



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:

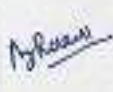



Traction Installation Directorate
RESEARCH DESIGNS & STANDARDS ORGANISATION
MANAK NAGAR
LUCKNOW – 226 011

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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
Designation	SSE/OHE DESIGN	SSE/CIVIL	EDTI	PED/TI

ASSISTED BY:

- i) Shri Shrikant Saroj, Senior Section Engineer,
- ii) Shri Blkesh Kumar, Senior Section Engineer,
- iii) Shri Sujeet Kumar, Senior Section Engineer,
- iv) Shri Dalip Singh Meena, Senior Section Engineer,
- v) Shri Dharmraj, Junior Engineer

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:

1.1.1 OHE 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/m² wind pressure and in some portion near Kolkata with 150kgf/m². 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/m² 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 :

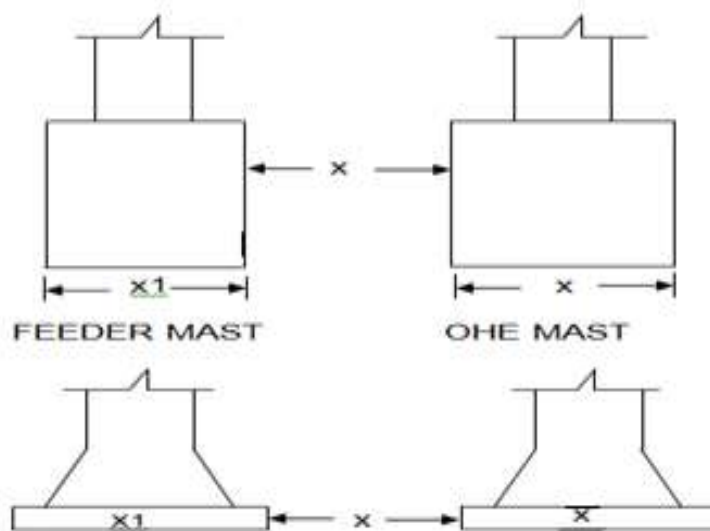
Feeder line has been designed, keeping in the view the provision for shifting the OHE on it in future. In this way, the feeder Mast will carry the OHE, AEC and feeder wire, after expiry of the codal life of the existing suitable mast which will presently carry the OHE and AEC. However wherever the existing 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 mm² /107 mm² catenary/contact wire with 1200/1200 kgf tension in contact wire and catenary wire, AEC 92mm² and Feeder wire 234 mm²)

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/m² 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 $125\text{mm}^2/150\text{mm}^2$ catenary/contact wire with 1500/1500 kgf tension in contact and catenary wire, AEC and Feeder wire 288mm^2)

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

New Feeder mast designed for OHE, feeder wire & Aerial 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, 155kgf/m^2 wind pressure attached as Annexure-[12](#), [13](#) & [14](#) for implantation of 2.8m, 3.8m & 4.85m respectively.

Similarly for 178kgf/m² 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 mm²/107 mm² Catenary/contact wire with 1200kgf/1200kgf tension. Feeder wire and AEC conductor shall be 234 mm² & 92mm² 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 mm² G Jumper may be replaced by 160 mm² 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 (107mm²) and Cu-Cd catenary wire (65 mm²) 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 (107mm²) and Cu-Cd catenary wire (65 mm²) 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 (Aerial 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 mm²), 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/0000 4/19/0 (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/0000 4/19 /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/0000 4/20/0 (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/0000 4/20/0 (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

[illegible]

7. FIND (CALCULATE) BEARING MINIMUM DEGREE (USE THE NEAREST WHOLE NUMBER) TO PREVENT CONTACT OF
 8. CALCULATE PRODUCTION RATE (LBS PER HOUR) (USE FORMULA IN 22.5.4.4.7.)
9. RESISTANCE (DETERMINED) IS IN PSI AND POSITIVE WHEN AVOIDS THE TRUCK AND NEGATIVE WHEN THROUS IT.
10. THE ACTUAL MINIMUM VALUE OF THE PRODUCTION PROVIDED IN EQUATION NO. 00302.
11. THE MAXIMUM ALLOWANCE OF 10 PSI ON SETTING OF MAIST HAS BEEN CONSIDERED. THE SETTING OF MAIST IS AS PER DRAWING NO. ETC/000000/000000 OF MAIST OF
12. IN CONNECTION WITH MIN. VIBRATION, SHOCK AND IMPULSIONS, IN 00307, 00310, 00311, 00312, 00313, 00314, 00315, 00316, 00317, 00318, 00319, 00320, 00321, 00322, 00323, 00324, 00325, 00326, 00327, 00328, 00329, 00330, 00331, 00332, 00333, 00334, 00335, 00336, 00337, 00338, 00339, 00340, 00341, 00342, 00343, 00344, 00345, 00346, 00347, 00348, 00349, 00350, 00351, 00352, 00353, 00354, 00355, 00356, 00357, 00358, 00359, 00360, 00361, 00362, 00363, 00364, 00365, 00366, 00367, 00368, 00369, 00370, 00371, 00372, 00373, 00374, 00375, 00376, 00377, 00378, 00379, 00380, 00381, 00382, 00383, 00384, 00385, 00386, 00387, 00388, 00389, 00390, 00391, 00392, 00393, 00394, 00395, 00396, 00397, 00398, 00399, 00400, 00401, 00402, 00403, 00404, 00405, 00406, 00407, 00408, 00409, 00410, 00411, 00412, 00413, 00414, 00415, 00416, 00417, 00418, 00419, 00420, 00421, 00422, 00423, 00424, 00425, 00426, 00427, 00428, 00429, 00430, 00431, 00432, 00433, 00434, 00435, 00436, 00437, 00438, 00439, 00440, 00441, 00442, 00443, 00444, 00445, 00446, 00447, 00448, 00449, 00450, 00451, 00452, 00453, 00454, 00455, 00456, 00457, 00458, 00459, 00460, 00461, 00462, 00463, 00464, 00465, 00466, 00467, 00468, 00469, 00470, 00471, 00472, 00473, 00474, 00475, 00476, 00477, 00478, 00479, 00480, 00481, 00482, 00483, 00484, 00485, 00486, 00487, 00488, 00489, 00490, 00491, 00492, 00493, 00494, 00495, 00496, 00497, 00498, 00499, 00500, 00501, 00502, 00503, 00504, 00505, 00506, 00507, 00508, 00509, 00510, 00511, 00512, 00513, 00514, 00515, 00516, 00517, 00518, 00519, 00520, 00521, 00522, 00523, 00524, 00525, 00526, 00527, 00528, 00529, 00530, 00531, 00532, 00533, 00534, 00535, 00536, 00537, 00538, 00539, 00540, 00541, 00542, 00543, 00544, 00545, 00546, 00547, 00548, 00549, 00550, 00551, 00552, 00553, 00554, 00555, 00556, 00557, 00558, 00559, 00560, 00561, 00562, 00563, 00564, 00565, 00566, 00567, 00568, 00569, 00570, 00571, 00572, 00573, 00574, 00575, 00576, 00577, 00578, 00579, 00580, 00581, 00582, 00583, 00584, 00585, 00586, 00587, 00588, 00589, 00590, 00591, 00592, 00593, 00594, 00595, 00596, 00597, 00598, 00599, 00600, 00601, 00602, 00603, 00604, 00605, 00606, 00607, 00608, 00609, 00610, 00611, 00612, 00613, 00614, 00615, 00616, 00617, 00618, 00619, 00620, 00621, 00622, 00623, 00624, 00625, 00626, 00627, 00628, 00629, 00630, 00631, 00632, 00633, 00634, 00635, 00636, 00637, 00638, 00639, 00640, 00641, 00642, 00643, 00644, 00645, 00646, 00647, 00648, 00649, 00650, 00651, 00652, 00653, 00654, 00655, 00656, 00657, 00658, 00659, 00660, 00661, 00662, 00663, 00664, 00665, 00666, 00667, 00668, 00669, 00670, 00671, 00672, 00673, 00674, 00675, 00676, 00677, 00678, 00679, 00680, 00681, 00682, 00683, 00684, 00685, 00686, 00687, 00688, 00689, 00690, 00691, 00692, 00693, 00694, 00695, 00696, 00697, 00698, 00699, 00700, 00701, 00702, 00703, 00704, 00705, 00706, 00707, 00708, 00709, 00710, 00711, 00712, 00713, 00714, 00715, 00716, 00717, 00718, 00719, 00720, 00721, 00722, 00723, 00724, 00725, 00726, 00727, 00728, 00729, 00730, 00731, 00732, 00733, 00734, 00735, 00736, 00737, 00738, 00739, 00740, 00741, 00742, 00743, 00744, 00745, 00746, 00747, 00748, 00749, 00750, 00751, 00752, 00753, 00754, 00755, 00756, 00757, 00758, 00759, 00760, 00761, 00762, 00763, 00764, 00765, 00766, 00767, 00768, 00769, 00770, 00771, 00772, 00773, 00774, 00775, 00776, 00777, 00778, 00779, 00780, 00781, 00782, 00783, 00784, 00785, 00786, 00787, 00788, 00789, 00790, 00791, 00792, 00793, 00794, 00795, 00796, 00797, 00798, 00799, 00800, 00801, 00802, 00803, 00804, 00805, 00806, 00807, 00808, 00809, 00810, 00811, 00812, 00813, 00814, 00815, 00816, 00817, 00818, 00819, 00820, 00821, 00822, 00823, 00824, 00825, 00826, 00827, 00828, 00829, 00830, 00831, 00832, 00833, 00834, 00835, 00836, 00837, 00838, 00839, 00840, 00841, 00842, 00843, 00844, 00845, 00846, 00847, 00848, 00849, 00850, 00851, 00852, 00853, 00854, 00855, 00856, 00857, 00858, 00859, 00860, 00861

*THE CRAMING IS THE PROPERTY OF RESEARCH, DESIGN & STANDARD ORGANIZATION (QUALITY OF MEASUREMENT), LUCKNOW-226002. IT CAN BE USED, COPIED OR REPRODUCED IN PART OR WHOLE WITHOUT PRIOR CLARIFICATION.

EMPLOYMENT SCHEDULE
FOR OHE-MAST (9.5 m)
WIND - 112.5 Kg/m²
COPPER OHE
WITH 1200 Kg. TENSIONS
(FOR HIGH SPEED 160 km./h.) :
(OHE + EW)

22/7/08	Prakash to P (A.J. MEHROTRA)	23/12/08
02/7/0	J. B. B. B. (A.C. BISHN)	24/12/08
02/7/0	P. B. B. B. (S.N. SATTANARAYAN)	25/12/08
02/7/0	P. B. B. B. (S. K. SAKSENA)	26/12/08

2101-

Case 11-1

DATE	INCL. NO.	NATURE OF INFO.	AUTHT.	DATE	NAME
					R. D. S. O.
			CR.	10/20/70	ETI/C/0730
			TC		
			EX.	10/20/70	
			CONF		

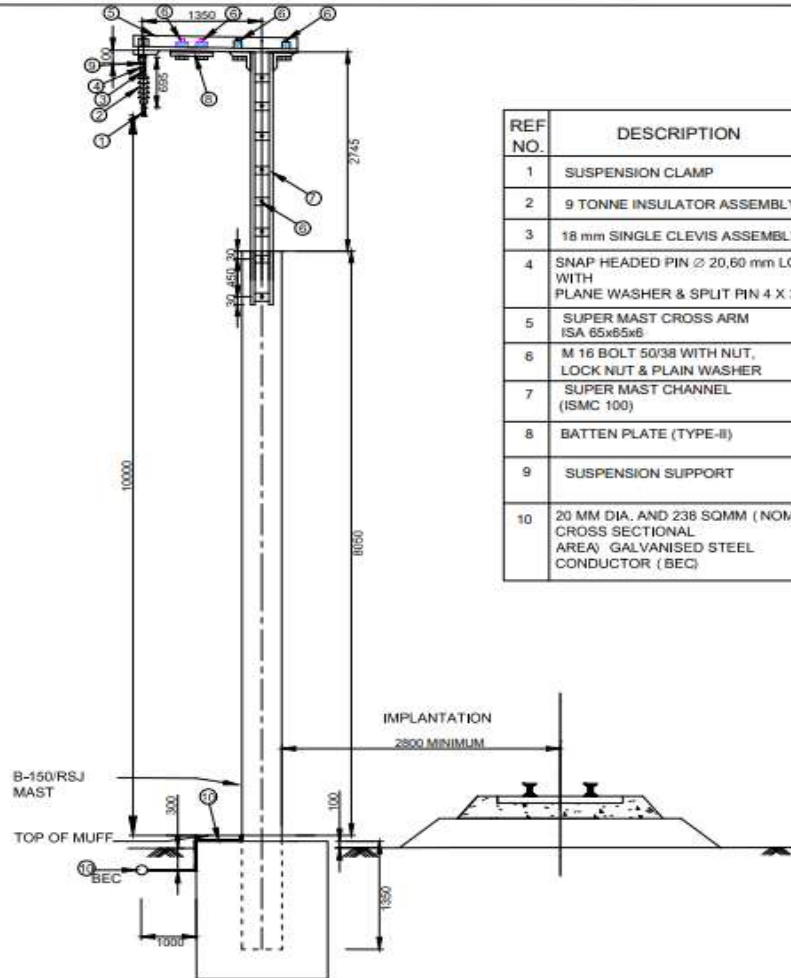
SH.
2/4

ANNEXURE 2

INSTRUCTION FOR CHECKING SUITABILITY OFEXISTING 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/m² for NDLS-HWH & NDLS-BCT section/150kgf/m² 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 ϕ 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	DATE	NAME	R. D. S. O.
						TI/DRG/OHE/FEEDER/ RDSO/00001/19/0
				DR		
				CK		
				CK		

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
			FBM CODE	147	147
67.5	2200	300	REV. DEF.	30	30
			FBM CODE	147	147
63	1900	310	REV. DEF.	30	30
			FBM CODE	147	147
58.5	1600	310	REV. DEF.	30	30
			FBM CODE	147	147
54	1400	320	REV. DEF.	30	30
			FBM CODE	140	140
49.5	1150	360	REV. DEF.	30	30
			FBM CODE	140	140
45	850	360	REV. DEF.	30	30
			FBM CODE	140	140
40.5	700	375	REV. DEF.	30	30
			FBM CODE	140	140
36	550	405	REV. DEF.	30	30
			FBM CODE	140	140
31.5	400	415	REV. DEF.	30	30
			FBM CODE	140	140
27	300	455	REV. DEF.	30	30
			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
			FBM CODE	147	147
67.5	2200	300	REV. DEF.	0	0
			FBM CODE	147	147
63	1900	310	REV. DEF.	0	0
			FBM CODE	147	147
58.5	1600	310	REV. DEF.	0	0
			FBM CODE	147	147
54	1400	320	REV. DEF.	0	0
			FBM CODE	140	140
49.5	1150	360	REV. DEF.	0	0
			FBM CODE	140	140
45	850	360	REV. DEF.	0	0
			FBM CODE	140	140
40.5	700	375	REV. DEF.	0	0
			FBM CODE	140	140
36	550	405	REV. DEF.	0	0
			FBM CODE	140	140
31.5	400	415	REV. DEF.	0	0
			FBM CODE	140	140
27	300	455	REV. DEF.	0	0
			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 (Rev. 0) (DESIGN WIND PRESSURE 155 kgf/m²) CALCULATED AS PER CLAUSE 3.4 OF IS: 875 (Part-3)-2015 (Rev. 0).
2. THIS EMPLOYMENT SCHEDULE IS APPLICABLE FOR 25 KV FEEDER ARRANGEMENT ON SEPARATE MAST FOR NDLS-PNH & 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 INFLUENCE 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/CN/FEEDER/00001/04/0 MODIFICATION "D" CHART OF (SHEET NO. 1 TO 5).
6. THE CYCLING DESIGN AREA FACTOR (DA) HAS NOT BEEN CONSIDERED IN THE DESIGN CALCULATION GIVEN IN CLAUSE 4.3.4 OF IS: 875 (Part-3)-2015 (Rev. 0).
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-PNH & NDLS-MUMBAI ROUTE		DS-2 (BHARDWAJ CHAUDHARY)	
BASIC WIND SPEED 47 m/s WIND PRESSURE 155 kgf/m ² 1212 kgf TENSION IN FEEDER WIRE 19.95mm ²			
REF: TI/DRG/CN/FEEDER/00001/18/0 "MOD-A" CROSS REF:-			
DATE	MOD.	INCORP. OF MOD.	INITIAL
R. D. S. O.			DATE
OR			NAME
OR			TI/DRG/CN/FEEDER-ES
OR			/RDSO/00001/20/0
NOT TO SCALE			SHEET-1

