Engineering Instructions
ON
Under Ground Optical Fibre Cable Laying Works for NOFN Projects

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CONSTRUCTION SPECIFICATIONS

BHARAT BROADBAND NETWORK LIMITED

(A GOVERNMENT OF INDIA ENTERPRISE)

Engineering Instructions

ON

Under Ground Optical Fibre Cable Laying Works

1.0 SCOPE

1.1 The Engineering Instructions spelt out in this document deal with the methods to be adopted for underground Optical Fiber Cable laying in PLB HDPE ducts and inter connection of the existing Optical Fiber Cables with the newly laid OF cables and termination of OF Cables at Gram Panchayats(GPs) for National Optical Fiber Network.

2.0 INTRODUCTION

2.1 The existing core Optical Fiber Cable (OFC) network already deployed by various service providers mostly covers State/District/Block headquarter but does not extend up to most of the Gram Panchayats. Under the NOFN project all 250000 Gram Panchayats across the country are proposed to be connected to the Block HQs by laying incremental Optical Fiber Cable.

3.0 OF CABLE LAYING APPROACH

3.1 On the basis of the survey reports routes for OF cable laying shall be finalized. Road Cutting Permission shall be obtained from road and rail authorities for laying the Optical Fiber Cable along the finalized roads and at rail / road crossing along the route. Generally O.F. Cable may preferably be laid straight as far as possible along the road near the boundaries, away from the burrow pits. When the O.F. Cable is laid along the National Highways, Cable should run along the road land boundary or at a minimum distance of 15 meters from the center line of the road where the road land in wider as the OFC carries high capacity traffic and is planned for about 25 to 30 years of life. It is essential that the cable is laid after obtaining due permission from all the concerned authorities to avoid any damage (which may result in disruption of services / revenue loss) and shifting in near future due to their planned road widening works.

3.2 In special cases where it may be necessary to avoid burrow pits or low lying areas, the Cable may be laid 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 center line of road.

4.0 GENERAL

4.1 Soil Classification

Soil shall be classified under two broad categories Rocky and Non Rocky, The soil is categorized as rocky if the cable trench cannot be dug without blasting and / of chiseling. All other types of soils shall be categorized as Non Rocky including Murrum & soil mixed with stone or soft rock.

1. **Rocky soil.**
   The terrain which consists of hard rocks or boulders where blasting/ chiseling is required for trenching such as quartzite, granite, basalt in hilly areas and RCC (reinforcement to be cut through but not separated) and the like.

2. **Non Rocky soils**
   This will include all types of soil- soft soil/hard soil/murrumie. any strata, such as sand, gravel, loam, clay, mud, black cotton murrum, shingle, river or nullah bed boulders, soling of roads, paths etc. (All such soils shall be sub-classified as **kachcha soil**) and hard core, macadam surface of any description (water bound, grouted tarmac etc.), CC roads and pavements, bituminous roads, bridges, culverts (All such soils shall be classified as **Pucca soils)**

4.2The Optical Fibre Cable shall be laid through PLB HDPE Ducts buried at a nominal depth of 165cms. The steps involved in OF Cable construction are as under

4.2.1. Excavation of trench up to a nominal depth of 165 cms.**innon-Rocky soil**, according to construction specifications. Along National/State Highways/other roads and in built up /rural areas. Under exceptional conditions/ genuine circumstances due to site constraints/ soil conditions, relaxation can be granted by the competent authority for excavation of trench to a depth lesser than 165cm. Such relaxation shall be given as per the laid down norms/ procedures being followed by the concerned CPSUs for their own works and with the approval of the competent authority. The payment in such cases shall be made on pro-rata basis as per the existing norms adopted by the concerned CPSUs.

4.2.2. Lying of PLB HDPE Ducts/coils coupled by sockets in excavated trenches, on bridges and culverts, as per construction specification and sealing of PLB HDPE Ducts pipe ends at every manhole by end-plugs of appropriate size.

4.2.3. Providing additional protection by R.C.C. Pipes/GI pipes and/or concreting/chambering, wherever required. According to construction specification.

4.2.4. Fixing of GI pipes/troughs with clamps on culverts/bridges and/or chambering or concreting of G.I. Pipes/troughs, wherever necessary. Normally, RCC/DWC pipes shall be used and use of GI pipes shall be avoided. However, in case it is felt that GI pipe is unavoidable in certain circumstances this should be done with the prior approval of competent authority within the concerned CPSUs. This shall be recorded appropriately.

4.2.5. **Laying Protection Pipes on Bridges And Culverts.** In case trenching and pipe laying is not possible on the culverts, the pipes shall be laid on the surface of the culverts/bridges after due permission from the competent authority **as per construction specification**

4.2.6. Back filling and Dressing of the Trench according to construction specifications**.**

4.2.7. Making manhole (of size 2.0 m length x 1.0 m width x 1.65 m Depth) at every Cable pulling location for housing the OF Cable loop & Pulling Optical Fibre

Cable using proper tools and accessories. Sealing of both ends of the PLB HDPE pipe in manhole by hard rubber bush of suitable size to avoid entry of rodents into the PLB HDPE Ducts, putting split PLB HDPE Ducts and split RCC pipes with proper fixtures over cable in the manhole to protect the bare cable.

4.2.8. Digging of pit of size 2 meter x 2 meter x 1.8 meter (depth) for fixing of Jointing chambered-cast RCC cover or stone of suitable size on Jointing chamber to protect the Joint and backfilling of jointing chamber with excavated soil.

4.2.9. Digging of pits 500 cm to 1000 cm towards jungle side at every manhole and jointing chamber along the route to a depth of 75cms. fixing of route Indicator/joint indicator, concreting and backfilling of pits. Painting of route indicators with Blue colour and joint Indicator by Grey colour and sign writing denoting route/joint indicator number and marked as "BBNL", as per construction specification.

4.3 Specifications of Materials to be used

4.3.1. PLB HDPE Duct

Optical Fiber Cables should be pulled though Permanently Lubricated HDPE Duct of 40mm/33 mm size conforming to the specifications as per TEC GR No. TEC/GR/TX/CDS-008/03/MAR-11 with latest Amendments. The Ducts shall be blue in colour and have the identification markings as per TEC GR wherein BBNL logo shall be marked as purchaser's name.

4.3.2. PLB HDPE Duct Accessories

a) Push fit Coupler

Push Fit couplers shall be used for coupling PLB HDPE ducts/coils. The specifications of the couplers shall be as per TECGR no TEC/GR/TX/CDS-008/03/Mar11 with latest amendments.

b) PP Rope

Should confirm to TEC GR No.TEC/GR/TX/CDS-008/03/MAR-11 with latest Amendments. However, this is optional and CPSUs may use the same on need basis. The PP rope can be ordered along with the PLB duct as required. In this case PP ropes drawn through the HDPE/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 rope used is 3 strands Polypropylene Para Pro rope having yellow colour and size of 6 mm diameter. It should have a minimum breaking strength of 550 kgs. The length of each coil of rope should be 5 meter more than the standard length of duct(or as ordered) and it should conform to (i) BS 4928 Part-II of 1974 (ii) IS 5175 of 1982. It should be of special grade and should have ISI certificate mark. It should be manufactured out of industrial quality Polypropylene.

c) End Cap

End Cap shall be used for sealing the ends of the empty ducts, prior to installation of the OF Cable and shall be fitted immediately after laying the duct to prevent the entry of any dirt, water, moisture, insects/rodents etc. It should confirm to TEC GR No. TEC/GR/TX/CDS-008/03/MAR-11with latest amendments. The ends of the PLB HDPE ducts/coilslaid in the manholes should be closed with End Caps. The End Caps used should be suitable for closing40mm/33mm PLB HDPE ducts/coils. A suitable arrangement should be provided in the End Cap to tie PP Rope. (See figure-1 for details)

d) Cable sealing Plug

This shall be used to seal the end of the ducts perfectly, after the OF cable is pulled in the duct. For pulling the cable through the ducts, it is necessary to provide manholes at that location and also at bends and corners wherever required. The ends of the PLB HDPE ducts/coilsare closed with Cable sealing Plugs. The End Plugs used should be suitable for closing40mm/33mm PLB HDPE ducts/coils. The Cable sealing plug shall confirm to TEC GR No. TEC/GR/TX/CDS-008/03/MAR-11 with latest amendments.(Wherever blowing technique is used for laying OF Cable, at the discretion of the CPSUs concerned, the hand holes/manholes required for accessing the cable during cable laying can be at longer distances depending upon requirement.)

4.3.3. Material for Providing Additional Protection

a) RCC Full Round Pipes

Reinforced cement concrete pipes (spun type) coupled with RCC collars sealed with cement mortar used to provide additional protection to PLB HDPE Ducts/coils at lessor depths should be of full round, NP-2 class and size 100 mm (internal diameter), conforming to IS standard 458-1988 with latest amendments. The pipes should have a nominal length of 2meters.

