RAILTEL CORPORATION OF INDIA LIMITED

II floor, 'B' block, Rail Nilayam, Secunderabad-500 071

TENDER DOCUMENT

TENDER NO:RailTel/Tender/OT/SR/HQ/2015-16/89, Dt:19-09-2015

Name of the Work

Zonal contract for Last Mile connectivity, OFC diversion/rectification and other miscellaneous worksin "Three Reaches"for Bangalore Territory

Tender Document sold to: M/s.

Signature of Tenderer with seal

RailTel Corporation of India Limited

A Government of India (Ministry of Railways) Undertaking

Southern Region Head Quarters, Second Floor, B-Block, Rail Nilayam, Secunderabad–500071
visit www.railtelindia.com, Tel: 040-27821134 Fax: 27820682,

OPEN TENDER NOTICE

Tender Notice No. RailTel/Tender/OT/SR/HQ/2015-16/89, Dt.19-09-2015

RailTel Corporation of India Ltd. Southern Region,Secunderabad invites sealed tenders from established contractors with proven experience for the work of "Zonal contract for Last Mile connectivity, OFC diversion/rectification and other miscellaneous worksin "Three Reaches" for Bangalore Territory"

Reach & No	Tender Value	EMD Cost	Tender document Cost	
			Direct Purchase	By post
Bangalore 1	Rs.58,74,780/-	Rs.1,17,500/-	Rs.5,725/-	Rs.6,300/-
Hubli 2	Rs.21,77,119/-	Rs.43,550/-	Rs.2,290/-	Rs.2,863/-
Mysore 3	Rs.21,77,119/-	Rs.43,550/-	Rs.2,290/-	Rs.2,863/-

a)	Sale of Tender Documents.	From 19-09-2015
b)	Closing of sale of Tender Documents	26-10-2015 at 12.30 hrs (by hand) 19-10-2015 (by post)
c)	Submission of tender documents.	26-10-2015 onor before 15.00 hrs.
d)	Opening of tender documents.	26-10-2015 at 16:30 hrs.
e)	Earnest Money (EMD) per section as specified above will be payable by Bank Draft / F.D.R in favour of RailTel Corporation of India Limited. Secunderabad	
f)	Cost of Tender Document mentioned above for each reach is inclusive of VAT@14.5%.	

Eligibility Criteria Per Zone:

Tenderer must have completed successfully and satisfactorily at least one similar work costing not less than 35 % of the value of the tendered work during the preceding three years (i.e. current financial year and three previous financial years) executed for Govt. /PSUs/ Telecom Service providers.

For detailed qualifying criteria, please refer Para 15 of Section II chapter I of tender document.

Cost of Tender Document shall be paid in the form of Demand Draft drawn in favour of RailTel Corporation of India Limited, Secunderabad from any scheduled bank. Tender document can be purchased from the RailTel Corporation of India Limited, 2nd floor, B-Block, Rail Nilayam, Secunderabad on any working day or can be downloaded from the web site www.railtelindia.com. Documents down loaded from web site shall accompany the payment for the cost of the document in the form of D.D as mentioned above during the submission of Tender document. Documents received without the cost of tender will summarily be rejected The tender document should be sealed in a cover duly superscripted tender No, and Name of the work and shall bedropped in the Box kept inthe office of Executive Director(Southern Region), RailTel, Second floor, B-Block, Rail Nilayam, Secunderabad, as

mentioned at clause “c” above. RailTel is not responsible for delay or loss in transit. The Tenderer may be present at the time of opening of tenders, if they desire. The tender offers are deemed to be valid for acceptance for a period of 120 days from the date of opening of the tender. Late/delayed/ incomplete tenders and tenders with insufficient EMD will be summarily rejected.However, small scale Units registered with NSIC under single point registration scheme are exempted from cost of Tender Document and EMD. Valid documents i.e., registration of NSIC should be provided for this to get exemption from submission EMD.

Tender Notice and Tender Document are also available at our website www.railtelindia.com

Note: Any, Corrigendum, if issued, will be uploaded only on RailTel’s website www.railtelindia.com

Sd/-
Addl.GM/Proj/SR
for Executive Director(Southern Region)
RailTel Corporation of India Limited, Secunderabad

Signature of Tenderer with seal

Check List for Tenderer before submission of tender

S.No	Check list	Complied
1	Each page of the tender document shall be signed and rubber stamped	
3	Experience certificate – 35% of contract value to prove minimum eligibility criteria.	
4	Turnover - 150% of tender value as per ITCC/Audited balance sheet	
5	Submission of DD for cost of EMD as mentioned in Tender Notice	
6	Submission of DD for cost of the tender document as mentioned in Tender Notice (as applicable for by hand/by post) Note: Tender cost for Each Reach need to paid separately.	
7	Offer letter complete. (Form No.1)	
8	The offer will be with percentage rate in figures and words for the Reach Participated.	
9	Statement of deviations (Para 4). Form No.5	
10	Bank details RTGS/IFSC code etc.	
11	Company registration number, PAN card details, TIN number etc.	
12	Constitution of firm & Power of attorney	
13	Details of work executed/under execution as per Form -10	

The above checklist is indicative and does not purport to be the entire requirement. Tenderers areadvised to go through the entire tender document carefully before submitting their offers.

Signature of Tenderer with seal

INDEX SHEET

Signature of Tenderer with seal

SECTION – I Chapter -1

Preamble

Tender No.RailTel/Tender/OT/SR/ERS/2015-16/89, Dated:19-09-2015

Name of work:Zonal contract for Last Mile connectivity, OFC diversion/rectification and other miscellaneous worksin "Three Reaches" for Bangalore Territory

Schedule of requirement:

Reach & No	Tender Value	EMD Cost	Tender document Cost	
			Direct Purchase	By post
Bangalore 1	Rs.58,74,780/-	Rs.1,17,500/-	Rs.5,725/-	Rs.6,300/-
Hubli 2	Rs.21,77,119/-	Rs.43,550/-	Rs.2,290/-	Rs.2,863/-
Mysore 3	Rs.21,77,119/-	Rs.43,550/-	Rs.2,290/-	Rs.2,863/-

1. Scope of work: The broad responsibility of the contractor under the scope of work for this tender shall be as under:

1.1. Supply: Supply of items conforming to industry standards as per schedule and the Technical Specifications.

1.2. Services/Works:Zonal contract for Last Mile connectivity, OFC diversion/rectification and other miscellaneous worksin "Three Reaches" for Bangalore Territory

1. RailTel/ Southern Region cover all the Southern Indian states (The three Railways ie. South Central Railways, South western Railways and Southern Railways.) Across the states and Railways, RailTel various customers have their PoPs or for other connectivity, OFC cable is to be laid up to the customer premises called Last Mile connectivity (LMC) and OFC diversion/rectification and other miscellaneous work for Bangalore Territory

2. The entire Southern Region of RailTel has been divided into four territories. They are;
   i. Secunderabad Territory
   ii. Chennai Territory
   iii. Bangalore Territory
   iv. Ernakulam Territory

3. Each Territory is divided into Zones. Bangalore Territory covered under present tender consists of Three Zones and the jurisdiction is given below;

	Zone	Covered
1	Bangalore Zone	South Western Rly's.
2	Hubli Zone	South Western Rly's.
3	Myzore Zone	South Western Rly's.

4. In order to Provide Optical Fibre connectivity from nearest RailTel's POP expeditiously and also for OFC diversion/rectification and other miscellaneous work for Bangalore Territory, RailTel Southern Region-Bangalore Territory intends to award Zonal Contract for execution of works as and when required in any of the two zones mentioned above.

5. The approximate quantities of different items of OFC related works which are expected to be executed during currency of the contract is given in SOR. (Section:I).

6. The quantities given in the Schedule of Requirement (SOR) are only indicative one to give an idea to the Tenderer of the total volume of work which is expected to be executed in one year of the contract in Bangalore territory. The quantities of SOR will be executed at the rates finalized through this tender from time to time depending on the actual requirements of works through separate Work orders which will be issued by respective Managers-in-charges.

7. Broad responsibility of Tenderer under the scope of work of this tender will be as under.

   Supply: Supply of all items confirming to industry standards as per Schedule of Requirements and the technical specifications except;

   i. OFC
   ii. HDPE Duct.
   iii. FDMS
   iv. Racks
   v. Power Plant.

   Services: (i) Trenching, laying, splicing, termination, testing and commissioning of Optical Fiber Cable for providing Last Mile Connectivity from RailTel POP to different customers of RailTel,OFC diversion/rectification and other miscellaneous work for Bangalore Territory as per specifications given in Tender document.

   (ii) Obtaining ROW permission from the local/Govt authorities. (Required ROW charges will be paid at actual by the RailTel). The original Receipt for the full amount of the ROW charges should be submitted to the RailTel.

8. Schedule of Requirements (SOR): The SOR are Schedule items for which Tenderer shall quote a percentage (both in figures and in words) in the Tenderer's Offer given at the end of SOR.

9. Tenderers are required to read the following instructions carefully.

   9.1 Validity of the Zonal Contract shall be 2 (two) years from the date of issue of LOA but can be extended for further period of three months on the same terms & conditions. This extended period will be used to complete the balance item of work or for work order given in the 11th / 12thmonth of the contract.

   9.2 The work awarded to the Zonal Contractor shall be executed strictly as per technical specification of the tender document.

   9.3 The rates of SOR should be quoted in percentage (above/ below/at par).

   9.4 Tenderer shall submit separate Tender Document duly filled in quoted by them accompanied with requisite Earnest Money deposit (EMD) as prescribed in Para-13 of Preamble. The tender document should be sealed in a cover duly superscripted

   i. Tender No
   ii. Tender Name& Zone
   iii. Date of Opening

Signature of Tenderer with seal

9.5 Wherever a work arises , the Work order will be issued by the Manager-in-Charge of the work directly to the contractor during currency of the contract. Each such work order may or may not contain all the items of the SOR

9.6 The time of completion of each work order shall be 10 days or as specified in the relevant work order.

9.7 Timely completion of the work is the essence of the contract and paramount importance to RailTel and any extension would be considered only in exceptional circumstances.

9.8 In case the contractor fails to execute the work in specified time the penalties will be imposed as per the tender conditions. RailTel reserves the right to terminate the work order after issue of 7 days notice. The security deposit submitted by the contractor will be forfeited if the work order is terminated on contractors account. RailTel may also delete the name of such contractor from the approved list of contractor.

9.9 Liquidated damages shall be imposed at the rate of 0.5 % per week or part thereof (rounded off to the nearest whole number) of the total value of the work order, subject to a maximum of 10% of the value of the work order.

10. Last Date of submission of Tender: The tender bid shall be submitted in a Sealed Cover. The tender shall be received up to 15:00 hrs on26-10-2015 in the office of the
    Executive Director/ Southern Region,
    2nd Floor, B-Block, Rail Nilayam Complex,
    Secunderabad-500 071.

11. Date of Opening of Tender: The tenders shall be opened at 16:30 hrson 26-10-2015 at the same address as mentioned above.

12. Address for Communication: All Correspondences and clarifications must be addressed to the:
    Executive Director/ Southern Region,
    2nd Floor, B-Block, Rail Nilayam Complex,
    Secunderabad-500 071.

13. Earnest Money: Tenderer shall deposit as Earnest Money in a manner prescribed in Clause-5 of Section II

14. Security Deposit: On receipt of Letter of Acceptance of Tender from the RailTel, the successful Tenderer shall, within a period of 15 days, deposit in favor of RailTel Corporation of India Limited, Secunderabad an amount in terms of clause-3SpecialConditions of Contract (Section II) towards Security Deposit for due fulfilment of contract.

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Signature of Tenderer with seal

SECTION I

Chapter 2

Tender No.RailTel/Tender/OT/SR/ERS/2015-16/89/R1, Dated:19-09-2015
Reach 1 : Schedule of Requirement for Bangalore Zone.

Sl No.	Description	Unit	Rate	For Bangalore	
				Qty	Amount
1	Drawings of 12F Armoured OFC on the electrical poles USING SUITABLE FIXTURES (as per the type of electrical Poles) or through already fixed/laid PVC/GI/HDPE Pipe. After completion of drawing of OFC, the OTDR reports for all the fibers and the route diagram should be submitted. in case any fiber break/High Loss at the time of drawings, the same shall be rectified by the agency	Km	8	2000	16000
2	Drawings of 12F/24F OFC inside the Building Premises including fixing of GI Pipe, Flexible Pipe, and other protection as required with prper Clamping. Drawing of OFC through the Building Duct, False ceiling, False flooring and with propere protection. All other materials except OF cable will be supplied by the tenderer.	Mts	81	7500	607500
3	U/G OFC work in Railway areas and in the campus of the Customer premises. This included trenching up to a depth of 120 Cm and Laying of HDPE duct. This works also includes fixing of GI Pipe, Flexible pipe and other protections as required in the trench or with Proper Claimping on the wall. all materials except HDPE Duct and OF cable to be supplied by tenderer.	Mts	112	7500	840000
4	Splicing and termination of OFC Cable in the termination Box. Terminatrion Box will be supplied by RailTel				
	a) 12F OFC	Nos	1725	45	77625
	b) 24F OFC	Nos	2875	70	201250
5	Supply and installation of RCC Splice chambers of 100 CM diameter, 60 CM depth and 5mm thickness with 2 halves of RCC top covers in the campus. The chamber should be filled with river sand mixed with anti-termite poweders	Nos	3450	80	276000

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6	Road Crossing / Track Crossing				
	a) by means of Open Trench as described under item-3.	Mts	112	300	33600
	b) Laying of U/G cable through HDD (Horizontal Directional Drilling). It include making test pit, Drilling up to 3 meter depth, pulling of Duct, blowing of OFC inside duct and backfilling of pit and restoration of all pits into original surface.	Mts	518	3500	1813000
7	Supply and fixing of B class 50 mm GI Pipe inside the campus for drain/Road crossing.				
	a) 50 mm size	Mts	421	250	105250
	b) 100 mm size	Mts	805	70	56350
8	Installation of Battery Bank, Battery Charger and wiring of power supply with necessary accessories. This includes transportation of said materials from the RailTel Stores/Location of that particular Location.	Nos	3450	20	69000
9	Installation of Racks, FDMS. This includes transportation of said materials from RailTel Stoes location of that particular section	Nos	2300	60	138000
10	CC/BT Road restoration (150mm thickness &300mm width) inside tha campus	Mts	170	900	153000
11	Supply and fixing of Route markers as per the drawing in the campus	Nos	354	85	30090
12	Blowing/Drawing of 12F/24F A) through the exising empty duct/GI Pipe burried in the ground	Mts	8	15000	120000
13	Installation of Optical Fiber Joint Enclosure (Raychem/R&M/3M/TVS make only) and Splicing of 24 fiber. This includes provision of pit as detailed in technical specn as advised by Engineer at site.	Nos	3178	30	95340
14	Internal wiring and fixing of all components required for commissioning of RailTel equipments in RailTel/Customer Racks at Customer locations and RailTel PoPs over Bangalore Territory as advised by the RailTel Engineer. RailTel will provide the SDH/Power/Switch Equipments and cables related with equipments required to be fitted and guide the installation. The vendor has to provide all other materials viz., Cables, Lugs, MCBs, Fans etc., required to fix and power on equipments irrespective of AC/DC supply. This includes transportation to site also.	Loc	3000	45	135000

Signature of Tenderer with seal

15	Transportation of Cable, Duct, Battery, Charger, DG Set and various equipments between any points within Bangalore territory including loading/unloading. The distance per trip will be calculated on round trip basis and as certifed by the RailTel Managers at both ends.	Km	9	35000	315000
16	Dressing up of all Cables & patch cords (existing & new) at RailTel PoPs by properly re-routing to avoid any accidental pull-out or damage and tagging the ends with industry standard methods. This includes supply of material & transportation required for the work.	Rack	1000	200	200000
17	Providing of Maintenance free Telecom Earth to the RailTel and Railway Colocated PoPs as per RDSO specification given in this tender document and as advised by RailTel Engineer at site including transportation also.	Nos	29518	15	442775
18	Preparation and fixing of laminated (A2 size) ACAD (or suitable tool) drawing of Fibre connectivity, Equipment configuration & Power supply arrangement in separate (3) sheets. RailTel Engineer will provide neat free hand sketch with standard logos for various items & routings. This includes transportation to site also.	Loc	1500	100	150000
	Grand Total amount in Rs.				**5874780**
	Contractor Percentage at Par/Below/Above				% should quote here
	Grand Total : after Contractor Percentage (Rs. in figures & words)				After applying %

(*Price shall be inclusive of all taxes, levis & freight)

Note: (i)Any discrepancy between figures and words, amount in words shall be reckoned for consideration.

(ii) If there is any discrepancy in the total amount and the Unit Rate, the value shown in the Unit Rate shall be considered for the evaluation.

(iii)Rate quoted should be inclusive of all taxes. however break-up of all taxes should be shown in a separate sheet for each individual item which includes contractor percentage**. A Performa of Invoice must be enclosed along with the your offer and it is mandatory. Since it is work contract 60 (supply portion) :40 (service portion) ratio will be applied.**

Signature of Tenderer with seal

Tender No.RailTel/Tender/OT/SR/ERS/2015-16/89/R2, Dated:19-09-2015
Reach 2 : Schedule of Requirement for Hubli Zone.

Sl No.	Description	Unit	Rate	For Bangalore	
				Qty	Amount
1	Drawings of 12F Armoured OFC on the electrical poles USING SUITABLE FIXTURES (as per the type of electrical Poles) or through already fixed/laid PVC/GI/HDPE Pipe. After completion of drawing of OFC, the OTDR reports for all the fibers and the route diagram should be submitted. in case any fiber break/High Loss at the time of drawings, the same shall be rectified by the agency	Km	8	1000	8000
2	Drawings of 12F/24F OFC inside the Building Premises including fixing of GI Pipe, Flexible Pipe, and other protection as required with prper Clamping. Drawing of OFC through the Building Duct, False ceiling, False flooring and with propere protection. All other materials except OF cable will be supplied by the tenderer.	Mts	81	3750	303750
3	U/G OFC work in Railway areas and in the campus of the Customer premises. This included trenching up to a depth of 120 Cm and Laying of HDPE duct. This works also includes fixing of GI Pipe, Flexible pipe and other protections as required in the trench or with Proper Claimping on the wall. all materials except HDPE Duct and OF cable to be supplied by tenderer.	Mts	112	3750	420000
4	Splicing and termination of OFC Cable in the termination Box. Terminatrion Box will be supplied by RailTel				
	a) 12F OFC	Nos	1725	15	25875
	b) 24F OFC	Nos	2875	15	43125
5	Supply and installation of RCC Splice chambers of 100 CM diameter, 60 CM depth and 5mm thickness with 2 halves of RCC top covers in the campus. The chamber should be filled with river sand mixed with anti-termite powederes	Nos	3450	20	69000
6	Road Crossing / Track Crossing				
	a) by means of Open Trench as described under item-3.	Mts	112	100	11200
	b) Laying of U/G cable through HDD (Horizontal Directional Drilling). It include making test pit, Drilling up to 3 meter depth, pulling of Duct, blowing of OFC inside duct and backfilling of pit and restoration of all pits into original surface.	Mts	518	750	388500

Signature of Tenderer with seal

7	Supply and fixing of B class 50 mm GI Pipe inside the campus for drain/Road crossing.				
	a) 50 mm size	Mts	421	50	21050
	b) 100 mm size	Mts	805	15	12075
8	Installation of Battery Bank, Battery Charger and wiring of power supply with necessary accessories. This includes transportation of said materials from the RailTel Stores/Location of that particular Location.	Nos	3450	10	34500
9	Installation of Racks, FDMS. This includes transportation of said materials from RailTel Stoes location of that particular section	Nos	2300	10	23000
10	CC/BT Road restoration (150mm thickness &300mm width) inside tha campus	Mts	170	150	25500
11	Supply and fixing of Route markers as per the drawing in the campus	Nos	354	20	7080
12	Blowing/Drawing of 12F/24F A) through the exising empty duct/GI Pipe burried in the ground	Mts	8	2500	20000
13	Installation of Optical Fiber Joint Enclosure (Raychem/R&M/3M/TVS make only) and Splicing of 24 fiber. This includes provision of pit as detailed in technical specn as advised by Engineer at site.	Nos	3178	10	31780
14	Internal wiring and fixing of all components required for commissioning of RailTel equipments in RailTel/Customer Racks at Customer locations and RailTel PoPs over Bangalore Territory as advised by the RailTel Engineer. RailTel will provide the SDH/Power/Switch Equipments and cables related with equipments required to be fitted and guide the installation. The vendor has to provide all other materials viz., Cables, Lugs, MCBs, Fans etc., required to fix and power on equipments irrespective of AC/DC supply. This includes transportation to site also.	Loc	3000	15	45000
15	Transportation of Cable, Duct, Battery, Charger, DG Set and various equipments between any points within Bangalore territory including loading/unloading. The distance per trip will be calculated on round trip basis and as certifed by the RailTel Managers at both ends.	Km	9	20000	180000

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16	Dressing up of all Cables & patch cords (existing & new) at RailTel PoPs by properly re-routing to avoid any accidental pull-out or damage and tagging the ends with industry standard methods. This includes supply of material & transportation required for the work.	Rack	1000	100	100000
17	Providing of Maintenance free Telecom Earth to the RailTel and Railway Colocated PoPs as per RDSO specification given in this tender document and as advised by RailTel Engineer at site including transportation also.	Nos	29518	10	295184
18	Preparation and fixing of laminated (A2 size) ACAD (or suitable tool) drawing of Fibre connectivity, Equipment configuration & Power supply arrangement in separate (3) sheets. RailTel Engineer will provide neat free hand sketch with standard logos for various items & routings. This includes transportation to site also.	Loc	1500	75	112500
	Grand Total amount in Rs.				**2177119**
	Contractor Percentage at Par/Below/Above				**% should quote here**
	Grand Total : after Contractor Percentage (Rs. in figures & words)				**After applying %**

(*Price shall be inclusive of all taxes, levis & freight)

Note: (i)Any discrepancy between figures and words, amount in words shall be reckoned for consideration.

(ii) If there is any discrepancy in the total amount and the Unit Rate, the value shown in the Unit Rate shall be considered for the evaluation.

(iii)Rate quoted should be inclusive of all taxes. however break-up of all taxes should be shown in a separate sheet for each individual item which includes contractor percentage**. A Performa of Invoice must be enclosed along with the your offer and it is mandatory. Since it is work contract 60 (supply portion) :40 (service portion) ratio will be applied.**

Signature of Tenderer with seal

Tender No.RailTel/Tender/OT/SR/ERS/2015-16/89/R3, Dated:19-09-2015
Reach 3 : Schedule of Requirement for Mysore Zone.

Sl No.	Description	Unit	Rate	For Bangalore	
				Qty	Amount
1	Drawings of 12F Armoured OFC on the electrical poles USING SUITABLE FIXTURES (as per the type of electrical Poles) or through already fixed/laid PVC/GI/HDPE Pipe. After completion of drawing of OFC, the OTDR reports for all the fibers and the route diagram should be submitted. in case any fiber break/High Loss at the time of drawings, the same shall be rectified by the agency	Km	8	1000	8000
2	Drawings of 12F/24F OFC inside the Building Premises including fixing of GI Pipe, Flexible Pipe, and other protection as required with prper Clamping. Drawing of OFC through the Building Duct, False ceiling, False flooring and with propere protection. All other materials except OF cable will be supplied by the tenderer.	Mts	81	3750	303750
3	U/G OFC work in Railway areas and in the campus of the Customer premises. This included trenching up to a depth of 120 Cm and Laying of HDPE duct. This works also includes fixing of GI Pipe, Flexible pipe and other protections as required in the trench or with Proper Claimping on the wall. all materials except HDPE Duct and OF cable to be supplied by tenderer.	Mts	112	3750	420000
4	Splicing and termination of OFC Cable in the termination Box. Terminatrion Box will be supplied by RailTel				
	a) 12F OFC	Nos	1725	15	25875
	b) 24F OFC	Nos	2875	15	43125
5	Supply and installation of RCC Splice chambers of 100 CM diameter, 60 CM depth and 5mm thickness with 2 halves of RCC top covers in the campus. The chamber should be filled with river sand mixed with anti-termite powederes	Nos	3450	20	69000
6	Road Crossing / Track Crossing				
	a) by means of Open Trench as described under item-3.	Mts	112	100	11200
	b) Laying of U/G cable through HDD (Horizontal Directional Drilling). It include making test pit, Drilling up to 3 meter depth, pulling of Duct, blowing of OFC inside duct and backfilling of pit and restoration of all pits into original surface.	Mts	518	750	388500

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7	Supply and fixing of B class 50 mm GI Pipe inside the campus for drain/Road crossing.				
	a) 50 mm size	Mts	421	50	21050
	b) 100 mm size	Mts	805	15	12075
8	Installation of Battery Bank, Battery Charger and wiring of power supply with necessary accessories. This includes transportation of said materials from the RailTel Stores/Location of that particular Location.	Nos	3450	10	34500
9	Installation of Racks, FDMS. This includes transportation of said materials from RailTel Stoes location of that particular section	Nos	2300	10	23000
10	CC/BT Road restoration (150mm thickness &300mm width) inside tha campus	Mts	170	150	25500
11	Supply and fixing of Route markers as per the drawing in the campus	Nos	354	20	7080
12	Blowing/Drawing of 12F/24F A) through the exising empty duct/GI Pipe burried in the ground	Mts	8	2500	20000
13	Installation of Optical Fiber Joint Enclosure (Raychem/R&M/3M/TVS make only) and Splicing of 24 fiber. This includes provision of pit as detailed in technical specn as advised by Engineer at site.	Nos	3178	10	31780
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15	Transportation of Cable, Duct, Battery, Charger, DG Set and various equipments between any points within Bangalore territory including loading/unloading. The distance per trip will be calculated on round trip basis and as certifed by the RailTel Managers at both ends.	Km	9	20000	180000

Signature of Tenderer with seal

16	Dressing up of all Cables & patch cords (existing & new) at RailTel PoPs by properly re-routing to avoid any accidental pull-out or damage and tagging the ends with industry standard methods. This includes supply of material & transportation required for the work.	Rack	1000	100	100000
17	Providing of Maintenance free Telecom Earth to the RailTel and Railway Colocated PoPs as per RDSO specification given in this tender document and as advised by RailTel Engineer at site including transportation also.	Nos	29518	10	295184
18	Preparation and fixing of laminated (A2 size) ACAD (or suitable tool) drawing of Fibre connectivity, Equipment configuration & Power supply arrangement in separate (3) sheets. RailTel Engineer will provide neat free hand sketch with standard logos for various items & routings. This includes transportation to site also.	Loc	1500	75	112500
	Grand Total amount in Rs.				**2177119**
	Contractor Percentage at Par/Below/Above				**% should quote here**
	Grand Total : after Contractor Percentage (Rs. in figures & words)				**After applying %**

(*Price shall be inclusive of all taxes, levis & freight)

Note: (i)Any discrepancy between figures and words, amount in words shall be reckoned for consideration.

(ii) If there is any discrepancy in the total amount and the Unit Rate, the value shown in the Unit Rate shall be considered for the evaluation.

(iii)Rate quoted should be inclusive of all taxes. however break-up of all taxes should be shown in a separate sheet for each individual item which includes contractor percentage**. A Performa of Invoice must be enclosed along with the your offer and it is mandatory. Since it is work contract 60 (supply portion) :40 (service portion) ratio will be applied.**

Signature of Tenderer with seal

Section-II

Chapter 1. Instructions to Tenderers and Conditions of Tendering

Chapter 2. Special Conditions of Contract

Chapter 3. Forms of Tenders etc.