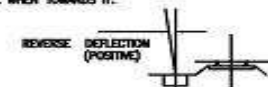
ANNEXURE 3B

EMPLOYMENT SCHEDULE: WIND PRESSURE 178 KGF/SQM

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

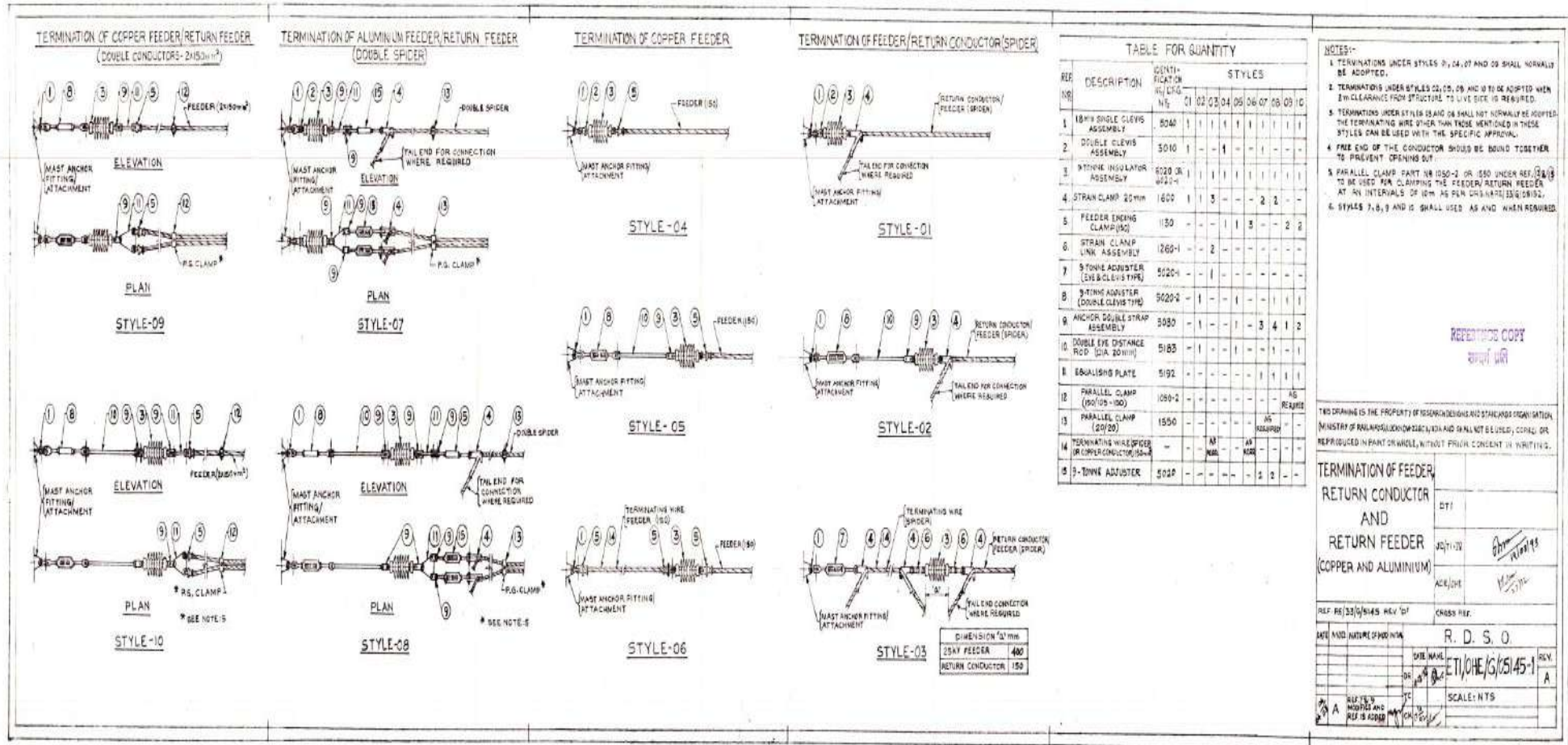
NOTES:-

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 REV.8 (DESIGN WIND PRESSURE 178 kgf/m² CALCULATED AS PER CLAUSE 6.4 OF IS: 875 (Part-3)-2015 (Rev.-8)).
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 NEAR SIDE OF THE FEEDER MAST. THE FEEDER MAST WILL HAVE MINIMUM IMPLANTATION 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/RDSO/00001/04/0 MODIFICATION "B" CHART OF (SHEET NO. 1 TO 6).
6. THE CYCLONIC DESIGN AREA FACTOR (K_a) HAS NOT BEEN CONSIDERED IN THE DESIGN CALCULATION GIVEN IN CLAUSE 6.3.4 OF IS: 875 (Part-3)-2015 (Rev.-8).
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		DT-2 (SHARDWAJ CHAUDHARY)	
REF:-TI/DRG/CIV/FEEDER/RDSO/00001/18/0 "MOD-A"		CROSS REF:-	
DATE	MOD	REVISION OF MOD	INITIAL
R. D. S. O.			
DATE	NAME		
DR.			
OK.			
OK.			
NOT TO SCALE		SHEET-2	

ANNEXURE 4



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)	VERT. DNE (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	0	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-	30	30	-	-	-	-	-	-	30	30	-	30	-	30	-	
			FBR. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	161	161	-	-	-	-	-	-	270	178	-	178	-	389
63	2500	200	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	30	-	-	-	-	-	-	30	30	-	30	-	30	-
			FBR. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	161	161	-	-	-	-	-	-	270	178	-	178	-
63	2500 1900	265	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	30	-	-	-	-	-	-	30	30	-	30	-	30	-
			FBR. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	161	161	-	-	-	-	-	-	270	185	-	185	-
58.5	1900 1600	265	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	30	-	-	-	-	-	-	30	30	-	30	-	30	-
			FBR. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	161	168	-	-	-	-	-	-	275	185	-	185	-
54	1600 1400	260	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	30	-	-	-	-	-	-	30	30	-	30	-	30	-
			FBR. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	161	168	-	-	-	-	-	-	275	195	-	185	-
49.5	1400 1150	265	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	30	-	-	-	-	-	-	30	30	-	30	-	30	-
			FBR. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	161	168	-	-	-	-	-	-	275	185	-	185	-
49.5	1150 850	360	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	30	-	-	-	-	-	-	30	-	-	-	30	30	30
			FBR. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	161	168	-	-	-	-	-	-	275	-	-	193	399
45	850 700	360	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	30	-	-	-	-	-	-	30	-	-	-	30	30	30
			FBR. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	161	168	-	-	-	-	-	-	275	-	-	193	399
40.5	700 550	375	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	30	-	-	-	-	-	-	30	-	-	-	30	30	30
			FBR. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	161	168	-	-	-	-	-	-	275	-	-	193	399
36	550 400	405	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	30	-	-	-	-	-	-	30	-	-	-	30	30	30
			FBR. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	161	168	-	-	-	-	-	-	275	-	-	193	399
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)	VERT. DNE (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	-	-	-	
			FBR. CODE	154	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	154	161	265	-	-	-	-	-	178	363	178	-	-
63	2500 1900	265	REV. DEF.	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-30	-30	-30	-	-	-	-	-	-30	-30	-30	-	-	-
			FBR. CODE	154	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	154	161	265	-	-	-	-	-	178	363	178	-	-
58.5	1900 1600	265	REV. DEF.	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-30	-30	-30	-	-	-	-	-	-30	-30	-30	-	-	-
			FBR. CODE	154	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	154	161	265	-	-	-	-	-	178	374	178	-	-
54	1600 1400	260	REV. DEF.	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-30	-30	-30	-	-	-	-	-	-30	-30	-30	-	-	-
			FBR. CODE	154	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	154	161	265	-	-	-	-	-	178	374	178	-	-
49.5	1400 1150	265	REV. DEF.	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-30	-30	-30	-	-	-	-	-	-30	-30	-30	-	-	-
			FBR. CODE	154	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	154	168	265	-	-	-	-	-	185	374	185	-	-
49.5	1150 850	360	REV. DEF.	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-30	-30	-30	-	-	-	-	-	-30	-30	-30	-	-	-
			FBR. CODE	154	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	154	168	265	-	-	-	-	-	185	374	185	-	-
45	850 700	360	REV. DEF.	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-30	-30	-30	-	-	-	-	-	-30	-30	-30	-	-	-
			FBR. CODE	154	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	154	168	265	-	-	-	-	-	185	374	185	-	-
40.5	700 550	375	REV. DEF.	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-30	-30	-30	-	-	-	-	-	-30	-30	-30	-	-	-30
			FBR. CODE	154	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	154	168	265	-	-	-	-	-	374	-	193	-	193
36	550 400	405	REV. DEF.	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-30	-30	-30	-	-	-	-	-	-30	-30	-30	-	-	-30
			FBR. CODE	154	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	154	168	-	-	-	-	-	-	270	-	374	193	-

NOTES:-

- BEYOND THE WIND SPEED OF 33 m/s THE TOWNS WILL HAVE TO BE STOPPED.
- THIS EMPLOYMENT SCHEDULE IS APPLICABLE FOR GREEN REGION OF BASIC WIND SPEED 47 m/s OF FIGURE-1 OF IS:8750 (Part-3)-2015 REV.B (DESIGN WIND PRESSURE 155 kgf/m² CALCULATED AS PER CLAUSE 5.4 OF IS:8750 (Part-3)-2015 REV.B).
- THE CYCLONIC REGION AREA FACTOR (K_z) HAS NOT BEEN CONSIDERED IN THE DESIGN CALCULATION GIVEN IN CLAUSE 6.3.4 OF IS: 8750(PART-3)-2015(REV.B).
- THE EMPLOYMENT SCHEDULE IS SUITABLE FOR IMPLANTATION UP TO 2.5 METRE 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.12/111 SH-1 HAS BEEN CONSIDERED.
- FOUNDATION BENDING MOMENT (T/M) CODE GIVEN THE NECESSARY CROSS REFERENCE TO EQUIVALENT FOUNDATIONS, FOR FOUNDATION SELECTION SEE THE DRAWING No. 1/DRG/CH/PHD/RESD/20001/04/0 MODIFICATION "F" CHART OF SHEET No.1 TO 5.
- FOR LOCATIONS WITH NON-CORNERED SPANS AND IMPLANTATIONS, THE SAFETY OF MAST AND FOUNDATION SHALL BE CHECKED AND SUITABLE MAST AND FOUNDATION SHALL BE PROVIDED.
- NEGATIVE DEFLECTIONS ARE IN mm, POSITIVE DEFLECTION IS POSITIVE WHEN AWAY FROM TRACK AND NEGATIVE WHEN TOWARDS IT.



- WHERE EQUALIZER IS TO BE PROVIDED ON MAST, NEXT HIGHER SIZE OF MAST AND NEXT HIGHER T/M CODE FOR FOUNDATION SHALL BE SELECTED.
- UNDER OVERLAP GENERAL LOCATION IN TANGENT TRACK 34 meters SPAN IS CONSIDERED.
- THE SPANS ON SPECIFIC LOCATION LIKE, BRIDGES, OVERLAPS, TURNOUTS, HELIUM SECTION ETC. SHALL BE AS PER PARA NO. 6.1.2.1, 5.6, 5.7, 5.8 OF ACIN VOL.4, PART-2.
- THE ARRANGEMENT OF ONE AT SUPPORT HAS BEEN CONSIDERED AS PER DRAWING NO. 12/CH/02102, SHEET-3, (REV.B).
- MAST OF ECONOMIC SIZE SHALL BE SELECTED.
- THE ONE SPAN AND RADIUS APPROVED BY RAILWAY BOARD FOR MINOR GAUGE CONCEPT.

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EMPLOYMENT SCHEDULE FOR OHE MAST (9.5 m) BASIC WIND SPEED 47 m/s WIND PRESSURE 155 kgf/m ² (OHE + FEEDER WIRE + EARTH WIRE) 1200 kgf TENSION IN CAT. 65mm ² 1200 kgf TENSION IN CONT.107mm ² (WITH IMPLANTATION UP TO 2.8M)		EDTI (BHARDWAJ CHAUDHARY)	
REF:-		CROSS REF:-	
DATE MOD. NATURE OF MOD. INITIAL		R. D. S. O.	
DATE NAME		TI/DRG/CIV/ES/RDSO	
DR.		/00004/19/0	
CK.		NOT TO SCALE (SHEET-1)	
CK.			

ANNEXURE 6

EMPLOYMENT SCHEDULE: WIND PRESSURE 155KG/SQM

MAST ON OUTSIDE OF CURVED TRACK																																
TYPE OF MAST			R53 (8" x 6")						B-150 K-150						B-175 K-175						B-200 K-200						B-225 K-225					
MAX. SPAN (m)	RADIUS (m)	VERT. INCL (DEG.)	N	ACC	ACA	OLC	OLA	OLI	N	ACC	ACA	OLC	OLA	OLI	N	ACC	ACA	OLC	OLA	OLI	N	ACC	ACA	OLC	OLA	OLI	N	ACC	ACA	OLC	OLA	OLI
67.5	10	0	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			FPM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
63	2500	200	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			FPM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
63	2500 1900	265	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			FPM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
58.5	1900 1600	265	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			FPM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
54	1600 1400	260	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			FPM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
49.5	1400 1150	265	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			FPM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
49.5	1150 850	360	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			FPM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
45	850 700	360	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			FPM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
40.5	700 550	375	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			FPM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
36	550 400	405	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			FPM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

MAST ON INSIDE OF CURVED TRACK																																
TYPE OF MAST			R53 (8" x 6")						B-150 K-150						B-175 K-175						B-200 K-200						B-225 K-225					
MAX. SPAN (m)	RADIUS (m)	VERTICES (N.A.C.) 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	N	ACC	ACA	OLC	OLA	OLI
63	2500	200	REV. DEF.	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			FPM. CODE	154	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
63	2500 1900	265	REV. DEF.	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			FPM. CODE	154	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
58.5	1900 1600	265	REV. DEF.	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			FPM. CODE	154	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
54	1600 1400	265	REV. DEF.	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			FPM. CODE	154	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
49.5	1400 1150	265	REV. DEF.	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			FPM. CODE	154	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
49.5	1150 850	360	REV. DEF.	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			FPM. CODE	154	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
45	850 700	360	REV. DEF.	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			FPM. CODE	154	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
40.5	700 550	375	REV. DEF.	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			FPM. CODE	154	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
36	550 400	405	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			FPM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

NOTES:-

- BEYOND THE WIND SPEED OF 33 m/s THE TRAINS WILL HAVE TO BE STOPPED.
- THIS EMPLOYMENT SCHEDULE IS APPLICABLE FOR GREEN REGION OF SHED WIND SPEED 47 m/s OF FIGURE-1 OF R5075 (Part-3)-2015 REV.6 (DESIGN WIND PRESSURE 155 kgf/m² CALCULATED AS PER CLAUSE 5.4 OF R5075 (Part-3)-2015 REV.6).
- THE CYCLONIC REGION AREA FACTOR (K₁) HAS NOT BEEN CONSIDERED IN THE DESIGN CALCULATION GIVEN IN CLAUSE 6.3.4 OF R5075 (Part-3)-2015 REV.6.
- 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.17/CH/THD/REGG/00001/04/0 MODIFICATION 'Y' CHART OF SHEET No.1 TO 53.
- FOUNDATION BENDING MOMENT (FPM) CODE GIVES THE NECESSARY CROSS REFERENCE TO EQUIVALENT FOUNDATIONS, FOR FOUNDATION SELECTION SEE THE DRAWING No. 12/DRG/CH/THD/REGG/00001/04/0 MODIFICATION 'Y' CHART OF SHEET No.1 TO 53.
- 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.
- REVERSE DEFLECTIONS ARE IN MIN. REVERSE DEFLECTION IS POSITIVE WHEN AWAY FROM TRACK AND NEGATIVE WHEN TOWARDS IT.



- WHERE ISOLATOR IS TO BE PROVIDED ON MAST, NEXT HIGHER SIZE OF MAST AND NEXT HIGHER FPM CODE FOR FOUNDATION SHALL BE SELECTED.
- UNDER OVERLAP CENTRAL LOCATION IN TANGENT TRACK 54 meter SPAN IS CONSIDERED.
- THE SPANS ON SPEEDY LOCKDOWN LINE, BRIDGES, OVERLAPS, TURNOUTS, HEALING SECTION ETC. SHALL BE AS PER PARA NO. 6.1.2.1, 6.6, 6.7, 6.8 OF ACIR VOL.3, PART-2.
- THE ARRANGEMENT OF ONE AT SUPPORT HAS BEEN CONSIDERED AS PER DRAWING NO. 12/CH/THD/REGG/00001/04/0 SHEET-3, (REV.6).
- MAST OF ECONOMIC SIZE SHALL BE SELECTED.
- THE ONE SPAN AND RADIUS APPROVED BY RAILWAY BOARD FOR MINOR GAUGE CONCEPT.

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EMPLOYMENT SCHEDULE FOR ONE 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.	DATE	NAME
R. D. S. O.		T/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				R53 (8" x 6")						B-150 K-150						B-175 K-175						B-200 K-200						B-225 K-225			
MAX. SPAN (m)	RADIUS (m)	VERT. DNE (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	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	285	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				R53 (8" x 6")						B-150 K-150						B-175 K-175						B-200 K-200						B-225 K-225			
MAX. SPAN (m)	RADIUS (m)	VERT. DNE (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	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	-	-	-
			FBM. CODE	154	-	-	-	-	-	-	-	-	-	-	-	-	-	-	154	168	265	-	-	-	-	-	185	374	185	-	-
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	-	-	-
			FBM. CODE	154	-	-	-	-	-	-	-	-	-	-	-	-	-	-	154	168	-	-	-	-	-	-	270	185	374	185	-
40.5	700 550	375	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-	-30	-30	-	-	-	-	-	-	-	-30	-	-30	-	-30	-
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	161	168	-	-	-	-	-	-	270	-	374	-	193
36	550 400	405	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-	-30	-30	-	-	-	-	-	-	-	-30	-	-30	-	-30	-
			FBM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	161	168	-	-	-	-	-	-	270	-	374	-	193

NOTES:-

- BEYOND THE WIND SPEED OF 33 m/s THE TRAINS WILL HAVE TO BE STOPPED.
- 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.8 (DESIGN WIND PRESSURE 155 kgf/m² CALCULATED AS PER CLAUSE 5.4 OF IS:875 (Part-3)-2015 REV.8).
- THE CYCLONIC REGION AREA FACTOR(K_z) HAS NOT BEEN CONSIDERED IN THE DESIGN CALCULATION GIVEN IN CLAUSE 6.3.4 OF IS: 875(PART-3)-2015(REV.8).
- 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 SHELTER ALLOWANCE ON SETTING OF MAST AND ON INSIDE OF CURVE EXTRA IMPLANTATION AS PER DRG. NO.ET/CH/CH/NO/NO/00001/04/0 MODIFICATION 'Y' CHART OF (SHEET No.1 TO 5).
- FOUNDATION BENDING MOMENT (FBM) CODE GIVES THE NECESSARY CROSS REFERENCE TO EQUIVALENT FOUNDATIONS, FOR FOUNDATION SELECTION SEE THE DRAWING No. T/DRG/CH/CH/NO/NO/00001/04/0 MODIFICATION 'Y' CHART OF (SHEET No.1 TO 5).
- FOR LOCATIONS WITH NON-SQUARED SPINS AND IMPLANTATIONS, THE SAFETY OF MAST AND FOUNDATION SHALL BE CHECKED AND SUITABLE MAST AND FOUNDATION SHALL BE PROVIDED.
- REVERSE DEFLECTIONS ARE IN mm. REVERSE DEFLECTION IS POSITIVE WHEN AWAY FROM TRACK AND NEGATIVE WHEN TOWARDS IT.



- WHERE ISOLATOR IS TO BE PROVIDED ON MAST, NEXT HIGHER SIZE OF MAST AND NEXT HIGHER FBM CODE FOR FOUNDATION SHALL BE SELECTED.
- UNDER OVERLAP GENERAL LOCATION IN TRACKS TRACK 04 meters SPIN IS CONSIDERED.
- (a) THE SPIN ON SPECIFIC LOCATION LINE, BRIDGES, OVERLAPS, TURNOUTS, MOUNTAIN SECTION ETC. SHALL BE AS PER PARA NO. 6.1.2.1, 6.1, 6.7, 6.5 OF ACTM VOL.4, PART-2.
- THE ARRANGEMENT OF ONE AT SUPPORT HAS BEEN CONSIDERED AS PER DRAWING NO. ET/CH/02102, SHEET-3 (REV.8).
- MAST OF ECONOMIC SIZE SHALL BE SELECTED.
- THE ONE SPIN AND RADIUS APPROVED BY RAILWAY BOARD FOR MINOR RAKE CONCEPT.