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 case of long spans, every third joint will be embedded in a concrete block of size 60 cms (L) x 40cms (W) x 25 cms (H) of 1:2:4 cement concrete mix (1: cement, 2: coarse sand, 4: stone aggregate of 20 mm nominal size) so that the alignment of RCC pipes remain firm and intact. Also, both ends of RCC pipes spans 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.

b) RCC Split Pipes

The split Reinforced cement concrete pipes (spun type) with in-built collars are used to provide additional protection to PLB HDPE Ducts/coils should be of 100mminternal dia.(Spotted), Class--NP-3, Thickness: 25mm, Length: 2Meters with inbuilt collaret one end, Conforming to ISI Specification IS: 458, 1988 with latest amendment

c) G.I. Pipes

G.I. pipes should be of medium duty class having inner diameter of 50mmandshould conform to specifications as per IS 554/1985 (revised upto date) IS 1989 (Part-I), 1900 Sockets (revised up to date) & IS 1239 (Part-II) 1992 (revised upto date).

d) DWC Pipes

Use of normal duty DWC (Double walled corrugated) HDPE pipe – confirming to TEC GR no.GR/DWC-34/01 Sep.2007 with latest amendments shall be preferably utilized as first choice for protection of Optical Fiber Cable instead of GI pipes. The DWC pipes used shall be of size 75/61mm as per table 2 of the said TEC GR.

e) M.S. Weld Mesh

The PLB HDPE Ducts can also be protected by embedding it in concrete of size of 25 cms x25 cms reinforced with MS weld mesh. The MS weld mesh used should be of 50 mm x 100mm size, 12 SWG, 120 cms in width in rolls of 50m each. One meter of MS weld mesh caters to approx. 3 meters of concreting. (See figure ‘2’ 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 not less than 1 kg per 8 sqm to avoid seepage of water into the soil.

4.3.4. Joint Chamber

The Joint chamber shall be provided at every joint location to keep the OF cable joint well protected and also to house extra length of cable which may be required in the event of faults at a later date. The Joint chamber shall be of pre-cast RCC type as per construction specification. Brick chamber can also be made with prior permission of Engineer in-charge.

4.3.5. Rubber Bush

To prevent entry of rodents into PLB HDPE DUCTS, the ends of PLB HDPE DUCTS 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 holes to fit into 40 mm PLB HDPE DUCTS pipe, so that it should be able to prevent the entry of insects, rodents, mud, and rainwater into the PLB HDPE DUCTS pipe. It should conform to TEC GR with latest amendments.(see Figure-3)

4.3.6. 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. Either RCC/Pre-cast or Stone based route indicators can be used. The detailed specification and design of the same shall be as per construction specification. Generally, Stone Route indicators shall be used for the NOFN project

CONSTRUCTION SPECIFICATIONS

1. EXACAVATION OF TRENCHES

1.1. Trenching

1.1.1. Location and Alignment of the Trench

In built up areas, the trench will normally follow the foot-path of the road except where it may have to come to the edge of the carriage way cutting across road with specific permissions from the concerned authorities maintaining the road (such permissions shall be obtained by the department as per MOU signed with respective State Govt.). Outside the built up 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).

The alignment of the trench will be decided by a responsible official of the CPSUs, not below the rank of a Junior Telecom Officer in case of BSNL and similar level in case of other CPSUs

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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 center 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 labor, 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 lineup 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 elsewhere.

1.1.2. Line-Up

The line-up of the trench must be such that PLB HDPE Ducts 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.

1.2. Method of Excavation

In built up areas, the contractor shall resort to use of manual labour / HDD 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 existing 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 (50 mm ID) 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 meter 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/ jack hammers 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/ jack hammers.

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 board and required watchman shall be provided by the contractor to prevent any accident to pedestrians or vehicles. While carrying out the blasting operations, the contractor shall ensure adequate safety by cautioning the vehicular and other traffic. The contractor shall employ sufficient 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 installation. No extra payment will be made towards this. In order to prevent damage to PLB HDPE DUCTS over a period of time, due to the growth oftrees, 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.

1.3. Depth and Size of the Trench

The depth of the trench form top of the surface shall not be less than 165 cms unless otherwise relaxation is granted by competent authority under genuine circumstances.

In rockyterrain, less depth shall be allowed only in exceptional circumstances with additional protection where it is not possible to achieve the normal depth due to harsh terrain/ adverse site conditions encountered. This shall be done only with the approval of the competent authority and consent of the Engineer in-charge after following the laid down norms and procedures being followed in the CPSUs concerned. This shall be properly documented. In all cases, the slope of the trench shall not be less than 15 degrees with the horizontal surface. The width of the trench shall normally be 45 cms at the top & 30 cms at the bottom.

In case, additional pipes (HDPE/GI/RCC Pipes) are to be laid in some stretches, the same shall be accommodated in this normal size trench.

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

to keep the gradient less than 15 degree with horizontal. For additional depth in excess of 165 cms., no additional payment 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. All the relaxations granted as specified above shall be dealt with as per the laid down norms and procedure of CPSUs .

1.3.1. Dewatering: The Contractor shall be responsible for all necessary arrangements to remove orpump out water from trench. The Contractor should survey the soil conditions encountered inthe section and make his own assessment about dewatering arrangement that may benecessary. No extra payment shall be admissible for this.

1.3.2. Wetting: Wherever the soil is hard due to dry weather conditions, if watering is to be donefor wetting the soil to make it loose, the same shall be done by the contractor. No extrapayment shall be admissible for this.

1.3.3. 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 toblasting operation. The contractor shall obtain license from the competent authority forundertaking blasting work as well as for obtaining and storing the explosive as per theExplosive Act, 1884 as amended upto date and the explosive Rules, 1983. The contractorshall purchase the explosives fuses, detonators, etc. only from a licensed dealer.Transportation and storage of explosive at site shall conform to the aforesaid Explosive Actand Explosive Rules. The contractor shall be responsible for the safe custody and properaccounting of the explosive materials. Fuses and detonators shall be stored separately andaway from the explosives. The Engineer-in-Charge or his authorized representative shallhave the right to check the contractor's store and account of explosives. The contractor shallprovide necessary facilities for this. The contractor shall be responsible for any damagearising out of accident to workmen, public or property due to storage, transportation and useof explosive during blasting operation. Blasting operations shall be carried out under thesupervision of a responsible authorized agent of the contractor (referred subsequently as agentonly), during specified hours as approved in writing by the Engineer-in-Charge. The agentshall be conversant with the rules of blasting. All procedures and safety precautions for theuse of explosives drilling and loading of explosives before and after shot firing and disposalof explosives shall be taken by the contractor as detailed in **IS: 4081** safety code for blastingand related drilling operation.

1.3.4. Trenching Near Culverts/ Bridges: The PLB HDPE Ducts shall be laid in the bed of culvertat the depth not less than 165 cms protected by RCC pipes as decided by Engineer- in charge.Both ends of culverts shall be excavated more than 165 cms in depth to keep the gradient ofnot less than 15 degree with horizontal. The bed of trench should be as smooth as possible.

1.3.5. While carrying out the work on bridges and culverts, adequate arrangement for cautioning thetraffic 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 subsequentexpansion and remodeling, the cable should be laid

with some curve on both sides of theculvert or the bridge to make some extra length available for readjustment of the cable at thetime of reconstruction of culvert or the bridge.

2. Laying OF PLB HDPE Ducts

After the trench is excavated to the specified depth, the bottom of the trench has to be cleared of allstones or pieces of rock and leveled up properly. A layer of soft soil/or sand (in case the excavatedmaterial contains sharp pieces of rock/stones) of not less than 5 cms is required for leveling thetrench to ensure that the cable when laid will follow a straight alignment. Adequate care shall beexercised while laying so that the OF cables are not put to undue tension/pressure after being laid asthis 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 leavingpatches or portions incomplete in between. In case intermediate patches are left, measurement of thecompleted portions will be taken only after work in such left over patches are also completed in allrespects.

Preparatory to aligning the pipe for jointing, each length of the PLB HDPE Ducts shall bethoroughly cleaned to remove all sand, dust or any other debris that may clog, disturb or damage theoptical fibre cable when it is pulled at a later stage. The ends of each pipe and inside of eachSocket shall be thoroughly cleaned of any dirt or other foreign materials.

After the trench is cleaned the PLB HDPE Ducts/Coil shall be laid in the cleaned trench, jointedwith Sockets. Drawing up of PP rope is optional as per TEC GR. In case of use of PP Rope, at everymanhole approximately at every 200m or at bends or turns the PP rope will be tied to the HDPEend caps used for sealing the PLB HDPE Ducts, to avoid entry of rodents/mud etc.

At the end of each day work, the open ends of the pipes sections shall be tightly closed with endcaps to prevent the entry of dirt/mud, water or any foreign matter into PLB HDPE Ducts until thework is resumed.In built up area falling within Municipal/Corporation limits, the PLB HDPE Ducts shall be laid withprotection using RCC Pipes/ Concreting reinforced with weld mesh (only in exceptional cases).

For lesser depths requiring additional protection in built up areas, towns and cities falling within t the municipal limits, suitable protection shall be provided to PLB HDPE pipes/coils using RCC/DWC full round/split pipes or GI pipes or cement concreting reinforced with MS weld mesh or a combination of any of these as per the site requirement. This shall be done only with the prior instructions/approval of the Engineer-in-charge. The specifications for providing each of these protections are given later in this document.

Moreover, in cross country routes, if depth is less than 1.2 meters, protection by using RCC/DWC Pipeshall be provided. Engineer-in-Charges shall decide about such stretches and type of protection tobe provided in view of the site requirements. Normally 100 mm RCC /DWC Pipes shall be used forprotecting PLB HDPE Ducts but if more than one PLB pipe is to be laid and protected, RCC/DWC Pipe ofsuitable size to accommodate the required number of PLB Pipes shall be used.

The PLB HDPE Ducts shall be laid in RCC Full Round spun Pipes/GI Pipes as required at Roadcrossings. The RCC pipes/GI pipes shall extend at least 3 meters on either side of the road at Roadcrossings. At Road crossings, extra GI/PLB HDPE Ducts may be laid as per the direction of theEngineer-in charge. On Rail bridges and

crossings, the PLB HDPE Ducts shall be encased insuitable cast iron as prescribed by the Railway Authorities.

Wherever RCC pipes are used for protection, the gaps between the RCC collars and the RCC pipesshall be sealed using cement mortar 1:3 (1:53 grade cement of reputed brand, 3: fine sand withoutimpurities) 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: coarsesand, 3: stone aggregate of nominal size of 20 mm) so that the alignment of RCC pipes remain firmand intact and to avoid entry of rodents.

