



GAUHATI UNIVERSITY
Gopinath Bordoloi Nagar: Guwahati 781014: Assam: India

NIQ No.: _GU/G/3680E___, Dated __22-11-2016

**Notice Inviting Quotation
For
Supply, Laying, Integration and Maintenance
of
Optical Fiber Cable,
Academic Area, Gauhati University**

Important Dates:

Issue of NIQ: 31-12-2016

Late date and Time: 18-1-2016 12 noon Quotation Opening: 18-1-2016 3 PM

1. Name of work: **“Supply, Laying, Integration and Maintenance of Optical Fiber Cable, Academic Area, Gauhati University”**
2. Tender No. : **GU/G/3680E___, Dated __22-11-2016**
3. Validity of the Offer: 100 (One Hundred) Days
4. Completion Period: 90 (Ninety) Days,
5. Processing fee- Rs. 500/ vide DD drawn in favour of Registrar, GU

SCOPE OF WORK -

Gauhati University intends to build Optical Fiber Cable Network interconnecting Departments and Offices within the Campus to the Central Network Center located at Department of Computer Science, Gauhati University.

Vendors, joint ventures/consortium, companies, or authorized entities of companies, who are with adequate expertise and experience for similar works may participate in the quotation process for consideration for selection.

The following terms and conditions in brief will be applicable:

1. Two Bid Procedure: The quotation must be in a two-bid system. All technical documents, along with the supporting documents in conformity of the terms and conditions are to be in a sealed envelop to be marked as “Technical Bid”. Price quotations for various components clearly indicating the amount quoted, various tax

- components etc. must be in the second envelop to be marked as “Price Quotation”. Both the envelopes are to be put in a single envelope and to be sealed and submitted to the Registrar, Gauhati University.
2. Only registered vendor with proper registration of Companies/Trades/Services, and for applicable Taxes of the Government can participate. Necessary documents must be enclosed.
 3. At least 3(three) similar work contract in Educational Institutes and/or Government Organization and/or Telecom Sector in previous 3 years is required.
 4. The Vendor should have atleast one work order of value 60% of the current quoted value.
 5. At least 1(one) similar work with successful implementation and completion certificate from the customer must be produced.
 6. Bidders should have an experience of operation and maintenance of Optical Fiber Cable for Telecom Operators. Successful execution certificates to be provided from clients.
 7. The OFC work indicated in the tender document is tentative. Actual requirement may vary as per site survey and finalization of sites.
 8. EMD in form of DD in favour of Registrar, Gauhati University, payable at Guwahati for an amount of 2% of the total quoted value must be submitted, and to be put in the Price Quotation envelope.
 9. The last date of submission of quotation is _____, 2016, _____ AM. The quotations will be opened on the same day at _____ PM. Representatives of the participating vendors may attend the quotation opening meeting to be held in the office of the Registrar, GU.
 10. Rates must be quoted module/item wise.
 11. Payment will be made 90% after successful implementation and 5% after completion of 1 year and 5% after completion of 3 years.
 12. The solution should be supported and maintained for 3 (three) years without any additional cost of maintenance. Before placing the Work Order a MoU has to be signed mentioning the terms and condition with respect to OFC maintenance for 3 years.
 13. All other terms and conditions will be as per the GU rules and regulations.
 14. All products are to be quoted with applicable taxes.
 15. Site survey to be done by the bidder at their own cost at a predefined time provided by the University Authority.
 16. GU reserves the right of modifications, cancellations and decisions in regards to the entire process.
 17. All communications must be addressed to the Registrar, Gauhati University Guwahati 781014, Assam, India.

CONSTRUCTION SPECIFICATIONS

LIST OF CONTENTS

1. Preliminary Survey

- 2. General Instruction**
- 3. Brief Description of Work**
- 4. Location and Alignment of the Trench**
- 5. Construction Specifications**
- 6. Precautions to be taken while Trenching**
- 7. Duct Laying**
- 8. Acceptance of ducts**
- 9. Cable Laying**
- 10. Back Filling**
- 11. Bridge/Culvert Crossing**
- 12. Road Crossing**
- 13. Specification for Concreting**
- 14. Earthing**
- 15. Splicing and Joint Closure**
- 16. Termination at MSU/RSU/ADM/REG Site**
- 17. Acceptance Testing**
- 18. Joint Pit**
- 19. Route and Joint Markers**
- 20. Stone/RCC Slab Protection**
- 21. Record Keeping**
- 22. Daily Report**

CONSTRUCTION SPECIFICATIONS

1. SITE SURVEY

- 1.1 Vendor shall survey all routes and submit report to Gauhati University Authority, with all details.
- 1.2 The report should contain details of all culverts, causeways, over/under bridges, level crossings, Electrical Poles, underground gas/oil/ water pipeline etc.
- 1.3 The OFC route shall be within the Campus of Gauhati University. Where ever existing OFC of G.U. or any other Telecom Operator exists on the same side where proposed OFC is planned, a minimum spacing of 1 m or more must be kept, otherwise suitable protection of the proposed OFC should be done.

2. GENERAL INSTRUCTIONS

- 2.1 The entire task should not cause interference with movement of traffic and cause inconvenience to public.
- 2.2 Vendor shall obtain all approvals, permits and licenses necessary to do work from appropriate authorities.

3. SCOPE OF WORK

Work, shall be carried out as per Specifications contained in this section. This involves:-

- 3.1 Excavation of trench.
- 3.2 Laying of HDPE ducts.
- 3.3 Laying of GI per IS1239 and / or DWC ducts per IS14930 as additional protection for the HDPE ducts at road crossings, on culverts, bridges and also on stretches wherever required, as decided by the Site In-charge of the work.
- 3.4 Chambering or concreting around DWC duct as per IS14930/ GI pipes as additional protection on bridges, culverts and also on stretches wherever depth of excavation is less than specified.
- 3.5 Reinstatement of excavated trench with proper compaction and crowning.
- 3.6 Fixing of duly galvanized clamps for suspending GI pipes at culverts and bridges, if necessary.