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EMPLOYMENT SCHEDULE FOR ONE MAST (9.5 m)				EDTI (BHARDWAJ CHAUDHARY)	
BASIC WIND SPEED 47 m/s					
WIND PRESSURE 155 kgf/m ²					
(OHE + FEEDER WIRE + EARTH WIRE)					
1200 kgf TENSION IN CAT. 65mm ²					
1200 kgf TENSION IN CONT.107mm ²					
(WITH IMPLANTATION MORE THAN 3.8M AND UP TO 4.85M)					
REF:-				CROSS REF:-	
DATE	MOD.	FIGURE OF MOD.	INITIAL	R. D. S. O.	
				DATE	NAME
					TI/DRG/CIV/ES/RDSO
					/00004/19/0
					NOT TO SCALE (SHEET-3)

ANNEXURE 8

EMPLOYMENT SCHEDULE: WIND PRESSURE 178KGF/SQM

[illegible]

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 (ft)	RADIUS (ft)	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	N	ACC	ACA	OLC	OLA	OLI		
58.5	2500	175	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-30	-	-	-	-	-	-	-30	-30	-30	-	-30	-	-30	-	-30	-	-		
			PEHM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	161	-	-	-	-	-	-	173	270	178	-	178	-	374	-	-		
58.5	2500 1900	225	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-30	-	-	-	-	-	-	-30	-30	-30	-	-30	-	-30	-	-30	-	-		
			PEHM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	161	-	-	-	-	-	-	173	270	178	-	178	-	374	-	-		
58.5	1900 1600	265	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-30	-	-	-	-	-	-	-30	-30	-30	-	-30	-	-30	-	-30	-	-		
			PEHM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	161	-	-	-	-	-	-	173	270	185	-	185	-	374	-	-		
54	1800 1400	260	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-30	-	-	-	-	-	-	-30	-30	-30	-	-30	-	-30	-	-30	-	-		
			PEHM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	161	-	-	-	-	-	-	173	270	185	-	185	-	389	-	-		
49.5	1400 1150	265	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-30	-	-	-	-	-	-	-30	-30	-30	-	-30	-	-30	-	-30	-	-		
			PEHM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	161	-	-	-	-	-	-	173	270	185	-	185	-	389	-	-		
49.5	1150 850	360	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-30	-	-	-	-	-	-	-30	-30	-	-	-	-	-30	-30	-30	-	-		
			PEHM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	161	-	-	-	-	-	-	173	270	-	-	-	193	389	193	-	-	
45	850 700	360	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-30	-	-	-	-	-	-	-30	-30	-	-	-	-	-30	-30	-30	-	-		
			PEHM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	161	-	-	-	-	-	-	173	270	-	-	-	193	389	193	-	-	
40.5	700 550	375	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-30	-	-	-	-	-	-	-30	-30	-	-	-	-	-30	-30	-30	-	-		
			PEHM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	161	-	-	-	-	-	-	173	270	-	-	-	193	389	193	-	-	
36	550 400	405	REV. DEF.	-	-	-	-	-	-	-	-	-	-	-	-	-30	-	-	-	-	-	-	-30	-30	-	-	-	-	-30	-30	-30	-	-		
			PEHM. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	161	-	-	-	-	-	-	173	270	-	-	-	193	389	193	-	-	

NOTE: 1. FOR OUTSIDE CURVE, ACA LOCATION ONE MUST 8/4-300 WITH SPECIAL FOUNDATION DESIGN FOR BENDING MOMENT 8000 KJLM TO BE ADOPTED.
2. FOR OUTSIDE CURVE, CLA LOCATION ONE MUST 8/4-225 WITH SPECIAL FOUNDATION DESIGN FOR BENDING MOMENT UP TO 11000 KJLM TO BE ADOPTED.

NOTES:-

2. SECOND THE WIND SPEED OF 33 m/s, THE TOWNS HALL HAVE TO BE STOPPED.
3. THIS EMPLOYMENT SCHEDULE IS APPLICABLE FOR RED REGION OF BASIC WIND SPEED 50 m/s OF FIGURE-1 OF IS:8757 (Part-3)-2015 REVIS (DESIGN WIND PRESSURE 178 kgf/m² CALCULATED AS CLAUSE 5.4 OF IS:8757 (Part-3)-2015 REVIS).
4. THE CYCLIC REGION AREA FACTOR(K_z) HAS NOT BEEN CONSIDERED IN THE DESIGN CALCULATION GIVEN IN CLAUSE 6.3.4 OF IS: 8757(WIND-3)-2015(REVIS).
5. THE EMPLOYMENT SCHEDULE IS SUFFICIENT FOR IMPROVEMENT UP TO 2.5 METER FROM THE CENTRE LINE OF HIGHEST TRUCK WITH +4.1 IS FOR TRUCK SWELLING ALLOWANCE ON SETTING OF WIND AND ON THE BASIS OF CLAUSE EXTRA IMPROVEMENT ALLOWANCE. REF. NO. 10/273/2015/001111 HAS BEEN CONSIDERED.
6. FOUNDATION DESIGNATION (FWD) CODED UNDER THE NECESSARY CROSS REFERENCE TO EQUIVALENT FOUNDATION FOUNDATION SELECTION. SEE THE FORMING No. 10/273/2015/0015/00001/00001/001/001 MODIFICATION BY CHART OF (SHEET No.1 TO 5).
7. FOR LOCATIONS WITH NON-STANDARD SPANS AND IMPLANTATIONS, THE SAFETY OF WIND AND FOUNDATION SHALL BE CHECKED AND SUITABLE WIND AND FOUNDATION SHALL BE PROVIDED.
8. REVERSE DEFLECTIONS ARE IN mm. REDUCE DEFLECTION IS POSITIVE.
9. WIND FOR THE TRUCK IS REDUCED TO 33 M/S.



8. WHERE EROSION IS TO BE PREVENTED ON MAST, NEXT HIGHER SIZE OF MAST AND NEXT HIGHER FORM CODE FOR FOUNDATION SHALL BE SELECTED.
- 9.(a) UNDER OVERLAY CENTRAL LOCATION IN TWENTY TONNAGE 44 metre SPAN IS CONSIDERED.
- (b) THE SPANS ON SPECIFIC LOCATION LINE, BRIDGES, OVERLAYS, TURNOUTS, NEUTRAL SECTION ETC. SHALL BE AS PER PARA NO. 9.1.2.1, 5.8, 5.7, 5.5 OF ACTM VOL.4, PART-2.
10. 34% GHE AT SUPPORT HAS BEEN CONSIDERED FOR PER DRAWING NO. 13/GHE/02102 (SHEET-3). (REV.5)
11. MAST OF ECONOMIC SIZE SHALL BE SELECTED.
12. THE GHE SPAN AND BRIDGES APPROVED BY RAILWAY BOARD FOR MAFER BASE CONCEPT HAS BEEN SELECTED.

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

EDITION (BHARDWAJ CHAUDHARY)

REF:—

CROSS REF:-

DATE	MOD.	INDICATURE OF MOD.	INITIAL	R.	D.	S.	O.
------	------	--------------------	---------	----	----	----	----

			DATE	NAME	TI/DRG/CIV/ES/RDSO	
			DRL		/00004/19/0	
			CKL			
			CKL		NOT TO SCALE	(SHEET-4)

ANNEXURE 9

EMPLOYMENT SCHEDULE: WIND PRESSURE 178KG/SQM

MAST ON OUTSIDE OF CURVED TRACK																																
TYPE OF MAST			RS3 (8" x 6")						B-150 K-150						B-175 K-175						B-200 K-200						B-225 K-225					
MAX. SPAN (ft.)	RAILS S (ft.)	VERT. S (ft.)	REV. DEF.	FOR. CODE	N	ACC	ACA	OLC	OLA	OLI	N	ACC	ACA	OLC	OLA	OLI	N	ACC	ACA	OLC	OLA	OLI	N	ACC	ACA	OLC	OLA	OLI				
63	0	0	REV. DEF.	FOR. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	30	30	30	-	30	30			
			REV. DEF.	FOR. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	168	173	270	185	-	185	395			
58.5	175	175	REV. DEF.	FOR. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	30	30	30	-	30	30			
			REV. DEF.	FOR. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	168	173	275	185	-	185	395			
58.5	225	225	REV. DEF.	FOR. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	30	30	30	-	30	30			
			REV. DEF.	FOR. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	168	173	275	185	-	185	395			
58.5	265	265	REV. DEF.	FOR. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	30	30	-	-	30	30			
			REV. DEF.	FOR. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	168	173	5PL	-	-	193	395			
54	260	260	REV. DEF.	FOR. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	30	30	-	-	30	30			
			REV. DEF.	FOR. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	168	173	5PL	-	-	193	399			
49.5	265	265	REV. DEF.	FOR. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	30	30	-	-	30	30			
			REV. DEF.	FOR. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	168	173	5PL	-	-	193	399			
49.5	360	360	REV. DEF.	FOR. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	30	30	-	-	30	30			
			REV. DEF.	FOR. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	168	173	5PL	-	-	193	399			
45	360	360	REV. DEF.	FOR. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	30	30	-	-	30	30			
			REV. DEF.	FOR. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	168	173	5PL	-	-	193	399			
40.5	375	375	REV. DEF.	FOR. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	30	30	-	-	30	30			
			REV. DEF.	FOR. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	173	178	5PL	-	-	199	399			
36	405	405	REV. DEF.	FOR. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	30	30	-	-	30	30			
			REV. DEF.	FOR. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	173	178	5PL	-	-	199	399			

MAST ON INSIDE OF CURVED TRACK																																
TYPE OF MAST			RS3 (8" x 6")						B-150 K-150						B-175 K-175						B-200 K-200						B-225 K-225					
MAX. SPAN (ft.)	RAILS S (ft.)	VERT. S (ft.)	REV. DEF.	FOR. CODE	N	ACC	ACA	OLC	OLA	OLI	N	ACC	ACA	OLC	OLA	OLI	N	ACC	ACA	OLC	OLA	OLI	N	ACC	ACA	OLC	OLA	OLI				
58.5	175	175	REV. DEF.	FOR. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
			REV. DEF.	FOR. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
58.5	225	225	REV. DEF.	FOR. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
			REV. DEF.	FOR. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
58.5	265	265	REV. DEF.	FOR. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
			REV. DEF.	FOR. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
54	260	260	REV. DEF.	FOR. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
			REV. DEF.	FOR. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
49.5	265	265	REV. DEF.	FOR. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
			REV. DEF.	FOR. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
49.5	360	360	REV. DEF.	FOR. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
			REV. DEF.	FOR. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
45	360	360	REV. DEF.	FOR. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
			REV. DEF.	FOR. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
40.5	375	375	REV. DEF.	FOR. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
			REV. DEF.	FOR. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
36	405	405	REV. DEF.	FOR. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
			REV. DEF.	FOR. CODE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				

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

NOTES:-

- BEYOND THE WIND SPEED OF 33 m/s, THE TRAINS WILL HAVE TO BE STOPPED.
- THIS EMPLOYMENT SCHEDULE IS APPLICABLE FOR RED REGION OF BASIC WIND SPEED 50 m/s OF FIGURE-1 OF SERTS (Part-3)-2015 REV.8 (DESIGN WIND PRESSURE 178 kgf/m² CALCULATED AS PER CLAUSE 5.4 OF SERTS (Part-3)-2015 REV.8).
- THE CYCLONE REGION AREA FACTOR(CA) HAS NOT BEEN CONSIDERED IN THE DESIGN CALCULATION OTHER IN CLAUSE 6.3.4 OF IS 875(PART-3)-2015 REV.8.
- THE EMPLOYMENT SCHEDULE IS SUITABLE FOR IMPLANTATION UP TO 3.5 METER FROM THE CENTRE LINE OF NEAREST TRACK WITH +0.1 m FOR TRACK SHELTER ALLOWANCE ON SETTING OF MAST AND ON INSIDE OF CURVE EXTRA IMPLANTATION AS PER ORL NO.ET/CH/0/00111 IS-1 HAS BEEN CONSIDERED.
- FOUNDATION BENDING MOMENT (BMC) CODE ONES - THE NECESSARY CROSS REFERENCE TO EQUIVALENT FOUNDATIONS, FOR FOUNDATION SELECTION SEE THE DRAWING No. T/DRG/CH/TH/0000/0000/04/0 MODIFICATION "I" CHART OF (SHEET No.1 TO 5).
- 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.
- NEGATIVE DEFLECTIONS ARE IN mm. NEGATIVE DEFLECTION IS POSITIVE WHEN AWAY FROM TRACK AND NEGATIVE WHEN TOWARDS IT.



- WHERE ISOLATOR IS TO BE PROVIDED ON MAST, NEXT HIGHER SIZE OF MAST AND NEXT HIGHER FOR CODE FOR FOUNDATION SHALL BE SELECTED.
- (a) UNDER OVERLAP CENTRAL LOCATION IN TANGENT TRACK 04 m/s/s SPAN IS CONSIDERED.
(b) THE SPAN ON SPECIFIC LOCATION LINE, BRIDGES, OVERLAPS, TURNOUTS, NEUTRAL SECTION ETC. SHALL BE AS PER PARA NO. 6.1.2.1, 5.4, 5.7, 5.5 OF ACTM VOL.1, PART-2.
- THE ARRANGEMENT OF ONE AT SUPPORT HAS BEEN CONSIDERED AS PER DRAWING NO. ET/CH/0/00111 SHEET-3, (REV.0).
- MAST OF ECONOMIC SIZE SHALL BE SELECTED.
- THE ONE SPAN AND AREAS APPROVED BY RAILWAY BOARD FOR MIRROR IMAGE CONCEPT HAS BEEN ADOPTED.

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EMPLOYMENT SCHEDULE FOR ONE MAST (9.5 m)		EDT	(BHARDWAJ CHAUDHARY)
BASIC WIND SPEED 50 m/s WIND PRESSURE 178 kgf/m ² (ONE + FEEDER WIRE + EARTH WIRE) 1200 kgf TENSION IN CAT. 65mm ² 1200 kgf TENSION IN CON. 107mm ² (WITH IMPLANTATION MORE THAN 2.8M AND UP TO 3.8M)			
REF:-			
CROSS REF:-		R. D. S. O.	
DATE	MOD.	NAME	DATE
		DR.	
		CK.	
		CK.	
TI/DRG/CIV/ES/RDSO /00004/19/0			NOT TO SCALE (SHEET-9)

ANNEXURE 10

EMPLOYMENT SCHEDULE: WIND PRESSURE 178KGF/SQM

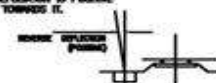
MAST ON OUTSIDE OF CURVED TRACK																															
TYPE OF MAST				RSJ (8" x 6")						B-150 K-150						B-175 K-175						B-200 K-200						B-225 K-225			
MAX. SPAN (m)	RADIUS S (m)	VERSION S (MAX.)		N	ACC	ACA	OLC	OLA	OLI	N	ACC	ACA	OLC	OLA	OLI	N	ACC	ACA	OLC	OLA	OLI	N	ACC	ACA	OLC	OLA	OLI	OLC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

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

NOTES:-

- BEYOND THE WIND SPEED OF 33 m/s, THE TRAINS WILL HAVE TO BE STOPPED.
- THIS EMPLOYMENT SCHEDULE IS APPLICABLE FOR RED REGION OF BASIC WIND SPEED 50 m/s OF ZONE-1 OF IS:8750 (Part-3)-2015 (REV.0) (SECTION WIND PRESSURE 178 kgf/m² CALCULATED AS PER CLAUSE 5.4 OF IS:8750 (Part-3)-2015 (REV.0)).
- THE CYCLONIC REGION AREA FACTOR (K_z) HAS NOT BEEN CONSIDERED IN THE DESIGN CALCULATION GIVEN IN CLAUSE 5.3.4 OF IS:8750 (Part-3)-2015 (REV.0).
- 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 SWELLING ALLOWANCE ON SETTING OF MAST AND ON INSIDE OF CURVE EXTRA IMPLANTATION AS PER DRG. NO.03/CHE/0/00111 SH-1 HAS BEEN CONSIDERED.
- FOUNDATION BENDING MOMENT (FM) CODE GIVES THE NECESSARY CROSS REFERENCE TO EQUIVALENT FOUNDATIONS FOR FOUNDATION SELECTION SEE THE DRAWING NO. T/DRG/CHE/THD/0090/00001/04/0 ACCORDING TO CHART OF SHEET No.1 TO 5.
- 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.
- REVERSE DEFLECTIONS ARE IN mm. REVERSE DEFLECTION IS POSITIVE WHEN AWAY FROM TRACK AND NEGATIVE WHEN TOWARDS IT.

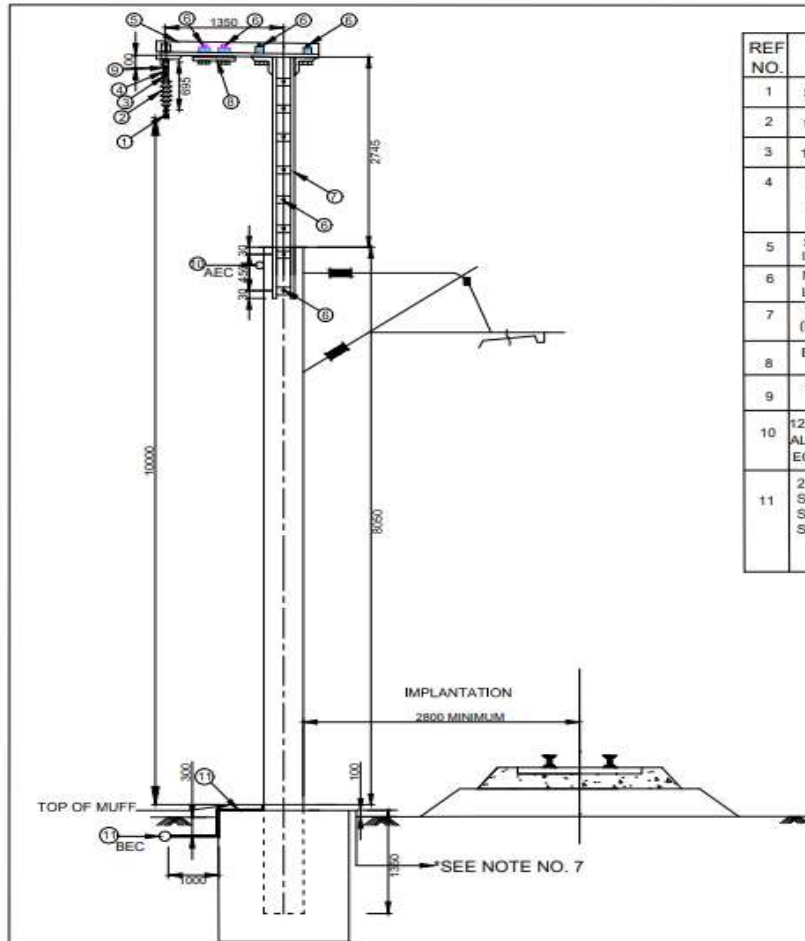


- WHERE ISOLATOR IS TO BE PROVIDED ON MAST, NEXT HIGHER SIZE OF MAST AND NEXT HIGHER FM CODE FOR FOUNDATION SHALL BE SELECTED.
- (a) UNDER OVERLAP CENTRAL LOCATION IN TANGENT TRACK 64 metre SPAN IS CONSIDERED.
(b) THE SPANS ON SPECIAL LOCATION LINE, BRIDGES, OVERLAPS, TUNNELS, NEUTRAL SECTION ETC. SHALL BE AS PER PARA NO. 5.1.2.1, 5.4.5.7, 5.5 OF AREA VOLS. PART-5.
- THE ASSIGNMENT OF CHE AT SUPPORT HAS BEEN CONSIDERED AS PER DRAWING NO. T/DRG/CHE/02102, SHEET-3. (REV.0)
- MAST OF ECONOMIC SIZE SHALL BE SELECTED.
- THE CHE SPAN AND ENDUS APPROVED BY RAILWAY BOARD FOR MIRROR IMAGE CONCEPT HAS BEEN ADOPTED.

