duct:

- Using ways of unloading the HDPE Duct:
- When using a boom truck to unload the Duct Coil, place a bar through the reed / coil arbour, then attach a chain to the bar. DO NOT wrap the chain around the duct to lift the coil.
- Open the tail board of truck, carrying coil and put wooden or metallic planks at appropriate places, slopping from the floor of the truck to ground Roll down over these planks to rest on ground.
- Duct coil can also be dropped from the floor of truck on sand or soft soil bed of about 12" height or more.

12.3.3.1 DUCT MOUNTING

- Place "Flange No. 1" of Collapsible Steel Reel on ground.
- Put Duct Coil on "Flange No. 1" evenly in such a way that all holes of Flange No. 1 are accessible for fixing the traverse Bars from inner space of Duct Coil.
- Place "Flange No. 2" on top of the coil and fix it in a place by tightening them with Traverse Bars by means of bolts and nuts.
- Lift the Reel with the Coil and mount it on proper Jack Stand with the help of a strong iron shaft passing through the centre of the Collapsible Reel.

12.4 DUCT INSTALLATION

For installation ducts in an open trench, use of the methods described below:-

12.4.1 Manual Laying

This method is efficiently used when installing single duct in an open trench or when there are many obstructions like trees etc along the route.

Steps in manual laying:
Place the Jack Stand along the sides of the trench.

- Observe correct drum position i.e. duct should be uncoiled from the bottom of the drum by anticlockwise rotation of the drum. NOT from the top of the drum.
- Drive the reel slowly to avoid spinning of reel while pulling HDPE Duct for installation.
- Unroll the duct to the required length spacing the workers after every 15-20 mtrs.
12.4.2 Multi Duct Laying: Foreseen Duct Laying

Whenever it is foreseen that in future more no. of cables will required, a 110 mm PVC Duct can be laid and 4 nos. of sub duct can be pulled, which can be tighten by Anchor block at the end of PVC pipe.

- In long distance network this 110 mm pipe can be buried directly in the Sand, and in the Built up areas it can be encased in the 200x200x200 MM Cement Concrete.
- 3 to 4 Kms length of OF cable reel is recommended to reduce the no. of splices.
- Coordination can set-up with Central / State government authorities, that while construction of Bridges / Culverts, provision of 8 to 10 Ducts of 110 mm.
- The cost of the same can be born by BSNL.

12.4.3 Moving Trailer Method.

This method is most efficiently used when path of duct does not contain any road bores, utility crossings and other obstructions that require the duct to be placed under or pulled through without unloading it.

- Mount the duct on the reel.
- Fix the Jack Stand properly on the trailer.
- Mount the duct along with the reel on the Jack Stand.
- Secure the cut end at the desired start location.
- Move the trailer slowly along the trench route pay out the duct and avoid over spinning of the reel.

12.4.4 Attaching Mechanical Pulling Machines to HDPE Telecom Ducts.

This method is suitable for laying multiple ducts simultaneously. In this method duct is pulled by mechanical pulling machine with the help of Pulling device that is fitted in-between duct and mechanical pulling machine. Two types of pulling devices commonly used are:

I) Pulling Grip:

These offer excellent means of pulling ducts. Grips are made of high quality galvanized steel stand to assure long life.

- Apply compressible bands of tape to HDPE ducts before installing the grip. Make the bands more than 1/16” thick using friction, vinyl or duct tape. Make these bands one tape width wide.
- Start first band of tapes about 6-8 inches behind the cap on the duct end. Remember to keep the duct capped.
- Start the second band of tape 6-8 inches behind the first band the grip will shorten when you stretch it to fit over the duct. Add bands until you have covered the length of duct, the grip will cover.
- Pass the grip over the capped duct end and bands of tape. Apply tape on the grip.

II) Thread-In-Pulling eye:

These are used to pull HDPE duct, when properly sized and installed, these eyes will not pull out from duct.

12.5 Procedure For Duct Laying Using Pulling Devices and Mechanical Pulling Machines.

- Mount duct coil on Collapsible Steel Reel (Refer to Procedure For Duct Mounting).
- Put the duct, wound on collapsible still reel, on a rigid Jack Stand with the help of a strong iron shaft passing through the centre of collapsible steel reel.
- Connect one end each of multiple ducts (already mounted on collapsible steel reel) to the pulling devices (pulling grip / pulling eye).
- Attach ducts (connected to pulling devices) to Multiple Pulling Harness.
- Connect the multiple pulling harness to suitable Mechanical Handling Machine (Excavator, Jeep etc.).
- Move the Mechanical Handling Machine along the side of trench, while unwinding duct from collapsible steel reel. Feed the ducts directly in to the trench without entanglement so that duct are laid without crisscrossing.