Wherever GI pipes are used, special care should be taken to ensure that G.I. Pipes are coupledproperly with the sockets so as to avoid damage to PLB pipe and eventually the OF Cable in theevent of pressure coming on the joint and G.I. Pipe joint giving its way. Rubber bushes shall beused at either ends of the GI pipes to protect PLB pipe. Both the ends of G.I. Pipe will be embeddedin 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 20 mm)so that the alignment of G.I. Pipes remain firm and intact and to avoid entry of rodents.

In case of protection by concreting at site, the nominal dimension of concreting shall be 250 mm x250 mm section. Cement Concrete Mixture used shall be of 1:2:4 composition i.e. 1:53 gradeCement of a reputed company , 2: Coarse Sand, 4: Graded Coarse Stone aggregate of 20 mmnominal size, reinforced with MS weld mesh. As the RCC is cast at site, it is imperative to ensurethat special care is taken to see that proper curing arrangements are made with adequate supply ofwater. 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 andof weight not less than 1 kg. Per 8 sq. meters shall be spread and nailed on sides of the trench toform 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 thePVC sheet, before laying PLB HDPE ducts. The PLB HDPE Ducts shall then be laid above this bedof concrete. After laying the PLB HDPE Ducts, MS weld mesh is wrapped around and tied andconcrete mix is poured to form the cross sectional dimensions as instructed by the Engineer-incharge.

The strength of RCC is dependent on proper curing therefore, it is imperative that watercontent of RCC mix does not drain out into the surrounding soil. Portions where cement concretinghas been carried out shall be cured with sufficient amount of water for reasonable time to harden thesurface. After curing, refilling of the balance depth of the trench has to be carried out withexcavated soil.

The PLB HDPE Ducts/RCC/GI Pipes shall be laid only in trenches accepted by Engineer-in-Chargeor his representative. The Contractor shall exercise due care to ensure that the PLB HDPE Ducts arenot subjected to any damage or strain.

Water present in the trench at the time of laying the PLB HDPE Ducts shall be pumped out by thecontractor 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 HDPE Ducts shall be laid insidethe RCC Pipes laid at a minimum depth of 165 cms., as instructed by the Engineer-in-charge. Themechanical 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 HDPE Ducts may be encased in reinforced cementconcrete, as detailed, ibid.While laying the pipes, a gap of 2 M is kept at convenient locations approx. 200 m apart and at thebends and turns, which will be used as manholes during OF cable pulling. Ends of the PLB HDPEDucts at the manholes shall be sealed using end caps after tying the PP rope to the end caps to avoidchoking of the pipes. In a similar manner, manholes shall be kept while approaching bridges, roadcrossings etc., as instructed by the Engineer-in-charge. The location of the manholes will be decidedby the Engineer-in-charge.

2.1. Laying Protection Pipes On Bridges And Culverts:

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

a. In case of 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 HDPE 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.

b. 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.

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

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 sufficiently to ensure that no portion of the GI Pipes/GI Troughs is exposed as approved by the Engineer- in-charge to protect the pipe/trough from any possible externally caused damage.

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.

3. Back Filling and Dressing of the Trench

Provided that the PLB HDPE pipes have been properly laid in the trench at the specified depth, the back filling operation shall follow as early as practicable. The earth used for filling shall be free from all roots, Grass, shrubs, vegetation, trees, saplings

and any other kind of garbage or pebbles. 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 HDPE pipes when the pipes get loaded with the back filled earth.
At locations where the back filled materials contains stones/sharp objects which may cause injury to the PLB HDPE 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 loose earth (free from any stones/pebbles) not less than 10 cms thick over the pipes.
Back filling on public, roads, railway crossings, footpaths in city areas shall be performed immediately after laying the HDPE pipes. Back filling at such locations shall be thoroughly rammed, so as to ensure original condition so that it is safe for the road traffic. All excess soil/ material left on road/ footpath/railway crossing shall be removed by contractor. However, along the highways and in country side, the excess dug up material left over after refilling should be kept in a heap above over the trench.

In city limits, at any given time not more than 50 Meters length of trench should be kept open and in all places where excavation has been done, no part of the trench should be kept open over night to avoid occurrence of any mishap or accident in darkness.

4. CABLE PULLING AND JOINING/SPLICING

4.1. CABLE PULLING

Manholes marked during PLB HDPE Ducts pipe laying of approx..size of 2.0 m length x 1.0 m width x 1.65 m depth shall be excavated for pulling the cables. There may be situations where addition manholes are required to be excavated , for some reasons, to facilitate smooth pulling of cable. Excavation of addition manholes will be carried out, without any extra cost. De-watering of the manhole, if required, will be carried out without any extra costs. Dewatering/ De-gasification of the Ducts, if required, will be carried out without any extra costs.

The Optical Fibre cables are available in drums in lengths of appox. 2 kms. The cables shall beblown / manually pulled (in exceptional cases) through already laid PLB HDPE DUCTS. This workis to be carried out under the strict supervision of site in-charge. It shall be ensured that during theblowing / pulling of Cable the tension is minimum and there is no damage to the Cable/Opticalfibers.

After pulling of the drum is completed, both ends of the PLB HDPE DUCTS pipe in each Manholeshould be sealed by hard rodent resistant rubber bush, to avoid entry of rodents/mud into PLBHDPE Ducts.
The Manholes are prepared by providing 40 mm split PLB HDPE DUCTS pipe of 2.5 to 3m lengthand closing the split PLB HDPE Ducts by providing necessary clamps/ adhesive tape as per thedirections of Engineer-in- charge. Afterwards, the split/cut PLB HDPE DUCTS pipe are coveredwith 100 mm split RCC pipe of 2m length and sealing the ends of RCC pipe with lean cementsolution for protecting bare cable in the manhole . After fixing of RCC Split Pipes necessaryback filling/reinstatement and dressing of manholes should be carried out as referred undertrenching. The location of the pulling manholeshould be recorded for preparation ofdocumentation.

4.2. Jointing/ Splicing

Optical Fibre Cable Joints will be at varying distances depending upon the incremental fiber to belaid for connecting Panchayats. The 24 fibers are to be spliced at every Joint & at both ends(Terminations) in the equipment room as directed by the Engineer-in-charge. The Infrastructurerequired for cable splicing i.e.

· Splicing machine
· OTDR
· Optical talk set

· Tool kit etc.
will be arranged by the CPSU and also any additional accessories. e.g. Engine etc.required at site for splicing will also be arranged by the CPSU.
The Optical Fibre Cable thus jointed end-to-end will be tested by an officer of Acceptance Testingunit of the concerned CPSUs for splice losses and transmission parameters as specified by BBNLand prevalent at that time. The throughOptical Fibre should meet all the technical parameters, specified and no relaxationwill be granted.

5. Construction of Jointing Chamber :

The joint chambers are provided at every joint to keep the O.F.C. joint well protected and also tokeep extra length of cable, which may be, required to attend the faults at a later date. Jointingchambers are to be prepared at the Fiber Point of Interconnect (FPIO) or normally at distance ofevery 2 kms. Actual location of jointing chamber depends on length of cable drum
andappropriateness of location for carrying out jointing work. The location is finalized by Engineer-incharge.

The jointing chambers are constructed by way of fixing pre-cast RCC chambers/Brick Chambers and coversas per the instructions from Engineer-in- charge.

5.1. 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 shall be required to be dug. Pre cast RCC chamber shall consist of three parts (i) round base plate of 140 cm diameter and 5 cm thickness in two halves (ii) full round RCC joint chamber with diameter of 120 cm and height of 100 cm and thickness of 5 cm (iii) round top cover will be in two halves with diameter of 140 cm and thickness of 5 cm having one handle for each half in centre and word ‘ BBNL OFC’ engraved on it. (See figure ‘4’). After, fixing the pre cast RCC joint chamber, the joint chamber is filled with clean sand before closing. Back filling of joint chamber pit with excavated soil shall be carried out in the end.

5.2. Brick Chamber

For constructing brick chamber, first a pit of size 2m x2 mx1.8 m depth is shall be required to be dug.. Then, base of the chamber shall be made using concrete mix of 1:5:10 (1 cement, 5 coarse sand, 10 graded stone aggregate of 40mm nominal size) of size of 1.7m x 1.7 m and 0.15 m thickness. Wall of brick chamber should be constructed on this base having wall thickness of 9” using cement mortar mix of 1:5 (1: cement, 5: fine sand). The chamber should have internal dimensions of 1.2 m x 1.2 m amd 1 m height.. The bricks to be used for this purpose should be of size 9” x 4.5” x 3”, 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 that, the bottom brick should support the pipe and upper brick should be provided in a manner that PLB HDPE 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 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. Back filling of joint chamber pit with excavated soil shall be carried out in the end

6. Fixing of Route Indicators / Joint Indicators

Pits shall be dug 500 cm to 1000 cm 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 murrumupto 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.

6.1. RCC/Pre cast Route Indicators

The route /joint indicator made of pre-cast RCC should have the following dimensions
(see Figure '5')
Base - 250 mm x 150 mm
Top - 200 mm x 75 mm
Height - 1250 mm

6.2. Stone based Route Indicators

The route /joint indicators made of Sand/lime Stone Should have the following dimensionThe word **'BBNL OFC'** should be engraved on the Route/Joint indicators.

i. Stone to be used (Sand/lime Stone)
ii. Indicator Top surface to be rounded
iii. Base 155 mm × 100 mm
iv. Upper 500 mm length to be Tapered width wise as shown in the drawing and homogeneously finished.
v. Height 650mm (Straight) + 400 mm (Tapered)
vi. The route indicators should be engraved with word 'OFC' of size 80mm length & 50mm, width.
vii. Length 3.5 Ft., top 4"x4" dressed 1Ft. from top & tapered.

