File No.RDSO-TI0LKO(OHE)/96/2020-O/o PED/TI/RDSO

भारतसरकार - रेलमंत्रालय - अनुसंधानअभिकल्पऔरमानकसंगठन,मानकनगर,लखनऊ-226011
Government of India - Ministry of Railways
Research Designs & Standards Organisation, Manak Nagar,
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No. RDSO-TILKO(OHE)/47/2020-O/o PED/TI/RDSO Dated, the 23rd October, 2020

Principal Chief Electrical Engineer & CAO,

(i) Northern Railway, Baroda House, New Delhi - 110 001.
(ii) North Central Railway, Allahabad-211 015.
(iii) East Central Railway, Hajipur-844 101.
(iv) Eastern Railway, Fairlie Place, Kolkata-700 001.
(v) Western Railway, Churchgate, Mumbai-400 020.
(vi) West Central Railway, Jabalpur- 482 001.
(vii) Central Organisation for Railway Electrification, Nawab Yusuf Road, Allahabad-211000.

विषय/Sub:OHE guidelines for Zonal railways for increasing speed potential to 160kmph on NDLS-HWH (including Kanpur-Lucknow) & NDLS-BCT (incl. Vadodara- Ahmedabad) route

संदर्भ/Ref :(i) Railway Board Letter No.. 2001/Elect(G)170/I Pt-III dated 07.08.2020
(ii) Railway Board Letter No. 2001/Elect(G)170/I Pt-II dated 16.10.2020
(iii)VC held with Railway Board, concerned Zonal Railways and RDSO on 31.07.2020 & 29.08.2020
(iv)Meeting held with Railway Board at RDSO on 12.09.2020 & 17.10.2020

In compliance to Railway Board letters referred above, Technical Instruction No. TI/IN/0042 for "OHE guidelines for Zonal railways for increasing speed potential to 160kmph on NDLS-HWH (including Kanpur-Lucknow) & NDLS-BCT (including Vadodara- Ahmedabad) route" has been prepared and enclosed herewith

This is issued with the approval of PED/TI/RDSO.

(Bhardwaj Chaudhary)
Executive Director/ TI
[कृते महानिदेशक(कर्षण संस्थापन)/For Director General(TI)]

Signed by Bhardwaj Chaudhary
Date: 23-10-2020 16:44:38
Reason: Approved

Encl: As above

Copy to:

1. ED/EEM/Railway Board – for kind information please.
2. EDRE/Railway Board - for kind information please.

सत्यमेव जयते

GOVERNMENT OF INDIA

Ministry of Railways

OHE GUIDELINES FOR

INCREASING SPEED POTENTIAL TO 160KMPH

ON

NDLS-HWH & NDLS-BCT ROUTES

INSTRUCTION No. TI/IN/0042

Issued by:

Traction Installation Directorate

RESEARCH DESIGNS & STANDARDS ORGANISATION

MANAK NAGAR

LUCKNOW – 226 011

(For official use only)

OCTOBER,2020

TITLE: OHE GUIDELINES FOR ZONAL RAILWAYS FOR INCREASING SPEED POTENTIAL TO 160KMPH ON NDLS-HWH (INCL. KANPUR-LUCKNOW) & NDLS-BCT (INCL. VADODARA- AHMEDABAD) ROUTE

INSTRUCTION NO.: TI/IN/0042

	PREPARED BY		CHECKED BY	APPROVED BY
Signature				
Date	23.10.2020	23.10.2020	23.10.20	23/10/20
Name	ANURADHA SRIVASTAVA	MUKESH KUMAR	BHARDWAJ CHAUDHARY	SUNIL KUMAR
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OHE GUIDELINES FOR ZONAL RAILWAYS FOR INCREASING SPEED POTENTIAL TO 160KMPH ON NDLS - HWH(INCL. KANPUR - LUCKNOW) & NDLS-BCT (INCL. VADODARA - AHMEDABAD) ROUTE

1.0 OHE GUIDELINES

In reference to Railway Board letter No.2001/Elect(G)170/1 Pt-III dated 07.08.2020, letter No.2001/Elect(G)170/1 Pt-II dated 16.10.2020 & VC held with Railway Board, concerned Zonal Railways and RDSO on 31.07.2020 & 29.08.2020, the final scheme/guidelines regarding up-gradation of OHE for increasing the speed potential to 160 KMPH in the territories of NR, NCR, ECR, ER, WR & WCR on NDLS-HWH & NDLS-BCT routes has been prepared and detailed below for ready reference to Railways.

1.1 OHE Structure:

1.1.1OHE mast & foundation of existing NDLS-HWH & NDLS-BCT section was designed for 1000/1000 kgf tension with OHE only/ OHE+ RC/OHE+ Earth wire/OHE+ RC + Earth Wire, mostly with 112.5 kgf/m^2 wind pressure and in some portion near Kolkata with 150kgf/m^2. Zonal Railways should check suitability of existing mast & foundation with OHE and earth conductor for increased tension of 1200/1200 kgf in OHE against Employment Schedule Drg No. ETI/C/0730 - Sheet-2 (Annexure-1) for 112.5kgf/m^2 Wind Pressure.
Alternatively for easy and convenient calculation, Excel sheet for checking suitability of mast & foundation with Instruction for checking Suitability of Mast and Foundation (Annexure-2) has been shared to Zonal Railways on 01.09.2020 & one correction was intimated on 24.09.2020. The suitability of existing mast should be checked and if existing mast is found unsuitable, OHE should be shifted on new feeder mast. If the existing mast is found suitable, the OHE can remain on existing mast and only feeder wire will be erected on new feeder mast.

PORTAL: Portal Structure has been checked for suitability with increase in tension in OHE from 1000/1000kgf to 1200/1200kgf, with Feeder wire and AEC. The existing portal has been found suitable for following loading:

SN	Type of Portal	Wind pressure KGF/M^2	Suitability with 1000/1000kgf Tension in OHE	Suitability with 1200/1200kgf Tension in OHE
1.	N Type	112.5	4 Track (8 OHE) + 2 feeder wire + 2AEC + 2 BWA	4 Track (6 OHE)+ 2 feeder wire + 2AEC + 2 BWA

		150	-Do-	4 Track (5 OHE)+ 2 feeder wire + 2AEC + 2 BWA
2.	O Type	112.5	6 Track (12 OHE) + 2 feeder wire + 2AEC + 2 BWA	6 Track (10 OHE)+ 2 feeder wire + 2AEC + 2 BWA
		150	-Do-	-Do-
3.	R Type	112.5	8 Track (16 OHE) + 2 feeder wire + 2AEC + 2 BWA	8 Track (14 OHE)+ 2 feeder wire + 2AEC + 2 BWA
		150	-Do-	8 Track (12 OHE)+ 2 feeder wire + 2AEC + 2 BWA

Zonal Railways are advised to check the existing loading of the Portal Structure and accordingly erect the feeder wire and AEC on the Portal if loading margin is available as given in the above table.

If loading goes beyond as given in the above table, separate Feeder mast and its foundation should be selected from Employment Schedule as per RDSO Drawing No. TI/DRG/CIV/FEEDER-ES/RDSO/00001/20/0 Sheet 1 & 2 (Annexure - 3A & 3B). 25kV Feeder wire (All Aluminum spider conductor of size 234 sq. mm) arrangement on separate mast for up and down tracks separately should be provided as per Drawing No. TI/DRG/OHE/FEEDER/RDSO/00001/19/0 (Annexure-3).

1.1.2 Feeder Line :

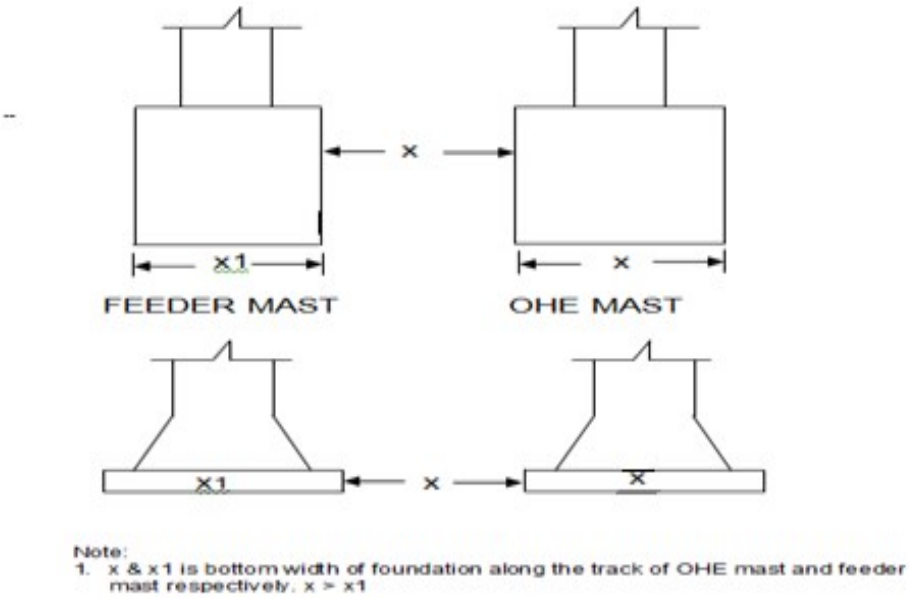
Feeder line has been designed, keeping in the view the provision for shifting the OHE on it in future. In this way, the feeder Mast will carry the OHE, AEC and feeder wire, after expiry of the codal life of the existing suitable mast which will presently carry the OHE and AEC. However wherever the existing mast has been found to be unsuitable for load of OHE with 1200/1200 kgf tension and AEC, the new feeder line mast will carry the OHE, AEC and feeder wire.

In this way it is needless to say that the feeder line should be constructed in such a way that it can be utilised as the OHE mast in future hence its pegging plan and Lay out plan should be made accordingly.

25kV Feeder line arrangement on separate mast for up and down tracks separately should be provided as per Option 1 or Option 2 as given in para 1.1.3.

Implantation of Feeder masts should be chosen as per para no 20.1 and 20.2 of Appendix-I of ACTM Vol.-II Part II with latest ACS.

The horizontal spacing (along the track) between Feeder mast foundation and existing OHE mast foundation should be as per drawing given below:



Note:
1. x & x1 is bottom width of foundation along the track of OHE mast and feeder mast respectively. x > x1

Feeder wire termination should be as per RDSO Drawing No.RE/33/G/05145-1-Rev.A (Annexure-4).

1.1.3 Feeder Line Employment Schedules

There are two design options for constructing Feeder line:

Option I:

(Feeder Mast and Foundation is designed for load of OHE configuration of 65 mm^2 /107 mm^2 catenary/contact wire with 1200/1200 kgf tension in contact wire and catenary wire, AEC 92$mm^2$and Feeder wire 234 mm^2)

New Feeder mast designed for OHE, feeder wire & Arial earth conductor should be provided as per employment schedule Drg No. TI/DRG/CIV/ES/RDSO/00004/19/0 (Sheet-I to III) for 1200/1200 kgf Tension, 155 kgf/m^2 wind pressure attached as Annexure-5, 6 & 7 for implantation of 2.8m, 3.8m & 4.85m respectively.

Similarly for 178kgf/m^2 wind pressure zone (Kolkata Region) new feeder mast should be provided as per employment schedule Drg No. TI/DRG/CIV/ES/RDSO/00004/19/0 (Sheet-IV to VI) for 1200/1200 kgf Tension attached as annexure 8, 9 & 10 for implantation of 2.8m, 3.8m & 4.85m respectively.

New feeder mast will carry the OHE, feeder wire on super mast and aerial earth conductor as per Drawing No. TI/DRG/OHE/FEEDER /RDSO/00002/19/0 (Annexure-11) wherever existing mast is found unsuitable. In this drawing the Feeder wire has been shown erected on the opposite side of the track/OHE for ease of execution of work.

Provision of feeder wire required for 2X25kV system in station areas, for 3rd & 4th line, under FOB , ROB & at places where clearance from other track is very less (Near DFCCIL track etc.), feeder wire may be provided towards OHE side on supermast. In places where clearance is very low, 25kV feeder cable of suitable size of voltage grade 26kV/45kV (52kV) as per IEC 60840 for 600 amp current carrying capacity as used in Metros may be provided.

Implantation of new feeder line mast should be chosen as per para no 20.1 and 20.2 of Appendix-I of ACTM Vol.-II Part II with latest ACS.

The new Feeder line spans should be chosen from respective Employment Schedule. In case new foundation is infringing with the old OHE mast foundation, the new feeder line span can be reduced to nearest lower value of the permissible span. The two consecutive spans shall not normally differ by more than 18m as per Para 5.5 of ACTM Vol. II Part-II.

Option II:

(Feeder Mast and Foundation designed for load of OHE configuration of 125mm^2/150 mm^2 catenary/contact wire with 1500/1500 kgf tension in contact and catenary wire, AEC and Feeder wire 288 mm^2)

This option should be adopted for providing Feeder mast & foundation suitable for higher size of OHE conductors (125/150 sq.mm Catenary/Contact wire) with 1500/1500kgf tension, higher size feeder wire (288 mm^2) and AEC (92mm^2).

New Feeder mast designed for OHE, feeder wire & Arial earth conductor should be provided as per employment schedule Drg No. TI/DRG/CIV/ES/RDSO/00004/20/0 (Sheet - I to III) for 1500/1500 kgf Tension, 155 kgf/m^2 wind pressure attached as Annexure-12, 13 & 14 for implantation of 2.8m, 3.8m & 4.85m respectively.

Similarly for 178kgf/m^2 wind pressure zone (Kolkata Region) new feeder mast should be provided as per employment schedule Drg No. TI/DRG/CIV/ES/RDSO/00004/20/0 (Sheet-IV to VI) for 1500/1500 kgf Tension attached as annexure - 15, 16 & 17 for implantation of 2.8m, 3.8m & 4.85m respectively.

New feeder mast will carry the OHE, feeder wire on super mast and aerial earth conductor as per Drawing No. TI/DRG/OHE/FEEDER/ RDSO/00002/20/0 (Annexure-18), wherever existing mast is found unsuitable. In this drawing the Feeder wire has been shown erected on the opposite side of the track/OHE for ease of execution of work.

Provision of feeder wire required for 2X25kV system in station areas, for 3rd & 4th line, under FOB , ROB & at places where clearance from other track is very less (Near DFCCIL track etc.), feeder wire may be provided towards OHE side on supermast. In places where clearance is very low, 25kV feeder cable of suitable size of voltage grade 26kV/45kV (52kV) as per IEC 60840 for 800 amp current carrying capacity as used in Metros may be provided.

However, Presently OHE will have 65 mm^2/107 mm^2 Catenary/contact wire with 1200kgf/1200kgf tension. Feeder wire and AEC conductor shall be 234 mm^2 & 92mm^2 respectively.

Implantation of new feeder line mast should be chosen as per para no 20.1 and 20.2 of Appendix-I of ACTM Vol.-II Part II with latest ACS.

The new Feeder line spans should be chosen from respective Employment Schedule. In case new foundation is infringing with the old OHE mast foundation, the new feeder line span can be reduced to nearest lower value of the permissible span. The two consecutive spans shall not normally differ by more than 18m as per Para 5.5 of ACTM Vol. II Part-II.

Preferably this design of the feeder line should be adopted by the Zonal Railways as this design of feeder line is suitable for 200kmph train operation in future.

1.1.4 Revised Wind Zones: The territorial limits of revised wind zones are available in IS 875-Part 3 (2015) which is attached as Annexure-19.

1.2 Modification in OHE:

1.2.1 Tension in OHE Conductors:

To increase the operational speed of OHE from existing 140 kmph to 160 kmph, the static & dynamic parameters of OHE like tension in conductors,

elasticity, push-up, wave propagation velocity, Doppler coefficient, reflection coefficient & amplification coefficient needs to be improved. For this, tension in contact (107 mm^2) and catenary wire (65 mm^2) is to be increased from 1000 kgf to 1200kgf.
With 1200 kgf tension of contact wire, condemning diameter of contact wire will increase from existing 8.25mm to 8.42mm to achieve minimum factor of safety of 2.3.

1.2.2 Regulating Equipment:

Regulating equipment (Three Pulley Type higher tension) should be provided as per RDSO specification no. TI/SPC/OHE/3PHTATD/0150 with ACS 1) with counter weight eye rod as per drawing no. ETI/OHE/SK/588 Rev. B (Annexure-20).Counter weight assembly should be provided as per RDSO Drawing No. ETI/OHE/SK/587 Rev. B (Annexure-21). X-Y value adjustment chart is attached as Annexure- 22.

1.2.3 Dropper Schedule:

Dropper schedule for 1200/1200 kgf tension with 0.8mm/m pre-sag in OHE issued vide this office letter no. TI/OHE/GA/2018 dated 20.09.2018 (Annexure-23 to 29). Dropper Schedule for 0.9/0.9m Encumbrance is attached at Annexure - 30. For 72m span presag will be 58mm (0.8X72). Dropper Assembly should be provided as per Drg. No. ETI/OHE/P/1190 Rev. B.

1.2.4 Contact wire Gradient:

Reduction of Contact wire Gradient to be done from 3mm/m to 2mm/m & Relative gradient from 1.5mm/m to 1mm/m.

1.2.5 Adjustment at turnouts:

Operation of the Gatimaan express train is being done at 160 kmph, between Palwal - Agra section. Following works have been done in OHE at turnout locations to prevent panto-entanglement as per CEDE/NCR letter no. EL/TRD/NCR/Gatimaan dated 19.11.2018 (Annexure-31)

a. At obligatory mast vertical gap between main line and turn out contact wire is to be maintained between 50 to 60mm.
b. At 5m distance from obligatory mast, gap is to be maintained at 50 mm.
c. At 10m distance from obligatory mast, gap is to be maintained between 40mm to 50mm.
d. Track separation is to be kept between 290mm to 550mm. Mast should be changed if track separation is less than 290mm.
e. Span length of turnout location reduced during increasing track separation.
f. From main line to loop line "take off" may be maintained in between 720 to 750mm.

1.2.6 Drop Bracket Assembly & Steady Arm:

Drop Bracket Assembly as per Drawing No. ETI/OHE/P/2360 shall be provided along with steady arm as per drawing no. ETI/OHE/P/2390 attached as Annexure-32 & 33 respectively.

1.2.7 Current Carrying 'A' Dropper:

Current carrying 'A' dropper as per Specification No.TI/SPC/OHE/CCFD/ 0160(02/2020) or one C jumper (in span jumper) in every span should be provided. The Drawing Nos.TI/DRG/OHE/CCD/RDSO/00001 to 4/20/0 for current carrying dropper assembly, Catenary wire clamp, Contact wire Clamp, Compression sleeve, thimble & cable lug for current carrying droppers is attached as Annexure-34, 35, 36,37.

1.2.8 Droppers:

Rigid droppers shall not be provided, only loop type droppers should be provided.

1.2.9 Double Pole Isolator:

Double pole Isolator type II should be provided at Insulated Overlap of 1250 Amp rating as per Specification No. ETI/PSI/133. Mounting Arrangement should be as per Drawing No.ETI/OHE/G/06005 Sh-2 & ETI/OHE/G/06008 for mast and portals respectively as per Annexure-38 & 39 respectively. Double pole Isolator of 1600 Amp capacity should be provided if 65/107 (Cu-Ag CW) or 125/150 OHE is planned to be provided in future.

1.2.10 Porcelain Section Insulators should not be provided on main line. This should be replaced by Light weight PTFE type Section Insulator (if unavoidable).

1.2.11 Cross type OHE to be converted into Overlap type.

1.2.12 G Jumpers: 105 mm^2 G Jumper may be replaced by 160 mm^2 G Jumper as per specification no. ETI/OHE/3(2/94) with the approval of CEE.

1.2.13 Structure Number Plate:

Retro reflective structure number plate shall be provided as per Railway Board letter No. 2001/Elect (G)/170/1 Pt dated 07.05.2012 (Annexure - 40).Retro Reflective number plate may be provided at additional masts if required, by Zonal Railway, as per Rly Board's letter No. 2001/Elect (G)/170/1 Pt dated 18.10.2012 (Annexure-41).

1.2.14 Contact Wire :

For these two routes contact wire replacement work wherever due should be done with 107 sq. mm silver bearing grooved copper contact wire as per specification no. TI/SPC/OHE/CW(Cu-Ag)/0130 if vendor developed.

The current carrying capacity of OHE with Cu-Ag contact wire (107mm^2) and Cu-Cd catenary wire (65 mm^2) for 80°C maximum allowable temperature with wind velocity 0.6m/s will increase to 696 amp from 600amp current carrying capacity of OHE with Cu contact wire (107mm^2) and Cu-Cd catenary wire (65 mm^2) for 70°C maximum allowable temperature with wind velocity 0.6m/s.

1.2.15 Simulation study/Field trial for OHE and pantograph dynamic interaction should be carried out by Railways to validate OHE design as per EN 50367/EN 50318.

1.3 Earthing & Bonding:

AEC (Arial Earth Conductor) & BEC (Buried Earth Conductor) shall be provided to contain the touch & step potential of the track. AEC of 12.24 mm dia. ACSR Raccoon conductor should be erected on the back side of the OHE masts/Portals. Similarly BEC of 20 mm dia.(cross section 238.64 mm^2), galvanized steel conductor should be laid underground along the UP and DN track separately, 300mm below ground surface and approximately one meter away (or as per site conditions) from the OHE foundation towards opposite direction of track. The BEC will be connected to each OHE mast/Portal and Feeder mast by same conductor having Tee Connector & Lug Connector as per Drawing No. TI/DRG/OHE/TC/RDSO/00001/20/0 & TI/DRG/OHE/SC /RDSO/00001/20/0 attached as Annexure 42 & 43 for BEC end and Lug for connection with mast/portal .The cross bonding of the UP BEC –UP Mast/Portal-UP Traction Rail-DN Traction Rail-DN mast/Portal –DN BEC should be done by 50X6 mm MS/GS flat at every 450 mtr. The details of the AEC/BEC and cross bonding scheme are given in drawing no TI/DRG/OHE/EARTHING/RDSO/00001/20/0 (Annexure–44).
At stations, BEC conductor should be laid underground for Loop lines & platform also. BEC can be run on the side wall of Platform (platform coping) with suitable clamp & bolt grouted in the coping. BEC should be connected to Earth Pit as per Drawing No. ETI/OHE/P/7020 Rev. B at every 450m wherever it is exposed above the ground. At Bridges/Platform coping laying arrangement of BEC should be as given in Annexure-45.
For Three line and four line section separate BEC should be provided for each line.

The above recommendation are as per prevalent practice used in 2X25 KV system with 12 KA fault current adopted by other projects in country. However the adequacy and efficacy of this earthing and bonding system should be verified by the simulation studies/measurements of the touch and

step potential of the rail in normal load and short circuit condition for compliance with EN 50122-1 and IEC 62128-1 (2013).

1.5 LIST OF DRAWINGS:

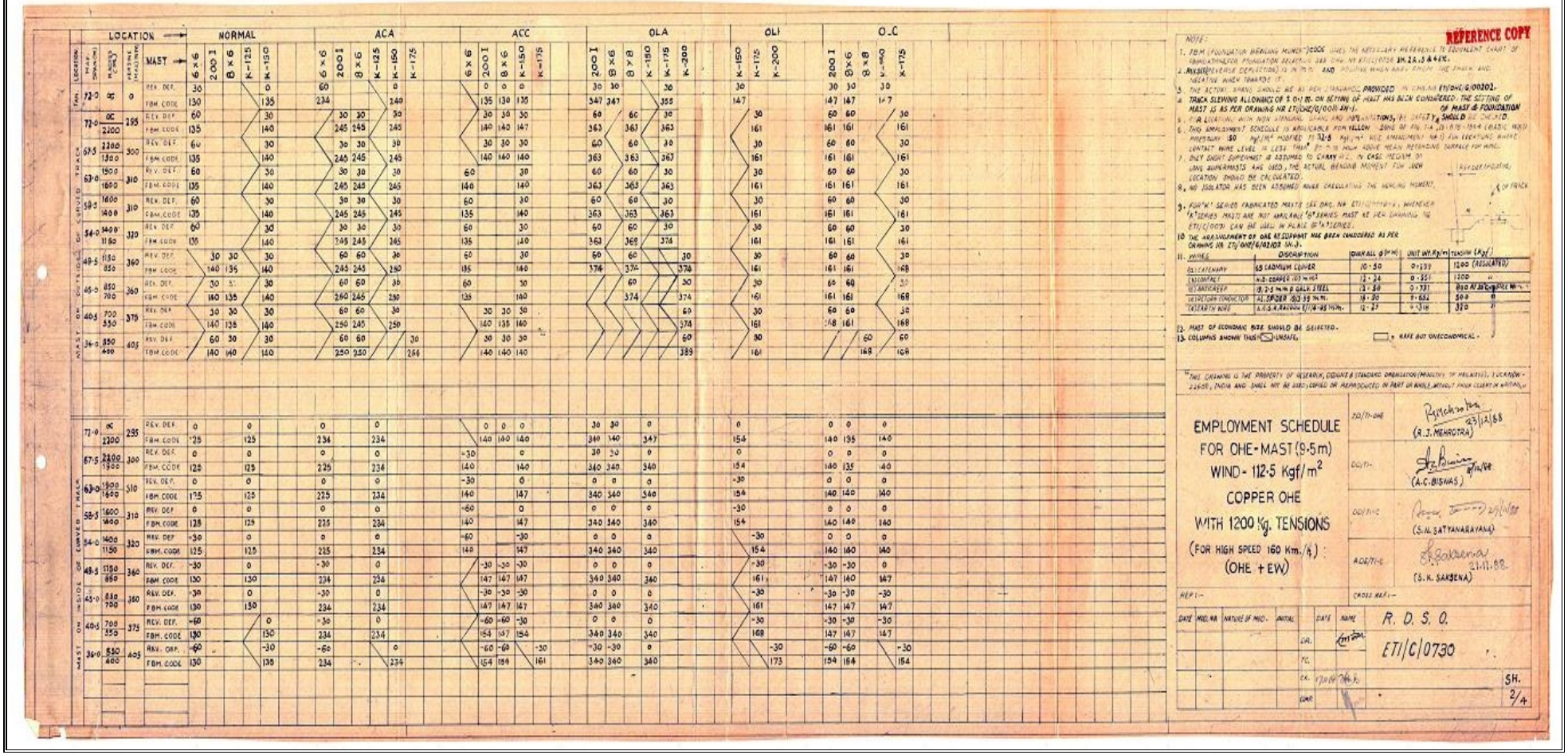
SN	Description	Drawing No	Annexure
1.	Employment Schedule for OHE mast (9.5m) wind pressure 112.5kgf/m^2 Copper OHE with 1200 kgf tension (OHE+EW)	ETI/C/0730 - Sheet-2	1
2.	Instruction for checking Suitability of Mast and Foundation	-	2
3.	25kV Feeder Arrangement on Separate mast	TI/DRG/OHE/FEEDER/RDSO /00001/19/0	3
4.	Employment Schedule for 25kV Feeder Arrangement on Separate mast for 155kgf Wind Pressure	TI/DRG/CIV/FEEDER-ES/RDSO/00001/20/0 (Sheet-I)	3A
5.	Employment Schedule for 25kV Feeder Arrangement on Separate mast for 178 kgf Wind Pressure	TI/DRG/CIV/FEEDER-ES/RDSO/00001/20/0 (Sheet-II)	3B
6.	Feeder Termination Drawing	RE/33/G/05145-1, Rev. A	4
7.	Employment Schedule for OHE Mast (9.5m) wind pressure 155kgf/m^2 & 2.8 m/3.8 m/4.85 m implantation (OHE + Feeder wire + Earth wire) for 1200 kgf tension in 65 mm^2 catenary wire & 1200kfg tension in 107 mm^2 contact wire.	TI/DRG/CIV/ES/RDSO/00004/19/0 (Sheet-I to III)	5,6,7
8.	Employment Schedule for OHE Mast (9.5m) wind pressure 178 kgf/m^2&& 2.8 m/3.8 m/4.85 m implantation (OHE + Feeder wire + Earth wire) for 1200 kgf tension in 65 mm^2 catenary wire &1200kfg tension in 107 mm^2 contact wire.	TI/DRG/CIV/ES/RDSO/00004/19 /0 (Sheet-IV to VI)	8,9,10
9.	General Arrangement of OHE with Feeder, Earth wire & BEC (1200+1200)	TI/DRG/OHE/FEEDER/RDSO /00002/19/0.	11
10.	Employment Schedule for OHE Mast (9.5m) wind pressure 155kgf/m^2& 2.8 m/3.8 m/4.85 m implantation (OHE + Feeder wire + Earth wire) for 1500 kgf tension in 125 mm^2 catenary wire & 1500kfg tension in 150 mm^2 contact wire.	TI/DRG/CIV/ES/RDSO/00004/20/0 (Sheet-I to III)	12,13,14
11.	Employment Schedule for OHE Mast (9.5m) wind pressure 178 kgf/m^2 & 2.8 m/3.8 m/4.85 m implantation (OHE + Feeder wire + Earth wire) for 1500 kgf tension in 125 mm^2 catenary wire & 1500kfg tension in 150 mm^2 contact wire.	TI/DRG/CIV/ES/RDSO/00004/20/0 (Sheet-IV to VI)	15,16,17
12.	General Arrangement of OHE with Feeder, Earth wire & BEC	TI/DRG/OHE/FEEDER/RDSO /00002/20/0.	18

	(1500+1500)		
13.	Territorial limits of revised wind zones	-	19
14.	Counter Weight Eye Rod	ETI/OHE /SK/588 Rev. B.	20
15.	Counter Weight Assembly	ETI/OHE/SK/587 Rev. B	21
16.	X-Y adjustment Chart	TI/DRG/OHE/ATD/RDSO/00003/99/0	22
17.	Dropper Schedule	TI/DRG/OHE/DROP/00001-00007/18/0 & TI/DRG/OHE/DROP/RDSO/00001/20/0	23 to 30
18.	CEDE/NCR letter no. EL/TRD/NCR /Gatimaan dated 19.11.2018	-	31
19.	25mm drop Bracket Assembly	ETI/OHE/P/2360- Rev. N	32
20.	BFB Steady Arm Assembly	ETI/OHE/P/2390-Rev. C	33
21.	Current Carrying Dropper Assembly	TI/DRG/OHE/CCD/RDSO/00001/20/0	34
22.	Catenary wire Clamp for Current Carrying Dropper	TI/DRG/OHE/CCD/RDSO/00002/20/0	35
23.	Contact wire clamp for Current Carrying Dropper	TI/DRG/OHE/CCD/RDSO/00003/20/0	36
24.	Compression sleeve, thimble & cable lug for Current Carrying Dropper	TI/DRG/OHE/CCD/RDSO/00004/20/0	37
25.	Mounting details of Double Pole Isolator on Mast (For 2X25kV)	ETI/OHE/G/06005-Sheet 2	38
26.	Mounting Details of Double Pole Isolator on Portals (For 2X25kV)	ETI/OHE/G/06008	39
27.	Railway Board letter No. 2001/Elect (G)/170/1 Pt dated 07.05.2012	-	40
28.	Railway Board letter No. 2001/Elect (G)/170/1 Pt dated 18.10.2012	-	41
29.	Tee Connector suitable for 20mm dia GS wire to 20mm dia GS wire	TI/DRG/OHE/TC/RDSO/00001/20/0	42
26.	Straight Connector suitable for 20mm dia GS wire to 20mm dia GS wire	TI/DRG/OHE/SC/RDSO/00001/20/0	43
21	Cross Bonding Arrangement	TI/DRG/OHE/EARTHING/RDSO/00001/20/0.	44
22	BEC Arrangement on Bridges and Platform Coping	-	45
23	Railway Board letter No.2001/Elect(G)170/1 Pt-III dated 07.08.2020	-	46
24	Railway Board letter No.2001/Elect(G)170/1 Pt-II dated 16.10.2020	-	47

1.6 LIST OF SPECIFICATIONS & APPROVED VENDORS

SN	Description of item	Specification No.	Annexure	Vendors
1	Three Pulley Higher Tension ATD	TI/SPC/OHE/3PHTA TD/0150 with ACS 1	-	1.M/s Kamgar Engineering Mumbai 2.M/s Shree steel Wire Rope Ltd. Mumbai 3. M/s Economic Electrical Kolkota 4.M/s Khatri Casting, Mumbai
2	107 sq.mm Silver bearing Grooved Copper Contact Wire for Electric traction (Draft)	TI/SPC/OHE/CW(Cu -Ag)/ 0130	-	Draft under approval
3	Current Carrying Dropper (Draft)	TI/SPC/OHE/CCFD/ 0160	-	Draft under approval
4	Double Pole Isolator	ETI/PSI/133	-	Under revision

ANNEXURE 1


REFERENCE COPY
EMPLOYMENT SCHEDULE
FOR OHE-MAST (9·5m)
WIND - 112·5 Kgf/m²
COPPER OHE
WITH 1200 Kg. TENSIONS
(FOR HIGH SPEED 160 Km./h) :
(OHE + EW)
(R.J. MEHROTRA)
(A.C. BISWAS)
(S.M. SATYANARAYANA)
(S.K. SAKSENA)
R. D. S. O.
ETI/C/0730
SH. 2/4

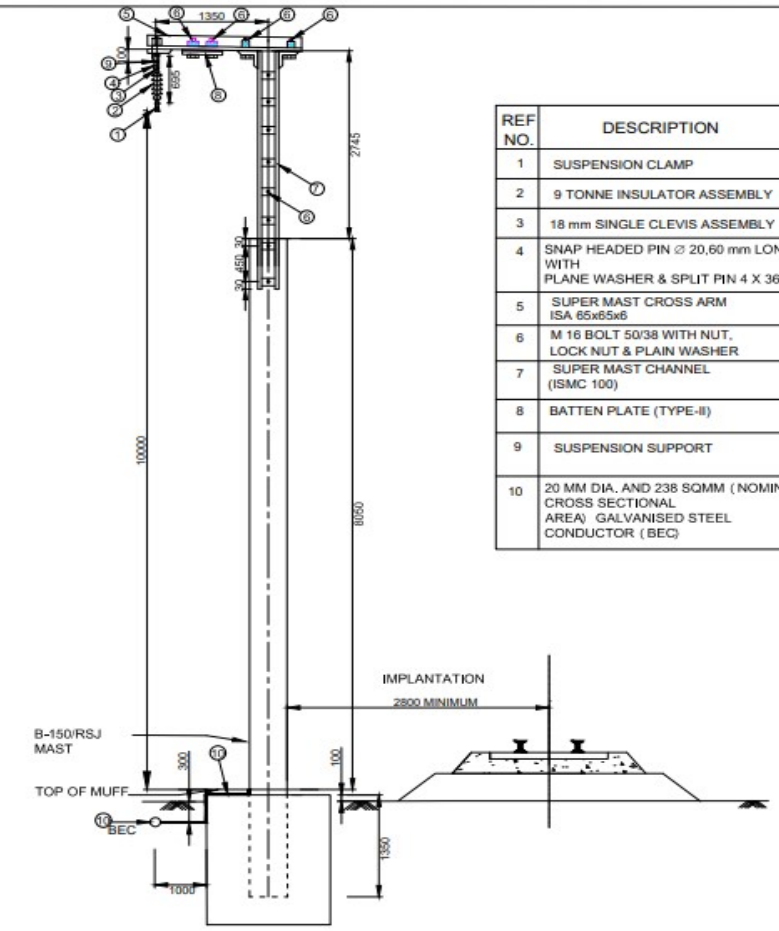
ANNEXURE 2

INSTRUCTION FOR CHECKING SUITABILITY OF

EXISTING MAST AND FOUNDATION

1. Select the Excel Sheet as per mast location.
2. Fill up the following Input design data in Value column.
   (i) OHE span length
   (ii) Tension in conductors =1200 kgf
   (iii) Weight of man = 0 kg
   (iv) Radius of curvature for Curved Track/Tangent Track
   (v) Wind Pressure- 112.5kgf/m^2 for NDLS-HWH & NDLS-BCT section/150kgf/m^2 for Kolkata Region
   (vi) Factor for Conductor -0.67
   (vii) Factor for OHE Mast- 1 for Rolled Mast/1.5 for Fabricated Mast
   (viii) Diameter of Contact wire-12.24mm
   (ix) Diameter of Catenary wire-10.5mm
   (x) Diameter of Earth Wire- 12.27mm
3. Compare total calculated bending moment with the permissible bending moment strength . Mast is suitable if permissible bending moment > Calculated bending moment .
4. For checking suitability of foundation the foundation drawing No. ETI/C/0058 Sheet 1 to 5 should be referred. The FMB code indicated in above drawing for calculated bending moment should be higher or equal to existing foundation at site.
5. There is a correction in Excel sheet circulated on 1.09.2020 for checking Mast and foundation suitability. For ACC outside sheet- Row no. 72-Bending moment due to radial pull on ACC wire up to radius 400m will be negative value (inadvertently it has been mentioned in sheet as positive) and below radius 400m positive value(inadvertently it has been mentioned as negative) will be taken.

ANNEXURE 3



REF NO.	DESCRIPTION	PART NO.	QTY
1	SUSPENSION CLAMP	1580	1
2	9 TONNE INSULATOR ASSEMBLY	6020	1
3	18 mm SINGLE CLEVIS ASSEMBLY	5040	1
4	SNAP HEADED PIN ∅ 20,60 mm LONG WITH PLANE WASHER & SPLIT PIN 4 X 36	262	1
5	SUPER MAST CROSS ARM ISA 65x65x6	8015/8012	2
6	M 16 BOLT 50/38 WITH NUT, LOCK NUT & PLAIN WASHER	16/3 NL	12
7	SUPER MAST CHANNEL (ISMC 100)	8021/8061/8011	2
8	BATTEN PLATE (TYPE-II)	8016	1
9	SUSPENSION SUPPORT	8014 OR 8014-1	1
10	20 MM DIA. AND 238 SQMM (NOMINAL CROSS SECTIONAL AREA) GALVANISED STEEL CONDUCTOR (BEC)	AS PER IS: 2141-2000	

NOTE :-

1. ALL DIMENSIONS ARE IN mm
2. THE 25 KV ALUMINIUM FEEDER WIRE (19.95 MM DIA. AND 233.8 SQMM CROSS SECTIONAL AREA) SHALL BE RUN ON THE REAR SIDE OF THE FEEDER MAST. THE FEEDER MAST WILL HAVE MINIMUM IMPLANTATION OF 2.8M
3. SPAN OF FEEDER LINE WILL BE SAME AS OHE SPAN.
4. TENSION LENGTH OF FEEDER LINE WILL BE 1500M.
5. SUITABLE SUPER MAST AND CROSS ARM SHOULD BE USED AS PER SITE CONDITION TAKING IN TO ACCOUNT THE GROUND CLEARANCE & LATERAL CLEARANCES IN OPEN ROUTE, ACROSS AND ALONG THE STREET/LC GATE.
6. MAST AND FOUNDATION SHOULD BE SELECTED AS PER DRAWING NO.TIDRG/CIV/FEEDER-ES/RDSO/00001/20/0 SHEET 1 & 2.
7. BEC WILL BE CONNECTED TO EACH FEEDER MAST BY BEC CONDUCTOR WITH SUITABLE TEE CONNECTOR AT ONE END & LUG ARRANGEMENT AT MAST END.