12.6 Duct Laying In Culverts, Bridges, Railway Crossing And Rivers:-

12.6.1 Duct Laying in Culverts / Bridges:

In culverts without earth cushioning or less cushioning, the wheel guard (kerb) may be broken and G.I. pipe is fixed and kerb is rebuilt enclosing the G.I. pipe. HDPE DUCT can be pushed or pulled through the G.I. pipe. At slopes, G.I. shall be enclosed in brick masonry chamber for better protection. At curves flexible G.I. shall be used.

NOTE: Do not use plastic couplings inside the G.I. pipe.

If the kerb is of RCC and where breaking is not permitted, 150 mm x 150 mm concrete chamber shall be constructed on kerb to enclose the G.I. pipe.

If neither of above method is possible, a G.I. pipe should be clamped to the outside of parapet wall.
12.6.2 At railway crossings, mole or Directional Boring system is used for boring hole under railway track and G.I./C.I. pipe is introduced through the hole. Always use a bigger diameter G.I./C.I. pipe at railway crossing so that one can use it in future when traffic increases.

13. **PLACEMENT OF DUCT INTO AN OPEN TRENCH**

- When placing the duct into an open trench, the bottom of the trench must be reasonably flat, free of horizontal and vertical bends, and free of stones and debris. If surrounding soil contains sharp stone or other materials, the duct should be insulated with a protective layer of fine sand (approximately 5 to 10 cm under and above the duct).
- Place the duct as straight as possible. In case of any directional changes, keep the bending radius as big as possible. A min. bending radius, which is 10 times the outer diameter of the duct, is to be maintained.

Vertical and horizontal winding in the trench directly lowers the distances. The cable can be pulled or blown.

- When duct takes a vertical position, it is important to support the duct to prevent damage or kinking during restoration. To accomplish this, compact the soil under and behind the bend.
- Use backfill to make rapid changes more gradual.

During transportation and storing at the site duct, it is necessary to seal the ends of the duct with the proper End caps against water penetration or other impurities. Sand, soil or water and other impurities significantly increase the friction between the duct and the cable out sheet.

- When installing duct into an open trench from a drum, correct drum position should be observed. Duct should be uncoiled the bottom not from the top of the drum.
- When placing multiple ducts in a single trench simultaneously, it is important not to cross or twist the ducts inside the trench. When installing large quantities of ducts it is possible to stack them one on top of the other in addition to side by side. However, positioning of the ducts must be designed in the planning stage to ensure clarity between duct placement.
- When placement of the duct is over and connections of duct ends are deferred to a later stage, it is advised to overlap duct ends by one meter from each side. Both ends of the duct must be properly sealed with End Plug to prevent water, dust or any other foreign articles from entering into the duct.
- Duct can be placed into an open trench either directly from a drum or temporarily laid along side the trench and placed later on. It is not recommended to hang ducts on fences, barriers, etc.
When crossing the rivers and streams, duct is typically buried 120 cm below the riverbed. Vertical bends required to descend to this depth below the river floor must be executed as gradually as possible to ensure optimal cable installation lengths.

When crossing bridges, HDPE Telecom Duct can either be bound directly to the bridge frame or it can be pulled within a Metal/PVC/Concrete pipe fixed to the bridge frame. As always, sharp bends should be avoided. An ideal installation should have only gradual bends.

- Pump out water, if any, from the trench before placement of duct.
- Whenever tree roots are found in the trench, make sure to lay the duct under tree roots and not above.
- Place the duct along the trench as straight as possible. Tightly close the ends of the ducts with self tightening End Plug to that no dirt, dust or moisture enters into the duct.

14 DUCT SPACER

When multiple ducts are placed in a single trench, it is better to use Duct Spacers so that ducts do not cross each other inside the trench. Duct end connections: There are two main choices for connecting duct ends: 1. metal-non-reusable connectors or 2 plastic-reusable Couplers. Metal connectors made of Aluminium are recommended when installing sub duct into a main duct system. This type of metal connector is not typically water or airtight. It is recommended to use heat shrink sleeve over metal cover to ensure water tightness and to protect against corrosion. The Plastic Couplers are re-usable and versatile, however, they double the outer diameter of a duct, which can cause problems in a main duct system. They may still be used in a broad spectrum of installation situations. They are pressure tight and water tight, can withstand a minimum pressure of 10bar.