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EMPLOYMENT SCHEDULE FOR OHE MAST (9.5 m)		EDT (BHARDWAJ CHAUDHARY)	
BASIC WIND SPEED 50 m/s			
WIND PRESSURE 178 kgf/m ²			
(OHE + FEEDER WIRE + EARTH WIRE)			
1200 kgf TENSION IN CAT. 65mm ²			
1200 kgf TENSION IN CONT.107mm ²			
(WITH IMPLANTATION MORE THAN 3.8M AND UP TO 4.85M)			
REF:-		CROSS REF:-	
DATE	MOD.	INCH. OF MOD.	INITIAL
R. D. S. O.			
DATE	NAME	TI/DRG/CIV/ES/RDSO	
DR		/00004/19/0	
CHK			
CHK		NOT TO SCALE (SHEET-8)	

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 ϕ 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 (ISM 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 MM ² 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	DATE	NAME
				DR	
				CK	
				CK	

R. D. S. O.

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

"A"

REF. NO. 11 & NOTE
2.5 MODIFIED AND
NOTE 7 ADDED

CK

CK

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	
MAST SPAN (m)	RADIUS (m)	VERTICALLY (mm)		N	ACC	ACA	OLC	OLA	OLE	N	ACC	ACA	OLC	OLA	OLE	N	ACC	ACA	OLC
63	200	2.25	REDA DEF.	30	30	30	30	-	30	-	-	-	30	-	-	-	-	-	-
			PERA CODE	1.68	1.73	2.75	18.5	-	18.5	-	-	-	3.99	-	-	-	-	-	-
63	2200	2.25	REDA DEF.	30	30	30	30	-	30	-	-	-	30	-	-	-	-	-	-
			PERA CODE	1.73	1.73	2.75	18.5	-	18.5	-	-	-	3.99	-	-	-	-	-	-
63	2200	2.60	REDA DEF.	30	30	30	30	-	30	-	-	-	30	-	-	-	-	-	-
			PERA CODE	1.73	1.73	2.75	18.5	-	18.5	-	-	-	3.99	-	-	-	-	-	-
58.5	1900	2.70	REDA DEF.	30	30	30	30	-	30	-	-	-	30	-	-	-	-	-	-
			PERA CODE	1.73	1.73	2.75	18.5	-	18.5	-	-	-	3.99	-	-	-	-	-	-
58.5	1600	3.05	REDA DEF.	30	30	30	30	-	30	-	-	-	30	30	30	-	-	-	-
			PERA CODE	1.73	1.73	2.75	18.5	-	18.5	-	-	-	3.99	3.99	3.99	-	-	-	-
54	1400	3.20	REDA DEF.	30	30	30	30	-	30	-	-	-	30	30	30	-	-	-	-
			PERA CODE	1.73	1.73	2.75	18.5	-	18.5	-	-	-	3.99	3.99	3.99	-	-	-	-
54	1150	4.30	REDA DEF.	30	30	30	30	-	30	-	-	-	30	-	30	-	-	-	-
			PERA CODE	1.78	1.78	2.75	18.5	-	18.5	-	-	-	3.99	-	3.99	-	-	-	-
49.5	850	4.40	REDA DEF.	30	30	30	30	-	30	-	-	-	30	-	30	-	-	-	-
			PERA CODE	1.78	1.78	2.75	18.5	-	18.5	-	-	-	3.99	-	3.99	-	-	-	-
45	700	4.60	REDA DEF.	30	30	30	30	-	30	-	-	-	30	-	30	-	-	-	-
			PERA CODE	1.78	1.78	2.75	18.5	-	18.5	-	-	-	3.99	-	3.99	-	-	-	-
36	550	4.65	REDA DEF.	30	30	30	30	-	30	-	-	-	30	-	30	-	-	-	-
			PERA CODE	1.78	1.78	2.75	18.5	-	18.5	-	-	-	3.99	-	3.99	-	-	-	-
33.5	400	4.15	REDA DEF.	30	30	30	30	-	30	-	-	-	30	-	30	-	-	-	-
			PERA CODE	1.78	1.78	2.75	18.5	-	18.5	-	-	-	3.99	-	3.99	-	-	-	-
27	300	4.55	REDA DEF.	30	30	30	30	-	30	-	-	-	30	-	30	-	-	-	-
			PERA CODE	1.85	1.85	2.75	18.5	-	18.5	-	-	-	3.99	-	3.99	-	-	-	-
MAST ON INSIDE OF CURVED TRACK																			
TYPE OF MAST			B-200 K-200					B-225 K-225					B-250 K-250					SPL.MAST	
MAST SPAN (m)	RADIUS (m)	VERTICALLY (mm)		N	ACC	ACA	OLC	OLA	OLE	N	ACC	ACA	OLC	OLA	OLE	N	ACC	ACA	OLC
63	200	2.25	REDA DEF.	-30	-30	-30	-30	-	-30	-	-	-	-30	-	-	-	-	-	-
			PERA CODE	1.68	1.68	2.70	17.8	-	17.8	-	-	-	3.89	-	-	-	-	-	-
63	2200	2.60	REDA DEF.	-30	-30	-30	-30	-	-30	-	-	-	-30	-	-	-	-	-	-
			PERA CODE	1.68	1.68	2.70	17.8	-	17.8	-	-	-	3.89	-	-	-	-	-	-
58.5	1900	2.70	REDA DEF.	-30	-30	-30	-30	-	-30	-	-	-	-30	-	-	-	-	-	-
			PERA CODE	1.68	1.68	2.70	17.8	-	17.8	-	-	-	3.95	-	-	-	-	-	-
58.5	1600	3.05	REDA DEF.	-30	-30	-30	-30	-	-30	-	-	-	-30	-	-	-	-	-	-
			PERA CODE	1.68	1.68	2.70	17.8	-	17.8	-	-	-	3.95	-	-	-	-	-	-
54	1400	3.20	REDA DEF.	-30	-30	-30	-30	-	-30	-	-	-	-30	-	-	-	-	-	-
			PERA CODE	1.68	1.68	2.75	18.5	-	18.5	-	-	-	3.99	-	-	-	-	-	-
54	1150	4.30	REDA DEF.	-30	-30	-30	-30	-	-30	-	-	-	-30	-	-	-	-	-	-
			PERA CODE	1.73	1.73	2.75	18.5	-	18.5	-	-	-	3.99	-	-	-	-	-	-
49.5	850	4.40	REDA DEF.	-30	-30	-30	-30	-	-30	-	-	-	-30	-	-	-	-	-	-
			PERA CODE	1.73	1.73	2.75	18.5	-	18.5	-	-	-	3.99	-	-	-	-	-	-
45	700	4.60	REDA DEF.	-30	-30	-30	-30	-	-30	-	-	-	-30	-	-	-	-	-	-
			PERA CODE	1.73	1.73	2.75	18.5	-	18.5	-	-	-	3.99	-	-	-	-	-	-
36	550	4.65	REDA DEF.	-30	-30	-30	-30	-	-30	-	-	-	-30	-	-	-	-	-	-
			PERA CODE	1.78	1.78	2.75	18.5	-	18.5	-	-	-	3.99	-	3.99	-	-	-	-
27	300	4.55	REDA DEF.	-30	-30	-30	-30	-	-30	-	-	-	-30	-	-	-	-	-	-
			PERA CODE	1.78	1.78	2.75	18.5	-	18.5	-	-	-	3.99	-	3.99	-	-	-	-

NOTES:-

- BEYOND THE WIND SPEED OF 33 m/s THE TRAINS WILL HAVE TO BE STOPPED.
- 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.01 (DESIGN WIND PRESSURE 155 kgf/m² CALCULATED AS PER CLAUSE 5.4 OF IS:875 (Part-3)-2015 REV.01).
- THE CYCLONIC REGION AREA FACTOR(K_z) HAS NOT BEEN CONSIDERED IN THE DESIGN CALCULATION GIVEN IN CLAUSE 6.3.4 OF IS: 875(PART-3)-2015(REV.01).
- 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.
- FOUNDATION BENDING MOMENT (F_{BM}) CODE GIVES THE NECESSARY CROSS REFERENCE TO EQUIVALENT FOUNDATIONS. FOR FOUNDATION SELECTION SEE THE DRAWING No. TI/DRG/CIV/TMS/RDSO/00001/04/0 MODIFICATION 'B' CHART OF (SHEET No.1 TO 5).
- 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.
- REVERSE DEFLECTIONS ARE IN mm. REVERSE DEFLECTION IS POSITIVE WHEN AWAY FROM TRACK AND NEGATIVE WHEN TOWARDS IT.



- UNDER OVERLAP CENTRAL LOCATION IN TANGENT TRACK 54 metre SPAN IS CONSIDERED.
- 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.4, PART-2.
- THE ARRANGEMENT OF OHE AT SUPPORT HAS BEEN CONSIDERED AS PER DRAWING NO. ETI/OHE/02102. SHEET-3/REV.-B.
- 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	DATE	NAME

R. D. S. O.

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											
MAST SPAN (m)	RADIUS (m)	VERTICALE (MM/L) (mm)	N	ACC	ACA	CLC	CLA	CLL	N	ACC	ACA	CLC	CLA	CLL	N	ACC	ACA	CLC	CLA	CLL	N	ACC	ACA	CLC	CLA	CLL	N	ACC	ACA	CLC	CLA	CLL
63	0	0	REV. DET.	30	30	30	30	30	-	30	-	-	-	30	-	-	-	-	30	-	-	-	-	-	-	-	-	-	-	-	-	-
			REPL. CODE	168	173	275	185	-	185	-	-	-	-	-	185	-	-	-	-	185	-	-	-	-	-	-	-	-	-	-	-	-
63	2200	225	REV. DET.	30	30	30	30	30	-	30	-	-	-	30	-	-	-	-	30	-	-	-	-	-	-	-	-	-	-	-	-	-
			REPL. CODE	173	173	275	185	-	185	-	-	-	-	-	185	-	-	-	-	185	-	-	-	-	-	-	-	-	-	-	-	-
63	2200 1900	260	REV. DET.	30	30	30	30	30	-	30	-	-	-	30	-	-	-	-	30	-	-	-	-	-	-	-	-	-	-	-	-	-
			REPL. CODE	173	173	275	185	-	185	-	-	-	-	-	185	-	-	-	-	185	-	-	-	-	-	-	-	-	-	-	-	-
58.5	1900 1600	270	REV. DET.	30	30	30	30	30	-	30	-	-	-	30	-	-	-	-	30	-	-	-	-	-	-	-	-	-	-	-	-	-
			REPL. CODE	173	173	SPL	185	-	185	-	-	-	-	-	185	-	-	-	-	185	-	-	-	-	-	-	-	-	-	-	-	-
58.5	1600 1400	305	REV. DET.	30	30	30	30	-	-	-	-	-	30	30	30	-	-	-	193	193	193	-	-	-	-	-	-	-	-	-	-	-
			REPL. CODE	173	173	SPL	-	-	-	-	-	-	-	-	193	193	193	-	-	-	193	193	193	-	-	-	-	-	-	-	-	-
54	1400 1150	320	REV. DET.	30	30	30	30	-	-	-	-	-	30	30	30	-	-	-	30	30	30	-	-	-	30	-	-	-	-	-	-	-
			REPL. CODE	173	173	SPL	-	-	-	-	-	-	-	-	193	193	193	-	-	-	193	193	193	-	-	-	SPL	-	-	-	-	-
54	1150 850	430	REV. DET.	30	30	30	30	-	-	-	-	-	30	30	30	-	-	-	30	30	30	-	-	-	30	30	30	-	-	-	-	-
			REPL. CODE	178	178	SPL	-	-	-	-	-	-	-	-	199	199	199	-	-	-	199	199	199	-	-	-	SPL	-	-	-	-	-
49.5	850 700	440	REV. DET.	30	30	30	30	-	-	-	-	-	30	30	30	-	-	-	30	30	30	-	-	-	30	30	30	-	-	-	-	-
			REPL. CODE	178	178	SPL	-	-	-	-	-	-	-	-	199	199	199	-	-	-	199	199	199	-	-	-	SPL	-	-	-	-	-
45	700 550	460	REV. DET.	30	30	30	30	-	-	-	-	-	30	30	30	-	-	-	30	30	30	-	-	-	30	30	30	-	-	-	-	-
			REPL. CODE	178	178	SPL	-	-	-	-	-	-	-	-	199	199	199	-	-	-	199	199	199	-	-	-	SPL	-	-	-	-	-
36	550 400	405	REV. DET.	30	30	30	30	-	-	-	-	-	30	30	30	-	-	-	30	30	30	-	-	-	30	30	30	-	-	-	-	-
			REPL. CODE	178	178	SPL	-	-	-	-	-	-	-	-	SPL	SPL	SPL	-	-	-	SPL	SPL	SPL	-	-	-	SPL	-	-	-	-	-
31.5	400 300	415	REV. DET.	30	30	30	30	-	-	-	-	-	30	30	30	-	-	-	30	30	30	-	-	-	30	30	30	-	-	-	-	-
			REPL. CODE	185	185	SPL	-	-	-	-	-	-	-	-	SPL	SPL	SPL	-	-	-	SPL	SPL	SPL	-	-	-	SPL	-	-	-	-	-
27	300 200	455	REV. DET.	30	30	30	30	-	-	-	-	-	30	30	30	-	-	-	30	30	30	-	-	-	30	30	30	-	-	-	30	-
			REPL. CODE	185	185	SPL	-	-	-	-	-	-	-	-	SPL	SPL	SPL	-	-	-	SPL	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											
MAST SPAN (m)	RADIUS (m)	VERTICALE (MM/L) (mm)	N	ACC	ACA	CLC	CLA	CLL	N	ACC	ACA	CLC	CLA	CLL	N	ACC	ACA	CLC	CLA	CLL	N	ACC	ACA	CLC	CLA	CLL	N	ACC	ACA	CLC	CLA	CLL
63	0	225	REV. DET.	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-30	-	-	-	-	-	-	-	-	-	-	-	-	-
			REPL. CODE	168	168	270	178	-	178	-	-	-	-	-	189	-	-	-	-	189	-	-	-	-	-	-	-	-	-	-	-	-
63	2200 1900	260	REV. DET.	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-30	-	-	-	-	-	-	-	-	-	-	-	-	-
			REPL. CODE	168	168	270	178	-	178	-	-	-	-	-	189	-	-	-	-	189	-	-	-	-	-	-	-	-	-	-	-	-
58.5	1900 1600	270	REV. DET.	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-30	-	-	-	-	-	-	-	-	-	-	-	-	-
			REPL. CODE	168	168	270	178	-	178	-	-	-	-	-	189	-	-	-	-	189	-	-	-	-	-	-	-	-	-	-	-	-
58.5	1600 1400	305	REV. DET.	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-30	-	-	-	-	-	-	-	-	-	-	-	-	-
			REPL. CODE	168	168	270	178	-	178	-	-	-	-	-	189	-	-	-	-	189	-	-	-	-	-	-	-	-	-	-	-	-
54	1400 1150	320	REV. DET.	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-30	-	-	-	-	-	-	-	-	-	-	-	-	-
			REPL. CODE	168	173	275	185	-	185	-	-	-	-	-	193	193	193	-	-	-	193	193	193	-	-	-	SPL	-	-	-	-	-
54	1150 850	430	REV. DET.	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-30	-	-	-	-	-	-	-	-	-	-	-	-	-
			REPL. CODE	173	173	275	185	-	185	-	-	-	-	-	193	193	193	-	-	-	193	193	193	-	-	-	SPL	-	-	-	-	-
49.5	850 700	440	REV. DET.	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-30	-	-	-	-	-	-	-	-	-	-	-	-	-
			REPL. CODE	173	178	275	185	-	185	-	-	-	-	-	193	193	193	-	-	-	193	193	193	-	-	-	SPL	-	-	-	-	-
45	700 550	460	REV. DET.	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-30	-	-	-	-	-	-	-	-	-	-	-	-	-
			REPL. CODE	178	178	SPL	-	-	-	-	-	-	-	-	193	193	193	-	-	-	193	193	193	-	-	-	SPL	-	-	-	-	-
36	550 400	405	REV. DET.	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-30	-	-	-	-	-	-	-	-	-	-	-	-	-
			REPL. CODE	178	178	SPL	-	-	-	-	-	-	-	-	199	199	199	-	-	-	199	199	199	-	-	-	SPL	-	-	-	-	-
27	300 200	455	REV. DET.	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-30	-	-	-	-	-	-	-	-	-	-	-	-	-
			REPL. CODE	178	178	SPL	-	-	-	-	-	-	-	-	199	199	199	-	-	-	199	199	199	-	-	-	SPL	-	-	-	-	-

NOTES:-

- BEYOND THE WIND SPEED OF 33 m/s THE TRAINS WILL HAVE TO BE STOPPED.
- 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.0) (DESIGN WIND PRESSURE 155 kgf/m² CALCULATED AS PER CLAUSE 5.4 OF IS:875 (Part-3)-2015 (REV.0)).
- THE CYCLONIC REGION AREA FACTOR(CA) HAS NOT BEEN CONSIDERED IN THE DESIGN CALCULATION GIVEN IN CLAUSE 6.3.4 OF IS: 875(PART-3)-2015(REV.0).
- 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/0/00111 SH.1 HAS BEEN CONSIDERED.
- FOUNDATION BENDING MOMENT (FBN) CODE GIVES THE NECESSARY CROSS REFERENCE TO EQUIVALENT FOUNDATIONS. FOR FOUNDATION SELECTION SEE THE DRAWING NO. TI/DRG/CIV/RDSO/00001/04/0 MODIFICATION 'D' CHART OF (SHEET No.1 TO 5).
- 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.
- REVERSE DEFLECTIONS ARE IN mm. REVERSE DEFLECTION IS POSITIVE WHEN AWAY FROM TRACK AND NEGATIVE WHEN TOWARDS IT.



- UNDER OVERLAP CENTRAL LOCATION IN TANGENT TRACK 54 m/s SPAN IS CONSIDERED.
- THE SPANS ON SPECIFIC LOCATION LIKE, BRIDGES, OVERLAPS, TURNOUTS, NEUTRAL SECTION ETC. SHALL BE AS PER PARA NO. 6.1.2.1, 6.1.2.2, 6.1.2.3, 6.1.2.4 OF ACTM VOL.1, PART-2.
- THE ARRANGEMENT OF OHE AT SUPPORT HAS BEEN CONSIDERED AS PER DRAWING NO. ETI/OHE/02102, SHEET-3/(REV.-B)
- MAST OF ECONOMIC SIZE SHALL BE SELECTED.