SECTION - II CHAPTER - 1

INSTRUCTIONS TO TENDERERS AND CONDITIONS OF TENDERING INDEX

SECTION - II

CHAPTER-1

INSTRUCTIONS TO TENDERERS AND CONDITIONS OF TENDERING

1. GENERAL INSTRUCTIONS

Tenders are invited on behalf of M/s. RailTel Corporation of India Limited, Secunderabad -500071 from established and reliable contractors for the work of Zonal contract for Last Mile connectivity, OFC diversion/rectification and other miscellaneous worksin "Three Reaches" for Bangalore Territory. *Contractor shall do the restoration of PWD/NH roads after trenching & laying HDPE/OFC as per KSTP standard and adhere to the guidelines issued by Bangalore Government G.O (MS) No.33/2014/PWD dt 29.04.2014and Obtain the no objection certificate from road authorities.* Contractor shall liaison with concerned state /NH department authorities for signing the MoU, necessary approvals and permissions.

1.1 The Special Conditions of Contract, Instructions to Tenderers and Conditions of Tendering, Technical Specifications & Supplement, Preamble including Schedule of Requirements and all Annexure & Forms etc. shall, hereafter, be collectively referred to as the "Tender Papers".

1.2 Tender offer: The Tenderer(s) are required to quote percentage **Below/Atpar/above**both in figures and words as indicated in the schedule. If there is any discrepancy in the rate quoted between figures and words, the rates quoted in words will be taken as final.

1.3 The Tenderer should have Registration No. for WCT in respective state where work is to be executed.

1.4 Plant & machinery: The Tenderer should furnish the details of the machinery and plant to be deployed, in case the Tenderer plans to use mechanized trenching.

1.5 TendershallsubmitTenderDocumentdulyfilledin bythemaccompaniedwithrequisiteEarnestMoney Deposit(EMD)asprescribedand the tender document cost (If downloaded from site).

2. INTERPRETATIONS

The following terms wherever occurring in the tender papers and wherever used throughout the execution of the work, shall, unless excluded by or repugnant to the context, have the meaning attributed thereto as follows:

"CONTRACT" Means the Contract resulting from the acceptance by the Purchaser of this Tender whether in whole or in part.

"CONTRACTOR" Means the successful Tenderer, i.e., the Tenderer whose Tender has been accepted either in whole or in part.

"CONTRACTOR's REPRESENTATIVE" Shall mean a person in supervisory capacity who shall be so declared by the Contractor and who shall be authorized under a duly executed power of attorney to receive materials issued by the Purchaser to the Contractor for the works. He shall be responsible for proper execution of works at each or all places and shall take orders from Purchaser's Engineers and carry out the same.

"ENGINEER / ENGINEER-IN-CHARGE "Shall mean an executive of RailTel In-charge of works and shall include the superior executives of RailTel. He is responsible for ensuring that all field works covered by the contract are carried out in accordance with approved designs, drawings & specifications and conditions of contract as agreed to.

"ENGINEER'S REPRESENTATIVE "Shall mean the supervisor of RailTel in direct charge of the works.

"EQUIPMENT" Means all or any equipment considered necessary by the Purchaser's Engineers for satisfactory operation, as a whole, of the installations.

"MONTH" Means any consecutive period of thirty days.

"MATERIALS" Means all equipment's, components, fittings and other materials including raw materials required to complete the work..

"PURCHASER" Means M/S RailTel Corporation of India Limited, 2nd Floor, 'B' Block, Rail Nilayam, Secunderabad – 500 071.

"PURCHASER'S ENGINEER" Means the General Manager of RailTel or successor who will decide all matters relating to design, manufacture, installation and commissioning of the plant and equipment at site.

"SUB-CONTRACTOR" Means an individual or a firm of Contractor or a Company registered under Indian Company Act or an approved supplier of materials to whom the Contractor sublets portions of the contract.

"CONSIGNEE" Means the person specified in the Acceptance of Tender to whom Stores are to be delivered at the destination.

"INSPECTING OFFICER" Means the person, or organization specified in the contract for the purpose of inspection of stores of work under the contract and includes his/their-authorized representative.

"RailTel" Means M/s. RailTel Corporation of India Limited, Southern Region, 2nd Floor, 'B' Block, Rail Nilayam, Secunderabad – 500 071.

"SITE" Means the areas to be taken up by the permanent works, together with any other area or areas as shall be determined by the Purchaser's Engineer, which may be placed at the disposal of the Contractor for the purpose of the contract and also such area or areas used for store yards, works yards or workshop in proximity of the works as the Purchaser's Engineer may have authorized as an extension of the site, irrespective of the terms and conditions under which they are occupied by the Contractor.

"BLOCK SECTION" Means the distance along the railway track between two consecutive Railway Block stations.

"TENDERER" Means and includes any firm of engineers or Contractors or any company or body, corporate or otherwise, who submit the Tender which has been invited.

"WORK OR WORKS" Means all or any of the items of the work for which the Tenderer /Contractor has Tendered/contracted according to the specifications, drawings and Annexure hereto annexed or to be implied there from, or incidental thereto or to be hereafter specified or required in such explanatory instructions and drawings, being in conformity with the original specifications, drawings, Annexure and schedules and also such instructions and drawings additional to the aforementioned as may from time to time be issued by the Purchaser's Engineer during the progress of the contracted work.

"WRITING" Includes all matters written, typewritten or printed either in whole or in part.

3. LOCAL CONDITIONS

3.1 It will be imperative on each Tenderer to fully acquaint him self with all the local conditions and factors, which would have any effect on the performance of the contract and cost of the stores. The purchaser shall not entertain any request for clarifications from the Tenderer regarding such local conditions. No request for the change of price or time schedule of delivery of stores shall be entertained after the offer is accepted by the purchase on account of any local condition or factor.

3.2 The intending Tenderer is advised to study the tender papers carefully. Any submission of a quotation by the Tenderer shall be deemed to have been done after a careful study and

examination of these documents with full understanding of the implication thereof. These conditions and specifications shall be deemed to have been accepted unless otherwise, specifically commented upon by the Tenderer in his quotation. Failure to adhere to anyone or all these instructions may render his offer liable to be ignored without any reference.

3.3 Should a Tenderer find discrepancies in, or omission from, the drawings or any of the Tender papers or he has any doubt to their meaning, he should at once notify the RailTel who may send a written clarification to all Tenderers.

4. COMPLIANCE TO TENDER CONDITIONS, SPECIFICATIONS & DRAWINGS

4.1 The Tenderer shall indicate paragraph by paragraph for each section of the tender document that either his tender complies in every respect with the requirements of each clause and sub clause or if not, precisely how they differ from the requirements of the tender. In later case, the Tenderer shall enclose a separate statement as per Performa given, indicating only the deviations for any clause or sub clause of Special Conditions of Contract, Instructions to Tenderers and Conditions of Tendering, Technical Specifications, Preamble etc. which he proposes with justifications for deviations proposed. The RailTel reserves the right to accept or reject these deviations and his decision thereon shall be final (see Form 5).

4.2 The equipment offered shall be in accordance with the drawings and specifications. Details of variation from the drawings and specifications, if any, should be clearly indicated separately for each annexure with justification for deviations proposed. The Purchaser reserves the right to accept or reject these deviations and his decision thereon shall be final.

4.3 Firms should give details of similar works carried out giving details of the name of the project, date of award, length of the section, value of the contract, the original execution period and the actual execution time taken as per form 10.

5 EARNEST MONEY/ BID GUARANTEE

5.1 The Tenderer shall submit demand draft or Bankers cheque/Deposit Receipt from any scheduled bank for a sum of rupees as detailed below as earnest money in favour of RailTel Corporation of India Limited, Secunderabad, payable at Secunderabad.

5.2 The Tenderers shall hold the offer open till such date as specified in Para 9 of this chapter. It being understood that the tender documents have been sold/issued to the Tenderer and the Tenderer has been permitted to tender in consideration of the stipulation on his part that after submitting his tender he will not rescile from his offer or modify the terms and conditions thereof in a manner not acceptable to RailTel. If the Tenderer fails to observe or comply with the foregoing stipulation, the aforesaid amount deposited as Earnest Money shall be liable to be forfeited by the RailTel.

5.3 The earnest money may be forfeited:

5.3.1 If a Tenderer withdraws its tender during the period of tenders validity specified in Clause 9 of Instructions to Tenderers and Conditions of Tendering. (Section II, Chapter-I)

5.3.2 In the case of successful Tenderer, if the Tenderer fails to Sign the contract in accordance with clause 2 of Special Conditions of Contract. (Section II, Chapter-II)

5.3.3 To furnish performance guarantee in accordance with clause 3.5 of Special Conditions of Contract. (Section II, Chapter-II)

5.4 The earnest money of unsuccessful Tenderer will be returned within reasonable time to the unsuccessful Tenderer but the RailTel shall not be responsible for any loss or depreciation that

may happen to the security for the due performance of the above stipulation to keep offer open for the period specified in the tender documents or to the Earnest Money while in their possession nor be liable to pay interest thereon.

5.5 If the tender is accepted, the amount of Earnest Money will be held as security deposit for due and faithful fulfillment of contract. The Earnest Money of successful Tenderer will be returned after the Contract Performance Guarantee (Security Deposit) as required under para 3 of Special Conditions of Contract is furnished and formal contract duly signed is received by the purchaser.

5.6 Any tender not accompanied by Earnest Money in the approved forms as mentioned in para 5 above will be summarily rejected. However, small scale Units registered with NSIC under single point registration scheme are exempted from cost of Tender Document and EMD. Valid documents i.e., registration of NSIC should be provided for this to get exemption from submission EMD.

6 SUBMISSION OF OFFERS

6.1 All offers in the prescribed forms should be submitted before the time and date fixed for the receipt of the offers. Offers received after the stipulated time and date will be summarily rejected.

6.2 In case the date of opening happens to be a holiday, the tender will be received and opened at the same time on the next working day.

6.3 All offers shall be either type written or written neatly in indelible ink in English. Each page of the offer must be numbered consecutively. A reference to total number of pages comprising the offer must be made at the top right hand corner of the top page. The supporting documents should be submitted either in original or duly signed by the authorized signatory of the Tenderer. The original documents shall be produced for verification when called for.

6.4 All copies of the tender papers shall be signed by the Tenderer, on each page including closing page in token of his having studied the tender papers carefully.

6.5 RATES IN FIGURES & WORDS:-

6.5.1 All prices and other information like discounts etc., having a bearing on the price shall be written both in figures and in words in the prescribed offer form. In case of difference in words and figures the amount written in words will be taken in to consideration.

6.5.2 In the event of any discrepancy between unit rate and total cost, the value shown in unit rate will be taken for evaluation purpose.

6.5.3 In case the schedule of requirement quoted by Tenderer is incomplete with reference to tender document, the offer is liable to be rejected.

6.6 ATTESTATION OF ALTERATION: No scribbling is permissible in the tender documents. Tender containing erasures and alterations in the tender documents are liable to be rejected. Any correction made by the Tenderer/Tenderers in his/their entries must be signed (not initialed) by him/them.

6.7 The bid shall consist of the following:

i) Offer letter complete. (Form No.1)

ii) Schedule of works (i.e., Schedule of Requirements) with rate and total amountduly signed by the Tenderer in figures and words.

iii) Earnest Money in prescribed form.
iv) Cost of Tender Document if downloaded.
v) Deleted
vi) Constitution of Firm and Power of Attorney
vii) Clause wise compliance to tender conditions & statement of deviations (Para 4). Form No.5
viii) Similar works executed or under execution. Form No. 10
ix) User's Certificate Form No. 2
x) Any other information desired to be submitted by the Tenderer.

7. CONSTITUTION OF FIRM AND POWER OF ATTORNEY

7.1 Any individual(s) signing the tender or other documents connected therewith should specify whether he is signing: -

(a) As sole proprietor of the concern or as attorney of the sole proprietor;
(b) As a partner or partners of the firm;
(c) As a Director, Manager or Secretary in the case of Limited Company duly authorized by a resolution passed by the Board of Directors or in pursuance of the authority conferred by Memorandum of Association

7.2 In the case of a firm not registered under the Indian Partnership Act, all the partners or the attorney duly authorized by all of them should sign the tender and all other connected documents. The original Power of Attorney or other documents empowering the individual or individuals to sign should be furnished to the Purchaser for verification, if required.

7.3 The RailTel will not be bound by Power of Attorney granted by the Tenderer or by the changes in the composition of the firm made subsequent to the execution of the contract agreement.

7.4 In case where the Power of Attorney partnership deed has not been executed in English, the true and authenticated copies of the translation of the same by Advocate, authorized translators of Courts and Licensed Petition Writers should be supplied by the Contractor(s) while tendering for the work.

7.5 The duly notarized Power of Attorney, Partnership Deed, Memorandum of Joint Venture as the case may be in original or duly signed.

8. UNIT/PERCENTAGE PRICES: The unit prices should be quoted by the Contractor after taking all the relevant factors into consideration and these should be Firm and all-inclusive without any variation clauses. The prices shall be quoted in rupees for the units under metric system. Reference may be made Special Conditions of Contract (Chapter II Section II). The prices shall be inclusive of all taxes and statutory payments.

9. VALIDITY OF OFFER: The Tenderer shall keep the offer open for a minimum period of 120 (One Hundred and Twenty) days, from the date of opening of tender. Within that period the Tenderer cannot withdraw his offer subject to the period being extended further, if required, by mutual agreement from time to time. Any contravention of the above condition will make the Tenderer liable for forfeiture of his Earnest Money.

10. RATES DURING NEGOTIATION: The Tenderer/s shall not increase his/their quoted rates in case the RailTel Administration negotiates for reduction of rates. Such negotiations shall not amount to

cancellation or withdrawal of the original offer and the rates originally quoted will be binding on the Tenderer/s.

11. PERIOD OF COMPLETION AND TIME PROGRESS GRAPH: The works/work are/is to be completed within a period as mentioned in preamble at para 9.

12. NON-TRANSFERABILITY AND NON-REFUNDABILITY: The tender documents are not transferable. The cost of tender document is not refundable.

13. ERRORS, OMISSIONS & DISCREPANCIES: The Contractor(s) shall not take any advantage of any misinterpretation of the conditions due to typing or any other error and if in doubt shall bring it to the notice of the Engineer without delay. In case of any contradiction only the printed rules, and books should be followed and no claim for the misinterpretation shall be entertained.

14. WRONG INFORMATION BY TENDERER: If the Tenderer/s deliberately gives/give wrong information in his/their tender which creates/create circumstances for the acceptance of his/their tender the RailTel reserves the right to reject such tender at any stage.

15. QUALIFYING CRITERIA PER ZONE:

15.1 General:

15.1.1 Qualifying criteria under this para lays down minimum acceptable qualifications in various areas to ensure that qualified bidder has necessary experience, technical expertise, equipment's and financial and human resources to successfully complete the project. In case of a consortium bid the qualification document details etc. must be provided for each member of consortium.

15.1.2 If the Tenderer proposes to buy any equipment from other suppliers/ sources, documents indicating the willingness to supply the equipment and provide technical support to the Tenderer that may be required during installation, commissioning and warranty period and later on directly to the RailTel, shall be included in the tender.

15.1.3 The Tenderer should submit the details of experience of similar works or services in the projects executed / under execution which should clearly bring out expertise in the equipment manufacture or installation etc. as per form no. 10.

15.1.4 Deleted.

15.1.5 The Tenderer/s must submit along with his/their tender, certificates from the original user for whom the project was undertaken certifying the date of award of contract, date of completion, date of commissioning and the present working state of the system so established. The Tenderer shall submit these certificates for all the projects that he has executed which only satisfy the minimum requirements in each case. The certificates are to be submitted in original or their true copies duly signed by the Tenderer to contain the information as per form no. 2.

15.2 Technical Capability: Tenderer must have completed works of similar nature, as indicated in para 16 below, successfully and satisfactorily of values as indicated below:

Tenderer must have completed successfully and satisfactorily at least one similar work costing not less than 35 % of the value of tendered work during the preceding three years (i.e. current financial year and three previous financial years). Offers not accompanied by user certificates as per Form no 2, will not be considered.

15.3 Financial:

The total contract amount received by the Tenderer during the last three years as per current ITCC/Audited balance sheet should be a minimum of 150% of applied Tender Value of work. Offers not accompanied by ITCC/Audited balance sheet will not be considered.

16. MEANING OF SIMILAR WORKS: Works similar to the scope of work as contained in this tender shall mean that

"Trenching, Blowing of OFC through HDPE Duct, splicing and testing of OFC",
The maintenance of OFC cable network and upkeep of associated gears
should form sizable part of the total work executed for Govt. /PSUs/ Telecom Service providers.

17. SYSTEM PERFORMANCE GUARANTEE: The Tenderer shall give unqualified and unconditional guarantee that when the equipment / material supplied by him is installed and commissioned at site, it shall achieve the desired objective and that in the event of performance of the system when installed not complying with the end objective or with the specifications, he shall provide further inputs to enable the RailTel to realize the end objectives with full compliance of the specifications contained in these documents. No additional payment will be made to the contractor for supply of any additional goods and service required in this regard.

18. AUTHORITY OF ACCEPTANCE: The authority for the acceptance of the tender rests with the Purchaser. The tenders received will be evaluated by the Purchaser to ascertain the best acceptable tender in the interest of the Purchaser.

However, the purchaser shall not be bound to accept the lowest or any tender or to assign any reason for non-acceptance or rejection of a tender. The purchaser reserves the right to accept any tender in respect of the whole or any portion of the work specified in the tender paper or to sub-divide the work among different Tenderers or to reduce the work or to accept any tender for less than the tendered quantities without assigning any reason whatsoever.

19. AGREEMENT: The successful Tenderer/s shall be required to execute an agreement with the representative of RailTel for carrying out the work according to the tender documents as indicated in para 2 of Special Conditions of Contract (Section II Chapter II).

20. TENDERER'S ADDRESS: Tenderer shall state in the tender his postal address fully and clearly. Any communication sent to the Tenderers by post at his said address shall be deemed to have reached the Tenderer duly & timely, notwithstanding the fact that the communication could not reach the Tenderer at all or in time for whatever reason. Important documents shall be sent by Registered Post.

21. EVALUATION OF OFFER

The authority for the acceptance of the tender rests with the Purchaser. The tenders received will be evaluated by the Purchaser to ascertain the best acceptable tender in the interest of the Purchaser.

However, the purchaser shall not be bound to accept the lowest or any tender or to assign any reason for non-acceptance or rejection of a tender. The purchaser reserves the right to accept any tender in respect of the whole or any portion of the work specified in the tender paper or to sub-divide the work among different Tenderers or to reduce the work or to accept any tender for less than the tendered quantities without assigning any reason whatsoever.

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SECTION- II
CHAPTER - 2

Special Conditions of Contract

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SPECIAL CONDITIONS OF CONTRACT

1. TENDER DOCUMENTS

1.1 The goods and works/services required, bidding procedure and contract terms are prescribed in the tender documents. The set of tender documents issued for the purpose of bidding includes the following together with any addendum and corrigendum thereto.

Section-I: Preamble along with schedule of requirements, annexure etc.
Section-II: I) Instructions to Tenderers and conditions of tendering.
II) Special conditions of contract.
III) Forms of Tender and annexure etc.
Section-III: Technical specifications and drawings etc.

1.2 If the Tender submitted by a Tenderer is accepted and the contract awarded to the Tenderer the various works coming under the purview of the contract shall be governed by tender documents mentioned above.

1.3 Any special conditions stated by the Tenderer in the covering letter submitted along with the tender shall be deemed to be a part of the Contract to such extent only as have been explicitly accepted by the RailTel.

2. AGREEMENT

The successful Tenderer shall within 15 days after having been called upon by notice to do so be bound to execute an agreement based on accepted rates and conditions, in such form as the RailTel may prescribe, and lodge the same with the RailTel together with the conditions of contract, specifications and Schedule of prices referred to therein duly complete. The form for agreement is included in Section II, Chapter III (Form No.3).

3. SECURITY DEPOSIT

3.1 On receipt of the Letter of Acceptance of Tender from the RailTel, the successful Tenderer shall within a period of 15 days deposit an amount equaling to 5% of contract as Security deposit for due fulfillment of the contract.

3.2 The Earnest Money already paid by the successful Tenderer (see Clause 5 of Instructions to Tenderers and Conditions of Tendering) may at the discretion of the successful Tenderer be adjusted towards payment of this Security deposit and the additional amount shall be paid in any one of the following forms:

(a) Bank draft
(b) Irrevocable Bank Guarantee issued by any scheduled bank acceptable to purchaser.
(c) Deposit Receipt

3.3 The Security Deposit will bear no interest.

3.4 The Instruments for security deposit should be valid three months beyond the warranty period (clause no 22).After satisfactory completion of the warranty period and on issue of Final

acceptance certificate the Security Deposit shall be refunded to the contractor after adjustment of any dues payable by the contractor. Wherever the contracts are rescinded, the security deposit shall be en-cashed by RailTel.

3.5 CONTRACT PERFORMANCE GUARANTEE (PBG)

3.5.1 On receipt of the Letter of Acceptance of Tender from the RailTel, the successful Tenderer should give a Performance Guarantee in the form of irrevocable bank guarantee from any Nationalized Bank or Scheduled Bank in the Form given in Tender document amounting to 5% of the contract value.

3.5.2 The Performance Guarantee should be furnished by the successful contractor after letter of acceptance has been issued, but before singing of the agreement. The agreement should normally be signed within 15(fifteen) days after issue of LOA and Performance Guarantee should also be submitted within this time limit. The Instruments for Performance Guarantee should be valid for for three months beyond the completion period.

3.5.3 On completion of work and issue of provisional Acceptance Certificate, the Performance Bank Guarantee will be released to the contractor after adjustment of any dues payable by the contractor.

3.5.4 Wherever the contracts are rescinded,the Performance Guarantee shall be en-cashed by RailTel.

3.5.5 The balance work shall be got done independently by RailTel.

3.5.6 The original contractor shall be debarred from participating in the tender for executing the balance work. If the failed contractor is a Joint Venture (JV) or a partnership firm, then every member/partner of such a firm would be debarred from participating in the tender for the balance work either in his/her individual capacity or as a partner of any other JV/partnership firm.

4. CONTRACTOR'S OFFICE & STORES DEPOT: The Contractor shall within ten days of issue of letter of acceptance of tender establish an office and store depot at a convenient place for receiving and storing equipments and materials and progressing field work expeditiously in consultation and with the approval of the purchaser's Engineer. He shall intimate the purchaser's Engineer address thereof to which all correspondence should be sent. Any communication sent to the contractor by post at his said address shall be deemed to have reached the contractor duly and in time. Important documents shall be sent by Registered post.

5. USE OF RAILWAY LAND: Use of Railway land required by the Contractor for construction of temporary offices, quarter(s), hutments etc. for the staff and for storing materials etc., will be permitted to him/them subject to approval by Railways, if available at the charges prescribed by the Railways. The land will be restored to Railways by the Contractor(s) in the same condition as when taken over or in vacant condition as desired by the Engineer after completion of the work or at any earlier day as specified by the Engineer. Failure to do so will make the Contractor(s) liable to pay the cost incurred by the Railway for getting possession of land.

6. PROGRAMME OF WORK

6.1 The Contractor shall have necessary resources to execute the work so that the entire work is completed within a period as mentioned in the preamble from the date of issue of Letter of Acceptance of the tender. He shall also have necessary resources to take up the work simultaneously at more than one independent place in order to expedite the completion of work.

6.2 Within a period of 7 days beginning from the date of issue of Letter of Acceptance of Tender the Contractor shall submit the detailed time Schedule for the execution of work based on the conditions in consultation with RailTel to the authority mentioned in the Preamble and approved by the later in writing before commencement of the work.

6.3 The Contractor shall be held responsible for the execution of the work according to the Program given above in full compliance of the various clauses of the Technical specifications, instructions / drawings etc. Failure to comply with any of these will be dealt with as per provision laid down in Conditions of Tendering.

6.4 The contractor will program his work in such a manner so as not to interfere in the working and movement of trains/ Public Transport.

7. COMPETENT SUPERVISORS: The Contractor shall place and keep competent representatives/Supervisors /Engineers as his representative on the works who will be authorized to receive and acknowledge materials issued by the RailTel and take all orders issued by the RailTel. The said representatives shall be present at site during working hours and any written orders or instructions which the purchaser's Engineer may give to the said representatives of the contractor shall be deemed to have been duly given or communicated to the contractor.

8. TEST & MEASURING INSTRUMENTS AND SPECIAL TOOLS ETC.

8.1 Special tools & instruments required for installation and commissioning of the work as detailed in preamble shall be arranged by contractor at his own cost.

8.2 All tests and measuring instruments and other arrangements required for carrying out all the acceptance tests etc shall be provided by the contractor at his own cost.

9. STORES TO BE SUPPLIED BY CONTRACTOR: All materials required for the execution of the contract shall be arranged and supplied by the Contractor as detailed in the scope (Preamble) so as to realize the end objective. The supply of equipment's and materials shall also include required installation and other materials and documents etc which may not be specifically mentioned herein but which are usually necessary for completing the work in all respects.

10. SUPPLY OF TECHNICAL LITERATURES, DOCUMENTATION, DRAWINGS, INSTRUCTION BOOK & COMPLETION PLANS ETC: The supply of equipment and materials shall include supply of two sets of printed documents from original equipment manufacturers for each equipment.

11 QUALITY ASSURANCE: In the event of RailTel waving off the inspection, the quality assurance department of the manufacturer shall carry out all the tests as per the specification and issue a certificate indicating clearly the test results and the adherence to the technical specifications. This is without prejudice to the purchaser's right to accept or reject the supplies if not found in conformity to its requirement

12 INSPECTION OF MATERIALS

12.1 All equipments materials fittings and components will be subject to inspection by the purchaser or his representative at the manufacturer's factory/Tenderer works before dispatch and no materials shall be dispatched until these are inspected and/or approved. The materials may also be inspected by the purchaser or his representative again at the contractor's depot.

12.2 All materials shall be procured from the manufacturers of repute/their-authorized dealers. Such

materials are to be accepted by the Engineer. The Contractor may be required to produce test certificate from the manufacturer wherever called for by the Engineer.

12.3 The cost of equipment and materials, all tests and/or analysis performed for inspection shall be borne by the Contractor.

12.4 The inspection charges, if any, payable to the purchaser's representative for carrying out the inspection shall be borne by the purchaser.

13. INSPECTION OF WORKS: The Engineer or his representative may inspect and test the various portions of the work at all stages and shall have full power to reject all or any portion of the work that he may consider to be defective or inferior in quality of materials, workmanship or design in comparison to what is called for in the specification. In the event of rejection of any work already executed and not in accordance with specification as in this tender and/or as determined by the Engineer or which the Contractor has been apprised, the Contractor shall carry out alterations/ replacements to such works to the satisfaction of the Engineer for which no additional expenses will be borne by the RailTel.

14. QUANTUM OF WORK AND VARIATION IN QUANTITIES

14.1 The quantities indicated in Schedule of Requirements are approximate and purport to convey the Tenderer an idea of the magnitude of the work. The quantities may vary within + / -25% of grand total of schedule of requirements as included in the Letter of Acceptance to tender as per site requirement, incase of variation in quantities the contractor shall be bound to carry out the work at the rates agreed in the schedule up to the limit of +/-25% of agreemental value and shall not be entitled to any claim or any compensation whatsoever.