15 The installation of Metal Connectors

Metal connectors have clockwise threads in one half and counter clockwise threads in the other half of one continuous piece of metal. This design enables the engineer to tighten both duct ends to the connector simply by twisting the connector in one direction.

15.1.1 Cut the duct at the same place where they overlap. The cutting of two duct ends should match up perfectly. Each end must be chamfered with a deburring toll in both the outer and the inner diameter ends. This is to prevent any sharp duct ends from catching the cable as it shoots through the HDPE Telecom Duct.

15.1.2 Mark duct on the duct ends before attaching the connectors to see how much of the duct will enter to the centre of the connector.
15.1.3 Push on the heat shrink sleeve and put both ends of the duct into the connector.

15.1.4 Tighten metal connectors with an installation tool in the direction of the arrow until the marked point is reached.

15.1.5 Centre the heat shrink sleeve over the connector. Heat the sleeve with a heat source such as a blowtorch until it shrinks tightly over the metal connector. Heat should be applied from the centre of the sleeve towards the ends. When using the heat shrink, follow the instructions from the manufacturer. Let the finished heat shrink cool for approximately ten minutes.

15.1.6 The installation of plastic coupler.

Cut the duct at the same place where they overlap, in such a way that the duct end matches with each other perfectly because it is very important for the Coupling joints to be airtight. Proper pipe shears or cutters must be used for smooth cutting. Do not use a hacksaw to cut the duct.

15.1.7 Debar both the inside and the outside edges of the duct with a debarring tool.

15.1.8 Apply a small amount of proper lubricant ( liquid detergent ) for better installation of plastic Couplers.

15.1.8 Tighten the plastic coupler with C-Spanner.

15.2 END PLUG

- Close the ends of duct with End Plugs so that moisture, dirt and dust do not enter the duct.
- It seals the duct ends completely and prevents air, moisture from entering the duct, even when it is laid underground.
- Further, interior surface of empty ducts also remains clean even after several years.
- Inspect the Neoprene Rubber for various defects such as pinholes, cuts, etc. In case of any such defect, replace the rubber gasket with a new one.

15.3 Simple Plug

- When the cable is already installed inside the duct, seal the duct with “SIMPLE PLUG”.
- It also saves the cable from dust, dirt, moisture etc. and increases the life of cable, since the contact with moisture is eliminated.

15.4 Duct Cutters and C - Spanner
16. METHODS FOR FIBRE OPTIC CABLE INSTALLATION INTO HDPE DUCTS.

The two most common methods are generally used for installation of O.F. Cable into HDPE Telecom duct, which are:

1. Cable Pulling.
2. Cable Blowing.

16.1 Cable Blowing

This advanced method is based on the concept of a consistent high-pressure airflow, equally distributed along the entire cable throughout the duct. The cable is mechanically fed into the pressurized space to overcome the pressure drop at the entry point. The additional pushing force at the entry point is important to increase the total blowable length. A cable jet-blowing machine is combination with an appropriate Compressor is essential for optimal blowing. For an effective Cable Blowing at an average speed of 50-60 meter/min. the Compressor should have the following parameters:

16.1.1 Factors Influencing the Blowable Length:

- Inside diameter of the duct.
- Outside cable diameter.
- Cable weight.
- Coefficient of friction between cable sheath and duct inner surface.
- Number of slopes.
- Cable stiffness
- Compressor parameters.
- Straightness of route.
- Degree of winding of the duct in the trench.
- Ambient temperature.

16.1.2 Blowing Chamber & Manholes:

I) These Chambers at a distance of 1 Km, are required. The size of the Blowing Chamber is 3m x 1m x 1.5m (length x width x depth). These Blowing Chambers are temporary Chambers and are refilled after accomplishing the blowing operation.

II) Joint Pit:

These are required at the termination locations. The distance of the Splice Chambers depends upon the length of the Optic Fibre Cable being used. Generally 2 Kms. length of Optical Fibre Cable is used. However, in developed countries, 4/6 Kms. of Optic Fibre Cable lengths are used. Pit size must be chosen carefully, taking into account length of Splice Closure and cable loop required for splicing and future repair. Joint Pit is always greater...
than Splice Closure length plus twice the minimum bending radius of the cable. A pit length of 1 metre is sufficient for most of the splice closures. Generally, size of the manhole is 1.5 m x 1 m x 1.65 (length x width x depth).