4. LOCATION AND ALIGNMENT OF THE TRENCH

Trench must be aligned according to permission granted by authority/ agency. However following guidelines must be adhered to:-

- 4.1 Cross pits must be made manually to check presence of any under ground utilities at adequate spacing.
- 4.2 Trench boundaries shall be marked with rope / lime powder prior to digging in order to get trench in straight line.
- 4.3 Trench shall be located at lowest point of lower area if feasible. Trench must not come over field boundary or any heap of soil.
- 4.4 Trees and their roots must be by passed to avoid damage while trenching and ensuring safe passage of OFC with smooth curves.

5. CONSTRUCTION SPECIFICATION:

5.1 Standard depth of trench shall be 1650 mm (1.65 m) minimum in normal soil. Depth will be measured from lower side (in case of sloppy ground) of natural ground level.

Where cable is laid through duct, depth of trench shall be 1650 mm from top of duct.

5.2 Specified trench depth (1.65 m from natural ground level) has to be maintained always in all types of Soil. However in certain exceptional site conditions, duct may be laid at depth not less than 1.2 m and the same should be protected by Double Walled Corrugated pipe (DWC) as per IS 14930 over ducts at no additional cost. In all cases of lesser depth, **deviation notes with proper reason** will have to be raised and got approved.

5.2.1 All depths mentioned are from top surface of duct / DWC.

5.2.2 If rocky portion is continuous / intermittent for a length of less than 20 meters, such rocky portions have to be excavated up to the depth of 1.65 meters.

5.2.3 If rocky portion are **continuous for more than 20 meters and rock is encountered from the surface itself, then depth of trench can be restricted up to 1.0 m.** But in these cases, it has to be ensured that change of depth from 1.65 meter to 1.0 m is slow and smooth.

5.3 Bottom of trench shall be uniform and should follow contour of ground.

5.4 Width can be kept as per convenience of method employed for trenching. However for manual trenching, it should be adequate to permit a depth of 1.65 m.

5.5 Width of trench shall normally be 45 cms at top and 30 cms at the bottom. However, the Vendor shall not have any objection for making width of excavated trench sufficient to lay requisite number of HDPE Ducts and GI / DWC pipes and also concreting, wherever required. Payment shall be made only on basis of running meter of completed work and shall not be based on volume of excavation.

5.6 In case of slope, trench bottom surface shall not be more than 15degree gradient with horizontal. In order to ensure gradient less than 15 degrees with horizontal, difference between two adjacent depth readings at an interval of the one meter length shall not be more than 25 cms at any location

5.7 To prevent soil erosion due to free rain water flowing along the trench, suitable “Blockades” may have to be constructed as per the instruction of site engineer.

5.8 In certain locations, such as uneven ground, hilly areas and any other places, due to any reason whatsoever it can be ordered to excavate beyond standard depth to keep bed of trench as smooth as possible. In large borrow pits and culverts, both side of burrow pits/culverts shall be excavated more than 1650 mm in depth to keep gradient less than 15 degrees with horizontal.

- 5.9 Trench will normally follow footpath or boundary of roadside road except where it may have to come to edge of carriage or when cutting across road with specific permissions from road authorities responsible (such permission will be obtained by vendor from concerned authorities).
- 5.10 Alignment of trench will be decided in consultation with Site-In charge. Once alignment is marked, no deviation from alignment is permissible except with approval of Site-In charge.
- 5.11 While marking alignment only center line will be marked, and Vendor shall set out all other work to ensure that, excavated trench is as straight as possible. Vendor shall provide all necessary assistance and layout, at his own cost for marking the alignment.
- 5.12 The Vendor shall clear, prepare and grade the Right of Way to facilitate marking of the alignment of the trench. Vendor shall remove all bushes, undergrowth, stumps, rocks and other obstacles to facilitate marking the centerline without any extra charges. It is to be ensured that minimum amount of bushes and shrubs shall be removed to clear way and Vendor shall give all consideration to preservation of trees within right of way.
- 5.13 Line up of trench must be such that HDPE duct(s) shall be laid in straight line, both laterally as well as vertically except at locations where it has to necessarily take a bend because of change in alignment or gradient of trench. Minimum radius of two meters shall be maintained, where necessary.

6. PRECAUTIONS TO BE TAKEN WHILE TRENCHING

- 6.1 It is required that trenches are not kept open. Trenching, cable laying/ducting and backfilling activities be done parallel as far as possible. Keeping trench open causes inconvenience to public and can cause accidents /casualties. It is also against guidelines issued by permission granting authorities. **Any mishap or accident due to open trenches shall be sole responsibility of VENDOR. No claim on this account shall be entertained by Gauhati University Authority.**
- 6.2 To achieve this it is necessary to do trenching continuously without intermediate gaps even in rocky areas and other difficult terrains. However where such intermediate sections cannot be avoided for any reasons beyond the control of VENDOR, it is suggested that OFC drums for blowing are planned accordingly.