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25 kV FEEDER ARRANGEMENT ON SEPARATE MAST FOR NDLS-HWH & NDLS-MUMBAI ROUTE

DTI-2

(BHARDWAJ CHAUDHARY)

REF. ETI/C/P/8020

CROSS REF :-

DATE	MOD.	NATURE OF MOD.	INITIALS
	"A"	NOTE 2,3 & 6 MODIFIED AND NOTE 7 & REF. 10 ADDED	

R . D . S . O.

	DATE	NAME
DR		
CK		
CK		

TI/DRG/OHE/FEEDER/RDSO/00001/19/0

ANNEXURE 3A

EMPLOYMENT SCHEDULE: WIND PRESSURE 155 KGF/SQM

MAST ON OUTSIDE OF CURVED TRACK

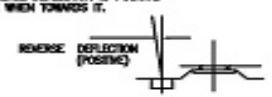
TYPE OF MAST				RSJ	B-150
MAX. SPAN (m)	RADIUS (m)	VERSINE (max.) mm		Normal location	
72	∞	0	REV. DEF.	30	30
			FBM. CODE	147	147
72	∞	295	REV. DEF.	30	30
	2200		FBM. CODE	147	147
67.5	2200	300	REV. DEF.	30	30
	1900		FBM. CODE	147	147
63	1900	310	REV. DEF.	30	30
	1600		FBM. CODE	147	147
58.5	1600	310	REV. DEF.	30	30
	1400		FBM. CODE	147	147
54	1400	320	REV. DEF.	30	30
	1150		FBM. CODE	140	140
49.5	1150	360	REV. DEF.	30	30
	850		FBM. CODE	140	140
45	850	360	REV. DEF.	30	30
	700		FBM. CODE	140	140
40.5	700	375	REV. DEF.	30	30
	550		FBM. CODE	140	140
36	550	405	REV. DEF.	30	30
	400		FBM. CODE	140	140
31.5	400	415	REV. DEF.	30	30
	300		FBM. CODE	140	140
27	300	455	REV. DEF.	30	30
	200		FBM. CODE	140	140

MAST ON INSIDE OF CURVED TRACK

TYPE OF MAST				RSJ	B-150
MAX. SPAN (m)	RADIUS (m)	VERSINE (max.) mm		Normal location	
72	∞	295	REV. DEF.	0	0
	2200		FBM. CODE	147	147
67.5	2200	300	REV. DEF.	0	0
	1900		FBM. CODE	147	147
63	1900	310	REV. DEF.	0	0
	1600		FBM. CODE	147	147
58.5	1600	310	REV. DEF.	0	0
	1400		FBM. CODE	147	147
54	1400	320	REV. DEF.	0	0
	1150		FBM. CODE	140	140
49.5	1150	360	REV. DEF.	0	0
	850		FBM. CODE	140	140
45	850	360	REV. DEF.	0	0
	700		FBM. CODE	140	140
40.5	700	375	REV. DEF.	0	0
	550		FBM. CODE	140	140
36	550	405	REV. DEF.	0	0
	400		FBM. CODE	140	140
31.5	400	415	REV. DEF.	0	0
	300		FBM. CODE	140	140
27	300	455	REV. DEF.	0	0
	200		FBM. CODE	140	140

NOTES:–

1. THIS EMPLOYMENT SCHEDULE IS APPLICABLE FOR GREEN REGION OF BASIC WIND SPEED 47 m/s OF FIGURE–1 OF IS: 875 (Part–3)–2015 RDSO (DESIGN WIND PRESSURE 155 Kgf/m²) CALCULATED AS PER CLAUSE 5.4 OF IS: 875 (Part–3)–2015 (Rev.–III).
2. THIS EMPLOYMENT SCHEDULE IS APPLICABLE FOR 25 kV FEEDER ARRANGEMENT ON SEPARATE MAST FOR NDLS–HWH & NDLS–MUMBAI ROUTE ONLY.
3. THE 25kV FEEDER SHALL BE RUN ON THE REAR SIDE OF THE FEEDER MAST. THE FEEDER MAST WILL HAVE MINIMUM INFLANDION OF 2.8 M.
4. MAST OF ECONOMIC SIZE SHALL BE SELECTED.
5. FOUNDATION BENDING MOMENT (FBM) CODE GIVE THE NECESSARY CROSS REFERENCE TO EQUIVALENT FOUNDATIONS, FOR FOUNDATION SELECTION SEE THE DRAWING NO. TI/DRG/CIV/FND/RDSO/00001/04/0 MODIFICATION '0' CHART OF (SHEET NO. 1 TO 5).
6. THE CYCLONIC DESIGN AREA FACTOR (K4) HAS NOT BEEN CONSIDERED IN THE DESIGN CALCULATION GIVEN IN CLAUSE 6.3.4 OF IS: 875 (Part–3)–2015 (Rev.–III).
7. WHERE ISOLATOR IS CONSIDERED ON FEEDER MAST, RSJ MAST WITH FBM CODE–154 SHALL BE USED.
8. REVERSE DEFLECTIONS ARE IN mm. REVERSE DEFLECTION IS POSITIVE WHEN AWAY FROM TRACK AND NEGATIVE WHEN TOWARDS IT.



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EMPLOYMENT SCHEDULE FOR 25kV FEEDER ARRANGEMENT ON SEPARATE MAST FOR NDLS–HWH & NDLS–MUMBAI ROUTE
BASIC WIND SPEED 47 m/s
WIND PRESSURE 155 kgf/m²
1212 kgf TENSION IN FEEDER WIRE
19.95mm²

DTS–2 (BHARDWAJ CHAUDHARY)

REF:–TI/DRG/DHE/FEEDER/RDSO/00001/18/0 "MOD–A" CROSS REF:–

DATE	MOD.	NATURE OF MOD.	INITIAL

R. D. S. O.

	DATE	NAME
DR.		
CK.		
CK.		

TI/DRG/CIV/FEEDER–ES /RDSO/00001/20/0

NOT TO SCALE SHEET–1

ANNEXURE 3B

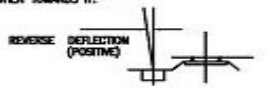
EMPLOYMENT SCHEDULE: WIND PRESSURE 178 KGF/SQM

MAST ON OUTSIDE OF CURVED TRACK					
TYPE OF MAST				RSJ	B-150
MAX. SPAN (m)	RADIUS (m)	VERSINE (max.) mm		NORMAL LOCATION	
67.5	∞	0	REV. DEF.	30	-
			FBM. CODE	154	-
63	∞	200	REV. DEF.	30	-
	2500		FBM. CODE	154	-
63	2500	265	REV. DEF.	30	-
	1900		FBM. CODE	154	-
58.5	1900	265	REV. DEF.	30	30
	1600		FBM. CODE	147	147
54	1600	260	REV. DEF.	30	30
	1400		FBM. CODE	147	147
49.5	1400	265	REV. DEF.	30	30
	1150		FBM. CODE	147	147
49.5	1150	360	REV. DEF.	30	30
	850		FBM. CODE	147	147
45	850	360	REV. DEF.	30	30
	700		FBM. CODE	147	147
40.5	700	375	REV. DEF.	30	30
	550		FBM. CODE	147	147
36	550	405	REV. DEF.	30	30
	400		FBM. CODE	147	147
31.5	400	415	REV. DEF.	30	30
	300		FBM. CODE	140	140
27	300	455	REV. DEF.	30	30
	200		FBM. CODE	140	140

MAST ON INSIDE OF CURVED TRACK					
TYPE OF MAST				RSJ	B-150
MAX. SPAN (m)	RADIUS (m)	VERSINE (max.) mm		NORMAL LOCATION	
63	∞	200	REV. DEF.	0	-
	2500		FBM. CODE	154	-
63	2500	265	REV. DEF.	0	-
	1900		FBM. CODE	154	-
58.5	1900	265	REV. DEF.	0	0
	1600		FBM. CODE	147	147
54	1600	260	REV. DEF.	0	0
	1400		FBM. CODE	147	147
49.5	1400	265	REV. DEF.	0	0
	1150		FBM. CODE	147	147
49.5	1150	360	REV. DEF.	0	0
	850		FBM. CODE	147	147
45	850	360	REV. DEF.	0	0
	700		FBM. CODE	147	147
40.5	700	375	REV. DEF.	0	0
	550		FBM. CODE	147	147
36	550	405	REV. DEF.	0	0
	400		FBM. CODE	147	147
31.5	400	415	REV. DEF.	0	0
	300		FBM. CODE	140	140
27	300	455	REV. DEF.	0	0
	200		FBM. CODE	140	140

NOTES:-

1. THIS EMPLOYMENT SCHEDULE IS APPLICABLE FOR RED REGION OF BASIC WIND SPEED 50 m/s OF FIGURE-1 OF IS: 875 (Part-3)-2015 REVIII (DESIGN WIND PRESSURE 178 Kgf/m^2 CALCULATED AS PER CLAUSE 5.4 OF IS: 875 (Part-3)-2015 (Rev.-III).
2. THIS EMPLOYMENT SCHEDULE IS APPLICABLE FOR 25 kV FEEDER ARRANGEMENT ON SEPARATE MAST FOR NDLS-HWH & NDLS-MUMBAI ROUTE ONLY.
3. THE 25kV FEEDER SHALL BE RUN ON THE REAR SIDE OF THE FEEDER MAST. THE FEEDER MAST WILL HAVE MINIMUM IMPLANTATION OF 2.5 M.
4. MAST OF ECONOMIC SIZE SHALL BE SELECTED.
5. FOUNDATION BENDING MOMENT (FBM) CODE GIVE THE NECESSARY CROSS REFERENCE TO EQUIVALENT FOUNDATIONS, FOR FOUNDATION SELECTION SEE THE DRAWING NO. TI/DRG/CIV/FND/RDSO/00001/04/0 MODIFICATION "B" CHART OF (SHEET NO. 1 TO 5).
6. THE CYCLONIC RESIGN AREA FACTOR (K4) HAS NOT BEEN CONSIDERED IN THE DESIGN CALCULATION GIVEN IN CLAUSE 6.3.4 OF IS: 875 (Part-3)-2015 (Rev.-III).
7. WHERE ISOLATOR IS CONSIDERED ON FEEDER MAST, B-200 MAST WITH FBM CODE-161 SHALL BE USED.
8. REVERSE DEFLECTIONS ARE IN mm. REVERSE DEFLECTION IS POSITIVE WHEN AWAY FROM TRACK AND NEGATIVE WHEN TOWARDS IT.



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EMPLOYMENT SCHEDULE FOR 25kV FEEDER ARRANGEMENT ON SEPARATE MAST FOR NDLS-HWH & NDLS-MUMBAI ROUTE BASIC WIND SPEED 50 m/s WIND PRESSURE 178 kgf/m^2 1212 kgf TENSION IN FEEDER WIRE 19.95mm^2

DTI-2 (BHARDWAJ CHAUDHARY)

REF:-TI/DRG/OHE/FEEDER/RDSO/00001/18/0 "MOD-A" CROSS REF:-

DATE	MOD.	NATURE OF MOD.	INITIAL

R. D. S. O.

	DATE	NAME
DR.		
CK.		
CK.		

TI/DRG/CIV/FEEDER-ES/RDSO/00001/20/0

NOT TO SCALE SHEET-2

ANNEXURE 4

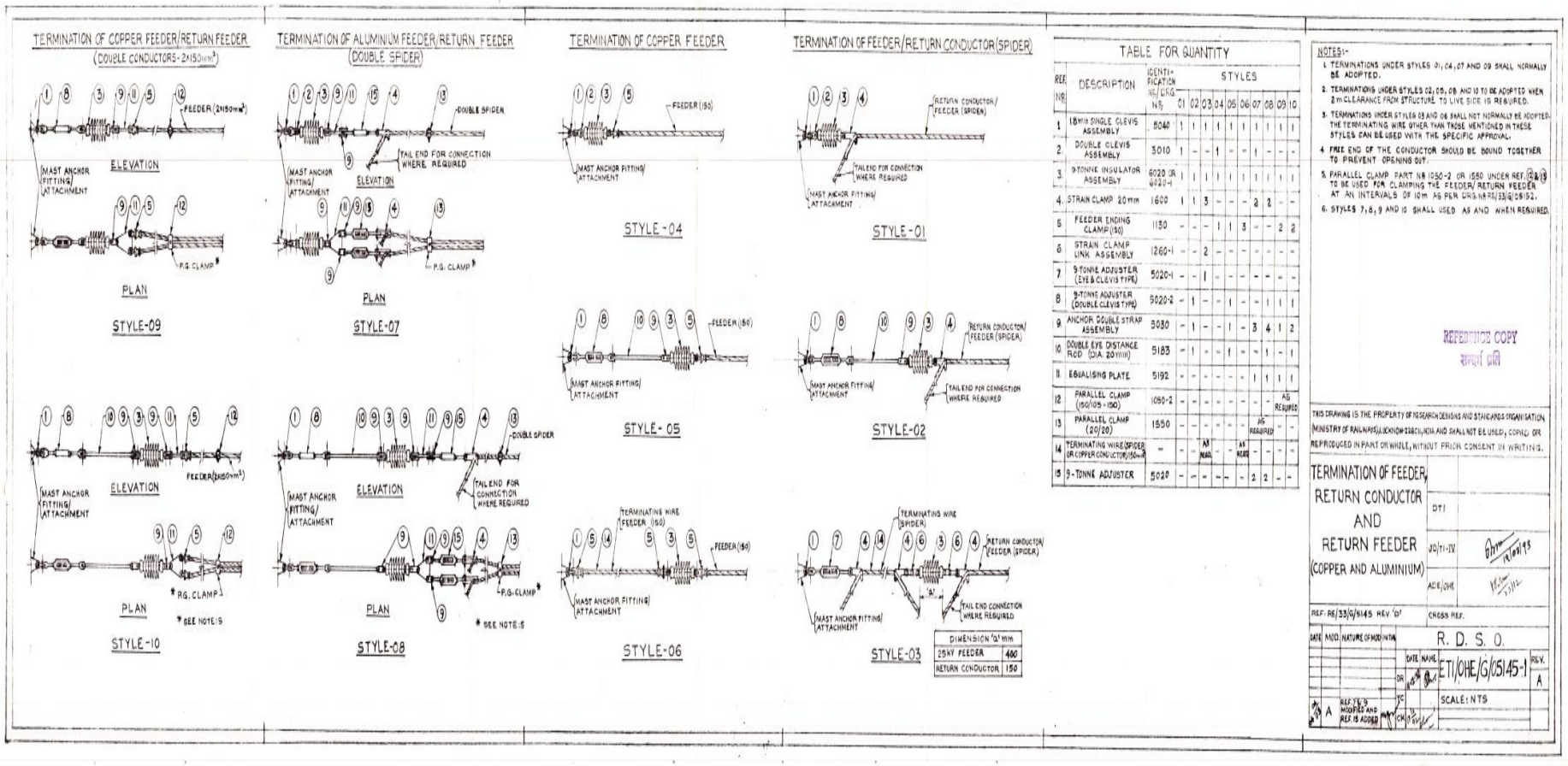


TABLE FOR QUANTITY

REF. NO	DESCRIPTION	IDENTIFICATION NO/ DRG. NO	STYLES 01	02	03	04	05	06	07	08	09	10
1	18mm SINGLE CLEVIS ASSEMBLY	5040	1	1	1	1	1	1	1	1	1	1
2	DOUBLE CLEVIS ASSEMBLY	3010	1	-	-	1	-	-	1	-	-	-
3	9 TONNE INSULATOR ASSEMBLY	6020 OR 6020-1	1	1	1	1	1	1	1	1	1	1
4	STRAIN CLAMP 20mm	1600	1	1	3	-	-	-	2	2	-	-
5	FEEDER ENDING CLAMP (150)	1130	-	-	-	1	1	3	-	-	2	2
6	STRAIN CLAMP LINK ASSEMBLY	1260-1	-	-	2	-	-	-	-	-	-	-
7	9 TONNE ADJUSTER (EYE & CLEVIS TYPE)	5020-1	-	-	1	-	-	-	-	-	-	-
8	9 TONNE ADJUSTER (DOUBLE CLEVIS TYPE)	5020-2	-	1	-	-	1	-	-	1	1	1
9	ANCHOR DOUBLE STRAP ASSEMBLY	5030	-	1	-	-	1	-	3	4	1	2
10	DOUBLE EYE DISTANCE ROD (DIA 20mm)	5183	-	1	-	-	1	-	-	1	-	1
11	EQUALISING PLATE	5192	-	-	-	-	-	-	1	1	1	1
12	PARALLEL CLAMP (150/105-150)	1050-2	-	-	-	-	-	-	-	-	-	AS REQUIRED
13	PARALLEL CLAMP (20/20)	1550	-	-	-	-	-	-	-	AS REQUIRED	-	-
14	TERMINATING WIRE (SPIDER OR COPPER CONDUCTOR) 150mm²	-	-	-	AS REQD.	-	-	AS REQD.	-	-	-	-
15	9-TONNE ADJUSTER	5020	-	-	-	-	-	-	2	2	-	-

NOTES:-

1. TERMINATIONS UNDER STYLES 01, 04, 07 AND 09 SHALL NORMALLY BE ADOPTED.
2. TERMINATIONS UNDER STYLES 02, 05, 08 AND 10 TO BE ADOPTED WHEN 2m CLEARANCE FROM STRUCTURE TO LIVE SIDE IS REQUIRED.
3. TERMINATIONS UNDER STYLES 03 AND 06 SHALL NOT NORMALLY BE ADOPTED. THE TERMINATING WIRE OTHER THAN THOSE MENTIONED IN THESE STYLES CAN BE USED WITH THE SPECIFIC APPROVAL.
4. FREE END OF THE CONDUCTOR SHOULD BE BOUND TOGETHER TO PREVENT OPENING OUT.
5. PARALLEL CLAMP PART NO 1050-2 OR 1550 UNDER REF. 12 & 13 TO BE USED FOR CLAMPING THE FEEDER/ RETURN FEEDER AT AN INTERVALS OF 10m AS PER DRG NO RE/33/G/05152.
6. STYLES 7, 8, 9 AND 10 SHALL USED AS AND WHEN REQUIRED.

REFERENCE COPY
संदर्भ प्रति

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TERMINATION OF FEEDER/ RETURN CONDUCTOR AND RETURN FEEDER (COPPER AND ALUMINIUM)

DTI

JD/TI-IV

ACE/OHE

REF: RE/33/G/5145 REV 'D'

CROSS REF.

R. D. S. O.

ETI/OHE/G/05145-1 REV. A

SCALE: NTS

DATE	MOD.	NATURE OF MODIFICATION
	A	REF. 7 & 9 MODIFIED AND REF. 10 ADDED

ANNEXURE 5

EMPLOYMENT SCHEDULE: WIND PRESSURE 155KG/SQM

MAST ON OUTSIDE OF CURVED TRACK

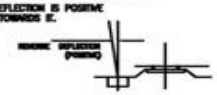
TYPE OF MAST				RSJ (8" x 6")						B-150 K-150						B-175 K-175						B-200 K-200						B-225 K-225		
MAX. SPAN (m)	RADIUS (m)	VERSINE (MAX.) mm		N	ACC	ACA	OLC	OLA	OLI	N	ACC	ACA	OLC	OLA	OLI	N	ACC	ACA	OLC	OLA	OLI	N	ACC	ACA	OLC	OLA	OLI	OLC	OLA	OLI
67.5	∞	0	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	30	30	-	-	-	-	-	-	30	30	-	30	-	30	-
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	161	161	-	-	-	-	-	-	270	178	-	178	-	389	-
63	∞ / 2500	200	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	30	30	-	-	-	-	-	-	30	30	-	30	-	30	-
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	161	161	-	-	-	-	-	-	270	178	-	178	-	389	-
63	2500 / 1900	265	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	30	30	-	-	-	-	-	-	30	30	-	30	-	30	-
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	161	161	-	-	-	-	-	-	270	185	-	185	-	395	-
58.5	1900 / 1600	265	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	30	30	-	-	-	-	-	-	30	30	-	30	-	30	-
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	161	168	-	-	-	-	-	-	275	185	-	185	-	395	-
54	1600 / 1400	260	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	30	30	-	-	-	-	-	-	30	30	-	30	-	30	-
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	161	168	-	-	-	-	-	-	275	185	-	185	-	395	-
49.5	1400 / 1150	265	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	30	30	-	-	-	-	-	-	30	30	-	30	-	30	-
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	161	168	-	-	-	-	-	-	275	185	-	185	-	399	-
49.5	1150 / 850	360	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	30	30	-	-	-	-	-	-	30	-	-	-	30	30	30
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	161	168	-	-	-	-	-	-	275	-	-	-	193	399	193
45	850 / 700	360	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	30	30	-	-	-	-	-	-	30	-	-	-	30	30	30
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	161	168	-	-	-	-	-	-	275	-	-	-	193	399	193
40.5	700 / 550	375	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	30	30	-	-	-	-	-	-	30	-	-	-	30	30	30
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	161	168	-	-	-	-	-	-	275	-	-	-	193	399	193
36	550 / 400	405	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	30	30	-	-	-	-	-	-	30	-	-	-	30	30	30
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	161	168	-	-	-	-	-	-	275	-	-	-	193	399	193

MAST ON INSIDE OF CURVED TRACK

TYPE OF MAST				RSJ (8" x 6")						B-150 K-150						B-175 K-175						B-200 K-200						B-225 K-225		
MAX. SPAN (m)	RADIUS (m)	VERSINE (MAX.) mm		N	ACC	ACA	OLC	OLA	OLI	N	ACC	ACA	OLC	OLA	OLI	N	ACC	ACA	OLC	OLA	OLI	N	ACC	ACA	OLC	OLA	OLI	OLC	OLA	OLI
63	∞ / 2500	200	REV. DEF.	0	-	-	-	-	-	-	-	-	-	-	-	-30	-30	-30	-	-	-	-	-	-	-30	-30	-30	-	-	-
			FBM. CODE	154	-	-	-	-	-	-	-	-	-	-	-	154	161	265	-	-	-	-	-	-	178	363	178	-	-	-
63	2500 / 1900	265	REV. DEF.	0	-	-	-	-	-	-	-	-	-	-	-	-30	-30	-30	-	-	-	-	-	-	-30	-30	-30	-	-	-
			FBM. CODE	154	-	-	-	-	-	-	-	-	-	-	-	154	161	265	-	-	-	-	-	-	178	363	178	-	-	-
58.5	1900 / 1600	265	REV. DEF.	0	-	-	-	-	-	-	-	-	-	-	-	-30	-30	-30	-	-	-	-	-	-	-30	-30	-30	-	-	-
			FBM. CODE	154	-	-	-	-	-	-	-	-	-	-	-	154	161	265	-	-	-	-	-	-	178	374	178	-	-	-
54	1600 / 1400	260	REV. DEF.	0	-	-	-	-	-	-	-	-	-	-	-	-30	-30	-30	-	-	-	-	-	-	-30	-30	-30	-	-	-
			FBM. CODE	154	-	-	-	-	-	-	-	-	-	-	-	154	161	265	-	-	-	-	-	-	178	374	178	-	-	-
49.5	1400 / 1150	265	REV. DEF.	0	-	-	-	-	-	-	-	-	-	-	-	-30	-30	-30	-	-	-	-	-	-	-30	-30	-30	-	-	-
			FBM. CODE	154	-	-	-	-	-	-	-	-	-	-	-	154	168	265	-	-	-	-	-	-	185	374	185	-	-	-
49.5	1150 / 850	360	REV. DEF.	0	-	-	-	-	-	-	-	-	-	-	-	-30	-30	-30	-	-	-	-	-	-	-30	-30	-30	-	-	-
			FBM. CODE	154	-	-	-	-	-	-	-	-	-	-	-	154	168	265	-	-	-	-	-	-	185	374	185	-	-	-
45	850 / 700	360	REV. DEF.	0	-	-	-	-	-	-	-	-	-	-	-	-30	-30	-30	-	-	-	-	-	-	-30	-30	-30	-	-	-
			FBM. CODE	154	-	-	-	-	-	-	-	-	-	-	-	154	168	265	-	-	-	-	-	-	185	374	185	-	-	-
40.5	700 / 550	375	REV. DEF.	0	-	-	-	-	-	-	-	-	-	-	-	-30	-30	-30	-	-	-	-	-	-	-	-30	-	-30	-	-30
			FBM. CODE	154	-	-	-	-	-	-	-	-	-	-	-	154	168	265	-	-	-	-	-	-	-	374	-	193	-	193
36	550 / 400	405	REV. DEF.	0	-	-	-	-	-	-	-	-	-	-	-	-30	-30	-	-	-	-	-	-	-30	-	-30	-	-30	-	-30
			FBM. CODE	154	-	-	-	-	-	-	-	-	-	-	-	154	168	-	-	-	-	-	-	270	-	374		193	-	193

NOTES:-

1. BEYOND THE WIND SPEED OF 33 m/s THE TRAINS WILL HAVE TO BE STOPPED.
2. THIS EMPLOYMENT SCHEDULE IS APPLICABLE FOR GREEN REGION OF BASIC WIND SPEED 47 m/s OF FIGURE-1 OF IS:875 (Part-3)-2015 REV.3 (DESIGN WIND PRESSURE 155 Kgf/m² CALCULATED AS PER CLAUSE 5.4 OF IS:875 (Part-3)-2015 REV.3).
3. THE CYCLONIC REGION AREA FACTOR(K4) HAS NOT BEEN CONSIDERED IN THE DESIGN CALCULATION GIVEN IN CLAUSE 6.3.4 OF IS: 875(PART-3)-2015(REV.3).
4. THE EMPLOYMENT SCHEDULE IS SUITABLE FOR IMPLANTATION UP TO 2.8 METER FROM THE CENTRE LINE OF NEAREST TRACK WITH +0.1 m FOR TRACK SWELLING ALLOWANCE ON SETTING OF MAST AND ON INSIDE OF CURVE EXTRA IMPLANTATION AS PER DRG. NO.ET/OHE/G/00111 SH.1 HAS BEEN CONSIDERED.
5. FOUNDATION BENDING MOMENT (FBM) CODE GIVES THE NECESSARY CROSS REFERENCE TO EQUIVALENT FOUNDATIONS, FOR FOUNDATION SELECTION SEE THE DRAWING No. TI/DRG/CIV/FND/RDSO/00001/04/0 MODIFICATION '0' CHART OF (SHEET No.1 TO 5).
6. FOR LOCATIONS WITH NON-STANDARD SPANS AND IMPLANTATIONS, THE SAFETY OF MAST AND FOUNDATION SHALL BE CHECKED AND SUITABLE MAST AND FOUNDATION SHALL BE PROVIDED.
7. REVERSE DEFLECTIONS ARE IN mm. REVERSE DEFLECTION IS POSITIVE WHEN AWAY FROM TRACK AND NEGATIVE WHEN TOWARDS IT.



8. WHERE ISOLATOR IS TO BE PROVIDED ON MAST, NEXT HIGHER SIZE OF MAST AND NEXT HIGHER FBM CODE FOR FOUNDATION SHALL BE SELECTED.
9.(a) UNDER OVERLAP CENTRAL LOCATION IN TANGENT TRACK 54 metre SPAN IS CONSIDERED.
(b) THE SPANS ON SPECIFIC LOCATION LIKE, BRIDGES, OVERLAPS, TURNOUTS, NEUTRAL SECTION ETC. SHALL BE AS PER PARA NO. 6.1.2.1, 5.8, 5.7, 5.5 OF ACTM VOL.II, PART-2.
10. THE ARRANGEMENT OF OHE AT SUPPORT HAS BEEN CONSIDERED AS PER DRAWING NO. ET/OHE/02102, SHEET-3, (REV.B)
11. MAST OF ECONOMIC SIZE SHALL BE SELECTED.
12. THE OHE SPAN AND RADIUS APPROVED BY RAILWAY BOARD FOR MIRROR IMAGE CONCEPT.

"THIS DRAWING IS THE PROPERTY OF RESEARCH, DESIGNS & STANDARDS ORGANISATION (MINISTRY OF RAILWAYS), LUCKNOW-226011, INDIA AND SHALL NOT BE USED, COPIED OR REPRODUCED, IN PART OR WHOLE, WITHOUT PRIOR CONSENT IN WRITING."

EMPLOYMENT SCHEDULE FOR OHE MAST (9.5 m) BASIC WIND SPEED 47 m/s WIND PRESSURE 155 kgf/m² (OHE + FEEDER WIRE + EARTH WIRE) 1200 kgf TENSION IN CAT. 65mm² 1200 kgf TENSION IN CONT.107mm² (WITH IMPLANTATION UP TO 2.8M)	EDTI	(BHARDWAJ CHAUDHARY)
REF:-	CROSS REF:-	

DATE	MOD.	NATURE OF MOD.	INITIAL

R. D. S. O.

	DATE	NAME
DR.		
CK.		
CK.		

TI/DRG/CIV/ES/RDSO /00004/19/0

NOT TO SCALE (SHEET-1)

ANNEXURE 6

EMPLOYMENT SCHEDULE: WIND PRESSURE 155KG/SQM

MAST ON OUTSIDE OF CURVED TRACK

TYPE OF MAST				RSJ (8" x 6")						B-150 K-150						B-175 K-175						B-200 K-200						B-225 K-225		
MAX. SPAN (m)	RADIUS (m)	VERSINE (MAX.) mm		N	ACC	ACA	OLC	OLA	OLI	N	ACC	ACA	OLC	OLA	OLI	N	ACC	ACA	OLC	OLA	OLI	N	ACC	ACA	OLC	OLA	OLI	OLC	OLA	OLI
67.5	∞	0	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	30	30	-	-	-	-	-	-	30	30	-	30	-	30	-
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	161	161	-	-	-	-	-	-	270	178	-	178	-	389	-
63	∞ / 2500	200	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	30	30	-	-	-	-	-	-	30	30	-	30	-	30	-
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	161	168	-	-	-	-	-	-	270	185	-	185	-	395	-
63	2500 / 1900	265	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	30	30	-	-	-	-	-	-	30	30	-	30	-	30	-
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	161	168	-	-	-	-	-	-	275	185	-	185	-	395	-
58.5	1900 / 1600	265	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	30	30	-	-	-	-	-	-	30	30	-	30	-	30	-
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	161	168	-	-	-	-	-	-	275	185	-	185	-	395	-
54	1600 / 1400	260	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	30	30	-	-	-	-	-	-	30	30	-	30	-	30	-
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	161	168	-	-	-	-	-	-	275	185	-	185	-	395	-
49.5	1400 / 1150	265	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	30	30	-	-	-	-	-	-	30	30	-	30	-	30	-
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	161	168	-	-	-	-	-	-	275	185	-	185	-	399	-
49.5	1150 / 850	360	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	30	30	-	-	-	-	-	-	30	-	-	-	30	30	30
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	161	168	-	-	-	-	-	-	275	-	-	-	193	399	193
45	850 / 700	360	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	30	30	-	-	-	-	-	-	30	-	-	-	30	30	30
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	161	168	-	-	-	-	-	-	275	-	-	-	193	399	193
40.5	700 / 550	375	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	30	30	-	-	-	-	-	-	30	-	-	-	30	30	30
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	168	168	-	-	-	-	-	-	275	-	-	-	193	399	193
36	550 / 400	405	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	30	30	-	-	-	-	-	-	30	-	-	-	30	30	30
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	168	168	-	-	-	-	-	-	275	-	-	-	193	399	193

MAST ON INSIDE OF CURVED TRACK

TYPE OF MAST				RSJ (8" x 6")						B-150 K-150						B-175 K-175						B-200 K-200						B-225 K-225		
MAX. SPAN (m)	RADIUS (m)	VERSINE (MAX.) mm		N	ACC	ACA	OLC	OLA	OLI	N	ACC	ACA	OLC	OLA	OLI	N	ACC	ACA	OLC	OLA	OLI	N	ACC	ACA	OLC	OLA	OLI	OLC	OLA	OLI
63	∞ / 2500	200	REV. DEF.	0	-	-	-	-	-	-	-	-	-	-	-	-30	-30	-30	-	-	-	-	-	-	-30	-30	-30	-	-	-
			FBM. CODE	154	-	-	-	-	-	-	-	-	-	-	-	154	161	265	-	-	-	-	-	-	178	363	178	-	-	-
63	2500 / 1900	265	REV. DEF.	0	-	-	-	-	-	-	-	-	-	-	-	-30	-30	-30	-	-	-	-	-	-	-30	-30	-30	-	-	-
			FBM. CODE	154	-	-	-	-	-	-	-	-	-	-	-	154	161	265	-	-	-	-	-	-	178	374	178	-	-	-
58.5	1900 / 1600	265	REV. DEF.	0	-	-	-	-	-	-	-	-	-	-	-	-30	-30	-30	-	-	-	-	-	-	-30	-30	-30	-	-	-
			FBM. CODE	154	-	-	-	-	-	-	-	-	-	-	-	154	161	265	-	-	-	-	-	-	178	374	178	-	-	-
54	1600 / 1400	260	REV. DEF.	0	-	-	-	-	-	-	-	-	-	-	-	-30	-30	-30	-	-	-	-	-	-	-30	-30	-30	-	-	-
			FBM. CODE	154	-	-	-	-	-	-	-	-	-	-	-	154	168	265	-	-	-	-	-	-	185	374	185	-	-	-
49.5	1400 / 1150	265	REV. DEF.	0	-	-	-	-	-	-	-	-	-	-	-	-30	-30	-30	-	-	-	-	-	-	-30	-30	-30	-	-	-
			FBM. CODE	154	-	-	-	-	-	-	-	-	-	-	-	154	168	265	-	-	-	-	-	-	185	374	185	-	-	-
49.5	1150 / 850	360	REV. DEF.	0	-	-	-	-	-	-	-	-	-	-	-	-30	-30	-30	-	-	-	-	-	-	-30	-30	-30	-	-	-
			FBM. CODE	154	-	-	-	-	-	-	-	-	-	-	-	154	168	265	-	-	-	-	-	-	185	374	185	-	-	-
45	850 / 700	360	REV. DEF.	0	-	-	-	-	-	-	-	-	-	-	-	-30	-30	-30	-	-	-	-	-	-	-30	-30	-30	-	-	-
			FBM. CODE	154	-	-	-	-	-	-	-	-	-	-	-	154	168	265	-	-	-	-	-	-	185	374	185	-	-	-
40.5	700 / 550	375	REV. DEF.	0	-	-	-	-	-	-	-	-	-	-	-	-30	-30	-	-	-	-	-	-	-30	-	-30	-	-30	-	-30
			FBM. CODE	154	-	-	-	-	-	-	-	-	-	-	-	154	168	-	-	-	-	-	-	270	-	374	-	193	-	193
36	550 / 400	405	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-30	-30	-	-	-	-	-	-	-30	-	-30	-	-30	-	-30
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	161	168	-	-	-	-	-	-	270	-	374		193	-	193

NOTES:–

1. BEYOND THE WIND SPEED OF 33 m/s THE TRAINS WILL HAVE TO BE STOPPED.
2. THIS EMPLOYMENT SCHEDULE IS APPLICABLE FOR GREEN REGION OF BASIC WIND SPEED 47 m/s OF FIGURE–1 OF IS:875 (Part–3)–2015 REV.III (DESIGN WIND PRESSURE 155 Kgf/m² CALCULATED AS PER CLAUSE 5.4 OF IS:875 (Part–3)–2015 REV.III).
3. THE CYCLONIC REGION AREA FACTOR(K4) HAS NOT BEEN CONSIDERED IN THE DESIGN CALCULATION GIVEN IN CLAUSE 8.3.4 OF IS: 875(PART–3)–2015(REV.III)
4. THE EMPLOYMENT SCHEDULE IS SUITABLE FOR IMPLANTATION UP TO 3.8 METER FROM THE CENTRE LINE OF NEAREST TRACK WITH +0.1 m FOR TRACK SHIELDING ALLOWANCE ON SETTING OF MAST AND ON INSIDE OF CURVE EXTRA IMPLANTATION AS PER DRG. NO.ES/I/OHE/S/00111 SH.1 HAS BEEN CONSIDERED.
5. FOUNDATION BENDING MOMENT (FBM) CODE GIVES THE NECESSARY CROSS REFERENCE TO EQUIVALENT FOUNDATIONS, FOR FOUNDATION SELECTION SEE THE DRAWING No. TI/DRG/CIV/FND/RDSO/00001/04/0 MODIFICATION 'B' CHART OF (SHEET No.1 TO 5).
6. FOR LOCATIONS WITH NON–STANDARD SPANS AND IMPLANTATIONS, THE SAFETY OF MAST AND FOUNDATION SHALL BE CHECKED AND SUITABLE MAST AND FOUNDATION SHALL BE PROVIDED.
7. REVERSE DEFLECTIONS ARE IN mm. REVERSE DEFLECTION IS POSITIVE WHEN AWAY FROM TRACK AND NEGATIVE WHEN TOWARDS IT.



8. WHERE ISOLATOR IS TO BE PROVIDED ON MAST, NEXT HIGHER SIZE OF MAST AND NEXT HIGHER FBM CODE FOR FOUNDATION SHALL BE SELECTED.
9. (a) UNDER OVERLAP CENTRAL LOCATION IN TANGENT TRACK 54 metre SPAN IS CONSIDERED.
   (b) THE SPANS ON SPECIFIC LOCATION LIKE, BRIDGES, OVERLAPS, TURNOUTS, NEUTRAL SECTION ETC. SHALL BE AS PER PARA NO. 8.1.2.1, 5.6, 5.7, 5.5 OF ACTM VOL.II, PART–2.
10. THE ARRANGEMENT OF OHE AT SUPPORT HAS BEEN CONSIDERED AS PER DRAWING NO. ES/OHE/02102. SHEET–3. (REV.B)
11. MAST OF ECONOMIC SIZE SHALL BE SELECTED.
12. THE OHE SPAN AND RADIUS APPROVED BY RAILWAY BOARD FOR MIRROR IMAGE CONCEPT.

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EMPLOYMENT SCHEDULE FOR OHE MAST (9.5 m)
BASIC WIND SPEED 47 m/s
WIND PRESSURE 155 kgf/m²
(OHE + FEEDER WIRE + EARTH WIRE)
1200 kgf TENSION IN CAT. 65mm²
1200 kgf TENSION IN CONT.107mm²
(WITH IMPLANTATION MORE THAN 2.8M AND UP TO 3.8M)

EDTI (BHARDWAJ CHAUDHARY)

REF:– CROSS REF:–

DATE	MOD.	NATURE OF MOD.	INITIAL

R. D. S. O.

	DATE	NAME
DR.		
CK.		
CK.		