16.1.3 The basic Rules and Recommendations for Blowing Cable into HDPE Telecom Duct:

Use a proper compressor, Never underestimate the compressor parameters.

Ideally, internal diameter (I.D.) of the duct should be 2 times the outer diameter (O.D) of the cable. For appropriate duct size please refer the following table:

<table>
<thead>
<tr>
<th>S.No</th>
<th>Outer Dia of O.F. Cable (mm)</th>
<th>Recommended Duct-Size (O.D/LD)mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>9.0-12.5</td>
<td>32/26</td>
</tr>
<tr>
<td>2</td>
<td>13.0-16.0</td>
<td>40/33</td>
</tr>
<tr>
<td>3</td>
<td>16.5-20.0</td>
<td>50/42</td>
</tr>
</tbody>
</table>

16.1.4 Before starting the Cable blowing, be sure that duct is free of any obstacles or damage. Use a proper mandrel equipped with a transmitting device. This method will quickly locate the damaged areas if any, which must be replaced immediately.

16.1.5 When cable blowing is carried in high temperatures, protect cable from direct sunlight where possible. High temperature drastically reduces blowable lengths.

16.1.6 The blowing method is far less sensitive to bends and curves along the route compared to the pulling technique. When using state-of-the art HDPE Telecom Duct and Cable jet blowing machines, it is possible to safely install fibre optic cable around 30° to 90° bends without any additional lubricant.

16.1.8 Before beginning the cable blowing survey the route to determine the best locations, for access points for blowing machines and compressors. This can save considerable materials and labour. Always blow downhill wherever possible. Up-hill slopes located at the beginning of the route reduce the blowable length.

16.1.9 The blowing technique can be used in almost any situation and reduces costs relative to the pulling method in many cases, blowing exerts less stress on the cable.

16.1.10 This lowered stress combined with fewer splices to the fibre optic cable increases overall network quality.
16.1.11 The average blow able distance with one machine ranges between 700 and 2000 metres depending on the above-mentioned parameters. Longer utilizing several blowing machines in tandem can accommodate blowing lengths, positioned in a series of access points along the route. Another technique for achieving extra long cable installation, distances is to access, the cable at manholes like 8 then pull out the cable and continue installation from this point along the route.

17. HOW TO REPAIR DAMAGED HDPE TELECOM DUCT

The HDPE Telecom duct system can be damaged during the construction activities of other utilities or agricultural activities, if the duct route is not traced properly, or when executing agencies do not respect the importance of tracing the duct route. Often people who dig the trenches or construct the main duct, route damage existing communications networks, because they have not properly identified the location of the underground network, before digging. Duct can be damaged either when empty or white housing optic fibre cable. The methods to repair these two possible situations are quite different.

17.1 How to Repair Empty Duct:

The location of the damage should be excavated for three meters along the troubled area. The manhole must be big enough, including width, for labourers to work comfortably.

- Cut off the damaged part of the duct.
- Prepare the same length, same size, and same colour of spare length.
- Debar the ends of both ducts entering the manhole and the two ends of the new piece. Connect the joints with plastic Couplers.
- Place locator or markers on the newly placed Couplers and enter this data into any relevant documentation.
- Place the Coupler into the ground and cover with fine sand or soil. Place warning tape and cover with earth when finished.
Annexure-I

General Instructions on the Acceptance Procedure for OF cables laid by HDD

Following are the major observations/tests to be conducted during Acceptance testing of OFC by HDD method.

1) Check at entry/exist pits:-

i) As far as feasible, the A/T representative should be called during start of HDD operation. At the entry pit proper protection should be provided if the depth of duct is less than prescribed depth.

ii) It may be ensured that proper caution boards and other barricades are provided to prevent any accidents during HDD operation.

iii) It may be ensured that at entry and exist pit duct is brought to proper level manually and joint with coupler.

iv) The Route Index Diagram (RID) of HDD duct route made with the help of tracker should be verified with reference to various landmarks on the duct route.

v) The cable route indicator to be provided suitably on the pavement or walls depending on the feasibility. In case of normal trunk route the route indicators to be provided on each manhole.

vi) The reference of other operators existing in the near vicinity should also be indicated in the RID.

vii) The duct at the lowest depth and the maximum depth of the duct should also be recorded. If A/T is done concurrently then tracking of ducts can also be verified with the help of tracker & preparation of RID.