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EMPLOYMENT SCHEDULE FOR OHE MAST (9.5 m)				IEDTI (BHARDWAJ CHAUDHARY)	
BASIC WIND SPEED 47 m/s					
WIND PRESSURE 155 kgf/m ²					
(OHE + FEEDER WIRE + EARTH WIRE)					
1500 kgf TENSION IN CAT. 125mm ²					
1500 kgf TENSION IN CONT.150 mm ²					
(WITH IMPLANTATION UP TO 3.8m)					
REF:-				CROSS REF:-	
DATE	MOD.	NATURE OF MOD.	INITIAL	R.	D. S. O.
				DATE	NAME
				DR.	
				CK.	
				OK.	
				TI/DRG/CIV/ES/RDSO /00004/20/0	
				NOT TO SCALE (SHEET-2)	

ANNEXURE 14

EMPLOYMENT SCHEDULE: WIND PRESSURE 155KG/SQM

[illegible]

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:8757 (Part-3)-2015 (REV) (DESIGN WIND PRESSURE: 155 kN/m² CALCULATED AS PER CLAUSE 5.4 OF IS:8757 (Part-3)-2015 (REV)).
3. THE CYCLONIC REGION AREA FACTOR(K₁₄) HAS NOT BEEN CONSIDERED IN THE DESIGN CALCULATION GIVEN IN CLAUSE 6.3.4 OF IS: 8757 (PART-3)-2015 (REV)(I).
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 SWELLING ALLOWANCE ON SETTING OF MAST AND ON SETTING OF CURVE AND SLEWING OF TRACK. FOR TRACK SWELLING ALLOWANCE OF 0.0111 H HAS BEEN CONSIDERED.
5. FOUNDATION BENDING MOMENT (TMD) CASE GIVES THE NECESSARY CROSS/SECTION TO EQUIVALENT FOUNDATIONS, FOR FOUNDATION SELECTION SEE THE DRAWING NO. T/DRG/CM/TMD/REGSD/00001/D/4/D MODIFICATION 'B' PART OF (SHEET No.1 TO 5).
6. FOR LOCATIONS WITH NON-STANDARD SPUNS 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
8. MINIMUM FRACURE AND NEGATIVE DEFLECTIONS ARE IN mm.



- B.(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.1, PART-2.
9. THE ARRANGEMENT OF ONE AT SUPPORT HAS BEEN CONSIDERED AS PER DRAWING NO. E7/OHE/022/02 SHEET-3/(REV-B)
10. MAST OF ECONOMIC SIZE SHALL BE SELECTED.

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**EMPLOYMENT SCHEDULE FOR ONE
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
MAST SPIN (°)	RADIUS (m)	VELOCITY (km/h)		N	ACC	ACA	CLC	OLA	OLI	N	ACC	ACA	CLC	OLA	OLI	N	ACC	ACA	CLC
58.5	0	0	RAW.DEN	30	30	30	30	-	30	-	-	-	-	30	-	-	-	-	-
			PERM.CODE	1.73	1.73	2.75	1.85	-	1.85	-	-	-	-	3.05	-	-	-	-	-
58.5	195	195	RAW.DEN	30	30	30	30	-	30	-	-	-	-	30	-	-	-	-	-
			PERM.CODE	1.73	1.73	2.75	1.85	-	1.85	-	-	-	-	3.05	-	-	-	-	-
58.5	2200	225	RAW.DEN	30	30	30	-	-	-	-	-	-	-	30	30	-	-	-	-
			PERM.CODE	1.73	1.73	2.75	-	-	-	-	-	-	-	1.93	3.99	1.93	-	-	-
58.5	1900	225	RAW.DEN	30	30	30	-	-	-	-	-	-	-	30	30	30	-	-	-
			PERM.CODE	1.73	1.73	2.75	-	-	-	-	-	-	-	1.93	3.99	1.93	-	-	-
58.5	1600	270	RAW.DEN	30	30	30	-	-	-	-	-	-	-	30	30	30	-	-	-
			PERM.CODE	1.73	1.73	2.75	-	-	-	-	-	-	-	1.93	3.99	1.93	-	-	-
58.5	1400	305	RAW.DEN	30	30	30	-	-	-	-	-	-	-	30	30	30	-	-	-
			PERM.CODE	1.73	1.73	2.75	-	-	-	-	-	-	-	1.93	3.99	1.93	-	-	-
54	1400	320	RAW.DEN	30	30	30	-	-	-	-	-	-	-	30	30	30	-	-	-
			PERM.CODE	1.73	1.73	2.75	-	-	-	-	-	-	-	1.93	3.99	1.93	-	-	-
54	1350	320	RAW.DEN	30	30	30	-	-	-	-	-	-	-	30	30	30	-	-	-
			PERM.CODE	1.73	1.73	2.75	-	-	-	-	-	-	-	1.93	3.99	1.93	-	-	-
54	1350	430	RAW.DEN	30	30	30	-	-	-	-	-	-	-	30	30	30	-	-	-
			PERM.CODE	1.73	1.73	2.75	-	-	-	-	-	-	-	1.93	3.99	1.93	-	-	-
49.5	850	440	RAW.DEN	30	30	30	-	-	-	-	-	-	-	30	30	30	-	-	-
			PERM.CODE	1.73	1.73	2.75	-	-	-	-	-	-	-	1.93	3.99	1.93	-	-	-
45	700	460	RAW.DEN	30	30	30	-	-	-	-	-	-	-	30	30	30	-	-	-
			PERM.CODE	1.73	1.73	2.75	-	-	-	-	-	-	-	1.93	3.99	1.93	-	-	-
36	200	405	RAW.DEN	30	30	30	-	-	-	-	-	-	-	30	30	30	-	-	-
			PERM.CODE	1.73	1.73	2.75	-	-	-	-	-	-	-	1.93	3.99	1.93	-	-	-
33.5	400	415	RAW.DEN	30	30	30	-	-	-	-	-	-	-	30	30	30	-	-	-
			PERM.CODE	1.73	1.73	2.75	-	-	-	-	-	-	-	1.93	3.99	1.93	-	-	-
27	200	455	RAW.DEN	30	30	30	-	-	-	-	-	-	-	30	30	30	-	-	-
			PERM.CODE	1.85	1.85	-	-	-	-	-	-	-	-	1.93	3.99	1.93	-	-	-

MAST ON INSIDE OF CURVED TRACK																			
TYPE OF MAST				B-200 K-200					B-225 K-225					B-250 K-250					SPL MAST
MAST SPIN (°)	RADIUS (m)	VELOCITY (km/h)		N	ACC	ACA	CLC	OLA	OLI	N	ACC	ACA	CLC	OLA	OLI	N	ACC	ACA	CLC
58.5	0	195	RAW.DEN	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-
			PERM.CODE	1.68	1.68	2.70	1.78	-	1.78	-	-	-	-	3.05	-	-	-	-	-
58.5	2200	225	RAW.DEN	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-
			PERM.CODE	1.68	1.68	2.70	1.78	-	1.78	-	-	-	-	3.05	-	-	-	-	-
58.5	1900	270	RAW.DEN	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-
			PERM.CODE	1.68	1.68	2.70	1.78	-	1.78	-	-	-	-	3.05	-	-	-	-	-
58.5	1600	305	RAW.DEN	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-
			PERM.CODE	1.68	1.68	2.70	1.78	-	1.78	-	-	-	-	3.05	-	-	-	-	-
54	1400	320	RAW.DEN	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-
			PERM.CODE	1.73	1.73	2.75	1.85	-	1.85	-	-	-	-	3.05	-	-	-	-	-
54	1350	320	RAW.DEN	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-
			PERM.CODE	1.73	1.73	2.75	1.85	-	1.85	-	-	-	-	3.05	-	-	-	-	-
54	1350	430	RAW.DEN	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-
			PERM.CODE	1.73	1.73	2.75	1.85	-	1.85	-	-	-	-	3.05	-	-	-	-	-
49.5	850	440	RAW.DEN	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-
			PERM.CODE	1.73	1.73	2.75	1.85	-	1.85	-	-	-	-	3.05	-	-	-	-	-
45	700	460	RAW.DEN	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-
			PERM.CODE	1.73	1.73	2.75	-	-	-	-	-	-	-	1.93	3.99	1.93	-	-	-
36	200	405	RAW.DEN	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-
			PERM.CODE	1.73	1.73	2.75	-	-	-	-	-	-	-	1.93	3.99	1.93	-	-	-
33.5	400	415	RAW.DEN	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-
			PERM.CODE	1.73	1.73	2.75	-	-	-	-	-	-	-	1.93	3.99	1.93	-	-	-
27	200	455	RAW.DEN	-30	-30	-30	-30	-	-30	-	-	-	-	-30	-	-	-	-	-
			PERM.CODE	1.85	1.85	-	-	-	-	-	-	-	-	1.93	3.99	1.93	-	-	-

NOTES:-

- BEYOND THE WIND SPEED OF 33 m/s THE TRAINS WILL HAVE TO BE STOPPED.
- 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.0) (DESIGN WIND PRESSURE 178 kgf/m² CALCULATED AS PER CLAUSE 5.4 OF IS:875 (Part-3)-2015 (REV.0)).
- THE CYCLIC REGION AREA FACTOR(K_z) HAS NOT BEEN CONSIDERED IN THE DESIGN CALCULATION GIVEN IN CLAUSE 4.3.4 OF IS: 875(PART-3)-2015(REV.0).
- 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/4/50111 SH.1 HAS BEEN CONSIDERED.
- FOUNDATION BENDING MOMENT (TBM) CODE GIVES THE NECESSARY CROSS REFERENCE TO EQUIVALENT FOUNDATIONS. FOR FOUNDATION SELECTION SEE THE DRAWING No. TI/DRG/CIV/PNE/RDSO/00001/04/5 MODIFICATION 'B' CHART OF (SHEET No.1 TO 5).
- 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.
- REVERSE DEFLECTIONS ARE IN mm. REVERSE DEFLECTION IS POSITIVE WHEN AWAY FROM TRACK AND NEGATIVE WHEN TOWARDS IT.



- UNDER OVERLAP CENTRAL LOCATION IN TANGENT TRACK 54 metre SPAN IS CONSIDERED.
- THE SPANS ON SPECIFIC LOCATION LINE, BRIDGES, OVERLAPS, TURNOUTS, NEUTRAL SECTION ETC. SHALL BE AS PER PARA NO. 6.1.2.1, 5.4, 5.7, 5.5 OF ACTN VOL.4, PART-2.
- THE ARRANGEMENT OF ONE AT SUPPORT HAS BEEN CONSIDERED AS PER DRAWING NO. ETI/OHE/02102, SHEET-3 (REV-0).
- 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/m ² (OHE + FEEDER WIRE + EARTH WIRE) 1500 kgf TENSION IN CAT. 125mm ² 1500 kgf TENSION IN CONT.150 mm ² (WITH IMPLANTATION UP TO 2.8M)		EDTI (BHARDWAJ CHAUDHARY)
REF:-		CROSS REF:-
DATE	MOD.	NATURE OF MOD.
DATE	NAME	R. D. S. O.
DR.		TI/DRG/CIV/ES/RDSO
CK.		/00004/20/0
CK.		NOT TO SCALE (SHEET-4)

ANNEXURE 17

[illegible]

NOTES:-

2. BEYOND THE WIND SPEED OF 33 m/s THE TRAINS WILL HAVE TO BE STOPPED.
 3. THIS EMPLOYMENT SCHEDULE IS APPLICABLE FOR RED REGION OF BASIC WIND SPEED 50 m/s OF FIGURE-1 OF IS8757 (Part-3)-2015 REVISED (DESIGN WIND PRESSURE 178 kgf/m² CALCULATED AS PER CLAUSE 5.4 OF IS8757 (Part-3)-2015 REVISED).
 4. THE CYCLING REGION AREA FACTOR(R_W) HAS NOT BEEN CONSIDERED IN THE DESIGN CALCULATION GIVEN IN CLAUSE 6.3.4 OF IS 8757(PART-3)-2015(REVISED).
 5. THE EMPLOYMENT SCHEDULE IS SUITABLE FOR IMPLANTATION UP TO 4.25 METER FROM THE CENTRE LINE OF NEAREST TRACK WITH +0.1 m FOR TRACK SKEWING ALLOWANCE ON SETTING OF MAST AND ON NODE OF CURVE. EXTRA IMPROVEMENT AS PER DRA. VOLET/01/00/111/04/11 HAS BEEN CONSIDERED.
 6. FOUNDATION BENDING MOMENT (FROM CODE GIVE) THE NECESSARY REFERENCE TO COMPLIANT FOUNDATIONS, FOR FOUNDATION SEE THE DRAWING NO. IT/VEG/CM/PH/REG/00001/D4/01 MODIFICATION 'B' CHART OF (SHEET No.1 TO 5).
 7. FOR LOCATIONS WITH NON-STANDARD SPINS AND IMPLANTATIONS, THE SAFETY OF MAST AND FOUNDATION SHALL BE CHECKED AND SUITABLE MAINT. AND FOUNDATION SHALL BE PROVIDED.
 8. REVERSE DEFLECTIONS ARE IN mm. REVERSE DEFLECTION IS POSITIVE WHEN AWAY FROM TRACK AND NEGATIVE WHEN TOWARDS IT.
-
- 9.(a) UNDER OVERLAP CENTRAL LOCATION IN TANGENT TRACK 54 metre SPIN IS CONSIDERED.
 - (b) THE SPINS ON SPECIFIC LOCATION LIKE, BRIDGES, OVERLAPS, TURNOUTS, NEUTRAL SECTION ETC. SHALL BE AS PER PARA NO.4.1.2.1, 5.4, 5.7, 5.5 OF ACTM VOL. PART-2.
 10. THE ARRANGEMENT OF ONE AT SUPPORT HAS BEEN CONSIDERED AS PER DRAWING NO. IT/VEG/02/1002, SHEET-3(PART-2).
 11. JUST OF ECONOMIC SIZE SHALL BE SELECTED.



- 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. 4.1.2.1, 5.4, 5.7, 5.5 OF ACTM VOL.1, PART-2.
9. THE ARRANGEMENT OF ONE AT SUPPORT HAS BEEN CONSIDERED AS PER DRAWING NO. ET/ONE/02102.
SHEET-3(REV.- B).
10. WEIGHT OF ECONOMIC SIZE SHALL BE SELECTED.

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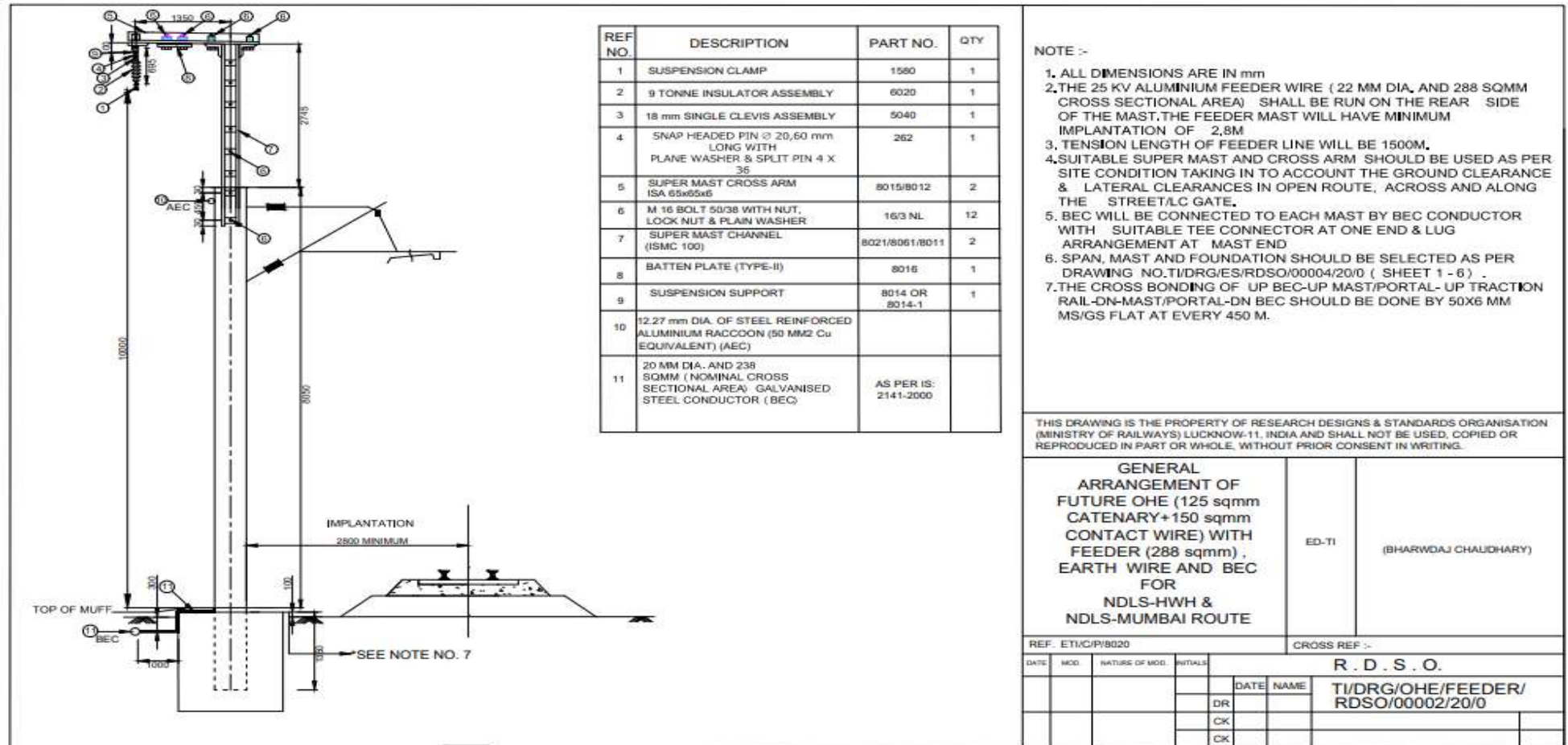
<p>EMPLOYMENT SCHEDULE FOR ONE MAST (9.5 m) BASIC WIND SPEED 50 m/s WIND PRESSURE 178 kgf/m² (OHE + FEEDER WIRE + EARTH WIRE) 1500 kgf TENSION IN CAT. 125mm² 1500 kgf TENSION IN CONT.150 mm² (WITH IMPLANTATION UP TO 4.85M)</p>	EDTI	(BHARDWAJ CHAUDHARY)
---	------	----------------------

REF:

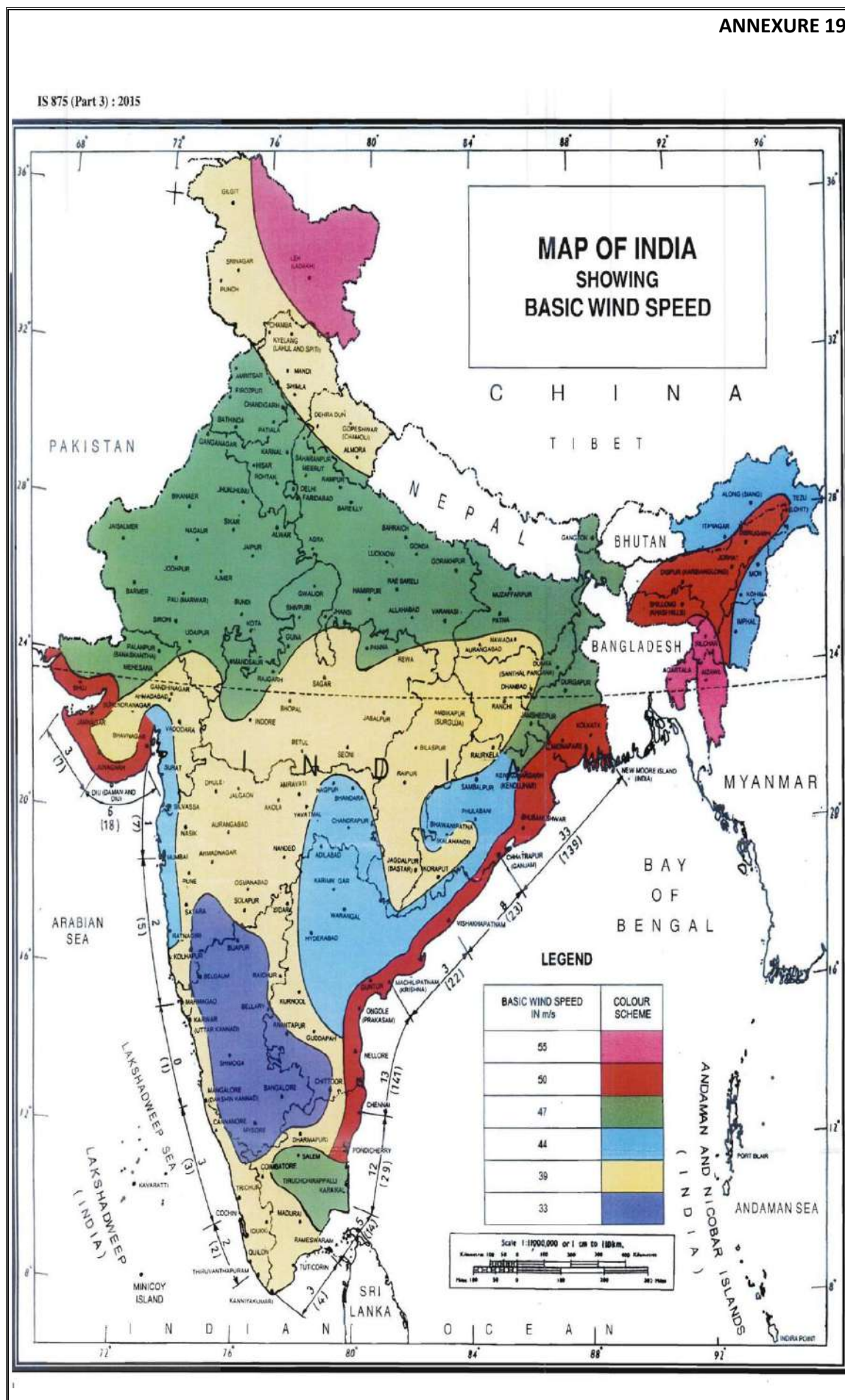
CROSS REF:--

DATE				R. D. S. O.			
DATE	MOD.	NATURE OF MOD.	INITIAL				
				DATE	NAME	TI/TRG/CIV/ES/RDSO /00004/20/0	
				DRL			
				CKL			
				CKL			
						NOT TO SCALE	(SHEET-6)

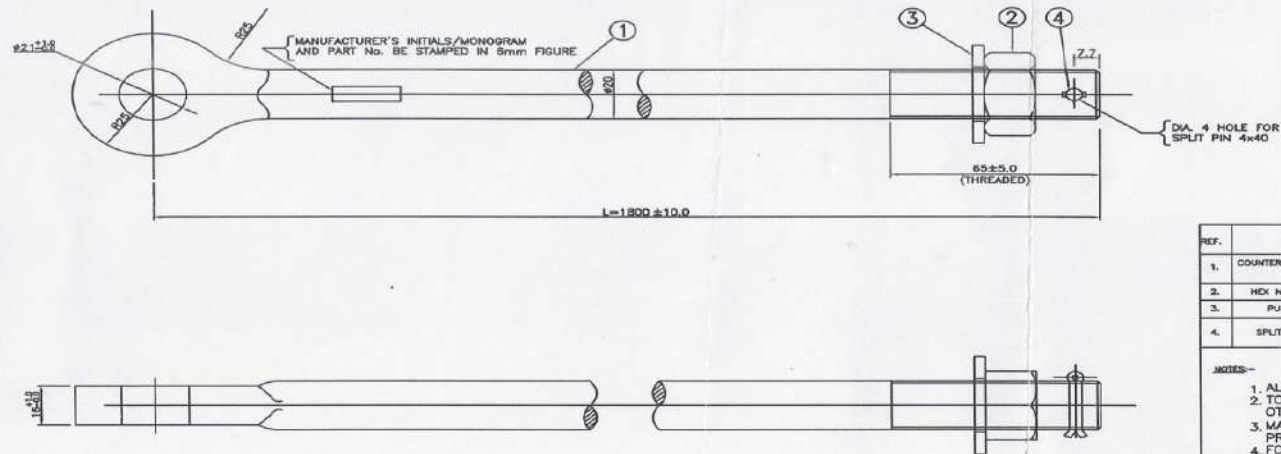
ANNEXURE 18



ANNEXURE 19



ANNEXURE 20



REF.	DESCRIPTION	PART No.	MATERIAL	SPECIFICATION	Approx. Wt. (kg)	No. OFF
1.	COUNTER WEIGHT EYE ROD (FORGED)	SK/588	FORGED STEEL GALVANIZED	IS:2004/1991 (CL. II) ETI/OHE/13		1
2.	HDX NUT	20N	STEEL GALV.	ETI/OHE/18		1
3.	PUNCHED WASHER A22	-	-D0-	-D0-		1
4.	SPLIT PIN 4x40	-	ANNEALED COPPER	IS:548		1

NOTES:-

1. ALL DIMENSIONS ARE IN mm.
2. TOLERANCE OF ± 0.5 IS PERMISSIBLE ON ALL DIMENSIONS UNLESS OTHERWISE SHOWN.
3. MANUFACTURER'S INITIALS/MONOGRAM AND PART No. TO BE PROVIDED AS SHOWN.
4. FORGED DRAFT ANGLE AND RADII OF FILLET TO CONFORM TO IS:3489.
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

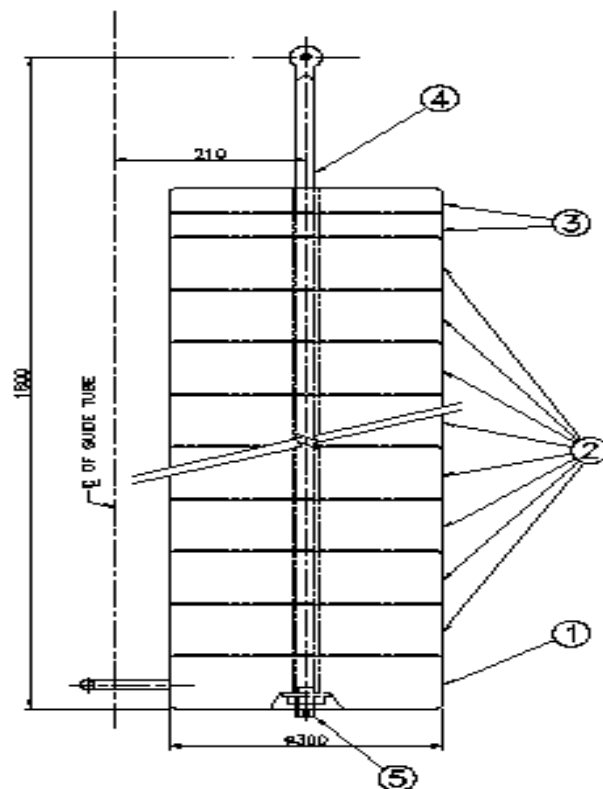
ADE/OHE Sd/- AJIT SINGH

REF.:-

CROSS REF.:-

DATE	MOD.	NATURE OF MOD.	INITIAL	DATE	NAME	REV.
				DR. 06 01 93	Sd/-	ETI/OHE/SK/588
				TC.		SCALE:- 1:1
08/12/14	BY	NATIONAL SPDS. ALTERED	CK.	16 12 93	Sd/-	
	BY	RE-DESIGN ON CAD				

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-12	40	1
2.	40kg COUNTER WEIGHT PIECE	5092	"	"	40	18
3.	20kg COUNTER WEIGHT PIECE	5093	"	"	20	2
4.	COUNTER WEIGHT EYE ROD	SK/588	STEEL GALVANISED ANNEALED COPPER	IS:2062 BR-A ETI/OHE/13		1
5.	SPLIT PIN 4x40			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:3489.
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 $\pm 0.5\text{kg}$ FOR PART No.5091/5092 AND $\pm 0.25\text{kg}$ FOR PART No.5093.
6. THE TOTAL Approx. WEIGHT OF THE WHOLE ASSEMBLY IS $800 \pm 0.5\text{kg}$.
7. FOR USE WITH 33.8mm 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/TT-V Sd/- OM PRAKASH
17.12.93

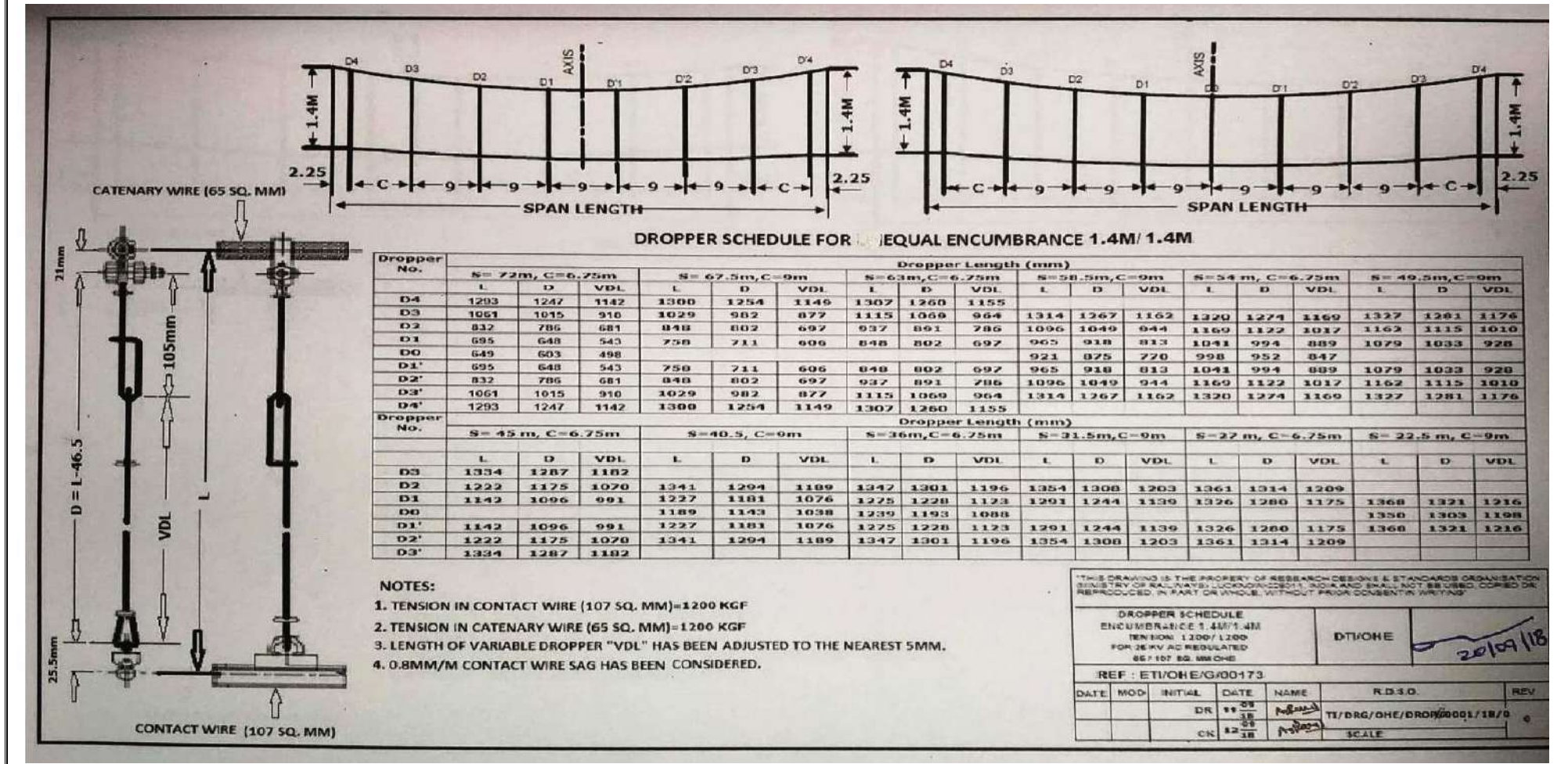
ADE/DHE Sd/- AJIT SINGH

REF:-

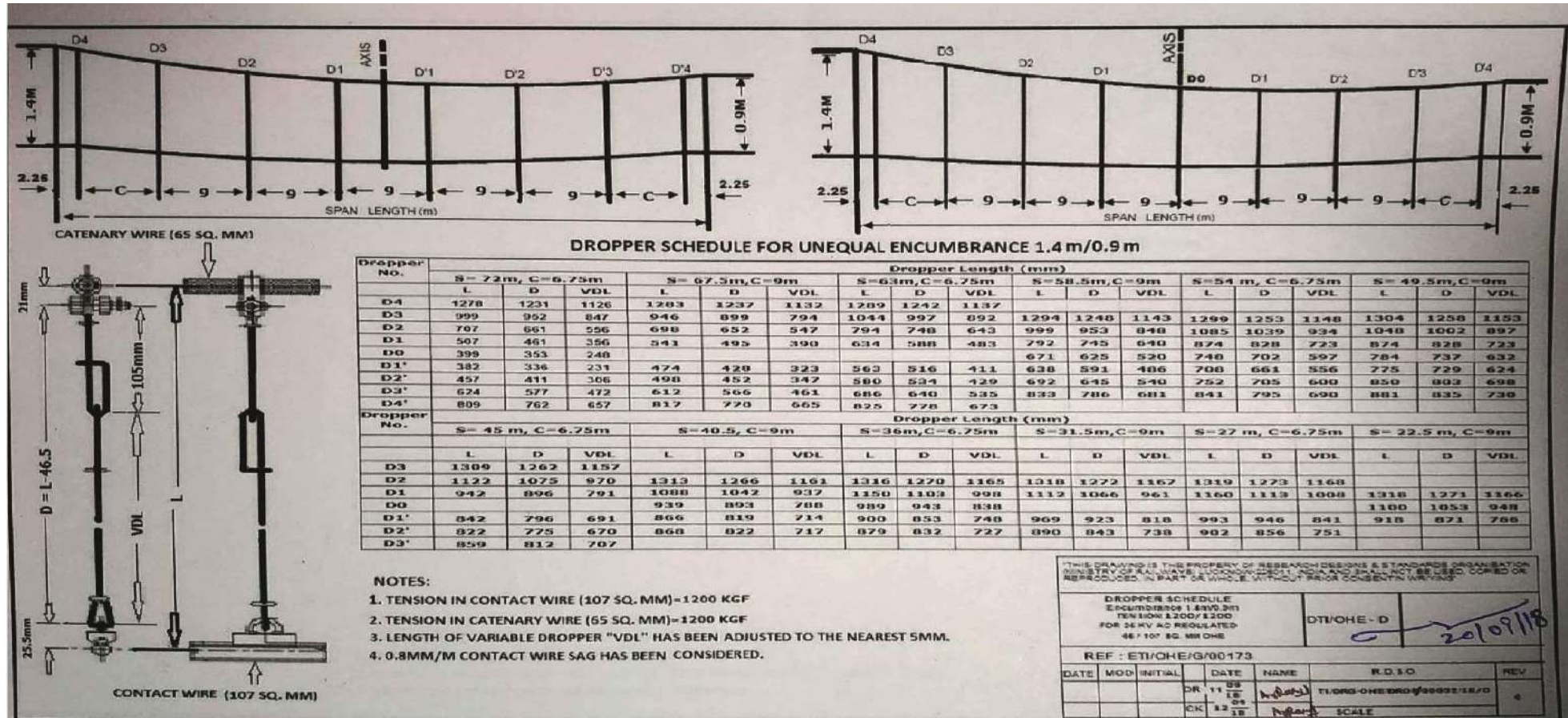
CROSS REF:-

DATE	NO.	NATURE OF MOD.	INITIAL	R. D. S. O.				REV. B
				DATE	NAME	ETI/OHE/SK/587		
				DR. 04.01.93	Sd/-			
				TC.		SCALE:- 1:5		
	'B'	REWORK ON 2ND		CK. 12.12.93	Sd/-	SUB SCALE:-		
	'A'	PAID FOR DEL. AT REF. No. 4				SUB SCALE:-		