(See figure '6' for details of Stone Route Indicators)

The Route indicators shall painted Blue and placed at 500 to 1000 cm away from the centre of the trench towards jungle side. The Joint indicators are placed at OFC joints and placed 500 to 1000 cm away from wall of the joint chamber facing jungle side and are painted Grey. The engraved word "BBNL 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, and 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.

The route and joint indicator shall be painted with primer before painting with oil paint. Thematerial used should bear ISI mark. The size of each written letter should be at least 3.5 cms. Thecolours of painting and sign writing is as under :

(1) For Joint Indicator: Grey colour
(2) For Route Indicator: Blue colour
(3) For BBNL OFC & Nos: White colour.

7. Documentation

The documentation, consisting of the following shall be prepared for each Block and the Panchayatsconnected to the Block. 4 sets of documentation shall be provided both in Electronic format on CDas well as Hard binded copy.

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

7.2. **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 HDPEDucts pipe thereon.
- Important landmarks to facilitated 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 ofmaximum 400 meters shall be given to ensure clarity.

7.3. **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 asa proof of accuracy of the details. The diagrams shall be bound in A-4 size book with cover.

Thecover sheets shall be of 110 GSM and laminated. The front cover shall have the following details.

1. Name of the State/District/Block
2. Name of the Panchayats connected
3. Name ofthe BBNL with logo
4. Name ofthe CPSU executing the work
5. Name of the Contractor
6. Date of commencement of work
7. Date of completion of work

For each Block 1 sets of above mentioned document shall be submitted to BBNL.

8. SAFETY PRECAUTIONS

8.1. 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 undertakingregarding any electric cables, which are known or suspected to exist near the proposed excavationand unless this is done, excavation should not be carried out in the section concerned. Theelectricity undertaking should be asked to send a representative and work should be preceded withclose consultation with them.

Only wooden handled hand tools should be used until the electric cables have been completelyexposed. Power Cables, not laid in conduits, are usually protected from above by a cover slab ofconcrete, brick or stone. They may or may not be protected on the sides. It is safer, therefore, alwaysto drive the point of the pickaxe downwards then uncovering a cable, so that there is less chance ofmissing such warning slabs. No workman should be permitted to work alone where there areelectric cables involved. At least one more man should be working near by so that help can be givenquickly in case of an accident. If disconnection of power could be arranged in that section it will bebetter. No electric cables shall be moved or altered without the consent of the Electric Authority andthey should be contacted to do the needful. If an electric cable is damaged even slightly, it should bereported to the Electric Authority and any warning bricks disturbed during excavation should bereplaced while back filling the trench. Before driving a spike into the ground, the presence of otherunderground properties should be checked. Information on plans regarding the location of powercables need not to be assumed as wholly accurate. Full precautions should be taken in the vicinityuntil the power cable is uncovered. All electric cables should be regarded as being live andconsequently dangerous. Any power is generally dangerous, even low voltage proving fatal inseveral cases.

8.2. Electric shock-Action and treatment :

Free the victim from the contact as quickly as possible. He should be jerked away from the liveconductors by dry timber, dry rope or dry clothing. Care should be taken not to touch with barehands as his body may be energized while in contact. Artificial respiration should beginimmediately to restore breathing even if life appears to be extinct. Every moment of delay isserious, so, in the meanwhile, a doctor should be called for.

8.3. 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 tosee that proper protection is provided to prevent any accidents

from occurring. Excavation workshould be done in such a manner that it will not unduly cause inconvenience to pedestrians oroccupants of buildings or obstruct road traffic. Suitable bridges over open trenches should be soplanned that these are required for the minimum possible time. Where bridges are constructed toaccommodate vehicular traffic and is done near or on railway property, it should be with the fullconsent and knowledge of the competent railway authorities.

8.4. Danger from falling material

Care should be taken to see that apparatus, tools or other excavating implements or excavatedmaterials are not left in a dangerous or insecure position so as to fall or be knocked into the trenchthereby injuring any workman who may be working inside the trench.

8.5. Care when working in Excavations

Jumping into a trench is dangerous. If it is deep, workmen should be encouraged to lowerthemselves. Workers should work at safe distance so as to avoid striking each other accidentallywith tools. If the walls of the trench contain glass bits, corroded wire or sharp objects they should beremoved carefully. If an obstruction is encountered, it should be carefully uncovered and protectedif necessary. If an obstruction is encountered, it should be carefully uncovered and protected ifnecessary. Care must be taken to see that excavated material is not left in such a position that it islikely to cause any accident or obstruction to a roadway or waterway. If possible the excavatedmaterial should be put between the workmen and the traffic without encroaching too much on theroad.

8.6. Danger of cave in

When working in deep trenches in loose soil, timbering up/shoring the sides will prevent soilsubsidence. The excavated material should be kept at sufficient distance from the edge of the trenchor 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 preventcave in even under adverse conditions of traffic. Extra care should be taken while excavating nearthe foundations of buildings or retaining walls. In such cases, excavation should be done graduallyand as far as possible in the presence of the owners of the property.

8.7. Protection of Excavations :

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

8.8. Precautions while working on roads

The period between half an hour after sun-set and half an hour before sunrise, and any period of fogor abnormal darkness may also be considered as night for the purpose of these instructions, for thepurpose of providing the warning signs.

Excavation liable to cause danger to vehicles or the publicmust at all times be protected with fencing of rope tied to strong uprights or bamboo poles at asuitable height or by some other effective means. Any such temporary erection which is likely tocause obstructions and which is not readily visible should be marked by posts carrying red flags orboards 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 pedestriansand drivers of vehicles the full expanse i.e. both width and length of the obstruction. The distancebetween lamps or between floors should not generally exceed 1.25 m along the width and 6m alonglength of the obstruction in non congested areas, but 4 meters along the length in congested areas.

If the excavation is extensive, sufficient notice to give adequate warning of the danger, should bedisplayed consciously not less than 1.25 m above the ground and close to the excavation. Whereany excavation is not clearly visible for a distance of 25m to traffic approaching from any directionor any part of the carriage way of the road in which the excavation exists, a warning notice shouldbe placed on the kerb or edge of all such roads from which the excavation or as near the distance asis practicable but not less than 10 m from the junction of an entering or intersecting road in whichthe excavation exists. All warnings, in these should have a red background and should be clearlyvisible and legible. All warning lamps should exhibit a red light, but white lights may be used inaddition to facilitate working at night. Wherever required a passage for pedestrians with footbridgeshould be provided. At excavations, cable drums, tools and all materials likely to offer obstructionsshould be properly folded round and protected. This applies to jointer's tents as well. Leads, hosesetc. stretched and across the carriageway should be guarded adequately for their own protection andalso that of the public.

8.9. Traffic Control

The police authorities are normally responsible for the control of traffic and may require the settingup of traffic controls to reduce the inconvenience occasioned by establishment of a single line oftraffic due to restriction in road width or any other form of obstruction caused by the work. As far aspossible, such arrangements should be settled in advance. If there are any specific regulationsimposed by the local authorities, these should be followed.

8.10. Work along Railway Lines

Normally all works at Railway crossing is to be done under supervision of the railway authoritiesconcerned, but it is to be borne in mind that use of white, red or green flags by the Departmentalstaff is positively forbidden to be used when working along a railway line as this practice may causean accident through engine drivers mistaking them for railway signals. When working along adouble 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 oneanother near the work spot.

8.11. 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 isnecessary to blast the rocks by using suitable explosives. The quality of explosive to be useddepends on the nature of the rocks and the kind of

boulders. A few types of explosive fuses anddetonators normally used for making trenches for cable works are detailed below:

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

8.11.1. Procedure

A detailed survey of the route is to be done to assess the length of the section where trenching is tobe done with the help of blasting. A route diagram of the rocky section may be prepared indicatingthe length of the route where the explosives are to be used. For the purpose of obtaining license, alonger length of route should be given in the application as in many cases, after digging, rocksappear which was not initially anticipated.

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

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

8.11.2. Method of using

The safest explosive is the Gilatine and electric detonator. Gilatine is in the form of a stick. Electricdetonator is a type of fuse used for firing the explosive electrically. Holes are made at suitableintervals on rocky terrain or boulders either by air compressor or by manual chipping. The depth ofthe holes should be 2 to 3 ft. Fill up the holes with small quantity of sand for about 6”. First theelectric detonator is to be inserted into the Gilatine and the Gilatine is to be inserted into the holeskeeping the + ve and- ve wirings of electric detonators outside the holes. Again refill the holes withsand. These +ve and-ve insulated wires of detonator are than extended and finally connected to anEXPLODER kept at a distance of not less than 100 m.

Now the explosive is ready for blasting. But, before connecting wires to exploder for blasting, allnecessary 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.

8.11.3. Operation of exploder (IDL schaffler type 350 type exploder)

The type 350 blasting machine consists of a bearing block with blasting machine system and theexplosion proof light- alloy injection molded housing. The exploder is held with the left hand. Thetwist handle is applied to the drive pin, clapped with the right hand turned in the clock wisedirection in continuous measurements at the highest speed from the initial position until it reachedto a stop. At this stage an indication lamp will glow. When the indication lamp glows,

" pressbutton switch" should be pressed. This will extend the electric current to detonator and Gilatine
will be detonated. The rock will be blasted out of the trench. Number of holes can be blasted in asingle 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. It the result of the firstblasting is not satisfactory, it should be repeated again on the same place.

8.11.4. Warning

There may be two reasons for unsatisfactory results of the blasting

a) Misfire of Gilatine due to leakage of current from detonator.
b) Over loading because of overburdens.