TI/DRG/CIV/ES/RDSO /00004/19/0

NOT TO SCALE (SHEET–2)

ANNEXURE 7

EMPLOYMENT SCHEDULE: WIND PRESSURE 155KG/SQM

MAST ON OUTSIDE OF CURVED TRACK

TYPE OF MAST				RSJ (8" x 6")						B-150 K-150						B-175 K-175						B-200 K-200						B-225 K-225		
MAX. SPAN (m)	RADIUS (m)	VERSINE (MAX.) mm		N	ACC	ACA	OLC	OLA	OLI	N	ACC	ACA	OLC	OLA	OLI	N	ACC	ACA	OLC	OLA	OLI	N	ACC	ACA	OLC	OLA	OLI	OLC	OLA	OLI
67.5	∞	0	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	30	30	-	-	-	-	-	-	30	30	-	30	-	30	-
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	161	168	-	-	-	-	-	-	270	185	-	185	-	395	-
63	∞ / 2500	200	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	30	30	-	-	-	-	-	-	30	30	-	30	-	30	-
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	161	168	-	-	-	-	-	-	275	185	-	185	-	395	-
63	2500 / 1900	265	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	30	30	-	-	-	-	-	-	30	30	-	30	-	30	-
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	161	168	-	-	-	-	-	-	275	185	-	185	-	395	-
58.5	1900 / 1600	265	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	30	30	-	-	-	-	-	-	30	30	-	30	-	30	-
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	161	168	-	-	-	-	-	-	275	185	-	185	-	395	-
54	1600 / 1400	260	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	30	30	-	-	-	-	-	-	30	30	-	30	-	30	-
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	161	168	-	-	-	-	-	-	275	185	-	185	-	395	-
49.5	1400 / 1150	265	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	30	30	-	-	-	-	-	-	30	30	-	30	-	30	-
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	161	168	-	-	-	-	-	-	275	185	-	185	-	399	-
49.5	1150 / 850	360	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	30	30	-	-	-	-	-	-	30	-	-	-	30	30	30
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	161	168	-	-	-	-	-	-	275	-	-	-	193	399	193
45	850 / 700	360	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	30	30	-	-	-	-	-	-	30	-	-	-	30	30	30
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	168	168	-	-	-	-	-	-	275	-	-	-	193	399	193
40.5	700 / 550	375	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	30	30	-	-	-	-	-	-	30	-	-	-	30	30	30
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	168	168	-	-	-	-	-	-	275	-	-	-	193	399	193
36	550 / 400	405	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	30	30	-	-	-	-	-	-	30	-	-	-	30	30	30
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	168	168	-	-	-	-	-	-	275	-	-	-	193	399	193

MAST ON INSIDE OF CURVED TRACK

TYPE OF MAST				RSJ (8" x 6")						B-150 K-150						B-175 K-175						B-200 K-200						B-225 K-225		
MAX. SPAN (m)	RADIUS (m)	VERSINE (MAX.) mm		N	ACC	ACA	OLC	OLA	OLI	N	ACC	ACA	OLC	OLA	OLI	N	ACC	ACA	OLC	OLA	OLI	N	ACC	ACA	OLC	OLA	OLI	OLC	OLA	OLI
63	∞ / 2500	200	REV. DEF.	0	-	-	-	-	-	-	-	-	-	-	-	-30	-30	-30	-	-	-	-	-	-	-30	-30	-30	-	-	-
			FBM. CODE	154	-	-	-	-	-	-	-	-	-	-	-	154	161	265	-	-	-	-	-	-	178	374	178	-	-	-
63	2500 / 1900	265	REV. DEF.	0	-	-	-	-	-	-	-	-	-	-	-	-30	-30	-30	-	-	-	-	-	-	-30	-30	-30	-	-	-
			FBM. CODE	154	-	-	-	-	-	-	-	-	-	-	-	154	161	265	-	-	-	-	-	-	178	374	178	-	-	-
58.5	1900 / 1600	265	REV. DEF.	0	-	-	-	-	-	-	-	-	-	-	-	-30	-30	-30	-	-	-	-	-	-	-30	-30	-30	-	-	-
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54	1600 / 1400	260	REV. DEF.	0	-	-	-	-	-	-	-	-	-	-	-	-30	-30	-30	-	-	-	-	-	-	-30	-30	-30	-	-	-
			FBM. CODE	154	-	-	-	-	-	-	-	-	-	-	-	154	168	265	-	-	-	-	-	-	185	374	185	-	-	-
49.5	1400 / 1150	265	REV. DEF.	0	-	-	-	-	-	-	-	-	-	-	-	-30	-30	-30	-	-	-	-	-	-	-30	-30	-30	-	-	-
			FBM. CODE	154	-	-	-	-	-	-	-	-	-	-	-	154	168	265	-	-	-	-	-	-	185	374	185	-	-	-
49.5	1150 / 850	360	REV. DEF.	0	-	-	-	-	-	-	-	-	-	-	-	-30	-30	-30	-	-	-	-	-	-	-30	-30	-30	-	-	-
			FBM. CODE	154	-	-	-	-	-	-	-	-	-	-	-	154	168	265	-	-	-	-	-	-	185	374	185	-	-	-
45	850 / 700	360	REV. DEF.	0	-	-	-	-	-	-	-	-	-	-	-	-30	-30	-	-	-	-	-	-	-30	-30	-30	-30	-	-	-
			FBM. CODE	154	-	-	-	-	-	-	-	-	-	-	-	154	168	-	-	-	-	-	-	270	185	374	185	-	-	-
40.5	700 / 550	375	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-30	-30	-	-	-	-	-	-	-30	-	-30	-	-30	-	-30
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	161	168	-	-	-	-	-	-	270	-	374	-	193	-	193
36	550 / 400	405	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-30	-30	-	-	-	-	-	-	-30	-	-30	-	-30	-	-30
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	161	168	-	-	-	-	-	-	270	-	374		193	-	193

NOTES:–

1. BEYOND THE WIND SPEED OF 33 m/s THE TRAINS WILL HAVE TO BE STOPPED.
2. THIS EMPLOYMENT SCHEDULE IS APPLICABLE FOR GREEN REGION OF BASIC WIND SPEED 47 m/s OF FIGURE–1 OF IS:875 (Part–3)–2015 REV.III (DESIGN WIND PRESSURE 155 Kgf/m²) CALCULATED AS PER CLAUSE 5.4 OF IS:875 (Part–3)–2015 REV.III).
3. THE CYCLONIC REGION AREA FACTOR(K4) HAS NOT BEEN CONSIDERED IN THE DESIGN CALCULATION GIVEN IN CLAUSE 8.3.4 OF IS: 875(PART–3)–2015(REV.III)
4. THE EMPLOYMENT SCHEDULE IS SUITABLE FOR IMPLANTATION UP TO 4.85 METER FROM THE CENTRE LINE OF NEAREST TRACK WITH +0.1 m FOR TRACK SHELLING ALLOWANCE ON SETTING OF MAST AND ON INSIDE OF CURVE EXTRA IMPLANTATION AS PER DRG. NO.ET/OHE/G/00111 SH.1 HAS BEEN CONSIDERED.
5. FOUNDATION BENDING MOMENT (FBM) CODE GIVES THE NECESSARY CROSS REFERENCE TO EQUIVALENT FOUNDATIONS, FOR FOUNDATION SELECTION SEE THE DRAWING No. TI/DRG/CIV/FND/RDSO/00001/04/0 MODIFICATION 'B' CHART OF (SHEET No.1 TO 5).
6. FOR LOCATIONS WITH NON–STANDARD SPANS AND IMPLANTATIONS, THE SAFETY OF MAST AND FOUNDATION SHALL BE CHECKED AND SUITABLE MAST AND FOUNDATION SHALL BE PROVIDED.
7. REVERSE DEFLECTIONS ARE IN mm. REVERSE DEFLECTION IS POSITIVE WHEN AWAY FROM TRACK AND NEGATIVE WHEN TOWARDS IT.



8. WHERE ISOLATOR IS TO BE PROVIDED ON MAST, NEXT HIGHER SIZE OF MAST AND NEXT HIGHER FBM CODE FOR FOUNDATION SHALL BE SELECTED.
9.(a) UNDER OVERLAP CENTRAL LOCATION IN TANGENT TRACK 54 metre SPAN IS CONSIDERED.
(b) THE SPANS ON SPECIFIC LOCATION LIKE, BRIDGES, OVERLAPS, TURNOUTS, NEUTRAL SECTION ETC. SHALL BE AS PER PARA NO. 6.1.2.1, 5.8, 5.7, 5.5 OF ACTM VOL.II, PART–2.
10. THE ARRANGEMENT OF OHE AT SUPPORT HAS BEEN CONSIDERED AS PER DRAWING NO. ET/OHE/02102, SHEET–3, (REV.B)
11. MAST OF ECONOMIC SIZE SHALL BE SELECTED.
12. THE OHE SPAN AND RADIUS APPROVED BY RAILWAY BOARD FOR MIRROR IMAGE CONCEPT.

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EMPLOYMENT SCHEDULE FOR OHE MAST (9.5 m)
BASIC WIND SPEED 47 m/s
WIND PRESSURE 155 kgf/m²
(OHE + FEEDER WIRE + EARTH WIRE)
1200 kgf TENSION IN CAT. 65mm²
1200 kgf TENSION IN CONT.107mm²
(WITH IMPLANTATION MORE THAN 3.8M AND UP TO 4.85M)

EDTI (BHARDWAJ CHAUDHARY)

REF:– CROSS REF:–

DATE	MOD.	NATURE OF MOD.	INITIAL

R. D. S. O.

	DATE	NAME
DR.		
CK.		
CK.		

TI/DRG/CIV/ES/RDSO /00004/19/0

NOT TO SCALE (SHEET–3)

ANNEXURE 8

EMPLOYMENT SCHEDULE: WIND PRESSURE 178KGF/SQM

MAST ON OUTSIDE OF CURVED TRACK

MAX. SPAN (m)	RADIUS (m)	VERSINE (MAX.) mm		RSJ (8" x 6") N	RSJ (8" x 6") ACC	RSJ (8" x 6") ACA	RSJ (8" x 6") OLC	RSJ (8" x 6") OLA	RSJ (8" x 6") OLI	B-150 K-150 N	B-150 K-150 ACC	B-150 K-150 ACA	B-150 K-150 OLC	B-150 K-150 OLA	B-150 K-150 OLI	B-175 K-175 N	B-175 K-175 ACC	B-175 K-175 ACA	B-175 K-175 OLC	B-175 K-175 OLA	B-175 K-175 OLI	B-200 K-200 N	B-200 K-200 ACC	B-200 K-200 ACA	B-200 K-200 OLC	B-200 K-200 OLA	B-200 K-200 OLI	B-225 K-225 OLC	B-225 K-225 OLA	B-225 K-225 OLI
63	∞	0	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	30	30	30	-	30	-	30	-
			FEM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	168	173	270	178	-	178	-	389	-
58.5	∞ / 2500	175	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	30	30	30	-	30	-	30	-
			FEM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	168	173	275	185	-	185	-	395	-
58.5	2500 / 1900	225	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	30	30	30	-	30	-	30	-
			FEM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	168	173	275	185	-	185	-	395	-
58.5	1900 / 1600	265	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	30	30	-	-	-	30	30	30
			FEM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	168	173	275	-	-	-	193	395	193
54	1600 / 1400	260	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	30	30	-	-	-	30	30	30
			FEM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	168	173	SPL	-	-	-	193	399	193
49.5	1400 / 1150	265	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	30	30	-	-	-	30	30	30
			FEM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	168	173	SPL	-	-	-	193	399	193
49.5	1150 / 850	360	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	30	30	-	-	-	30	30	30
			FEM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	168	173	SPL	-	-	-	193	399	193
45	850 / 700	360	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	30	30	-	-	-	30	30	30
			FEM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	168	173	SPL	-	-	-	193	399	193
40.5	700 / 550	375	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	30	30	-	-	-	30	30	30
			FEM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	168	173	SPL	-	-	-	199	399	199
36	550 / 400	405	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	30	30	-	-	-	30	30	30
			FEM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	168	173	SPL	-	-	-	199	399	199

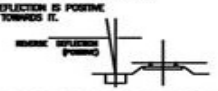
MAST ON INSIDE OF CURVED TRACK

MAX. SPAN (m)	RADIUS (m)	VERSINE (MAX.) mm		RSJ (8" x 6") N	RSJ (8" x 6") ACC	RSJ (8" x 6") ACA	RSJ (8" x 6") OLC	RSJ (8" x 6") OLA	RSJ (8" x 6") OLI	B-150 K-150 N	B-150 K-150 ACC	B-150 K-150 ACA	B-150 K-150 OLC	B-150 K-150 OLA	B-150 K-150 OLI	B-175 K-175 N	B-175 K-175 ACC	B-175 K-175 ACA	B-175 K-175 OLC	B-175 K-175 OLA	B-175 K-175 OLI	B-200 K-200 N	B-200 K-200 ACC	B-200 K-200 ACA	B-200 K-200 OLC	B-200 K-200 OLA	B-200 K-200 OLI	B-225 K-225 OLC	B-225 K-225 OLA	B-225 K-225 OLI
58.5	∞ / 2500	175	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-30	-	-	-	-	-	-	-30	-30	-30	-	-30	-	-30	-
			FEM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	161	-	-	-	-	-	-	173	270	178	-	178	-	374	-
58.5	2500 / 1900	225	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-30	-	-	-	-	-	-	-30	-30	-30	-	-30	-	-30	-
			FEM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	161	-	-	-	-	-	-	173	270	178	-	178	-	374	-
58.5	1900 / 1600	265	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-30	-	-	-	-	-	-	-30	-30	-30	-	-30	-	-30	-
			FEM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	161	-	-	-	-	-	-	173	270	185	-	185	-	374	-
54	1600 / 1400	260	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-30	-	-	-	-	-	-	-30	-30	-30	-	-30	-	-30	-
			FEM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	161	-	-	-	-	-	-	173	270	185	-	185	-	389	-
49.5	1400 / 1150	265	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-30	-	-	-	-	-	-	-30	-30	-30	-	-30	-	-30	-
			FEM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	161	-	-	-	-	-	-	173	270	185	-	185	-	389	-
49.5	1150 / 850	360	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-30	-	-	-	-	-	-	-30	-30	-	-	-	-30	-30	-30
			FEM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	161	-	-	-	-	-	-	173	270	-	-	-	193	389	193
45	850 / 700	360	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-30	-	-	-	-	-	-	-30	-30	-	-	-	-30	-30	-30
			FEM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	161	-	-	-	-	-	-	173	270	-	-	-	193	389	193
40.5	700 / 550	375	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-30	-	-	-	-	-	-	-30	-30	-	-	-	-30	-30	-30
			FEM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	161	-	-	-	-	-	-	173	270	-	-	-	193	389	193
36	550 / 400	405	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-30	-	-	-	-	-	-	-30	-30	-	-	-	-30	-30	-30
			FEM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	161	-	-	-	-	-	-	173	270	-	-	-	193	389	193

NOTE: 1. FOR OUTSIDE CURVE, ACA LOCATION ONE MAST B/K-200 WITH SPECIAL FOUNDATION DESIGN FOR BENDING MOMENT 8000 KGM TO BE ADOPTED.
2. FOR OUTSIDE CURVE, OLA LOCATION ONE MAST B/K-225 WITH SPECIAL FOUNDATION DESIGN FOR BENDING MOMENT UPTO 11000 KGM TO BE ADOPTED.

NOTES:-

1. BEYOND THE WIND SPEED OF 33 m/s, THE TRAINS WILL HAVE TO BE STOPPED.
2. THIS EMPLOYMENT SCHEDULE IS APPLICABLE FOR RED REGION OF BASIC WIND SPEED 50 m/s OF FIGURE-1 OF IS:875 (Part-3)-2015 REV.III (DESIGN WIND PRESSURE 178 Kgf/m² CALCULATED AS PER CLAUSE 5.4 OF IS:875 (Part-3)-2015 REV.III).
3. THE CYCLONIC REGION AREA FACTOR(K4) HAS NOT BEEN CONSIDERED IN THE DESIGN CALCULATION GIVEN IN CLAUSE 6.3.4 OF IS: 875(PART-3)-2015(REV.III).
4. THE EMPLOYMENT SCHEDULE IS SUITABLE FOR IMPLANTATION UP TO 2.8 METER FROM THE CENTRE LINE OF NEAREST TRACK WITH +0.1 m FOR TRACK SWELLING ALLOWANCE ON SETTING OF MAST AND ON INSIDE OF CURVE EXTRA IMPLANTATION AS PER DRG. NO.ET/OHE/S/00111 SH.1 HAS BEEN CONSIDERED.
5. FOUNDATION BENDING MOMENT (FBM) CODE GIVES THE NECESSARY CROSS REFERENCE TO EQUIVALENT FOUNDATIONS, FOR FOUNDATION SELECTION SEE THE DRAWING No. TI/DRG/CIV/FND/RDSO/00001/04/0 MODIFICATION 'B' CHART OF (SHEET No.1 TO 3).
6. FOR LOCATIONS WITH NON-STANDARD SPANS AND IMPLANTATIONS, THE SAFETY OF MAST AND FOUNDATION SHALL BE CHECKED AND SUITABLE MAST AND FOUNDATION SHALL BE PROVIDED.
7. REVERSE DEFLECTIONS ARE IN mm. REVERSE DEFLECTION IS POSITIVE WHEN AWAY FROM TRACK AND NEGATIVE WHEN TOWARDS IT.



8. WHERE SIDE/ER IS TO BE PROVIDED ON MAST, NEXT HIGHER SIZE OF MAST AND NEXT HIGHER FBM CODE FOR FOUNDATION SHALL BE SELECTED.
9.(a) UNDER OVERLAP CENTRAL LOCATION IN TANGENT TRACK 54 metre SPAN IS CONSIDERED.
(b) THE SPANS ON SPECIFIC LOCATION LIKE, BRIDGES, OVERLAPS, TURNOUTS, NEUTRAL SECTION ETC. SHALL BE AS PER PARA NO. 6.1.2.1, 6.6, 6.7, 6.8 OF ACTN VOL.II, PART-2.
10. THE ARRANGEMENT OF OHE AT SUPPORT HAS BEEN CONSIDERED AS PER DRAWING NO. ET/OHE/02102. SHEET-3. (REV.B)
11. MAST OF ECONOMIC SIZE SHALL BE SELECTED.
12. THE OHE SPAN AND RADIUS APPROVED BY RAILWAY BOARD FOR MIRROR IMAGE CONCEPT HAS BEEN ADOPTED.

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EMPLOYMENT SCHEDULE FOR OHE MAST (9.5 m)
BASIC WIND SPEED 50 m/s
WIND PRESSURE 178 kgf/m²
(OHE + FEEDER WIRE + EARTH WIRE)
1200 kgf TENSION IN CAT. 65mm²
1200 kgf TENSION IN CONT.107mm²
(WITH IMPLANTATION UP TO 2.8M)

EDTI (BHARDWAJ CHAUDHARY)

REF:- CROSS REF:-

DATE	MOD.	NATURE OF MOD.	INITIAL

R. D. S. O.

	DATE	NAME
DR.		
CK.		
CK.		

TI/DRG/CIV/ES/RDSO /00004/19/0

NOT TO SCALE (SHEET-4)

ANNEXURE 9

EMPLOYMENT SCHEDULE: WIND PRESSURE 178KG/SQM

MAST ON OUTSIDE OF CURVED TRACK

TYPE OF MAST				RSJ (8" x 6")						B-150 K-150						B-175 K-175						B-200 K-200						B-225 K-225		
MAX. SPAN (m)	RADIUS (m)	VERSINE (MAX.) mm		N	ACC	ACA	OLC	OLA	OLI	N	ACC	ACA	OLC	OLA	OLI	N	ACC	ACA	OLC	OLA	OLI	N	ACC	ACA	OLC	OLA	OLI	OLC	OLA	OLI
63	∞	0	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	30	30	30	-	30	-	30	-
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	168	173	270	185	-	185	-	395	-
58.5	∞ / 2500	175	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	30	30	30	-	30	-	30	-
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	168	173	275	185	-	185	-	395	-
58.5	2500 / 1900	225	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	30	30	30	-	30	-	30	-
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	168	173	275	185	-	185	-	395	-
58.5	1900 / 1600	265	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	30	30	-	-	-	30	30	30
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	168	173	SPL	-	-	-	193	395	193
54	1600 / 1400	260	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	30	30	-	-	-	30	30	30
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	168	173	SPL	-	-	-	193	399	193
49.5	1400 / 1150	265	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	30	30	-	-	-	30	30	30
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	168	173	SPL	-	-	-	193	399	193
49.5	1150 / 850	360	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	30	30	-	-	-	30	30	30
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	168	173	SPL	-	-	-	193	399	193
45	850 / 700	360	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	30	30	-	-	-	30	30	30
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	168	173	SPL	-	-	-	193	399	193
40.5	700 / 550	375	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	30	30	-	-	-	30	30	30
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	173	178	SPL	-	-	-	199	399	199
36	550 / 400	405	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	30	30	-	-	-	30	30	30
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	173	178	SPL	-	-	-	199	399	199

MAST ON INSIDE OF CURVED TRACK

TYPE OF MAST				RSJ (8" x 6")						B-150 K-150						B-175 K-175						B-200 K-200						B-225 K-225		
MAX. SPAN (m)	RADIUS (m)	VERSINE (MAX.) mm		N	ACC	ACA	OLC	OLA	OLI	N	ACC	ACA	OLC	OLA	OLI	N	ACC	ACA	OLC	OLA	OLI	N	ACC	ACA	OLC	OLA	OLI	OLC	OLA	OLI
58.5	∞ / 2500	175	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-30	-	-	-	-	-	-	-30	-30	-30	-	-30	-	-30	-
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	161	-	-	-	-	-	-	173	270	178	-	178	-	374	-
58.5	2500 / 1900	225	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-30	-	-	-	-	-	-	-30	-30	-30	-	-30	-	-30	-
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	161	-	-	-	-	-	-	173	270	185	-	185	-	374	-
58.5	1900 / 1600	265	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-30	-	-	-	-	-	-	-30	-30	-30	-	-30	-	-30	-
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	161	-	-	-	-	-	-	173	270	185	-	185	-	389	-
54	1600 / 1400	260	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-30	-	-	-	-	-	-	-30	-30	-30	-	-30	-	-30	-
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	161	-	-	-	-	-	-	173	270	185	-	185	-	389	-
49.5	1400 / 1150	265	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-30	-	-	-	-	-	-	-30	-30	-30	-	-30	-	-30	-
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	161	-	-	-	-	-	-	173	270	185	-	185	-	389	-
49.5	1150 / 850	360	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-30	-	-	-	-	-	-	-30	-30	-	-	-	-30	-30	-30
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	161	-	-	-	-	-	-	173	270	-	-	-	193	389	193
45	850 / 700	360	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-30	-	-	-	-	-	-	-30	-30	-	-	-	-30	-30	-30
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	161	-	-	-	-	-	-	173	270	-	-	-	193	389	193
40.5	700 / 550	375	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-30	-	-	-	-	-	-	-30	-30	-	-	-	-30	-30	-30
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	161	-	-	-	-	-	-	173	275	-	-	-	193	389	193
36	550 / 400	405	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-30	-30	-30	-	-	-	-30	-30	-30
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	168	178	275	-	-	-	193	389	193

NOTE: 1. FOR OUTSIDE CURVE, ACA LOCATION ONE MAST B/K-200 WITH SPECIAL FOUNDATION DESIGN FOR BENDING MOMENT 8000 KGM TO BE ADOPTED.
2. FOR OUTSIDE CURVE, OLA LOCATION ONE MAST B/K-225 WITH SPECIAL FOUNDATION DESIGN FOR BENDING MOMENT UPTO 11000 KGM TO BE ADOPTED.

NOTES:–

1. BEYOND THE WIND SPEED OF 33 m/s, THE TRAINS WILL HAVE TO BE STOPPED.
2. THIS EMPLOYMENT SCHEDULE IS APPLICABLE FOR RED REGION OF BASIC WIND SPEED 50 m/s OF FIGURE–1 OF IS:875 (Part–3)–2015 REV.3 (DESIGN WIND PRESSURE 178 Kgf/m²) CALCULATED AS PER CLAUSE 5.4 OF IS:875 (Part–3)–2015 REV.3).
3. THE CYCLONIC REGION AREA FACTOR(K4) HAS NOT BEEN CONSIDERED IN THE DESIGN CALCULATION GIVEN IN CLAUSE 6.3.4 OF IS: 875(PART–3)–2015(REV.3).
4. THE EMPLOYMENT SCHEDULE IS SUITABLE FOR IMPLANTATION UP TO 3.8 METER FROM THE CENTRE LINE OF NEAREST TRACK WITH +0.1 m FOR TRACK SHIELDING ALLOWANCE ON SETTING OF MAST AND ON INSIDE OF CURVE EXTRA IMPLANTATION AS PER DRG. NO.TI/DHE/S/00111 SH.1 HAS BEEN CONSIDERED.
5. FOUNDATION BENDING MOMENT (FBM) CODE GIVES THE NECESSARY CROSS REFERENCE TO EQUIVALENT FOUNDATIONS, FOR FOUNDATION SELECTION SEE THE DRAWING No. TI/DRG/CIV/FND/RDSO/00001/04/0 MODIFICATION 'B' CHART OF (SHEET No.1 TO 5).
6. FOR LOCATIONS WITH NON–STANDARD SPANS AND IMPLANTATIONS, THE SAFETY OF MAST AND FOUNDATION SHALL BE CHECKED AND SUITABLE MAST AND FOUNDATION SHALL BE PROVIDED.
7. REVERSE DEFLECTIONS ARE IN mm. REVERSE DEFLECTION IS POSITIVE WHEN AWAY FROM TRACK AND NEGATIVE WHEN TOWARDS IT.



8. WHERE ISOLATOR IS TO BE PROVIDED ON MAST, NEXT HIGHER SIZE OF MAST AND NEXT HIGHER FBM CODE FOR FOUNDATION SHALL BE SELECTED.
9. (a) UNDER OVERLAP CENTRAL LOCATION IN TANGENT TRACK 54 metre SPAN IS CONSIDERED.
   (b) THE SPANS ON SPECIFIC LOCATION LIKE, BRIDGES, OVERLAPS, TURNOUTS, NEUTRAL SECTION ETC. SHALL BE AS PER PARA NO. 6.1.2.1, 5.6, 5.7, 5.5 OF ACTM VOL.II, PART–2.
10. THE ARRANGEMENT OF OHE AT SUPPORT HAS BEEN CONSIDERED AS PER DRAWING NO. EX/OHE/0210Z, SHEET–3. (REV.B)
11. MAST OF ECONOMIC SIZE SHALL BE SELECTED.
12. THE OHE SPAN AND RADIUS APPROVED BY RAILWAY BOARD FOR MIRROR IMAGE CONCEPT HAS BEEN ADOPTED.

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EMPLOYMENT SCHEDULE FOR OHE MAST (9.5 m)
BASIC WIND SPEED 50 m/s
WIND PRESSURE 178 kgf/m²
(OHE + FEEDER WIRE + EARTH WIRE)
1200 kgf TENSION IN CAT. 65mm²
1200 kgf TENSION IN CONT.107mm²
(WITH IMPLANTATION MORE THAN 2.8M AND UP TO 3.8M)

EDTI (BHARDWAJ CHAUDHARY)

REF:–

CROSS REF:–

DATE	MOD.	NATURE OF MOD.	INITIAL

R. D. S. O.

	DATE	NAME
DR.		
CK.		
CK.		

TI/DRG/CIV/ES/RDSO /00004/19/0

NOT TO SCALE (SHEET–5)

ANNEXURE 10

EMPLOYMENT SCHEDULE: WIND PRESSURE 178KGF/SQM

MAST ON OUTSIDE OF CURVED TRACK

TYPE OF MAST				RSJ (8" × 6")						B-150 K-150						B-175 K-175						B-200 K-200						B-225 K-225		
MAX. SPAN (m)	RADIUS (m)	VERSION & (MAX.) mm		N	ACC	ACA	OLC	OLA	OLI	N	ACC	ACA	OLC	OLA	OLI	N	ACC	ACA	OLC	OLA	OLI	N	ACC	ACA	OLC	OLA	OLI	OLC	OLA	OLI
63	∞	0	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	30	30	30	-	30	-	30	-
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	168	173	275	185	-	185	-	395	-
58.5	∞ / 2500	175	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	30	30	30	-	30	-	30	-
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	168	173	275	185	-	185	-	395	-
58.5	2500 / 1900	225	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	30	30	-	-	-	30	30	30
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	168	173	275	-	-	-	193	395	193
58.5	1900 / 1600	265	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	30	30	-	-	-	30	30	30
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	168	173	SPL	-	-	-	193	399	193
54	1600 / 1400	260	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	30	30	-	-	-	30	30	30
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	168	173	SPL	-	-	-	193	399	193
49.5	1400 / 1150	265	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	30	30	-	-	-	30	30	30
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	168	173	SPL	-	-	-	193	399	193
49.5	1150 / 850	360	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	30	30	-	-	-	30	30	30
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	173	173	SPL	-	-	-	193	399	193
45	850 / 700	360	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	30	30	-	-	-	30	30	30
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	173	178	SPL	-	-	-	193	399	193
40.5	700 / 550	375	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	30	30	-	-	-	30	30	30
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	173	178	SPL	-	-	-	199	399	199
36	550 / 400	405	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	30	30	-	-	-	30	30	30
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	173	178	SPL	-	-	-	199	399	199

MAST ON INSIDE OF CURVED TRACK

TYPE OF MAST				RSJ (8" × 6")						B-150 K-150						B-175 K-175						B-200 K-200						B-225 K-225		
MAX. SPAN (m)	RADIUS (m)	VERSION & (MAX.)		N	ACC	ACA	OLC	OLA	OLI	N	ACC	ACA	OLC	OLA	OLI	N	ACC	ACA	OLC	OLA	OLI	N	ACC	ACA	OLC	OLA	OLI	OLC	OLA	OLI
58.5	∞ / 2500	175	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-30	-	-	-	-	-	-	-30	-30	-30	-	-30	-	-30	-
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	161	-	-	-	-	-	-	173	270	178	-	178	-	374	-
58.5	2500 / 1900	225	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-30	-	-	-	-	-	-	-30	-30	-30	-	-30	-	-30	-
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	161	-	-	-	-	-	-	173	270	185	-	185	-	389	-
58.5	1900 / 1600	265	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-30	-	-	-	-	-	-	-30	-30	-30	-	-30	-	-30	-
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	161	-	-	-	-	-	-	173	270	185	-	185	-	389	-
54	1600 / 1400	260	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-30	-	-	-	-	-	-	-30	-30	-30	-	-30	-	-30	-
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	161	-	-	-	-	-	-	173	270	185	-	185	-	389	-
49.5	1400 / 1150	265	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-30	-	-	-	-	-	-	-30	-30	-	-	-	-30	-30	-30
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	161	-	-	-	-	-	-	173	270	-	-	-	193	389	193
49.5	1150 / 850	360	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-30	-	-	-	-	-	-	-30	-30	-	-	-	-30	-30	-30
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	161	-	-	-	-	-	-	173	270	-	-	-	193	389	193
45	850 / 700	360	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-30	-	-	-	-	-	-	-30	-30	-	-	-	-30	-30	-30
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	161	-	-	-	-	-	-	173	275	-	-	-	193	389	193
40.5	700 / 550	375	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-30	-30	-30	-	-	-	-30	-30	-30
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	168	178	275	-	-	-	193	389	193
36	550 / 400	405	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-30	-30	-30	-	-	-	-30	-30	-30
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	168	178	275	-	-	-	193	389	193

NOTE: 1. FOR OUTSIDE CURVE, ACA LOCATION ONE MAST B/K-200 WITH SPECIAL FOUNDATION DESIGN FOR BENDING MOMENT 8000 KG.M TO BE ADOPTED.
2. FOR OUTSIDE CURVE, OLA LOCATION ONE MAST B/K-225 WITH SPECIAL FOUNDATION DESIGN FOR BENDING MOMENT UPTO 11000 KG.M TO BE ADOPTED.

NOTES:–

1. BEYOND THE WIND SPEED OF 33 m/s, THE TRAINS WILL HAVE TO BE STOPPED.
2. THIS EMPLOYMENT SCHEDULE IS APPLICABLE FOR RED REGION OF BASIC WIND SPEED 50 m/s OF FIGURE–1 OF IS:875 (Part–3)–2015 REV.III (DESIGN WIND PRESSURE 178 Kgf/m² CALCULATED AS PER CLAUSE 5.4 OF IS:875 (Part–3)–2015 REV.III).
3. THE CYCLONIC REGION AREA FACTOR(K4) HAS NOT BEEN CONSIDERED IN THE DESIGN CALCULATION GIVEN IN CLAUSE 8.3.4 OF IS: 875(PART–3)–2015(REV.III).
4. THE EMPLOYMENT SCHEDULE IS SUITABLE FOR IMPLANTATION UP TO 4.85 METER FROM THE CENTRE LINE OF NEAREST TRACK WITH +0.1 m FOR TRACK SHELLING ALLOWANCE ON SETTING OF MAST AND ON INSIDE OF CURVE EXTRA IMPLANTATION AS PER DRG. NO.ET/OHE/0/00111 SH.1 HAS BEEN CONSIDERED.
5. FOUNDATION BENDING MOMENT (FBM) CODE GIVES THE NECESSARY CROSS REFERENCE TO EQUIVALENT FOUNDATIONS, FOR FOUNDATION SELECTION SEE THE DRAWING No. TI/DRG/CIV/FND/RDSO/00001/04/0 MODIFICATION 'O' CHART OF (SHEET No.1 TO 5).
6. FOR LOCATIONS WITH NON–STANDARD SPANS AND IMPLANTATIONS, THE SAFETY OF MAST AND FOUNDATION SHALL BE CHECKED AND SUITABLE MAST AND FOUNDATION SHALL BE PROVIDED.
7. REVERSE DEFLECTIONS ARE IN mm. REVERSE DEFLECTION IS POSITIVE WHEN AWAY FROM TRACK AND NEGATIVE WHEN TOWARDS IT.



8. WHERE ISOLATOR IS TO BE PROVIDED ON MAST, NEXT HIGHER SIZE OF MAST AND NEXT HIGHER FBM CODE FOR FOUNDATION SHALL BE SELECTED.
9. (a) UNDER OVERLAP CONTINL LOCATION IN TANGENT TRACK 54 metre SPAN IS CONSIDERED.
   (b) THE SPANS ON SPECIFIC LOCATION LIKE, BRIDGES, OVERLAPS, TURNOUTS, NEUTRAL SECTION ETC. SHALL BE AS PER PARA NO. 6.1.2.1, 5.6, 5.7, 5.5 OF ACTM VOL.II, PART–2.
10. THE ARRANGEMENT OF OHE AT SUPPORT HAS BEEN CONSIDERED AS PER DRAWING NO. ET/OHE/02102. SHEET–3. (REV.B)
11. MAST OF ECONOMIC SIZE SHALL BE SELECTED.
12. THE OHE SPAN AND RADIUS APPROVED BY RAILWAY BOARD FOR MIRROR IMAGE CONCEPT HAS BEEN ADOPTED.

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EMPLOYMENT SCHEDULE FOR OHE MAST (9.5 m)
BASIC WIND SPEED 50 m/s
WIND PRESSURE 178 kgf/m²
(OHE + FEEDER WIRE + EARTH WIRE)
1200 kgf TENSION IN CAT. 65mm²
1200 kgf TENSION IN CONT.107mm²
(WITH IMPLANTATION MORE THAN 3.8M AND UP TO 4.85M)

EDTI (BHARDWAJ CHAUDHARY)

REF:– CROSS REF:–

DATE	MOD.	NATURE OF MOD.	INITIAL

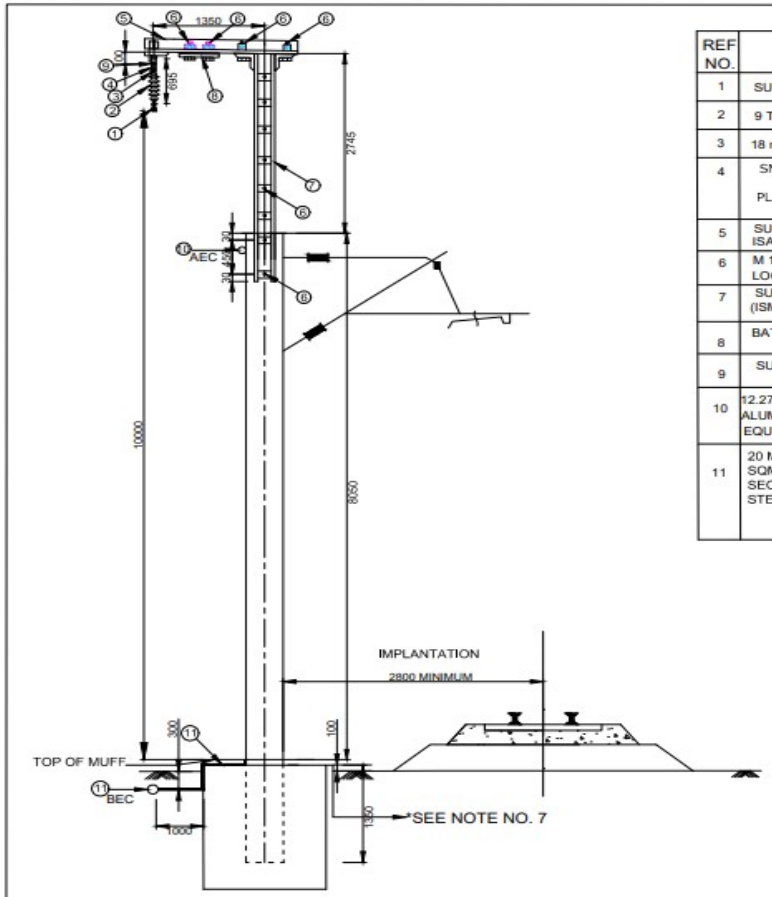
R. D. S. O.

	DATE	NAME
DR.		
CK.		
CK.		

TI/DRG/CIV/ES/RDSO /00004/19/0

NOT TO SCALE (SHEET–6)

ANNEXURE 11



REF NO.	DESCRIPTION	PART NO.	QTY
1	SUSPENSION CLAMP	1580	1
2	9 TONNE INSULATOR ASSEMBLY	6020	1
3	18 mm SINGLE CLEVIS ASSEMBLY	5040	1
4	SNAP HEADED PIN ∅ 20,60 mm LONG WITH PLANE WASHER & SPLIT PIN 4 X 36	262	1
5	SUPER MAST CROSS ARM ISA 65x65x6	8015/8012	2
6	M 16 BOLT 50/38 WITH NUT, LOCK NUT & PLAIN WASHER	16/3 NL	12
7	SUPER MAST CHANNEL (ISMC 100)	8021/8061/8011	2
8	BATTEN PLATE (TYPE-II)	8016	1
9	SUSPENSION SUPPORT	8014 OR 8014-1	1
10	12.27 mm DIA. OF STEEL REINFORCED ALUMINIUM RACCOON (50 MM2 Cu EQUIVALENT) (AEC)		
11	20 MM DIA. AND 238 SQMM (NOMINAL CROSS SECTIONAL AREA) GALVANISED STEEL CONDUCTOR (BEC)	AS PER IS: 2141-2000	

NOTE :-

1. ALL DIMENSIONS ARE IN mm
2. THE 25 KV ALUMINIUM FEEDER WIRE (19.95 MM DIA. AND 233.8 SQMM CROSS SECTIONAL AREA) SHALL BE RUN ON THE REAR SIDE OF THE MAST.THE FEEDER MAST WILL HAVE MINIMUM IMPLANTATION OF 2.8M
3. TENSION LENGTH OF FEEDER LINE WILL BE 1500M.
4. SUITABLE SUPER MAST AND CROSS ARM SHOULD BE USED AS PER SITE CONDITION TAKING IN TO ACCOUNT THE GROUND CLEARANCE & LATERAL CLEARANCES IN OPEN ROUTE, ACROSS AND ALONG THE STREET/LC GATE.
5. BEC WILL BE CONNECTED TO EACH MAST BY BEC CONDUCTOR WITH SUITABLE TEE CONNECTOR AT ONE END & LUG ARRANGEMENT AT MAST END
6. SPAN, MAST AND FOUNDATION SHOULD BE SELECTED AS PER DRAWING NO.TI/DRG/ES/RDSO/00004/19/0 (SHEET 1 - 6) .
7. THE CROSS BONDING OF UP BEC-UP MAST/PORTAL- UP TRACTION RAIL-DN-MAST/PORTAL-DN BEC SHOULD BE DONE BY 50X6 MM MS/GS FLAT AT EVERY 450 M.