15. SUBLETTING AND ASSIGNMENT: No part of the CONTRACT nor any share or interest therein shall in any manner or degree be transferred, assigned or sublet by the CONTRACTOR directly or indirectly to any person, firm or corporation whatsoever without the consent in writing, of the ENGINEER/EMPLOYER except as provided for in the succeeding sub-clause.

a) SUB-CONTRACTS FOR TEMPORARY WORKS ETC :
The EMPLOYER may give written consent to Sub-contract for the execution of any part of the WORK at the site, being entered in to by CONTRACTOR provided each individual Sub-contract is submitted to the ENGINEER-IN-CHARGE before being entered into and it approved by him.

b) LIST OF SUB-CONTRACTORS TO BE SUPPLIED :
At the commencement of every month the CONTRACTOR shall furnish to the ENGINEER-IN-CHARGE list of all SUB-CONTRACTORS or other persons or firms engaged by the CONTRACTOR and working at the SITE during the previous month with particulars of the general nature of the Subcontract or works done by them.

c) CONTRACTOR'S LIABILITY NOT LIMITED BY SUB-CONTRACTORS:
Notwithstanding any sub-letting with such approval as aforesaid and notwithstanding that the ENGINEER-IN-CHARGE shall have received copies of any Subcontracts, the contractor shall be and shall remain solely responsible for the quality, proper and expeditious execution of the Contract in all respects as if such sub-letting or Subcontracting had not taken place, and as if such work had been done directly by the CONTRACTOR. The CONTRACTOR shall bear all responsibility for any act or omission on the part of sub-contractors in regard to work to b e performed under the CONTRACT.

d) EMPLOYER MAY TERMINATE SUB-CONTRACTS :

If any SUB-CONTRACTOR engaged upon the works at the site executes any works which in the opinion of the ENGINEER-IN-CHARGE is not in accordance with the COTNRACT documents, the EMPLOYER may by written notice to the CONTRACTOR request him to terminate such subcontract and the CONTRACTOR upon the receipt of such notice shall terminate such Subcontract and dismiss the SUB-CONTRACTOR(S) and the later shall forthwith leave the works, failing which is EMPLOYER shall have the right to remove such SUB-CONTRACTOR(S) from the site.

e) NO REMEDY FOR ACTION TAKEN UNDER THIS CLAUSE :
No action taken by the EMPLOYER under the clause shall relieve the CONTRACTOR of any of his liabilities under the CONTRACT or give rise to any right or compensation, extension of time or otherwise failing which the EMPLOYER shall have the right to remove such SUB-CONTRACTOR(s) from the site.

16. EXECUTION OF WORK: All the works shall be executed in strict conformity to the provisions of the contract document and with such explanatory detailed drawings, specifications and instructions as may be approved from time to time based on detailed design and engineering carried out by contractor in line with requirements as per contract document. The contractor shall be responsible for ensuring that the work throughout are executed in the most substantial, proper and workmanlike manner with the quality of material and workmanship in strict accordance with the specifications and as per sound industrial practices and to the entire satisfaction of the RailTel.

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

18. CLEARANCE OF SITE: At the end of the work at each location the Contractor shall as a part of his Contractual obligation leave the area completely neat and clean.

19. PROVISIONAL ACCEPTANCE

19.1 Immediately after the completion of the work at each link/ section/PoP the contractor shall certify and advise the purchaser in writing that the installation is (i) complete (ii) ready for satisfactory commercial service and (iii) ready to be handed over.

19.2 The test or tests specified in Technical supplement (section III) will be conducted jointly by purchaser and contractor as soon as possible after receipt of advice of completion of one link/section by purchaser from the contractor. The test schedule shall be finalized by mutual discussion between the contractor and M/S RailTel Corporation of India Limited, Secunderabad. Any component, modules, sub assemblies or

equipment failing during the commissioning test shall be replaced/repaired free of cost by Tenderer. Part Provisional Acceptance certificate will be issued after commissioning of one link/section/PoPissued through Work orders.

19.3 Purchaser's Engineer shall issue a Provisional Acceptance certificate for successful commissioning of entire reach in the tender covering all materials and works/services included in the Schedule of works after the final acceptance test as per the approved test procedures enumerated under para 3.26 of Section III- chapter 3 i.e. specification, have been completed and the performance has been found to meet the specifications. RailTel's decision in this respect shall be final. The Provisional Acceptance Certificate shall be signed by both the parties. The period of maintenance of works shall commence from the date of issue of last Provisional Acceptance Certificate.

20. PLACING IN SERVICE & MAINTENANCE SUPERVISION

20.1 After the work has been completed & placed in service and Provisional Acceptance certificate issued by Purchaser's Engineer, the contractor shall be responsible for proper maintenance supervision of the work for a period of twelve months from the date of commissioning.

For this purpose he shall prepare a maintenance plan and make available the works/services of qualified maintenance engineer stationed at the location approved by Purchaser's Engineer who will guide and supervise the work of RailTel maintenance staff. The maintenance engineer of the Tenderer will visit the total installation at least once in a month.

20.2 The Contractor shall inspect all trenches after first monsoon and shrinkage etc. shall be refilled and rammed & trench surface brought to the original. No extra charge shall be payable for the same.

20.3 During this period of maintenance supervision if any lacuna is noticed in the functioning, as a result of any work, the contractor free of cost will rectify the same. During such rectification if any faulty materials need replacement or repair, they shall be provided by the contractor from the set of materials that the contractor should bring to the site of installation in addition to all the materials to be supplied against this contract.

21. FINAL ACCEPTANCE

21.1 The final acceptance of the works completed shall take effect from the date of expiry of the period of maintenance supervision as defined above or the expiry of the last of the respective period of maintenance supervision of various sub-sections for which Provisional Acceptance Certificates are issued or brought into commercial operation, provided in any case that the contractor has complied fully with his obligations in respect of each item under the contract.

21.2 Notwithstanding the issue of Final Acceptance Certificate the contractor and the purchaser (subject to Sub Clause as above) shall remain liable for fulfillment of any obligation incurred under the provision of the contract prior to the issue of Final Acceptance Certificate which remains unperformed at the time such certificate is issued and for determining the nature and extent of such obligation the contract shall be deemed to remain in force between the parties hereto.

22. WARRANTY.

22.1 The work carried out and equipment supplied by the Contractor shall be guaranteed against the defects for a period of One Year from the date of issue of Provisional Acceptance Certificate. The

contractor shall provide comprehensive warranty maintenance for all the items supplied and work carried out by him against this tender.

22.2 The replacement of defective materials supplied by contractor at site shall be undertaken by RailTel. However, incase RailTel representative is unable to rectify the defects, maintenance engineers of the contractor shall go to the site immediately on receipt of the intimation to assist RailTel representative for diagnostic and rectification of the fault. RailTel shall not bear any expenditure for any such traveling or during the maintenance and warranty period.

22.4 During the free warranty maintenance period contractor should stabilize the working of the system. RailTel has the right to extend the period of supervision of the maintenance free of cost till the system stabilizes and works satisfactorily for a reasonable period of time. If during the time any equipment etc. is to be added or deficiencies are to be rectified to make the system work trouble free the same also will have to be done by the contractor free of cost as to make good all the deficiencies.

23. INFRINGEMENTS OF PATENTS:

(a) The Contractor is forbidden to use any patents or registered drawings, processes or patterns in fulfilling his contract without prior consent in writing of the owner of such patents, drawings, patterns or trade marks except where these are specified by the Purchaser himself. Royalties where payable for the use of such patented processes, registered drawings or patterns shall be borne exclusively by the Contractor. The Contractor shall advise the Purchaser of any proprietary rights that may exist on such processes, drawings or patterns, which he may use of his own accord.

(b) In the case of patents taken out by the Contractor of the drawings or patterns registered by him or of those patents, drawings or patterns for which he holds a license, the signing of the contract automatically gives the Purchaser the right to repair by himself the purchased articles covered by the patent or by any person or body chosen by him and to obtain from any sources he desires the component parts required by him for carrying out the repair work. In the event of infringement of any patent rights due to above action of the Purchaser he shall be entitled to claim damages from the Contractor on the grounds of any loss of any nature which he may suffer e.g. in the case of attachment because of counterfeiting.

24. LICENSE AS PER GOVT. OF INDIA CONTRACT LABOUR ACT: The Contractors are required to produce license as enjoined in the Government of India Contract Labour (Regulation and Abolition) Act (1978) with latest amendments, if any. They shall not be allowed to undertake or execute any work through contract Labour except under and in accordance with a license issued under the said Act in that behalf by the authorized licensing Officer.

25. DEFAULTS AND DELAYS: The Contractor shall execute the work with due diligence and expedition, keeping to the approved time schedule. Should he refuse or neglect to comply with any reasonable orders given to him in writing by the Purchaser's Engineers in connection with the work or contravene the provision of the Contract or the progress of work lags persistently behind the time schedule due to his neglect, the Purchaser shall be at liberty to give seven days notice in writing to the Contractor requiring him to make good the neglect or contravention complained of and should the Contractor fail to comply with the requisitions made in the notice within seven days from the receipt thereof, it shall be lawful for the purchaser to take the work wholly or in part out of the Contractor's hands without any further reference and get the work or any part thereof, as the case may be, completed by other agencies at the expense of the Contractor without prejudice to any other right or remedy of the Purchaser.

26. LOSS SUSTAINED DUE TO DEFAULTS AND DELAYS: In the event of any loss to the purchaser on account of execution and/or completion of the work or any part thereof by agencies other than the contractor, in terms of para above the contractor shall be liable to reimburse the loss to purchaser without prejudice to the other rights and remedies of the purchaser and the reimbursement in full or in part, as the case may be, shall be met at the option of the purchaser form out of all or any of the following sources viz:

(a) i) Any amount due and payable to the contractor by the purchaser on any account whatsoever;
ii) The Contractor's security deposit in the hands of the purchaser as far as available, and;
iii) Any other assets whatsoever of the contractor;
(b) In the event of re-imbursement from out of sources (i) and/or (ii) above mentioned, the purchaser shall have the right of appropriation suomoto.

27. PENALTY FOR DELAY IN COMPLETION

27.1 The contractor fails to execute and complete the work within the time specified in the Agreement or within the period of extension granted the contractor shall accept reduction in the total amount payable to him by the purchaser at the rate of 0.5% per week or part thereof (rounded off to the nearest whole number) of the total value of the contract for the actual delay occasioned beyond the appointed time by which the work shall have been completed under the contract.

27.2 The total value of penalty on account of above shall be limited to maximum of 10% (Ten percent) of the total contract value.

27.4 Penalty for damaging the Railway Cable: For each case of damaging the Railway cable a lump sum amount of Rs.1.00 lakh (Rupees one lakh) shall be imposed in the case of any cable cut/damage to railway cable. The penalty shall be multiple if it happens in multiples i.e. if cable is cut 2 times by the contractor, then the penalty imposed shall be Rs.2.00 lakh.

28 ADHERENCE OF TIME SCHEDULE

28.1 Timely completion of the work is the essence of the contract. Delay in execution will attract penalty in accordance with the provisions in above para 27.

28.2 If any delay as aforesaid shall have arisen from any cause which the Purchaser may agree as being a reasonable ground for extension of time the purchaser's engineer or his representative may allow such additional time as he may in his absolute discretion consider to be reasonably justified by the circumstances of the case. Such extensions shall be granted, on request from contractor, with liquidated damages in the Form No.11.

29 CONTRACTOR'S LIABILITIES FOR COSTS AND DAMAGES

29.1 WITHHOLDING AND LIEN IN RESPECT OF SUMS CLAIMED

a) Whenever any claim or claims for payment of a sum of money arises out of or under the contract against the contractor, the Purchaser shall be entitled to withhold and also have lien to retain such sum or sums in whole or in part from the security, if any, deposited by the contractor and for the purpose aforesaid the purchaser shall be entitled to withhold the said cash security deposit or the security, if any, furnished as the case may be and also have lien over the sum pending finalization or adjudication of any such claim.

b) In the event of the security being insufficient to cover the claimed amount or amounts or if no security has been taken from the Contractor, the Purchaser shall be entitled to withhold and have lien to retain to the extent of such claim amount or amounts referred to from any sum or sums found payable or which at

any time thereafter may become payable to the Contractor under the same contract or any other department of the Central Government pending finalization or adjudication of any such claims.
c) It is an agreed term of the contract that the sum of money or moneys so withheld or retained under the lien referred to by the purchaser till the claim arising out of or under the contract is determined by the Arbitrator (if the contract is governed by the Arbitration clause) or by the competent court, as the case may be, and that the contractor will have no claim for interest of damages whatsoever on any account in respect of such withholding or retention under the lien referred to spura and duly notified as such to the Contractor.
d) For the purpose of this clause, where contractor is a partnership firm or a limited company, the purchaser shall be entitled to withhold and also have a lien to retain towards such claimed amount or amounts in whole or in part from any sum found payable to any partner/limited company, as the case may be, whether in his individual company or otherwise.

30 UNIT PRICES

30.1 The unit price quoted by the Tenderer shall include the prices of materials including all incidental charges for transport, loading/unloading and handling of materials, commission for arranging dispatch by rail direct from manufacturer's factory and completing all necessary formalities in this respect, such as submission of forwarding notes, arranging placement of Wagon, collection of banker's charges for Bank guarantee, Indemnity Bonds inclusive of cost of Stamp etc., as also siding or shunting charges, if any, levied by the Railway.

30.2 The unit prices shall include all taxes, duties, Royalty and levies (including Octroi etc.,) applicable on this Works Contract. Therefore, they should quote their prices taking into account the rate of sales tax on works contract as levible. It is clarified that required form applicable for this purpose will be supplied to the Contractor as applicable in the state where the Contract is being executed.

30.3 The unit prices quoted by the Tenderer shall include cost of commissioning and testing and all costs of Administration of Contract, Insurance Premium, Banker's charges for guarantees, cost of storage, loading-unloading and handling of materials and for any road transport which the contractor may use for carriage of materials to his depot and the site of work. The prices shall include the cost of works and adjustments necessary to be done by the contractor during or after tests carried out by the purchaser.

30.4 The unit price to be quoted by the Tenderers should take into account the credit availed on inputs under the MODVAT scheme introduced w.e.f. 1st March 1986. The Tenderers should give a declaration that any set off in respect of duties on inputs as admissible under law is being totally and unconditionally passed on to the purchaser in the price quoted by him (see para 39).

30.5 While the unit price quoted in the contract are inclusive of all taxes i.e. excise duty, octroi, local levies, Service Tax, sales tax levied by any statutory authority, the purchaser shall make any deduction toward sales tax on works contract if statutorily required to do so. The deducted sales tax on works contract shall be remitted to the concerned sales tax authority and the purchaser shall in no way be responsible for any disputes between the sales tax authorities and the contractor in this regard.

30.6 All taxes, duties and levies (Including octroi etc.) arising out of the transaction between the contractor and his sub contractor/supplier for this work will be included in the rate quoted by the contractor in the relevant Schedule.

30.7 Arrangement for permits/license for materials will not be made by the RailTel or any assistance given. The Contractor will have to make his own arrangement. Also no import license shall be arranged by the RailTel for this work.

31 MEASUREMENT OF WORKS: Payments for the works shall be made in accordance with approved designs & drawings and measured in relevant units except where provided or otherwise. The measurements will be made generally in accordance with standard engineering practices.

32 MEANING AND INTERPRETATION BY RAILTEL TO BE FINAL: All measurement, method of measurement, meaning intent of specifications and interpretation of Special Conditions of Contract, given and made by the Purchaser or by the Purchaser's Engineer shall be final and binding.

33 TERMS OF PAYMENT:

33.1 All bills shall be submitted to the authority mentioned in Preamble.

33.2 Subject to any deductions or recovery which the RailTel may be entitled to make under contract, the Contractor will be entitled to be paid from time to time by way of 'on account payment' for supply of goods and 'progress payment' for works as in the opinion of the Engineer he has executed in terms of Contract.

34 PROGRESS PAYMENT FOR EXECUTION OF WORK

34.1 On Account Bill: Part payment will be on the basis of PAC issued; no fractional payment other than part-PAC certified work will be made. Part payment can be claimed thru' on account bills duly enclosing part PACs and other required documents/drawings. 90% payment will be made after submission of documents as indicated in clause 34.3.

34.2 Retention Money: 10% of the bill amount shall be retained from the on account bill as retention money and same shall be released after the expiry of "Warranty Period" or on the submission of Bank Guarantee for equivalent amount valid for one year. Format for bank Guarantee is enclosed at Form-4 (Section-II/Chapter-III)

34.3 Documents to be submitted along with the on account Bills:

a. RailTel Measurement Book certified for 100% quality test check and 20% quality test check by nominated officials of RailTel and accepted by contractor
b. OFC Route acceptance certificate duly certified by RAILTEL Works-in-charge commissioning of link/section.
c. Fiber Acceptance Certificates duly certified by RAILTEL Works-in-charge for commissioning of link/section
d. Materials Reconciliation statement duly checked and certified by RAILTEL works-in-charge.
e. Soft and Hard Copies of As-built Drawings including all duly certified by works-in-charge of RAILTEL.
f. Provisional acceptance Certificate issued by RAILTEL Works-in-charge.
g. Contractor to furnish ST Regn No, PAN No, TIN No, Breakup of ST,RTGS details.

34.4 In case of no response to take measurements even after notice of 1 week, measurements shall be filled-in by RailTel unilaterally and deemed to be accepted by contractor.

35. FINAL SETTLEMENT

On expiry of the warranty period and issue of the certificate of final acceptance of the entire installations, the PBG (Para 3) will be released to the Contractor after receipt of any dues payable by the contractor. (Else the PBG/SD will be forfeited to settle any amount due) and the balance amount shall be paid.

36. CERTIFICATE FOR MODVAT /VAT BENEFITS ON BILLS

a) The Contractor should submit the following certificate along with the bills:-"We certify that no additional duty set offs on the Goods supplied by us have accrued under the MODVAT/VAT Scheme in force on the date of supply after we submitted our quotations and submitted the present bill".

b) In the event of MODVAT/VAT credit being extended by the Government of India to more items that already covered, the firm should advise the purchaser about the additional benefits accrued through a letter containing the following certificate, or any variation thereof, as may be considered necessary by RailTel administration:-"We hereby declare that we can avail additional duty set offs as per latest MODVAT /VAT scheme in force now and we hereby give a reduction of (----------) per unit and agree to revise the prices indicated in the order. The current E.D. of (----------) is payable on this reduced price. Therefore, we request you to amend the order accordingly."

38 DEDUCTION FROM ON ACCOUNT PAYMENT BILLS

(i) All costs, damages or expenses, which RailTel may have been paid or incurred which under the provisions of contract are Contractor's obligations will be deducted by RailTel from progress payment Bills/Invoice of Contractor, as and when it is understood that such an expense has been incurred or paid for.

(ii) All such claims of RailTel shall, however, be duly supported by appropriate and certified vouchers, receipts or explanations as are available to enable the Contractor to identify such claims.

39 TAXES

39.1 The Contractor and all personnel employed by him shall pay such taxes like Income Tax as are payable under statutory laws of India and the Purchaser WILL NOT ACCEPT any liability for the same.

39.2 Deduction of Income Tax at source as per provisions of Finance Act and Income Tax in force shall be made from the Contractor/Sub-Contractor and the amount so deducted may be credited to the Central Government.

39.3 Wherever the law makes it statutory for the Purchaser to deduct any amount towards Sales Tax on Works Contract, the same will be deducted and remitted to the concerned authority.

40 INSURANCE

40.1 The Contractor shall take out and keep in force a policy or policies of insurance against all liabilities of the Contractor or the Purchaser at common law or under any statute in respect of accidents to persons who shall be employed by the contractor in or about the site for the purpose of carrying out the works on the site. The Contractor shall also take out and keep in force a policy or policies of Insurance against all recognized risks to their offices and depots. Such insurance shall in all respects be to the approval of the Purchaser and if he so requires in his name.

40.2 INSURANCE OF MATERIALS & INSTALLATIONS: The Contractor shall take out and keep in force a Policy or policies of Insurance for all materials including RailTel supply materials/equipment's irrespective of whether used up in the portion of work already done or kept for the use in the balance portion of the work until such works are provisionally handed over to the RailTel/Railways. For this purpose, the works are deemed to have been provisionally handed over when provisional acceptance certificate is issued.

40.3 The Contractor shall not be liable for losses/damages to the materials either used up in the portion of work done or his material kept for use at site, in consequence of Mutiny, or other similar causes over which the Contractor has no control and which cannot be insured. Such losses or damages shall be the liability of the Purchaser and if required by the Purchaser, be made good by the contractor at the cost of the Purchaser.

40.4 The Contractor should, however, insure the stores brought to site, against risks in consequence of war and invasion, as required under the Emergency Risk (Goods) Insurance Act in force from time to time.

40.5 It may be noted that the beneficiary of the insurance policy should be RailTel or the policies should be pledged in favour of RailTel. The contractor shall keep the policy/policies current till the installations are provisionally handed over to the purchaser. It may also be noted that in the event of contractor's failure to keep the policy current and alive, renewal of policy will be done by purchaser for which the cost of the premium plus 20% of premium shall be recovered from the contractor.

40.6 For the purpose of enabling the contractor to take the insurance cover in connection with this contract, the purchaser's Engineer will advise the approximate price of all the RailTel supply materials to the Contractor.

41 FORCE MAJEURE CLAUSE: If at any time, during the continuance of this Contract, the performance, in whole or part, by either party, of any obligation under this contract shall be prevented or delayed by reason of any war, hostility, act of the public enemy, Civil Commotion, Sabotage, Fires, Floods, Earth quakes, explosions, strikes, epidemics, quarantine restrictions, lockouts, any statute, statutory rules/ regulations, order of requisitions issued by any Government Department or Competent Authority of acts of God here-in-after referred to as event) then provided notice of the happening of any such event is give by either party to the other within twenty one days from the date of occurrence thereof, neither party shall, by reason of such event, be entitled to terminate this Contract nor shall either party have any claim for damage against the other in respect of such non-performance or delay in performance, and the obligations under the Contract shall be resumed as soon as practicable after such event has come to an end or ceased to exist, PROVIDED FURTHER that if the performance in whole or part of any obligation under this Contract is prevented or delayed by reason of any such event beyond a period as mutually agreed to by the RailTel and the Contractor after any event or 60 days in the absence of such an agreement whichever is more, either party may at its option terminate the Contract provided also that if the contract is so terminated under this clause the RailTel may at the time of such termination take over from the Contractor at prices as provided for in the contract, all works executed or works under execution.

42 SETTLEMENT OF DISPUTE AND ARBITRATION

42.1 Any dispute or difference whatsoever arising between the parties out of or relating to the construction, meaning, scope, operation or effect of this contract or the validity or the breach thereof shall be settled by a sole arbitrator in accordance with provisions contained in Arbitration and Conciliation Act, 1996.

42.2 The sole arbitrator shall be appointed by the Managing Director of RailTel Corporation of India

Limited. It is expressly understood between the parties that no objection shall be raised at any time after execution hereof to the appointment of the arbitrator by the Managing Director of RailTel Corporation of India Limited including that the person appointing the arbitrator is connected to and /or employed with the RailTel Corporation of India Limited.

42.3 The Venue of the arbitration shall be Secunderabad (India). The arbitration proceedings shall be conducted in English and cost of the arbitration shall be borne between the parties in equal proportion.

42.4 The Arbitrator shall give a reasoned award, which shall be binding on the parties.

43 TERMINATION OF CONTRACT OWING TO DEFAULT OF CONTRACTOR

43.1 If the Contractor should:

(i) Become bankrupt or insolvent or

(ii) Make an arrangement with or assignment in favour of his creditors, or agree to carry out the contract under a committee of inspection of his creditors, or

(iii) Being a Company or Corporation, go into liquidation (other than voluntary Liquidation for the purpose of amalgamation or reconstruction) , or

(iv) Have an execution levied on his goods or property on the works, or

(v) Assign the contract or any part thereof otherwise than as provided in clause-15 of SCC, or

(vi) Abandon the contract, or

(vii) Persistently disregard the instructions of the RailTel's Engineer or contravene any provision of the contract, or

(viii) Fail to adhere to the agreed programme of work by a margin of 10% of the Stipulated period, or

(ix) Fail to remove materials from the site or to pull down and replace the work after receiving from the Engineer's notice to the effect that the said materials or works have been condemned or rejected, or

(x) Fail to take steps to employ competent or additional staff and labour as required under clause 7 of SCC, or

(xi) Fail to supply material and/or carry out the works as per contractual specifications, or

(xii) Promise offer or give any bribe, commission, gift or advantage either himself or through his partner, agent or servant to any officer or employee of RailTel or any person on his or on their behalf in relation to the execution of this or any other contract with the RailTel, then and in any of these said cases, the Engineer on behalf of the RailTel may serve the Contractor with a notice in writing to that effect and if the Contractor does not, within 7 days after the delivery to him of such notice, proceed to make good his default in so far as the same is capable of being made good and carry on the work or comply with such directions as aforesaid to the entire satisfaction of the Engineer, the RailTel shall be entitled after giving 48 hours notice in writing under the hand of the Engineer to rescind the contract as a whole or in part or parts (as may be specified in such notice) and adopt either or both the following courses: A final termination notice will be issued by RailTel after expiry of 48 hrs, notice.

(a) To carry out the whole or part of the work from which Contractor has been removed by the employment of the required labour and materials, the cost of which shall include lead, lift, freight, supervision and all incidental charges.

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

both cases (a) and (b) mentioned above the RailTel shall be entitled to forfeit the whole or such portion of the security deposit as it may consider fit,

43.2 Provided always that in any case in which any of the powers conferred upon the RailTel by Sub-clause above shall have become exercisable and the same shall not be exercised, the non-exercise thereof shall not constitute a waiver of any of the conditions thereof and such power shall not withstanding be exercisable in the event of any future case of default by the Contractor for which his liability for past and future shall remain unaffected.

43.3 RIGHT OF RAILTEL AFTER TERMINATION OF CONTRACT OWING TO DEFAULT OF CONTRACTOR: In the event of any or several of the courses, referred in Sub-clause 43 above, being adopted:

(a) The Contractor shall have no claim to compensation for any loss sustained by him by reason of his having purchased or procured any materials or entered into any commitments or made any advances on account of or with a view to the execution of the works or the performance of the contract and Contractor shall not be entitled to recover or be paid any sum for any works thereto not actually performed under the contract, unless or until the Engineer shall have certified the performance of such work and the value payable in respect thereof and the Contractor shall only be entitled to be paid the value so certified.

(b) The Engineer or Engineer's Representative shall be entitled to take possession of any materials, tools, implements, machinery or buildings on the works or on the property on which these are being or ought to have been executed, and to retain and employ the same in the further execution of the works or any part thereof until the completion of the works without the Contractor being entitled to any compensation for the use and employment thereof or for wear and tear or destruction thereof.

(c) The Engineer shall, as soon as may be practicable after removal of the Contractor fix and determine exparte or by or after reference to the parties or after such investigation or enquiries as he may consider fit to make or institute and shall certify what amount (if any) has at the time of termination of the contract been reasonably earned by or would reasonably assure to the Contractor in respect of the work then actually done by him under the contract what was the value of any unused or partially used materials, any constructional plants and any temporary works upon the site.

(d) The RailTel shall not be liable to pay to the Contractor any moneys on account of the contract until the expiration of the period of maintenance and thereafter until the cost of completion and maintenance damages for delay in completion (if any) and all other expenses incurred by the RailTel have been ascertained and the amount thereof certified by the Engineer. The Contractor shall have no claim to any payment of compensation or otherwise howsoever on account of any profit or advantage which he might have derived from execution of the work in full but he did not derive in consequence of termination of the contract. The Contractor shall then be entitled to receive only such sum or sums (if any) as the Engineer may certify would have been due to him upon due completion by him after deduction of the said amount; but if such amount shall exceed the sum which would have been payable to the Contractor, then the Contractor shall upon demand pay to the RailTel the amount of such excess and it shall be deemed a debt due by the Contractor to the RailTel and shall be recoverable accordingly.