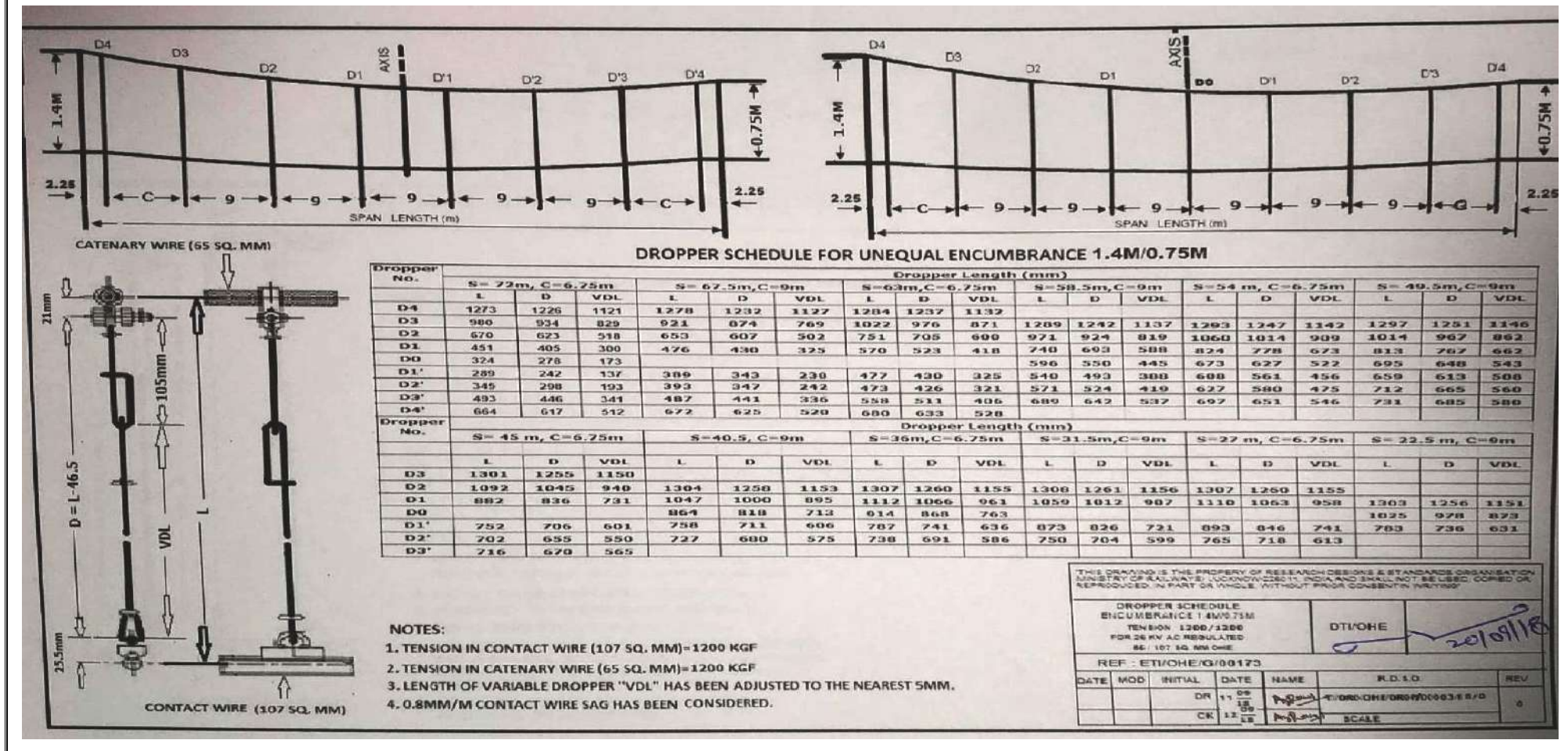
ANNEXURE 23



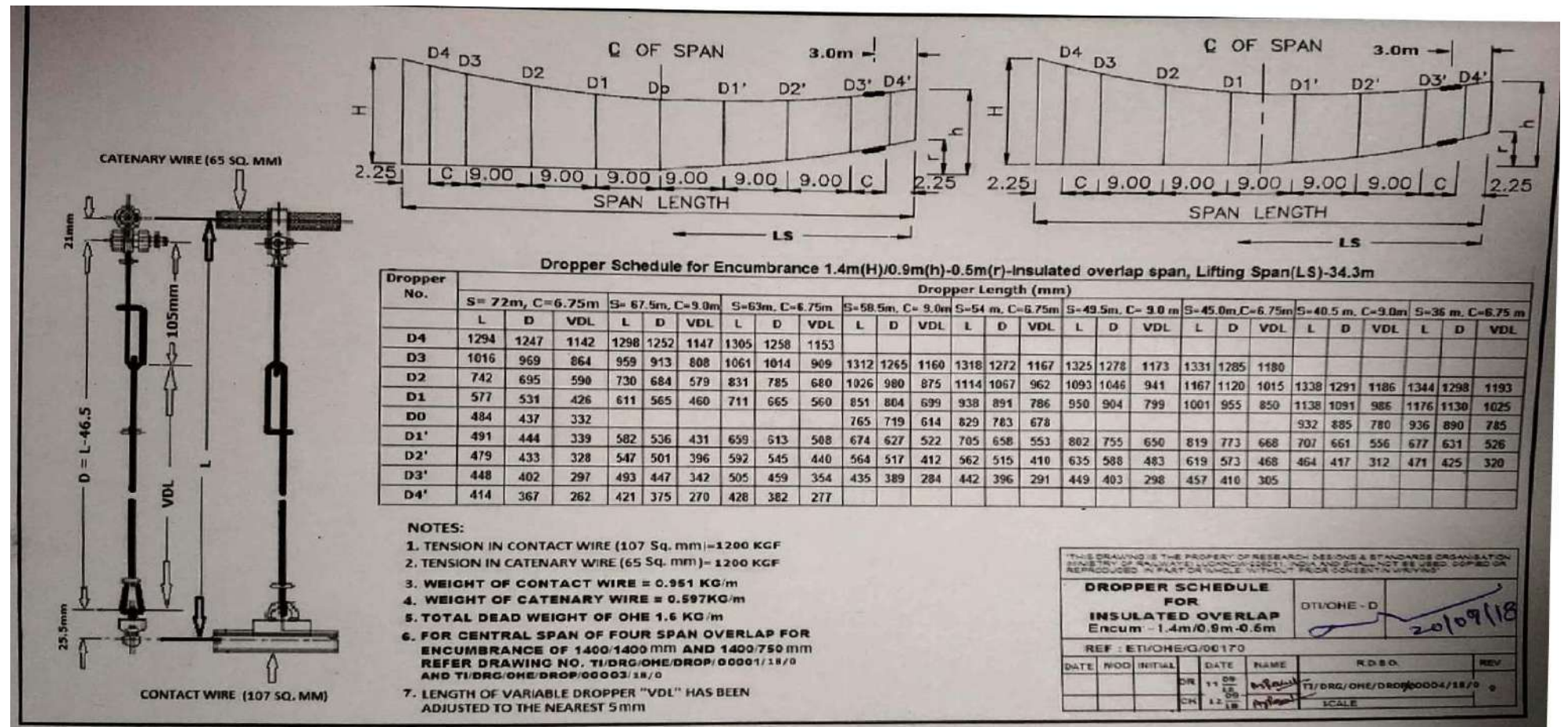
ANNEXURE 24



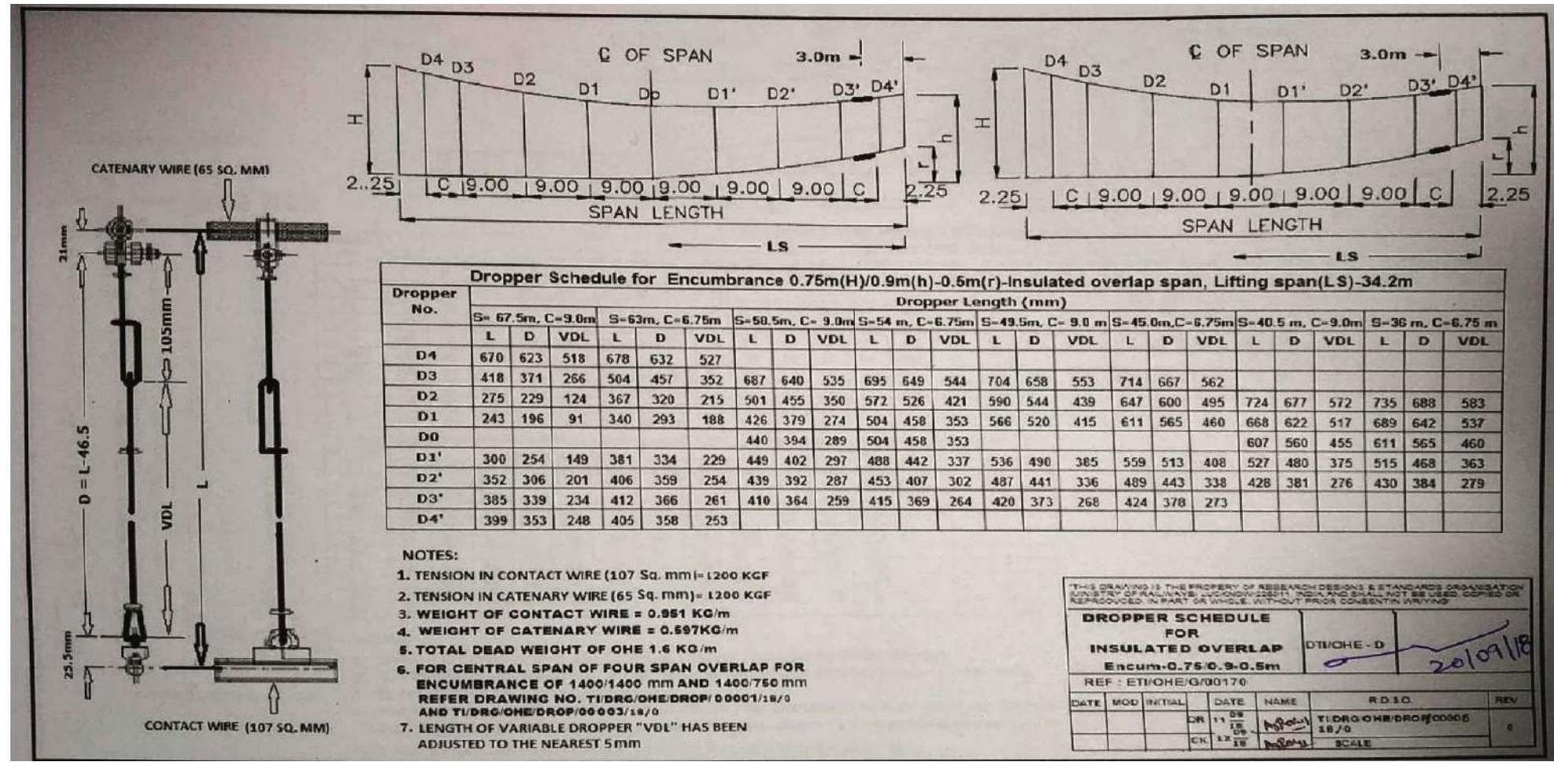
ANNEXURE 25



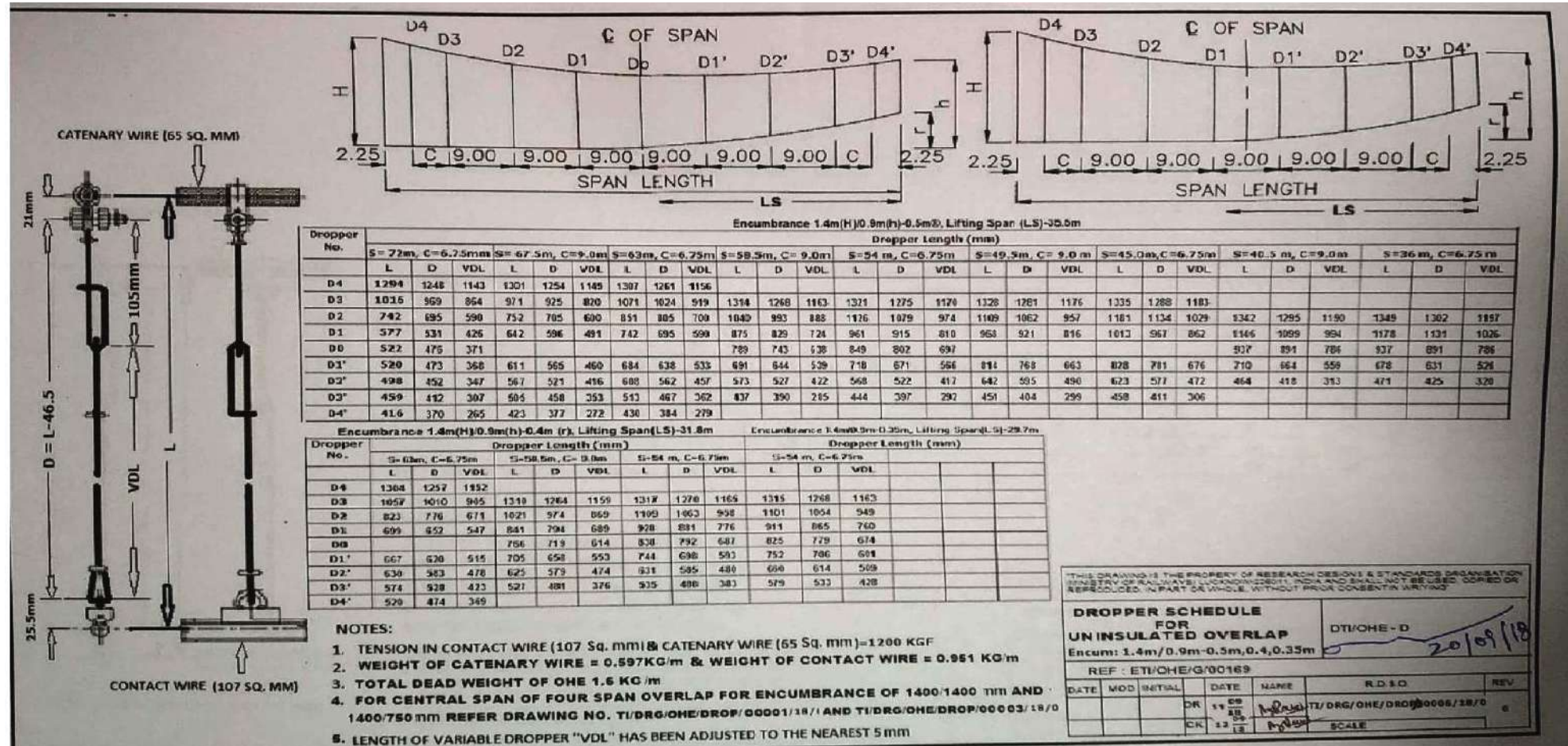
ANNEXURE 26



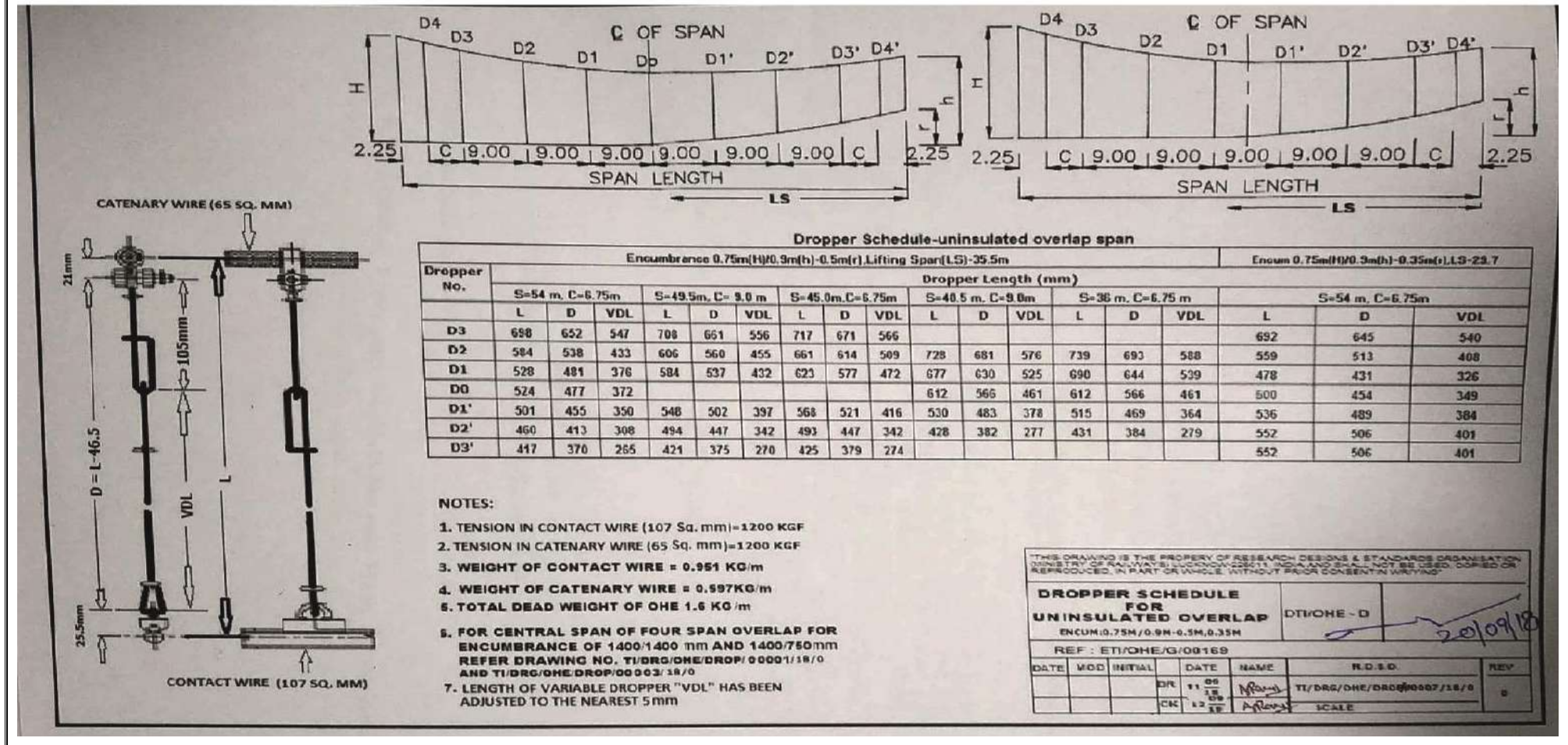
ANNEXURE 27



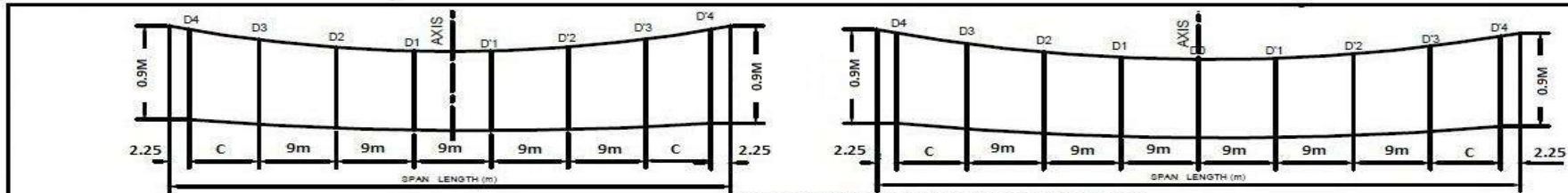
ANNEXURE 28



ANNEXURE 29



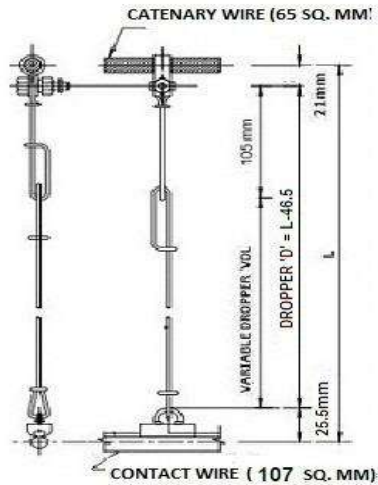
ANNEXURE 30



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
86 / 107 SQ. MM OHE

EDTI

DATE	MOD	INITIAL	DATE	NAME	R.D.S.O.	REV
			DR		TI/DRG/OHE/DROP/	
			CK		RD50/00001/20/0	
					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
cedencrtd@gmail.com

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 Gatimaan Express at 160 Kmph in Agra - Palwal section.