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GENERAL ARRANGEMENT OF OHE WITH FEEDER , EARTH WIRE AND BEC FOR NDLS-HWH & NDLS-MUMBAI ROUTE

DTI-2

(BHARWDAJ CHAUDHARY)

REF. ETI/C/P/8020

CROSS REF :-

DATE	MOD.	NATURE OF MOD.	INITIALS
	"A"	REF. NO. 11 & NOTE 2,6 MODIFIED AND NOTE 7 ADDED	

R . D . S . O.

	DATE	NAME
DR		
CK		
CK		

TI/DRG/OHE/FEEDER/ RDSO/00002/19/0

ANNEXURE 12

EMPLOYMENT SCHEDULE: WIND PRESSURE 155KG/SQM

MAST ON OUTSIDE OF CURVED TRACK

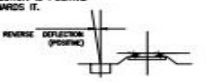
TYPE OF MAST				B-200 K-200						B-225 K-225						B-250 K-250						SPL.MAST		
MAS. SPAN (m)	RADIUS (m)	VARIENT (MAS.) mm		N	ACC	ACA	CLC	CLA	CLI	N	ACC	ACA	CLC	CLA	CLI	N	ACC	ACA	CLC	CLA	CLI	CLC	CLA	CLI
63	∞	0	REM. DEF.	30	30	30	30	-	30	-	-	-	-	30	-	-	-	-	-	-	-	-	-	-
			FBM. CODE	168	173	275	185	-	185	-	-	-	-	395	-	-	-	-	-	-	-	-	-	-
63	∞ / 2200	225	REM. DEF.	30	30	30	30	-	30	-	-	-	-	30	-	-	-	-	-	-	-	-	-	-
			FBM. CODE	173	173	275	185	-	185	-	-	-	-	395	-	-	-	-	-	-	-	-	-	-
63	2200 / 1900	260	REM. DEF.	30	30	30	30	-	30	-	-	-	-	30	-	-	-	-	-	-	-	-	-	-
			FBM. CODE	173	173	275	185	-	185	-	-	-	-	399	-	-	-	-	-	-	-	-	-	-
58.5	1900 / 1600	270	REM. DEF.	30	30	30	30	-	30	-	-	-	-	30	-	-	-	-	-	-	-	-	-	-
			FBM. CODE	173	173	275	185	-	185	-	-	-	-	399	-	-	-	-	-	-	-	-	-	-
58.5	1600 / 1400	305	REM. DEF.	30	30	30	-	-	-	-	-	-	30	30	30	-	-	-	-	-	-	-	-	-
			FBM. CODE	173	173	SPL	-	-	-	-	-	-	193	399	193	-	-	-	-	-	-	-	-	-
54	1400 / 1150	320	REM. DEF.	30	30	30	-	-	-	-	-	-	30	30	30	-	-	-	-	-	-	-	-	-
			FBM. CODE	173	173	SPL	-	-	-	-	-	-	193	399	193	-	-	-	-	-	-	-	-	-
54	1150 / 850	430	REM. DEF.	30	30	30	-	-	-	-	-	-	30	-	30	-	-	-	-	30	-	-	-	-
			FBM. CODE	178	178	SPL	-	-	-	-	-	-	199	-	199	-	-	-	-	SPL	-	-	-	-
49.5	850 / 700	440	REM. DEF.	30	30	30	-	-	-	-	-	-	30	-	30	-	-	-	-	30	-	-	-	-
			FBM. CODE	178	178	SPL	-	-	-	-	-	-	199	-	199	-	-	-	-	SPL	-	-	-	-
45	700 / 550	460	REM. DEF.	30	30	30	-	-	-	-	-	-	30	-	30	-	-	-	-	30	-	-	-	-
			FBM. CODE	178	178	SPL	-	-	-	-	-	-	199	-	199	-	-	-	-	SPL	-	-	-	-
36	550 / 400	485	REM. DEF.	30	30	30	-	-	-	-	-	-	30	-	30	-	-	-	-	30	-	-	-	-
			FBM. CODE	178	178	SPL	-	-	-	-	-	-	199	-	199	-	-	-	-	SPL	-	-	-	-
31.5	400 / 300	415	REM. DEF.	30	30	30	-	-	-	-	-	-	30	-	30	-	-	-	-	30	-	-	-	-
			FBM. CODE	178	178	SPL	-	-	-	-	-	-	SPL	-	SPL	-	-	-	-	SPL	-	-	-	-
27	300 / 200	455	REM. DEF.	30	30	30	-	-	-	-	-	-	30	-	30	-	-	-	-	-	-	-	30	-
			FBM. CODE	185	185	SPL	-	-	-	-	-	-	SPL	-	SPL	-	-	-	-	-	-	-	SPL	-

MAST ON INSIDE OF CURVED TRACK

TYPE OF MAST				B-200 K-200						B-225 K-225						B-250 K-250						SPL.MAST		
MAS. SPAN (m)	RADIUS (m)	VARIENT (MAS.) mm		N	ACC	ACA	CLC	CLA	CLI	N	ACC	ACA	CLC	CLA	CLI	N	ACC	ACA	CLC	CLA	CLI	CLC	CLA	CLI
63	∞ / 200	225	REM. DEF.	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-	-	-	-	-	-
			FBM. CODE	168	168	270	178	-	178	-	-	-	-	389	-	-	-	-	-	-	-	-	-	-
63	2200 / 1900	260	REM. DEF.	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-	-	-	-	-	-
			FBM. CODE	168	168	270	178	-	178	-	-	-	-	395	-	-	-	-	-	-	-	-	-	-
58.5	1900 / 1600	270	REM. DEF.	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-	-	-	-	-	-
			FBM. CODE	168	168	270	178	-	178	-	-	-	-	395	-	-	-	-	-	-	-	-	-	-
58.5	1600 / 1400	305	REM. DEF.	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-	-	-	-	-	-
			FBM. CODE	168	168	270	178	-	178	-	-	-	-	395	-	-	-	-	-	-	-	-	-	-
54	1400 / 1150	320	REM. DEF.	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-	-	-	-	-	-
			FBM. CODE	168	168	275	185	-	185	-	-	-	-	399	-	-	-	-	-	-	-	-	-	-
54	1150 / 850	430	REM. DEF.	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-	-	-	-	-	-
			FBM. CODE	173	173	275	185	-	185	-	-	-	-	399	-	-	-	-	-	-	-	-	-	-
49.5	850 / 700	440	REM. DEF.	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-	-	-	-	-	-
			FBM. CODE	173	173	275	185	-	185	-	-	-	-	399	-	-	-	-	-	-	-	-	-	-
45	700 / 550	460	REM. DEF.	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-	-	-	-	-	-
			FBM. CODE	173	173	275	185	-	185	-	-	-	-	399	-	-	-	-	-	-	-	-	-	-
36	550 / 400	485	REM. DEF.	-30	-30	-30	-	-	-	-	-	-	-30	-	-30	-	-	-	-	-30	-	-	-	-
			FBM. CODE	178	178	SPL	-	-	-	-	-	-	193	-	193	-	-	-	-	SPL	-	-	-	-
27	300 / 200	455	REM. DEF.	-30	-30	-30	-	-	-	-	-	-	-30	-	-30	-	-	-	-	-30	-	-	-	-
			FBM. CODE	178	178	SPL	-	-	-	-	-	-	199	-	199	-	-	-	-	SPL	-	-	-	-

NOTES:–

1. BEYOND THE WIND SPEED OF 33 m/s THE TRAINS WILL HAVE TO BE STOPPED.
2. THIS EMPLOYMENT SCHEDULE IS APPLICABLE FOR GREEN REGION OF BASIC WIND SPEED 47 m/s OF FIGURE–1 OF IS:875 (Part–3)–2015 REV.III (DESIGN WIND PRESSURE 155 kgf/m² CALCULATED AS PER CLAUSE 5.4 OF IS:875 (Part–3)–2015 REV.III).
3. THE CYCLONIC REGION AREA FACTOR(K4) HAS NOT BEEN CONSIDERED IN THE DESIGN CALCULATION GIVEN IN CLAUSE 6.3.4 OF IS: 875(PART–3)–2015(REV.III)
4. THE EMPLOYMENT SCHEDULE IS SUITABLE FOR IMPLANTATION UP TO 2.8 METER FROM THE CENTRE LINE OF NEAREST TRACK WITH +0.1 m FOR TRACK SWELLING ALLOWANCE ON SETTING OF MAST AND ON INSIDE OF CURVE EXTRA IMPLANTATION AS PER DRG. NO.ETI/OHE/G/00111 SH.1 HAS BEEN CONSIDERED.
5. FOUNDATION BENDING MOMENT (FBM) CODE GIVES THE NECESSARY CROSS REFERENCE TO EQUIVALENT FOUNDATIONS, FOR FOUNDATION SELECTION SEE THE DRAWING No. TI/DRG/CIV/FND/RDSO/00001/04/0 MODIFICATION '0' CHART OF (SHEET No.1 TO 5).
6. FOR LOCATIONS WITH NON–STANDARD SPANS AND IMPLANTATIONS, THE SAFETY OF MAST AND FOUNDATION SHALL BE CHECKED AND SUITABLE MAST AND FOUNDATION SHALL BE PROVIDED.
7. REVERSE DEFLECTIONS ARE IN mm. REVERSE DEFLECTION IS POSITIVE WHEN AWAY FROM TRACK AND NEGATIVE WHEN TOWARDS IT.



8.(a) UNDER OVERLAP CENTRAL LOCATION IN TANGENT TRACK 54 metre SPAN IS CONSIDERED.
(b) THE SPANS ON SPECIFIC LOCATION LIKE, BRIDGES, OVERLAPS, TURNOUTS, NEUTRAL SECTION ETC. SHALL BE AS PER PARA NO. 6.1.2.1, 5.6, 5.7, 5.5 OF ACTM VOL.II, PART–2.

9. THE ARRANGEMENT OF OHE AT SUPPORT HAS BEEN CONSIDERED AS PER DRAWING NO. ETI/OHE/02102. SHEET–3/REV.–B)
10. MAST OF ECONOMIC SIZE SHALL BE SELECTED.

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EMPLOYMENT SCHEDULE FOR OHE MAST (9.5 m)
BASIC WIND SPEED 47 m/s
WIND PRESSURE 155 kgf/m²
(OHE + FEEDER WIRE + EARTH WIRE)
1500 kgf TENSION IN CAT. 125mm²
1500 kgf TENSION IN CONT.150 mm²
(WITH IMPLANTATION UP TO 2.8M)

EDTI (BHARDWAJ CHAUDHARY)

REF:– CROSS REF:–

DATE	MOD.	NATURE OF MOD.	INITIAL

R. D. S. O.

	DATE	NAME
DR.		
CK.		
CK.		

TI/DRG/CIV/ES/RDSO /00004/20/0

NOT TO SCALE (SHEET–1)

ANNEXURE 13

EMPLOYMENT SCHEDULE: WIND PRESSURE 155KG/SQM

MAST ON OUTSIDE OF CURVED TRACK

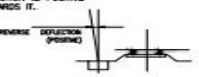
TYPE OF MAST				B-200 K-200						B-225 K-225						B-250 K-250						SPL MAST		
MAX. SPAN (m)	RADIUS (m)	VERSINE (MAX.) mm		N	ACC	ACA	CLC	CLA	CLI	N	ACC	ACA	CLC	CLA	CLI	N	ACC	ACA	CLC	CLA	CLI	CLC	CLA	CLI
63	∞	0	REV. DIST.	30	30	30	30	-	30	-	-	-	-	30	-	-	-	-	-	-	-	-	-	-
			REM. CODE	168	173	275	185	-	185	-	-	-	-	395	-	-	-	-	-	-	-	-	-	-
63	∞ / 2200	225	REV. DIST.	30	30	30	30	-	30	-	-	-	-	30	-	-	-	-	-	-	-	-	-	-
			REM. CODE	173	173	275	185	-	185	-	-	-	-	395	-	-	-	-	-	-	-	-	-	-
63	2200 / 1900	260	REV. DIST.	30	30	30	30	-	30	-	-	-	-	30	-	-	-	-	-	-	-	-	-	-
			REM. CODE	173	173	275	185	-	185	-	-	-	-	399	-	-	-	-	-	-	-	-	-	-
58.5	1900 / 1600	270	REV. DIST.	30	30	30	30	-	30	-	-	-	-	30	-	-	-	-	-	-	-	-	-	-
			REM. CODE	173	173	SPL	185	-	185	-	-	-	-	399	-	-	-	-	-	-	-	-	-	-
58.5	1600 / 1400	305	REV. DIST.	30	30	30	-	-	-	-	-	-	30	30	30	-	-	-	-	-	-	-	-	-
			REM. CODE	173	173	SPL	-	-	-	-	-	-	193	399	193	-	-	-	-	-	-	-	-	-
54	1400 / 1150	320	REV. DIST.	30	30	30	-	-	-	-	-	-	30	-	30	-	-	-	-	30	-	-	-	-
			REM. CODE	173	173	SPL	-	-	-	-	-	-	193	-	193	-	-	-	-	SPL	-	-	-	-
54	1150 / 850	430	REV. DIST.	30	30	30	-	-	-	-	-	-	30	-	30	-	-	-	-	30	-	-	-	-
			REM. CODE	178	178	SPL	-	-	-	-	-	-	199	-	199	-	-	-	-	SPL	-	-	-	-
49.5	850 / 700	440	REV. DIST.	30	30	30	-	-	-	-	-	-	30	-	30	-	-	-	-	30	-	-	-	-
			REM. CODE	178	178	SPL	-	-	-	-	-	-	199	-	199	-	-	-	-	SPL	-	-	-	-
45	700 / 550	460	REV. DIST.	30	30	30	-	-	-	-	-	-	30	-	30	-	-	-	-	30	-	-	-	-
			REM. CODE	178	178	SPL	-	-	-	-	-	-	199	-	199	-	-	-	-	SPL	-	-	-	-
36	550 / 400	405	REV. DIST.	30	30	30	-	-	-	-	-	-	30	-	30	-	-	-	-	30	-	-	-	-
			REM. CODE	178	178	SPL	-	-	-	-	-	-	SPL	-	SPL	-	-	-	-	SPL	-	-	-	-
31.5	400 / 300	415	REV. DIST.	30	30	30	-	-	-	-	-	-	30	-	30	-	-	-	-	30	-	-	-	-
			REM. CODE	185	185	SPL	-	-	-	-	-	-	SPL	-	SPL	-	-	-	-	SPL	-	-	-	-
27	300 / 200	455	REV. DIST.	30	30	30	-	-	-	-	-	-	30	-	30	-	-	-	-	-	-	-	30	-
			REM. CODE	185	185	SPL	-	-	-	-	-	-	SPL	-	SPL	-	-	-	-	-	-	-	SPL	-

MAST ON INSIDE OF CURVED TRACK

TYPE OF MAST				B-200 K-200						B-225 K-225						B-250 K-250						SPL MAST		
MAX. SPAN (m)	RADIUS (m)	VERSINE (MAX.) mm		N	ACC	ACA	CLC	CLA	CLI	N	ACC	ACA	CLC	CLA	CLI	N	ACC	ACA	CLC	CLA	CLI	CLC	CLA	CLI
63	∞ / 200	225	REV. DIST.	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-	-	-	-	-	-
			REM. CODE	168	168	270	178	-	178	-	-	-	-	389	-	-	-	-	-	-	-	-	-	-
63	2200 / 1900	260	REV. DIST.	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-	-	-	-	-	-
			REM. CODE	168	168	270	178	-	178	-	-	-	-	395	-	-	-	-	-	-	-	-	-	-
58.5	1900 / 1600	270	REV. DIST.	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-	-	-	-	-	-
			REM. CODE	168	168	270	178	-	178	-	-	-	-	395	-	-	-	-	-	-	-	-	-	-
58.5	1600 / 1400	305	REV. DIST.	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-	-	-	-	-	-
			REM. CODE	168	168	270	178	-	178	-	-	-	-	395	-	-	-	-	-	-	-	-	-	-
54	1400 / 1150	320	REV. DIST.	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-	-	-	-	-	-
			REM. CODE	168	173	275	185	-	185	-	-	-	-	399	-	-	-	-	-	-	-	-	-	-
54	1150 / 850	430	REV. DIST.	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-	-	-	-	-	-
			REM. CODE	173	173	275	185	-	185	-	-	-	-	399	-	-	-	-	-	-	-	-	-	-
49.5	850 / 700	440	REV. DIST.	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-	-	-	-	-	-
			REM. CODE	173	178	275	185	-	185	-	-	-	-	399	-	-	-	-	-	-	-	-	-	-
45	700 / 550	460	REV. DIST.	-30	-30	-30	-	-	-	-	-	-	-30	-	-30	-	-	-	-	-30	-	-	-	-
			REM. CODE	178	178	SPL	-	-	-	-	-	-	193	-	193	-	-	-	-	SPL	-	-	-	-
36	550 / 400	405	REV. DIST.	-30	-30	-30	-	-	-	-	-	-	-30	-	-30	-	-	-	-	-30	-	-	-	-
			REM. CODE	178	178	SPL	-	-	-	-	-	-	199	-	199	-	-	-	-	SPL	-	-	-	-
27	300 / 200	455	REV. DIST.	-30	-30	-30	-	-	-	-	-	-	-30	-	-30	-	-	-	-	-30	-	-	-	-
			REM. CODE	178	178	SPL	-	-	-	-	-	-	199	-	199	-	-	-	-	SPL	-	-	-	-

NOTES:-

1. BEYOND THE WIND SPEED OF 33 m/s THE TRAINS WILL HAVE TO BE STOPPED.
2. THIS EMPLOYMENT SCHEDULE IS APPLICABLE FOR GREEN REGION OF BASIC WIND SPEED 47 m/s OF FIGURE-1 OF IS:875 (Part-3)-2015 (REV.II) (DESIGN WIND PRESSURE 155 Kgf/m² CALCULATED AS PER CLAUSE 5.4 OF IS:875 (Part-3)-2015 REV.II).
3. THE CYCLONIC REGION AREA FACTOR(K4) HAS NOT BEEN CONSIDERED IN THE DESIGN CALCULATION GIVEN IN CLAUSE 6.3.4 OF IS: 875(PART-3)-2015(REV.II)
4. THE EMPLOYMENT SCHEDULE IS SUITABLE FOR IMPLANTATION UP TO 3.8 METER FROM THE CENTRE LINE OF NEAREST TRACK WITH +0.1 m FOR TRACK SWELLING ALLOWANCE ON SETTING OF MAST AND ON INSIDE OF CURVE EXTRA IMPLANTATION AS PER DRG. NO.ETI/OHE/G/00111 SH.1 HAS BEEN CONSIDERED.
5. FOUNDATION BENDING MOMENT (FBM) CODE GIVES THE NECESSARY CROSS REFERENCE TO EQUIVALENT FOUNDATIONS, FOR FOUNDATION SELECTION SEE THE DRAWING No. TI/DRG/CIV/FND/RDSO/00001/04/0 MODIFICATION "0" CHART OF (SHEET No.1 TO 5).
6. FOR LOCATIONS WITH NON-STANDARD SPANS AND IMPLANTATIONS, THE SAFETY OF MAST AND FOUNDATION SHALL BE CHECKED AND SUITABLE MAST AND FOUNDATION SHALL BE PROVIDED.
7. REVERSE DEFLECTIONS ARE IN mm. REVERSE DEFLECTION IS POSITIVE WHEN AWAY FROM TRACK AND NEGATIVE WHEN TOWARDS IT.



8.(a) UNDER OVERLAP CENTRAL LOCATION IN TANGENT TRACK 54 metre SPAN IS CONSIDERED.
(b) THE SPANS ON SPECIFIC LOCATION LIKE, BRIDGES, OVERLAPS, TURNOUTS, NEUTRAL SECTION ETC. SHALL BE AS PER PARA NO. 6.1.2.1., 5.6, 5.7, 5.5 OF ACTM VOL.II, PART-2.

9. THE ARRANGEMENT OF OHE AT SUPPORT HAS BEEN CONSIDERED AS PER DRAWING NO. ETI/OHE/02102. SHEET-3,(REV.-B)
10. MAST OF ECONOMIC SIZE SHALL BE SELECTED.

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EMPLOYMENT SCHEDULE FOR OHE
MAST (9.5 m)
BASIC WIND SPEED 47 m/s
WIND PRESSURE 155 kgf/m²
(OHE + FEEDER WIRE + EARTH WIRE)
1500 kgf TENSION IN CAT. 125mm²
1500 kgf TENSION IN CONT.150 mm²
(WITH IMPLANTATION UP TO 3.8M)

IEDTI (BHARDWAJ CHAUDHARY)

REF:- CROSS REF:-

DATE	MOD.	NATURE OF MOD.	INITIAL

R. D. S. O.

	DATE	NAME
DR.		
CK.		
CK.		

TI/DRG/CIV/ES/RDSO /00004/20/0

NOT TO SCALE (SHEET-2)

ANNEXURE 14

EMPLOYMENT SCHEDULE: WIND PRESSURE 155KG/SQM

MAST ON OUTSIDE OF CURVED TRACK

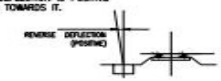
TYPE OF MAST				B-200 K-200						B-225 K-225						B-250 K-250						SPL MAST		
MAX SPAN (M)	RADIUS (M)	VERSINE (MSC) mm		N	ACC	ACA	CLC	CLA	CLI	N	ACC	ACA	CLC	CLA	CLI	N	ACC	ACA	CLC	CLA	CLI	CLC	CLA	CLI
63	∞	0	REV. DIFF.	30	30	30	30	-	30	-	-	-	-	30	-	-	-	-	-	-	-	-	-	-
			FBM CODE	173	173	275	185	-	185	-	-	-	-	395	-	-	-	-	-	-	-	-	-	-
63	∞ 2200	225	REV. DIFF.	30	30	30	30	-	30	-	-	-	-	30	-	-	-	-	-	-	-	-	-	-
			FBM CODE	173	173	275	185	-	185	-	-	-	-	399	-	-	-	-	-	-	-	-	-	-
63	2200 1900	260	REV. DIFF.	30	30	30	30	-	30	-	-	-	-	30	-	-	-	-	-	-	-	-	-	-
			FBM CODE	173	173	SPL	185	-	185	-	-	-	-	399	-	-	-	-	-	-	-	-	-	-
58.5	1900 1600	270	REV. DIFF.	30	30	30	30	-	30	-	-	-	-	30	-	-	-	-	-	-	-	-	-	-
			FBM CODE	173	173	SPL	185	-	185	-	-	-	-	399	-	-	-	-	-	-	-	-	-	-
58.5	1600 1400	305	REV. DIFF.	30	30	30	-	-	-	-	-	-	30	30	30	-	-	-	-	-	-	-	-	-
			FBM CODE	173	173	SPL	-	-	-	-	-	-	193	399	193	-	-	-	-	-	-	-	-	-
54	1400 1150	320	REV. DIFF.	30	30	30	-	-	-	-	-	-	30	-	30	-	-	-	-	-	30	-	-	-
			FBM CODE	173	173	SPL	-	-	-	-	-	-	193	-	193	-	-	-	-	-	SPL	-	-	-
54	1150 850	430	REV. DIFF.	30	30	30	-	-	-	-	-	-	30	-	30	-	-	-	-	-	30	-	-	-
			FBM CODE	178	178	SPL	-	-	-	-	-	-	199	-	199	-	-	-	-	-	SPL	-	-	-
49.5	850 700	440	REV. DIFF.	30	30	30	-	-	-	-	-	-	30	-	30	-	-	-	-	-	30	-	-	-
			FBM CODE	178	178	SPL	-	-	-	-	-	-	199	-	199	-	-	-	-	-	SPL	-	-	-
45	700 550	460	REV. DIFF.	30	30	30	-	-	-	-	-	-	30	-	30	-	-	-	-	-	30	-	-	-
			FBM CODE	178	178	SPL	-	-	-	-	-	-	SPL	-	SPL	-	-	-	-	-	SPL	-	-	-
36	550 400	485	REV. DIFF.	30	30	30	-	-	-	-	-	-	30	-	30	-	-	-	-	-	30	-	-	-
			FBM CODE	178	185	SPL	-	-	-	-	-	-	SPL	-	SPL	-	-	-	-	-	SPL	-	-	-
31.5	400 300	415	REV. DIFF.	30	30	30	-	-	-	-	-	-	30	-	30	-	-	-	-	-	30	-	-	-
			FBM CODE	185	185	SPL	-	-	-	-	-	-	SPL	-	SPL	-	-	-	-	-	SPL	-	-	-
27	300 200	455	REV. DIFF.	30	30	30	-	-	-	-	-	-	30	-	30	-	-	-	-	-	-	-	30	-
			FBM CODE	185	185	SPL	-	-	-	-	-	-	SPL	-	SPL	-	-	-	-	-	-	-	SPL	-

MAST ON INSIDE OF CURVED TRACK

TYPE OF MAST				B-200 K-200						B-225 K-225						B-250 K-250						SPL MAST		
MAX SPAN (M)	RADIUS (M)	VERSINE (MSC) mm		N	ACC	ACA	CLC	CLA	CLI	N	ACC	ACA	CLC	CLA	CLI	N	ACC	ACA	CLC	CLA	CLI	CLC	CLA	CLI
63	∞ 200	225	REV. DIFF.	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-	-	-	-	-	-
			FBM CODE	168	168	270	178	-	178	-	-	-	-	389	-	-	-	-	-	-	-	-	-	-
63	2200 1900	260	REV. DIFF.	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-	-	-	-	-	-
			FBM CODE	168	168	270	178	-	178	-	-	-	-	395	-	-	-	-	-	-	-	-	-	-
58.5	1900 1600	270	REV. DIFF.	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-	-	-	-	-	-
			FBM CODE	168	168	270	178	-	178	-	-	-	-	395	-	-	-	-	-	-	-	-	-	-
58.5	1600 1400	305	REV. DIFF.	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-	-	-	-	-	-
			FBM CODE	168	168	270	178	-	178	-	-	-	-	395	-	-	-	-	-	-	-	-	-	-
54	1400 1150	320	REV. DIFF.	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-	-	-	-	-	-
			FBM CODE	168	173	275	185	-	185	-	-	-	-	399	-	-	-	-	-	-	-	-	-	-
54	1150 850	430	REV. DIFF.	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-	-	-	-	-	-
			FBM CODE	173	178	275	185	-	185	-	-	-	-	399	-	-	-	-	-	-	-	-	-	-
49.5	850 700	440	REV. DIFF.	-30	-30	-30	-	-	-	-	-	-	-30	-	-30	-	-	-	-	-	-30	-	-	-
			FBM CODE	178	178	SPL	-	-	-	-	-	-	193	-	193	-	-	-	-	-	SPL	-	-	-
45	700 550	460	REV. DIFF.	-30	-30	-30	-	-	-	-	-	-	-30	-	-30	-	-	-	-	-	-30	-	-	-
			FBM CODE	178	178	SPL	-	-	-	-	-	-	199	-	199	-	-	-	-	-	SPL	-	-	-
36	550 400	485	REV. DIFF.	-30	-30	-30	-	-	-	-	-	-	-30	-	-30	-	-	-	-	-	-30	-	-	-
			FBM CODE	178	178	SPL	-	-	-	-	-	-	199	-	199	-	-	-	-	-	SPL	-	-	-
27	300 200	455	REV. DIFF.	-30	-30	-30	-	-	-	-	-	-	-30	-	-30	-	-	-	-	-	-30	-	-	-
			FBM CODE	178	178	SPL	-	-	-	-	-	-	199	-	199	-	-	-	-	-	SPL	-	-	-

NOTES:–

1. BEYOND THE WIND SPEED OF 33 m/s THE TRAINS WILL HAVE TO BE STOPPED.
2. THIS EMPLOYMENT SCHEDULE IS APPLICABLE FOR GREEN REGION OF BASIC WIND SPEED 47 m/s OF FIGURE–1 OF IS:875 (Part–3)–2015 REV.III (DESIGN WIND PRESSURE 155 Kgf/m² CALCULATED AS PER CLAUSE 5.4 OF IS:875 (Part–3)–2015 REV.III).
3. THE CYCLONIC REGION AREA FACTOR(K4) HAS NOT BEEN CONSIDERED IN THE DESIGN CALCULATION GIVEN IN CLAUSE 6.3.4 OF IS: 875(PART–3)–2015(REV.III)
4. THE EMPLOYMENT SCHEDULE IS SUITABLE FOR IMPLANTATION UP TO 4.85 METER FROM THE CENTRE LINE OF NEAREST TRACK WITH +0.1 m FOR TRACK SHELLING ALLOWANCE ON SETTING OF MAST AND ON INSIDE OF CURVE EXTRA IMPLANTATION AS PER DRG. NO.ETI/OHE/D/00111 SH.1 HAS BEEN CONSIDERED.
5. FOUNDATION BENDING MOMENT (FBM) CODE GIVES THE NECESSARY CROSS REFERENCE TO EQUIVALENT FOUNDATIONS, FOR FOUNDATION SELECTION SEE THE DRAWING No. TI/DRG/CIV/FND/RDSO/00001/04/0 MODIFICATION '0' CHART OF (SHEET No.1 TO 5).
6. FOR LOCATIONS WITH NON–STANDARD SPANS AND IMPLANTATIONS, THE SAFETY OF MAST AND FOUNDATION SHALL BE CHECKED AND SUITABLE MAST AND FOUNDATION SHALL BE PROVIDED.
7. REVERSE DEFLECTIONS ARE IN mm. REVERSE DEFLECTION IS POSITIVE WHEN AWAY FROM TRACK AND NEGATIVE WHEN TOWARDS IT.



8.(a) UNDER OVERLAP CENTRAL LOCATION IN TANGENT TRACK 54 metre SPAN IS CONSIDERED.
(b) THE SPANS ON SPECIFIC LOCATION LIKE, BRIDGES, OVERLAPS, TURNOUTS, NEUTRAL SECTION ETC. SHALL BE AS PER PARA NO. 6.1.2.1, 5.6, 5.7, 5.5 OF ACTM VOL.II, PART–2.

9. THE ARRANGEMENT OF OHE AT SUPPORT HAS BEEN CONSIDERED AS PER DRAWING NO. ETI/OHE/02102. SHEET–3,(REV–B)
10. MAST OF ECONOMIC SIZE SHALL BE SELECTED.

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EMPLOYMENT SCHEDULE FOR OHE MAST (9.5 m)
BASIC WIND SPEED 47 m/s
WIND PRESSURE 155 kgf/m²
(OHE + FEEDER WIRE + EARTH WIRE)
1500 kgf TENSION IN CAT. 125mm²
1500 kgf TENSION IN CONT.150 mm²
(WITH IMPLANTATION UP TO 4.85M)

EDTI (BHARDWAJ CHAUDHARY)

REF:– CROSS REF:–

DATE	MOD.	NATURE OF MOD.	INITIAL

R. D. S. O.

	DATE	NAME
DR.		
CK.		
CK.		

TI/DRG/CIV/ES/RDSO /00004/20/0

NOT TO SCALE (SHEET–3)

ANNEXURE 15

EMPLOYMENT SCHEDULE: WIND PRESSURE 178KG/SQM

MAST ON OUTSIDE OF CURVED TRACK

TYPE OF MAST				B-200 K-200						B-225 K-225						B-250 K-250						SPL MAST		
MAX. SPAN (m)	RADIUS (m)	VERSINE (MAX.) mm		N	ACC	ACA	CLC	CLA	CLI	N	ACC	ACA	CLC	CLA	CLI	N	ACC	ACA	CLC	CLA	CLI	CLC	CLA	CLI
58.5	∞	0	REV. DEFL	30	30	30	30	-	30	-	-	-	-	30	-	-	-	-	-	-	-	-	-	-
			FBM CODE	173	173	225	185	-	185	-	-	-	-	395	-	-	-	-	-	-	-	-	-	-
58.5	∞ 2200	195	REV. DEFL	30	30	30	30	-	30	-	-	-	-	30	-	-	-	-	-	-	-	-	-	-
			FBM CODE	173	173	225	185	-	185	-	-	-	-	399	-	-	-	-	-	-	-	-	-	-
58.5	2200 1900	225	REV. DEFL	30	30	30	-	-	-	-	-	-	30	30	30	-	-	-	-	-	-	-	-	-
			FBM CODE	173	173	225	-	-	-	-	-	-	193	399	193	-	-	-	-	-	-	-	-	-
58.5	1900 1600	270	REV. DEFL	30	30	30	-	-	-	-	-	-	30	30	30	-	-	-	-	-	-	-	-	-
			FBM CODE	173	173	SPL	-	-	-	-	-	-	193	399	193	-	-	-	-	-	-	-	-	-
54	1600 1400	305	REV. DEFL	30	30	30	-	-	-	-	-	-	30	30	30	-	-	-	-	-	-	-	-	-
			FBM CODE	178	178	SPL	-	-	-	-	-	-	193	399	193	-	-	-	-	-	-	-	-	-
54	1400 1150	320	REV. DEFL	30	30	30	-	-	-	-	-	-	30	30	30	-	-	-	-	-	-	-	-	-
			FBM CODE	178	178	SPL	-	-	-	-	-	-	193	399	193	-	-	-	-	-	-	-	-	-
54	1150 850	430	REV. DEFL	30	30	30	-	-	-	-	-	-	30	-	30	-	-	-	-	30	-	-	-	-
			FBM CODE	178	178	SPL	-	-	-	-	-	-	199	-	199	-	-	-	-	SPL	-	-	-	-
49.5	850 700	440	REV. DEFL	30	30	30	-	-	-	-	-	-	30	-	30	-	-	-	-	30	-	-	-	-
			FBM CODE	178	178	SPL	-	-	-	-	-	-	199	-	199	-	-	-	-	SPL	-	-	-	-
45	700 550	460	REV. DEFL	30	30	30	-	-	-	-	-	-	30	-	30	-	-	-	-	30	-	-	-	-
			FBM CODE	178	178	SPL	-	-	-	-	-	-	199	-	199	-	-	-	-	SPL	-	-	-	-
36	550 400	405	REV. DEFL	30	30	30	-	-	-	-	-	-	30	-	30	-	-	-	-	30	-	-	-	-
			FBM CODE	178	178	SPL	-	-	-	-	-	-	199	-	199	-	-	-	-	SPL	-	-	-	-
31.5	400 300	415	REV. DEFL	30	30	30	-	-	-	-	-	-	30	-	30	-	-	-	-	-	-	-	30	-
			FBM CODE	178	178	SPL	-	-	-	-	-	-	SPL	-	SPL	-	-	-	-	-	-	-	SPL	-
27	300 200	455	REV. DEFL	30	30		-	-	-	-	-	30	30	-	30	-	-	-	-	-	-	-	30	-
			FBM CODE	185	185		-	-	-	-	-	SPL	SPL	-	SPL	-	-	-	-	-	-	-	SPL	-

MAST ON INSIDE OF CURVED TRACK

TYPE OF MAST				B-200 K-200						B-225 K-225						B-250 K-250						SPL MAST		
MAX. SPAN (m)	RADIUS (m)	VERSINE (MAX.) mm		N	ACC	ACA	CLC	CLA	CLI	N	ACC	ACA	CLC	CLA	CLI	N	ACC	ACA	CLC	CLA	CLI	CLC	CLA	CLI
58.5	∞ 2200	195	REV. DEFL	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-	-	-	-	-	-
			FBM CODE	168	168	270	178	-	178	-	-	-	-	389	-	-	-	-	-	-	-	-	-	-
58.5	2200 1900	225	REV. DEFL	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-	-	-	-	-	-
			FBM CODE	168	168	270	178	-	178	-	-	-	-	395	-	-	-	-	-	-	-	-	-	-
58.5	1900 1600	270	REV. DEFL	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-	-	-	-	-	-
			FBM CODE	168	168	275	178	-	178	-	-	-	-	395	-	-	-	-	-	-	-	-	-	-
54	1600 1400	305	REV. DEFL	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-	-	-	-	-	-
			FBM CODE	173	173	275	185	-	185	-	-	-	-	395	-	-	-	-	-	-	-	-	-	-
54	1400 1150	320	REV. DEFL	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-	-	-	-	-	-
			FBM CODE	173	173	275	185	-	185	-	-	-	-	399	-	-	-	-	-	-	-	-	-	-
54	1150 850	430	REV. DEFL	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-	-	-	-	-	-
			FBM CODE	173	173	275	185	-	185	-	-	-	-	399	-	-	-	-	-	-	-	-	-	-
49.5	850 700	440	REV. DEFL	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-	-	-	-	-	-
			FBM CODE	173	173	275	185	-	185	-	-	-	-	399	-	-	-	-	-	-	-	-	-	-
45	700 550	460	REV. DEFL	-30	-30	-30	-	-	-	-	-	-	-30	-30	-30	-	-	-	-	-	-	-	-	-
			FBM CODE	173	173	275	-	-	-	-	-	-	193	399	193	-	-	-	-	-	-	-	-	-
36	550 400	405	REV. DEFL	-30	-30	-30	-	-	-	-	-	-	-30	-	-30	-	-	-	-	-30	-	-	-	-
			FBM CODE	178	178	SPL	-	-	-	-	-	-	199	-	199	-	-	-	-	SPL	-	-	-	-
27	300 200	455	REV. DEFL	-30	-30	-	-	-	-	-	-	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-
			FBM CODE	185	185	-	-	-	-	-	-	SPL	199	-	199	-	-	-	-	SPL	-	-	-	-

NOTES:–

1. BEYOND THE WIND SPEED OF 33 m/s THE TRAINS WILL HAVE TO BE STOPPED.
2. THIS EMPLOYMENT SCHEDULE IS APPLICABLE FOR RED REGION OF BASIC WIND SPEED 50 m/s OF FIGURE–1 OF IS:875 (Part–3)–2015 REV.III (DESIGN WIND PRESSURE 178 Kgf/m² CALCULATED AS PER CLAUSE 5.4 OF IS:875 (Part–3)–2015 REV.III).
3. THE CYCLONIC REGION AREA FACTOR(K4) HAS NOT BEEN CONSIDERED IN THE DESIGN CALCULATION GIVEN IN CLAUSE 6.3.4 OF IS: 875(PART–3)–2015(REV.III)
4. THE EMPLOYMENT SCHEDULE IS SUITABLE FOR IMPLANTATION UP TO 2.8 METER FROM THE CENTRE LINE OF NEAREST TRACK WITH +0.1 m FOR TRACK SWELLING ALLOWANCE ON SETTING OF MAST AND ON INSIDE OF CURVE EXTRA IMPLANTATION AS PER DRG. NO.ETI/OHE/G/00111 SH.1 HAS BEEN CONSIDERED.
5. FOUNDATION BENDING MOMENT (FBM) CODE GIVES THE NECESSARY CROSS REFERENCE TO EQUIVALENT FOUNDATIONS, FOR FOUNDATION SELECTION SEE THE DRAWING No. TI/DRG/CIV/FND/RDSO/00001/04/0 MODIFICATION '0' CHART OF (SHEET No.1 TO 5).
6. FOR LOCATIONS WITH NON–STANDARD SPANS AND IMPLANTATIONS, THE SAFETY OF MAST AND FOUNDATION SHALL BE CHECKED AND SUITABLE MAST AND FOUNDATION SHALL BE PROVIDED.
7. REVERSE DEFLECTIONS ARE IN mm. REVERSE DEFLECTION IS POSITIVE WHEN AWAY FROM TRACK AND NEGATIVE WHEN TOWARDS IT.