2) Check of manholes:-

Verifying the following major points with reference to manholes:

i) Check that the construction of manholes is as per the drawing & design approved by the competent authority (verify size/depth etc).

ii) Please ensure that duct is having proper hangers for keeping the coil of slack OFC.

iii) Ensure that unused ducts are provided with end caps.

iv) Check that proper holes are provided at suitable depth for taking the fibre to different buildings as per the requirements.

v) Ensure the proper placement of FDMS and proper workmanship to ensure the fault free operation.

vi) Suitable arrangements are made to avoid entering water and mud in the manhole.

vii) Check of provision of manhole numbering plate properly fixed at the manhole or imbedded on nearby wall or pavements with suitable direction and distance for easy location of manhole on sides of manhole.

viii) Ensure that spare OFC cable is coiled with one meter Dia roll and hanged properly.

ix) Record the depth of PLB duct at the manhole (it should be more than 1.65 meters).
3) Duct Integrity Test (DIT):
   
   i) Conduct the Duct Integrity Test from manhole to manhole or for specified duct length as per instructions already given in paras above.
   
   ii) Please ensure that the ducts are laid with proper colour code as specified for OAN (Overlay Access Network).

4) Check of proper documentation
   
   i) Please ensure that proper RID is made and the duct route is drawn on the geographical map to the extent feasible. In later projects GIS based route map may also be floated.
   
   ii) Please ensure that in less depth case if any are covered by relaxation by competent authority and proper mechanical board is provided as per the standards laid by BSNL.
   
   iii) Please also record the routes of other operators if any and details of distance from out duct route for future reference.

5) Check of HDD laid duct on bridges and culverts:

6) Provision of site register

---

**Annexure-II**

**HDD Operation**

**Contents**

- Horizontal Directional Drilling (HDD)
- Applications Of HDD
- Project Planning
- HDD Tooling
- Locating
- HDD Fluids
Horizontal Directional Drilling (HDD)

HDD Overview: Horizontal directional drilling is an excellent alternative to traditional utility installation methods. Unlike manual labor, trenching or excavation, the HDD process is highly suitable in urban areas or places where aboveground obstructions exist that are expensive, inconvenient or impossible to disturb for product installation. HDD machines install utilities under obstacles such as roads, rivers, creeks, buildings and highways — with little or no impact to the aboveground surface.

Drill Rig: Horizontal directional drilling machines are available in many sizes. Regardless of a machine’s size, it has three main functions — rotation, forward thrust/pullback and fluid flow.

HDD Process: Horizontal directional drilling machines will bore under or around obstacles. Once the drill path is planned, an underground pilot bore is performed utilizing a series of drill rods connected to a drill head. After the pilot bore is completed, a back reamer is attached to the drill string that enlarges the drill path to accommodate the product that will subsequently be pulled into place. Vermeer NAVIGATOR horizontal directional drilling machines can install product under roads, buildings, railroad tracks, streets, rivers, creeks and in congested underground areas.

Steering: Steering refers to control of the direction of a drill path. The shape of a drill bit on the drill head allows an operator to change the drill path direction during a bore. When an operator points the drill bit downward to the 6 o'clock position and pushes the drill head forward, the drill head goes deeper. When the drill faces the 12 o'clock position, the drill head will rise. Pushed to the 9 o'clock position, the head goes left. Pushed to the 3 o'clock position, the head goes right. If no change in drill path is needed, the drill head and rod are rotated while thrusting.

Locating: Prior to starting a bore, the drill head is equipped with a transmitter that sends signals to an aboveground receiver during the bore. The drill head’s location must be tracked during a bore in order to provide steering position information to the HDD operator.
Backreamers
When a pilot bore is complete, the drill head exits the drill path and a backreamer is attached. Utilizing drilling fluid and the drill string, the backreamer is pulled back through the path to enlarge it to accommodate the product that will be pulled into place. Sometimes prereaming is performed to incrementally enlarge the drill-path wall. The installation product is then attached to the drill string and pulled into place. Many backreamer styles and sizes are available for different ground conditions and product sizes.