SECTION-II

CHAPTER-3

FORMS OF TENDER

Form No. 1	:	Offer Letter
Form No. 2	:	Qualifying Criteria / User's Certificate
Form No. 3	:	Agreement
Form No. 4	:	Guarantee Bond for Security Deposit /PBG
Form No. 5	:	Statement of Deviations
Form No. 6	:	Standing Indemnity Bond for on Accounts Payments and Stores Supplied
Form No. 7	:	Bank Guarantee for Mobilization Advance - Deleted
Form No. 8	:	Acknowledgement for receiving materials from RailTel
Form No. 9	:	Extension of period of completion of work on account of contractor
Form No. 10	:	Qualification /Experience
Form No 11	:	Deleted
Form No 12	:	Indemnity Bond

FORM –I
PARA 6.7 (i) Section-II Chapter –I

OFFER LETTER

To
Executive Director(Southern Region)
RailTel Corporation of India Limited.,
2nd Floor, 'B' Block, Rail Nilayam,
Secunderabad – 500 071

1. I/We _____ have read the various conditions to tender attached here to and hereby agree to ABIDE BY THE SAID CONDITIONS. I/We also agree to keep this tender open for acceptance for a period of 120 days from the date fixed for opening the same and in default thereof, I/We will be liable for forfeiture of my/our Earnest Money. I/We offer to do the work of I/We offer to do the work of Zonal contract for Last Mile connectivity, OFC diversion/rectification and other miscellaneous worksin "Three Reaches" for Bangalore Territoryas detailed in para 1 of preamble for RailTel Corporation of India Limited at the rates quoted in the attached schedules and hereby bind myself/ourselves to complete the work for each reach within specified period mentioned in the preamble from the date of issue of Letter of Acceptance of the tender. I/We also hereby agree to abide by the Various Conditions of Contract and to carry out the work according to the Specifications for materials and works laid down by the RailTel for the present contract.

2. A sum of Rs. ----------/-(Rupees ---------- thousand only) is herewith forwarded as "Earnest Money". The full value of Earnest Money shall stand forfeited without prejudice to any other rights or remedies if,
a) I/We do not execute the contract agreement within 15 days after receipt of notice issued by the RailTel that such documents are ready or, b) I/We do not commence the work within 15 days after receipt of orders to that effect.

3. Until a formal agreement is prepared and executed the acceptance of this tender shall constitute a binding contract between us subject to modifications, as may be mutually agreed to between us and indicated in the "Letter of Acceptance" of my/our offer for this work.

SIGNATURE OF CONTRACTOR (S) Date
CONTTRACTOR (S) ADDRESS
SIGNATURE OF WITNESS
1.
2.
ACCEPTANCE OF TENDERS
I accept the tender as above and agree to pay the rate as entered in Schedule of requirements. WITNESS
1. for and on behalf of
2. RailTel Corporation of India Limited Southern Region, Secunderabad

Date

Signature of Tenderer with seal

Form- 2 Para 15.1.5 Section-II

Chapter - I

QUALIFYING CRITERIA USER's CERTIFICATE

Name of the Firm Contract No.& date

Scope of Work
Contract Amount (in Indian Rupees)
Completion Period as per contract Data of Commencement
Actual date of Successful Completion
Quality of work : Satisfactory / unsatisfactory
(Please specify)

Name:
Dated:
Designation:

Signature of the User with Company Seal

FORM – 3

Para- 2 Section-II Chapter II

AGREEMENT

An agreement made this ---- day of -------- 2015, between RailTel Corporation of India Ltd, a company incorporated under the companies Act 1956 and having its Regional Office at 2nd Floor, 'B' Block, RailNilayam Building, Secunderabad (here in after referred as RailTel) of the One part; and M/s ---------- ----------(Hereinafter referred to as 'contractor') of the other part.

Whereas in response to a call for Tender for "Zonal contract for last mile connectivity, OFC diversion/rectification and other miscellaneous work for Bangalore Territory", as per Tender papers, the Contractor has submitted his offer.

Where as the Contractor has agreed with RailTel Corporation of India Ltd for carrying out the work of "Zonal contract for last mile connectivity, OFC diversion/rectification and other miscellaneous work for Bangalore Territory"as per the Tender document No. RailTel/Tender/OT/SR/HQ/2015-16/89for Rs.---------- (Rupees ---------- only) as per copy of Letter of Acceptance (LOA) of limited tender issued vide letter No. RailTel/Tender/OT/SR/HQ/2015-16/89, at accepted rates as contained in the said LOA (Annexure-3 hereto) issued by RailTel with schedule of requirement and terms and conditions.

Now this agreement witnesses that in consideration of the payment to be made by RailTel to the Contractor provided, the Contractor shall execute the work of "Zonal contract for last mile connectivity, OFC diversion/rectification and other miscellaneous work for Bangalore Territory for which the said tender of Contractor has been accepted strictly according to the Annexure-1,2 and 3 hereto and upon such work of "Zonal contract for last mile connectivity, OFC diversion/rectification and other miscellaneous work for Bangalore Territory"satisfactory completion of work and performance of the system to the satisfaction of the RailTel, the RailTel shall pay to the Contractor at the rates accepted as per the said Annexure-1 and in terms of conditions contained in Annexure-1, 2 & 3.

Whereas M/s. ---------- has submitted ---------- no. -------dt.---------- for Rs.-------- drawn on ----- Bank , ----------branch, --------- valid till ---------- towards the security deposit and submitted ---------- no. -------dt.---------- for Rs.-------- drawn on ----- Bank , ----------branch, --------- valid till ---------- towards Performance Bank Guarantee for due fulfillment of the contract.

In the witness where of the parties have hereinto set and subscribed their respective hands and/or seals day and year respectively mentioned against their respective signatures.

Signed and delivered at _____ by Shri _____ for and on behalf of M/s. _____

The contractor within named in the presence of:

1. Signatures Date Name in Block Capitals Address
2. Signatures

Date

Name in Block Capitals

Address

Signed and delivered at _____ for and on behalf of RailTel by Shri _____ {Executive Director (Southern Region) or his successor} in the presence of:

1. Signatures

Signature of Tenderer with seal

Date

Name in Block Capitals

2. Signature Date Name in Block Capitals
Address:
Annexure ‘1’: Schedule of Works/rates.
Annexure ’2’: Tender Document.
Annexure ‘3’: copy of Letter of Acceptance

(Signature)_____ Dated: Complete with enclosures

Form -4
Para 3 / Section-II Chapter – II
GURANTEE BOND FOR SECURITY DEPOSIT/PBG
(On Stamp Paper of requisite value)
(To be used by approved Scheduled Banks)

1. In consideration of the Executive Director (Southern Region), RailTel Corporation of India Limited, Secunderabad – 500 071 (Herein after called RailTel) having agreed to exempt …….. (Hereinafter called "the said Contractor(s)") from the demand, under the terms and conditions of an LOA/Agreement No. …… …… dated …… made between …… and ……. (hereinafter called " the said Agreement") of security deposit/PBG for the due fulfillment by the said Contractor (s) of the terms and conditions contained in the said Agreement, or production of a Bank Guarantee for Rs. …….. (Rs. …….. only). We, …… (indicate the name of the Bank) hereinafter referred to as "the Bank") at the request of ……. ……. Contractor(s) do hereby undertake to pay the RailTel an amount not exceeding Rs. ……. Against any loss or damage caused to or suffered or would be caused to or suffered by the RailTel by reason of any breach by the said Contractor(s) of any of the terms or conditions contained in the said Agreement.

2. We, ……. Bank do hereby undertake to pay the amounts due and payable under this Guarantee without any demur, merely on demand from the RailTel stating that the amount is claimed is due by way of loss or damage caused to or would be caused to or suffered by the RailTel by reason of breach by the said Contractor(s) of any of terms or conditions contained in the said Agreement or by reason of the Contractor(s) failure to perform the said Agreement. Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs. ……

3. We, …….. bank undertake to pay to the RailTel any money so demanded notwithstanding any dispute or disputes raised by the Contractor(s) / Supplier(s) in any suit or proceedings pending before any court or Tribunal relating thereto our liability under this present being, absolute and unequivocal. The payment so made by us under this Bond shall be a valid discharge of our liability for payment there under and the Contractor(s) / Supplier(s) shall have no claim against us for making such payment.

4. We, ……. Bank further agree that the Guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said Agreement and that it shall continue to be enforceable till all the dues of the RailTel under or by virtue of the said Agreement have been fully paid and its claims satisfied or discharged or till RailTel certifies that the terms and conditions of the said Agreement have been fully and properly carried out by the said Contractor(s) and accordingly discharges this Guarantee. Unless a demand or claim under the Guarantee is made on us in writing on or before the …….

(1) ……. We shall be discharged from all liability under this Guarantee thereafter.

5. We, ……. (Indicate the name of Bank) Further agree with the RailTel that the RailTel shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the Agreement or to extend time of to postpone for any time or from time to time any of the powers exercisable by the RailTel against the said contractor(s) and to forbear or enforce any of the terms and conditions relating to the said Agreement and we shall not be relieved from our liability by reason of any such variation, or extension to the said Contractor(s) or for any forbearance, act or omission on the part of RailTel or any indulgence by the RailTel

to the said Contractor(s) or by any such matter or thing whatsoever which under the law relating to sureties would, but for this provision, have affect of so relieving us.

6. This Guarantee will not be discharged due to the change in the Constitution of the Bank or the Contractor(s) Supplier(s).

7. (Indicate the name of Bank) lastly undertake not to revoke this Guarantee during its currency except with the previous consent of the RailTel in writing.

Dated the day of 2015

for …….. (Indicate the name of the Bank)

Witness

1. Signature
   Name

2. Signature
   Name

Signature of Tenderer with seal

FORM – 5

Para 4 Section-II

Chapter-I

Statement of Deviations

PROFORMA FOR STATEMENT OF DEVIATIONS

1. The following are the particulars of deviations from requirement of the Instructions to Tenderers and Conditions of Tendering, Preamble and Special conditions of Contract.

1.1 Instructions to Tenderers and Conditions of Tendering

Clause	Deviation (Including Justification)	Remarks

1.2 Preamble

Clause	Deviation	Remarks (Including Justification)

1.3 Special conditions of Contract.

Clause	Deviation	Remarks (Including Justification)

2. The following are the particulars of deviations from requirement of the technical specifications.

Annexure	Clause	Deviation	Remarks (Including Justification)

Note:
Where there is no deviation, the statement should be returned duly signed with an endorsement indicated no deviations.

SIGNATURE AND SEAL OF THE
MANUFACTURER / TENDERER

FORM – 6

Section-II Chapter –II

STANDING INDEMNITY BOND

(For on Account Payments and Stores supplied by RailTel)

(On Stamp paper of Requisite Value)

We, M/s _____ hereby undertake that we hold at our Stores Depot/s at _____ for and on behalf of RailTel Corporation of India Limited in the premises through Executive Director/RailTel/Southern Region or his successor hereinafter referred to as "the Purchaser" all materials for which 'On Account' payments have been made to us against the Contract for ----------vide letter of Acceptance of Tender No. RailTel/Tender/OT/SR/HQ/2015-16/89and the materials handed over to us by the Purchaser for all purpose of execution of the said Contract, until such time the materials are duly erected or otherwise handed over to him.

We shall be entirely responsible for the safe custody and protection of said materials against all risk till they are duly delivered as erected equipment to the purchaser or as he may direct otherwise and shall indemnify the Purchaser against any loss, damage or deterioration whatsoever in respect of the said materials while in our possession and against disposal of surplus materials. The said materials shall at all times be open to inspection by any engineer authorized by the Executive Director /Southern Region

Should any loss, damage or deterioration of materials occur or surplus materials disposed off and refund becomes due, the purchaser shall be entitled to recover from us the full cost as per prices included in the Contract (as applicable) and also compensation for such loss or damage, if any, along with the amount to be refunded without prejudice to any other remedies available to his by deduction from any sum due or any sum which at any time hereafter becomes due to us under the said or any other Contract.

Dated this _____ day of _____

for and on behalf of M/s _____

(Contractor)

Signature of witness

Name and witness in Block letters

Address

FORM – 8 PARA 8.3 of Section-II Chapter – II

ACKNOWLEDGMENT FOR RECEIVING MATERIALS FROM RAILTEL

Station: Date:

Sub: Receipt of Material from RailTel

It is hereby acknowledged that the following materials have been received in full and good condition by me on ----------at---------- for the work under the Agreement no.----------dated----------

Sl. No.
Description of Material
Quantity Remarks (Meter/No.) if any

Witnessed by:

(Signature of Engineer's Representative)

(Signature of Contractor Representative with or Contractor's Designation)

Signature of Tenderer with seal

FORM - 9

Para - 35 Section-II Chapter - II

EXTENSION OF PERIOD OF COMPLETION OF WORK ON CONTRACTOR'S ACCOUNT

No. Date:

To, ……..

……..

Sub: (i) Name of Work:

(ii) Acceptance Letter No.

(iii) Undertaking / Agreement No.

Ref: ……. (Quote specific application of the Contractor for extension to date, if received).

Dear Sir,

The stipulated date for completion of the work mentioned above is ……..from the progress made so far and the present rate of progress, it is unlikely that the work will be completed by the above date (or However, the work was not completed on this date)

Expecting that you may be able to complete the work if some time is given the Executive Director (Southern Region), RailTel Corporation of India Limited, Secunderabad although not bound to do so, hereby extends the time for completion from …… to …… .

Please note that an amount equal to 0.5% of the total value of the contract per week or part thereof (rounded off to the nearest whole number) subject to a maximum of 10% of the total contract value of the works as a recovery for delay in the completion of the work after the expiry of (1) ……. will be recovered from as mentioned in para 35 chapter II, section II of the special conditions of contract for the extended period notwithstanding the grant of this extension. You may proceed with the work accordingly.

The above extension of the completion date will also be subject to the further condition that no increase in rates on any account will be payable to you.

Please intimate within a week of the receipt of this letter your acceptance of the extension on the conditions stated above.

Please note that in the event of declining to accept the extension on the above said conditions or, in the event of your failure after accepting or acting up to this extension to complete the work by (2) ……. here mention the extended date), further action will be taken in terms of relevant para of special conditions of contract.

Yours faithfully, for & on behalf of RailTel Corporation of India Limited

Note:

1. Give here the stipulated date for completion without any penalty fixed earlier.
2. Here mention the extended date.

Signature of Tenderer with seal

FORM - 10
Para 18.1.3 Section-II Chapter I

QUALIFICATION / EXPERIENCE

Details of works executed and under execution during the last 3 financial years and the current financial year should be furnished in the following format.

S.No.	Name of Project and description of work.	Party's Address of whom the work was done	Total value (in Indian Rupees)	Year of completion and schedule period of execution (in months)	Year of completion and actual period of execution (in months)	Remarks

Note: A certificate from the organization, for which the work was executed, should preferably be enclosed to indicate that the contract was satisfactorily performed.

Signature and Seal of the Tenderer

Signature of Tenderer with seal

FORM – 12
Section-II Chapter –II

STANDING INDEMNITY BOND
(For Damages & Claims)
(On Stamp paper of Requisite Value)

We, M/s _____ hereby undertake vide RailTel letter of Acceptance of Tender No. RailTel/Tender/OT/SR/HQ/2015-16/89 We M/s …….. shall be entirely responsible for the safe execution custody and protection of said work against all risk till they are duly delivered to the purchaser or as he may direct otherwise and shall indemnify the Purchaser against any loss, damage or deterioration, or claims whatsoever in respect of the said work. The said work shall at all times be open to inspection by any engineer authorized by the Executive Director /Southern Region

Should any loss, damage of public/private utility/OFC/Copper Cable or other such things and claims due to all such things , We M/s ……. Shall be fully responsible for the making such things in good condition or the payment of claims for compensation by the public/private agency.

Dated this _____ day of _____

for and on behalf of M/s _____
(Contractor)

Signature of witness
Name and witness in Block letters
Address

SECTION III

CHAPTER 1

OFC system on 25 KV AC Traction

And

General scheme of OFC system.

Para No.Subject.

1.1 General.

SECTION III

CHAPTER 1

OFC SYSTEM ON 25 KV AC TRACTION AND GENERAL SCHEME OF OFC SYSTEM.

1.1 GENERAL

1.1.1 Any Telecommunication circuits in the vicinity of AC Traction running parallel to 25 KV lines are liable to be affected by AC induced voltage. Therefore precautions should be taken to eliminate the possibility of induced voltage affecting equipment and humans.

1.1.2 Crossing of track, if any, should be negotiated by underground cables running at right angles to the track as far as practicable.

1.1.3 Special protective measures (viz. provision of G.D tubes, fuses and earthingetc) are required to be taken for telecommunication lines entering 25 KV sub station /switching posts.

1.1.4 For the human safety considerations the safe working voltages should be 60 V under normal conditions and 150 V with special precautions and 430 V under fault conditions.

1.1.5 Instructions for protection of railway staff/working personals on signaling and telecommunications installations on 25 KV AC traction shall be strictly adhered to. Precautions are required to be taken on account of following,

i) Proximity of live conductor.
ii) Pressure of return current in Rails.
iii) Induction in all metallic bodies situated closed to over head equipment.

****

SECTION III
CHAPTER 2

2.0 SCOPE: ROUTE SURVEY FOR OPTICAL FIBRE CABLE:

a) RailTel has in-charge officials in the rank of Assistant Managers/Deputy Managers/Managers or above for the OFC route maintenance in the different sections. The contractor has to liaison with corresponding section in-charges while carrying out the work. RailTel will provide information of these officials after issue of LOI/LOA.

b) Before start of work in any section/link, the contractor will jointly survey the route with RailTel official. The route will be selected in such a way that it covers existing RailTel PoP on aerial fiber to be converted in to Underground OFC or shortest possible route. The report will be jointly signed by Contractor and RailTel official along with approximate drawing and approximate roué length and will be submitted in Regional Office. Permission will be accorded by competent authority for this route. However it is the right of RailTel to not to grant the permission without assigning any reason.

SECTION III

CHAPTER 3

TECHNICAL SPECIFICATION AND INSTRUCTIONS FOR TRENCHING, LAYING OF OPTICAL FIBRE CABLE, SPECIAL PROTECTIVE WORKS, DUCT INTEGRITY AND BLOWINF OF OFC

Sl No	Subject
3.1	Scope.
3.2	Excavation & Back Filling Of Trenches In Different Types Of Terrain
3.3	Laying of OFC through G.I. Pipe over Girder Bridges & Slab Bridges
3.4	Laying of OFC through DWC PIPE OVER CULVERTS AND BRIDGES
3.5	Track Crossing & Road Crossing.
3.6	Cables in Congested Residential areas and Marshy Areas.
3.7	Leading in of Cable in Masonry buildings
3.8	Laying of Cable in Special Cases.
3.9	Handling of Cable Drums & Paying of Cables.
3.10	PROCEDURE FOR CABLE LAYING/BLOWING
3.11	Provision of Chambers
3.12	Route Markers
3.13	Concreting with CC
3.14	Joint Enclosure
3.15	Splicing
3.16	Preparation of Cable for Jointing
3.17	Stripping and Cleaving of Cable
3.18	Preparation of cable joint closure for splicing
3.19	Striping& Cleaving of Fiber
3.20	Method of fusion splicing of fiber.
3.21	Organizing Fibre and finishing Joints
3.22	Placing of completed Joint in Pit
3.23	Opening of the Joint
3.24	FRP Joint/Loop Chambers
3.25	Termination of OFC in FMS
3.26	Testing of fibers and submission of ABD
3.27	Test protocols for OFC
3.28	Tools &Equipments required for jointing & termination of OFC

Signature of Tenderer with seal

SECTION III
CHAPTER 3
TECHNICAL SPECIFICATION AND INSTRUCTIONS FOR TRENCHING, LAYING OF HDPE PIPES/OPTICAL FIBRE CABLE, SPECIAL PROTECTIVE WORKS, DUCT INTEGRITY AND BLOWINF OF OFC

3.1 SCOPE:

This chapter deals with blowing of OFC specifications under which the various work for trenching, laying of HDPE Duct, termination and testing of optical fiber cable coming under the purview of the contract are to be executed by the contractor.

3.2 EXCAVATION & BACK FILLING OF TRENCHES IN DIFFERENT TYPES OF TERRAIN:

3.2.1 Generally trench for OF cable shall be dug to a depth of 1.2 meter. The width of the trench shall be adequate at the bottom to accommodate cables and their protection. Normally width of approx. 300 mm at the bottom should be maintained. In places where underground pipes, electric cable etc, come in the way, trenches deeper than 1.2 meter shall be dug as necessary and R.C.C/D.W.C. pipes shall be placed to protect the optical fiber cables wherever required.

The specification for trench in various types of Soil strata is as detailed below:

(a) Normal and Hard Soil: Trench to be excavated to a depth of 1200 mm and width of 300 mm at bottom in all types of soil (Normal soil/Soft soil/Sandy soil/Hard soil), except in bridges, culverts, level crossing, track crossing, loop/joint chambers. Cable route has to be marked with lime after clearing of jungle and bushes any obstacles. The trench to be refilled with excavated soil, rammed and consolidated after laying of HDPE Duct. Complete to the finished item of work as directed by the RailTel Engineer-in-Charge vide drawing No. RAILTEL/SR/ OFC/2008/1 and 2.

(b) Hard Rock:

I. Wherever hard rock is visible from surface to a depth of 300 mm, Rock has to be cut to a depth and width of 300mm & concreting to be done up to ground level with 1:2:4 PCC mix after laying of HDPE Duct and curing of concrete to the required number of days or with suitable protection with CC Half Cuts/DWC Pipes/GI Pipes/Concreting as per site engineer instructions, except in bridges, culverts, level crossing, track crossing, loop chambers, rocky soil/rock including marking of cable alignment, clearing of debris etc., complete to the finished item of work as directed by the RailTel Engineer-in-Charge, vide drawing No. RAILTEL/SR/ OFC/2008/3.

II. Where hard rock is encountered from a depth more than300 mm up to550mm, rock has to be cut to a depth and width of 200 mm, concreting to be done 200 x 200 after laying of HDPE Duct (PCC 1:2:4 mix) and curing of concrete to the required number of days with suitable protection CC Half Cuts/DWC Pipes/GI Pipes/Concreting as per site engineer instructions, refilling with excavated soil, rammed and consolidated, complete to the finished item of work as directed by the RailTel Engineer- in-Charge vide drawing No. RCIL/SR/OFC/2008/4.

III. Where hard rock is encountered from a depth more than550 mm up to 1050 mm, OFC has to be protected by concreting 200mm x 200mm after laying of HDPE Duct (PCC 1:2:4 mix) sand curing of concrete to the required number of days or CC Half Cuts/DWC Pipes/GI Pipes/Concreting as per site engineer instructions, refilling with excavated soil, rammed and consolidated, complete to the finished item of work as directed by the RailTel Engineer-in-Charge vide drawing No. RAILTEL/SR/ OFC/2008/5.

Note: Gravel of the size of 20mm to be used for the PCC.

(c) Cutting of metal / tar / CC surface, platforms and trenching to a depth of 1200mm, refilling with

excavated material, ramming and surface restored with concrete of size 300 x 300 mm (PCC 1:2:4 mix) after laying of HDPE duct, curing of concrete to the required number of days etc., complete to the finished item of work as directed by the RailTel Engineer- in-Charge.

(d) Cutting of Footpaths: Slabs/tiles will be removed carefully and trenching will be done upto depth of 1.2 Meter. In case of any obstacle due to hard rock/or other utility cables, the duct will be given suitable protection with CC Half Cuts/DWC Pipes/GI Pipes/Concreting as per site engineer instructions. Slabs will be reinstalled as before. In case of any breakage of slab/tiles, the contractor will replace the same with new. The cost to be borne by the contractor.

3.2.2 Metalled, macadamized, concrete and stone paved roads shall also be cut to a depth of 1.2 meter. The cable shall be laid through DWC pipe. The road surface shall be restored to original.

3.2.3 Wherever it is not possible to dig trench up to 1.2 meter depth due to site conditions, specific approval of site engineer / engineer's representative should be taken before digging trenches of lesser depth. Specific protection arrangement as mentioned above should be carried out.

3.2.4 The bottom of the trench where the cable is to be laid shall be free from any stones. The bottom of the trench shall be horizontal and shall in no case be undulating. When the cable bed changes from solid to soft surface or from the bridge to soft soil, tamped fill at the transition point shall be provided so that cable is not pressed against the edge of a hard surface.

The back filling of trenches shall be done by tamping and consolidating the excavated soil in layers of 15-20 cm at a time. All the soil that is excavated shall be put back to the trench and care shall be taken in consolidation to ensure that the back filling does not suffer any sinking in monsoon.

3.2.5 If under unavoidable circumstances, the excavation is to be done between the tracks or between OHE foundation and track, it shall be done to the full depth just before laying the cables and in the presence of the Engineer's representative so as to ensure the safety of train operations.

3.2.6 Wherever the Engineer's representative considers it necessary to adopt shoring, the Contractor will be required to adopt shoring for which the Contractor shall have sufficient quantities of shoring material on hand.

3.2.7 Where the direction of the trench has to change, it should be done in a gentle curve of not less than one meter radius and not at sharp angles.

3.2.8 While crossing tracks, roads at LC gates and laying over bridges & culverts, the RailTel and Railway engineer's representative (SSE/P-Way) shall be present. The date and time of such works shall be communicated to concerned telecom supervisor of the Railways and adequate precautions, as advised by them, have to be taken.

3.3 Laying of OFC through G.I. Pipe over Girder Bridges & Slab Bridges

3.3.1 The HDPE pipe required for blowing of OFC to be laid in 50mm GI pipes over the Girder and RCC bridges as per drawing no. RAILTEL/SR/OFC/2008/6 (In TWO sheets). The GI pipe with its HDPE pipe containing fiber optic cable should be effectively fitted on the bridges as detailed below.

a) The contractor has to Supply and fix 50 mm dia GI pipe, IS 1239 medium grade, with holes drilled at suitable intervals for anti theft measure, (i) On girder bridges, fixing coupled GI pipe line at both ends of the bridge, with concrete (PCC 1:2:4 mix) of size length 600, width 450, depth not less than 150 into the ground and 100mm above the GI pipe. (ii) On Concrete slab bridges fixing coupled GI pipe line are to be fixed at ends of pipe line as in case (i) and also supported with concrete pillars at the intervals of 2000 mm of size 300 mm x 300 mm height not less than 300 to maintain the GI pipe line in level. (iii) On drainage crossing GI pipe line is to be supported on concrete (PCC 1:2:4) mix 300 mm x 300 mm height not less than 300 mm with suitable foundation on either side of drainage and also as per site conditions to keep the GI pipe line in stable position. Concrete pillar finished to a smooth surface, to drain out water without stagnation, curing the required number of days etc., Complete to the finished

item of work as directed by the Engineer-in-Charge vide drawing no. RAILTEL/SR/OFC/2008/6 (In TWO sheets)

b) The contractor has to supply and fix the C-channel, Z-brackets, special bolts of various sizes, ' ⎍ ' shape bracket (On Girder bridges), ISMC 100 mm X 50 mm, average length 1000 mm, fixed at intervals of 1m/centre of the railway alternate steel channel sleeper whichever is applicable, with two numbers Z- shape brackets size 300 mm x 50 mm x 12 mm, (Z- shape depends on number of main girder top flange plates) fixed tightly with 3 Nos. of special bolts with locking pins & nuts, MS Spring washer and washer per each bracket to the existing railway girder. 50 mm dia GI pipe line is to be run (GI pipe supplied separately) on the edge of above ISMC fixed with ' ⎍ ' shape bracket, 4 nos. of bolts with locking pins & nuts, MS Spring washers etc., Complete to the finished item of work as directed by the Engineer-in-Charge vide drawing No. RAILTEL/ SR/OFC/2009/7.