8.(a) UNDER OVERLAP CENTRAL LOCATION IN TANGENT TRACK 54 metre SPAN IS CONSIDERED.
(b) THE SPANS ON SPECIFIC LOCATION LIKE, BRIDGES, OVERLAPS, TURNOUTS, NEUTRAL SECTION ETC. SHALL BE AS PER PARA NO. 6.1.2.1, 5.6, 5.7, 5.5 OF ACTM VOL.II, PART–2.

9. THE ARRANGEMENT OF OHE AT SUPPORT HAS BEEN CONSIDERED AS PER DRAWING NO. ETI/OHE/02102. SHEET–3 (REV–B).
10. MAST OF ECONOMIC SIZE SHALL BE SELECTED.

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EMPLOYMENT SCHEDULE FOR OHE MAST (9.5 m) BASIC WIND SPEED 50 m/s WIND PRESSURE 178 kgf/m² (OHE + FEEDER WIRE + EARTH WIRE) 1500 kgf TENSION IN CAT. 125mm² 1500 kgf TENSION IN CONT.150 mm² (WITH IMPLANTATION UP TO 2.8M)

EDTI (BHARDWAJ CHAUDHARY)

REF:– CROSS REF:–

DATE	MOD.	NATURE OF MOD.	INITIAL

R. D. S. O.

	DATE	NAME
DR.		
CK.		
CK.		

TI/DRG/CIV/ES/RDSO /00004/20/0

NOT TO SCALE (SHEET–4)

ANNEXURE 16

EMPLOYMENT SCHEDULE: WIND PRESSURE 178KG/SQM

MAST ON OUTSIDE OF CURVED TRACK

TYPE OF MAST				B-200 K-200						B-225 K-225						B-250 K-250						SPL MAST		
MAX. SPAN (m)	RADIUS (m)	VERSINE (MAX.) mm		N	ACC	ACA	CLC	CLA	CLI	N	ACC	ACA	CLC	CLA	CLI	N	ACC	ACA	CLC	CLA	CLI	CLC	CLA	CLI
58.5	∞	0	REV. DIFF.	30	30	30	30	-	30	-	-	-	-	30	-	-	-	-	-	-	-	-	-	-
			PERM CODE	173	173	275	185	-	185	-	-	-	-	395	-	-	-	-	-	-	-	-	-	-
58.5	∞ 2200	195	REV. DIFF.	30	30	30	-	-	-	-	-	-	30	30	30	-	-	-	-	-	-	-	-	-
			PERM CODE	173	173	275	-	-	-	-	-	-	193	399	193	-	-	-	-	-	-	-	-	-
58.5	2200 1900	225	REV. DIFF.	30	30	30	-	-	-	-	-	-	30	30	30	-	-	-	-	-	-	-	-	-
			PERM CODE	173	173	SPL	-	-	-	-	-	-	193	399	193	-	-	-	-	-	-	-	-	-
58.5	1900 1600	270	REV. DIFF.	30	30	30	-	-	-	-	-	-	30	30	30	-	-	-	-	-	-	-	-	-
			PERM CODE	178	178	SPL	-	-	-	-	-	-	193	399	193	-	-	-	-	-	-	-	-	-
54	1600 1400	305	REV. DIFF.	30	30	30	-	-	-	-	-	-	30	30	30	-	-	-	-	-	-	-	-	-
			PERM CODE	178	178	SPL	-	-	-	-	-	-	193	399	193	-	-	-	-	-	-	-	-	-
54	1400 1150	320	REV. DIFF.	30	30	30	-	-	-	-	-	-	30	-	30	-	-	-	-	30	-	-	-	-
			PERM CODE	178	178	SPL	-	-	-	-	-	-	199	-	199	-	-	-	-	SPL	-	-	-	-
54	1150 850	430	REV. DIFF.	30	30	30	-	-	-	-	-	-	30	-	30	-	-	-	-	30	-	-	-	-
			PERM CODE	178	178	SPL	-	-	-	-	-	-	199	-	199	-	-	-	-	SPL	-	-	-	-
49.5	850 700	440	REV. DIFF.	30	30	30	-	-	-	-	-	-	30	-	30	-	-	-	-	30	-	-	-	-
			PERM CODE	178	178	SPL	-	-	-	-	-	-	199	-	199	-	-	-	-	SPL	-	-	-	-
45	700 550	460	REV. DIFF.	30	30	30	-	-	-	-	-	-	30	-	30	-	-	-	-	30	-	-	-	-
			PERM CODE	178	178	SPL	-	-	-	-	-	-	199	-	199	-	-	-	-	SPL	-	-	-	-
36	550 400	485	REV. DIFF.	30	30	30	-	-	-	-	-	-	30	-	30	-	-	-	-	30	-	-	-	-
			PERM CODE	178	178	SPL	-	-	-	-	-	-	199	-	199	-	-	-	-	SPL	-	-	-	-
31.5	400 300	415	REV. DIFF.	30	30	-	-	-	-	-	-	30	30	-	30	-	-	-	-	-	-	-	30	-
			PERM CODE	185	185	-	-	-	-	-	-	SPL	SPL	-	SPL	-	-	-	-	-	-	-	SPL	-
27	300 200	455	REV. DIFF.	30	30	-	-	-	-	-	-	30	30	-	30	-	-	-	-	-	-	-	30	-
			PERM CODE	185	185	-	-	-	-	-	-	SPL	SPL	-	SPL	-	-	-	-	-	-	-	SPL	-

MAST ON INSIDE OF CURVED TRACK

TYPE OF MAST				B-200 K-200						B-225 K-225						B-250 K-250						SPL MAST		
MAX. SPAN (m)	RADIUS (m)	VERSINE (MAX.) mm		N	ACC	ACA	CLC	CLA	CLI	N	ACC	ACA	CLC	CLA	CLI	N	ACC	ACA	CLC	CLA	CLI	CLC	CLA	CLI
58.5	∞ 2200	195	REV. DIFF.	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-	-	-	-	-	-
			PERM CODE	168	168	270	178	-	178	-	-	-	-	395	-	-	-	-	-	-	-	-	-	-
58.5	2200 1900	225	REV. DIFF.	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-	-	-	-	-	-
			PERM CODE	168	168	275	178	-	178	-	-	-	-	395	-	-	-	-	-	-	-	-	-	-
58.5	1900 1600	270	REV. DIFF.	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-	-	-	-	-	-
			PERM CODE	173	173	275	185	-	185	-	-	-	-	395	-	-	-	-	-	-	-	-	-	-
54	1600 1400	305	REV. DIFF.	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-	-	-	-	-	-
			PERM CODE	173	173	275	185	-	185	-	-	-	-	395	-	-	-	-	-	-	-	-	-	-
54	1400 1150	320	REV. DIFF.	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-	-	-	-	-	-
			PERM CODE	173	173	275	185	-	185	-	-	-	-	399	-	-	-	-	-	-	-	-	-	-
54	1150 850	430	REV. DIFF.	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-	-	-	-	-	-
			PERM CODE	173	173	275	185	-	185	-	-	-	-	399	-	-	-	-	-	-	-	-	-	-
49.5	850 700	440	REV. DIFF.	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-	-	-	-	-	-
			PERM CODE	173	173	275	185	-	185	-	-	-	-	399	-	-	-	-	-	-	-	-	-	-
45	700 550	460	REV. DIFF.	-30	-30	-30	-	-	-	-	-	-	-30	-30	-30	-	-	-	-	-	-	-	-	-
			PERM CODE	173	173	275	-	-	-	-	-	-	193	399	193	-	-	-	-	-	-	-	-	-
36	550 400	485	REV. DIFF.	-30	-30	-30	-	-	-	-	-	-	-30	-	-30	-	-	-	-	-30	-	-	-	-
			PERM CODE	178	178	SPL	-	-	-	-	-	-	199	-	199	-	-	-	-	SPL	-	-	-	-
27	300 200	455	REV. DIFF.	-30	-30	-	-	-	-	-	-	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-
			PERM CODE	185	185	-	-	-	-	-	-	SPL	199	-	199	-	-	-	-	SPL	-	-	-	-

NOTES:–

1. BEYOND THE WIND SPEED OF 33 m/s THE TRAINS WILL HAVE TO BE STOPPED.
2. THIS EMPLOYMENT SCHEDULE IS APPLICABLE FOR RED REGION OF BASIC WIND SPEED 50 m/s OF FIGURE–1 OF IS:875 (Part–3)–2015 REV.III (DESIGN WIND PRESSURE 178 kgf/m² CALCULATED AS PER CLAUSE 5.4 OF IS:875 (Part–3)–2015 REV.III).
3. THE CYCLONIC RESION AREA FACTOR(K4) HAS NOT BEEN CONSIDERED IN THE DESIGN CALCULATION GIVEN IN CLAUSE 6.3.4 OF IS: 875(PART–3)–2015(REV.III)
4. THE EMPLOYMENT SCHEDULE IS SUITABLE FOR IMPLANTATION UP TO 3.8 METER FROM THE CENTRE LINE OF NEAREST TRACK WITH +0.1 m FOR TRACK SHIELDING ALLOWANCE ON SETTING OF MAST AND ON INSIDE OF CURVE EXTRA IMPLANTATION AS PER DRG. NO.ET/OHE/G/00111 SH.1 HAS BEEN CONSIDERED.
5. FOUNDATION BENDING MOMENT (FBM) CODE GIVES THE NECESSARY CROSS REFERENCE TO EQUIVALENT FOUNDATIONS, FOR FOUNDATION SELECTION SEE THE DRAWING No. TI/DRG/CIV/FND/RDSO/00001/04/0 MODIFICATION '0' CHART OF (SHEET No.1 TO 5).
6. FOR LOCATIONS WITH NON–STANDARD SPANS AND IMPLANTATIONS, THE SAFETY OF MAST AND FOUNDATION SHALL BE CHECKED AND SUITABLE MAST AND FOUNDATION SHALL BE PROVIDED.
7. REVERSE DEFLECTIONS ARE IN mm. REVERSE DEFLECTION IS POSITIVE WHEN AWAY FROM TRACK AND NEGATIVE WHEN TOWARDS IT.



8.(a) UNDER OVERLAP CENTRAL LOCATION IN TANGENT TRACK 54 metre SPAN IS CONSIDERED.
(b) THE SPANS ON SPECIFIC LOCATION LIKE, BRIDGES, OVERLAPS, TURNOUTS, NEUTRAL SECTION ETC. SHALL BE AS PER PARA NO. 6.1.2.1, 5.6, 5.7, 5.5 OF ACTM VOL.II, PART–2.

9. THE ARRANGEMENT OF OHE AT SUPPORT HAS BEEN CONSIDERED AS PER DRAWING NO. ET/OHE/02102. SHEET–3 (REV.–B).
10. MAST OF ECONOMIC SIZE SHALL BE SELECTED.

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EMPLOYMENT SCHEDULE FOR OHE MAST (9.5 m)
BASIC WIND SPEED 50 m/s
WIND PRESSURE 178 kgf/m²
(OHE + FEEDER WIRE + EARTH WIRE)
1500 kgf TENSION IN CAT. 125mm²
1500 kgf TENSION IN CONT.150 mm²
(WITH IMPLANTATION UP TO 3.8M)

EDTI (BHARDWAJ CHAUDHARY)

REF:– CROSS REF:–

DATE	MOD.	NATURE OF MOD.	INITIAL

R. D. S. O.

	DATE	NAME
DR.		
CK.		
CK.		

TI/DRG/CIV/ES/RDSO /00004/20/0

NOT TO SCALE (SHEET–5)

ANNEXURE 17

EMPLOYMENT SCHEDULE: WIND PRESSURE 178KG/SQM

MAST ON OUTSIDE OF CURVED TRACK

TYPE OF MAST				B-200 K-200						B-225 K-225						B-250 K-250						SPL MAST		
MAX. SPAN (m)	RADIUS (m)	VERSINE (MAX.) mm		N	ACC	ACA	CLC	CLA	CLI	N	ACC	ACA	CLC	CLA	CLI	N	ACC	ACA	CLC	CLA	CLI	CLC	CLA	CLI
58.5	∞	0	REV. DEF.	30	30	30	-	-	-	-	-	-	30	30	30	-	-	-	-	-	-	-	-	-
			PERM CODE	173	173	275	-	-	-	-	-	-	193	399	193	-	-	-	-	-	-	-	-	-
58.5	∞ 2200	195	REV. DEF.	30	30	30	-	-	-	-	-	-	30	30	30	-	-	-	-	-	-	-	-	-
			PERM CODE	173	173	275	-	-	-	-	-	-	193	399	193	-	-	-	-	-	-	-	-	-
58.5	2200 1900	225	REV. DEF.	30	30	30	-	-	-	-	-	-	30	30	30	-	-	-	-	-	-	-	-	-
			PERM CODE	178	178	SPL	-	-	-	-	-	-	193	399	193	-	-	-	-	-	-	-	-	-
58.5	1900 1600	270	REV. DEF.	30	30	30	-	-	-	-	-	-	30	30	30	-	-	-	-	-	-	-	-	-
			PERM CODE	178	178	SPL	-	-	-	-	-	-	193	399	193	-	-	-	-	-	-	-	-	-
54	1600 1400	305	REV. DEF.	30	30	30	-	-	-	-	-	-	30	-	30	-	-	-	-	30	-	-	-	-
			PERM CODE	178	178	SPL	-	-	-	-	-	-	193	-	193	-	-	-	-	SPL	-	-	-	-
54	1400 1150	320	REV. DEF.	30	30	30	-	-	-	-	-	-	30	-	30	-	-	-	-	30	-	-	-	-
			PERM CODE	178	178	SPL	-	-	-	-	-	-	199	-	199	-	-	-	-	SPL	-	-	-	-
54	1150 850	430	REV. DEF.	30	30	30	-	-	-	-	-	-	30	-	30	-	-	-	-	30	-	-	-	-
			PERM CODE	178	178	SPL	-	-	-	-	-	-	199	-	199	-	-	-	-	SPL	-	-	-	-
49.5	850 700	440	REV. DEF.	30	30	30	-	-	-	-	-	-	30	-	30	-	-	-	-	30	-	-	-	-
			PERM CODE	178	178	SPL	-	-	-	-	-	-	199	-	199	-	-	-	-	SPL	-	-	-	-
45	700 550	460	REV. DEF.	30	30	30	-	-	-	-	-	-	30	-	30	-	-	-	-	30	-	-	-	-
			PERM CODE	178	178	SPL	-	-	-	-	-	-	199	-	199	-	-	-	-	SPL	-	-	-	-
36	550 400	405	REV. DEF.	30	30	-	-	-	-	-	-	30	30	-	30	-	-	-	-	30	-	-	-	-
			PERM CODE	178	178	-	-	-	-	-	-	SPL	199	-	199	-	-	-	-	SPL	-	-	-	-
31.5	400 300	415	REV. DEF.	30	30	-	-	-	-	-	-	30	30	-	30	-	-	-	-	-	-	-	30	-
			PERM CODE	185	185	-	-	-	-	-	-	SPL	SPL	-	SPL	-	-	-	-	-	-	-	SPL	-
27	300 200	455	REV. DEF.	-	-	-	-	-	-	30	30	30	30	-	30	-	-	-	-	-	-	-	30	-
			PERM CODE	-	-	-	-	-	-	193	193	SPL	SPL	-	SPL	-	-	-	-	-	-	-	SPL	-

MAST ON INSIDE OF CURVED TRACK

TYPE OF MAST				B-200 K-200						B-225 K-225						B-250 K-250						SPL MAST		
MAX. SPAN (m)	RADIUS (m)	VERSINE (MAX.) mm		N	ACC	ACA	CLC	CLA	CLI	N	ACC	ACA	CLC	CLA	CLI	N	ACC	ACA	CLC	CLA	CLI	CLC	CLA	CLI
58.5	∞ 2200	195	REV. DEF.	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-	-	-	-	-	-
			PERM CODE	168	168	275	178	-	178	-	-	-	-	395	-	-	-	-	-	-	-	-	-	-
58.5	2200 1900	225	REV. DEF.	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-	-	-	-	-	-
			PERM CODE	173	173	275	185	-	185	-	-	-	-	395	-	-	-	-	-	-	-	-	-	-
58.5	1900 1600	270	REV. DEF.	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-	-	-	-	-	-
			PERM CODE	173	173	275	185	-	185	-	-	-	-	395	-	-	-	-	-	-	-	-	-	-
54	1600 1400	305	REV. DEF.	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-	-	-	-	-	-
			PERM CODE	173	173	275	185	-	185	-	-	-	-	399	-	-	-	-	-	-	-	-	-	-
54	1400 1150	320	REV. DEF.	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-	-	-	-	-	-
			PERM CODE	173	173	275	185	-	185	-	-	-	-	399	-	-	-	-	-	-	-	-	-	-
54	1150 850	430	REV. DEF.	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-	-	-	-	-	-
			PERM CODE	173	173	275	185	-	185	-	-	-	-	399	-	-	-	-	-	-	-	-	-	-
49.5	850 700	440	REV. DEF.	-30	-30	-30	-	-	-	-	-	-	-30	-30	-30	-	-	-	-	-	-	-	-	-
			PERM CODE	173	173	275	-	-	-	-	-	-	193	399	193	-	-	-	-	-	-	-	-	-
45	700 550	460	REV. DEF.	-30	-30	-30	-	-	-	-	-	-	-30	-30	-30	-	-	-	-	-	-	-	-	-
			PERM CODE	173	173	275	-	-	-	-	-	-	193	399	193	-	-	-	-	-	-	-	-	-
36	550 400	405	REV. DEF.	-30	-30	-30	-	-	-	-	-	-	-30	-	-30	-	-	-	-	-30	-	-	-	-
			PERM CODE	178	178	SPL	-	-	-	-	-	-	199	-	199	-	-	-	-	SPL	-	-	-	-
27	300 200	455	REV. DEF.	-30	-30	-	-	-	-	-	-	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-
			PERM CODE	185	185	-	-	-	-	-	-	SPL	199	-	199	-	-	-	-	SPL	-	-	-	-

NOTES:-

1. BEYOND THE WIND SPEED OF 33 m/s THE TRAINS WILL HAVE TO BE STOPPED.
2. THIS EMPLOYMENT SCHEDULE IS APPLICABLE FOR RED REGION OF BASIC WIND SPEED 50 m/s OF FIGURE-1 OF IS:875 (Part-3)-2015 REV.III (DESIGN WIND PRESSURE 178 Kgf/m² CALCULATED AS PER CLAUSE 5.4 OF IS:875 (Part-3)-2015 REV.III).
3. THE CYCLONIC REGION AREA FACTOR(K4) HAS NOT BEEN CONSIDERED IN THE DESIGN CALCULATION GIVEN IN CLAUSE 6.3.4 OF IS: 875(PART-3)-2015(REV.III)
4. THE EMPLOYMENT SCHEDULE IS SUITABLE FOR IMPLANTATION UP TO 4.85 METER FROM THE CENTRE LINE OF NEAREST TRACK WITH +0.1 m FOR TRACK SHIELDING ALLOWANCE ON SETTING OF MAST AND ON INSIDE OF CURVE EXTRA IMPLANTATION AS PER DRG. NO.ET/OHE/G/00111 SH.1 HAS BEEN CONSIDERED.
5. FOUNDATION BENDING MOMENT (FBM) CODE GIVES THE NECESSARY CROSS REFERENCE TO EQUIVALENT FOUNDATIONS, FOR FOUNDATION SELECTION SEE THE DRAWING No. TI/DRG/CIV/FND/RDSO/00001/04/0 MODIFICATION '0' CHART OF (SHEET No.1 TO 5).
6. FOR LOCATIONS WITH NON-STANDARD SPANS AND IMPLANTATIONS, THE SAFETY OF MAST AND FOUNDATION SHALL BE CHECKED AND SUITABLE MAST AND FOUNDATION SHALL BE PROVIDED.
7. REVERSE DEFLECTIONS ARE IN mm. REVERSE DEFLECTION IS POSITIVE WHEN AWAY FROM TRACK AND NEGATIVE WHEN TOWARDS IT.



8.(a) UNDER OVERLAP CENTRAL LOCATION IN TANGENT TRACK 54 metre SPAN IS CONSIDERED.
(b) THE SPANS ON SPECIFIC LOCATION LIKE, BRIDGES, OVERLAPS, TURNOUTS, NEUTRAL SECTION ETC. SHALL BE AS PER PARA NO. 6.1.2.1, 5.6, 5.7, 5.5 OF ACTM VOL.II, PART-2.

9. THE ARRANGEMENT OF OHE AT SUPPORT HAS BEEN CONSIDERED AS PER DRAWING NO. ETI/OHE/02102. SHEET-3(REV.- B).
10. MAST OF ECONOMIC SIZE SHALL BE SELECTED.

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EMPLOYMENT SCHEDULE FOR OHE MAST (9.5 m)
BASIC WIND SPEED 50 m/s
WIND PRESSURE 178 kgf/m²
(OHE + FEEDER WIRE + EARTH WIRE)
1500 kgf TENSION IN CAT. 125mm²
1500 kgf TENSION IN CONT.150 mm²
(WITH IMPLANTATION UP TO 4.85M)

EDTI (BHARDWAJ CHAUDHARY)

REF:- CROSS REF:-

DATE	MOD.	NATURE OF MOD.	INITIAL

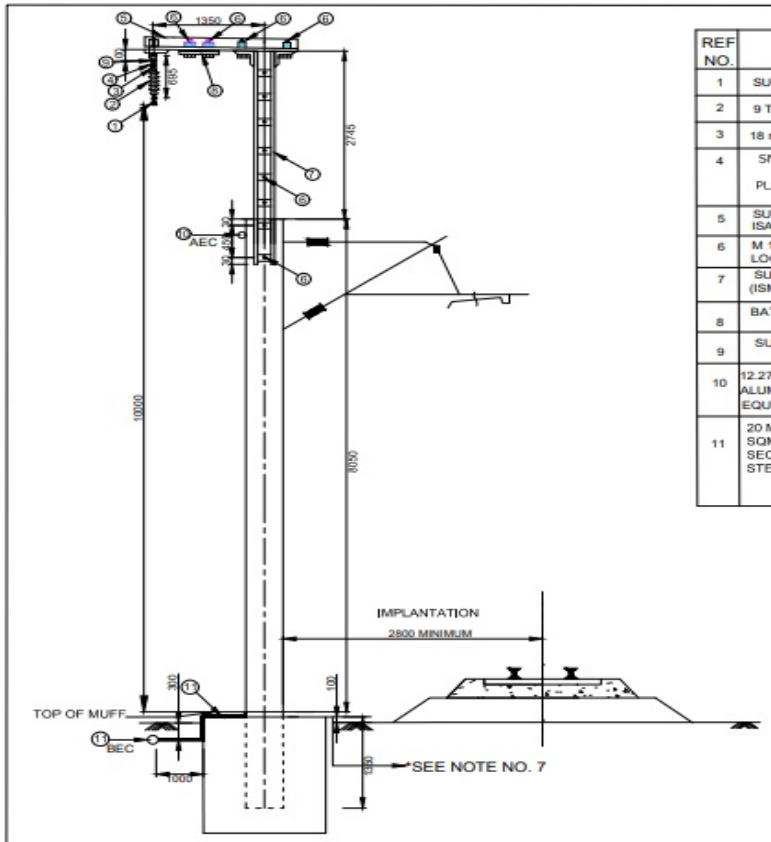
R. D. S. O.

	DATE	NAME
DR.		
CK.		
CK.		

TI/DRG/CIV/ES/RDSO /00004/20/0

NOT TO SCALE (SHEET-6)

ANNEXURE 18



REF NO.	DESCRIPTION	PART NO.	QTY
1	SUSPENSION CLAMP	1580	1
2	9 TONNE INSULATOR ASSEMBLY	6020	1
3	18 mm SINGLE CLEVIS ASSEMBLY	5040	1
4	SNAP HEADED PIN ∅ 20,60 mm LONG WITH PLANE WASHER & SPLIT PIN 4 X 36	262	1
5	SUPER MAST CROSS ARM ISA 65x65x6	8015/8012	2
6	M 16 BOLT 50/38 WITH NUT, LOCK NUT & PLAIN WASHER	16/3 NL	12
7	SUPER MAST CHANNEL (ISMC 100)	8021/8061/8011	2
8	BATTEN PLATE (TYPE-II)	8016	1
9	SUSPENSION SUPPORT	8014 OR 8014-1	1
10	12.27 mm DIA. OF STEEL REINFORCED ALUMINIUM RACCOON (50 MM2 Cu EQUIVALENT) (AEC)		
11	20 MM DIA. AND 238 SQMM (NOMINAL CROSS SECTIONAL AREA) GALVANISED STEEL CONDUCTOR (BEC)	AS PER IS: 2141-2000	

NOTE :-

1. ALL DIMENSIONS ARE IN mm
2. THE 25 KV ALUMINIUM FEEDER WIRE (22 MM DIA. AND 288 SQMM CROSS SECTIONAL AREA) SHALL BE RUN ON THE REAR SIDE OF THE MAST. THE FEEDER MAST WILL HAVE MINIMUM IMPLANTATION OF 2.8M
3. TENSION LENGTH OF FEEDER LINE WILL BE 1500M.
4. SUITABLE SUPER MAST AND CROSS ARM SHOULD BE USED AS PER SITE CONDITION TAKING IN TO ACCOUNT THE GROUND CLEARANCE & LATERAL CLEARANCES IN OPEN ROUTE, ACROSS AND ALONG THE STREET/LC GATE.
5. BEC WILL BE CONNECTED TO EACH MAST BY BEC CONDUCTOR WITH SUITABLE TEE CONNECTOR AT ONE END & LUG ARRANGEMENT AT MAST END
6. SPAN, MAST AND FOUNDATION SHOULD BE SELECTED AS PER DRAWING NO.TI/DRG/ES/RDSO/00004/20/0 (SHEET 1 - 6) .
7. THE CROSS BONDING OF UP BEC-UP MAST/PORTAL- UP TRACTION RAIL-DN-MAST/PORTAL-DN BEC SHOULD BE DONE BY 50X6 MM MS/GS FLAT AT EVERY 450 M.

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GENERAL ARRANGEMENT OF FUTURE OHE (125 sqmm CATENARY+150 sqmm CONTACT WIRE) WITH FEEDER (288 sqmm) , EARTH WIRE AND BEC FOR NDLS-HWH & NDLS-MUMBAI ROUTE

ED-TI

(BHARWDAJ CHAUDHARY)

REF. ETI/C/P/8020

CROSS REF :-

DATE	MOD.	NATURE OF MOD.	INITIALS

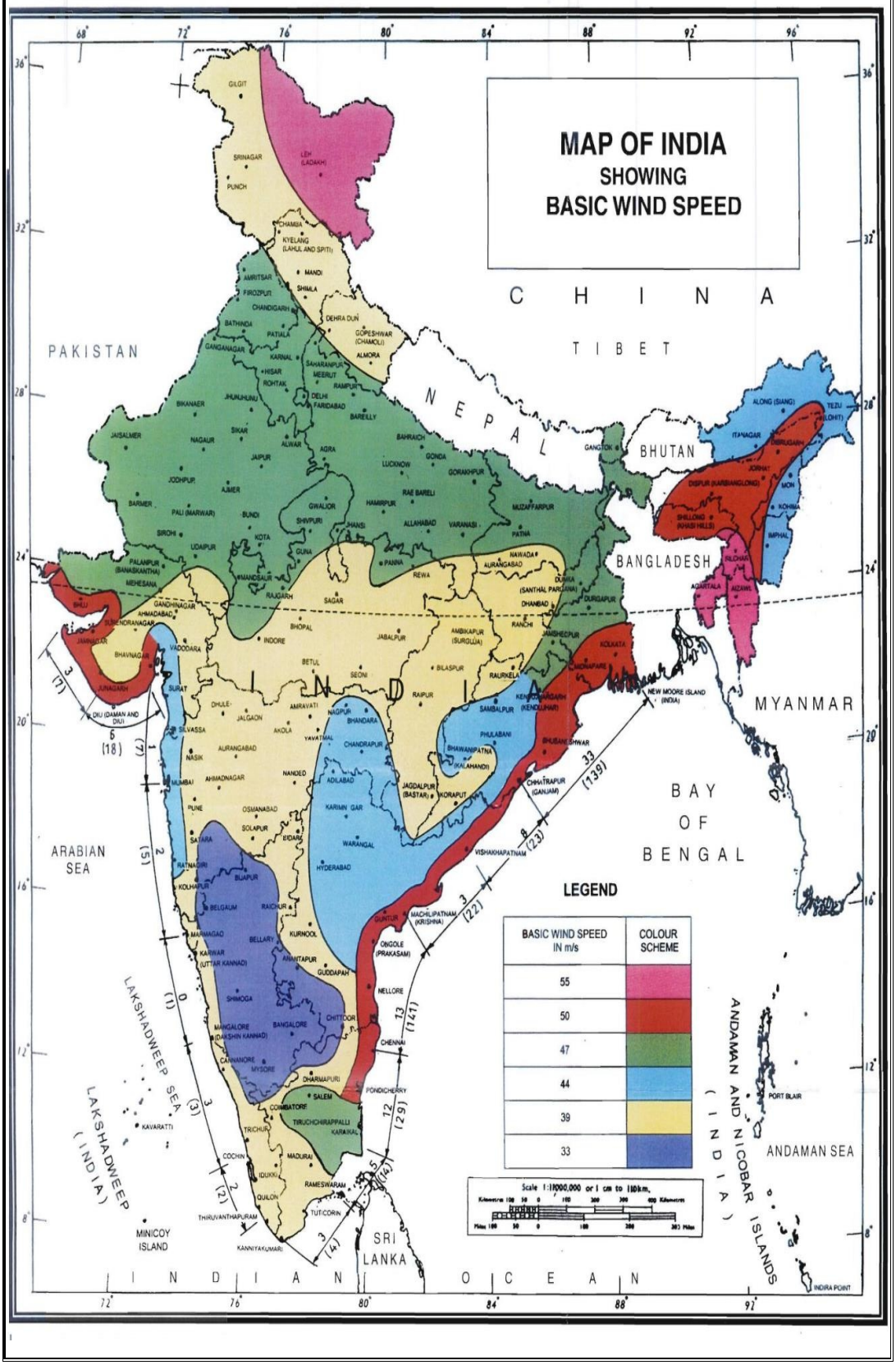
R . D . S . O.

	DATE	NAME
DR		
CK		
CK		

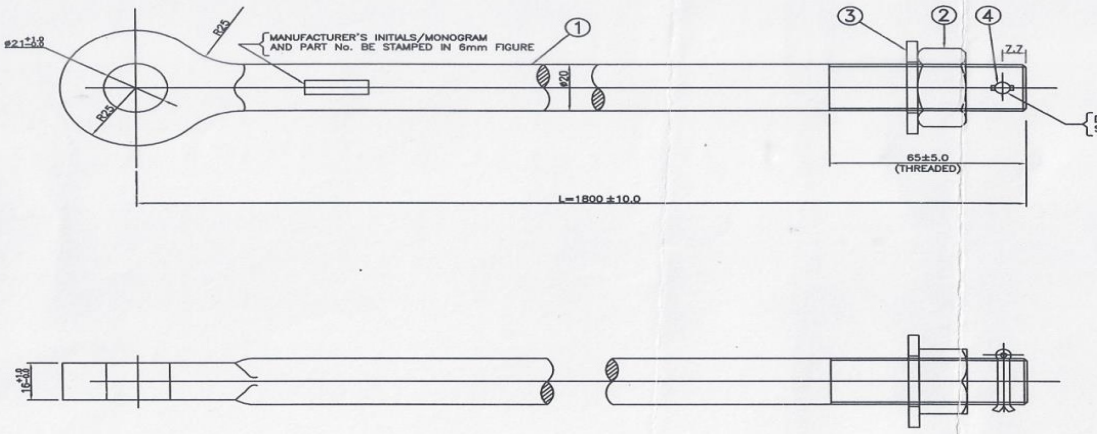
TI/DRG/OHE/FEEDER/ RDSO/00002/20/0

ANNEXURE 19

IS 875 (Part 3) : 2015



ANNEXURE 20



REF.	DESCRIPTION	PART No.	MATERIAL	SPECIFICATION	Approx. Wt. (kg)	No. OFF
1.	COUNTER WEIGHT EYE ROD (FORGED)	SK/588	FORGED STEEL GALVANISED	IS:2004/1991 (CLII) ETI/OHE/13		1
2.	HEX NUT	20N	STEEL GALV.	ETI/OHE/18		1
3.	PUNCHED WASHER A22	–	–DO–	–DO–		1
4.	SPLIT PIN 4x40	–	ANNEALED COPPER	IS:549		1

NOTES:–

1. ALL DIMENSIONS ARE IN mm.
2. TOLERANCE OF ±0.5 IS PERMISSIBLE ON ALL DIMENSIONS UNLESS OTHERWISE SHOWN.
3. MANUFACTURER'S INITILS/MONOGRAM AND PART No. TO BE PROVIDED AS SHOWN.
4. FORGED DRAFT ANGLE AND RADII OF FILLET TO CONFORM TO IS:3469.
5. REFERENCE TO IS:2004(CL.II) & IS 3469 SHALL BE TAKEN AS REFERENCE TO LATEST VERSION OF THE STANDARDS.

USAGE:–
THE EYE ROD SHALL BE USED WITH CAST IRON COUNTER WEIGHT ASSEMBLY (800kgs).

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COUNTER WEIGHT EYE ROD

JD/OHE Sd/– OM PRAKASH 17.12.93

ADE/OHE Sd/– AJIT SINGH

REF.:– CROSS REF.:–

DATE	MOD.	NATURE OF MOD.	INITIAL
28.12.94	'B'	MATERIAL SPEC. ALTERED	
	'A'	REDRAWN ON CAD	

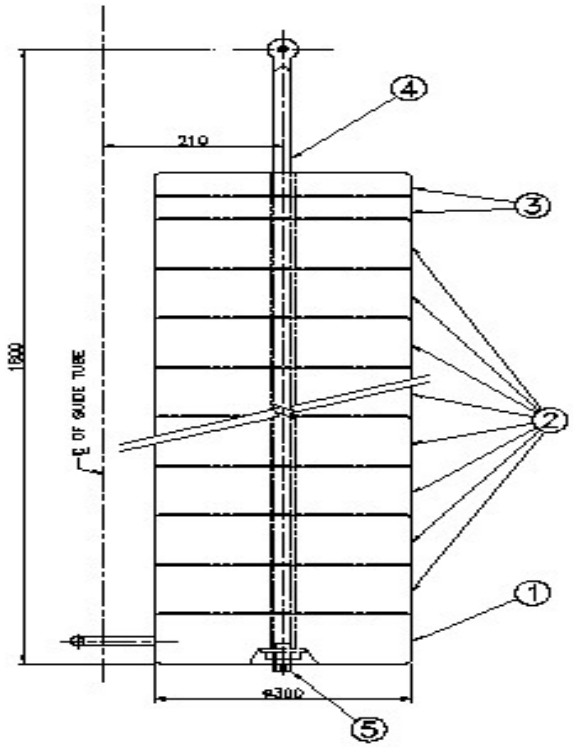
R. D. S. O.

	DATE	NAME
DR.	06 01 93	Sd/–
TC.		
CK.	16 12 93	Sd/–

ETI/OHE/SK/588 REV. B

SCALE:–1:1

ANNEXURE 21



REF.	DESCRIPTION	PART No.	MATERIAL	SPECIFICATION	Approx. WEIGHT(Kg)	NUMBER OFF
1.	CAST IRON BASE WEIGHT	5091	GREY CAST IRON	IS:210 GRADE-18	40	1
2.	40kg COUNTER WEIGHT PIECE	5092	"	"	40	18
3.	20kg COUNTER WEIGHT PIECE	5093	"	"	20	2
4.	COUNTER WEIGHT EYE ROD	SK/587	STEEL GALVANISED	IS:2062 GR-A ETI/OHE/13		1
5.	SPLIT PIN 4x40		ANNEALED COPPER	IS:549		1

NOTES:-

1. ALL DIMENSIONS IN mm.
2. CAST IRON WEIGHTS SHALL BE GIVEN ONE COAT OF PRIMER AND TWO COATS OF ALUMINIUM PAINT FINAL COAT OF ALUMINIUM PAINT TO BE GIVEN AFTER ERECTION.
3. FORGED DRAFT ANGLE AND RADII OF FILLET TO CONFORM IS:3469.
4. MANUFACTURER'S INITIALS/MONOGRAM AND PART No. TO BE PROVIDED AS SHOWN IN PART DRG.
5. THE VARIATION IN WEIGHT OF THE WEIGHT PIECES IS IN THE ORDER OF ±0.5kg FOR PART No.5091/5092 AND ±0.25kg FOR PART No.5093.
6. THE TOTAL Approx. WEIGHT OF THE WHOLE ASSEMBLY IS 800±0.5kg.
7. FOR USE WITH 33.5mm GUIDE TUBE IN TERMINATION WITH REGULATING EQUIPMENT (3:1 RATIO) AND TENSION IN EACH CONDUCTOR BEING 1200kgf.