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

8.11.5. Precautions

The abstract of Explosives Rules 1983 which are relevant to our work is given below :

8.12. Restriction of delivery and dispatch of explosives

No person shall deliver or dispatch any explosives to anyone other than a person who.

a) is the holder of a license to possess the explosives or the agent of a holder of such a licenseduly authorized by him in writing on his behalf.

OR

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

The explosives so delivered or dispatched shall in no case exceed the quantity, which the person towhom they are delivered or dispatched is authorized to possess with or without a license under theserules.

No person shall receive explosives form any person other than the holder of a license granted underthese rules. No person shall receive from or transfer explosives to any person for a temporarystorage or safe custody in a licensed premise unless prior approval is obtained from the ChiefController.

A person holding license for possession of explosives granted under these rules shall store theexplosives only in premised specified in the license.

8.13. Protection from Lightening During Storing

Every magazine shall have attached there to one or more efficient lightening conductors designedand 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 thelightening conductor terminal on the building to the earth shall be tested at least once in every yearby a qualified electrical engineer or any other competent person holding a certificate of competencyin this behalf from the State Electricity Department. A certificate showing the results of such testsand the date of the last test shall be hung up in conspicuous place in the building.

8.14. Precautions during thunder-storm

When a thunder- storm appears to be imminent in the vicinity of a magazine or store house everyperson engaged in or a round such magazine and store house shall be withdrawn to a safe distancefrom such magazine or store house and the magazine and store house shall be kept closed andlocked until the thunder storm has ceased or the threat of it has passed.

8.15. Maintenance of records

Every person holding a license granted under these rules for possession, sale or use of explosivesshall maintain records in the prescribed form and shall produce such record on demand to anInspection Officer.

8.16. Explosives not to be kept in damaged boxes

The licensee of every magazine or store house shall ensure that, the explosives are always kept intheir original outer package. In case, the outer package gets damaged so that the explosive containedtherein cannot be stored or transported, such explosives shall be repacked only after the same areexamined by controller of explosives.

8.17. 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 notexceed the quantity entered in the license against such kind of explosives. No explosives in excessof the licensed quantity shall be stored in the magazine or store house unless a permit in this behalfis obtained from the licensing authority by a letter or telegram.

8.18. Precautions to be observed at Site

The electric power at the blasting site shall be discontinued as far as practicable before charging theexplosives. No work other than that associated with the charging operations shall be carried outwithin 10 meters 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 thevicinity of the hole and stored at a distance which should prevent accidental detonation in the eventof a charge detonating prematurely in any hole. The holes which have been charged with explosiveshall not be left unattended till the blasting is completed. Care shall be taken to ensure that fuse orwires connected to the detonation are not damaged during the placing of stemming materials andtamping.

8.19. 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 siteshall lay down a clear warning procedure consisting of warning signs and suitable signals and allpersons employed in the area shall be made fully conversant with such signs and signals.

8.20. 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. Anexploder shall not be used for firing a circuit above its rated capacity. The electric circuits shall betested for continuity before firing. All persons other than the shot-firer and his assistant, if any, shallbe 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 fora maximum length of 5 cms. and should, then be made clear and bright for a minimum length of2.5 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 tobe drilled shall be marked in circles with white paint. These shall be inspected by the Contractor'sagent. Bore holes shall be of a size that the cartridge can easily pass down. After the drillingoperation, the agent shall inspect the holes to ensure that drilling has been done only at the markedlocations and no extra hole has been drilled. The agent shall then prepare the necessary chargeseparately for each bore hole. The bore holes shall be thoroughly cleaned before a cartridge isinserted. Only cylindrical wooden tamping rods shall be used for tamping. Metal rods or rodshaving pointed end shall never b e used for tamping. One cartridge shall be placed in the bore holeand gently pressed but not rammed down. Other cartridges shall then be added as may be requiredto make up the necessary charge for the bore hole. The top most cartridge shall be connected to thedetonator which shall in turn be connected to the safety fuses of required length. All fuses shall becut 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 bewrapped with rubber tape.

The maximum of eight bore holes shall be loaded and fired at one occasion. The charges shall befired successively and not simultaneously. Immediately before firing, warning shall be given andthe agent shall see that all persons have retired to a place of safety. The fuses of the charged holesshall 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 other of each blast as it explodes. In case all thecharged bore holes have exploded, the agent shall inspect the site soon after the blast but in case ofmisfire the agent shall inspect the site after half an hour and mark red crosses (X) over the holeswhich have not exploded. During this interval of half an hour, nobody shall approach the misfiredholes. No driller shall work near such bore until either of the following operations has been done bythe agent for the misfired boreholes.

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

ii. The holes shall be cleaned for 30 cm of tamping and its direction ascertained by placing astick in the hole. Another hole shall then be drilled 15 cm away and parallel to it. This holeshall 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 himfor the next shift, of any case of misfire and each such location shall be jointly inspected and theaction 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 cause andsteps taken in that connection.

8.21. General Precautions

For the safety of persons red flags shall be prominently displayed around the area where blastingoperations 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 metere from the blasting site. Audio warning byblowing 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 permittedby the Engineer-in-Charge in writing.

8.22. Precautions against misfire

The safety fuse shall be cut in an oblique direction with a knife. All saw dust shall be cleared forminside of the detonator. This can be done by blowing 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 bemade water tight by means of tough grease or any other suitable material. The detonator shall beinserted into the cartridge so that about one-third of the copper tube is left exposed outside theexplosive. The safety fuse just above the detonator shall be securely tied in position in the cartridge.Waster 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 entireconsignment from which the fuse, detonator or dynamite was taken shall be got inspected by theEngineer-in-Charge or his authorized representative before resuming the blasting or returning theconsignment.

8.23. Precaution against stray currents :

Where electrically operated equipments is used in locations having conductive ground or continuousmetal objects, tests shall be made for stray current to ensure that electrical firing can proceed safely.

9. ALLIEDACTIVITIES

9.1. Transportation of Materials : The materials required for executing the work entrusted to the contractors against a work order shall be made available at Project Store Depot. In some cases the materials may be available at sub divisional store godown. The contractor shall be responsible for transporting the materials, to be supplied by the BBNL 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.

9.2. 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.

9.3. 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.

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

9.5. Supply Of Materials : There are some materials required to be supplied by the contractor for execution of work 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 a accordance with the specifications .

9.6. Social auditing: While carrying out the execution work of cable/Eqpt. ,photography/videography may be carried out on sample basis for duration of 15 to 30 minutes per Gram Panchayat which may also involve the local people of the Gram Panchayats and villages including the Gram Panchayat Pradhan (If possible) and same may be submitted in a form of CD along with the documentation sets for information.

Note: All the materials as above have to be TSEC/Type approved by BSNL QA/TEC against mentioned TEC GR or as per the approval procedure of executing CPSUs for which TEC GR not there.

Figure 1

HDPE END CAPS

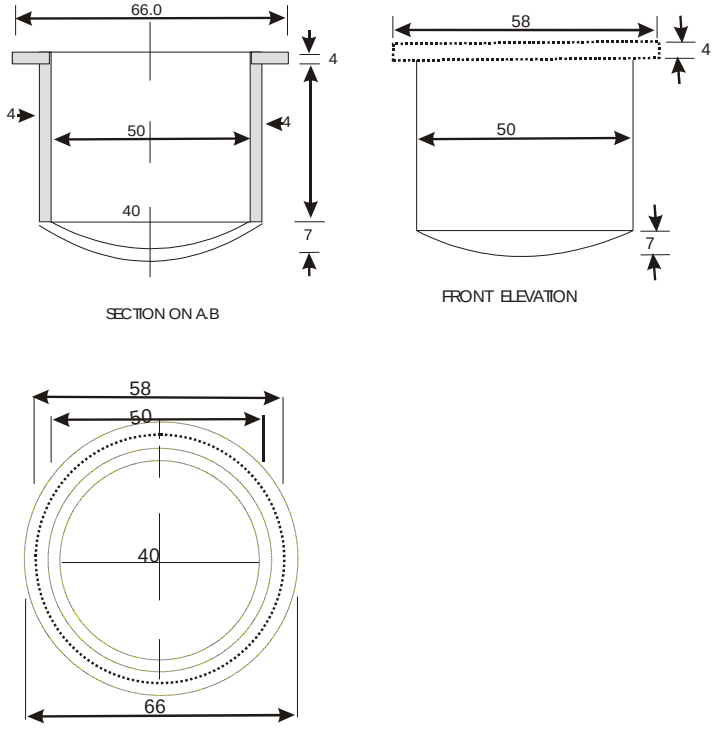
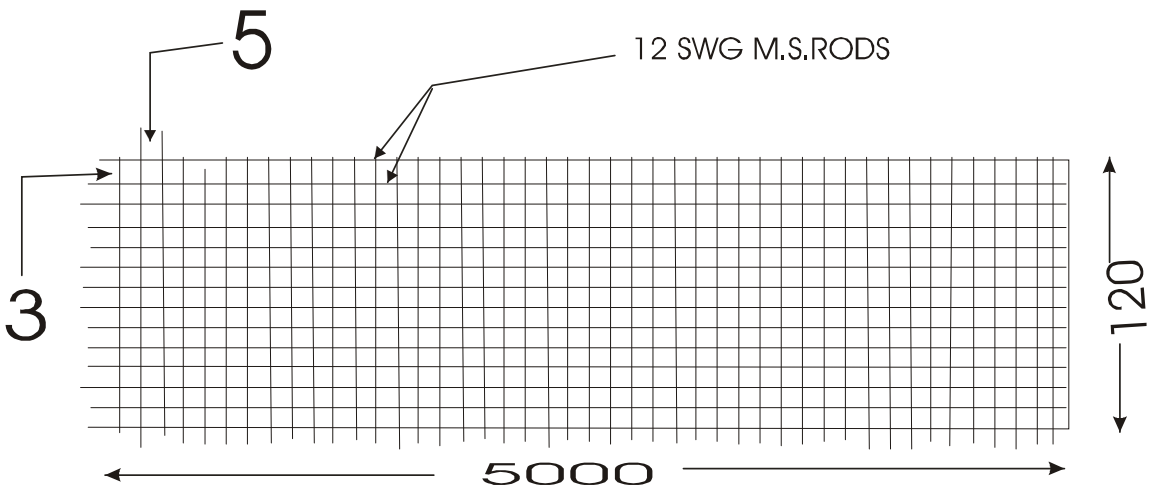