3.3.2 When laying cable on long bridges, the question of longitudinal expansion caused by temperature differences should be taken into consideration and suitable cable loops should be provided at the pillars of the bridge.

3.3.3 The laying of the cable on the bridges is to be done with much care and planning. It is necessary that the cable drum to be laid on the bridge is inspected and tested thoroughly so that damaged cable is not installed.

3.4 Laying of OFC through DWC PIPE OVER CULVERTS AND BRIDGES

3.4.1 Wherever the water flow is less the cable in HDPE shall be laid under the bed of the culvert at a depth of 1.6 meter through DWC pipes as detailed below:

a) The contractor has to Supply and fix the DWC pipes of size 77 mm / 78 mm outer dia. and 63 mm / 65 mm inner dia in 6 m length as protection to HDPE Duct where cable route passes across the culvert / bridge where water is not flowing in the bed of the culvert / bridge. Excavation of trench in the bed to a depth of 1300 mm, width 300 mm duly deepening to a depth another 300 mm below DWC pipe at interval of 2000 mm, concreting with PCC 1:2:4 mix at the ends of the pipe line and at 2000 mm intervals (preferable at all couplers), of size length 300 mm, width 300 mm, depth 300 mm below DWC pipe support, 173 mm above DWC pipe as cover concrete to make concrete pillar of 550 mm height, curing the required no. of days, re-filling with excavated
soil after laying DWC pipe, ramming and consolidation of soil etc., Complete to the finished item of work as per drawing No.RCIL/SR/OFC/ 2008/9 and as directed by the RailTel Engineer-in-Charge.
Similar arrangement as detailed at (a) above shall be provided for taking the cable in water logged areas and drains.

The DWC shall be approved by RailTel before use.

3.4.2 In case of wet culverts or unfriendly terrains where it is not possible to lay cable under the bed of culverts, the cables may be laid over the culvert in G.I. pipes as per Drg. No.RailTel/SR/OFC/2008/6.

3.5 TRACK CROSSING & ROAD CROSSING USING HORIZONTAL BORE METHOD

All cable crossings across railway tracks & across road crossing or road crossing at level crossing gates shall be done in horizontal boring method as detailed below:
"Drilling of 100mm dia Horizontal Bore, supply of 50 mm dia GI pipe across the Railway Track and

road at LC Gates by boring method at a depth of 1200 mm from the ground level (ground level to be considered ignoring the bank height of track/road) and insertion of GI pipes etc., Complete to the finished item of work as directed by the RailTel Engineer-in-charge vide drawing No RAITEL/SR/ OFC/2008/10 (In TWO sheets)".There should be no damage to the road/platform/tracks or any such structures etc., enroute during or after the HDD operations. The work includes supply of all accessories required for laying of HDPE pipes. Necessary precautions to be taken for safety of train traffic /road traffic while execution of horizontal boring in the presence of concerned RailTel officials. In the city area Road Crossing can be done by HSS/open cut method where horizontal boring is not possible with the suitable protection to Duct & OFC as per site engineer instruction.

3.6 CABLES IN CONGESTED RESIDENTIAL AREAS AND MARSHY AREAS:

3.6.1 When laying the cable in residential sections, the cable should be specially protected on both sides up to a distance of about 300 meters beyond the building line. In such cases the cable should be protected by means of DWC pipes.

3.6.2 In marshy area where it is not possible to divert the cable route the cable shall be suitably laid and protected as per decision of Engineer depending on site condition, like laying cable in G.I. pipe 50 mm dia or 150 mm dia/DWC Pipe of 77 mm/78 mm outer dia and 63 mm/65 mm inner dia supported on PCC pillars/Iron channels etc.

3.7 LEADING OF CABLE IN MASONRY BUILDINGS

3.7.1 The cable will have to be led inside any masonry building such as Cable hut, ASM's room at a depth of 0.75 meter by cutting the masonry structure of the wall as per as per the directions of the RailTel Engineer-in-Charge. After the cable has been led inside the masonry wall the floor inside shall be duly repaired and plastered.

3.7.2 Leading of OFC in Pre-fab/PoP: The cable will have to lead in and lead out through G.I. Pipe, G.I. long 'L' bend as per instructions of RailTel engineer-in-charge.

3.8 LAYING OF CABLE IN SPECIAL CASES:

3.8.1 Near Power Cable

When the contractor comes across any other cable already laid, he shall first report the fact to the Engineer. Should the cable be identified by the Engineer as a power cable (LT or HT), the trench shall be dug as far away from the route of the power cable as practicable.

3.8.2 Crossing of Optical Fibre Cable with another cable

Crossing of the Optical Fibre cable with another cable shall be avoided wherever possible. Where, however, this is not possible, the Optical Fibre cable shall be laid in cement or asbestos cement pipes. The length of the pipe to be provided on either side of the crossing shall be at least one meter.

3.8.3 Laying of other than optical fibre cables in the same Trench

No cable other than quad shall be laid in the trench for the Optical Fibre cable. Even in such cases, both the cables are to be laid as per approved drawing. Where, however, exceptional circumstances exist, the optical fibre cable may be laid along with another cable in the same trench provided a specific permission of each such case is obtained in writing from Engineer. When optical fibre cable and L.T. power cable have to be laid in the same trench they shall be separated by placing a layer of brick between them vertically (approx. 16 bricks/meter) or laid in DWC pipe.

3.8.4 Laying cable near feeding post:

In the vicinity of feeding posts, as far as possible the cable shall be laid on the side of the track

opposite to the feeding post. Further the Optical fiber cable shall be at least one meter away from any metallic part of the O.H.E. and other equipment at the sub station which is fixed on the ground and at least one meter away from the sub stationearthing. In addition, the cable shall be laid in DWC pipes (standard 6 meter length) complete or capable of being split into two half as per spec. no. ISS-458 latest for a length of 300 meters on either side of the feeding point as per the instruction of RailTel engineer.

3.8.5 Running of cables at foundations others than OHE Masts and from pipe outlets.

Damages to cable is likely to occur if care is not taken in laying cable where the bed changes from solid support such as a foundation pipe or bridge to soft support such as soft soil. The cable must not press against the edge of the solid support. The soft soil near the edge must be tamped and the cable raised slightly.

3.8.6 Laying near oily surface

If during the excavation of trenches for laying cables, the Contractor or his representative notices the presence of oil or oily substance or any other chemical which is likely to cause the deterioration of the cable protective material he shall bring the matter to the notice of the Engineer or his representative and on the latter's decision he shall choose an alternative cable route or he shall protect the cable in such places in such manner as advised in writing by the Engineer or his representative. No additional charges are payable.

3.8.7 Special soil condition

Cable should not be laid in abnormally high acidic or alkaline soil or through sewage. If this is unavoidable, special measures should be taken against corrosion as advised by the Engineer in Charge.

3.8.8 Provision of damage due to sharp edges

When cable are laid in trunking, care should be taken to see that no ballast or stones have been dropped inside the trunking and it should be cleared of all ballast and stones before the cover is secured. When the ends of covers are joined together with cement plaster, a piece of paper or wood should be placed under the joint to prevent the cement plaster from falling on the cables.

3.8.9 Laying of HDPE Duct

HDPE duct (33/40 mm dia) has to be laid in the already excavated trench on existing bridges through GI/DWC pipes (HDPE duct with accessories will be supplied at any one location in the section of work by RAILTEL). Proper couplers have to be provided for blowing OFC as directed by the RailTel Engineer-in-charge.

3.8.10 Blowing of OFC: The contractor has to blow the OFC through HDPE Duct as detailed below:

Blowingof armored Optic Fiber cable (24 Fiber as per RDSO specification TC 55-2006 Rev.1 with amendment1.1 or 48F OFC Cable) in the already laid HDPE duct by using blowing machine, providing the sufficient loops in loop / joint chambers and other associated works (OFC Shall be supplied by RailTel at any one location in the section of work) complete to the finished item of work and as directed by the RailTel Engineer-in-charge.

3.9 HANDLING OF CABLE DRUMS & HDPE Duct

Before commencement of the laying, inspection of the trench and inspection of protection works should be carried out so as to ensure their conformity with the specification. The trench bottom should be clean, smooth and free of small stone. When the soil contains stone or pieces of rock, sieved earth about 10 cm. thick should be used both for the bedding on which the HDPE duct is laid and for covering the cables

3.9.1 The drums shall be unloaded by the side of the Railway Track by either a crane or any other

suitable means very carefully so as not to cause any damage to the cable. The drums at site shall be protected until they are laid.

3.9.2 On each drum there are two ends, A&B. The 'B' end of one cable length shall meet 'A' end of the next cable at a joint. The 'A' end shall be normally on the top unless otherwise indicated on a drum.

3.9.3 The drums shall always be kept upright, i.e. axle in parallel position to the base. The drums shall not be set by jerks but shall be handled slowly and with care. The walls of the drums should not be damaged while moving the drums if required for un-rolling.

3.9.4 The drums shall normally be unrolled at the same place and the cable carried by workmen near the trench. The drums shall not be dragged in any case. But where cable drums have to be moved, would always be rolled in the direction of the arrow, otherwise the coils tend to unwind and the cable may get battered. In case no direction arrow is marked on the drum, remove several battens and determine the direction in which the cable is coiled. The arrow should then be painted on the drum pointing in the opposite direction in which the upper cable end is coiled so that future handling of the cable drum is facilitated and then re-fix the battens carefully.

3.9.5 The drum should be properly mounted on jacks (or on a cable wheel) making sure that the spindle is large enough to carry the weight without bending and that it is laying horizontally in the bearings so as to prevent the drum creeping to one side or the other while it is rotating. Before attempting to pull off the cable, remove the end protection seal attached to the flange of the drum and cut the security ropes so as to leave the cable free to move.

3.9.6 If a portion of the cable only is taken out from the cable drum, the battens should be immediately re-fix to prevent damage to the balance of the cable.

3.9.7 The use of steel bars between the bolt heads to 'jump' or turn the drum around is dangerous to staff and likely to damage the drums. A better method is to use two steel plates with grease between them. By standing the drum on these greased plates, it can be easily elevated round to the desired position.

3.9.8 All care should be taken in handling cable drums with a view to ensure safety not only of the cables but also of the working party handling them. The man should not be allowed to break the cable drum by standing in front but only from side.

3.9.9 Rewinding and Re-drumming of cables.

i.	If for any reason if it is found necessary to rewind the cable on a drum, drum of a proper barrel diameter not less than of the original drum should be chosen.
ii.	The drums should be mounted on cable jacks during rewinding operations using proper size of spindles passed through the flange holes, which will not buckle under the lead. The cable should not be bent opposite to the set it is having already.
iii.	In the re-drumming operations, drums should be so turned that the cable passes from the bottom of the original set with as little gap as possible.
iv.	Replace all the lagging on the cable drum.

3.10 PROCEDURE FOR CABLE LAYING/BLOWING

3.10.1 Minimum Bending Radius: Cables should always be bent (or straightened) slowly, they should never be bent to small radius while handling. The minimum safe bending radius for optical fiber cables should be 50 times the diameter of the cable but wherever possible larger radius should be used.

3.10.2 Wherever cable has to be coiled/looped, the diameter of the coil/loop shall be greater than 50 times the diameter of the cable.

3.10.3 The pit for loop/splice chamber should be as per the specification given in the Drg. No. RailTel/SR/OFC/2008/12.

3.10.4 The cable drum should be brought as close as possible to the cable trench. It should be lifted with the aid of cable jacks firmly mounted on a support of stone or wood. The spindle should be minimum of 55 mm diameter and have a clearance from ground by 5 to 10 cm.

3.10.5 The wooden battens on the drums should be carefully removed shortly prior to laying and before the drum is mounted on the jack. The nails on the lagging should be carefully removed.

3.10.6 While rolling a cable drum for blowing, the drum shall be supported on an axle running through its centre, the height of the axle being such that the end frames are free to rotate and do not touch the ground at any point. The cable shall be carefully uncoiled by gently pulling the cable assisted as necessary by carefully turning the drums. The quick pulling of the cable or turning the drums shall be avoided at all costs. Each cable drum shall be broken while laying is in progress to prevent sharp bending or buckling, particularly when the cable coils are sticking together.

3.10.7 The method of mounting the brakes is shown in Drg. No. RailTel/SR/OFC/2008/11

3.10.8 When drums are turned for change of direction, wooden blocks shall be carefully put under the drum bolts, which stand out from the drum discs.

3.10.9 On no account should a cable be allowed to twist or kink as this is likely to spring the Armour and fracture the outer serving of the cable.

3.10.10 The cable shall be blown using Cable jet blowing method.

3.10.11 Contractor may have to blow the cable in the Ducts as instructed by engineer – in – charge. Duct cleaning; cable blowing arrangement has to be made by contractor at no extra cost to RailTel before blowing of the cables.

3.10.12 Cable manufacturer's specification will be provided to the contractor prior to blowing.

3.10.13 Unless otherwise specified, the contractor must leave minimum 25 meters of slack on both sides of fiber Optic splices at each splice chamber (every 3 KMs) and pull through chambers.

3.10.14 The proposed cable is an armored type and delivered in reels of up to 3 KMs. Splice points are located and planned considering the coils kept in splice/pull through chambers.

3.10.15 OFC is normally installed bi-directional that is cable reel is placed midway and installation is taken up on each side one after the other. The first installation is when the cable directly uncoiled from the reel and next is after uncoiling all the cable from the reel are placed on the ground in a figure of 8 to facilitate installation.

3.10.16 Anti twist tool may be used to avoid twisting of cable while blowing.

3.10.17 Cable should always be kept away from vehicular and pedestrian movement over it.

3.10.18 Sometimes there is considerable lapse of time between the pipe laying and cable laying. This intervening period could have heavy rains too. Therefore, there is possibility of entering dissolved muddy water into the HDPE pipes. This dissolved muddy water may transform into a thick paste or solid mud. Cleaning of the pipes before the cable blowing is absolutely necessary to remove any such obstructions. Replacing mandrill with nylon brush and rugs.

3.10.19 Before blowing OTDR test has to be conducted for all 24 fibers of the OFC in 1310nm and 1550nm windows and readings to be recorded in soft as well as hard copy and drums with any defects for even one single fiber shall not be blown/Pulled. Such defects shall be immediately brought to the notice of the engineer – in –charge and a joint statement has to be signed for record.

3.10.20 The OFC shall be handled with utmost care and industry standard tools are toused for transporting, loading, unloading and blowing of OFC.

3.11 PROVISION OF CHAMBERS: The contractor has to arrange for Casting of circular FRP chamber, top covers and bottom plate (1:2:4 concrete mix) with reinforcement, two hooks in each half cover, provision of duct holes as shown in the drawing. Excavation of circular pit to a depth of 1300 mm, dia of 1500 mm, positioning of bottom plates, chamber and top covers (two halves). Chamber to be filled with river sand to the brim of the chamber after cable blowing and splicing, top covers placed, refilled with excavated soil and rammed etc., complete to the finished item of work as directed by the RailTel Engineer-in-Charge vide drawing No RAILTEL/SR/ OFC/2009 /12.

The chambers to be installed in the following locations:

1. LC Gates: One chamber will be provided at all the LC Gates at least 10 mtrs. away from the centre point of the road, a coil of 30 mtrs of OFC will be kept as spare in this chamber.
2. Bridges: For all bridges of length less than 25 mtrs, one chamber will be provided at a distance of 10 mtrs. from the edge of the bridge and two chambers will be provided for all bridges of length of more than 25 mtrs. A coil of 30 mtrs of OFC will be kept as spare in each chamber.
3. Prefab: All prefabs will be provided with one chamber with a coil of 30 mtrs.
4. At every 500 Meter: One loop chamber will be provided with coil of 50 mtrs.
5. Track Crossing/Road Crossing: One loop chamber with 30 mtrs coil to be provided at every track crossing/Road Crossing.
6. At every OFC Joint, one joint chamber will be provided by providing a coil of 25 mtrs for each side of the cable.
7. Stations: Every station will be provided with one number of joint chamber where 'T' joint is made. Only those fibers which are required to be derived only are to be spliced with derivation cable with 'T' joint without disturbing the other fibers. For through cable 15 mtrs. to be left as coil and for derivation cable 15 mtrs. to be left as a coil in the chamber.
8. As far as possible, it should be ensured that there will be at least one KM distance between loop chambers. If there is an LC gate or a bridge or a track crossing or prefab and then the next loop chamber will be at one KM distance.

3.12 ROUTE MARKERS: The contractor has to provide route markers as detailed below:
Casting, transporting and fixing of FRP Route Markers at a distance of 200 Meter apart on the cable route/at places where the route of the cable changes/ on either sides of the culverts/bridges/LC gates/road cuttings etc. They should be of standard letters "RailTel", "OFC", with RailTel logo on top. They shall be painted with green when placed at joint chambers, yellow placed at loop chambers and orange at all other places. The length is 900mm,as shown in the drawing, complete to the finished item of work as directed by the RailTel Engineer-in-Charge vide drawing No. RAILTEL/SR/ OFC/2009/11.

Technical Specification of Route Markers for OFC Network

Physical Dimensions:

1. Total height of the Route Marker : 900mm
2. Width of the Route marker : 100mm
3. Thickness of the Route marker : 2mm
4. Radius of Semicircular Top : 300mm
5. Height of Vertical Beam : 570mm

Signature of Tenderer with seal

6. Breadth of Vertical Beam : 100mm
7. Height of the Anchoring Base : 30mm
8. Breadth of the Anchoring Base : 300mm
9. Depth to be planted underground : 500mm

Material Specifications:

1. Silica Material :
   i. Combination Mat -WR-610gsm+CSM-300gsm
   ii. CSM -300gsm
2. Unsaturated Polymer : Orthopthalic UV stable
3. Pigment : Orange-Polymer Compatible
4. Accelerator : MEKP(UN3105)
5. Catalyst : 3% Cobalt (UN No-3163)

Installation Specifications:

1. Route marker inside hallow portion has to be filled with locally available soft soil and compacted end closed with the locking flap provided with bolts and nuts.

2. A pit of cross section 400mm X 400mm and of depth 500 has to be dug.

3. The soil filled and flap closed Route marker should be placed upwards on 30mm soil bed and pit to be closed to the Ht of 500mm of route marked. The soil should be compacted thoroughly so that Route marker is planted firmly.

3.13 Concreting with CC of 1:2:4

The contractor has to do the protective works of concreting as per requirement. The OFC has to be protected with Concreting 0.3 x 0.3 to the approaches of bridges and culverts in the ratio (PCC 1:2:4 mix) wherever necessary as per the technical specification and as directed by RailTel Engineer-in-Charge at site.

3.14 Joint Closure: splicing of 24 F OFC/ 48F OFC has to be done as per requirement, complete to the finished item of work and as directed by the RailTel Engineer-in-charge. Splicing of OFC has to be done using joint closurewith all accessories broadly as per specification TEC/GR/OJC-02/02 September' 03 with additional features or suitable like Joint closure shall be dome shaped, capable to close mechanically/ worm clip, cable entry shall be sealed with heat shrink& hot melt adhesive system, fiber organizer trays in closure must be hinged at one endto accommodate 24/48F. The Optic Fibre joint closure shall be of reputed make like TVSE, Raychem, 3M etc. and the same may be approved by RailTel before use

3.15 Splicing:

3.15.1 STRAIGHT/BRANCH JOINT FOR FIBRE OPTIC CABLE:

There are various types of joint enclosures available in the market. The procedure for assembly of joint closure is described in the installation manual supplied with straight joint closure. This includes the following:

a) Material inside joint closure kit.
b) Installation tools required.
c) Detailed procedure for cable jointing.
d) Procedure for re-opening the closure

3.15.2 The Optic Fiber joint closure shall be of reputed make like TVSE, Raychem, 3M etc. and the same may be approved by RailTel before use. The joint shall be protected in concrete chamber.

3.15.3 However, generally, the following steps are involved for jointing of the cable.

- Preparation of cable for jointing
- Stripping/cutting the cable
- Preparation of cable and joint closure for splicing
- Fiber splicing
- Organizing fibers and finishing joints
- Sealing of joint closure and
- Placing joint in pit.

3.16 PREPARATION OF CABLE FOR JOINTING

3.16.1 During the installation, a minimum of 10 meters of cable of each end is coiled in the jointing pit to provide for jointing to be carried out at convenient location as well as spare length to be available for future use in case of failures.

3.16.2 The pit size must be chosen carefully to ensure the length of the way on which joint is mounted is greater than closure length plus twice the minimum bending radius of the cable. A pit length of 1 meter is sufficient for most of the cable and joint closures. Bracket to support the cable coil are also fixed on the wall of the pit.

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

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

3.16.5 Sufficient cable at each end up to the jointing vehicle/enclosure is then uncoiled from the pit for jointing.

3.17 STRIPPING/CUTTING OF THE CABLE

3.17.1 The cables are stripped of their outer and inner sheath with each sheath staggered approximately 10mm from the one above it.

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

3.17.3 The fibres are then removed from cable one by one and each fibre is cleaned individually using Kerosene to remove the jelly.

3.18 PREPARATION OF CABLE JOINT CLOSURE FOR SPLICING The type of preparation work performed on the cable prior to splicing differs on the type of joint closure and fiber organizer used. However, the following steps are usually common:

3.18.1 The strength member of each cable is joined to each other and/or the central frame of the joint closure.

3.18.2 The joint closure is assembled around the cable.

3.18.3 The sealing compound or heat shrink sleeve is applied to the cables and closure or prepared for application after splicing is complete.

3.18.4 The fibers are protected (usually with plastic tubing) in their run from the cable core to the fibre organizer trays (particularly if cable construction is slotted core type).
3.18.5 Tags which identify the fibers nos. are attached at suitable locations on the fibres
3.18.6 Splice protectors are slipped over each fiber in readiness for splicing over the bare fibre after splicing.

3.19 STRIPPING AND CLEAVING OF FIBRE
3.19.1 Prior to splicing each fiber must have approximately 50mm of its primary protective U.V. cured coating removed, using fibre stripper which are manufactured to fine tolerances and only score the coating without contacting the glass fibre.
3.19.2 The bare fiber is then wiped with a lint free tissue doused with ethyl alcohol.
3.19.3 Cleaving of the fiber is then performed to obtain as close as possible to a perfect 90 degrees face on the fibre.

3.20 METHOD OF FUSION SPLICING OF THE FIBER some of the general steps with full automatic microprocessor control splicing machine is as under:
3.20.1 Wash hands thoroughly before start of splicing.
3.20.2 Dip the clean bare fibre in the beaker of ethyl alcohol of the ultrasonic cleaver. Switch on ultrasonic cleaver for 5-10 seconds (some of the manufacturers does not prescribe the above cleaning).
3.20.3 Place the bare fiber inside 'V' groove of the splicing machine by opening clamp handle such that the end of fiber is app.1 mm. over the end of the 'V' groove towards the electrodes.
3.20.4 Repeat the same procedure for other fibre, however first insert heat shrink splice protector.
3.20.5 Press the start button on the splice controller.
3.20.6 The machine will pre fuse, set align both in 'X' and 'Y' direction and then finally fuse the fiber.
3.20.7 Inspect the splice on monitor if provided on the fusion splicing machine and assure no nicking, bulging is there and cores appear to be adequately aligned if the splice does not visually look good repeat the above procedure.
3.20.8 Slide the heat shrink protector over the splice and place in tube heater. Heat is complete when soft inner layer is seen to be 'oozing' out of the ends of the outer layer of the protector.
3.20.9 Repeat the same procedure for all the other fibers

3.21 ORGANISING FIBER AND FINISHING JOINTS
3.21.1 After each fiber is spliced, the heat shrink protection sleeve must be slipped over the bare fiber before any handling of fiber takes place, as uncoated fibers are very brittle and cannot withstand small radius bends without breaking.
3.21.2 The fiber is then organized into its tray by coiling the fibers on each side of the protection sleeve using the full tray side to ensure the maximum radius possible for fiber coils.
3.21.3 The tray is placed in the position.
3.21.4 OTDR reading taken for all splices in this organized state and recorded on the test sheet to confirm that all fibers attenuation are within 0.02 dB per splice. This OTDR test confirms fibers were not subjected to excessive stress during the organizing process.
3.21.5 After this the joint can be closed with necessary sealing etc and ready for placement in the pit.

3.22 PLACING OF COMPLETED JOINT IN PIT
3.22.1 Joint is taken out from the vehicle and placed on the tarpaulin provided near the pit.
3.22.2 The cable is laid on the ground, loop the cable such that pen mark previously place on the cable line up. Tape these loops together at the top of the coil.

3.22.3 The joint can now be permanently closed and sealed by heating heat shrinkable sleeve etc. However, before closing, silica gel to be kept inside for moisture protection.

3.22.4 Now the joint closure is fixed to the bracket on the pit wall and pit is closed.

3.23 OPENING OF THE JOINT. If required for attending to faults etc., manufacturers supply special kits for opening of the joint and the steps to be followed. However the general steps are as under:

3.23.1 Using suitable knife cut heat shrink sleeve longitudinally along its entire length.

3.23.2 Do not damage the smaller heat shrunk sleeve on the ends of the joint.

3.23.3 Apply heat to the cut sleeve until it begins to separate.

3.23.4 Gently remove the cut sleeve from the joint. Now the joint can be opened.

3.23.5 Protective sleeve/cover can be removed for attending to faults etc.

3.24 FRP joint/Loop Chambers. FRP joint/loop chambers of 0.9 mts inner dia, 60cm depth and 3mm thickness with 2 piece top cover with two hooks each and bottom cover with holes for drainage and cable entry as per drawing No RAILTEL/SR/ OFC/2009/12.
and as directed of RailTel engineer to be provided at every KM for OFC joint/ loop. The Chamber shall be filled with sand mixed with anti termitepowder .

Technical Specification of OFC Joint Chamber

Physical Dimensions:

1. The Diameter of the OFC Joint Chamber : 900mm
2. Height of the OFC Joint Chamber : 600mm
3. Thickness of Silica –Ortho enclosure : 3mm
4. Thickness of Top Split SRC cover : 50mm
5. Diameter of Bottom Silica-Ortho cover : 950mm
6. Bottom Flange Height : 30mm
7. All other dimensions as indicated in drawing.
8. Cable entry slots (semi closed) : 50mm dia (3 Nos) on three sides

Material Specifications:

1. Silica Material :
   i. Combination Mat -WR-610gsm+CSM-300gsm
   ii. CSM -450gsm
2. Unsaturated Polymer : Orthopthalic
3. Pigment : Grey-Polymer Compatible
4. Accelerator : MEKP(UN3105)
5. Catalyst : 3% Cobalt (UN No-3163)

Installation Specification:

1. A pit of Diameter 1200mm and of depth 1300mm has to be dug.
2. The bottom plate type cover has to be place first and the chamber to be inserted later.
3. Cable duct entry window to be opened at the semi closed circular cuts on the enclosure by hitting with hammer/screw driver as per no. of ducts.

4. Top cover should be place slowly in its position as shown in the drawing.

5. The soil has to be pulled back over the chamber buried 600mm below the ground level.

3.25 Termination of OFC in FMS: The OFC has to be terminated in the FDMS supplied by RailTel as directed by the RailTel Engineer-in-Charge as per site requirement.All 24 /48 fibers to be terminated at important stations specified by RailTel.