- 6.3 No trench shall be kept open close to carriage way/berm. Caution boards shall be displayed at all such locations, to caution public. Vendor shall protect all life and property from damage while doing construction/trenching work.
- 6.4 Trenching shall be kept ahead of laying of ducts as far as possible. Vendor shall exercise due care that soil dug during trenching, intended to be used for back filling, is not mixed with loose debris, boulders and sharp stones. Trenches shall be immediately closed after laying HDPE ducts.
- 6.5 If Warning covers of other services are encountered during excavation, earth around these is gently removed to loosen them. The covers are then removed and stacked outside the trench for reuse. When under ground plan of other services are exposed during excavation, adequate protection is provided at suitable intervals along the run of these plans/services and concerned authorities shall be informed.
- 6.6 In event of inadvertent damage, location and nature of damage must be intimated to concerned department immediately. In the mean time action is taken for preventing aggravation of damage.
- 6.7 Necessary barricades, night lamps, warning boards and required watch man shall be provided by the Vendor at his own cost, to prevent any accident to pedestrians or vehicles. While carrying out blasting operations, the Vendor shall ensure adequate safety by cautioning vehicular and other traffic. He shall employ sufficient manpower for this with caution boards, flags, sign writing etc. Any consequences due to lack of precaution on this shall be sole responsibility of Vendor.
- 6.8 While trenching, the Vendor shall not cause damage to any over ground or under ground installations belonging to other agencies. A minimum free clearance of around 1000mm-1650mm shall be maintained from any existing under ground installations.
- 6.9 Caution boards are set up at a height of 1.25 meters above ground level so that they are visible from a distance of 25 meters. Boards will have yellow and white background with writing in bold letters with black fluorescent paint. Boards shall be displayed at start and finish point of area in which work is under progress. Additional display boards are placed at either side of the trench. Boards must indicate the name of trenching authority, name of Engineer in charge of work and dates of opening and closing trench. During night warning lamps (flicker lamp, lantern with glass painted

red) shall be provided. They are placed at locations so as to indicate length and width of trench.

6.10 All work is supervised by Vendor's representative, who must carry with him following documents:-

6.10.1 Letter authorizing Vendor to carry out work in the specific area.

6.10.2 Copy of permission issued by concerned authority.

6.11 Vendor shall provide adequate precautionary measures to prevent caving in of the trenches while excavation, due to soil condition. At such locations, width of the trenches shall be kept adequate and necessary arrangement shall be made for safe working within trenches. Arrangement must also be made for pumping out sub-soil/under ground water from trench, if any.

6.12 Vendor shall use manual labour only, and shall ensure that no damage is caused to any under ground or surface installations belonging to other public utility services and/or private parties.

6.12.1 Temporary foot-bridges are to be provided when trenches are taken across entrance of buildings etc.

6.12.2 Special care should be taken in digging footpaths. Proper protection shall be provided to avoid accidents. No inconvenience should be caused to pedestrians.

6.12.3 Under ground power cable is not to be moved. Electricity dept. is immediately informed. Horizontal and vertical separation of 60 cm shall be maintained from power cable. As far as possible power cable should be crossed at right angle.

6.12.4 Excavated soil is stacked carefully along the route on both sides of the trench. The excavated material is stacked at either end of the trench forming an earth barricade to avoid accidents.

6.12.5 Near foundations and boundary walls, excavation must be taken up in consultation of & in presence of owners.

6.12.6 All necessary arrangement are made to maintain stability of trenching..

6.12.7 Rock Excavation. This is normally done by chiseling. Blasting is done, if permitted by local authority. Necessary license should be obtained for blasting. Public property both below and above ground must not be endangered. All possible precautions must be taken for safety of public and staff involved in the work.

- 6.12.8 However, there shall be no objection to Vendor resorting to mechanical means of excavation, with approval of Site-In charge provided that no underground installation existing in path of excavation, if any, are damaged.
- 6.12.9 While working with mechanical excavators close to roads and at curves, minimum clearance for swing of its arms to be maintained, “Machine at work” – Caution boards shall be displayed and red warning lamps during night hours be used.
- 6.12.10 While the machine can be used for clearing small bushes, trees should not be cut or uprooted for purpose of movement of excavating machines. Where such necessity arises, permission from competent authorities to partially cut such trees should be obtained in writing. Compensation to cut such trees for movement of machines shall be paid by the Vendor and no additional payment shall be claimed from the G.U.
- 6.12.11 Any valuable material of cultural/ historical/ archeological interest, if found while trenching, shall brought to the notice of the authority concerned.
- 6.12.12 Machine operators and supervisors and other work force shall wear safety helmets and footwear. Vendor shall provide adequate facility for First Aid in case of accidents to work force.
- 6.13 Activities of trenching shall be carried out in such a way that it does not cause nuisance due to noise pollution in neighborhood.

7. DUCT LAYING

- 7.1 Ducts shall be laid using **dispenser/de-coiler** designed for the purpose. Vendor shall ensure that Duct laid are free from twist and kinks. Any collapsed portion of duct shall be removed before backfilling and duct made continuous by putting couplers.
- 7.2 Place the duct in trench as straight as possible. However at bends horizontal and vertical minimum bending radius for duct 1300 mm is to be maintained.
- 7.3 Ducts shall be laid in a flat bottom trench free from stones, sharp edged debris. No water should be present in trench, while laying the cable / duct.
- 7.4 **Spacers** must be used while installing multiple four or more ducts. Upto three ducts no spacer is used. Vendor shall ensure parallel laying of ducts (without criss-cross).
- 7.5 Ends of ducts shall always be closed with **END PLUGS** to avoid ingress of mud, water or dust.