Figure2

M.S. WELDMESH

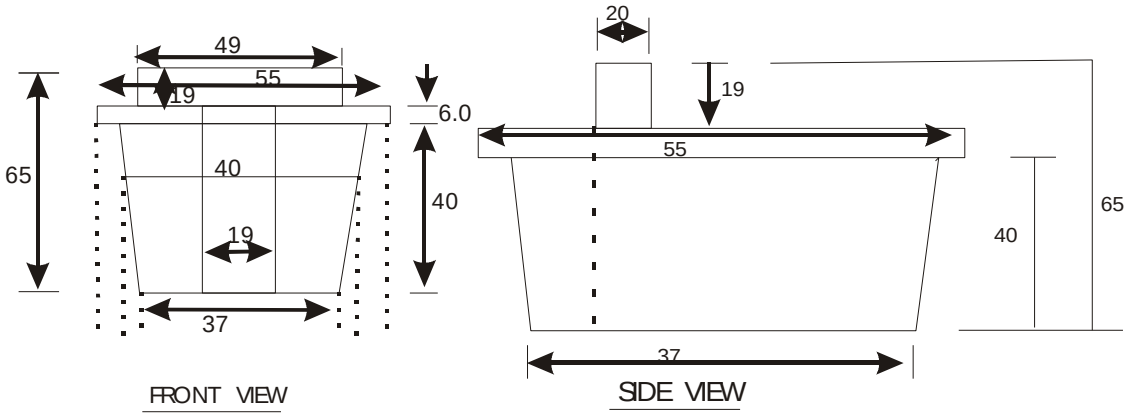
DETAILS OF 100 MM X 50 MM, 12 SWG MILD STEEL WELD MESH HAVING WIDTH OF 120 CM.

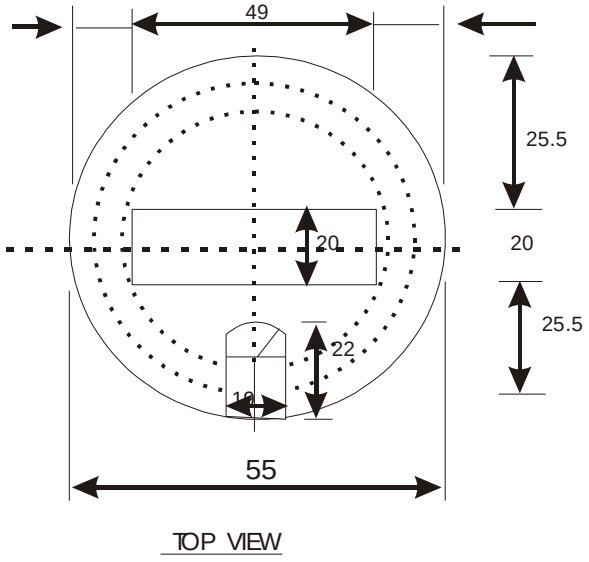


Note : All measurements are in centimeters.

Figure 3

Rubber Cork



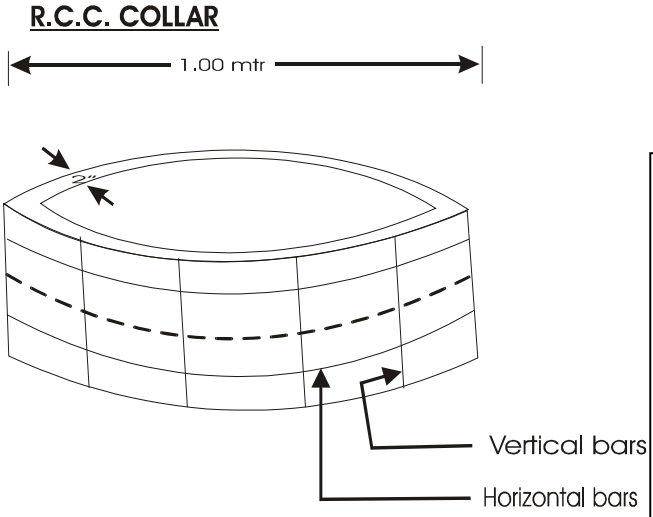


NOTE:

1. ALL DIMENSIONS ARE IN MM.
2. DIMENSIONS ARE ONLY FOR GUIDENCE. TAPPER SHOULD BE SUCH THAT IT SHOULD TIGHTLY FIX. INTO TYPE A & TYPE B HOPE 50 mm OO PIPES.

Figure 4

SPECIFICATION AND REINFORCEMENT DETAILS OFR.C.C. JOINT PROTECTION CHAMBERS



Specification :

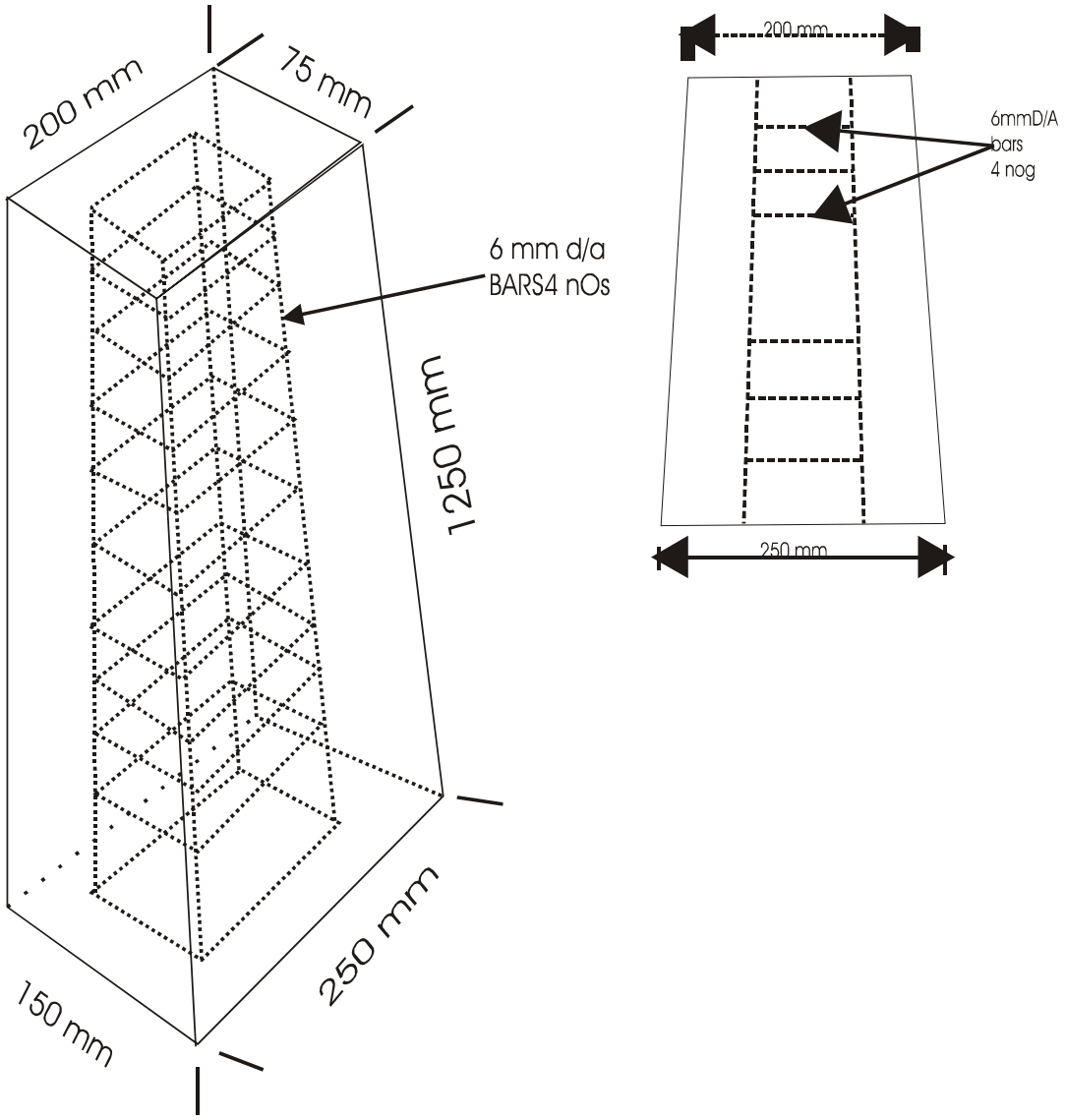
1. Diameter : 1.00 Mtr.(inner side)
2. Thickness : 5 cm.
3. Height : 50 cm.
4. 6 mm Horizontal Iron round rings – 4 Nos.
5. 6 mm vertical bars Iron – 12 mm Nos.
6. 12 gauge GI wire mesh to be wrapped before reinforcing the concrete.