3.26 Testing of fibers and submission of as made drawings: The contractor has to do the testing and commissioning of OFC system from Cable hut to cable hut with proper lead in and lead out through G.I Pipe, splicing and termination as directed by RailTel engineer. Testing and commissioning after defect rectification if any defects located during the testing, obtaining the clearance from RailTel in the form of acceptance certificate, preparation of test reports, as build drawings of cable route plan and OFC jointing location schedules in CAD format and submission of 2 soft copies in CDs and 3 hard copies in A4 size etc., complete to the finished item of work and as directed by the RailTel Engineer-in-charge.

3.26.1 Testing consists of OTDR reading and power meter reading of all fibers. Station to station testing is required for fibers terminated at block stations. Run through fibers may be tested form end-to-end terminations only. OTDR readings are to be taken in 1310 nm and 1550nm windows and one set of readings to be recorded in soft as well as hard copy and submitted duly counter signed by contractor's authorized representative and RailTel's engineer – in - charge.

3.26.2 Reports: The reports consists of (a) tabulation of all events reported by OTDR of more than 0.2 db over the section for all fibers tested, (b) Tabulation of power loss from A-B & B-A direction, average and loss per km in both 1310 & 1550 nm. for all the fibers tested.

3.27 TEST PROTOCOL FOR OPTICAL FIBRE CABLE

SYSTEM TEST PROTOCOL OPTICAL FIBRE CABLE FIELD TEST

Route: ---------- Date: ----------

Station: ---------- No. of mid- section splices: ----------

Section: ---------- Measured by: ----------

Length (by OTDR): ---------- Length as per meter marking on cable sheath----------

Optical measurements (On Line):

Measurement	Fibre – number 1 2 3 4 ……47 48	Accepted Value
1.1 Total attenuation at 1300/1550 nm with OTDR		
1.2 Total attenuation per Km at 1300/1550 nm:		<0.40 dB/Km at 1300 nm &<0.25 at 1550 nm

1.3 Splice Loss in dB with OTDR Location		Average splice loss
OHE Mast No. / Overhead alignment post no. A. B. C. D. E.		
Average Splice Loss		0.15 dB/Splice

NOTE: ALSO ATTACH OTDR RESULTS |----|

2) Visual Inspection (On Line):

2.1 No. of Cable drum used in the section: ----------

2.2 S.No. of cable and length of each drum:

S.No. LENGTH

1. ----------Mtr
2. ----------Mtr
3. ----------Mtr
4. ----------Mtr
5. ----------Mtr

2.3 Location of Isolation Sleeves: 1. 2. 3.

Contractor's Representative RailTel's Representative

Signature of Tenderer with seal

3.28 TOOLS AND EQUIPMENTS REQUIRED FOR JOINTING AND TERMINATION OF FIBRE OPTIC CABLE.

S.No. Tool's Name

1. Branch Joint Closure
2. Termination Box
3. Rubber end Block
4. Sheath Clamp
5. Bushing
6. Strength Member holder
7. Heat Shrinkage tube
8. Arc fusion splicer machine.
9. Power cord AC/DC
10. Walkie-Talkie 12V DC source
11. Tube heater
12. Precision cleaver
13. Cable sheath stripper
14. Fibre stripper
15. Knife for HDPE cutting
16. Hexa for strength membrane
17. Isopropyl alcohol or methanol of high specific gravity
18. Johnson Buds
19. Tweezers
20. Gun heater Blower type
21. Sleeve for splice protection
22. O.T.D.R.
23. Stickers for numbering of splicers.
24. Portadle k. oilgenerator
25. Umbriílla 2 Nos.
26. Dust protection for splicing machine

Note:-Wherever cable has to be coiled/looped, the diameter of the coil/loop shall be greater than 50 times the diameter of the cable.

Replacement of Defective OFC: No defects like high loss events and fiber breaks are permitted and the contractor shall at his cost replace the entire drum length of cable of RAILTEL's specification and in any case not less than the length of the drum being re-laid. The contractor also at his cost blows the cable again including the splicing/Termination of the cable. No joints with pieces of OFC are permitted. In case of any deviation, specific approval from Competent Authority of RailTel should be obtained

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Technical specification for provision of earth

1. Introduction

The earthing arrangement is required to provide one earth for DG set & other earth for AC supply. The earth resistance should be less than 1 ohm.

CODE OF PRACTICE

FOR

EARTHING AND BONDING SYSTEM

FOR SIGNALLING EQUIPMENTS

RDSO SPECIFICATION NO. RDSO/SPN/197/2008

SIGNAL DIRECTORATE

RESEARCH, DESIGNS & STANDARDS ORGANISATION

LUCKNOW – 226011.

CODE OF PRACTICE FOR EARTHING AND BONDING SYSTEM FOR SIGNALLING EQUIPMENTS

1. Scope

This document covers earthing & bonding system to be adopted for signaling equipments with solid state components which are more susceptible to damage due to surges, transients and over voltages being encountered in the system due to lightning, sub-station switching etc. These signaling equipments include Electronic Interlocking, Integrated Power supply equipment, Digital Axle counter, Data logger etc.

2. References

IS 3043	*Code of practice for earthing.*
ANSI/UL 467	*Grounding & bonding equipment.*
IEEE 80	*IEEE guide for Safety in AC sub-station grounding.*
IEEE 837	*Standard for qualifying permanent connections used in sub-station grounding.*
IEC 62305	*Protection against lightning.*

3. Importance of Earthing

The installation and maintenance of an effective low resistance earthing system is essential due to the following -

- Efficiently dissipate heavy fault currents and electrical surges, both in magnitude and duration, to protect equipment being damaged so as to minimize down time, service interruption and replacement cost.
- Provide a stable reference for electrical and RF circuits at the installation to minimize noise during normal operation.
- Protection of personnel who work within the area from dangerous electric shock caused due to “step potential” or “touch potential”.

4. Characteristics of good Earthing system

- Excellent electrical conductivity
  - Low resistance and electrical impedance.
  - Conductors of sufficient dimensions capable of withstanding high fault currents with no evidence of fusing or mechanical deterioration.
  - Lower earth resistance ensures that energy is dissipated into the ground in the safest possible manner.
  - Lower the earth circuit impedance, the more likely that high frequency lightning impulses will flow through the ground electrode path, in preference to any other path.

- High corrosion resistance
  The choice of the material for grounding conductors, electrodes and connections is vital as most of the grounding system will be buried in the earth mass for many years. Copper is by far the most common material used. In addition to its inherent high conductivity, copper is usually cathodic with respect to other metals in association with grounding sites, which means that it is less likely to corrode in most environments.

- Mechanically robust and reliable.

5. Location for Earth

- Low lying areas close to the building or equipment are good for locating Earth Electrodes.
- The location can be close to any existing water bodies or water points but not naturally well-drained.
- Dry sand, lime stone, granite and any stony ground should be avoided.
- Earthing electrode should not be installed on high bank or made-up soil.

6. Acceptable Earth Resistance value

The acceptable Earth Resistance at earth busbar shall not be more than 1 ohm.

7. Components of Earthing & Bonding system

The components of Earthing & Bonding system are-

Earth electrode, Earth enhancement material, Earth pit, Equi-potential earth busbar, connecting cable & tape/strip and all other associated accessories.

8. Design of Earthing & Bonding system

8.1 Earth Electrode

- The earth electrode shall be made of high tensile low carbon steel circular rods, molecularly bonded with copper on outer surface to meet the requirements of Underwriters Laboratories (UL) 467-2007 or latest. Such copper bonded steel cored rod is preferred due to its overall combination of strength, corrosion resistance, low resistance path to earth and cost effectiveness.
- The earth electrode shall be UL listed and of minimum 17.0mm diameter and minimum 3.0mtrs long.
- The minimum copper bonding thickness shall be of 250 microns.
- Marking: UL marking, Manufacturer's name or trade name, length, diameter, catalogue number must be punched on every earth electrode.
- Earth electrode can be visually inspected, checked for dimensions and thickness of copper coating using micron gauge. The supplier shall arrange for such inspection at the time of supply, if so desired.

8.2 Earth Enhancement material

Earth enhancement material is a superior conductive material that improves earthing effectiveness, especially in areas of poor conductivity (rocky ground, areas of moisture

variation, sandy soils etc.). It improves conductivity of the earth electrode and ground contact area. It shall have following characteristics-

- Shall mainly consist of Graphite and Portland cement. Bentonite content shall be negligible.
- Shall have high conductivity, improves earth's absorbing power and humidity retention capability.
- Shall be non-corrosive in nature having low water solubility but highly hygroscopic.
- Shall have resistivity of less than 0.2 ohms-meter. Resistivity shall be tested by making a 20cm. cube of the material and checking resistance of the cube at the ends. The supplier shall arrange for such testing at the time of supply, if so desired. Necessary certificate from National/ International lab for the resistivity shall also be submitted.
- Shall be suitable for installation in dry form or in a slurry form.
- Shall not depend on the continuous presence of water to maintain its conductivity.
- Shall be permanent & maintenance free and in its "set form", maintains constant earth resistance with time.
- Shall be thermally stable between -10 ^{0}C to + 60 ^{0}C ambient temperatures.
- Shall not dissolve, decompose or leach out with time.
- shall not require periodic charging treatment nor replacement and maintenance.
- Shall be suitable for any kind of electrode and all kinds of soils of different resistivity.
- Shall not pollute the soil or local water table and meets environmental friendly requirements for landfill.
- Shall not be explosive.
- Shall not cause burns, irritation to eye, skin etc.
- Marking: The Earth enhancement material shall be supplied in sealed, moisture proof bags. These bags shall be marked with Manufacturer's name or trade name, quantity etc.

8.3 Backfill material

The excavated soil is suitable as a backfill but should be sieved to remove any large stones and placed around the electrode taking care to ensure that it is well compacted. Material like sand, salt, coke breeze, cinders and ash shall not be used because of its acidic and corrosive nature.

8.4 Earth Pit

8.4.1 Construction of unit earth pit: Refer typical installation drawing.

- A hole of 100mm to 125mm dia shall be augured /dug to a depth of about 2.8 meters.
- The earth electrode shall be placed into this hole.
- It will be penetrated into the soil by gently driving on the top of the rod. Here natural soil is assumed to be available at the bottom of the electrode so that min. 150 mm of the electrode shall be inserted in the natural soil.

- Earth enhancement material (minimum approx. 30-35 kg) shall be filled into the augured/dug hole in slurry form and allowed to set. After the material gets set, the diameter of the composite structure (earth electrode + earth enhancement material) shall be of minimum 100mm dia covering entire length of the hole.
- Remaining portion of the hole shall be covered by backfill soil, which is taken out during auguring /digging.
- A copper strip of 150mmX25mmX6mm shall be exothermically welded to main earth electrode for taking the connection to the main equi-potential earth busbar in the equipment room and to other earth pits, if any.
- Exothermic weld material shall be UL listed and tested as per provisions of IEEE 837 by NABL/ ILAC member labs.
- The main earth pit shall be located as near to the main equi-potential earth busbar in the equipment room as possible.

8.4.2 Construction of loop Earth by providing multiple earth pits

- At certain locations, it may not be possible to achieve earth resistance of ≤1ohm with three earth electrodes /pits due to higher soil resistivity. In such cases, provision of loop earth consisting of more than one earth pit shall be done. The number of pits required shall be decided based on the resistance achieved for the earth pits already installed. The procedure mentioned above for one earth pit shall be repeated for other earth pits.

- The distance between two successive earth electrodes shall be min. 3mtrs and max. upto twice the length of the earth electrode i.e. 6 mtrs. approx.

- These earth pits shall then be inter linked using 25X2 mm. copper tape to form a loop using exothermic welding technique.

- The interconnecting tape shall be buried at depth not less than 500mm below the ground level. This interconnecting tape shall also be covered with earth enhancing compound.

- Main Equi-potential Earth Busbar (MEEB) of size 300X25X6 mm copper strip shall be installed to the wall of prefab/room on suitable insulators.

- For connecting earth pit and Main Equi-potential Earth Busbar (MEEB) 16 Sq.mm dia multi-strand single core PVC insulated copper cable with suitable copper lugs and stainless steel nuts and bolts shall be used. This cable shall be protected with GI pipe with clamping while entering into the prefab.

- The MEEBs shall have pre-drilled holes of suitable size for termination of bonding conductors. The MEEBs shall be insulated from the building walls. Each MEEB shall be installed on the wall with low voltage insulator spacers of height 60mm. The insulators used shall have suitable insulating and fire resistant properties for this application. The MEEBs shall be installed at the height of 0.5m

from the room floor surface for ease of installation & maintenance. All terminations on the MEEBs shall be by using copper lugs with spring washers.

8.4.3 Measurement of Earth resistance

The earth resistance shall be measured at the Main Equi-potential Earth Busbar (MEEB) with all the earth pits interconnected using Fall of Potential method as per Para 37 of IS: 3043.

8.4.4 Inspection Chamber

- A 300X300X300 mm (inside dimension) concrete box with smooth cement plaster finish shall be provided on the top of the pit. A concrete lid, painted black, approx. 50 mm. thick with pulling hooks, shall be provided to cover the earth pit.
- Care shall be taken regarding level of the floor surrounding the earth so that the connector is not too deep in the masonry or projecting out of it.
- On backside of the cover, date of the testing and average resistance value shall be written with yellow paint on black background.

8.5 Equipotential Earth Busbar and its connection to equipments & Surge protection devices in the Equipment room: Refer typical bonding connections drawing no.SDO/RDSO/E&B/002.

8.5.1 Equi-potential earth busbars

There shall be one equi-potential earth busbar for each of the equipment room i.e. IPS/Battery charger room and EI/Relay room. The equi-potential earth busbars located in individual rooms shall be termed as Sub equi-potential busbars (SEEB). The equi-potential earth busbar located in the IPS /Battery charger room and directly connected to Class 'B' SPDs and the main earth pit shall be termed as Main equi-potential earth busbar (MEEB).

The EEBs shall have pre-drilled holes of suitable size for termination of bonding conductors. The EEBs shall be insulated from the building walls. Each EEB shall be installed on the wall with low voltage insulator spacers of height 60mm. The insulators used shall have suitable insulating and fire resistant properties for this application. The EEBs shall be installed at the height of 0.5m from the room floor surface for ease of installation & maintenance. All terminations on the EEBs shall be by using copper lugs with spring washers.

8.5.2 Bonding Connections

To minimize the effect of circulating earth loops and to provide equi-potential bonding, "star type" bonding connection is required. As such, each of the SEEBs installed in the rooms shall be directly connected to MEEB using bonding conductors. Also, equipment/racks in the room shall be directly connected to its SEEB. The bonding conductors shall be bonded to their respective lugs by exothermic welding.

8.5.3 All connections i.e. routing of bonding conductors from equipments to SEEB & from SEEBs to MEEB shall be as short and as direct as possible with min. bends and separated from other wiring. However, connection from SPD to MEEB shall be as short as possible and preferably without any bend.

8.5.4 Materials and dimensions of bonding components for connection of individual equipments with equipotential bus bar and earth electrode shall be as given below.

Component/Bonding	Material	Size
Main equipotential earth busbar (MEEB).	Copper	300X25X6 mm (min.)
Sub equipotential earth busbar (SEEB).	Copper	150X25X6 mm (min.)
Individual equipments to SEEB using copper lugs with stainless steel nut and bolts.	Multi-strand single core PVC insulated copper cable as per IS:694	10 Sq.mm
SEEB to MEEB using copper lugs with stainless steel nut and bolts.	Multi-strand single core PVC insulated copper cable as per IS:694	16 Sq.mm
Surge protection devices (SPD) to MEEB using copper lugs with stainless steel nut and bolts.	Multi-strand single core PVC insulated copper cable as per IS:694	16 Sq.mm
MEEB to main earth electrode.	Multi-strand single core PVC insulated copper cable as per IS:694 (Duplicated)	35 Sq.mm
Main earth pit to other earth pit in case of loop earth.	Copper tape	25X2 mm

9. Drawing of earthing & bonding system

The complete layout with dimensions of the earthing & bonding system shall be submitted by the supplier after commissioning.

10. Warranty

The supplier shall be responsible for complete supply, installation & commissioning of the earthing & bonding system. The warranty of such system shall be 60 months from date of commissioning. During this period, any failure of earthing system due to improper materials & bad workmanship shall be attended free of cost by the supplier.

11. Maintenance of earthing & bonding system

The maintenance schedule should cover verification of earthing system conductors and components, verification of electrical continuity, measurement of earth resistance, re-fastening of components and conductors etc.

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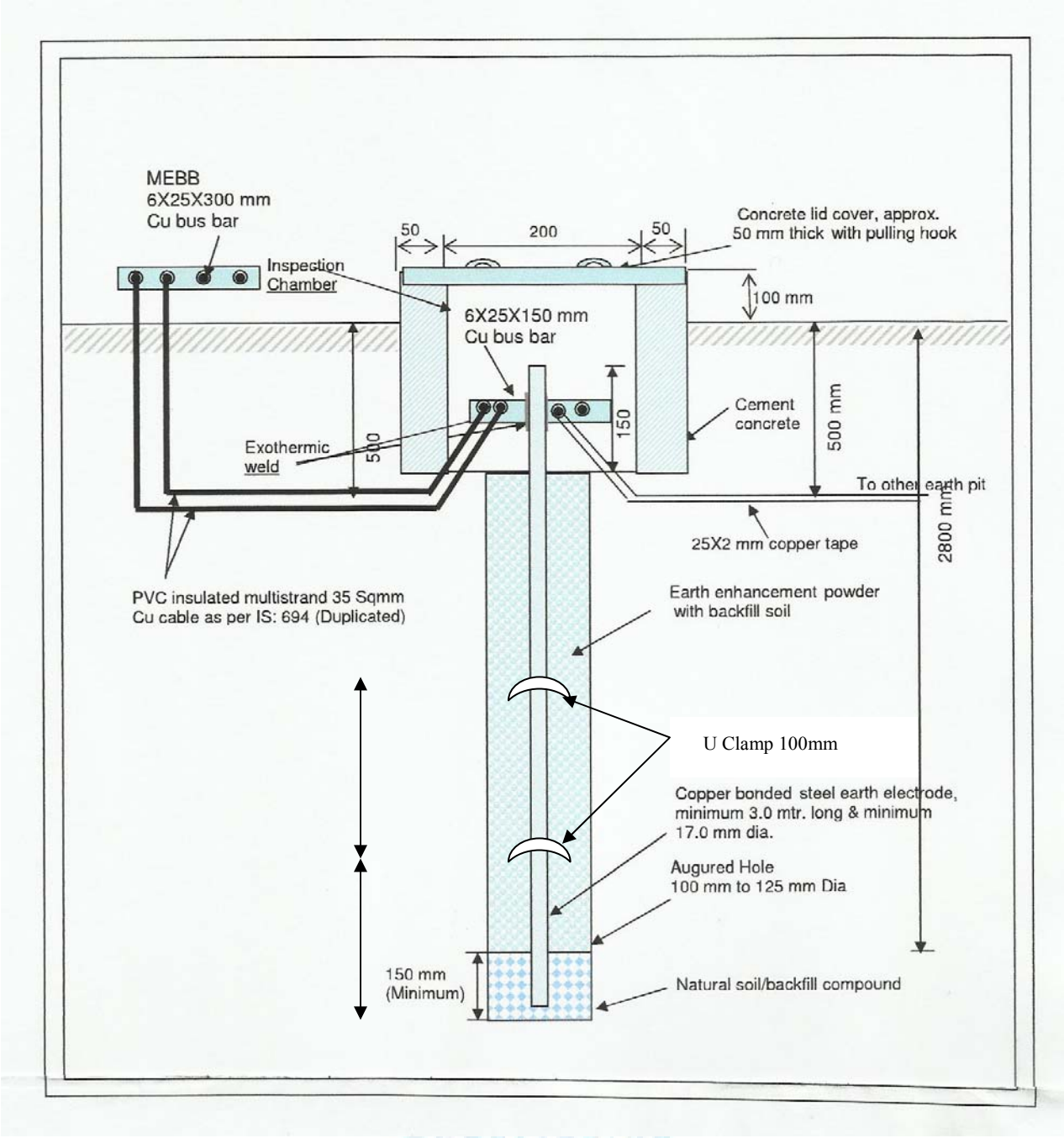
Signature of Tenderer with seal



Signature of Tenderer with seal

SPECIFICATION FOR CABLE LAYING

Specification for High Tension and Low Tension under ground cables and cable trenches, cable laying etc.

1. SCOPE: This specification covers supply of low tension and high tension under ground cables and laying of cables in the cable trenches running of cables along the structures, wall, steel frame work, trusses, etc. with connected materials indicators etc.

2. LT UG CABLE:

2.1: power cables shall be suitable for 440/435 V 3 phase with neutral earthed system and for heavy duty use.

2.2: The cable shall be of 1100 Volts grade, 4 core, PVC insulated and PVC sheathed, aluminum conduct red, cores laid up, surrounded by comma covering inner sheath applied either by extrusion or by wrapping of a filling material containing un vulcanized rubber orthermo-plastic material applied with Proofed or plastic tape and armored with galvanized steel round wire flat strip and outer sheathing with PVC.

2.3: The conductors shall be of stranded aluminum wires, sizes conforming to class-2 of table 13 of IS – 8130/76 or latest.

2.4: The PVC insulated and PVC sheathed LTUG cables shall conform to IS-1554 (Part I)/1976 or latest.

3. CABLE TRENCHES (ORDINARY):
Excavation of cable trenches of different sizes in all types of soils. The bottom of trench is leveled freed from stones, and sharp edges of rock. A layer of 10 cms thick sand is laid at the bottom of trench after laying the cable, it is covered once again with 10 cms thick sand and covered with well burnt country bricks at the rate of 9 to 10 bricks per metre depending upon width of brick for each cable without leaving any gap between so as to prevent damages to the cables due to crow bars etc.(during any excavation at a later date) and one brick to be placed in between the cables at every one metre of regular interval and duly filling the trench with earth after positioning the cable markers ramming well in stages to bring the surface in level with original surface.

If two separate feeders are to be laid in the same trench horizontal interval spacing is advisable in order to reduce the effect of mutual heating and also to ensure a fault occurring on the cable will not damage the adjacent one.

If single core cables are used for forming a three phase circuit, the three cables are laid in triangular formation (trefoil).

The sizes and cable trench details are shown in the drawing No. RailTel/SR/SC/Power Cable/2/2004.

4. ROAD CROSSING: Cutting of roads, excavation of the cable trench of different sizes and laying of RCC Hume pipes and jointed with collers in an approved manner. The pipes are required to be laid so as to keep the cable at one metre below the ground level. The pipes shall be extended up to 2 meters on either side of the road, measured from the edge of the road. The pipes shall be positioned so as to maintain a slope of about 1 in 30, to allow drainage of seepage water. No bricks or sand are required to be placed at such places. A number of pipes are laid for number of cables, if are required to be laid. The cable trench can be closed with the excavated earth and ramming well in stages to bring the surface in level with the original and making the road as earlier.

The cable can be drawn through pipes without disturbing the traffic when once the above arrangement is made.

The cable markers can be placed on either side of the road so as to identify the cable route.

The sizes and road crossing details are shown in the Drg.No.RailTel/SR/SC/Power Cable/2/2004 enclosed.

5. Track crossings: Removing of existing ballast, excavation of the cable trench of different sizes under the track and laying of RCC Hume pipes and joined with collers in and approved manner. The pipes are required to be laid so as to keep the cable at minimum one metre below the track or formation level. The pipes shall be laid up to the railway boundary at both ends or up to the point as prescribed by the Railway. The pipes used shall be of long lengths and the pipes shall be positioned so as to maintain a slope of about 1 in 30 to allow drainage or seepage water. No bricks or sand are required to be placed at such places. A number pipes are laid for number of cables if are required to be laid. The cable trench can be closed with the excavated earth and ramming well in stages to bring the formation/cutting as per the original and replacing the removed ballast as earlier.
The cables can be drawn through pipes without disturbing the traffic, when once the above arrangement is made.

The cables markers can be placed on either side of the track at a convenient place so as to identify the cable route.

The size and the track crossing details are shown in the Drg.No./SR/SC/Power Cable/2/2004 enclosed.

6. Laying of cables on Racks and Cleats:
Inside buildings, workshops, sheds, sub-stations etc. it is sometimes necessary to lay the cables on racks or brackets, spaced at regular intervals or some times they are required to be clamped/cleated directly on the walls/trusses/beams or M.S. structures fixed on walls.

The cables are laid direct upon trays with or without spacers some times instead of using metal trays the cables are required to be supported and clamped on brackets spaced at such regular intervals so as to prevent under sag.

For horizontal runs, brackets or supports made from angle iron are grouted in the walls and they are arranged in a single place when only a few cables are involved. When large numbers of cables have to be laid over the same route the brackets are fixed as per formation.

For horizontal run of one or two cables can be clamped/cleated directly on walls beams preferably with the non-magnetic materials like aluminum, wood etc. For vertical runs, the cables are clamped/cleated on walls/columns or on MS flats or on angle irons fixed on walls and they are required to be spaced at such intervals so as to prevent beckling of cables and creepage of load.

All steel work shall be painted with two coat of Red Oxide and finished with suitable colour anti corrosive paints.

7. Cables along with structures:

The GI pipes shall be fastened to the structures up to 2.5 mtrs. From ground level by suitable MS clamps at an interval of not more than one metre with suitable bolts, nuts, washers, etc. the cable shall be drawn through the GI pipe. Both the ends of GI pipe shall have a PVC/Wooden bushes to avoid abrasion to the cable. in addition the top end shall be sealed with cable compound to arrest ingress of rain water.

The cable shall be run above pipe level up to cable termination end through suitable teak wood cleats duly clamped to the structure by suitable clamps, bolts, nuts, washers, etc.

8. Cable laying in the masonary trench:
Inside the substations, repair sheds, work shops etc. suitable sizes of masonry trenches will be constructed by the Railways.
The cable shall be laid in the trenches and covered with RCC slabs/MS sheet/Aluminium chequred plates as per the schedule and instructions of Engineer at site.

9. Bends: the cable trench shall be straight as far as possible without bends and at places where obstacles are encountered, there shall be no abrupt bends or sharp, corners, such bends if unavoidable, the cable shall be laid with minimum bend as per following specification.

9.1: Bending radius for PVC cables while installing/ laying PVC cables the following minimum bending radius should be observed in order that the cables, especially insulation may not undergo damage.

For 1.1 KV cables:

(a) Single core cables – 15 x D (where D is the overall diameter of cable)
(b) Multi core cables – 12 x D

9.2 Bending Radius for XLPE cables:

While installing/laying XLPE HT cables the following minimum bending radius should be observed so that the cable end especially the insulation is not damaged.

Voltage Grade of cable	Recommended minimum bending radius
a) Up to 11 KV	15 x D
b) Above 11 KV	15 x D for multicore cables
	20 x D for single core cables

Where D – is overall diameter of cable.

10. Slope: The slope of the cable trench according to the formation of the land shall be made so as to keep the bend of the cable minimum as stated in item 10 above.

11. Looping of cable:

11.1 : the cable at the foot of the structures shall be looped to the lengths of 5 metre to allow for the future requirement the coil diameter shall be not less than minimum bending radius as stated in item 10 above. The excavation at structures shall be done suitably and covered with sand, bricks and earth as detailed under item 4 above.

11.2: At each end termination near the panel board a 5 metre loop shall be kept as an allowance and loop ring shall be formed circular and as recommended by the cable manufacturers.

12.0: Accessories/Materials:

12.1:Cable Route Indicators: Cast Iron Cable Indicators/markers manufactured as per the Drg.No.RailTel/SR/SC/Cable Route Marker/3/2004 enclosed. The cable markers shall be positioned, fixed firm and cemented in a manner acceptable to the Engineer at site. The M.S. Item's shall be dipped in hot tar and dried before they are fixed. The cable marker shall be painted with 2 coats of red oxide, one coat before providing at site and another after positioning and cementing. The spacing of the markers shall be not more than 6 metre in straight runs.