- 7.6 Vendor shall ensure HDPE ducts are clear of sand, dust or any other particles, which would cause obstruction to blowing of Optical Fibre cable. Prior to aligning the ducts for jointing, each length of the HDPE ducts shall be thoroughly cleaned to remove all sand, dust or any other debris that may clog, disturb or damage the optical fiber cable when it is pulled or blown at a later stage. Any obstruction remaining in the pipe line after its completion shall be removed at the expense of the Vendor.
- 7.7 The ducts shall be **joined with couplers using duct cutter & proper tools only and shall be tightened properly** Do not use hacksaw to cut the duct.. The duct joint shall be practically airtight to ensure smooth cable blowing using cable blowing machines.
- 7.8 All coupler locations shall be covered with red stone (25 mm thick X 30 cm wide X 1.0 M length) prior to backfilling and position marked on As built drawing.
Never place coupler along the bent portion of duct/trench.
- 7.9 Duct shall be laid in piece length as per requirement with prior approval of the authority.
- 7.10 Wherever GI pipes are used rubber bushes shall be used at the two ends of the GI pipes to protect the damages of HDPE ducts. When GI pipes are to be laid with suitable bends, pipe bender is to be used. The bends may be obtained by making proper 'V' cut on GI pipe at two locations close to the bend and by applying bending force so that proper curvature is achieved without sharp corners. The HDPE duct shall be inserted into the GI pipe before bending. **GI pipe shall be welded at 'V' cut edges after bending..**

8. ACCEPTANCE OF DUCTS

- 8.1 After backfilling ducts shall be tested for integrity (air tightness and kink-free shape). Air tightness test is done by pressuring 2 km duct stretch at a time. One end of duct will be closed and compressed air at 5-6kg/cm² is sent from the other end. At about 5kg/cm² pressure the inlet of compressed air will be closed. Fall in pressure should not be more than 50% in 1 (one) hour.
- 8.2 To check that duct has not collapsed or kinked a wooden cylindrical piece (shuttle) of size 150 mm long and 0.75 X D mm in dia where 'D' is inner diameter of duct, is blown into the duct with far end fitted with flexible wire grip/stocking. The wooden shuttle should pass through duct at far end with out any obstruction within approx.10 minutes or less. One should not stand in front of the far end of the duct under test. IT CAN BE FATAL.

9. CABLE BLOWING

- 9.1 Drum test will be carried out for every drum as per format at Annexure-II A, B, C as applicable Cable drums after Inward Goods Inspection (IGI) should be mounted on pay off stand, which is kept on plain ground for stability. Soil under stand should be firm, not to allow stand to tilt. Process of OFC blowing is explained as under
- 9.2 Cable blowing machine (Cablejet or any other machine) should be deployed along with a good compressor delivering 10 kg/ sq. cm pressure and 700 cfm discharge.
- 9.3 Cable drum will be loaded on payoff stand & unwound from topside of the drum. Pay off stand should be placed properly so that it does not get tilted or fall down while dispensing OFC. First half of total length should be blown through duct in one direction from the center of the span of the duct in which cable is planned to be laid.
- 9.4 In case when complete half of the drum length can not be blown in a single go, cable is blown upto feasible distance by opening the coupler at that location and then balance length shall be blown and stored in figure of “8” close to trench in obstacle free space. Further blowing shall be done from this location.
- 9.5 The process at clause 8.2 can be repeated so that complete length is blown on one side.
- 9.6 After blowing half length in one direction the cable should be unwounded at the location of pay off stand and stored in a figure of “8”. Then inner end of the OFC should be blown in opposite direction as explained in clause no. 8.2 above.
- 9.7 Kink in OFC during blowing and after blowing must be avoided. At blowing points, after cable blowing, couplers must be tightened.

10. BACK FILLING

10.1 Back Filling in Rocky Terrain (Country Side)

Trench shall be initially filled with Sieved soil for about 5 cm which will act as a Soft cushion/Padding and then duct is placed gently over it. After that another layer of 10 cm of fine sieved soil is poured and then entire trench is backfilled with excavated material.

10.2 Back Filling in Normal Soil

Under normal soil conditions duct is directly laid in trench and backfilled in same manner as explained in section 8.1. Adequate dry compaction shall be done before Crowning. Compaction is done in layers of 50 cms each.

10.3 Crowning

When backfilling has been done up to ground level a hump of soil is made to cater for soil settlement. Entire excavated soil shall be used for back filling. Crowning shall be confined over width of trench only. No surplus soil shall be left outside trench.

10.4 Back Filling in Hard Rock (where minimum depth could not be achieved)

Duct is laid through DWC/GI pipe, which is then covered with 1:2:4 concrete. Cross-section of concrete should be 30 cm x 30 cm with DWC/GI pipe at center. After making concrete block the curing should be done at least for 7 days. Back filling in remaining portion is done with crushed stones, which have been removed with excavation of trench. Top 10 cm of trench is to be filled with loose soil and crown of 25 cm made on trench.

10.5 Backfilling of Trench on Slope

10.5.1 DWC duct as per IS14930 of dia 117/100 mm size should be used at bottom of trench near culverts or at the bottom of hillocks or where trench is having slope, where rainwater flows during monsoon. Length of DWC duct shall be equal to length of trench on the slope. Culvert backfilling will be done with crushed stone and then by soil as explained in 8.4. Duct portion which is outside the DWC duct should be protected up to 50 m max on either side of culvert by laying through & covered by PCC (1:2:4), length of HDPE duct will be decided by site engineer.

10.5.2 Back filling operation shall be performed in such a manner as to provide firm support under and above pipes and to avoid bend or deformation of HDPE duct when HDPE duct gets loaded with back filled earth.

10.5.3 At locations where back filled material contains hard clods, rock fragments and other hard materials which may cause damage to HDPE duct and where excavated or rock fragments are intended to refill the trench in whole or in part, trench shall be initially filled with a layer of ordinary soil not less than 10 cms above pipes, without any extra cost.

10.6 Back filling on public, private roads and footpaths shall be performed immediately after laying HDPE ducts. Back filling at such location shall be carried out by dry compaction in layers of 50 cms and thoroughly rammed; so as to ensure original condition is achieved and made safe to traffic. All excess soil/material left out on road/footpath shall be removed without extra cost. However, along highways and

cross-country, dug up material left out shall be kept as heap above trench while refilling.