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COUNTER WEIGHT ASSEMBLY

JD/TI-V	Sd/-	OM PRAKASH 17.12.93
ADE/OHE	Sd/-	AJIT SINGH

REF.:-

GROSS REF.:-

DATE	NOD.	NATURE OF MOD.	INITIAL
	'B'		
	'A'		Sd/-

R. D. S. O.

	DATE	NAME
DR.	04 01 93	Sd/-
TC.		
CK.	15 12 93	Sd/-

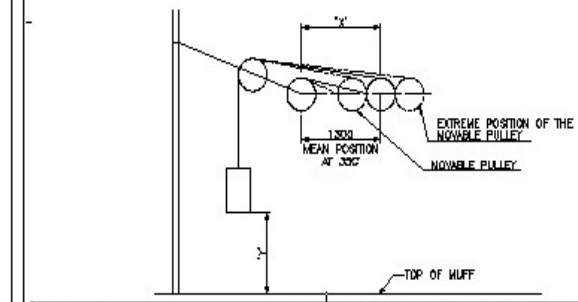
ETI/OHE/SK/587 REV. B

SCALE:-1:5

SUB SCALE:-

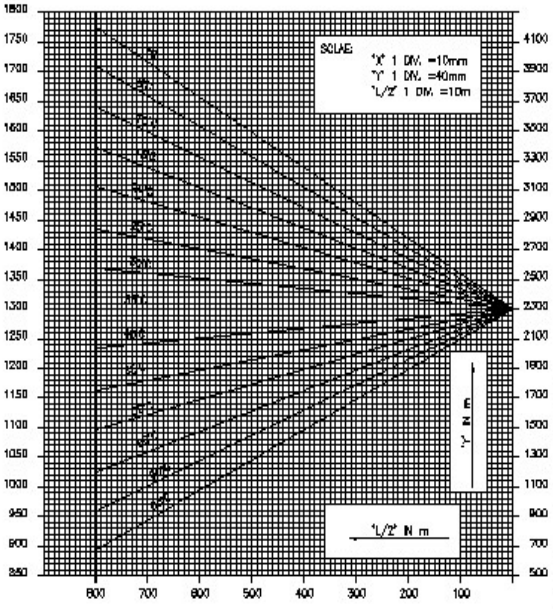
SUB SCALE:-

ANNEXURE 22



TEMP \ LENGTH	VALUE OF 'X' IN mm FOR VALUE OF 'L/2' IN m															
	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
0	1330	1360	1389	1418	1448	1479	1508	1538	1568	1598	1627	1657	1687	1717	1746	1776
5	1326	1351	1377	1402	1428	1453	1479	1504	1530	1555	1581	1606	1632	1657	1683	1708
10	1321	1343	1364	1385	1406	1428	1449	1470	1491	1513	1534	1555	1576	1598	1619	1640
15	1317	1334	1351	1368	1385	1402	1419	1436	1453	1470	1487	1504	1521	1538	1555	1572
20	1313	1328	1338	1351	1384	1377	1389	1402	1415	1428	1440	1453	1466	1479	1491	1504
25	1308	1317	1326	1334	1343	1351	1360	1368	1377	1385	1394	1402	1411	1419	1428	1436
30	1304	1309	1313	1317	1321	1328	1330	1334	1338	1343	1347	1351	1355	1360	1364	1368
35	1300	1300	1300	1300	1300	1300	1300	1300	1300	1300	1300	1300	1300	1300	1300	1300
40	1296	1292	1287	1283	1279	1275	1270	1265	1262	1258	1253	1249	1245	1241	1236	1232
45	1292	1283	1275	1266	1258	1249	1241	1232	1224	1215	1207	1198	1190	1181	1173	1164
50	1287	1275	1262	1249	1236	1224	1211	1198	1185	1173	1160	1147	1134	1122	1109	1096
55	1283	1266	1249	1232	1215	1198	1181	1164	1147	1130	1113	1096	1079	1062	1045	1028
60	1279	1258	1236	1215	1194	1173	1151	1130	1109	1088	1068	1045	1024	1003	981	960
65	1275	1249	1224	1198	1173	1147	1122	1096	1071	1045	1020	994	969	943	918	892

TEMP \ LENGTH	CORRESPONDING VALUES OF 'Y' IN mm															
	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
0	2389	2479	2568	2657	2746	2836	2925	3014	3103	3193	3282	3371	3460	3550	3639	3728
5	2377	2453	2530	2606	2683	2759	2836	2912	2989	3065	3142	3218	3295	3371	3448	3524
10	2364	2428	2491	2555	2619	2683	2746	2810	2874	2938	3001	3065	3129	3193	3257	3320
15	2351	2402	2453	2504	2555	2606	2657	2708	2759	2810	2861	2912	2963	3014	3065	3116
20	2338	2377	2415	2453	2491	2530	2568	2606	2644	2683	2721	2759	2797	2835	2874	2912
25	2326	2351	2377	2402	2428	2453	2479	2504	2530	2555	2581	2606	2632	2657	2683	2708
30	2313	2326	2338	2351	2364	2377	2389	2402	2415	2428	2440	2453	2466	2479	2491	2504
35	2300	2300	2300	2300	2300	2300	2300	2300	2300	2300	2300	2300	2300	2300	2300	2300
40	2287	2275	2262	2249	2236	2224	2211	2198	2185	2173	2160	2147	2134	2122	2109	2096
45	2275	2249	2224	2198	2173	2147	2122	2096	2071	2045	2020	1994	1969	1943	1918	1892
50	2262	2224	2185	2147	2109	2071	2032	1994	1956	1918	1879	1841	1803	1765	1727	1688
55	2249	2198	2147	2096	2045	1994	1943	1892	1841	1790	1739	1688	1637	1588	1535	1484
60	2236	2173	2109	2045	1981	1918	1854	1790	1726	1663	1599	1535	1471	1408	1344	1280
65	2224	2147	2071	1994	1918	1841	1765	1688	1612	1535	1459	1382	1306	1229	1153	1078



NOTES:-

1. 'X' IS THE DISTANCE IN mm BETWEEN CENTRES OF MOVABLE PULLEY AND ADJACENT FIXED PULLEY.
2. 'Y' IS THE DISTANCE IN mm BETWEEN TOP OF MUFF AND BOTTOM OF COUNTERWEIGHT ASSEMBLY.
3. THE TEMPERATURE REFERRED IN THIS DRAWING IS THE TEMPERATURE OF CONDUCTORS WHICH ARE BEING REGULATED FOR TENSION.
4. 'L/2' REFERS TO HALF TENSION LENGTH i.e., THE LENGTH OF OHE BETWEEN ANTICREEP AND REGULATING EQUIPMENT OR BETWEEN FIXED TERMINATION AND REGULATING EQUIPMENT.
5. THE HALF TENSION LENGTH SHALL NORMALLY BE 700m BUT MAY BE INCREASED TO 750m(MAXIMUM) FOR OHE WITH 103mm PRESAG FOR 72m SPAN(PROPORTIONATELY LESS THAN SMALLER SPANS).
6. THE HALF TENSION LENGTH SHALL NORMALLY BE 750m BUT MAY BE INCREASED TO 800m(MAXIMUM) FOR OHE WITH 50mm PRESAG FOR 72m SPAN(PROPORTIONATELY LESS FOR SMALLER SPANS).
7. FOR LIMITATION OF HALF TENSION LENGTHS, RELEVANT PARAS OF PRINCIPLES FOR THE OHE LAYOUT PLANS AND SECTIONING DIAGRAMS No.ETI/OHE/53 MAY BE REFERRED.
8. THIS DRAWING IS APPLICABLE FOR REGULATING EQUIPMENT, THREE PULLEY TYPE(3:1 RATIO) MODIFIED, TO DRG No.TI/DRG/OHE/ATD/RDSO/00001/99/3.

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ADJUSTMENT CHART OF REGULATING EQUIPMENT
THREE PULLY TYPE(3:1 RATIO) (MODIFIED)

DTI-IV Sd/- 16.9.99
ADE/TI-IV Sd/- 15.9.99

REF.:- CROSS REF.:-

DATE	NO.	NATURE OF MOD.	INITIAL
	'1'	REDRAWN ON CAD	

R. D. S. O.

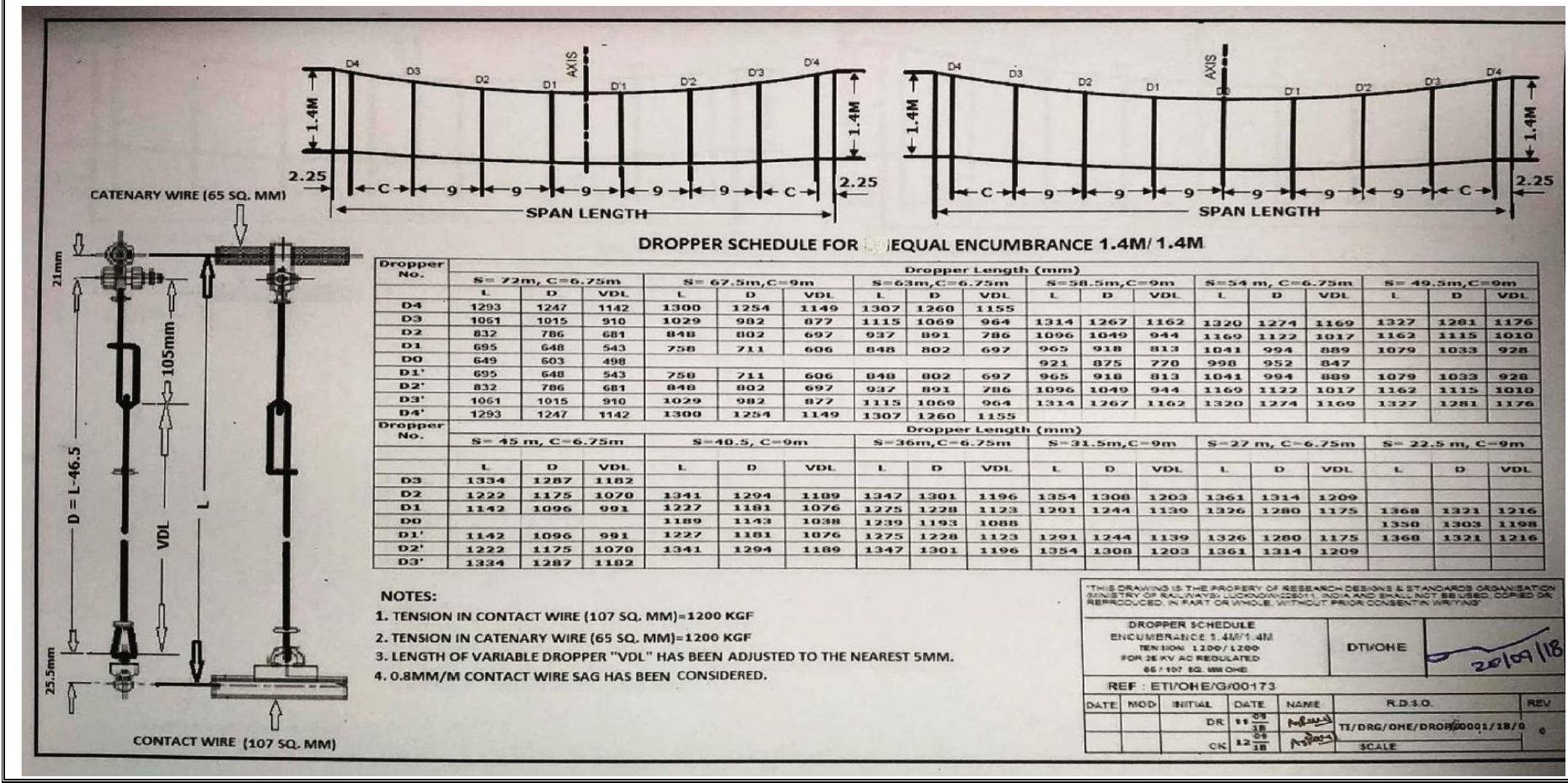
	DATE	NAME
DR.		
TC.		
CK.		

TI/DRG/OHE/ATD/RDSO/00003/99/1

SCALE:-N.T.S.

SUB BOND-
SUB BOND-

ANNEXURE 23



DROPPER SCHEDULE FOR EQUAL ENCUMBRANCE 1.4M/ 1.4M

Dropper No.	Dropper Length (mm)																	
	S= 72m, C=6.75m			S= 67.5m,C=9m			S=63m,C=6.75m			S=58.5m,C=9m			S=54 m, C=6.75m			S= 49.5m,C=9m		
	L	D	VDL	L	D	VDL	L	D	VDL	L	D	VDL	L	D	VDL	L	D	VDL
D4	1293	1247	1142	1300	1254	1149	1307	1260	1155									
D3	1061	1015	910	1029	982	877	1115	1069	964	1314	1267	1162	1320	1274	1169	1327	1281	1176
D2	832	786	681	848	802	697	937	891	786	1096	1049	944	1169	1122	1017	1162	1115	1010
D1	695	648	543	758	711	606	848	802	697	965	918	813	1041	994	889	1079	1033	928
D0	649	603	498							921	875	770	998	952	847			
D1'	695	648	543	758	711	606	848	802	697	965	918	813	1041	994	889	1079	1033	928
D2'	832	786	681	848	802	697	937	891	786	1096	1049	944	1169	1122	1017	1162	1115	1010
D3'	1061	1015	910	1029	982	877	1115	1069	964	1314	1267	1162	1320	1274	1169	1327	1281	1176
D4'	1293	1247	1142	1300	1254	1149	1307	1260	1155									

Dropper No.	Dropper Length (mm)																	
	S= 45 m, C=6.75m			S=40.5, C=9m			S=36m,C=6.75m			S=31.5m,C=9m			S=27 m, C=6.75m			S= 22.5 m, C=9m		
	L	D	VDL	L	D	VDL	L	D	VDL	L	D	VDL	L	D	VDL	L	D	VDL
D3	1334	1287	1182															
D2	1222	1175	1070	1341	1294	1189	1347	1301	1196	1354	1308	1203	1361	1314	1209			
D1	1142	1096	991	1227	1181	1076	1275	1228	1123	1291	1244	1139	1326	1280	1175	1368	1321	1216
D0				1189	1143	1038	1239	1193	1088							1350	1303	1198
D1'	1142	1096	991	1227	1181	1076	1275	1228	1123	1291	1244	1139	1326	1280	1175	1368	1321	1216
D2'	1222	1175	1070	1341	1294	1189	1347	1301	1196	1354	1308	1203	1361	1314	1209			
D3'	1334	1287	1182															

NOTES:

1. TENSION IN CONTACT WIRE (107 SQ. MM)=1200 KGF
2. TENSION IN CATENARY WIRE (65 SQ. MM)=1200 KGF
3. LENGTH OF VARIABLE DROPPER "VDL" HAS BEEN ADJUSTED TO THE NEAREST 5MM.
4. 0.8MM/M CONTACT WIRE SAG HAS BEEN CONSIDERED.

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DROPPER SCHEDULE
ENCUMBRANCE 1.4M/1.4M
TENSION 1200/1200
FOR 2X KV AC REGULATED
65 / 107 SQ. MM OHE

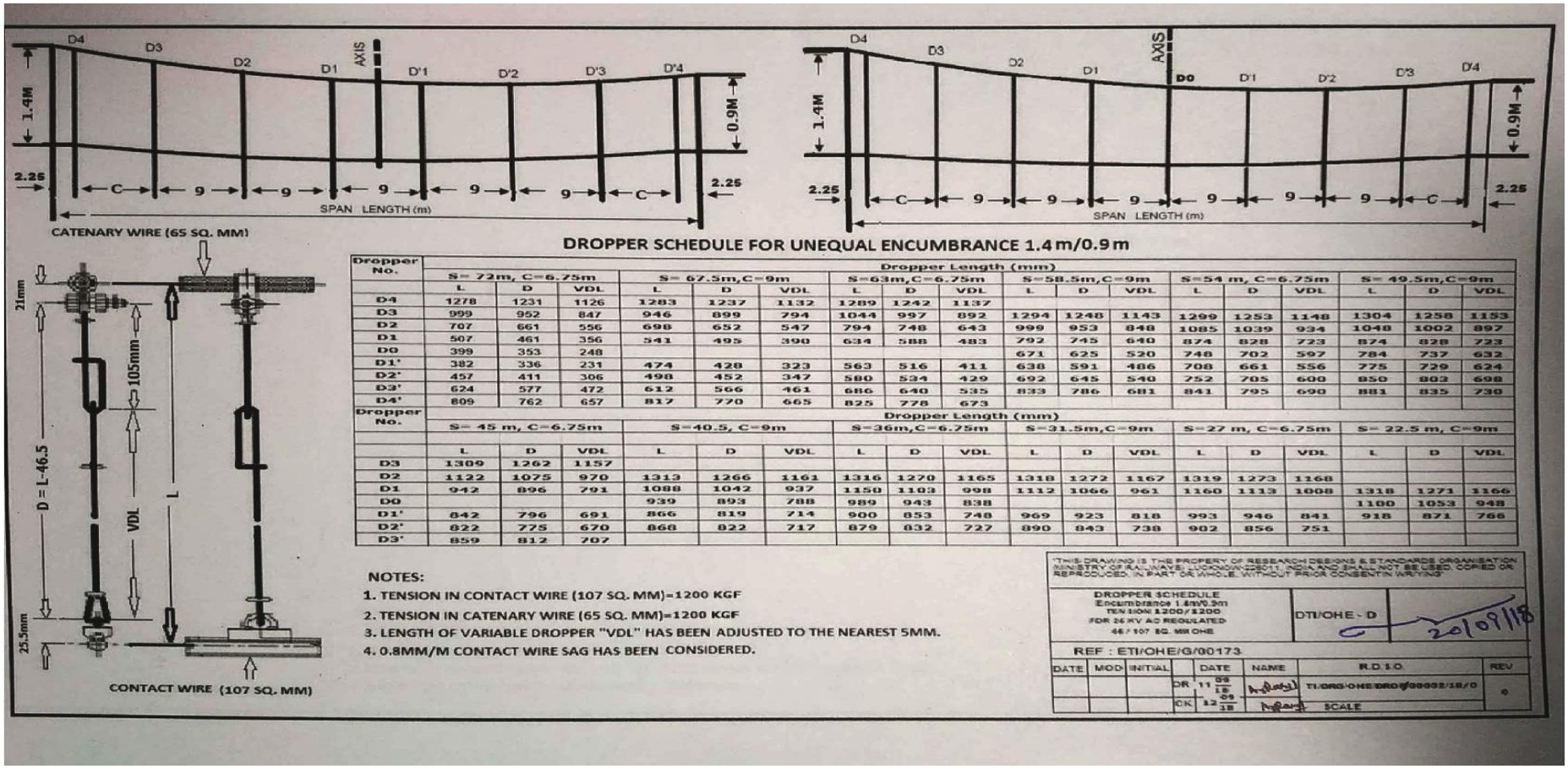
DTI/OHE

20/09/18

REF : ETI/OHE/G/00173

DATE	MOD	INITIAL	DATE	NAME	R.D.S.O.	REV
		DR	11-09-18		TI/DRG/OHE/DROP/00001/18/0	0
		CK	12-09-18		SCALE	

ANNEXURE 24



DROPPER SCHEDULE FOR UNEQUAL ENCUMBRANCE 1.4 m/0.9 m

Dropper No.	Dropper Length (mm)																	
	S= 72m, C=6.75m			S= 67.5m,C=9m			S=63m,C=6.75m			S=58.5m,C=9m			S=54 m, C=6.75m			S= 49.5m,C=9m		
	L	D	VDL	L	D	VDL	L	D	VDL	L	D	VDL	L	D	VDL	L	D	VDL
D4	1278	1231	1126	1283	1237	1132	1289	1242	1137									
D3	999	952	847	946	899	794	1044	997	892	1294	1248	1143	1299	1253	1148	1304	1258	1153
D2	707	661	556	698	652	547	794	748	643	999	953	848	1085	1039	934	1048	1002	897
D1	507	461	356	541	495	390	634	588	483	792	745	640	874	828	723	874	828	723
D0	399	353	248							671	625	520	748	702	597	784	737	632
D1'	382	336	231	474	428	323	563	516	411	638	591	486	708	661	556	775	729	624
D2'	457	411	306	498	452	347	580	534	429	692	645	540	752	705	600	850	803	698
D3'	624	577	472	612	566	461	686	640	535	833	786	681	841	795	690	881	835	730
D4'	809	762	657	817	770	665	825	778	673									

Dropper No.	Dropper Length (mm)																	
	S= 45 m, C=6.75m			S=40.5, C=9m			S=36m,C=6.75m			S=31.5m,C=9m			S=27 m, C=6.75m			S= 22.5 m, C=9m		
	L	D	VDL	L	D	VDL	L	D	VDL	L	D	VDL	L	D	VDL	L	D	VDL
D3	1309	1262	1157															
D2	1122	1075	970	1313	1266	1161	1316	1270	1165	1318	1272	1167	1319	1273	1168			
D1	942	896	791	1088	1042	937	1150	1103	998	1112	1066	961	1160	1113	1008	1318	1271	1166
D0				939	893	788	989	943	838							1100	1053	948
D1'	842	796	691	866	819	714	900	853	748	969	923	818	993	946	841	918	871	766
D2'	822	775	670	868	822	717	879	832	727	890	843	738	902	856	751			
D3'	859	812	707															

NOTES:

1. TENSION IN CONTACT WIRE (107 SQ. MM)=1200 KGF
2. TENSION IN CATENARY WIRE (65 SQ. MM)=1200 KGF
3. LENGTH OF VARIABLE DROPPER "VDL" HAS BEEN ADJUSTED TO THE NEAREST 5MM.
4. 0.8MM/M CONTACT WIRE SAG HAS BEEN CONSIDERED.

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DROPPER SCHEDULE
Encumbrance 1.4m/0.9m
TENSION 1200/1200
FOR 25 KV AC REGULATED
65 / 107 SQ. MM OHE

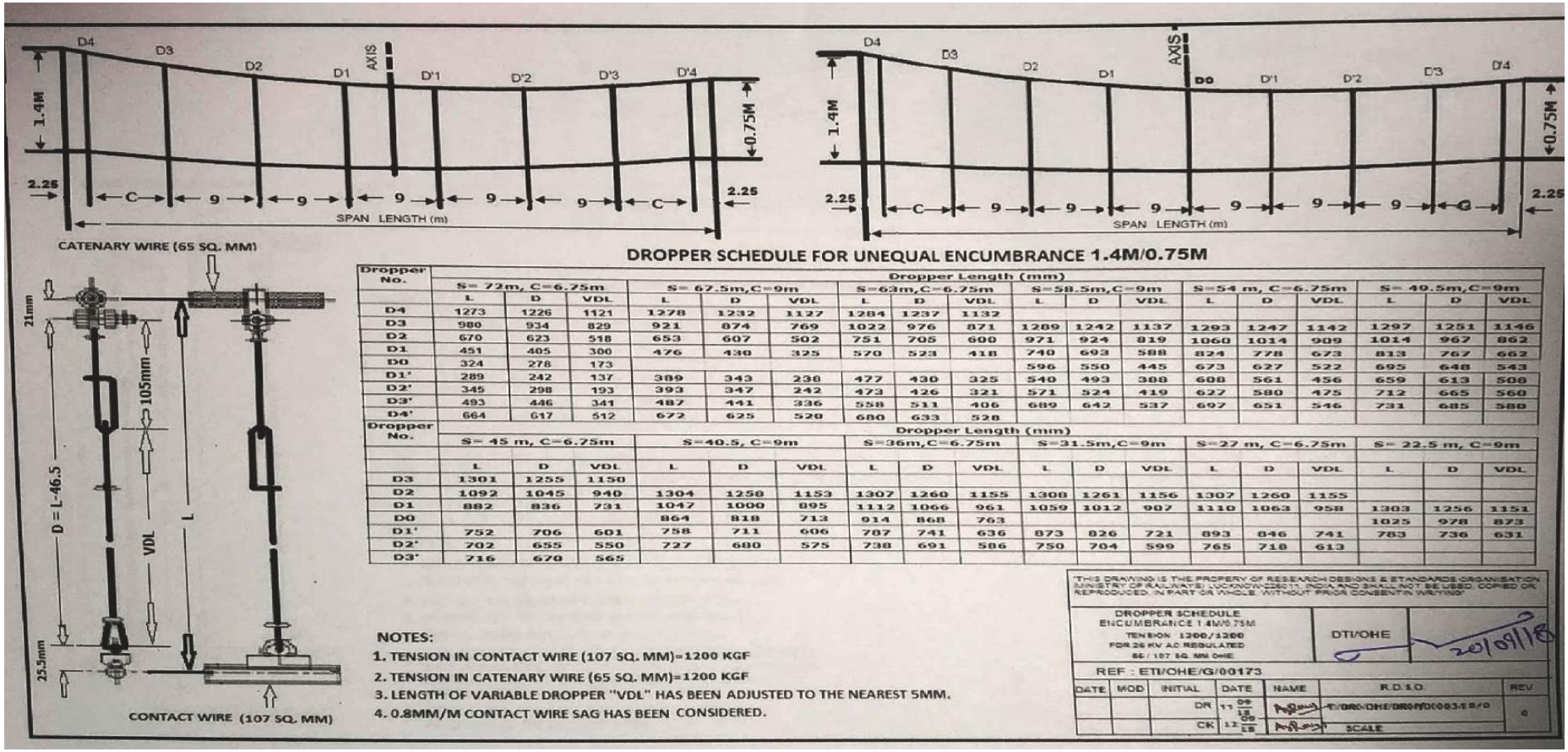
DTI/OHE - D

20/09/18

REF : ETI/OHE/G/00173

DATE	MOD	INITIAL		DATE	NAME	R.D.S.O.	REV
			DR	11/09/18		TI/DRG/OHE/DROP/00002/18/0	0
			CK	12/09/18		SCALE	

ANNEXURE 25



DROPPER SCHEDULE FOR UNEQUAL ENCUMBRANCE 1.4M/0.75M

Dropper No.	Dropper Length (mm)																	
	S= 72m, C=6.75m			S= 67.5m,C=9m			S=63m,C=6.75m			S=58.5m,C=9m			S=54 m, C=6.75m			S= 49.5m,C=9m		
	L	D	VDL	L	D	VDL	L	D	VDL	L	D	VDL	L	D	VDL	L	D	VDL
D4	1273	1226	1121	1278	1232	1127	1284	1237	1132									
D3	980	934	829	921	874	769	1022	976	871	1289	1242	1137	1293	1247	1142	1297	1251	1146
D2	670	623	518	653	607	502	751	705	600	971	924	819	1060	1014	909	1014	967	862
D1	451	405	300	476	430	325	570	523	418	740	693	588	824	778	673	813	767	662
D0	324	278	173							596	550	445	673	627	522	695	648	543
D1'	289	242	137	389	343	238	477	430	325	540	493	388	608	561	456	659	613	508
D2'	345	298	193	393	347	242	473	426	321	571	524	419	627	580	475	712	665	560
D3'	493	446	341	487	441	336	528	511	406	689	642	537	697	651	546	731	685	580
D4'	664	617	512	672	625	520	680	633	528									

Dropper No.	Dropper Length (mm)																	
	S= 45 m, C=6.75m			S=40.5, C=9m			S=36m,C=6.75m			S=31.5m,C=9m			S=27 m, C=6.75m			S= 22.5 m, C=9m		
	L	D	VDL	L	D	VDL	L	D	VDL	L	D	VDL	L	D	VDL	L	D	VDL
D3	1301	1255	1150															
D2	1092	1045	940	1304	1258	1153	1307	1260	1155	1308	1261	1156	1307	1260	1155			
D1	882	836	731	1047	1000	895	1112	1066	961	1059	1012	907	1110	1063	958	1303	1256	1151
D0				864	818	713	914	868	763							1025	978	873
D1'	752	706	601	758	711	606	787	741	636	873	826	721	893	846	741	783	736	631
D2'	702	655	550	727	680	575	738	691	586	750	704	599	765	718	613			
D3'	716	670	565															

NOTES:

1. TENSION IN CONTACT WIRE (107 SQ. MM)=1200 KGF
2. TENSION IN CATENARY WIRE (65 SQ. MM)=1200 KGF
3. LENGTH OF VARIABLE DROPPER "VDL" HAS BEEN ADJUSTED TO THE NEAREST 5MM.
4. 0.8MM/M CONTACT WIRE SAG HAS BEEN CONSIDERED.

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DROPPER SCHEDULE
ENCUMBRANCE 1.4M/0.75M
TENSION 1200/1200
FOR 25 KV AC REGULATED
65 / 107 SQ. MM OHE

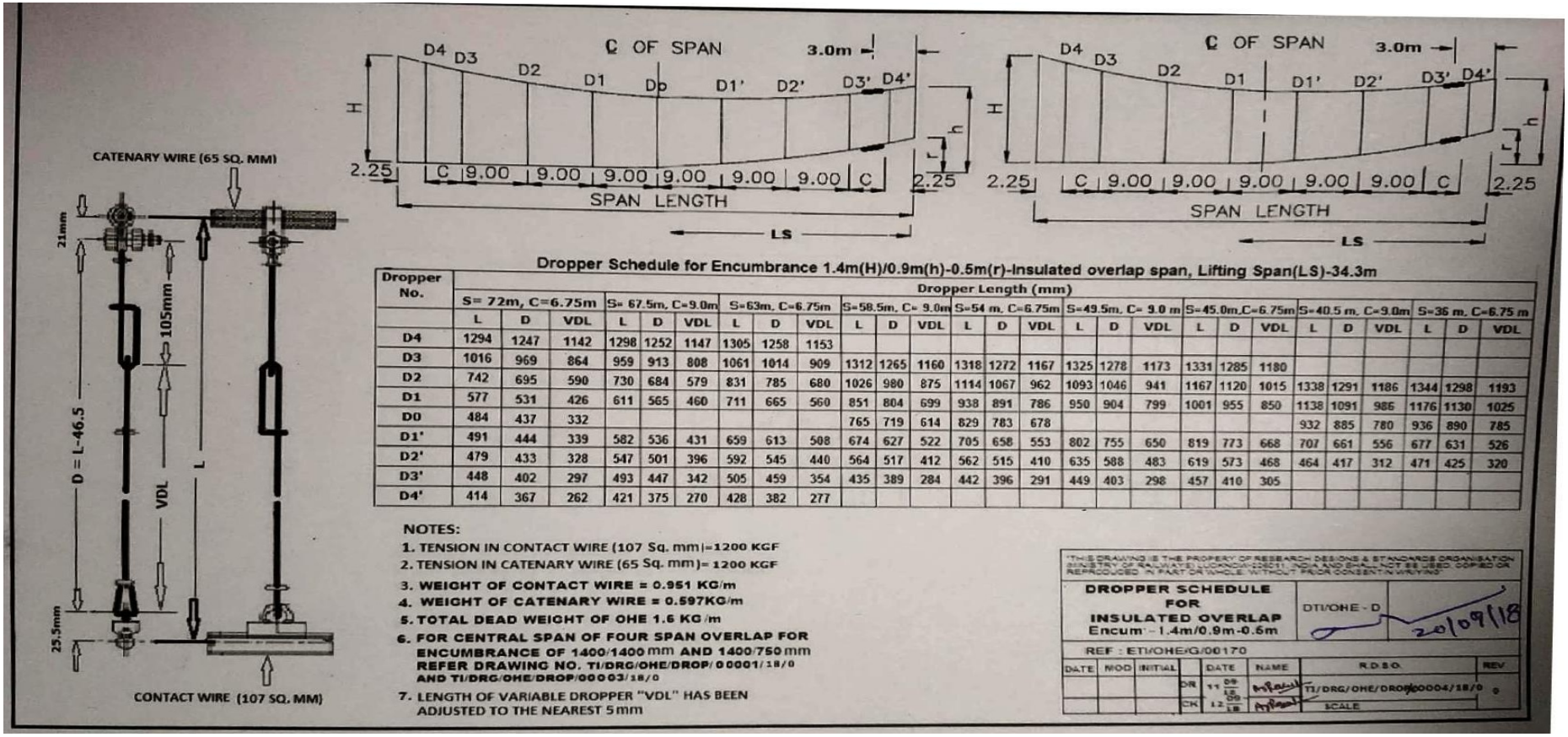
DTI/OHE

20/09/18

REF : ETI/OHE/G/00173

DATE	MOD	INITIAL	DATE	NAME	R.D.S.O.	REV
		DR	11.09.18		T/DRG/OHE/DROPPER/0003-65/0	0
		CK	12.09.18		SCALE	

ANNEXURE 26



Dropper Schedule for Encumbrance 1.4m(H)/0.9m(h)-0.5m(r)-Insulated overlap span, Lifting Span(LS)-34.3m

Dropper No.	Dropper Length (mm)																											
	S= 72m, C=6.75m			S= 67.5m, C=9.0m			S=63m, C=6.75m			S=58.5m, C= 9.0m			S=54 m, C=6.75m			S=49.5m, C= 9.0 m			S=45.0m,C=6.75m			S=40.5 m, C=9.0m			S=36 m, C=6.75 m		
	L	D	VDL	L	D	VDL	L	D	VDL	L	D	VDL	L	D	VDL	L	D	VDL	L	D	VDL	L	D	VDL	L	D	VDL
D4	1294	1247	1142	1298	1252	1147	1305	1258	1153																			
D3	1016	969	864	959	913	808	1061	1014	909	1312	1265	1160	1318	1272	1167	1325	1278	1173	1331	1285	1180							
D2	742	695	590	730	684	579	831	785	680	1026	980	875	1114	1067	962	1093	1046	941	1167	1120	1015	1338	1291	1186	1344	1298	1193
D1	577	531	426	611	565	460	711	665	560	851	804	699	938	891	786	950	904	799	1001	955	850	1138	1091	986	1176	1130	1025
D0	484	437	332							765	719	614	829	783	678							932	885	780	936	890	785
D1'	491	444	339	582	536	431	659	613	508	674	627	522	705	658	553	802	755	650	819	773	668	707	661	556	677	631	526
D2'	479	433	328	547	501	396	592	545	440	564	517	412	562	515	410	635	588	483	619	573	468	464	417	312	471	425	320
D3'	448	402	297	493	447	342	505	459	354	435	389	284	442	396	291	449	403	298	457	410	305						
D4'	414	367	262	421	375	270	428	382	277																		

NOTES:

1. TENSION IN CONTACT WIRE (107 Sq. mm)=1200 KGF
2. TENSION IN CATENARY WIRE (65 Sq. mm)= 1200 KGF
3. WEIGHT OF CONTACT WIRE = 0.951 KG/m
4. WEIGHT OF CATENARY WIRE = 0.597KG/m
5. TOTAL DEAD WEIGHT OF OHE 1.6 KG/m
6. FOR CENTRAL SPAN OF FOUR SPAN OVERLAP FOR ENCUMBRANCE OF 1400/1400 mm AND 1400/750 mm REFER DRAWING NO. TI/DRG/OHE/DROP/00001/18/0 AND TI/DRG/OHE/DROP/00003/18/0
7. LENGTH OF VARIABLE DROPPER "VDL" HAS BEEN ADJUSTED TO THE NEAREST 5 mm

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DROPPER SCHEDULE FOR INSULATED OVERLAP
Encum - 1.4m/0.9m-0.5m

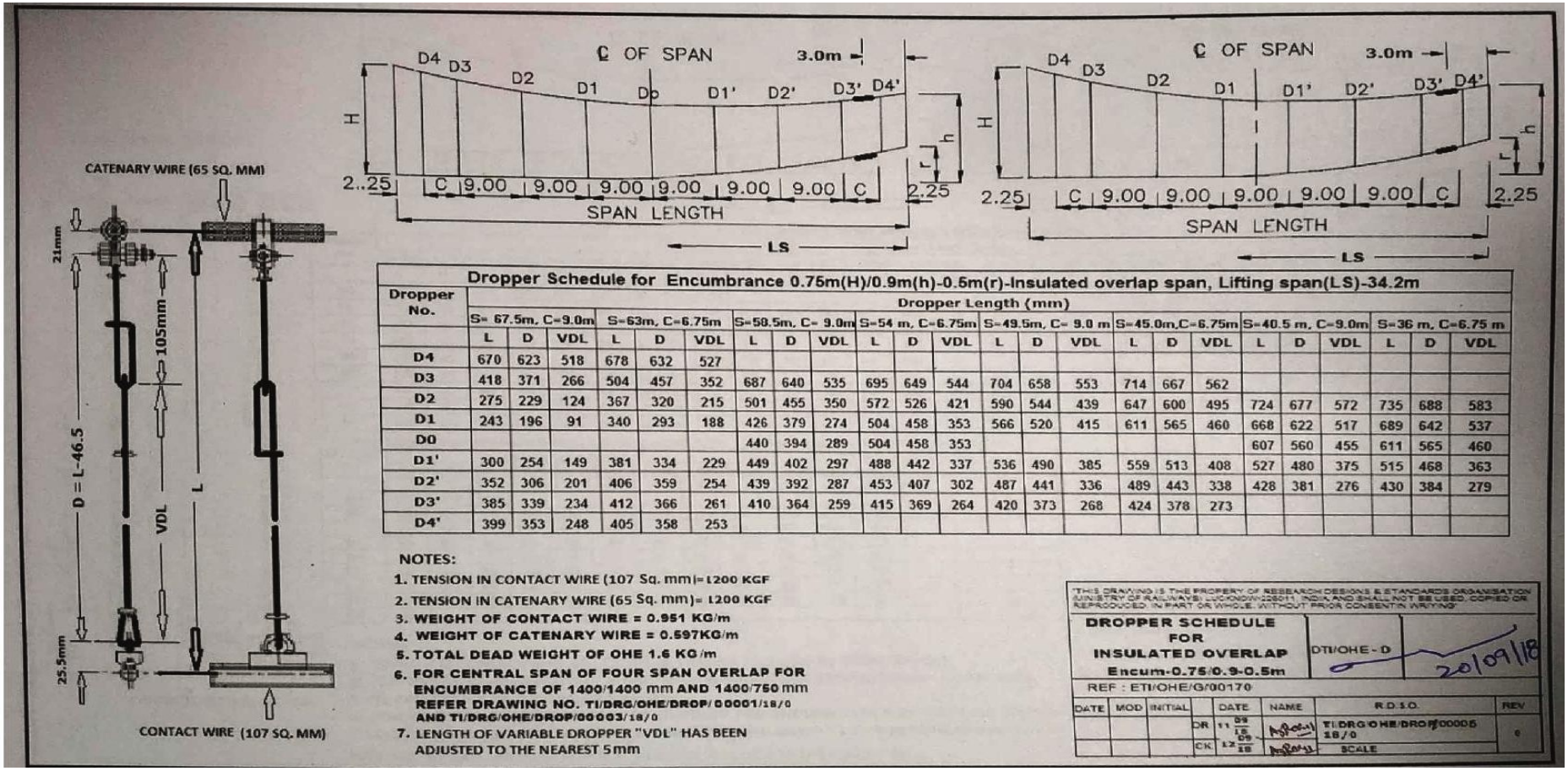
DTI/OHE - D

20/09/18

REF : ETI/OHE/G/00170

DATE	MOD	INITIAL		DATE	NAME	R.D.S.O.	REV
			DR	11 09 18		TI/DRG/OHE/DROP/00004/18/0	0
			CK	12 18		SCALE	

ANNEXURE 27



Dropper Schedule for Encumbrance 0.75m(H)/0.9m(h)-0.5m(r)-Insulated overlap span, Lifting span(LS)-34.2m