12.2: Country Bricks:

12.2.1: GENERAL: Country bricks must free from cracks large chipped surfaces and broken corners stones and lumps inclusions of burnt kankar if of small extended may be permitted. The brick surface should be so hard as not to get scratched by the finger nail. Franchres surface should not have cava ties to any appreciable extent and the texture should be as even as possible. The country bricks when struck with a piece of steel should give a fairly ringing and not a dull earthy sound. It should not absorb more than 25% of its own dry weight of water. When dropped on ground from a height of 1 metre, it should not crack or break.

12.2.2: Quality and size: Country bricks may be slightly over burnt but not under burnt in any case. The Colour may be dull red or even reddish yellow, provided it is not due to under-burnt material and is only a feature of the type of moldings clay used. The normal size of country brick should be 225mm x 115mm x 75mm. The size of the frog in the upper face should be same as per first or second class bricks.

12.3: Sand: the sand shall be preferably of river sand or as per the quality required by the Engineer at site. The sand shall be free from lumps of earth, clay, etc. and screened.

12.4: RCC Hume Pipes: RCC Hume pipes supplied shall be of size 150 mm internal dia and 210 mm external dia to the standard lengths. Necessary collers for joining the above pipes shall also be supplied. The pipes and collers shall be conforming to relevant latest ISS and same should be approved by the Engineer at site before laying in the trenches.

12.5: Clamps, bolts, etc: Clamps shall make out of Aluminium or M.S.Flat. The bolts used shall be of suitable dia and of sufficient lengths. One M.S.Hex nut and a check nut with one spring washer between two nos. of flat washers shall be used for tightening the bolts. The M.S.Clamps shall be painted with one coat of Red Oxide and 2 coats of Aluminium paint.

12.6: GI Pipes: the GI Pipes shall be of 'B' Class of 50 mm dia/100mm 3.4mm dia thickness to the standard lengths. Necessary collers bends etc. for joining the above pipes shall also be supplied. The pipes and accessories shall be conforming to relevant latest ISS and same should be approved by the Engineer at site before use.

12.7: HT Cable end boxes/kits to use with 11 KV earthed system XLPE Cables:

12.7.1: Out door end termination: the kit should essentially contain the following contents:

1. Required quantity of cable joining compound.
2. Required quantity of hardener
3. Plastic mould
4. Mould adhesive cum-solvent
5. Earth continuity connection
6. Stress grading paste
7. Self bonding insulating tape
8. Insulators
9. Copper binding wire
10. Aluminium Oxide tape
11. Nylon stringer cutting XLPE insulation
12. Polyester tape
13. Semi conducting self bonding tape
14. M.Seal (Fast setting)epoxy putty
15. Instruction sheet

12.7.2: Indoor end terminations: The kit should essentially contain the following contents.

1. Required quantity of cable jointing compound
2. Required quantity of hardener
3. Plastic mould
4. Mould adhesive cum solvent
5. M.Seal (fast settings)epoxy putty
6. Earth continuity connection
7. Stress grading paste
8. Self bonding insulating tape

9. Copper binding wire
10. Aluminium oxide tape
11. Nylon string for cutting XLPE insulation
12. Semi conducting self bonding tape
13. Instruction sheet

12.8:LT Cable end boxes/kits to use with 1.1 KV PVC Cables:
For indoor & outdoor end terminations: The kit should essential contain the following contents.

1. Required quantity of cable jointing compound
2. Required quantity of hardener
3. Plastic mould
4. Mould adhesive cum solvent
5. M.Seal(fast settings) epoxy putty
6. Earth continuity connection
7. Spacer
8. Instruction sheet

12.9: WP Junction Boxes: These shall be made out of MS Sheet iron with weather proof arrangements type with suitable terminals, locking arrangements knock out cable entry holes etc. The box shall be painted with one coat of red oxide and two coats of aluminum paint. These shall be made & provided as per the instructions of the Engineer at site.

12.10: Cable gland: The cable gland shall be of brass with fixing check nuts etc. The correct size of gland shall be used for the particular size of cable. The glands to be used should be approved by the Engineer at site.
12.11: (Cable jointing lugs): These shall be made of aluminum, crimping type (i.e. solder less) and bolted type and also shall have adequate current carrying capacity. The lugs to be used should be approved by the Engineer at site.

12.12: Cable markers for track crossings: These shall be made of cast iron the design shall be approved by the Railway. The following information shall be clearly marked on the marker.

1.	Electric cable	:	Volts
2.	Number	:	Cables
3.	Danger	:	In English, Hindi and the vernacular of the Dist.
4.	Depth of cable	:	Below track level
5.	Depth of cable	:	Below ground level between the toc of bank and Railway fencing.

12.13: Cable markers used where no. of feeders involved:

These shall be made of cast iron; the design shall be approved by the Rly. The following information shall be clearly marked on the marker.

a) Electrical cables, volts (b) No. & sizes of cables

c) Length of cable (d) origin & destination of cable.

13: General:

13.1: Test Certificates shall be produced for the cables supplied from the manufacturers:

13.2: Kit materials/accessories supplies should have approval of site Engineer before using the same.

13.3: The method of laying the cables shall be generally as indicated in Drg.No.SC. /SR/SC/Power Cable/2/2004.

13.4: The cable routes shall be actually measured at site and the requirement accessed before the supplies are affected. No joints in straight runs will be permitted. Measurement for cables will be taken as straight runs and from gland to gland. Covering of trenches shall be carried out only after measurements are taken and recorded. Insulation resistance tests shall be repeated after laying the cable and before the terminations are made in the presence of the Engineer-in charge at site.

13.5: While connecting the cables to OH Mains/switch panels the cable end boxes shall be used as per the directions of Engineer at site, required to be laid in existing trenches within the unit substations/shop bays, the contractor shall ensure that this is done by removing the existing slabs and replacing the same after laying, duly cleaning the trench wherever warranted.

13.6: Wherever the cables enter or leave the buildings they shall be through walls in 150mm. Dia RCC pipes, GI pipes with collar as directed by the Engineer-in charge at site including civil works.

13.7: The cables shall be treated through RCC pipes at all road and rail line crossings and at all other service line crossings like drain pipes, sewage and water-mains as per instructions of the Engineer- in charge at site.

13.8: Where track crossings are involved in two cable markers shall be fixed at both ends of the underground crossing as directed by the Engineer at site.

13.9: Where we have to deal with No. of feeders like workshops, repair shops, sub-stations etc.

Approved type C.I Cable route indicators shall be grouted in concrete along the route of the cable at intervals of 50 metre in straight runs and at every diversion point and at every entry and exist paints of buildings, sheds etc. These shall be used along with other types of cable markers as directed by the engineer at site.

13.10: All cables ends shall be provided with cable glands and each lead provided with crimped aluminum shoes of suitable sizes.

13.11: Any foundation drainage/walls/masonry structure will be remade with a good mason after passing the cable, by the contractor. Pipes will be provided by the contractor.

14: CABLE TERMINATIONS:

14.1: All the exposed cable runs in shop, floors, particularly being terminated on SDBs, Fuse boxes, shall be encased in a suitable size of GI Pipe and secured to the pillars/columns by means of clamps.

14.2: Termination of cables shall be carried out using approved crimping type "dowels: aluminum lugs and approved type of crimping tools.

14.3: The method of termination shall be as per the procedure laid down in the relevant manufacturer's literature.

14.4: The prices quoted shall include all the necessary supply of materials such as glands, lugs, consumables etc.

14.5: Every piece of cable shall be tested before taking up the termination work and after completion of the same and the results of such tests shall be recorded.

14.6: All testing shall be carried out in the presence of the Engineer-in-charge at site.

NOTE: Any Required Drawings Can Be Obtained From RailTel Engineer In Charge

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SECTION III CHAPTER 4

List of Addresses for Specification

4.0 Address from where specification copy can be purchased:

The copy of IRS, RDSO, TEC and BIS specification used in the tender documents can be purchased from following sources.

4.1 IRS Specification:

i) Manager Publications, Government of India Civil Lines, New Delhi- 110054

ii)Government of India Book Depot, 8 - S.K. Roy Road, Calcutta – 700001

4.2 RDSO Specification: RDSO, Manak Nagar, Lucknow

4.3 DOT/TEC/ITD Specification: KhurshidLalBhavan ,Janpath, New Delhi- 110001

4.4 B.I.S. Specification: i) Directorate General, Indian Standards Institution, 9- Bahadur Shah ZafarMarg, New Delhi -110002

4.5 The specifications and drawings referred but not enclosed in the tender documents may be seen in the RailTel's office on any working day.

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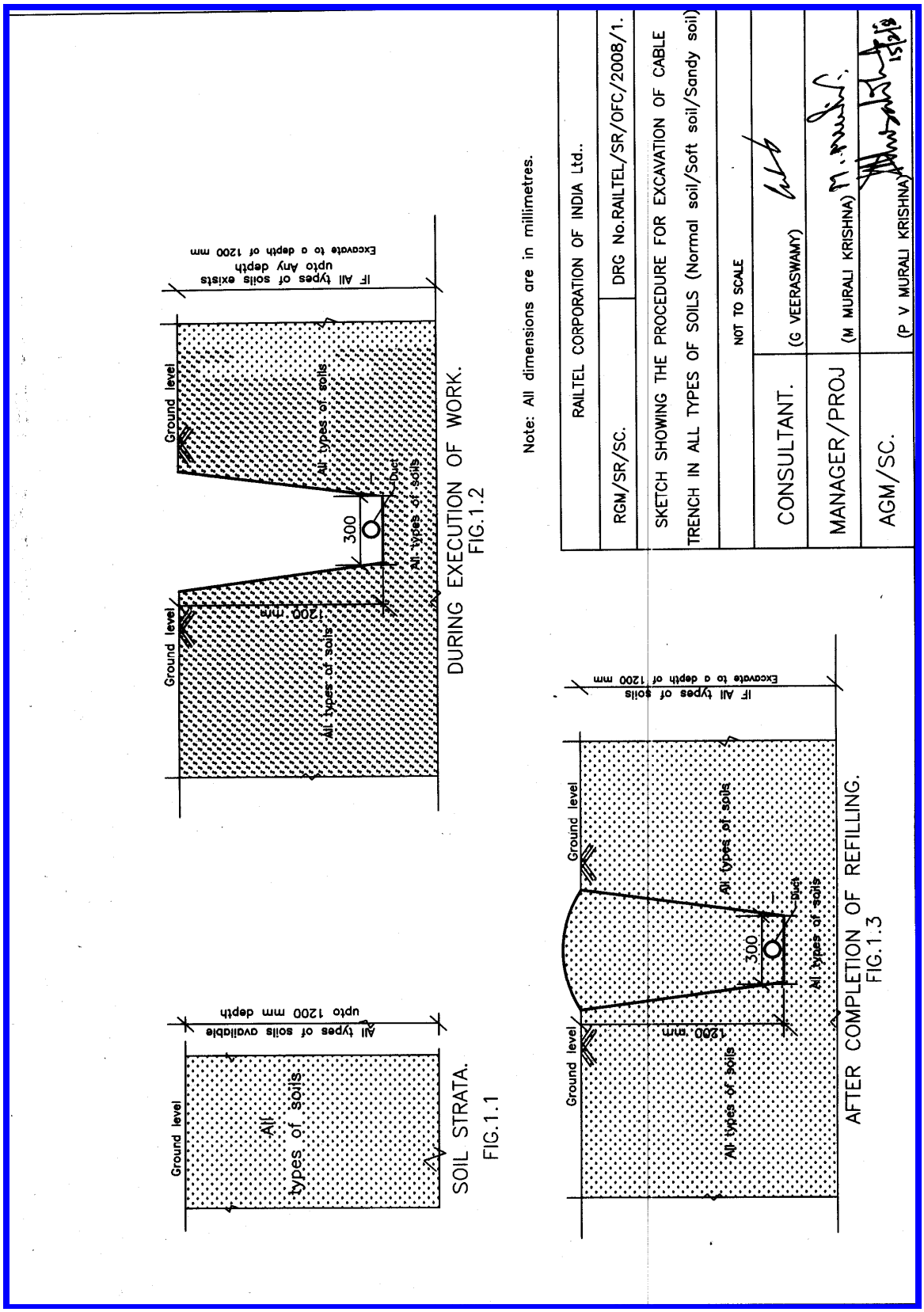
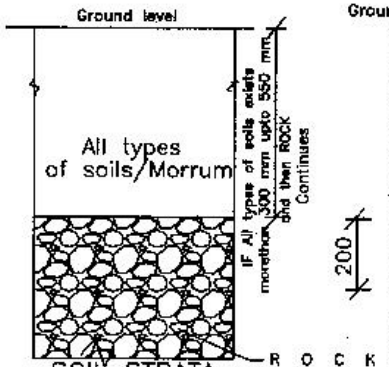
Chapter IV

DRAWINGS

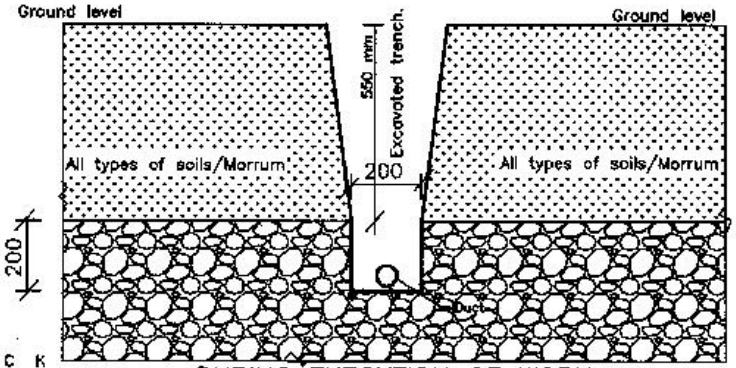


Signature of Tenderer with seal

Signature of Tenderer with seal

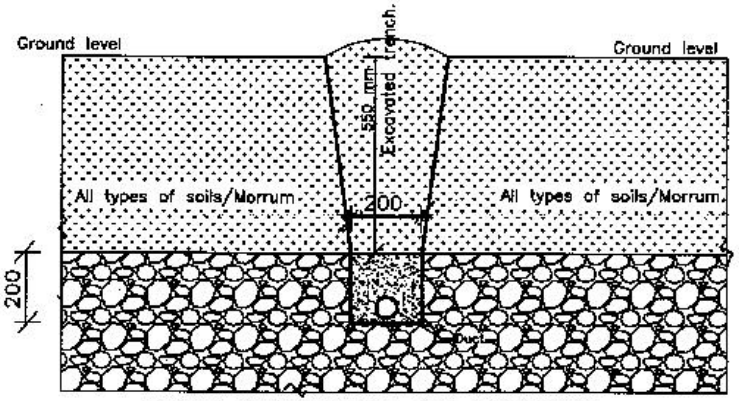


SOIL STRATA.
FIG.4.1



DURING EXECUTION OF WORK.
FIG.4.2

Depth of Rock from surface	Cutting of ROCK.		Plain cement concrete	
	width	depth	Top level	Bottom level
300	200	200	300	500
350	200	200	350	550
450	200	200	450	650
550	200	200	550	750

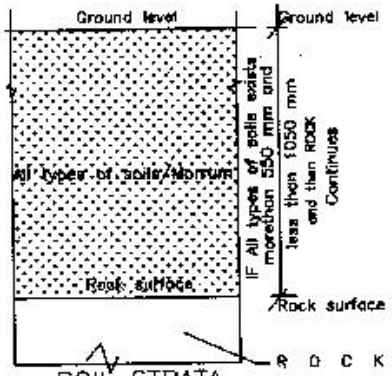


AFTER COMPLETION OF REFILLING.
FIG.4.3

NOTE;
1.All dimensions are in millimetres.

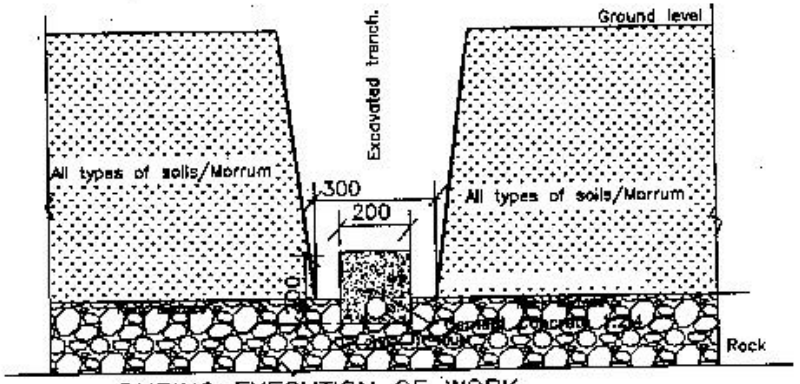
RAILTEL CORPORATION OF INDIA Ltd.	
RGM/SR/SC.	DRG No.RAILTEL/SR/OFC/2008/4.
SKETCH SHOWING THE PROCEDURE FOR EXCAVATION OF CABLE TRENCH IF ROCK EXISTS morethan 300 to 550 mm FROM G.L.	
NOT TO SCALE	
CONSULTANT.	(G VEERASWAMY)
MANAGER/PROJ	(M MURALI KRISHNA)
AGM/SC.	(P.V.MURALI KRISHNA) 15/7/10

Signature of Tenderer with seal



SOIL STRATA.

FIG.5.1



DURING EXECUTION OF WORK.

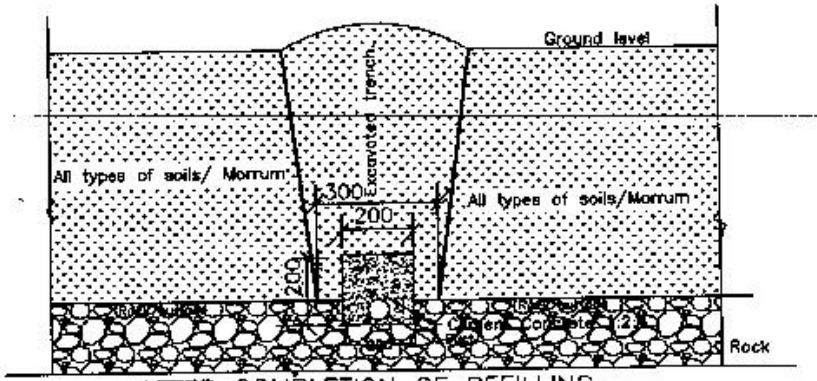
FIG.5.2

Note: All dimensions are in millimetres.

Depth of Rock from surface	Cutting of ROCK		Plain cement concrete	
	width	depth	Top level	Bottom level
600	200	150	550	750
650	200	100	550	750
750	200	Nil	550	750
850	200	Nil	650	850
950	200	Nil	750	950
1050	200	Nil	850	1050

NOTE:

1.All dimensions are in millimetres.

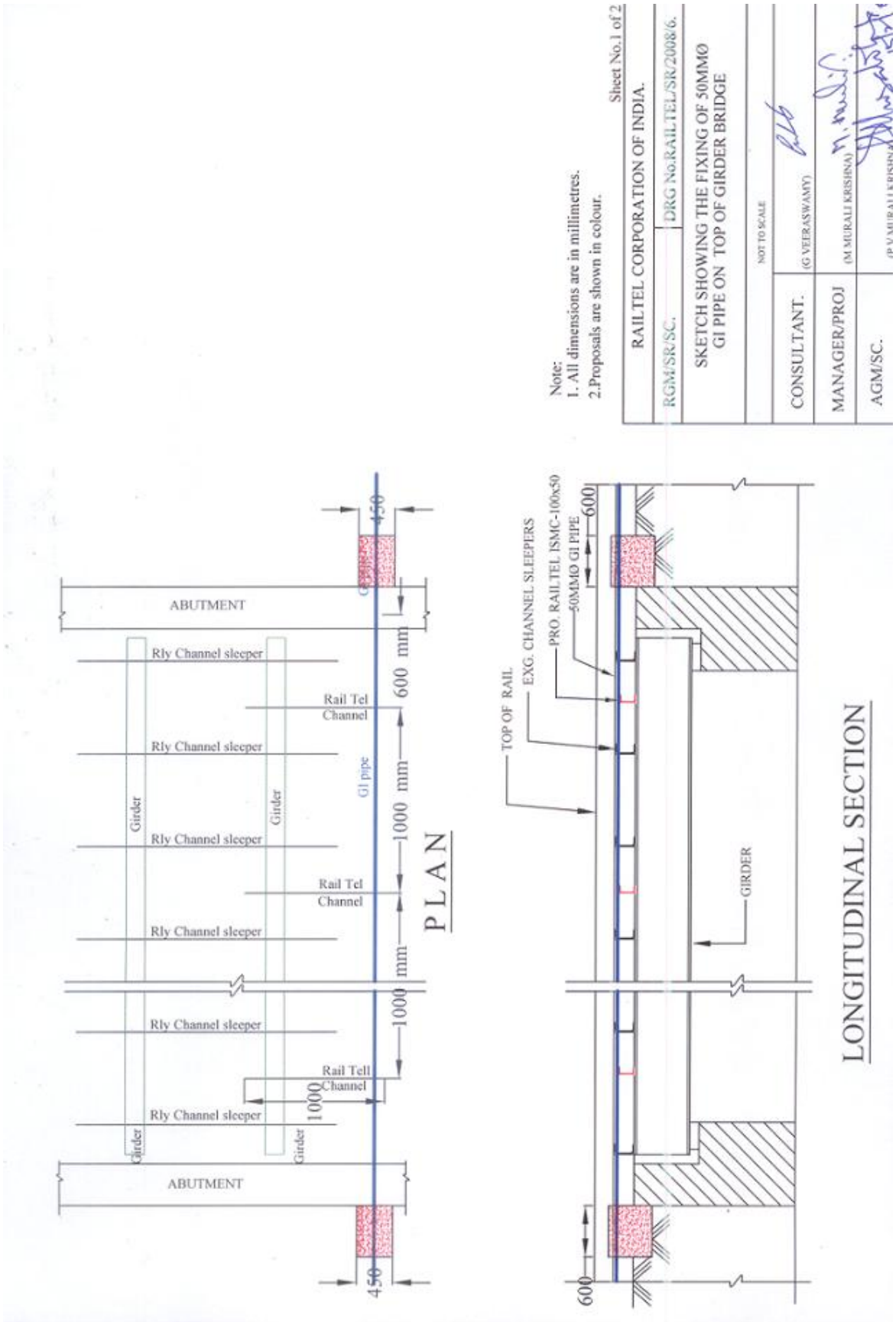


AFTER COMPLETION OF REFILLING..

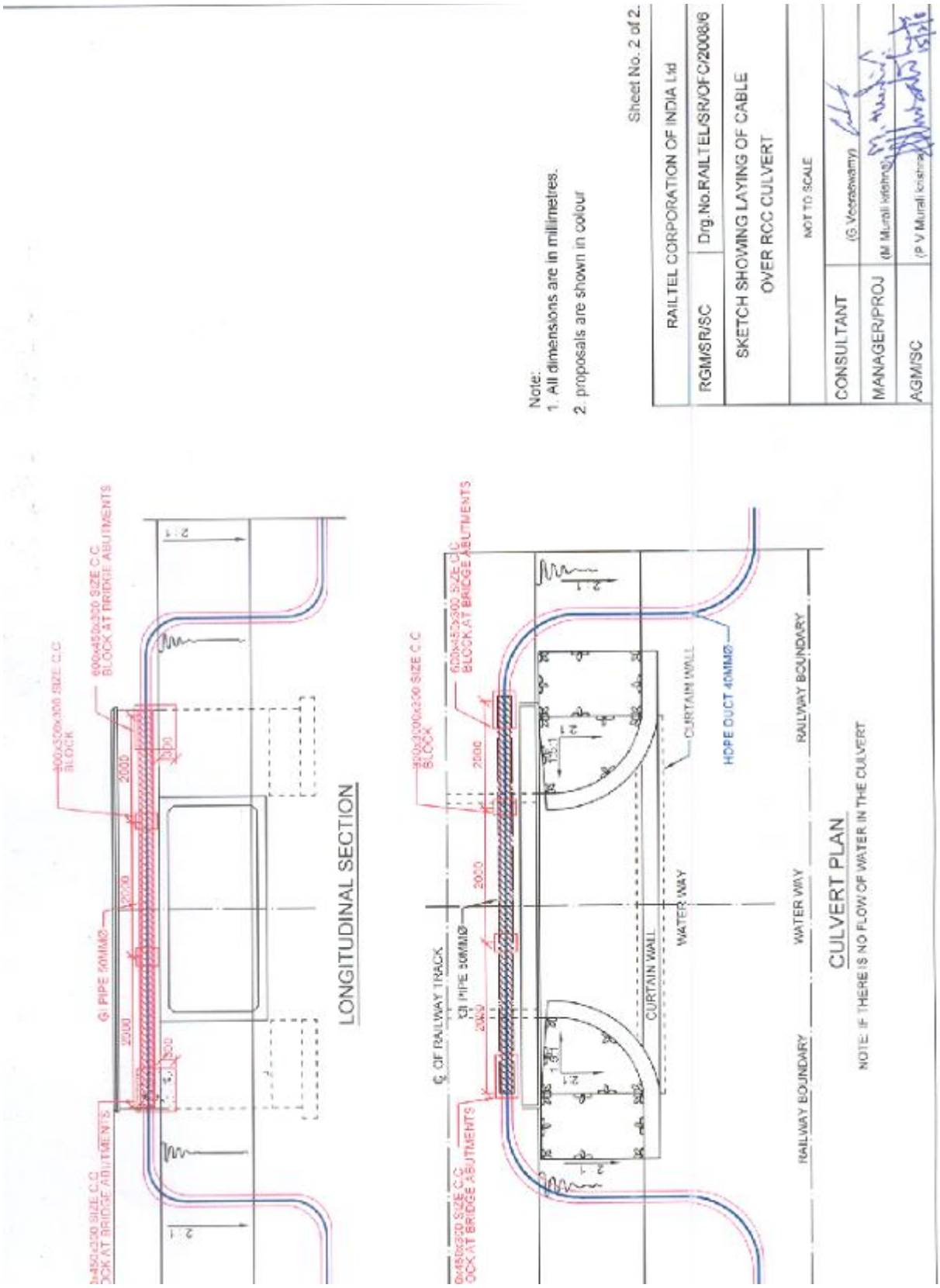
FIG.5.3

RAILTEL CORPORATION OF INDIA Ltd..	
RGM/SR/SC.	DRG No.RAILTEL/SR/OFC/2008/5.
SKETCH SHOWING THE PROCEDURE FOR EXCAVATION OF CABLE TRENCH IF ROCK EXISTS morethan 550 and lessthan 1050	
NOT TO SCALE	
CONSULTANT.	(G VEERASWAMY)
MANAGER/PROJ	(M MURALI KRISHNA)
AGM/SC.	(P V MURALI KRISHNA)