10.7 Back-fill shall be maintained by Vendor against wash-out, settlement below original level and rotting, until final completion of work and until first monsoon season and reinstated to keep leveled condition as acceptable to the Site -In charge and highway/local authorities without any extra payment. To ensure this, Vendors agent will inspect compacted trench alignment after first rain and redo work as pointed out by engineers-in-charge. Decision of Site-In charge in this regard is final and binding on Vendor.

10.8 Final Inspection of Backfilling

Quality of backfilling will be checked after one monsoon season for any settlement of soil or any defect found shall be rectified by VENDOR free of cost.

11. BRIDGE / CULVERT CROSSING

The work involves laying of HDPE ducts through DWC pipes laid on the bridge. DWC pipes are to be used at such locations where sun rays & rain water don't fall on them.

11.1 On Arch type bridges where depth up to 300 mm is possible to dig, make a trench in bridge tar road of 150-mm width and lay DWC duct as per IS14930. Concreting 1:2:4 will be done over the DWC pipe up to the road level.

11.2 In case of dry seasonal rivers/drains, it is advisable to cross water path from riverbed. A trench of 1.5 meter or more is made. DWC ducts 117/100 mm with couplers are laid. Ducts (1 for cable + 1 spare) are laid through the DWC duct. DWC duct are encased/covered in 30 x 30 cms beam, Steel member 8 mm with stirrup at every 30 cms for reinforcement. Beam should extend upto abutment of bridge. Length of DWC duct should go 10m beyond the abutment of Bridge on either side & BDL ducts should project at least 10m beyond DWC duct and are protected upto 25m all around with 1:2:4 concrete.

11.3 In case of river/nallah with water flow, the water path may be crossed from riverbed following the method explained in 9.2. by diverting water with temporary bunds.

11.4 If 9.1, 9.2 and 9.3 are not feasible then GI pipe is to be clamped on the outer side of parapet wall with the help of 6 mm thick clamps made from 30 mm wide flats &

Fischer make M12 Anchor bolt. Clamps & anchor bolts are to be fixed at every **1.5 m spacing**. Two GI pipes shall be joined properly with pipe wrench. The **level of GI pipe shall always be below the road level**.

11.5 If 9.1, 9.2, 9.3 and 9.4 are not feasible in case of bridge / culverts with wheel guard, and if the PWD/NH authorities approve, the GI pipe can be placed on the wheel guard and concreted with PCC 1:2:4, with duct inside GI pipe. Proper slope at either end of culvert/bridge should be maintained & the GI pipe should continue upto atleast 10 m on either side, covered with concrete.

11.6 In case the parapet wall is non-existent or is in dilapidated condition, the clamps should be fixed on slab of bridge if permitted.

11.7 Cable loop as per following schedule is to be left at bridge crossings.

BRIDGE LENGTH	CABLE LOOP ON EITHER SIDE
UP TO 35 Meter	05 Meter
35 – 100 Meter	10 Meter
100 – 300 Meter	25 Meter
> 300 Meter	35 Meter

11.8 Leave a cable length as specified above on both sides at the bridge in loop chamber/ pit.

11.9 Before crossing culvert the local PWD engineer must be consulted in charge for future plan of expansion or re-construction and decide the alignment of trench (distance from road center line).

Trench depth should be minimum of 1.5 m, length of trench should be at least double of culvert length or 5 meter beyond abutment whichever ever is more. In rocky terrain depth shall be 1.2 but RCC protection has to be given as per 9.2

Leave the cable loop on each side of the culverts as per para 9.7 above. In case there are more than one culvert over 500 m span, 10 m OFC coils on both sides of the span to be kept.

Route marker will be installed at both end of duct where OFC loop has been stored.

12 ROAD CROSSING

12.1 Roads are to be crossed either by Horizontal boring or by open cut as the case may be. Suitable permission shall be obtained from Authorities concerned.

12.2 In either method of road crossing, DWC duct should be used with two ducts. DWC duct should project 5 M out side black topping on either side. In case of boring, length of DWC duct should be equal to bored length.

12.3 In case of WBM roads, panchayat, Kachha roads DWC duct should be used. DWC duct should project 2 m on either side from road formation level.

12.4 A cable loop of 10 m be kept on either side of road. Length of cable loop shall be further confirmed from Company site engineer..

13. SPECIFICATIONS FOR CONCRETING

13.1 Nominal dimension of concreting shall be instructed by Site-In charge during execution of work. Depending on the situation at site number and size of pipe to be laid/used, cross section dimension may vary to ensure proper protection to pipes as well as uniformity with any existing structure/base, on which the GI pipes or DWC duct are placed, as demanded by road authorities.

13.2 At both ends of Bridges/culverts, where GI pipes slope down and get buried, concreting shall be carried out to ensure that no portion of the GI pipe is exposed and further down as required by the Site-In charge to protect pipe from any possible damage externally caused.

13.3 Any damages caused to the existing structure such as footpath or base of parapet or kerb wall on which GI pipes or DWC duct are placed shall be repaired and original condition re-stored to satisfaction of Road Authorities.

13.4 Vendor shall provide all the materials required for the cement concreting work at the site. Cement concrete mixture used shall be of 1:2:4 composition i.e. 1 cement: 2 coarse sand: 4 coarse aggregate of 20mm nominal size. The aggregates should confirm to IS. Smooth finishing of exposed surface shall be done with mixture of 1:3 i.e. 1 cement: 3 fine sand.

13.5 When concreting is carried out in trenches, a layer of cement concrete mixture of appropriate width 80mm thickness shall be laid along trench, before laying HDPE ducts. HDPE ducts shall be, then laid above this bed of concrete as per construction specifications. After laying HDPE ducts the remaining concreting work shall be carried out to form the cross sectional dimensions 300 X300 mm.