Mud Flow
Mud flow is an important component of the HDD process. Mud flow is created by pumping a combination of water and specialized drilling fluid additives through the drill rod and head (or backreamer). The drilling fluid then mixes with soil in the drill path and creates a flowing slurry back out of the path as the product pipe is pulled into place. Mud flow cools the transmitter housing in the drill head, suspends cuttings to help prevent product pipe from getting stuck during the bore and seals the bore to help prevent fluid loss and bore wall collapse.

Applications Of HDD
Applications Overview
The horizontal directional drilling process has several distinct advantages over other methods of utility product installation. The HDD process offers precise installation, minimizes traffic interruption and excavation, and eliminates the need to dig up roads and disturb commercial interests.

Project Planning
Project Planning Overview
Prior to starting an HDD project, certain steps should be taken to ensure that you are performing the bore as efficiently as possible.
Safety
A thorough understanding of all safety and operating procedures is necessary to successfully operate an HDD. Each HDD unit is equipped with an operator’s manual in a protected storage location. It is essential to study this manual before using the HDD unit.

Exposing Utilities
Location and exposure of utilities must be completed prior to starting an HDD project. Locating underground utilities and obstacles before beginning a project will help to ensure the final success of a bore. Ground-penetrating radar systems (GPR) can be used in conjunction with traditional locating techniques to help provide more accurate production of underground information.

Machine Setup
Proper placement of the machine prior to starting the project can greatly affect the efficiency of your bore. The HDD unit must be placed at the job site with care to ensure that the maximum depth of the bore can be obtained without overstressing the drill rods or the product being installed. The Vermeer Terrain Mapping System is available to help map geographical conditions at the job site. Information from the Terrain Mapping System can also be uploaded directly to software to help ensure proper machine placement.

HDD Tooling

Tooling Overview
Tooling is an essential component of the HDD process. Because tooling is subject to wear, choosing high-quality tooling for your HDD unit will help keep your projects more productive in the long run. Specialty tooling is also available for applications like rock and sewer. Customized tooling created to fit your work environment is available by special order.

Drill Rod
Drill rod is designed for pushing drill heads and pulling backreamers and new product through the drill path. They are made with a hollow center to allow drilling fluid to flow through the rod, into the drill head or backreamer and out into the bore path. Drill rod has an allowable bend radius which determines how much it can be steered to produce the desired drill path. The bend radius is specific to each rod length and diameter.

Drill Heads
A drill head connects to the end of the drill rod and houses the locating transmitter and cutting bit. Drill heads also transfer drilling fluid from the drill rod to the drill bit. Drill heads can be connected to the drill rod using a connection system or hex collar connection system. A variety of drill heads is available for use in different ground conditions and applications.
— For use in standard dirt-based soil conditions.
— For use ranging from standard soil conditions to softer rock formations.
— For short- to mid-range use in solid rock formations.
— For use with bores involving wire line, gravity sewer or extended-battery operation.

Drill Bits
A drill bit attaches to the drill head and accomplishes the cutting action during a bore. There are many drill bits available for various underground conditions. Vendors offer a large variety of drill bits, several of which include standard bits for use in normal soil conditions and carbide-tipped and carbide-fragmented bits for tougher, more abrasive soil conditions.

Backreamers
There is a large variety of backreamers available for various soil conditions. The primary function of all backreamers is to prepare the bore path by cutting, shearing and mixing soil and drilling fluid into a flowing substance called slurry. When pulling product into place, the size of the backreamer used is larger than the outside diameter of the product(s), creating a flowing slurry between the bore path wall and product(s).

Pipe-Pulling Accessories
Pipe-pulling accessories are used to enhance the performance of a product pullback and project efficiency. Several commonly used pipe accessories include:

• Swivels — Prevent product from twisting while being pulled into the bore path.
• Pipe pullers (including pull grips, expanding taper pullers and carrot-type pullers) — Allow product to be pulled into the bore path.

Locating

Locating Overview
The type of locator most commonly used in HDD is a walkover system. The walkover system consists of a transmitter and a receiver. This type of system allows the user to walk over the top of the drill head with a receiver that interprets signals from the transmitter in the drill head. Information from these transmissions allows the user to determine the position of the drill head and displays several important pieces of information including pitch, roll, depth and location. This information is then relayed to a remote screen at the machine for the operator to see.