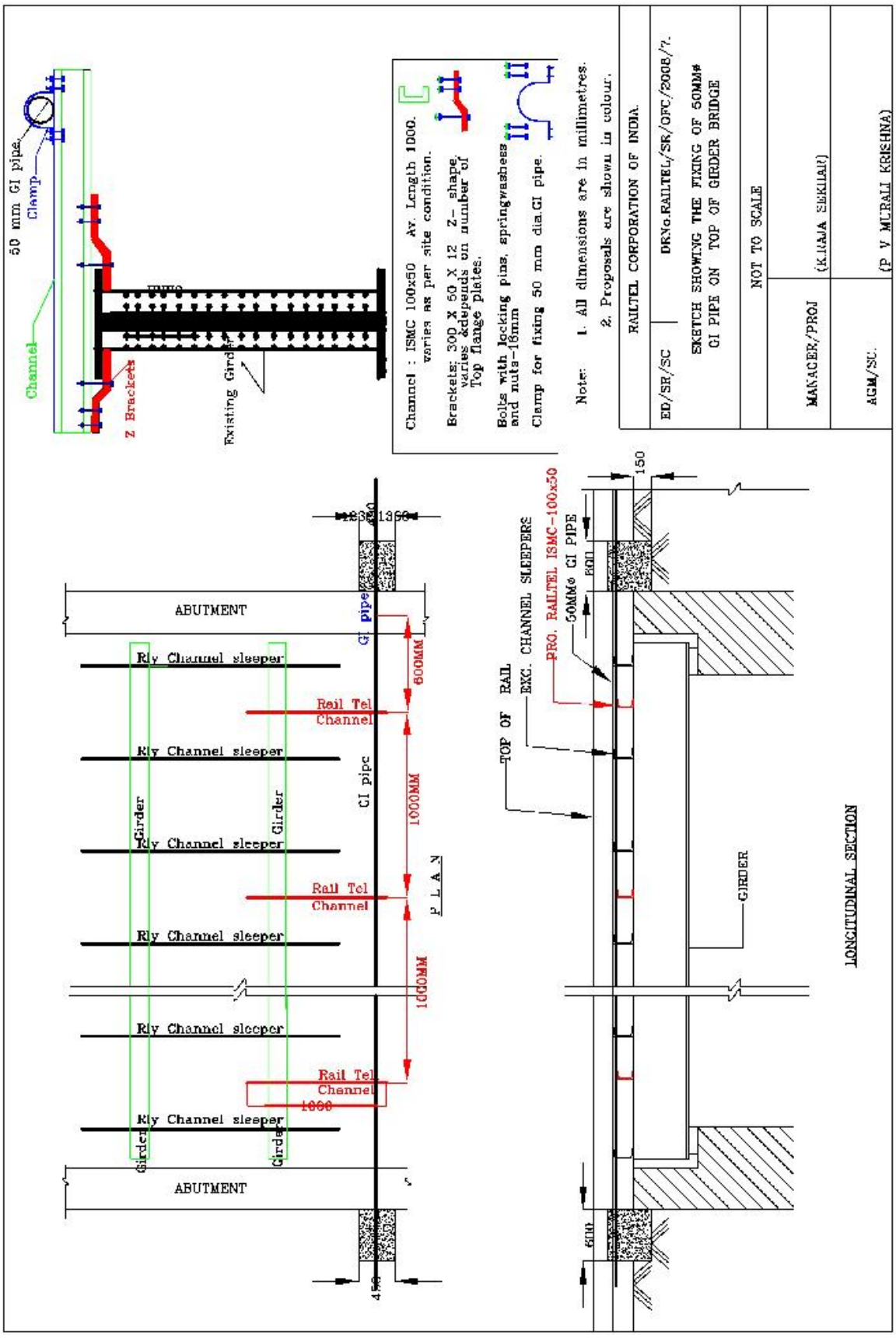
Signature of Tenderer with seal



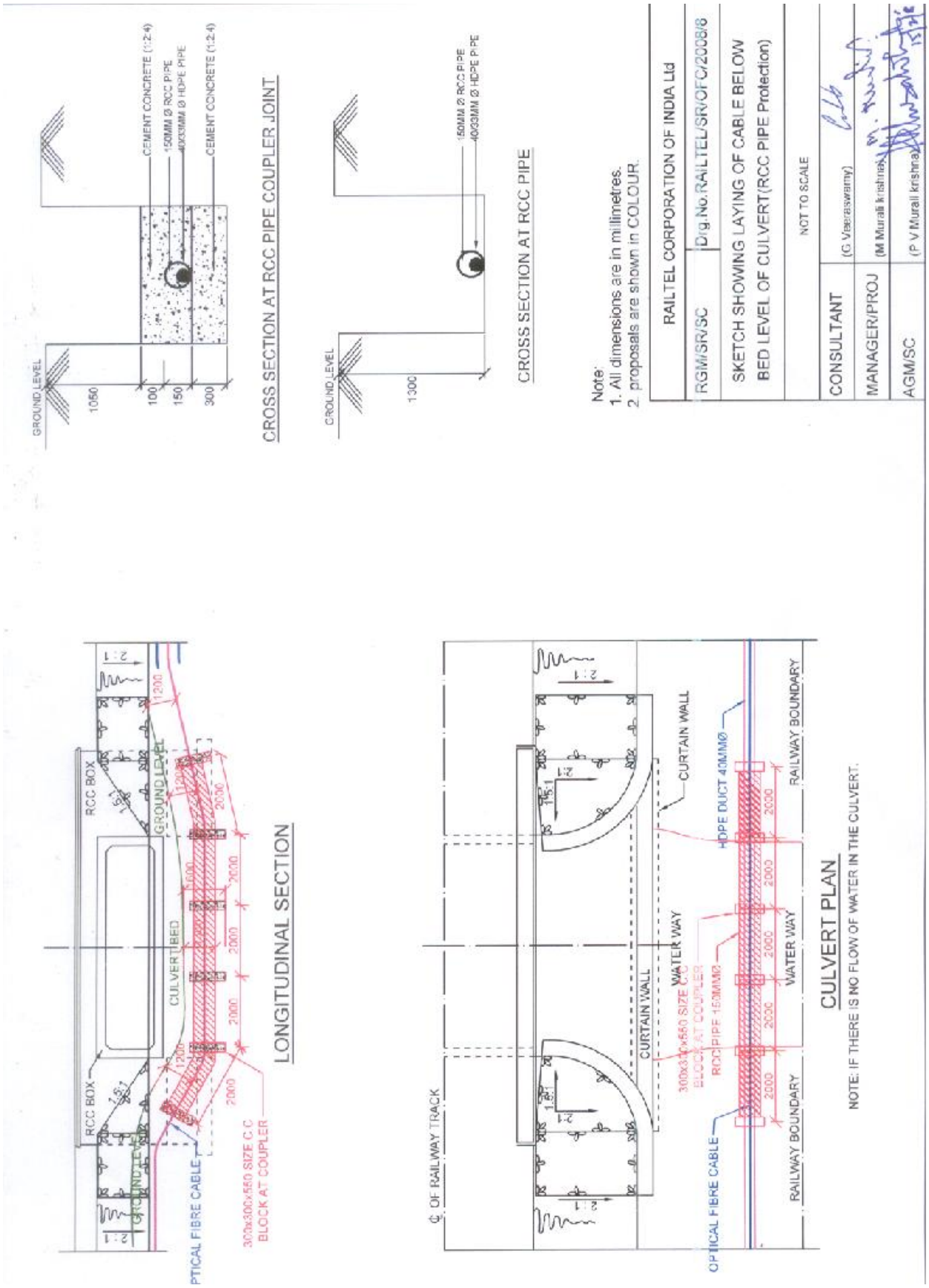
Signature of Tenderer with seal



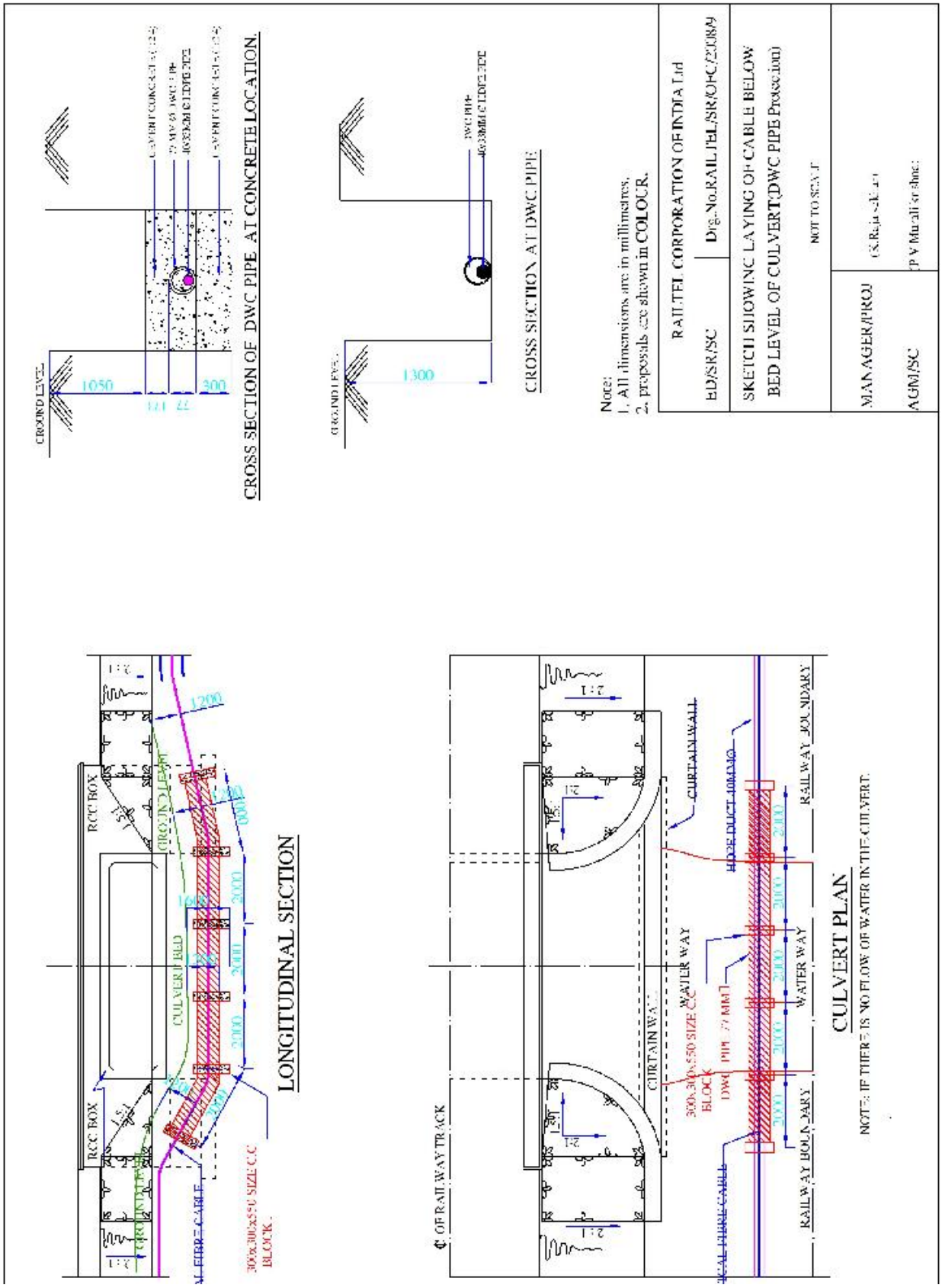
Signature of Tenderer with seal



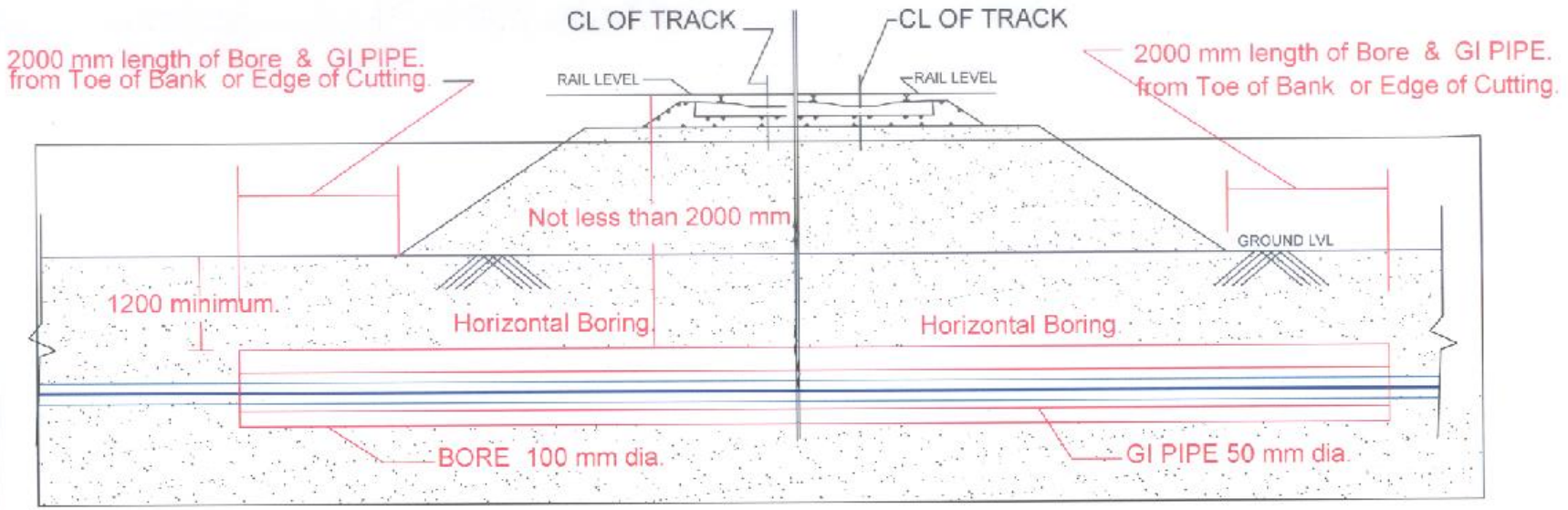
Signature of Tenderer with seal



Signature of Tenderer with seal



Signature of Tenderer with seal

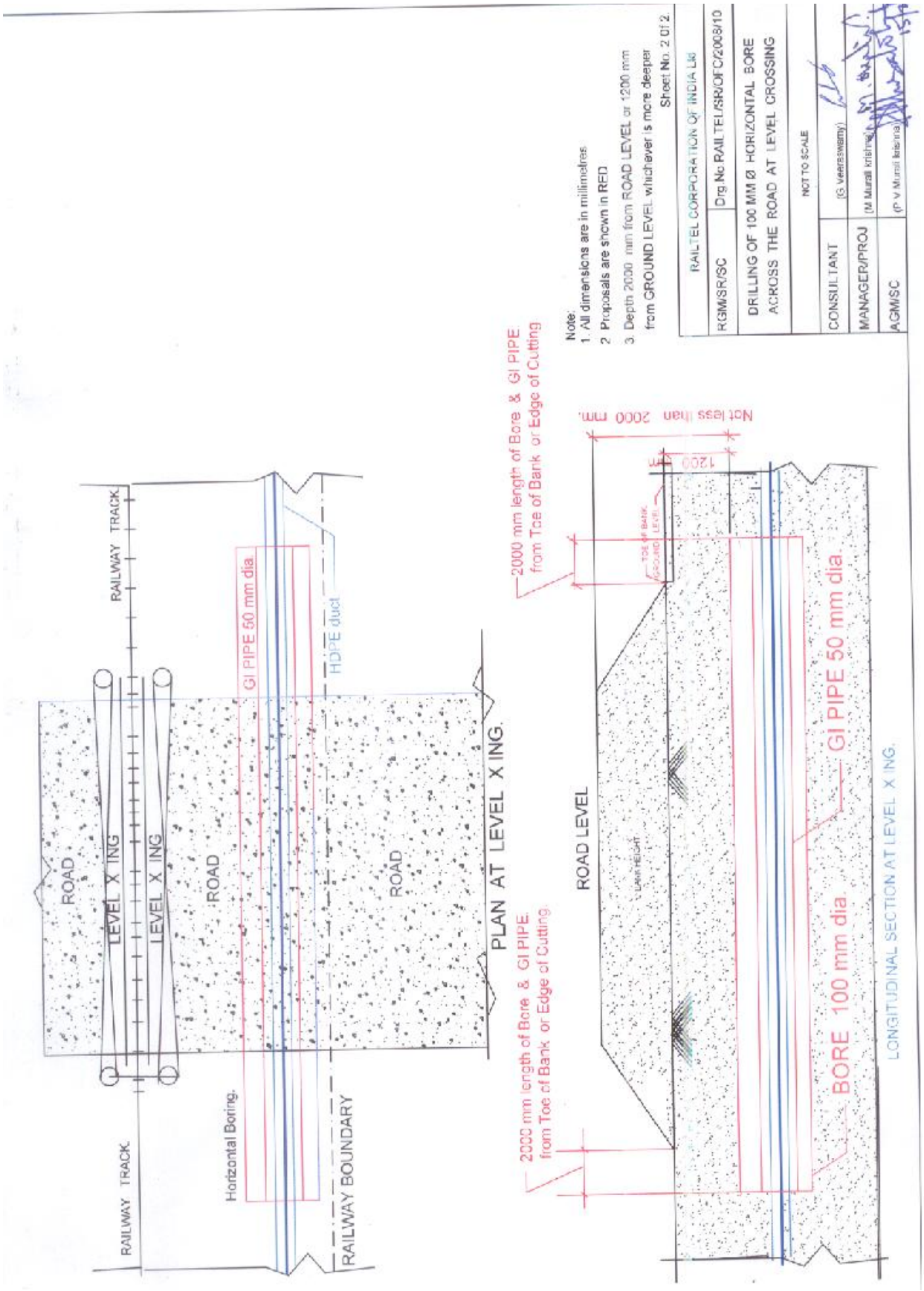


CROSS SECTION OF RAILWAY EMBANKMENT.

Note:
1. All dimensions are in millimetres.
2. PROPOSALS ARE SHOWN IN RED
3. Depth 2000 mm from ROAD LEVEL or 1200 mm from GROUND LEVEL whichever is more deeper.

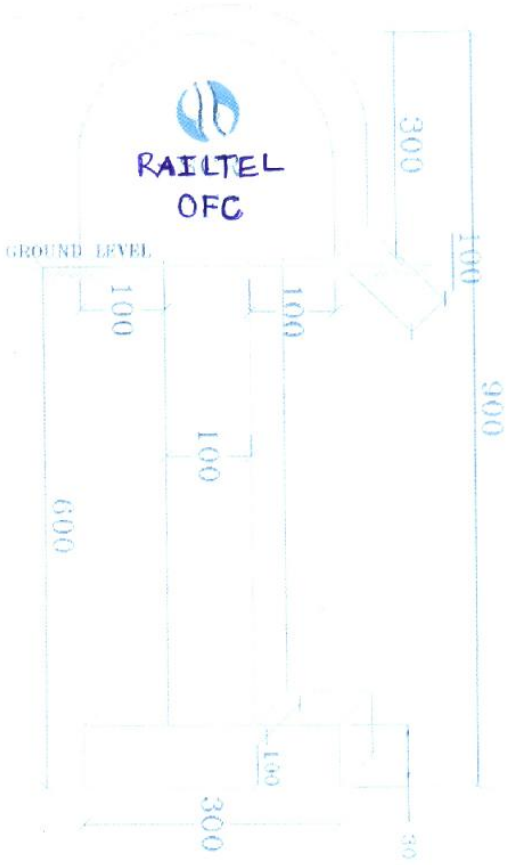
RAILTEL CORPORATION OF INDIA Ltd	
RGM/SR/SC	Drg.No.RAILTEL/SR/OFC/2008/10
DRILLING OF 100MMØ HORIZONTAL BORE ACROSS THE RAILWAY TRACK	
NOT TO SCALE	
CONSULTANT	(G.Veeraswamy)
MANAGER/PROJ	(M Murali krishna)
AGM/SC	(P V Murali krishna)

Signature of Tenderer with seal



Signature of Tenderer with seal

FRP ROUTE MARKER



NOTE:
1. ALL DIMENSIONS ARE IN MM
2. NOT TO SCALE
3. SKIN THICKNESS 2MM

RAILTEL CORPORATION OF INDIA LTD

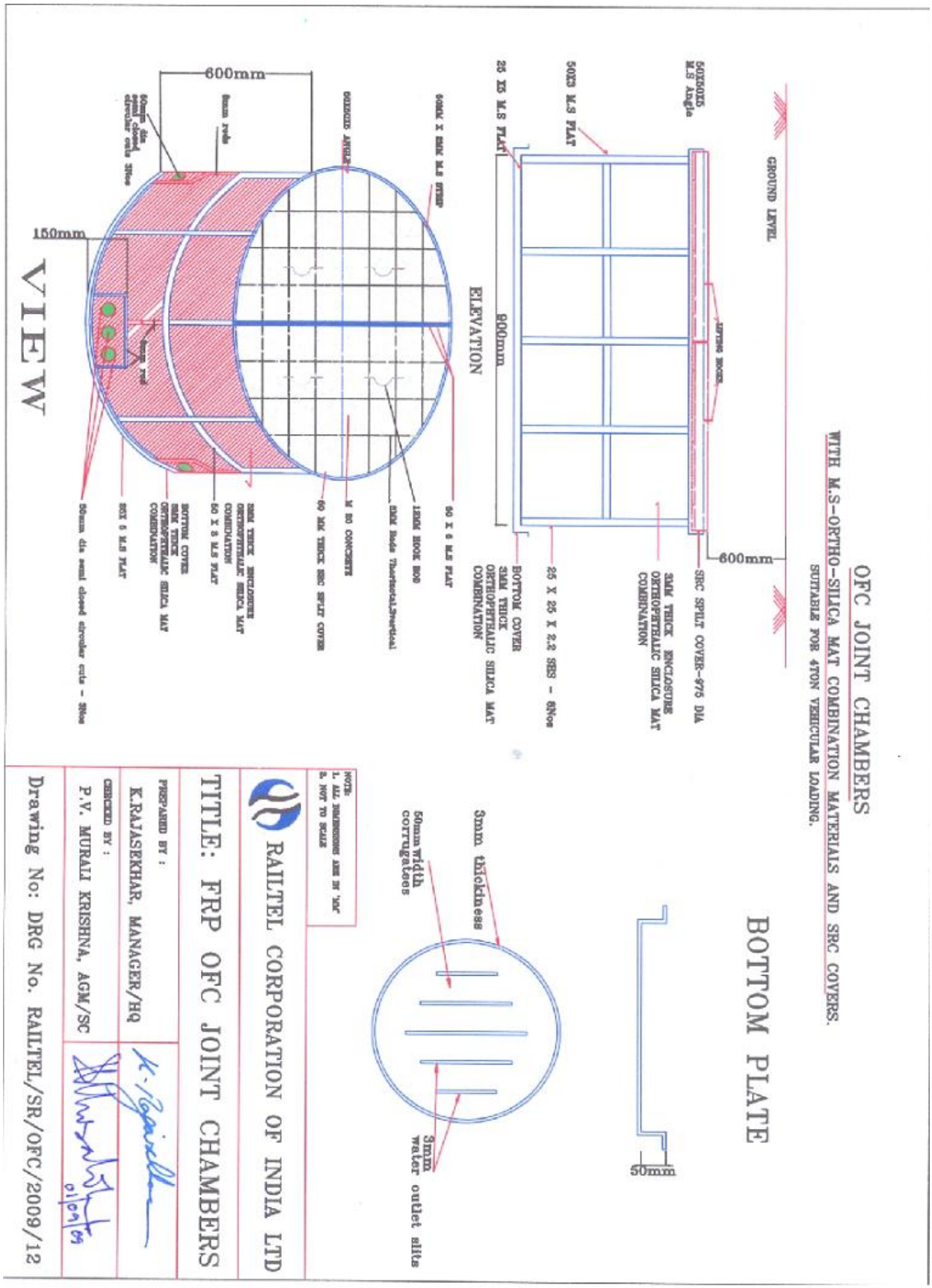
TITLE: FRP ROUTE MARKER

PREPARED BY :
K.RAJASEKHAR, MANAGER/PROJ

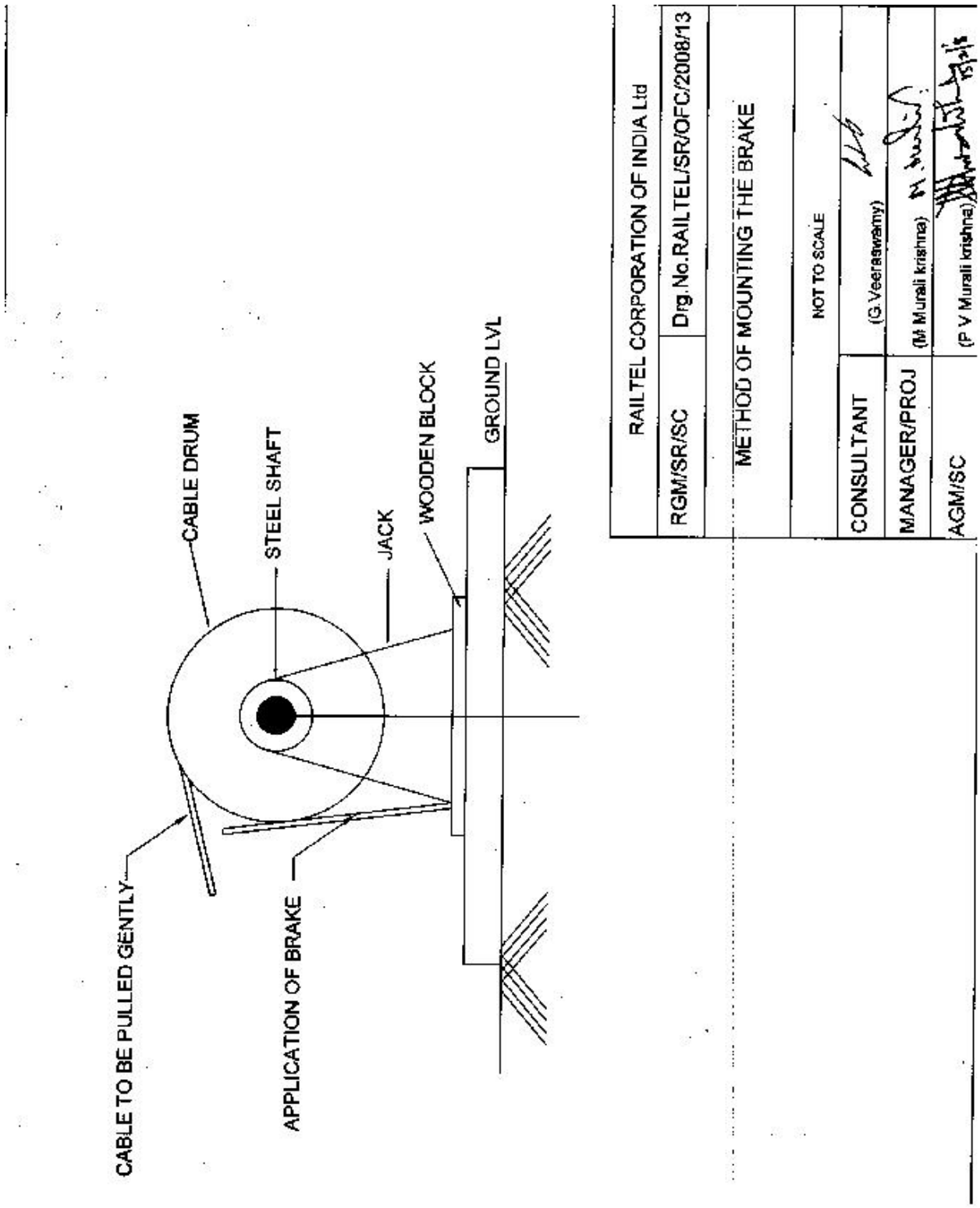
CHECKED BY :
P.V.MURALI KRISHNA, AGM/SC

Drawing No: DRG No. RAILTEL/SR/OFC/2009-11

Signature of Tenderer with seal



Signature of Tenderer with seal



Any other drawings not available in the tender document can be obtained from RailTel Engineer in charge.