13.6 Portions where cement concreting has been done shall be cured for minimum 7 days time to harden the surface. After curing refilling of balance depth of trench has to be

done with excavated soil. Refilling is to be done immediately to carriage ways, the curing over soil can be continued after refilling. It may be noted that no extra payment is admissible for arranging necessary material, layout tools and machines, or for carrying water for curing while carrying out the work.

EARTHING

A copper rod of around 20mm dia and 0.5 mtr long shall be buried alongwith good quality of Charcoal and salt at a min. 2.5 mtr depth from NGL or as required so that the resistance in normal soil shall not be more than 1 ohm and in rock not be more than 2 ohm. A tinned copper strip flat 32 mm wide and 6 mm thick after bolting and welding with rod shall be brought to the surface for bonding with the optic fiber armour. Specially made clamp, made of steel, will also be used for bonding the braided copper wire with the copper rod and with cable armour for avoiding corrosion and galvanic currents. Multiple pits may be required in some of the locations where the soil resistivity is high. However, under normal circumstances a single pit would be enough at the locations of good soil conductivity. Locations where cable armour earthing shall be done is as follows:-

S.No.		EARTHING LOCATION
2	University Area	<ul style="list-style-type: none"> • Where ever cable joint is made.

14. SPLICING & JOINT CLOSURE

14.1 Splicing is done using a good quality splicing machine. Splice loss per joint shall be minimum and should not be more than 0.05dB. In no case average Splice loss per link shall not be more than 0.05 dB x No. of splices.

14.2 At least 0.6 M to 0.8 M fiber should be stored in cable tray. Fiber should be neatly coiled without kinks. Minimum bending radius of 80mm should be ensured.

14.3 Joint closure should be sealed properly before it is taken out of splicing van. Joint closure assembly should be done as per instructions of manufacturer.

14.4 After assembly, **joint closure is to be clamped to joint pit with the help of M6 anchor bolts (Fischer make) in vertical direction such that dome portion points towards sky and cables enter joint closure from bottom.**

14.5 It is advisable to carry out leakage/ water penetration test before clamping the joint closure for 1 hour.

14.6 Cable should not be bent at diameter less than 600 mm.

14.7 Detailed instructions for identifications and splicing are at **Annexure-III**.

TERMINATION AT MSU/RSU/ADM/REG Site

14.8 FDMS shall be deployed for fibre termination and distribution.

14.9 Cable is brought into the building through duct/GI pipe in case building is on higher floor.

approx 2m OFC is kept/stored in Fibre Distribution Management system's (FDMS) for any eventuality.

OFC entry into FDMS shall be done through bottom holes provided for this purpose.

14.10 fibres of OFC shall be spliced with pig tails and stored in the bottom tray, as per detailed instruction of the FDMS Supplier. Bottom most splice module shall be used first for one cable (say incoming cable) and 2nd module for the outgoing cable.

14.11 No mixing of incoming and outgoing OFC fibres are permitted unless specifically asked by Site Engineer.

14.12 Pigtails shall be brought up by side and within space provided in FDMs upto Fibre Distribution Module and shall be properly routed and stored, as per detailed instruction of Supplier of FDMS. Pigtails routing shall be ready-to-remove type without disturbing any other pigtail.

14.13 Pigtails shall be mounted in designated adaptor and outer opening of adopter shall be capped.

14.14 Fibre Distribution modules for incoming and outgoing fibres shall be in sequence of Splice Modules used for incoming and outgoing cables.

14.15 All covers shall be properly closed/locked to prevent any type of ingress of foreign material, duct, insects, etc.

14.16 **Cable armour shall be properly earthed.**

14.17 Flags shall be fixed with each pigtails depicting fibre number and station from where cable is originating/terminating.

14.18 There shall not be any loose pigtails hanging or coiled at place other than specified.

15. ACCEPTANCE TESTING

15.1 Acceptance Testing shall be done as per Acceptance Test schedule at **Annexure –IV A, B, C, D.**

15.2 Link Test

15.2.1 Link Test shall be carried out on OFC section terminated at both ends.

15.2.2 Equipment required for link testing are :-

S. No.	Equipment	Test Parameter
1.	OTDR (@1310 nm & 1550 nm)	<ul style="list-style-type: none">▪ Continuity▪ Length▪ Location Identification▪ Fibre Faults▪ Splice Loss▪ Overall Loss
2	Optical Power Loss measuring Equipment (Light source & Power meter)	<ul style="list-style-type: none">▪ Overall Loss▪ Fibre Identification

15.2.3 **OTDR Measurements**

15.2.3.1 Measurements shall be taken on every fibre of cable.

15.2.3.2 Wave length of measurement shall be 1550 nm.

15.2.3.3 Horizontal and vertical scale of OTDR shall be chosen to accommodate the full trace of fibre.

15.2.3.4 Splice loss of each fibre at every splice location shall be measured from both ends of fibres. To arrive at splice loss, average of algebraic sum of splice loss measured from both ends shall be taken. Measured value shall be recorded in the format at **Annexure - IV B.**

15.2.3.5 Splice loss at any fibre joints at any location shall not be exceed 0.05 dB and Average of Splice losses of a fibre over the link shall not exceed 0.05 dB.

15.2.3.6 Any loss point other than joint point, exceeding 0.02 dB shall not be acceptable.

15.2.3.7 Location of every joint as measured by OTDR shall be recorded in **Annexure – IV C.**

15.2.3.8 Total Fibre loss as measured end to end by OTDR shall be recorded in **Annexure -IV C.**

15.2.4 Optical Loss Measurement

- 15.2.4.1 Optical Loss Test set up a combination of light source and power meter, shall be needed. Measurement shall be taken at 1550 mm.
- 15.2.4.2 Transmitted (Tx) Power of light source, shall be measured by connecting power meter using 2 M patch cord and if required fixed attenuator.
- 15.2.4.3 The measured Tx value shall either be recorded otherwise power meter shall be reset at this measured value.
- 15.2.4.4 Once power metre has been reset or Tx power has been recorded, patch cord shall be replaced by Fibre Under Test (FUT). [FUT can be put in between light source and power metre by placing physically power meter or light source at the either end of the FUT.
- 15.2.4.5 Value displayed in power metre in dB is the link loss.
- 15.2.4.6 Optional Loss measurement shall be recorded in **Annexure –IV D**.