Depth/Position
To determine location of the drill head, the receiver uses signal strength from the transmitter in the drill head to indicate its depth and position. The depth and position information is displayed on the locator screen.
Roll
Roll is the rotary position of the drill head. It is indicated by a clock-face reading. Roll is very important when making a steering correction. When the operator of the drill rack faces the direction that the drill is advancing, 12 o'clock means the drill head will steer upward, 6 o'clock indicates a downward thrust, 9 o'clock is left and 3 o'clock is right. A bit can be positioned to move two directions at the same time by choosing a clock position in between any of the main clock positions. Example: 2 o'clock would cause the drill head to move mainly to the right, but a little upward as well.

Pitch
Pitch is the inclination of the drill head and can be expressed either in degrees or as a percentage of slope. If the pitch is zero, the drill head is level. If the pitch is minus, then the drill head is pointed down. A positive pitch indicates the drill head is pointed up. By knowing the pitch, you can calculate how much depth change there will be.

HDD Fluids

Fluids Overview
Drilling fluid is a mixture of water and specialized additives used in the drilling process. Drilling fluid cools the drill head and transmitter, lubricates the drill string and product being pulled back and suspends drill path cuttings into a slurry which flows out of the drill path as the product pipe is pulled into the bore path. A key requirement of drilling fluid is the ability to stay in the drill path without dissipating into the surrounding soil. The type of drilling fluid used depends upon the type of soil at the HDD project site.

Soil Types
Soils can be placed into two general categories — coarse and fine. Coarse soils consist of sands and gravels. Fine soils are comprised of clay. Coarse soils are non compactable and allow water to flow freely into the formation. Fine soils will usually prevent water from flowing into the formation, but have a strong tendency to become sticky and swell when mixed with water. It is possible to have a soil type that is a mixture of these two general types.

Fluid Additives
Depending upon work-site soil conditions, certain additives are mixed with the drilling fluid.

- Bentonite is added to drilling fluid that will be used in coarse soil types. Bentonite forms a filter cake around the bore wall to prevent drilling fluid from dissipating into the surrounding soil.

- Polymers and surfactents are used for fine soil types. Polymers reduce swelling of the soil and lubricate the drill path to reduce friction on the drill stem and product.
Pullback Volume
The amount of drilling fluid used on an HDD project is equally important to the type of drilling fluid used. Your objective is to have enough fluid to allow cuttings (slurry) to flow out of the drill path as it is displaced by the product being installed. The size of the drill path and soil conditions should be considered when determining pullback fluid volume. To determine the amount of soil in a bore path, the following formula should be used:

**Metric:**
Reamer in inches squared then divided by 2 = liters per meter.
Liters per meter multiplied by meters of drill path = liters of soil in bore path.

**English:**
Diameter of backreamer squared then divided by 24.5 = gallons per foot.
Gallons per foot multiplied by feet of drill path = gallons of soil in bore path.

Enough drilling fluid needs to be added to the drill path to create a flowable slurry. As a general rule, the minimum amount of fluid required will produce a 1:1 ratio of drilling fluid to soil in the bore path. In some ground conditions like dry, reactive clay, a higher ratio of drilling fluid to soil is required.

A leading cause of failed or stuck bores is not using enough drilling fluid. The pullback volume formula will assist in planning how much drilling fluid will be required at the job site.

**Pullback Speed**
Patiently pulling in product and using enough drilling fluid will contribute greatly to ensuring a successful pullback. After determining how much drilling fluid will be used per meter (foot), it is helpful to multiply this measurement by the length of drill rod being used to determine the volume of fluid that will be needed per rod. Dividing total volume per rod by the volume of fluid pumped per minute will provide a minimum pullback time for that rod.

In some cases, the pumping capability of a unit could theoretically reduce pullback time to a minimum. It is extremely important that the pullback is slow enough to allow proper mixing of drilling fluids and soil in the bore path.
Ground Probing Radar

GPR operation

Entry Manhole

Exit Manhole

5 mtrs

GPR
Annexure-III
Manhole design aspects

RCC MH COVER SLAB- FRONT VIEW

15CM

120CM

40CM

Top view

KEY HOLE AND KEY ARRANGEMENT

BSNL
2004

120CM

40CM

MS CHANNEL 150 X 75 X 6 MM
Reinforcement & Cement Concrete Mix Details for MH Cover Slabs

CEMENT CONCRETE 1:1:2
(1Cement: 1 Coarse Sand: 2 Grade stone
Aggregate of 12.5MM nominal size)
WITH 12 MM REINFORCEMENT AND 10 X 10 CM GRID