Dropper No.	Dropper Length (mm)																							
	S= 67.5m, C=9.0m			S=63m, C=6.75m			S=58.5m, C= 9.0m			S=54 m, C=6.75m			S=49.5m, C= 9.0 m			S=45.0m,C=6.75m			S=40.5 m, C=9.0m			S=36 m, C=6.75 m		
	L	D	VDL	L	D	VDL	L	D	VDL	L	D	VDL	L	D	VDL	L	D	VDL	L	D	VDL	L	D	VDL
D4	670	623	518	678	632	527																		
D3	418	371	266	504	457	352	687	640	535	695	649	544	704	658	553	714	667	562						
D2	275	229	124	367	320	215	501	455	350	572	526	421	590	544	439	647	600	495	724	677	572	735	688	583
D1	243	196	91	340	293	188	426	379	274	504	458	353	566	520	415	611	565	460	668	622	517	689	642	537
D0							440	394	289	504	458	353							607	560	455	611	565	460
D1'	300	254	149	381	334	229	449	402	297	488	442	337	536	490	385	559	513	408	527	480	375	515	468	363
D2'	352	306	201	406	359	254	439	392	287	453	407	302	487	441	336	489	443	338	428	381	276	430	384	279
D3'	385	339	234	412	366	261	410	364	259	415	369	264	420	373	268	424	378	273						
D4'	399	353	248	405	358	253																		

NOTES:

1. TENSION IN CONTACT WIRE (107 Sq. mm)= 1200 KGF
2. TENSION IN CATENARY WIRE (65 Sq. mm)= 1200 KGF
3. WEIGHT OF CONTACT WIRE = 0.951 KG/m
4. WEIGHT OF CATENARY WIRE = 0.597KG/m
5. TOTAL DEAD WEIGHT OF OHE 1.6 KG/m
6. FOR CENTRAL SPAN OF FOUR SPAN OVERLAP FOR ENCUMBRANCE OF 1400/1400 mm AND 1400/750 mm REFER DRAWING NO. TI/DRG/OHE/DROP/00001/18/0 AND TI/DRG/OHE/DROP/00003/18/0
7. LENGTH OF VARIABLE DROPPER "VDL" HAS BEEN ADJUSTED TO THE NEAREST 5mm

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DROPPER SCHEDULE FOR INSULATED OVERLAP Encum-0.75/0.9-0.5m

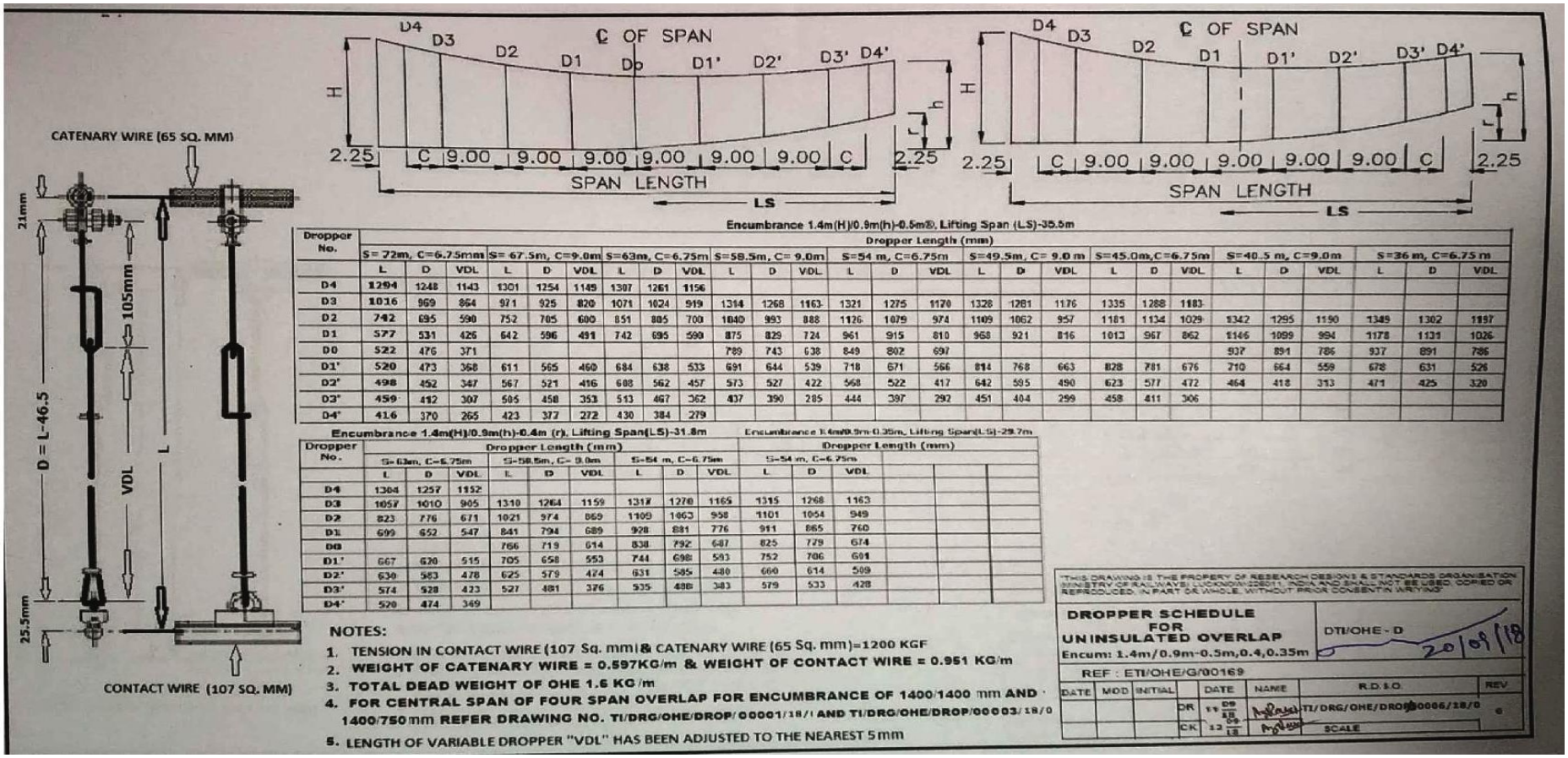
DTI/OHE-D

20/09/18

REF : ETI/OHE/G/00170

DATE	MOD	INITIAL		DATE	NAME	R.D.S.O.	REV
			DR	11 09 18	Approved	TI/DRG/OHE/DROP/00005 18/0	0
			CK	12 09 18	Approved	SCALE	

ANNEXURE 28



Encumbrance 1.4m(H)/0.9m(h)-0.5m®, Lifting Span (LS)-35.5m

Dropper No.	Dropper Length (mm)																							
	S= 72m, C=6.75mm			S= 67.5m, C=9.0m			S=63m, C=6.75m			S=58.5m, C= 9.0m			S=54 m, C=6.75m			S=49.5m, C= 9.0 m			S=45.0m,C=6.75m			S=40.5 m, C=9.0m			S=36 m, C=6.75 m		
	L	D	VDL	L	D	VDL	L	D	VDL	L	D	VDL	L	D	VDL	L	D	VDL	L	D	VDL	L	D	VDL	L	D	VDL
D4	1294	1248	1143	1301	1254	1149	1307	1261	1156																		
D3	1016	969	864	971	925	820	1071	1024	919	1314	1268	1163	1321	1275	1170	1328	1281	1176	1335	1288	1183						
D2	742	695	590	752	705	600	851	805	700	1040	993	888	1126	1079	974	1109	1062	957	1181	1134	1029	1342	1295	1190	1349	1302	1197
D1	577	531	426	642	596	491	742	695	590	875	829	724	961	915	810	968	921	816	1013	967	862	1146	1099	994	1178	1131	1026
D0	522	476	371							789	743	638	849	802	697							937	891	786	937	891	786
D1'	520	473	368	611	565	460	684	638	533	691	644	539	718	671	566	814	768	663	828	781	676	710	664	559	678	631	526
D2'	498	452	347	567	521	416	688	562	457	573	527	422	568	522	417	642	595	490	623	577	472	464	418	313	471	425	320
D3'	459	412	307	505	458	353	513	467	362	437	390	285	444	397	292	451	404	299	458	411	306						
D4'	416	370	265	423	377	272	430	384	279																		

Encumbrance 1.4m(H)/0.9m(h)-0.4m (r), Lifting Span(LS)-31.8m

Encumbrance 1.4m/0.9m-0.35m, Lifting Span(LS)-29.7m

Dropper No.	Dropper Length (mm)									Dropper Length (mm)		
	S=63m, C=6.75m			S=58.5m, C= 9.0m			S=54 m, C=6.75m			S=54 m, C=6.75m		
	L	D	VDL	L	D	VDL	L	D	VDL	L	D	VDL
D4	1304	1257	1152									
D3	1057	1010	905	1310	1264	1159	1317	1270	1165	1315	1268	1163
D2	823	776	671	1021	974	869	1109	1063	958	1101	1054	949
D1	699	652	547	841	794	689	928	881	776	911	865	760
D0				766	719	614	838	792	687	825	779	674
D1'	667	620	515	705	658	553	744	698	593	752	706	601
D2'	630	583	478	625	579	474	631	585	480	660	614	509
D3'	574	528	423	527	481	376	535	488	383	579	533	428
D4'	520	474	369									

NOTES:

1. TENSION IN CONTACT WIRE (107 Sq. mm)& CATENARY WIRE (65 Sq. mm)=1200 KGF
2. WEIGHT OF CATENARY WIRE = 0.597KG/m & WEIGHT OF CONTACT WIRE = 0.951 KG/m
3. TOTAL DEAD WEIGHT OF OHE 1.6 KG/m
4. FOR CENTRAL SPAN OF FOUR SPAN OVERLAP FOR ENCUMBRANCE OF 1400/1400 mm AND 1400/750 mm REFER DRAWING NO. TI/DRG/OHE/DROP/00001/18/0 AND TI/DRG/OHE/DROP/00003/18/0
5. LENGTH OF VARIABLE DROPPER "VDL" HAS BEEN ADJUSTED TO THE NEAREST 5mm

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DROPPER SCHEDULE FOR UNINSULATED OVERLAP

Encum: 1.4m/0.9m-0.5m,0.4,0.35m

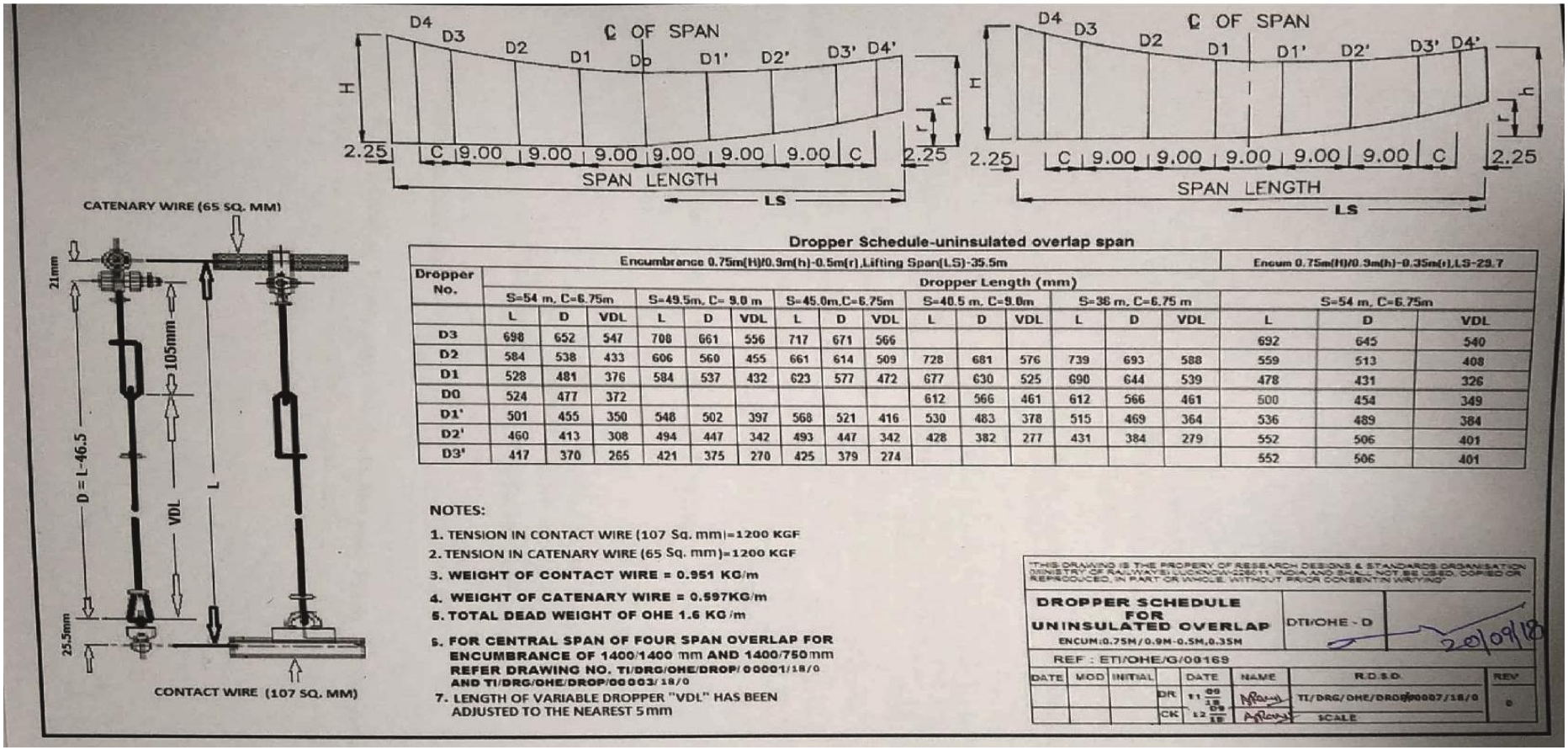
DTI/OHE - D

20/09/18

REF : ETI/OHE/G/00169

DATE	MOD	INITIAL		DATE	NAME	R.D.S.O.	REV
			DR	11/09/18		TI/DRG/OHE/DROP/00006/18/0	0
			CK	12/09/18		SCALE	

ANNEXURE 29



Dropper Schedule-uninsulated overlap span

Dropper No.	Encumbrance 0.75m(H)/0.9m(h)-0.5m(r),Lifting Span(LS)-35.5m															Encum 0.75m(H)/0.9m(h)-0.35m(r),LS-29.7		
	Dropper Length (mm)																	
	S=54 m, C=6.75m			S=49.5m, C= 9.0 m			S=45.0m,C=6.75m			S=40.5 m, C=9.0m			S=36 m, C=6.75 m			S=54 m, C=6.75m		
	L	D	VDL	L	D	VDL	L	D	VDL	L	D	VDL	L	D	VDL	L	D	VDL
D3	698	652	547	708	661	556	717	671	566							692	645	540
D2	584	538	433	606	560	455	661	614	509	728	681	576	739	693	588	559	513	408
D1	528	481	376	584	537	432	623	577	472	677	630	525	690	644	539	478	431	326
D0	524	477	372							612	566	461	612	566	461	500	454	349
D1'	501	455	350	548	502	397	568	521	416	530	483	378	515	469	364	536	489	384
D2'	460	413	308	494	447	342	493	447	342	428	382	277	431	384	279	552	506	401
D3'	417	370	265	421	375	270	425	379	274							552	506	401

NOTES:

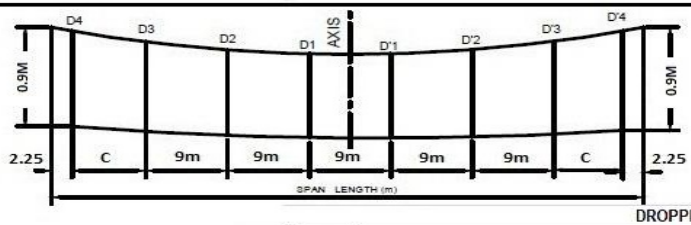
1. TENSION IN CONTACT WIRE (107 Sq. mm)=1200 KGF
2. TENSION IN CATENARY WIRE (65 Sq. mm)=1200 KGF
3. WEIGHT OF CONTACT WIRE = 0.951 KG/m
4. WEIGHT OF CATENARY WIRE = 0.597KG/m
5. TOTAL DEAD WEIGHT OF OHE 1.6 KG /m
6. FOR CENTRAL SPAN OF FOUR SPAN OVERLAP FOR ENCUMBRANCE OF 1400/1400 mm AND 1400/750 mm REFER DRAWING NO. TI/DRG/OHE/DROP/ 00001/18/0 AND TI/DRG/OHE/DROP/00003/ 18/0
7. LENGTH OF VARIABLE DROPPER "VDL" HAS BEEN ADJUSTED TO THE NEAREST 5 mm

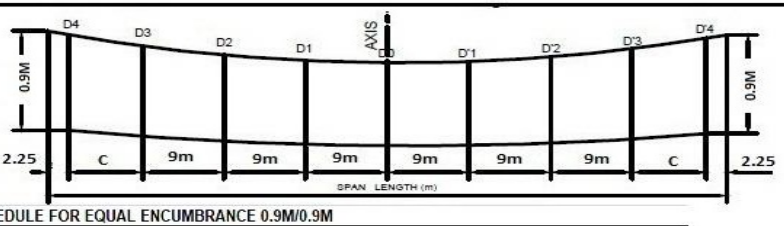
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DROPPER SCHEDULE FOR UNINSULATED OVERLAP	DTI/OHE - D
ENCUM:0.75M/0.9M-0.5M,0.35M	20/09/18
REF : ETI/OHE/G/00169	

DATE	MOD	INITIAL		DATE	NAME	R.D.S.O.	REV
			DR	11 09/18		TI/DRG/OHE/DROP/00007/18/0	0
			CK	12 09/18		SCALE	

ANNEXURE 30

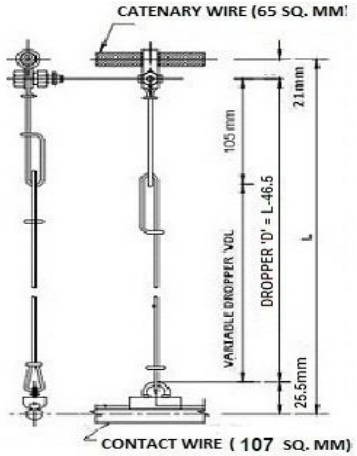




DROPPER SCHEDULE FOR EQUAL ENCUMBRANCE 0.9M/0.9M

Dropper No.	Dropper Length (mm)																	
	S= 67.5m,C=9m			S=63m,C=6.75m			S=58.5m,C=9m			S=54 m, C=6.75m			S= 49.5m,C=9m			S= 45 m, C=6.75m		
	L	D	VDL	L	D	VDL	L	D	VDL	L	D	VDL	L	D	VDL	L	D	VDL
D4	800	754	649	807	760	655												
D3	529	482	377	615	569	464	814	767	662	820	774	669	827	781	676	834	787	682
D2	348	302	197	437	391	286	596	549	444	669	622	517	662	615	510	722	675	570
D1	258	211	106	348	302	197	465	418	313	541	494	389	579	533	428	642	596	491
D0							421	375	270	498	452	347						
D1'	258	211	106	348	302	197	465	418	313	541	494	389	579	533	428	642	596	491
D2'	348	302	197	437	391	286	596	549	444	669	622	517	662	615	510	722	675	570
D3'	529	482	377	615	569	464	814	767	662	820	774	669	827	781	676	834	787	682
D4'	800	754	649	807	760	655												

Dropper No.	Dropper Length (mm)																	
	S=40.5, C=9m			S=36m,C=6.75m			S=31.5m,C=9m			S=27 m, C=6.75m			S= 22.5 m, C=9m					
	L	D	VDL	L	D	VDL	L	D	VDL	L	D	VDL	L	D	VDL			
D2	841	794	689	847	801	696	854	808	703	861	814	709						
D1	727	681	576	775	728	623	791	744	639	826	780	675	868	821	716			
D0	689	643	538	739	693	588							850	803	698			
D1'	727	681	576	775	728	623	791	744	639	826	780	675	868	821	716			
D2'	841	794	689	847	801	696	854	808	703	861	814	709						



NOTES:

1. TENSION IN CONTACT WIRE (107 SQ. MM)= 1200KGF
2. TENSION IN CATENARY WIRE (65 SQ. MM)= 1200KGF
3. LENGTH OF VARIABLE DROPPER "VDL" HAS BEEN ADJUSTED TO THE NEAREST 5MM.
4. 0.8MM/M CONTACT WIRE SAG HAS BEEN CONSIDERED.

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DROPPER SCHEDULE
ENCUMBRANCE 0.9M/0.9M
TENSION 1200/1200KGF
FOR 25 KV AC REGULATED
65 / 107 SQ. MM OHE

EDTI

DATE	MOD	INITIAL		DATE	NAME	R.D.S.O.	REV
			DR			TI/DRG/OHE/DROP/ RDSO/00001/20/0	
			CK			SCALE.	

ANNEXURE 31

उत्तर मध्य रेलवे
NORTH CENTRAL RAILWAY
विद्युत विभाग
Electrical Department

प्रधान कार्यालय
Head Quarter's Office
सूबेदारगंज, इलाहाबाद –211015
Subedarganj, Allahabad – 211015
cedencrald@gmail.com

Duplicate

No.EL/TRD/NCR/Gatimaan

Date:19.11.2018

SrED/TI
RDSO/Lucknow

Sub: Work done to run Gatimaan Express at 160 kmph in Agra - Palwal section.

In Palwal-Agra section of Agra Division, Ndls-BPL Shatabdi express was already running at 150 Kmph. When Gatimaan Exp. was introduced in the same section at 160 Kmph, there were several cases of panto entanglement at turn out locations. Hence to prevent the cases of panto entanglement, following works have been done in OHE at turn out locations to run Gatiman Express at 160 Kmph in Agra - Palwal section.

1. At obligatory mast vertical gap between main line and turn out contact wire is maintained between 50 to 60 mm.
2. At 5 mtr distance from obligatory mast, gap is maintained at 50 mm.
3. At 10 mtr distance from obligatory mast, gap is maintained between 40 mm to 50 mm.
4. Track separation is kept between 290mm to 550mm. Mast changed if Track Separation is less than 290 mm.
5. Span length of turn out location reduced during increasing of track separation.
6. From main line to loop line, 'take off' goes in between 720 to 750mm.
7. One Skilled staff is daily going to NZM outpit for checking the Panto of Gatimaan Loco.

Submitted for kind perusal please.

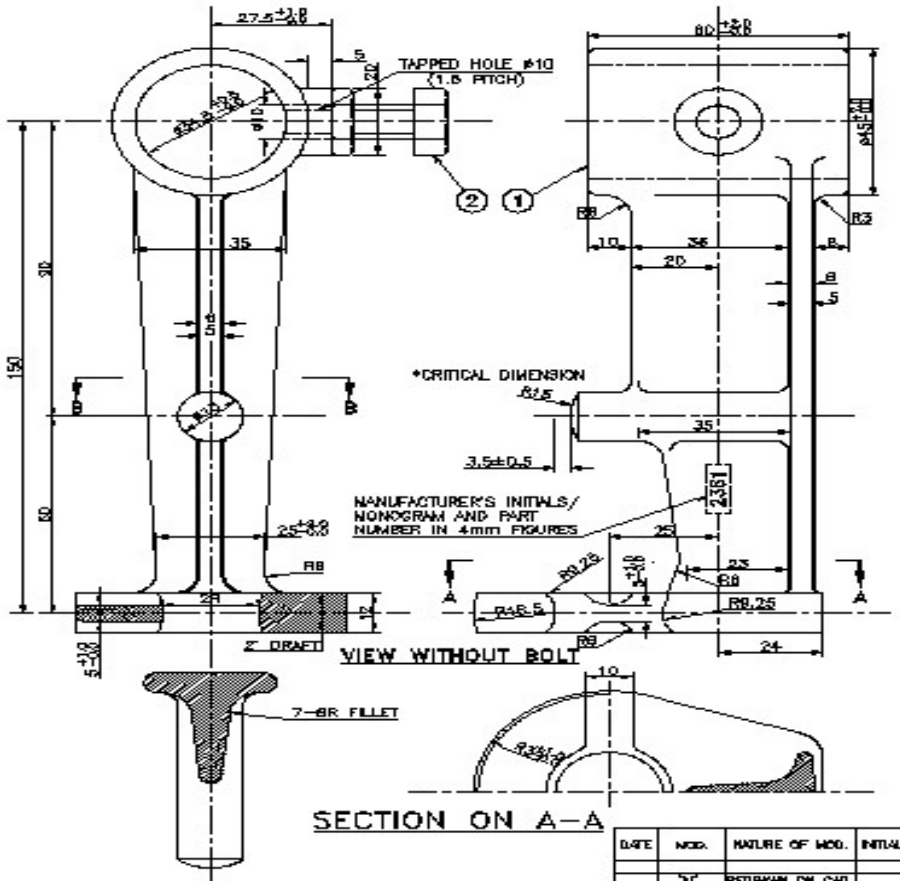
19/11/18

(V.K.Garg)
CEDE/NCR

Copy to : ED/EEM, Rly. Bd. : for kind inf. Please.

वरि० कार्य० निदेशक/टी० आई०
कार्य० निदेशक/टी० आई०
निदेशक/टी० आई०(लो० एस० ई०-ई०)
निदेशक/टी० आई०(टी० एस० ई०-टी०)
निदेशक/टी० आई०(पी० एस० ई०)
निदेशक/टी० आई०(जनरल)

ANNEXURE 32



REF. No.	DESCRIPTION	PART No.	MATERIAL	SPECIFICATION	Approx. WEIGHT (kg)	NUMBER OFF
1.	25mm DROP BRACKET PART	2361	MALL. IRON CASTING GALVANISED	IS:2108 BM.340 ETI/OHE/13		1
2.	BOLT ⌀10x25/30 WITH LOCKNUT	10/14LN	STAINLESS STEEL	ETI/OHE/18		1

NOTES:—

ALL DIMENSIONS ARE IN mm.

1. TOLERANCE OF ±0.5mm IS PERMISSIBLE ON ALL DIMENSIONS UNLESS
2. OTHERWISE SHOWN.
3. MANUFACTURER'S INITIALS/MONOGRAM AND PART NUMBER TO BE PROVIDED IN RELIEF.
4. DIMENSIONAL LIMITS APPLICABLE AFTER GALVANISATION.
5. THE SURFACE OF THE MALLEABLE IRON CASTING WHEN EXPOSED BY ROUGH MACHINING OR SECTIONING IN TERMS OF CLAUSE 8.2 OF IS:2108 SHALL PRESENT AN UNIFORM SILKY BLACK APPEARANCE WITHOUT WHITE OR SHINY SPOTS (EXCEPT AT THE EDGES OF THE SURFACE).
6. FOR USE WITH BFB STEADY ARM IDENT NUMBER 2390.
7. UNLESS OTHERWISE SPECIFIED RADII SHALL BE 1.5mm.
8. ALL THE SPECIFICATIONS MENTIONED IN THE DRAWING SHALL BE THE LATEST VERSION.

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25mm DROP BRACKET ASSEMBLY

DOS/OHE Sd/- 29.1.76

ADS/OHE Sd/- 27.1.76

REF.:— CROSS REF.:—

DATE	MOD.	NATURE OF MOD.	INITIAL
	'K'		
	'J'		
	'H'	NUT DELETED IN REF.2	
	'G'	RETRACED	

R. D. S. O.

DR. 21 01 78 VERMA

TC.

CK. 24 01 78 Sd/-

ETI/OHE/P/2360 REV. H

SCALE:—1:1

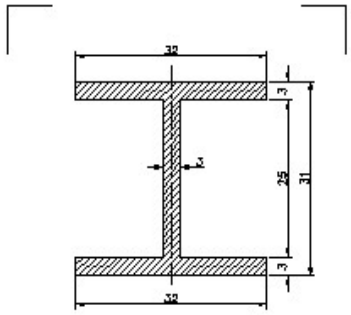
SUB SCALE:—

SUB SCALE:—

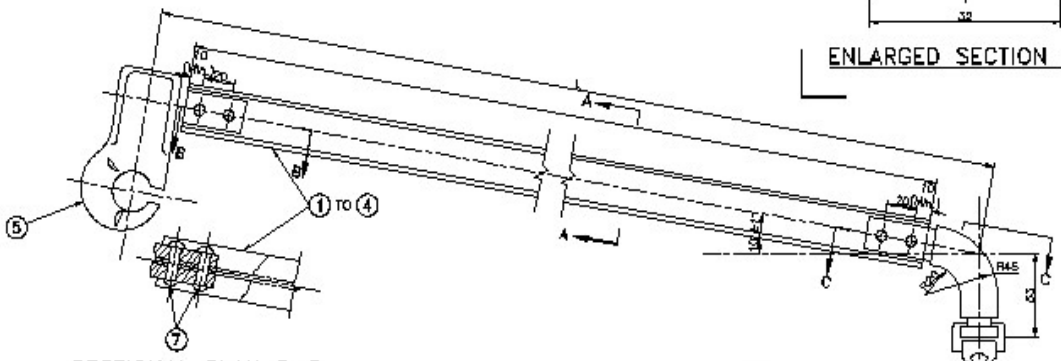
ANNEXURE 33

TABLE

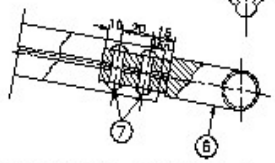
REF. No.	IDENTIFICATION No.	LENGTH 'L' OF STEADY ARM ASSEMBLY (m)	LENGTH 'l' OF STEADY ARM PART (m)	IDENTIFICATION OF STEADY ARM
1	2390/01	0.75	0.69	2544–5
2	2390/02	0.95	0.89	2544–6
3	2390/03	1.15	1.09	2544–7
4	2390/04	1.35	1.29	2544–8



ENLARGED SECTION A–A



SECTIONAL PLAN B–B



SECTIONAL PLAN C–C

REF. No.	DESCRIPTION	PART No.	MATERIAL	SPECIFICATION	Approx. WEIGHT (kg)	NUMBER OFF
1 TO 4	BFB STEADY ARM	SEE TABLE	ALUMINIUM ALLOY	ETI/OHE/21		1
5	STEADY ARM HOOK (BFB)	2391	MALL. CAST IRON GALVANISED	IS:2108,GR.BN340 RE/OHE/13		1
6.	BFB STEADY ARM SWIVEL	2392	FORGED STEEL GALVANISED	IS:2004, CL–2 RE/OHE/13		1
7.	RIVET ⌀6x35		ALUMINIUM ALLOY	IS:240, GRADE HR–E OR HR–B OR HR–30 & IS:2852		4

NOTES:–

1. ALL DIMENSIONS IN mm.
2. DRILLING AND RIVETTING TO BE DONE AFTER ASSEMBLING THE END FITTINGS TO THE STEADY ARM.

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BFB STEADY ARM ASSEMBLY

DDS/OHE

ADS/OHE Sd/– R.P. MITTAL 28.5.76

REF.:–

CROSS REF.:–

DATE	MOD.	NATURE OF MOD.	INITIAL
	'C'	REDRAWN ON CAD	
	'B'	MOD BR. CORRECTED	Sd/–
	'A'	CORRECTED AND TRACED IN ULDHM	

R. D. S. O.

	DATE	NAME
DR.	28/03/76	Sd/–
TC.	29/03/76	Sd/–
CK.	22/03/76	Sd/–

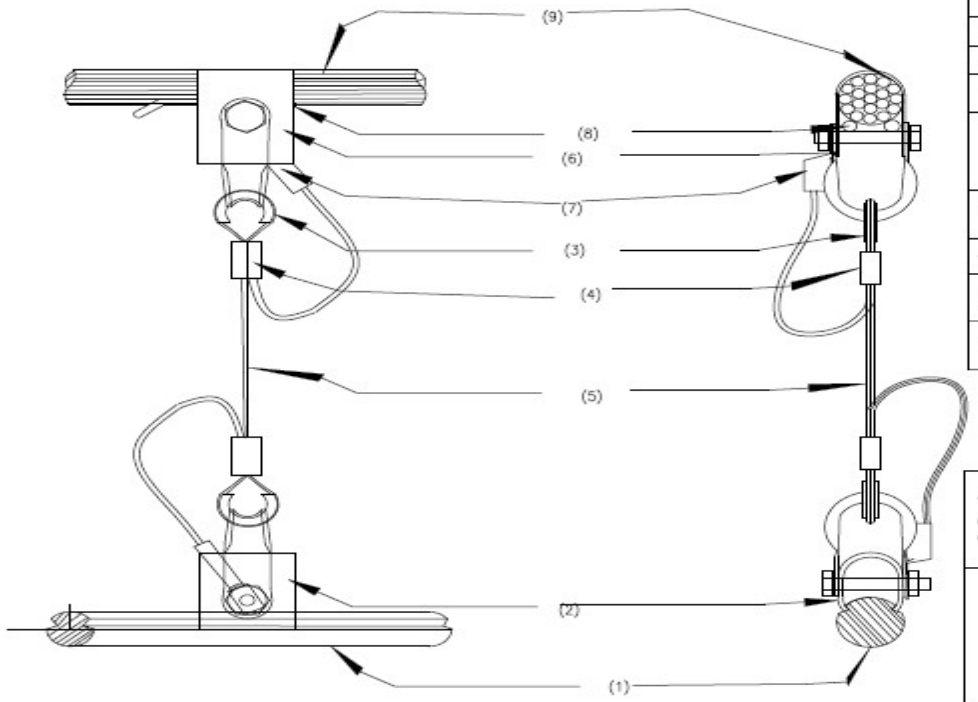
ETI/OHE/P/2390 REV. C

SCALE:–1:2

SUB SCALE–2:1

SUB SCALE–

ANNEXURE 34



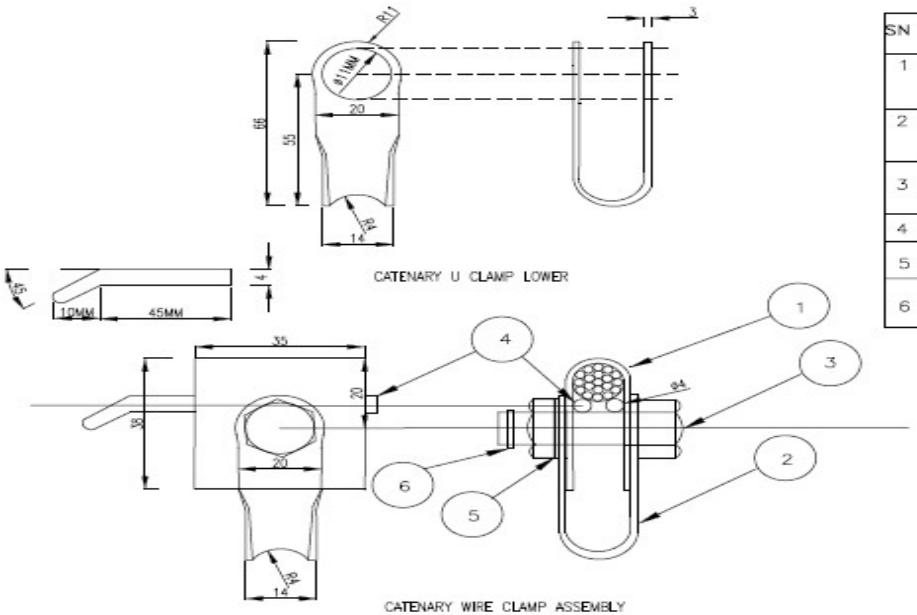
SN	DESCRIPTION	PART No.	MATERIAL	SPECIFICATION
1	CONTACT WIRE		–	ETI/OHE/76(6/97)
2	CONTACT WIRE CLAMP		CuNi2Si	ASTM B411
3	THIMBLE		Cu–ETP	IS:1897–2008
4	COMPRESSION SLEEVE		Cu–ETP	IS:1897–2008
5	CURRENT CARRYING FEXIBLE DROPPER WIRE DIA. 7.5MM, 25 SQMM		Cu–Mg	TI/SPC/OHE/CCFD/0160 (02/2020)
6	CATENARY WIRE CLAMP		CuNI2SI	ASTM B411
7	CABLE LUG		Cu–ETP	IS:1897–2008
8	STOPPER WIRE		ANNEALED COPPER	IS–549
9	CATENARY WIRE		Cd–Cu	ETI/OHE/50 (6/97)

NOTE–
1. ALL DIMENSION ARE IN MM.
2. TOERANCE OF ±0.5MM IS PERMISSIBLE ON ALL DIMENSIONS UNLESS OTHERWISE SHOWN..
3. FOR CONTACT WIRE CLAMP SEE THE DRG. NO.TI/DRG/OHE/CCD/00003/20/0
4. FOR CATENARY WIRE CLAMP SEE THE DRG. NO.TI/DRG/OHE/CCD/00002/20/0
5. FOR CRIMPING SLEEVE, THIMBLE AND CABLE LUG SEE THE DRG. NO. TI/DRG/OHE/CCD/RDSO/00004/0
6. MANUFACTURERS, INITIALS/MONOGRAM TO BE PROVIDED.

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CURRENT CARRYING DROPPER ASSEMBLY		DIRECTOR/TI	
REF: ETI/OHE/P/1190		ED/TI	
DATE / MOD NO. / NATURE OF MOD. / INITIALS		TI/DRG/OHE/CCD/RDSO/00001/20/0	

ANNEXURE 35



SN	DESCRIPTION	PART No.	MATERIAL	SPECIFICATION
1	CATENARY U CLAMP UPPER		CuNI2SI	ASTM B 411
2	CATENARY U CLAMP LOWER		CuNI2SI	ASTM B 411
3	BOLT M 10X35/30 WITH NUT		STAINLESS STEEL	TI/SPC/OHE/FASTENER /0120
4	STOPPER PIN		ANNEALED COPPER	IS:549
5	SPRING WASHER		PHOSPHOR BRONZE	TI/SPC/OHE/FASTENER /0120
6	SPLIT PIN 2.5X20		PHOSPHOR BRONZE	IS:549

NOTE–
1. ALL DIMENSION ARE IN MM.
2. TOERANCE OF ±0.5MM IS PERMISSIBLE ON ALL DIMENSIONS UNLESS OTHERWISE SHOWN.
3. MANUFACTURERS, INITIALS/MONOGRAM TO BE PROVIDED.

"THIS DRAWING IS THE PROPERTY OF RESEARCH, DESIGNS & STANDARDS ORGANISATION (MINISTRY OF RAILWAYS), LUCKNOW–226011, INDIA AND SHALL NOT BE USED, COPIED OR REPRODUCED, IN PART OR WHOLE, WITHOUT PRIOR CONSENT IN WRITING."