16 JOINT PIT

- 16.1 Joint Pit is a RCC cylindrical pipe with 750 mm length, 900 mm diameter (internal) and 50 mm or more thickness made by spun concreting method with 8 mm steel reinforcement, both directions.
- 16.2 A cover (Lid) of RCC having 25 mm or more thickness, 1000 mm dia and 8 mm steel reinforcement in both the directions with two handles for lifting is used for covering the joint pit.
- 16.3 Top of lid should be at a depth of 1.0 M from natural ground level.
- 16.4 Pit is packed with loose sand before placing lid.

17 ROUTE & JOINT MARKERS

17.1 Concrete Route Marker

- 17.1.1 Route markers made of RCC (1:2:4) of length 1250 mm with bottom cross-section of 150 mm x 200 mm tapering to 75 mm x 125 mm, will be provided at a distance of 250 mtrs or wherever there is crossings or major deviation in the trench from being straight. At the crossing, route markers has to be placed on both sides of the road, bridge, culvert etc. depending on the case. Route markers shall

also be put at coupler locations falling at a distance of 500 mtrs. from the nearest coupler marker.

17.1.2 Route marker shall be in **Blue colour**. Joint marker shall have the same specification, but in **Brown colour**. Route markers placed at coupler locations shall be of Blue colour with 100 mm wide **Yellow** colour band at a gap of 100 mm from top end of the Route Marker.

17.1.3 Route markers shall be embossed HUTCH OFC and shall be filled with fluorescent **white colour**. 750 mm length of route marker shall be underground and 500 mm shall be exposed. Fixing of the route markers shall be done at 0.5 M from the trench and away from the road center. 'HUTCH OFC' embossed on the marker shall face roadside.

17.1.4 Route markers & joint markers should never be put together. If such a situation is encountered then route marker may be placed at 50 meter distance from joint pit marker.

17.2 Electronic Route Marker

17.2.1 Electronic Route Markers are planned to be placed in area like dense built up area, close vicinity of road edges, etc where placing of concrete route markers is not possible.

17.2.2 Electronic Route Markers can be used to mark and locate following:-

- a) Cable Route
- b) Road / Bridge / Canal etc crossings
- c) Buried splices
- d) Extra OFC loops
- e) Pipe ends
- f) Manholes under pavement or grade changes
- g) Repair points
- h) Non-metallic lines
- i) Snow covered installation
- j) In trench close to road edge.

17.2.3 Electronic Route Markers shall be buried at depth of 1.2 m from ground in the trench during backfilling the trench.

17.2.4 Electronic Route Markers shall be buried at a spacing of 150 m in general to mark trench / route. At all major road crossings Electronic Route Markers shall be placed.

17.2.5 Trench shall be completely backfilled immediately after placing Electronic Markers.

17.2.6 Electronic Markers shall be located with electronic locator after tuning at specified frequency.

18 STONE/RCC SLAB PROTECTION

Wherever cable is laid where construction activity can happen in near future, stone slabs of size 25 mm thickness (min) and 300 mm width shall be put after 30 cms padding with excavated material over duct. In case stone is not available, RCC slab of size 600mm L x 300 mm W x 40 mm T shall be used.

19 RECORD KEEPING

All measurements will be recorded in Measurement Sheet and reported on a daily basis duly signed jointly by G.U. representative and representative of Vendor as per provided format.

20 DAILY REPORT

Vendor will send Daily Progress as per **provided format**.

EXECUTION AND MATERIAL SPECIFICATION:

SL NO	ITEM DESCRIPTION (SERVICE PART)-ASSAM	UOM
1	Excavation of Trench to the depth of 1.65 mtrs, laying & jointing of HDPE ducts and reinstatement / crowning of trench. For hard rock area depth shall be 1.20mtr. Wherever depth is less than 1.60 mtrs. additional protection of half round RCC pipes are to be laid on the duct structure , free of cost by the contractor. For hard rock areas if depth is less than 1.20 mtrs. additional protection of 100mm CC (1:3:6) is to be done on the duct structure , free of cost by the contractor.The contractor shall ensure that the ducts laid are free from any defects like kinks, punctures.... etc. The contractor shall perform mandrell test of 28mm is passed and pressure (5 kg for 30 min) test or Duct Proving for acceptance purpose.	Mtr.
(a)	Normal Soil	Mtr.
(b)	Soft Rock/Hard Soil	Mtr.
(c)	Slussy Soil Area.* depth cannot go beyond i.1 mtr hence PCC with DWC pipe is must.	Mtr.
2	Horizontal Directional Drilling for Road Crossing and laying of ducts.	Mtr.
3	Overhead Charges for Arial Cable lying	Mtr.