Note :

a) Concrete 'Mix. 1: 2:3 (1 Cement : 2 Sand : 3 graded Stone aggregate 20 mm nominal size.
b) Finishing : Smooth

Figure 5

RCC Route Indicator



1. Stone OFC Route Indicator

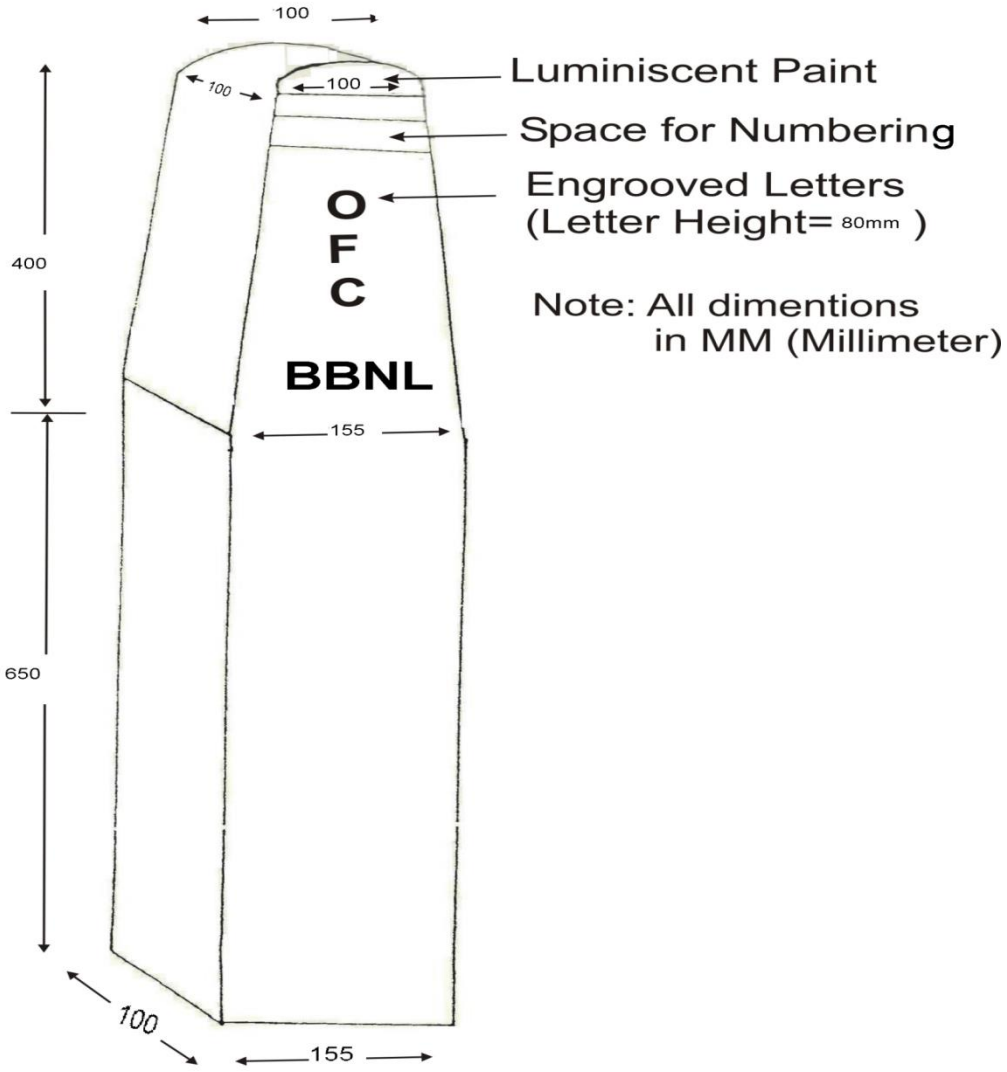


Figure 6

Abbreviations

1.	DOT	: Department of Telecom
2.	BBNL	: Bharat Broadband Network Limited
3.	BSNL	: Bharat Sanchar Nigam Limited
4.	TEC	: Telecom Engineering Centre
5.	HDPE	: High Density Polyethylene
6.	DWC Ducts	: Double Walled Corrugated Ducts
7.	GI pipe	: Galvanized Iron Pipe
8.	ASTM	: American Society for Testing and materials
9.	GR	: Generic Requirement
10.	CACT	: Component Approval Centre for Telecom
11.	RCC	: Reinforced Cement concrete

Addendum no.1

Sl No.	Cl.NO with main heading	Description of Clause after due correction/addition	Remarks
1.	**9.6. Social auditing**	While carrying out the execution work of cable/Eqpt. Videography may be carried out on sample basis for duration of 15 to 30 minutes per Gram Panchayat which may also involve the local people of the Gram Panchayats and villages including the Gram Panchayat Pradhan (If possible) and same may be submitted in a form of CD along with the documentation sets for information.	Photography is deleted from earlier clause
2.	**3.1 Restoration of Road surface**	**3.1(a)**. **RRSB**: Road restoration work to be made with bituminous macadam for semi grouting 50 mm thick and premix carpet surfacing 25 mm thick over the grouted surface (total up to 75 mm thick) including supply of asphalt etc. to evenly match the road, including consolidation and rolling as per standard specification of DSR 1997.	New Clause is added
		3.1(b). RRSC: Road restoration work with cement concrete 1:4:8 mix for thickness varying from 150 mm to 225 mm, including supply of concrete to be made to evenly match the road.	New Clause is added
3.	**4.3.2(b) PP Rope**	Should conform to TECGRno.TEC/GR/TX/CDS-008/03/MAR-11 with latest amendments. However this is optional and CPSUs may use the same on need basis. The PP rope can be ordered along with the PLB duct as required. In this case PP rope is drawn through the HDPE/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 duct shall be supplied with pre-installed rope when so ordered by the purchasing authority. The rope shall be polypropylene, 4 mm in diameter for 40mm/33mm ducts and conform to IS: 5175, with a minimum slackness of 2%.	Earlier Clause is modified. Diameter of rope changed to 4 mm from 6 mm

Annexure
SOR (Schedule of Rates)

BHARAT BROADBAND NETWORK LIMITED
Corporate Office, New Delhi

No. BBNL/CGM(Plg.)/OFC Laying/SOR/2013/
Dated : 16 th April 2013

To,

1. Shri Ranjan Ghosh
   GM(NOFN)
   BSNL C.O.
   New Delhi

2. Shri Anshul Gupta
   ED(CC)CC
   Railtel Corporation
   Gurgaon

3. Shri V.Balaji
   Chief Manager
   Power Grid Corporation of India Ltd.
   New Delhi

Subject : Schedule of Rates for Trenching, Pipe Laying and Cable Works for NOFN project – clarification regarding

Sir,

With reference to the above subject and clarifications sought by PGCIL, the amendment/ clarification Number 1 given at Annexure 1 may be noted pl. This amendment/ clarification will form part of the SOR already circulated on 4th April, 2013. Corrected SOR (dated 12.04.13), including amendment/ clarifications is enclosed.

It may be ensured that while inviting open tenders for these works, the Guidelines enclosed earlier and attached herewith for ready reference are strictly followed.

16.04.13
Deepika Khosla
CGM(Planning)
BBNL C.O.

Copy for kind information to:
1. CMD BSNL/RAILTEL/PGCIL
2. CMD(BBNL)
3. Dir(Plg.)/Dir(O)/Dir(F)

Annexure-3

SCHEDULE OF RATES

For OF Cable Laying Works

Sr. No.	Item Code	Description of Item	Unit Rate (in Rs.)	Unit
1		**Excavation of Trenches/ HDD**		
1.1	OFT	Excavating trenches upto a depth of 1.65 m and back filling the excavated trenches after laying the HDPE / PLBpipe with or without protection as per tender specification.		
	OFTK	I) in Kuchcha soil	50.00	per M
	OFTP	ii) in pucca soil	73.00	per M
	OFTR	iii) in rocky soil	200.00	per M
1.2	OFB	Excavation and trenching including tunneling or boring and reinstatement as per construction specification of the tender to a depth of 1.65 cms in Bituminised/Concrete/Set Stone (rate per meter) for Single PLB pipe.	65.00	per M
1.3	OFH	Laying of PLB HDPE duct by HDD method at a Depth of 1.65m.or more (for Single PLB pipe).	180.00	per M
The Executing Agency will supply PLB HDPE Pipes/Coil PP Rope.				
2.0		**Laying of PLB HDPE Pipe/ GI Pipe/RCC Pipe/DWC**		
2.1	LPH	Laying of single PLB HDPE Pipes/Coils, coupled with coupler.	3	per M
The Executing Agency will supply PLB Pipe/ PLBSockets/Coupler, End caps .				
2.2	LGIT	Laying and fixing of 65 mm/40mm G.I. Pipes in trenches with PLB HDPE Pipes/Coils inside.	5.00	per M
2.3	LGIC	Laying and fixing of 65mm / 40 mm GI pipes in trenches on Bridges and Culverts with PLB HDPE pipes/coils inside.	10.00	per M
The Executing Agency will supply G.I.Troughs/GI Pipes in lengths of approx. 6 M clamps and PLB HDPE Pipes/Coils				
2.4	LFRC	Supply and Laying of full round RCC/DWC pipe (ISI mark) in trenches over PLB HDPE pipes / coils, on culverts/ bridges/nulla and for cases where cable is laid at less depth (wherever required).	75	per M
2.5	LSRC	Supply and laying of split RCC/DWC pipe (ISI mark) in trenches over PLB HDPE pipes / coils, on culverts/ bridges/nulla and for cases where cable is laid at less depth (wherever required).	60	per M
Materials required for sealing the coupling of RCC/DWC Pipes will be arranged by the contractor.				
2.6	PCCT	Providing cement concrete 1:2:4 at Wheel guard of bridge/culvert over the toe or in the trench for protection.	2000.00	per CuM
2.7	PCCM	Providing cement concrete 1:2:4 over the PLB HDPE PIPE with wire mesh in the trenches for protection, where the depth is less than 120 Cms (Cement Concrete as per specification).	2200.00	per Cu.M
PLB HDPE ducts, G.I. Pipes, will be supplied by the Executing Agency. All other materials required for the work shall be arranged by the contractor. Rates include cost of material and standard curring, shuttering etc.and transportation from store.				