CATENARY WIRE CLAMP FOR CURRENT CARRYING DROPPER		DIRECTOR/TI	
		ED/TI	

REF:TI/DRG/OHE/CCD/RDSO/00001/20/0

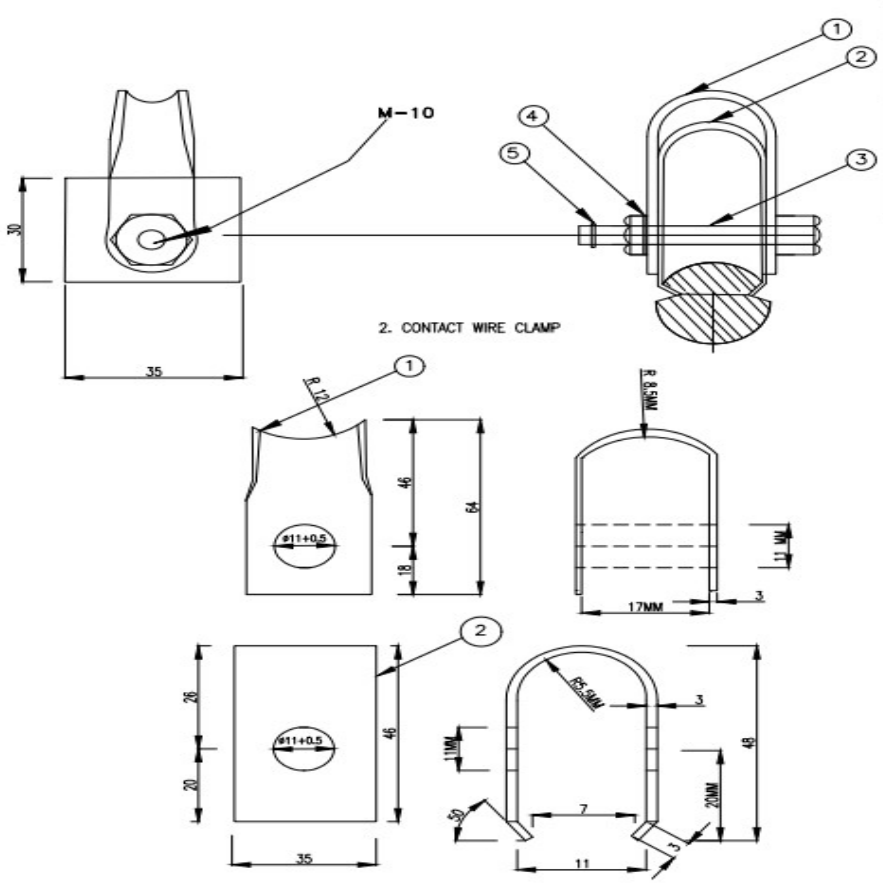
DATE	MOD NO.	NATURE OF MOD.	INITIALS

TI/DRG/OHE/CCD/RDSO/ 00002/20/0

REV

IR

ANNEXURE 36



SN	DESCRIPTION	PART No.	MATERIAL	SPECIFICATION
1	CONTACT U CLAMP LARGE		CuNi2Si	ASTM B411
2	CONTACT U CLAMP SMALL		CuNi2Si	ASTM B411
3	BOLT M10X35/30 WITH NUT		STAINLESS STEEL	TI/SPC/OHE/FASTENER /0120
4	SPRING WASHER		PHOSPHOR BRONZE	TI/SPC/OHE/FASTENERS/0120
5	SPLIT PIN		ANNELEAD COPPER	IS 549

NOTE–
1. ALL DIMENSION ARE IN MM.
2. TOERANCE OF ±0.5MM IS PERMISSIBLE ON ALL DIMENSIONS UNLESS OTHERWISE SHOWN.
3. MANUFACTURERS, INITIALS/MONOGRAM TO BE PROVIDED.

"THIS DRAWING IS THE PROPERTY OF RESEARCH, DESIGNS & STANDARDS ORGANISATION (MINISTRY OF RAILWAYS), LUCKNOW–226011, INDIA AND SHALL NOT BE USED, COPIED OR REPRODUCED, IN PART OR WHOLE, WITHOUT PRIOR CONSENT IN WRITING."

CONTACT U CLAMP (LARGE AND SMALL) FOR CURRENT CARRYING DROPPER

REF: TI/DRG/OHE/CCD/RDSO/00001/20/0

DATE	MOD NO.	NATURE OF MOD.	INITIALS

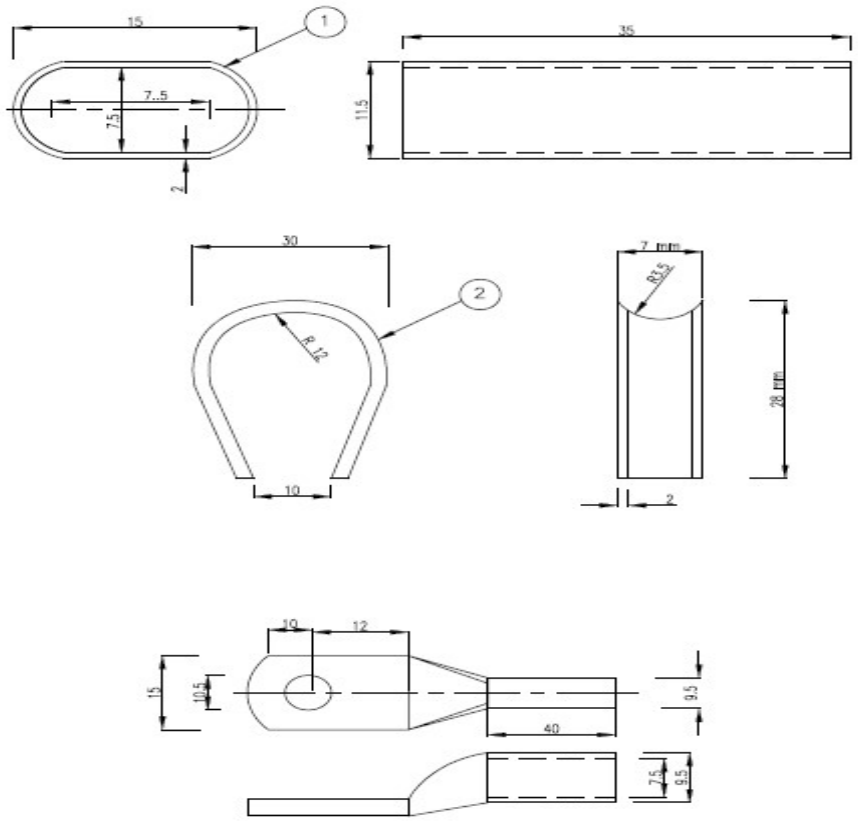
DIRECTOR/TI

ED/TI

TI/DRG/OHE/CCD/RDSO/ 00003/20/0

REV IR

ANNEXURE 37



SN	DESCRIPTION	PART No.	MATERIAL	SPECIFICATION
1	COMPRESSION SLEEVE		Cu–ETP	IS:1897–2008
2	THIMBLE		Cu–ETP	IS:1897–2008
3	CABLE LUG		Cu–ETP	IS:1897–2008

NOTE–
1. ALL DIMENSION ARE IN MM.
2. TOLERANCE OF ±0.5MM IS PERMISSIBLE ON ALL DIMENSIONS UNLESS OTHERWISE SHOWN.
3. DOUBLE CRIMPING SHOULD BE DONE ON COMPRESSION SLEEVE.
4. MANUFACTURERS, INITIALS/MONOGRAM TO BE PROVIDED.

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1.COMPRESSION SLEEVE
2. THIMBLE
3. CABLE LUG
FOR CURRENT CARRYING DROPPER

DIRECTOR/TI

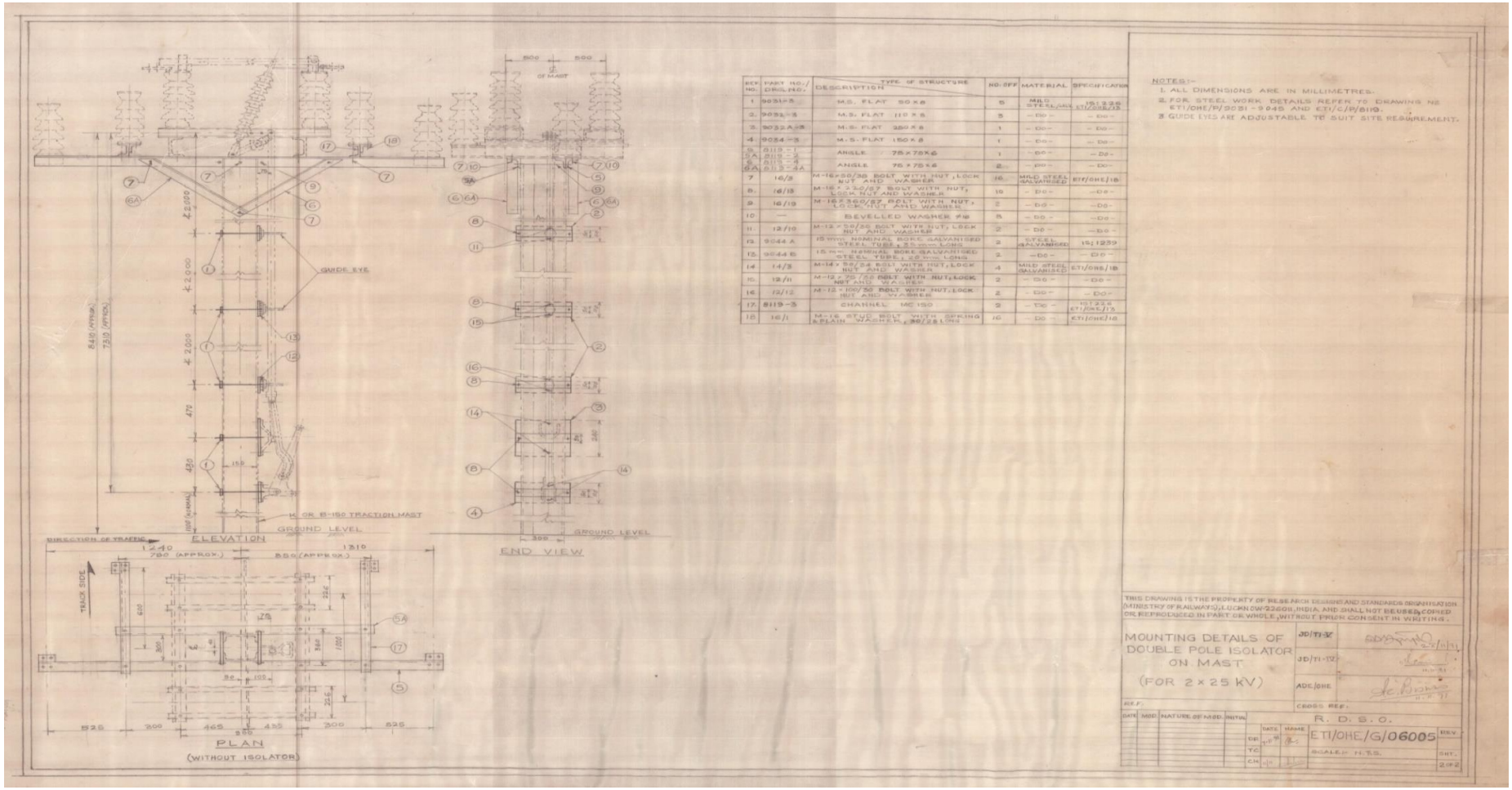
ED/TI

REF: TI/DRG/OHE/CCD/RDSO/00001/20/0

DATE	MOD NO.	NATURE OF MOD.	INITIALS

TI/DRG/OHE/CCD/RDSO/00004/0 REV IR

ANNEXURE 38



REF. NO.	PART NO./ DRG. NO.	DESCRIPTION — TYPE OF STRUCTURE	NO. OFF	MATERIAL	SPECIFICATION
1	9051-5	M.S. FLAT 50×8	5	MILD STEEL, GALV.	IS:226 ETI/OHE/13
2	9052-5	M.S. FLAT 110×8	5	— DO —	— DO —
3	9052A-5	M.S. FLAT 250×8	1	— DO —	— DO —
4	9054-5	M.S. FLAT 150×8	1	— DO —	— DO —
5, 5A	8119-1	ANGLE 75×75×6	1	— DO —	— DO —
6, 6A	8119-2				
6, 6A	8119-4	ANGLE 75×75×6	2	— DO —	— DO —
6A	8119-4A				
7	16/3	M-16×50/30 BOLT WITH NUT, LOCK NUT AND WASHER	16	MILD STEEL GALVANISED	ETI/OHE/18
8	16/15	M-16×230/87 BOLT WITH NUT, LOCK NUT AND WASHER	10	— DO —	— DO —
9	16/19	M-16×360/87 BOLT WITH NUT, LOCK NUT AND WASHER	2	— DO —	— DO —
10	—	BEVELLED WASHER 7/8	5	— DO —	— DO —
11	12/10	M-12×50/30 BOLT WITH NUT, LOCK NUT AND WASHER	2	— DO —	— DO —
12	9044A	15 mm NOMINAL BORE GALVANISED STEEL TUBE, 85 mm LONG	2	STEEL GALVANISED	IS:1239
13	9044B	15 mm NOMINAL BORE GALVANISED STEEL TUBE, 220 mm LONG	2	— DO —	— DO —
14	14/3	M-14×50/34 BOLT WITH NUT, LOCK NUT AND WASHER	4	MILD STEEL GALVANISED	ETI/OHE/18
15	12/11	M-12×75/30 BOLT WITH NUT, LOCK NUT AND WASHER	2	— DO —	— DO —
16	12/12	M-12×100/30 BOLT WITH NUT, LOCK NUT AND WASHER	2	— DO —	— DO —
17	8119-3	CHANNEL MC 150	2	— DO —	IS:226 ETI/OHE/15
18	16/1	M-16 STUD BOLT WITH SPRING & PLAIN WASHER, 30/28 LONG	16	— DO —	ETI/OHE/18

NOTES:-
1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. FOR STEEL WORK DETAILS REFER TO DRAWING NO ETI/OHE/M/9051-9055 AND ETI/C/M/8119.
3. GUIDE EYES ARE ADJUSTABLE TO SUIT SITE REQUIREMENT.

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MOUNTING DETAILS OF DOUBLE POLE ISOLATOR ON MAST (FOR 2×25 kV)

JD/TI-V

JD/TI-IV

ADE/OHE

CROSS REF.

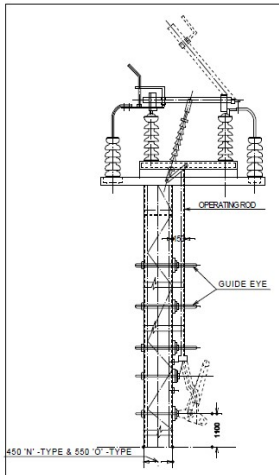
R. D. S. O.

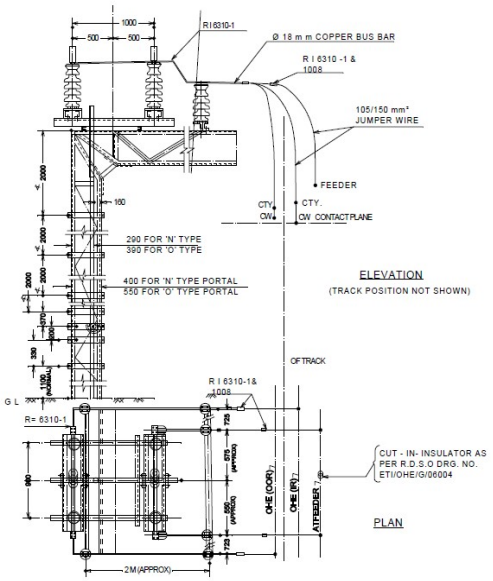
ETI/OHE/G/06005

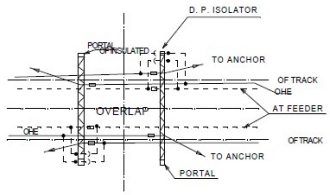
SCALE: N.T.S.

SHT. 2 OF 2

ANNEXURE 39







NOTES:-

1. ALL DIMENSIONS ARE IN mm.
2. FOR STEEL WORK DETAIL REFER TO DRAWING NO. ETI/OHE/P/9031 - 9045 AND ETI/C/P/ 8118 SHEET 2/2.
3. FOR OTHER SPS AND MOUNTING DETAILS REFER DRAWING NO.ETI/OHE/G/05513 SHEET - 1.
4. GUIDE EYES ARE ADJUSTABLE TO SUIT SITE REQUIREMENT.

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MOUNTING DETAILS OF DOUBLE POLE ISOLATOR ON PORTALS (FOR 2 X 25 KV)

DD/TI -V	Sd/- 13.10.1992
ADE/PSI	Sd/- 16.09.1992
ADE/OHE	Sd/- 08.09.1992

REF.

DATE	MOD.	NATURE OF MOD.	INITIALS
	0	RETRUGED REDRAWN ON CUD	

R. D. S. O.

	DATE	NAME
DR	15[illegible]	Sd/-
TC		
CK		Sd/-

ETI/OHE/G/06008

SCALE : NTS

SUBSCALE :-

SUBSCALE :-

ANNEXURE 40

GOVERNMENT OF INDIA
MINISTRY OF RAILWAY
RAILWAY BOARD

Policy Circular No. TRD/2012/2

2001/Elect (G)/170/1 Pt.

New Delhi, dated: 07.05.12

Chief Electrical Engineers,
Zonal Railways

Chief Electrical Engineers,
CORE/Allahabad

Executive
Director(Electrical)
RVNL/New Delhi

Sub: Provision of retro-reflective number plate on OHE mast.

Ref:
1. RDSO's letter No TI/OHE/STR/NOP/04 dated 16/20.04.04 & 23.11.2011
2. NR letter No. 230-Elect./TRD/2 dated 11.03.11 & 08.09.2010
3. NCR letter No EL/TRD/NCR/OHE Maintenance dt. 08.11.2010
4. Railway Board letter No. 2001/Elect (G)/170/1 dt. 07.10.2010 & 21.02.12

In supersession of earlier instructions regarding provision of retro-reflective number plates on OHE structures, the following guidelines shall be followed-

(i) One no. of retro-reflective OHE number plates should be provided in each Kilometers at the beginning of kilometer.

(ii) Retro-reflective number plates should be provided at critical locations like before the stop signals and before the permanent speed restrictions.

(iii) All other warning boards as per ACTM like DJ open, DJ close, 500m board, 250m board, coasting, dangers etc. which are used in OHE (not PSI) should be retro-reflective type as it will improve the visibility of running staff.

(iv) Number plate background i.e. traffic blue colour will be non reflective type with no borders.

(v) Only the letters & figures will be retro-reflective type in deep yellow colour.

(vi) The retro-reflective strip in sigma shape for identification of all signals shall be provided two masts prior to all signal locations for easy identification during foggy weather. The detailed design for provision of sigma strip shall be finalized by RDSO. It shall be advised to running staff that this is only an aide to the running staff and it's non-availability/ damaged number plate or poor visibility will not be considered the reason for any signal overshooting.

(vii) Sigma strips wherever provided should be on the lower post of mast for proper retro-reflection.

(viii) Sigma strips may be provided on fog prone area only.

This issues in consultation with Safety Dte. & approval of Board (ML)

(Sushil Kumar)
Director Elect. Engg. (PS)
Railway Board

ANNEXURE 41

5933
22/10/12
महाप्रबंधक (प्रशासन) कार्यालय
पूर्व-मध्य रेल, हाजीपुर
रेल बोर्ड का पत्र संख्या सं.
दिनांक 22/IX/12

GOVERNMENT OF INDIA
MINISTRY OF RAILWAY
RAILWAY BOARD

(63) (6)

Policy Circular No. RB/Elect./TRD/07-2012

2001/Elect (G)/170/1 Pt.

New Delhi, dated: 18.10.12

Chief Electrical Engineers,
ECR Zonal Railways, CORE Allahabad,
ED/Elect. RVNL New Delhi.

Sub: Provision of retro-reflective number plate on OHE mast.
Ref: Railway Board Policy Circular No. TRD/2012/2 of even no dated 07.05.12

In continuation to Board's letter under reference regarding provision of retro-reflective number plates for OHE structures, it has been further decided that GMs of the Zonal Railways may permit to provide additional retro-reflective number plates with non-retro reflective background as per the operational/safety requirement on case to case basis such as in fog affected areas.

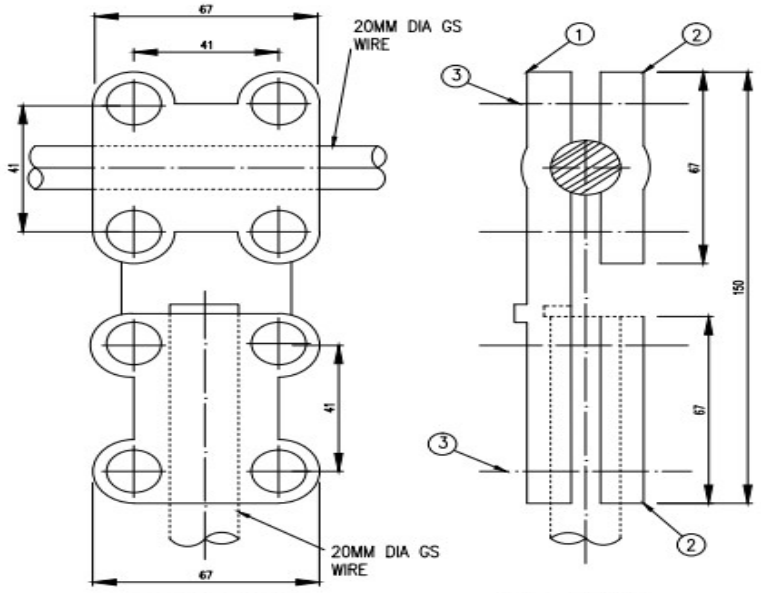
All other conditions stipulated in Board's policy circular under reference (copy enclosed) will remain same.

This issue in consultation with Safety Dte. & approval of Board (ML)

(Sushil Kumar)
Director Elect. Engg. (PS)
Railway Board

Copy to: Sr. ED/TI: for information. This is also in reference to RDSO's letter No. TI/OHE/STRNOP/12 dated 22.06.12

ANNEXURE 42



MATERIAL LIST:

REF. NO.	DESCRIPTION	MATERIAL	QTY.
1.	CONNECTOR BODY	MALLEABLE CAST IRON GALVANISED, GR. MB 340, AS PER IS:14329–1995	1
2.	CLAMPING PIECE	–DO–	2
3..	M 12X60 BOLT WITH NUT, PLAIN & SPRING WASHER	HOT DIP GALVANISED AS PER RDSO SPEC. NO.TI/SPC/OHE/ FASTENERS/0120– REV.1	6
3..	SINGLE HOLE ALUMINIUM LUG & M–16, 50/38 BOLT AND NUT	ALUMINIUM & AS PER RDSO SPEC. NO.TI/SPC/OHE/ FASTENERS/0120– REV.1	1

NOTE :–

1. REF. STANDARD : IS : 5561-2018
2. SHORT TIME RATING : 12 KA FOR 3 SEC.
3. ALL SHARP CORNERS SHALL BE SMOOTHLY ROUNDED OFF.
4. MANUFACTURING TOLERANCES :
   UPTO 500 mm ±5% : FROM 51 TO 100 mm: ± 4%:
   FROM 101 TO 300mm : 3%

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TEE CONNIRCTOR SUITABLE FOR 20mm GS WIRE TO 20 mm DIA GS WIRE

ED–TI

(BHARWDAJ CHAUDHARY)

REF.

CROSS REF :–

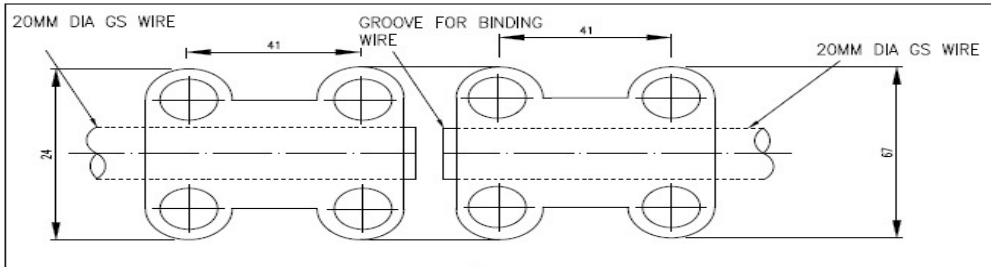
DATE	MOD.	NATURE OF MOD.	INITIALS

	DATE	NAME
DR		
CK		
CK		

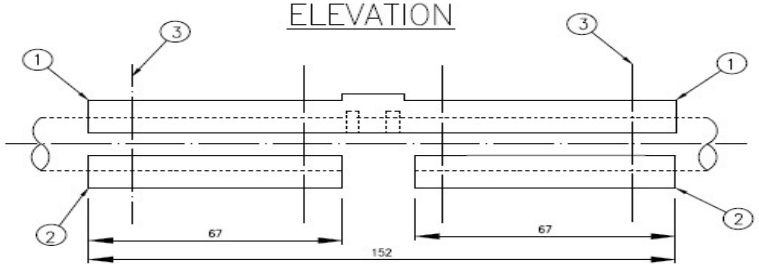
R . D . S . O.

TI/DRG/OHE/TC/RDSO/ 00001/20/0

ANNEXURE 43



ELEVATION



END VIEW

MATERIAL LIST:

REF. NO.	DESCRIPTION	MATERIAL	QTY.
1.	CONNECTOR BODY	MALLEABLE CAST IRON GALVANISED, GR. MB 340, AS PER IS:14329–1995	1
2.	CLAMPING PIECE	–DO–	2
3..	M 12X60 BOLT WITH NUT, PLAIN & SPRING WASHER	HOT DIP GALVANISED AS PER RDSO SPEC. NO.TI/SPC/OHE/ FASTENERS/0120–REV.1	8

NOTE :–

1. REF. STANDARD : IS : 5561-2018
2. SHORT TIME RATING : 12 KA FOR 3 SEC.
3. ALL SHARP CORNERS SHALL BE SMOOTHLY ROUNDED OFF.
4. MANUFACTURING TOLERANCES :
   UPTO 500 mm ±5% : FROM 51 TO 100 mm: ± 4%:
   FROM 101 TO 300mm : 3%

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STRAIGHT CONNECTOR SUITABLE FOR 20MM DIA. GS WIRE TO 20MM DIA GS WIRE

ED–TI

(BHARWDAJ CHAUDHARY)

REF.

CROSS REF :–

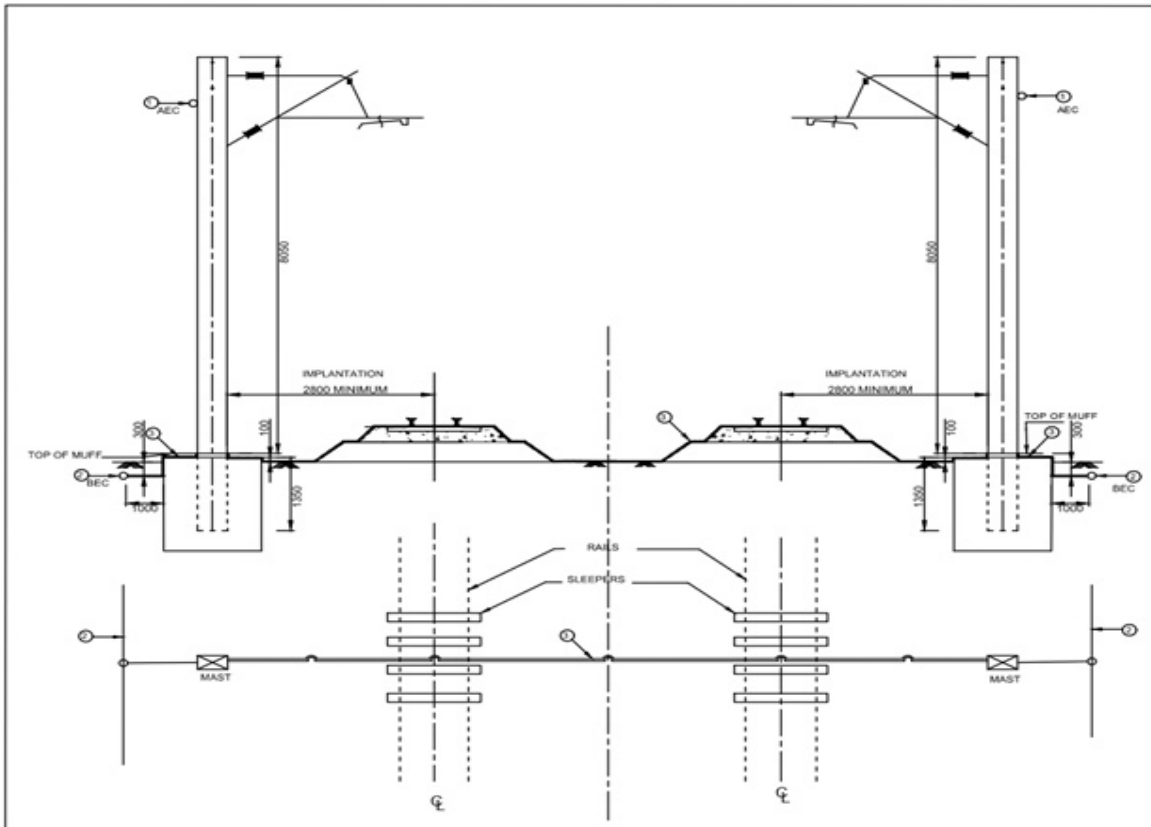
DATE	MOD.	NATURE OF MOD.	INITIALS

R . D . S . O.

	DATE	NAME
DR		
CK		
CK		

TI/DRG/OHE/ST/RDSO/ 00001/20/0

ANNEXURE 44



REF NO.	DESCRIPTION	PART NO.	QTY
1	12.27 mm DIA. STEEL RAINFORCED ALUMINIUN RACCOON (505QMM Cu EQUIVALANT) (AEC)		
2	20 MM DIA. AND 238 SQMM (NOMINAL CROSS SECTIONAL AREA) GALVANISED STEEL CONDUCTOR (BEC)	AS PER IS: 2141-2000	
3	50X6 MS/GS FLAT		

NOTE :-

1. ALL DIMENSIONS ARE IN mm
2. BEC WILL BE LAID 300MM BELOW FORMATION LEVEL ALONG THE TRACK
3. THE CROSS BONDING ARRANGEMENT CONNECTING UP BEC- UP MAST/PORTAL-UP TRACTION RAILS - DN TRACTION RAILS -DN MAST-DN BEC WILL BE PROVIDED AT EVERY 450 M.
4. BEC WILL BE CONNECTED TO EACH MAST BY BEC CONDUCTOR WITH SUITABLE TEE CONNECTOR AT ONE END & LUG ARRANGEMENT AT MAST END.
5. 50X6 MM MS/GS FLAT WILL BE CONNECTED WITH RAIL/MAST BY M-16 BOLT 50X38 MM WITH NUT, LOCK & PLAIN WASHER.

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CROSS BONDING ARRANGEMENT FOR NDLS-HWH & NDLS-MUMBAI ROUTE

ED-TI

(BHARWDAJ CHAUDHARY)

REF. ETI/C/P/8020

CROSS REF :-

DATE	MOD.	NATURE OF MOD.	INITIALS

R . D . S . O.

	DATE	NAME
DR		
CK		
CK		

TI/DRG/OHE/EARTHING/ RDSO/00001/20/0

ANNEXURE 45



BEC ARRENGMENT ON BRIDGES AND PLATFORM COPING

ANNEXURE 46

GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS
RAILWAY BOARD

No. 2001/Elect(G)170/1Pt-III

New Delhi, Date: 07.08.2020

Sr. Executive Director (TI)
RDSO, Manak Nagar
Lucknow

Sub: VC held on 02.08.2020 regarding train speed raising upto 160 kmph in Delhi-Howrah and Delhi-Mumbai routes.

A Video Conference was held with Hon'ble MR and zonal railways on 02.08.2020 regarding raising of speed upto 160 kmph in Delhi-Howrah and Delhi-Mumbai routes. It has been instructed that associated electrical works should be completed within 1.5 years.

2. Accordingly, RDSO is advised to finalize all specifications/designs as required so that work could be completed timely. Action plan with timelines to be sent to Railway Board by date 14.08.2020.

This is issued with the approval of Competent Authority.

07/08/2020

(Sumit Garg)
Director Elect. Engg. (PS)

Copy to: DG/RDSO: For kind information please.

ANNEXURE 47

भारत सरकार (GOVERNMENT OF INDIA)
रेल मंत्रालय (MINISTRY OF RAILWAYS)
रेलवे बोर्ड (RAILWAY BOARD)

No. 2001/Elect(G)/170/1 Pt-II New Delhi, Dated: 16.10.2020

Director General
RDSO
Lucknow

Sub: Minutes of Meeting of MTRS (then OSD/Safety), Railway Board with RDSO Officers of TI Dte. at RDSO and Zonal Railway CEEs/CEDEs& ED/DMRC on call on 12.09.2020 regarding 2x25 kV scheme for upgradation of OHE & PSI.

In reference to the above subject, a meeting was chaired by M/TRS (then OSD/Safety) with RDSO Officers of TI Dte. at RDSO on 12.09.2020, in continuation to the meeting held through VC with Zonal Railways and RDSO officers on 29.08.2020 regarding 2x25 kV scheme for upgradation of OHE & PSI.

2. In this regard, minutes of meeting is enclosed herewith for kind information.

Encl: Copy enclosed.

16/10/2020
(Manish Gupta)
Executive Director (EEM)

Copy to:

(i) AM/Traction, Railway Board
(ii) PCEE/ER, ECR, NCR, NR, WCR,WR
(iii) PED/TI, PED/SE, ED/PS & EMU/ RDSO
(iv) CAO/CORE, Prayagraj
(v) ED/RE, Railway Board
(vi) ED/Dev, Railway Board

For kind information please

Minutes of Meeting of M/TRS (then OSD/Safety), Railway Board with RDSO Officers of TI Dte. at RDSO and Zonal Railway CEEs/CEDEs & ED/DMRC on call on 12.09.2020 regarding 2x25kv scheme for upgradation of OHE & PSI

This meeting on 12.09.2020 at RDSO was held in continuation to the meeting held through VC with Zonal Railways and RDSO officers on 29.08.2020.

Following officers were present during the meeting held at RDSO on 12.09.2020:

1.	Shri Rajesh Tiwari	:	M/TRS (then OSD/Safety), Railway Board & Ex-Officio Secretary to Govt. of India.
2.	Shri Sanjiv Swarup	:	PED/SE/RDSO
3.	Shri Sunil Kumar	:	PED/TI/RDSO
4.	Shri Bhardwaj Chaudhary	:	ED/TI/RDSO
5.	Shri Gyan Prakash Katiyar	:	Director/TI/RDSO
6.	Shri Arvind Koomar	:	Joint Director/TI/RDSO

1. Review of the items discussed during VC with Zonal Railways (ER, ECR, NR, WR, & WCR) & RDSO regarding 2x25kv system adoption has been done. Status is as below:

1.1 **OHE Work:**

i) RDSO has finalized draft OHE guidelines for Zonal Railways for increasing the speed to 160 kmph on NDLS-HWH (including CNB-LKO) and NDLS-BCT (incl. Varodara-Ahemdabad) routes and circulated to all Zonal Railways vide instruction No. TI/IN/0042 on 11.09.2020.Final OHE guidelines should be issued by RDSO by this week end after considering comments from Railways.

ii) Detailed guidelines for checking the OHE structure suitability has been given in para 1.1.1 of draft OHE guidelines. Zonal Railways should check the existing mast and foundation as per excel sheet circulated by RDSO and report the status of failed masts and foundation to RDSO for scrutiny. The decision on mast and foundation found not suitable by a small margin should be taken in consultation with RDSO.

Portal structure should also be checked for suitability to take load of feeder wire on super mast, increase in tension in conductors to 1200+1200kgf and aerial earth wire.

iii) Execution strategy of OHE modification work has been discussed and it was concluded that increase in tension in OHE conductor by providing additional counter weight by changing center rod and re-droppering can be done in the field within 2.5 to 3 hrs. for one tension length of 1500 mtrs. This is almost at

xi) Vendor (indigenous) development for Cu-Mg catenary wire should be expedited as in future Cu-Mg catenary may have to be used due to environment and technical considerations.

1.2 **PSI Work:**

i) All the Zonal Railways must send the details of available area for TSS/SP /SSP after site survey. Some of the Zonal Railways have not submitted the details of space availability for TSS/SP/SSP.

ii) Standardized TSS/SP/SSP layout drawings should be finalized by RDSO expeditiously. Minimum 3 types/scheme for layout should be developed. If land availability at site warrants, layouts will have to be developed suiting the site conditions.

a) TSS/SP/SSP having standard dimensions where adequate space is available.

b) TSS/SP/SSP with 25 kV switch yard along the track for lower dimension across the track.

c) Attempt should be made to reduce the dimension of length required across the track upto 50 mtr for Scott/V-connected TSS. This is possible as this exercise has already been done for development of layout drawing of Malwa and Sirathu TSS in NCR.

d) Both type of schematic may be considered for TSS/SP/SSP i.e. with approach Road & without approach Road. However, the TSS if not provided with Road must have cross track.

The acquisition of land is very critical & complicated and wastes a lot of time. Wherever the land is less, the TSS should be tried to be accommodated in the available land. If the connectivity of Road from cross track cum Road is not feasible at present due to less land, the TSS layout should be finalized without approach Road. 25 kV & 132 kV cables instead of overhead wires can be considered at specific locations by Railways where area of land is very less, in order to expedite the work.

iii) SP & SSP should have interrupters in place of circuit breaker for sectioning and paralleling, as the same arrangement has been working satisfactorily in Bina-Katni section.

iv) The requirement of Auto Transformer protection at TSS/SP/SSP should be critically reviewed and removed if not required.

v) Similarly detailed position of transmission line work involved in this up gradation work to meet power supply requirement in the range of 60-80MVA

should also be made by Zonal Railways. The status should contain the following details:

a) Name of the TSS

b) Existing transmission line status (no. of circuit and no. of phase and size of Conductor).

c) Details of Transmission line enhancement work required/proposed.

d) Requirement of separate bay in grid sub-station.

e) Enhancement of transformer capacity etc. in grid sub-station.

Zonal Railways should send letter to the Power Supply Authorities regarding requirement of enhanced demand of energy.

vi) RDSO and Zonal Railways should give time line for completing following items:

a) OHE & PSI guidelines for Raising of sectional speed to 160kmph on New Delhi-Howrah and New Delhi-Mumbai route within a fortnight.

b) All the detailed drawings like structure, foundation, cable lay-out etc and new specifications should be finalized by 31.12.2020.

c) Final report of checking of OHE structure should be submitted by Zonal Railways as per excel sheet circulated by RDSO.

vii) TI Directorate of RDSO should organize Vendor meet to inform the Vendors regarding development of new PSI items required for this work.

2.0 Other Items :

i) The location of pantographs of Vande Bharat rake has been discussed and it has come out that there are four pantographs installed in the Vande Bharat rake, Out of which PT-1 and PT-4 and PT-2 and PT-3 can be raised at a time during operation of the train. The distance between PT-2 and PT-3 is approximately 80 mtr which causes poor current collection from the rear pantograph at high speed. This situation can be improved by relocating the Pantographs. PS&EMU and TI Directorate should further examine the issue.

ii) Zonal Railways should be consulted before deletion of specification of an item from vendor directory. After the feedback of Zonal Railways proposal for deletion of the specification should be sent to Railway Board.

16/X/2020

(Manish Gupta)
Executive Director (EEM)
Railway Board