4	Blowing of 48f Armd.optical fibre cable inside the ducts. Before blowing the contractor shall check the duct integrity plus clearance by DIT and Pressure method and if reqd. rectify the same.The contractor shall ensure that the change in attenuation of cable laid < 0.01 dB / km when tested by an OTDR.	Mtr.
5	Supply & Laying of 150mm Half Round RCC Pipes having 1 Mtr. Length as per NP2 Class as per the instrn. of EIC.	Nos.
6	Supply & Laying of 150mm Full Round RCC Pipe having 2 Mtr. Length & Collar as per NP2 Class as per the instrn. of EIC.	Nos.
7	Supply & Laying of DWC pipe of dia 110mm and jointing the same with required couplers as per the instrn. of EIC in bridges , culverts and slussy area.(D.W.C. to be used in siussysril and Bridge portion of 1800 mts.)	Mtr.
8	Cement concreting in the ration 1 : 3 : 6. 53 grade ISI marked ordinary portland cement with 15mm size aggregates and river sand to be used. (P.C.C.to be done with D.W.C. pipe in slussy area and Bridge lantght of 1800 mts.)	cubic - meter
9	Supply & Installation of Route Indicators as per drawing. The route indicators shall be painted in Orange reflector color for trench line , Yellow reflector color for joint pits and Red colors for pull through chambers mentioning ADIL OFC in black paint and easily visible.(at every 200 mtrs)	Nos.
10	Splicing and jointing of 48F OFC. Proper looping of extra cables shall be done and enclosed in flexible pipes. The contractor shall perform (a) splice loss test and continuity / defect test by OTDR (b) Llink loss test by powermeter - laser source. The contractoer shall ensure that average splice loss are <0.07dB , events < 0.1 dB and link loss within the budgeted limit. Soft and hard copies of the test results are to be furnished.	per fibre
11	Splicing and termination of 48F OFC on FMS The contractor shall perform (a) splice loss test and continuity / defect test by OTDR (b) Llink loss test by powermeter - laser source. The contractoer shall ensure that average splice loss are <0.07dB , events < 0.1 dB and link loss within the budgeted limit. Soft and hard copies of the test results are to be furnished.	per fibre
12	Supply & Installation of Splice Chambers alongwith covers as per the drawing. This includes excavating the necessary splice pit , prepare a concrete (1: 3 :6) base of 100mm and place the splice chamber. The contractor shall ensure proper earthing is made as per the annexure.	Nos.
13	Clamping on Bridge / Buildings(GI/HDPE) as per the drawings in annexure and site conditions.(DWC Pipes to be used instrad of GI).	Mtrs.
14	Supply and fixing of PVC clamp (110mm) on wall.	Nos.
15	Supply and fixing of GI (150mm) clamp on wall.	Nos.

16	Survey and ROW charges.The contractor shall coordinate and arrange for the permissions from the statutory authorities. Permission letter to be submitted during billing.	per meter
17	Supply of GI Pipe / Installation	Nos.
18	Charges for Overhead Cable Installation via GI Pole	
A	Specifications of the GI Pipe. Overall Height of the pole will be 6 mtrs, 5mtr above ground and 1 mtr planting depth or as per the site requirement. Only Hot Dip Galvanized Pole to be used, specification – 410-SP-1 with base plate & vent hole. Cross hole is required 20 mm at the height of 300mm from bottom of pole, and 16mm bar will be used –m300 mm long at the time of grouting/concreting as per drawing. Pole to Pole distance 30 meter only Earthing should be done in all erected G.I.Pole by 8/10 swgG.I.wire only. Pole marking and numbering in all erected poles.	Nos.
B	Specifications of the GI Pipe for Road Crossing Overall Height of the pole will be 7.5 mtrs, 6.5 mtr above ground and 1 mtr planting depth or as per the site requirement. Only Hot Dip Galvanized Pole to be used, specification – 410-SP-1 with base plate & vent hole. Cross hole is required 20 mm at the height of 300mm from bottom of pole, and 16mm bar will be used –m300 mm long at the time of grouting/concreting as per drawing. Pole to Pole distance 30 meter only Earthing should be done in all erected G.I.Pole by 8/10 swgG.I.wire only. Pole marking and numbering in all erected poles.	Nos.
C	Cement Concrete -M-20,Size of the Concrete area -300 mm x 300mm x 800 mm height to be given above the SGL.	Cum
D	The OFC cable drawn along with the G.I. pole with the following materials mentioned below: Pole Clamp as per the size of Pole head, G.I., Shackle Insulator/Spool Insulator along with Adjustor / turn buckle & nut bolt to be use on pole in zig -zag route & in straight road, "round shackle" insulator can be use. Loop is required in alternative pole or at a distance of 120-150 Mtr or as advice given by the engineer in charge(Maximum loop 10 mtr), Loop to be done properly binding with cable tie and hang on the pole with extra G.I. cross arm (40 mm x 40 mm x 6mm) with U clamp.	Mtr.
E	Supply of 48f Armd.optical fibre cable.	Mtrs
F	Supply of 12f overhead optical fiber cable.	Mtrs
G	Supply of 6f overhead optical fiber cable.	Mtrs
H	Supply of Optical fiber patch Chords, LIU, termination boxes as per design requirements.	Nos.
I	Splicing of fiber.	Nos.
J	Termination of fiber.	Nos.
K	Any other materials vendor would like to propose.	Mtrs/Nos.
L	Any other service vendor would like to propose.	Job

Note: -

- 1) All materials should be of reputed brand and of the same feature as used by Telecom Operators.**
- 2) At least two Work Orders of similar nature to be produced which should include the material make, service description and scope of work.**
- 3) Vendor should propose all the items required to complete the task. Any material or service not mentioned in the above table should be quoted separately.**

4) The proposal should be complete in all respect and in case any additional component or service is required the Vendor should notify it to the authority after the site survey and thereby if approved, such components or service should be included in their final proposal.

Important Dates:

Issue of NIQ: 31-12-2016

Late date and Time: 18-1-2016 12 noon Quotation Opening: 18-1-2016 3 PM

Registrar
Gauhati University

Copy to:

1. Rector, GU
2. Secretary to the Vice Chancellor, for information of the Vice Chancellor
3. Treasurer, GU
4. Controller, GU
5. Jt. Registrar, GU, for uploading in the GU website
6. M/s Gulf Advertising Agency, for publishing the BRIEF VERSION of this notice in the Assam Tribune in the immediate next issue, and submit the bill in triplicate for payment.
7. Office Files



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