RCC MH BOTTOM PLAN OF COVER SLAB

RCC MH SECTION 'AA' VIEW

1.5" dia MS pipe welded to bolt head
1.25" dia bolt 5.5" length welded with flat

MS CHANNEL 150 X 75 X 6 MM
CEMENT CONCRETE
1:1:2 (1 CEMENT
1:COARSE SAND
2:GRADED STONE
AGGREGATE OF SIZE 12.5MM

15 CM
MS SHEET 18 GAUGE WELDED TO CHANNEL
5CM WIDE
FLAT WELDED TO CHANNEL

D2

120cm
160cm
(4no x 40cm)
15cm Thickness
ENGINEERING INSTRUCTIONS

MILD STEEL COVER SLAB LIFTING KEY

HORIZONTAL SECTIONAL VIEW OF RCC MAN HOLE

190CM

160CM

30CM

30CM

SUMP 30 X 30 CM

100CM

D4

D5
FRONT ELEVATION OF RCC-MH

D6

FRONT ELEVATION OF RCC-MH

D7
RCC MH CROSS SECTIONAL VIEW - 1

RCC MH CROSS SECTIONAL VIEW - 2
1.5" DIA MS PIPE
THREADED INSIDE

1.5" DIA MS ROD
THREADED OUTSIDE

2.5" WIDTH 6MM
MS FLAT

NOTE: ONE HOLDER ASSEMBLY
TO BE PROVIDED ON THE OTHER
TWO WALLS OF THE MH EACH
ONE MT AWAY FROM THE WALL
DIAGONALLY OPP SIDE

RCC MH CABLE ENTRY

CABLE ENTRY
WITH 150MM GI PIPE
50MM GI-4NOS
Manhole under construction in Chennai
Open trench: Protection – Stone slabs, RCC Half cuts to be incorporated.

**ABBREVIATION:**
1. FTTH: Fibre to the Home
2. GE-PON: Gigabit Ethernet Passive Optical Network
3. GPON: Gigabit Passive Optical Network
4. GPR: Ground Probing Radar
5. HDD: Horizontal Directional Drilling Method.
6. OAN: Overlay Access Network
7. RCC: Reinforced Cement Concrete

**Glossary**

**Backreamer:** a cutting/mixing tool attached to the end of the drill string that is pulled and rotated through the pilot bore to enlarge the drill path.

**Backreaming:** the process of pulling and rotating a cutting/mixing tool through the pilot bore to enlarge the drill path.

**Bentonite:** a form of powdered clay used to contain fluid in the drill path.

**Bore path/drill path:** a path made in the ground by drilling or pushing the drill rod and drill head.

**Boring/drilling:** The process of creating an underground path for the purpose of product installation.

**Drill bit:** the cutting tool that attaches to the front of the drill head. It mounts to the head at an angle. This angle is what provides steering capability when pushing the drill string.
Drill head: tooling that is connected between the drill rod and drill bit. The drill head houses the locator transmitter.

HDD: the abbreviation for the process of horizontal directional drilling; the abbreviation for a horizontal directional drilling unit — horizontal directional drill.

**Horizontal Directional Drilling**: The process of using a steerable cutting head attached to the end of a rotating drill rod string to bore through the earth in a horizontal direction.

Lineman’s boots: insulated boots worn by HDD crews to help protect against electrocution hazards.

Locator: unit that reads the signal from the transmitter. The unit provides location, pitch, roll and depth information.

Locating: the process of collecting underground information from a transmitter to determine the position, pitch and depth of the drill head.

Pilot bore: the initial path created in the ground during the process of directional drilling.

Pitch: a measurement identifying the drill head’s angle of ascent or descent.

Planning/setup: the process of preparing equipment and information for a drilling project.

Polymer: a compound that enhances gel strength, lowers filtration rate and increases lubricity.

Pullback: the process of installing product in the drill path.

Steering/roll: control of the direction of a drill path; the rotary position of the drill bit. It is indicated by a clock-face reading.

Slurry/mud: a flowing substance comprised of soil and drilling fluid.

Probe/transmitter: an electronic device that fits inside the drill head and sends out a signal used to locate and determine the depth, pitch and position of the head.

Thrust: occurs when the drill stem is pushed into the ground without rotating.

Utilities/product: The service, pipe or material that is installed underground to carry water, gas, fiber, cable, electric, sewer, etc.

**REFERENCE:**

- Recommendation of the committee of BSNL Corporate Office, vide Letter No. 35-9/04 -TPL (OF) (Pt.) Dated 16/10/06.