BBNL/CGM(Plg.)/OFC Laying/SOR/2013 date: 12.04.2013

Sr. No.	Item Code	Description of Item	Unit Rate (in Rs.)	Unit
3		**Cable laying by Pulling/blowing**		
3.1	OFPB	Laying of OF Cable by Pulling/blowing method including openning of Manhole, Sealing of PLB HDPE Pipes by	4.00	per M
PLB HDPE pipe shall be provided by the Executing agency. All other materials required for the work shall be arranged by the contractor.				
4		**Splicing of of Cable**		
4.1	SSBJ	Splicing of Fibres in existing/New Joint Chambers for making Straight/Branch joints on new routes or at FPOI and end to end testing of all Fibres after Splicing. The rates specified are inclusive of installation and splicing of splitters also wherever applicable.	3000.00	per Joint
4.2	SFTB	Splicing of all the fibres of 24 F OF cable in the Fibre Termination Box at the Gram Panchayats and testing all the fibres for continuity.This will also include installation/mounting of the FTB as specified.	3500.00	per FTB
Note: All tools, Splicing machine and instruments required for above work shall be arranged by the contractor.				
5		**Jointing Chamber**		
5.1	JCBR	Construction of Bricks joints chamber as per specification and the construction practice as specified in the tender document.	2000.00	per Jointing Chamber
5.2	JCRC	Construction of pre fabricated RCC joints chamber as per specification and the construction practice as specified in the tender document.	2200.00	per Jointing Chamber
All materials required for the work shall be arranged by the contractor.				
6		**Route Indicator**		
6.1	RISR	Supply and fixing of RCC/Stone route/joint indicator by	220.00	Per Indicator
7		**Restoration of Road Surface**		
7.1	RRSB	Road restoration work with bituminous macadam for semi grouting 50 mm thick and premix carpet surfacing 25 mm thick over the grouted surface (total upto 75mm thick), including supply of asphalt etc. to evenly match the road, including consolidation and rollong as per standard specification of DSR 1997.	90	per M
7.2	RRSC	Road restoration work with cement concrete 1:4:8 mix for thickness varying from 150 mm to 225 mm, including supply of concrete to evenly match the road.	1600.00	Per CuM
All materials required for the work shall be arranged by the contractor.				
8		**Route Index Diagram**		
8.1	DRID	Supply of route index diagram in hard as well as soft copy on cd for complete Block	100.00	Per KM
8.2	VLCR	Videography of the route on which cable is laid	300.00	Per KM
The contractor shall arrange all materials required for the work.				
9		**Laying of OF cable in buildings (Leading in work)**		

BBNL/CGM(Plg.)/OFC Laying/SOR/2013 date: 12.04.2013

Sr. No.	Item Code	Description of Item	Unit Rate (in Rs.)	Unit
9.1	LOIB	Installation of PVC flexible conduit in corridor/risers/ exchange premises and Laying of OF Cable through it (leading in work)	10.00	per M
PVC/Tuflex pipe shall be provided by the Executing agency. All other materials required for the work shall be arranged by the contractor.				
10		**Mounting of FDMS at OLT locations**		
10.1	MFDO	Physical Mounting of FDMS on wall at OLT locations	250	per FDMS
All material required for the work shall be arranged by the contractor				
11		**Recovery of Store**		
11.1	RECD	Recovery of empty 24 F cable Drum	200.00	Per Drum
Note :	The above Schedule of Rates is for the cable laying works to be carried out as per the description of various items as specified in the Engineering Instructions and Construction Specifications for Underground cable laying works issued by BBNL			

BBNL/CGM(Plg.)/OFC Laying/SOR/2013 date: 12.04.2013

MATERIALS COST

Sr. No.	Item	Unit	Average Unit Rate in Rs.
1	PLB DUCTS*	Mtr	40
2	GI PIPE	Mtr	200
3	PUSH FIT COUPLERS	Nos.	55
4	CABLE SEALING PLUGS	Nos.	22
5	END PLUGS	Nos.	18

BBNL/CGM(Plg.)/OFC Laying/SOR/2013 Date: 12.04.2013

Guidelines For Preparation of PE's and Execution of OF Cable Laying Works

1. As per the generally available geographical information most of the terrains in India can be widely classified as normal plains with non-rocky soil strata. In these areas cable laying should be possible by normal cable laying method using open trenching. It is therefore envisaged that major cable laying works would be covered in this category. However, in about 15-20 % areas of the country where the strata is very well known to be rocky in nature the cable laying works may be carried out as per Rocky soil method.

2. As already specified above, in most of the states/areas the cable laying works shall be carried out by open trenching method only. This is all the more necessary since the states have agreed to provide ROW free of cost for the NOFN project. The provision for HDD method has been made for very essential cases only like road crossings, pucca portion for which the cutting permissions may not be granted by the civic authorities, the sites where the proper cable laying space may not be available etc. For all such cases put together it should be endeavoured that the work of OF cable laying through HDD machine is limited to about 10% of total OF cable laying work.

3. Similarly, in cases where small portions in narrow lanes/Gallis/ where due to lack of proper working space HDD is not possible and open trenching is not allowed/permissible The work of OF cable laying may be carried out using Tunneling/ manual boring/bucky method. For all such cases put together it should be endeavoured that the work of OF cable laying using these methods is limited to about 15% of total OF cable laying work.

4. For all the cable laying works the specifications and construction practices as specified in the Engineering Instructions and Construction Specifications for Under Ground Optical Fibre Cable Laying Works giving details of construction and material specifications, issued by BBNL shall be followed.

5. The route/joint indicators should generally be placed at every joint chamber and approximately at every 200 meters and at other places where the road takes curves or turns or the cable changes sides.

6. About 10% of the total length may require Road restoration work since it is anticipated that major portion of the route would lie on normal kachcha soil where only backfilling should suffice.

7. Any instructions/Guidelines issued subsequently shall form part of these guidelines.

Page 1 of 1

Amendment/ Clarification Number 1 **Annexure I**

Sl. No.	Item No. in SOR	Item code	Item	Clarification sought	Amendment/clarification
1	4.1	SSBJ	Cable and Splicing work of Fibres in existing/New Joint Chambers (Straight/Branch), FPOI and testing of all Fibres after Splicing, end to end.	Please clarify that the installation rate of Underground Splitter is included in this price or not.	Installation rate is included
2	4.2	SFTB	Splicing of all the fibres of 24 F OF cable in the Fibre Termination Box at the Gram Panchayats and testing all the fibres for continuity.This will also include installation/mounting of the FTB as specified	1. Please clarify that this rate is also applicable for FDMS at OLT/Exchange location. 2. Installation rate of Wall Mounted Splitter is also included in this price or not. 3. Unit is 'per pair'. Does it mean per pair of fibre.	1. A separate item for Mounting of FDMS is being added in SOR 2. Not applicable 3. Unit is per FTB and not per pair. Same may be corrected.
3	8.2	VLCR	Videography of the route on which cable is laid	The Description of item may be modified as "Photography & Videography per Gram Panchayat for 15-30 Minutes to meet Social Audit Requirement " and Unit may be kept as Per GP	No change proposed
4	9.1	LOIB	Laying of OF Cable in corridor/rises/exchange premises (leading in work)	Please clarify that the supply & installation rate of flexible PVC conduit is included in this price or not.	Clause is self explanatory. The item is for fixing of PVC conduit and laying of OF cable through it.

17.04.13
Deepika Khosla
CGM(Planning)
BBNL C.O.

BHARAT BROADBAND NETWORK LIMITED(BBNL)
Corporate Office,**(New Delhi)**

No.BBNL/CGM(Plg)/OFC Laying/SOR/2013

Dated 15.05.2013

To,

1).Sh. Ranjan Ghosh
GM(NOFN),BSNL CO,
New Delhi

2.)Sh.Anshul Gupta,
ED/CC,Corporate office,
RailTel Corporation of India Limited,
Gurgaon.

3).Sh.V.Balaji,
Corporate office,
M/s Power Grid Corporations India Ltd.
Gurgaon.

Sub: Amendment /clarification no.2 to Schedule of Rates for OF Cable Laying for NOFN project

Sir,

With reference to the above subject and further to clarification no. 1 issued by BBNL vide letter no..BBNL/CGM(Plg)/OFC Laying/SOR/2013 dated 12.04.2013, kindly find amendment /clarification no.2 enclosed as annexure herewith.

This is for your information and further necessary action pl.

Encl:As above

Deepika Khosla
CGM(planning)
BBNL CO

Copy to:
1) CMD,BSNL/RailTel/PGCIL.
2) CMD BBNL
3) Dir(plg)/Dir(O)/Dir(Fin) BBNL

Annexure

Ammendment/ Clarification Number 2

Sl. No.	Item No. in SOR	Item Code	Item	Modified as
1	1.2	OFB	Excavation and trenching including tunneling or boring and reinstatement as per construction specification of the tender to a depth of 1.65 cms in Bituminised/ Concrete/ Set Stone (rate per meter) for Single PLB pipe.	Excavation and trenching including tunneling or boring and reinstatement as per construction specification of the tender to a depth of 1.65 m in Bituminised/ Concrete/ Set Stone (rate per meter) for Single PLB pipe.
2	2.4	LFRC	Supply and laying of full round RCC/ DWC pipe (ISI Mark) in trenches over PLB HDPE pipes/ coils on culverts/ bridges/ nulla and for cases where cable is laid at less depth (wherever required).	Supply and laying of full round RCC (ISI mark) and DWC pipe (As per existing TEC GR no. GR/DWC-34/01 Sep.2007 with latest ammendment) in trenches over PLB HDPE pipes/ coils on culverts/ bridges/ nulla and for cases where cable is laid at less depth (wherever required).

15.05.2013