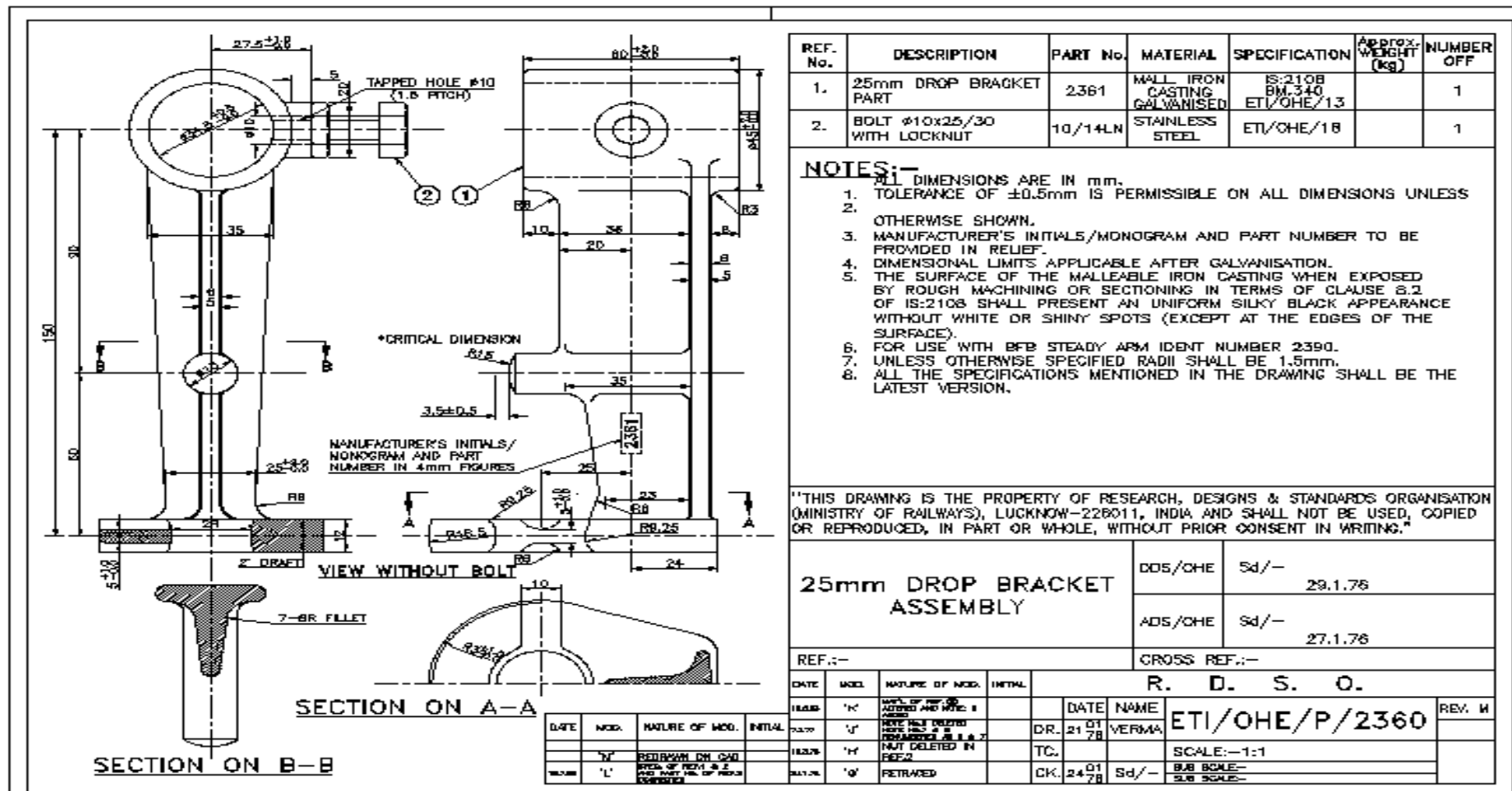
1. At obligatory mast vertical gap between main line and turn out contact wire is maintained between 50 to 60 mm.
2. At 5 mtr distance from obligatory mast, gap is maintained at 50 mm.
3. At 10 mtr distance from obligatory mast, gap is maintained between 40 mm to 50 mm.
4. Track separation is kept between 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 output for checking the Panto of Gatimaan Loco.

Submitted for kind perusal please.

(V.K. Garg)
CEDE/NCR

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

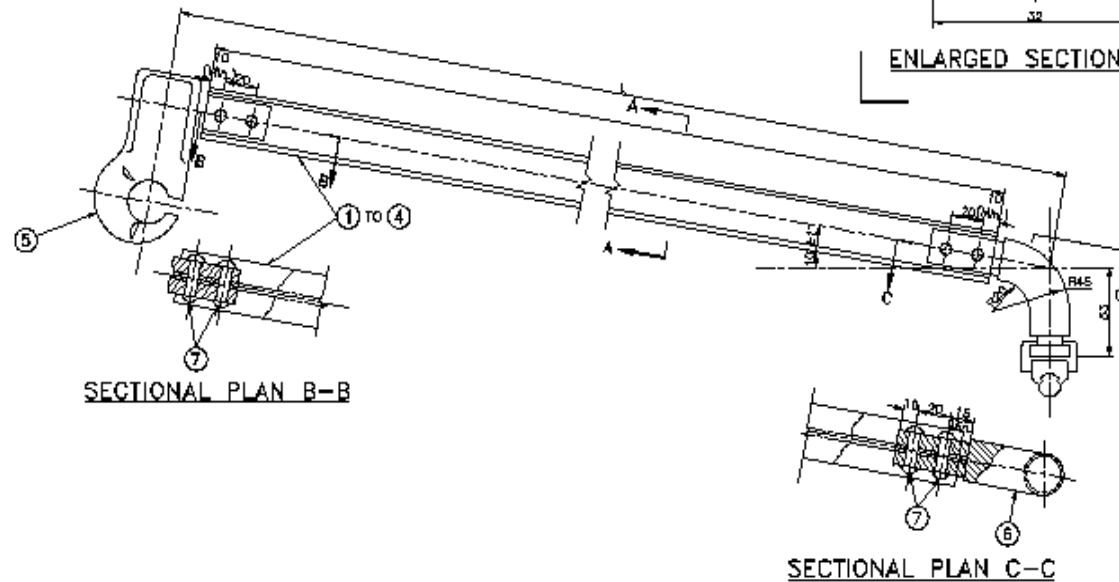
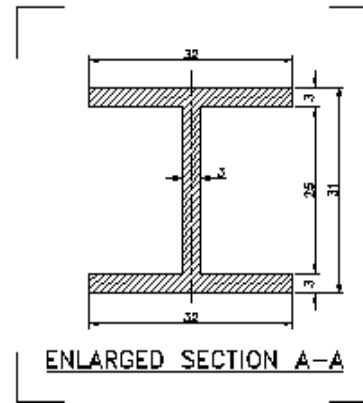
वरिष्ठ कार्य निदेशक/टी० आई०
कार्य निदेशक/टी० आई०
निदेशक/टी० आई० (ओ० एच० ई० ई०)
निदेशक/टी० आई० (ए० ए० ई० ई०)
निदेशक/टी० आई० (ए० ए० ई० ई०)
निदेशक/टी० आई० (ए० ए० ई० ई०)



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



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)	23B1	WELL CAST IRON GALVANISED	IS-2103, GR. DN340 RE/OHE/13		1
6	BFB STEADY ARM SWIVEL	23B2	FORGED STEEL GALVANISED	IS-2004, CL-2 RE/OHE/13		1
7	RIVET #8x35		ALUMINIUM ALLOY	IS-2004, CL-2 RE/OHE/13		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

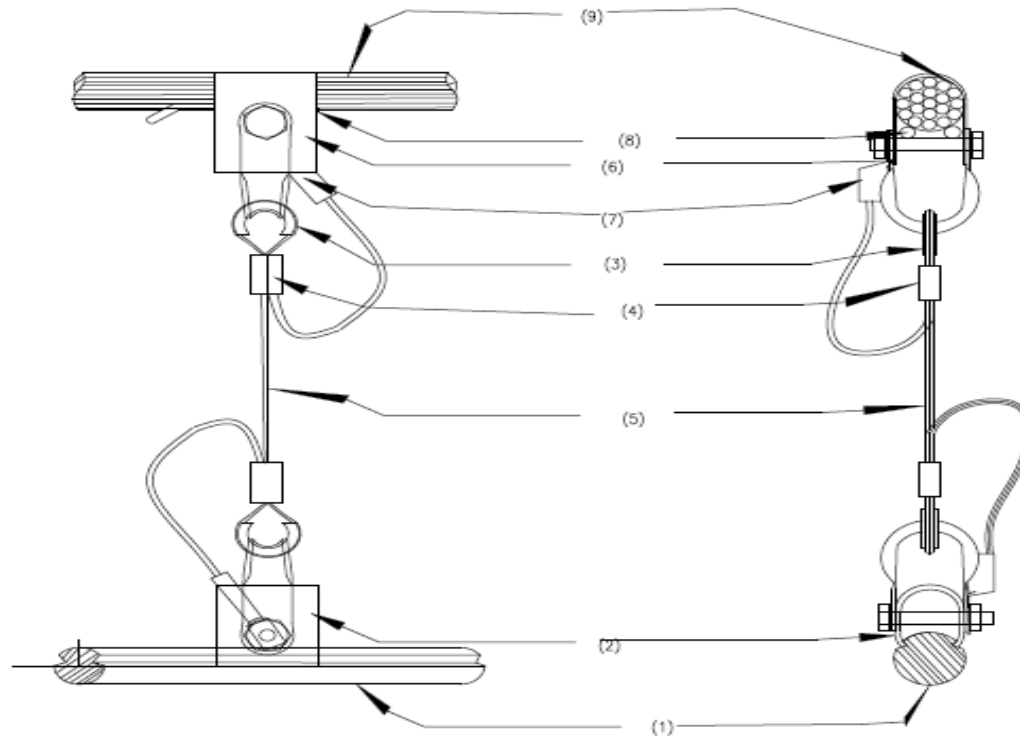
Sd/- R.P. MITTAL
26.5.78

REF:-

CROSS REF:-

DATE	MOD.	NATURE OF MOD.	INITIAL	DATE	NAME	REV.
				DR. 28.03.78	Sd/-	ETI/OHE/P/2390
				TC. 29.03.78	Sd/-	SCALE: 1:1.2
				CK. 22.03.78	Sd/-	SUB SCALE: 1:1

ANNEXURE 34



NOTE—

1. ALL DIMENSION ARE IN MM.
2. TOLERANCE OF $\pm 0.5\text{MM}$ 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.

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)

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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. TOLERANCE OF ± 0.5 MM IS PERMISSIBLE ON ALL DIMENSIONS UNLESS OTHERWISE SHOWN.
3. MANUFACTURERS, INITIALS/MONOGRAM TO BE PROVIDED.

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CATENARY WIRE CLAMP
FOR CURRENT CARRYING
DROPPER

DIRECTOR/TI

ED/TI

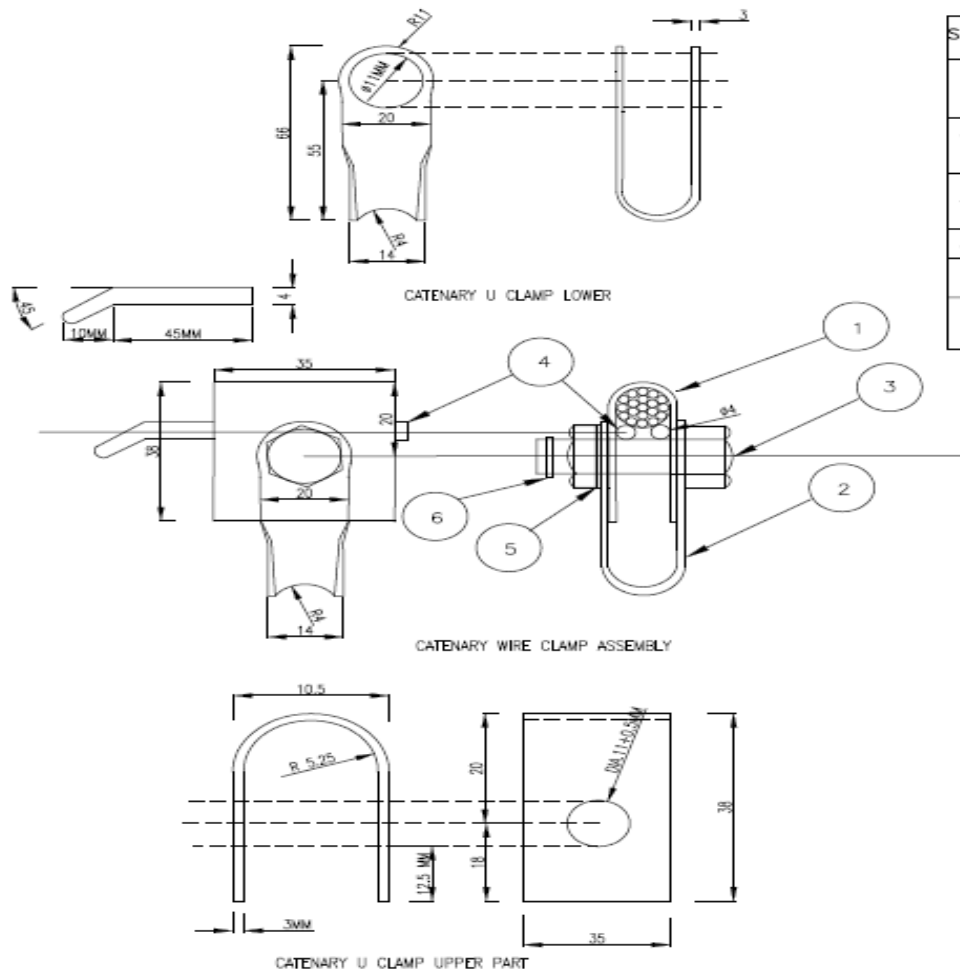
REF:TI/DRG/OHE/CCD/RDSO/00001/20/0

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

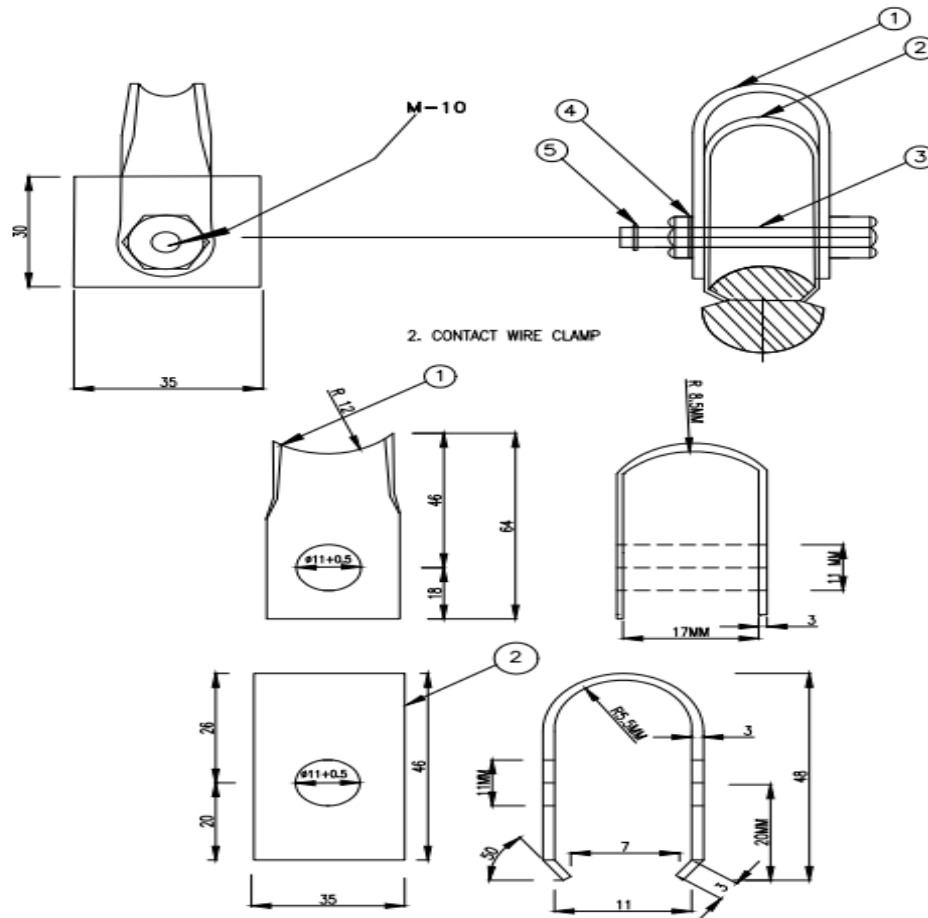
REV

DATE MOD NO. NATURE OF MOD. INITIALS

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		ANNEAL COPPER	IS 549

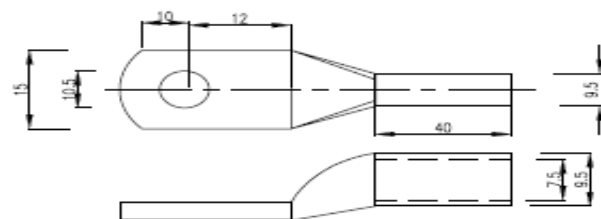
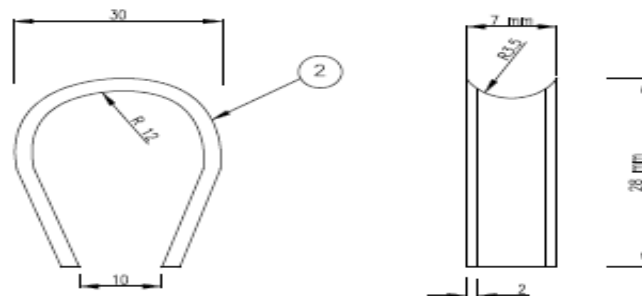
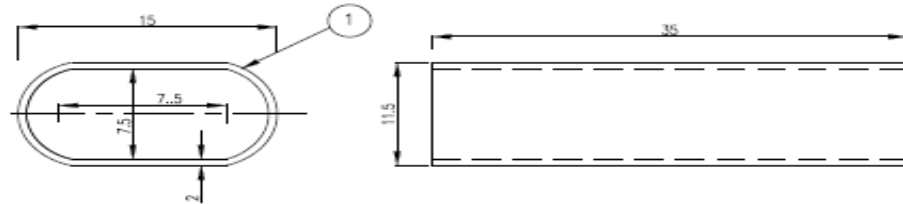
NOTE-

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

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CONTACT U CLAMP (LARGE AND SMALL) 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/ 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

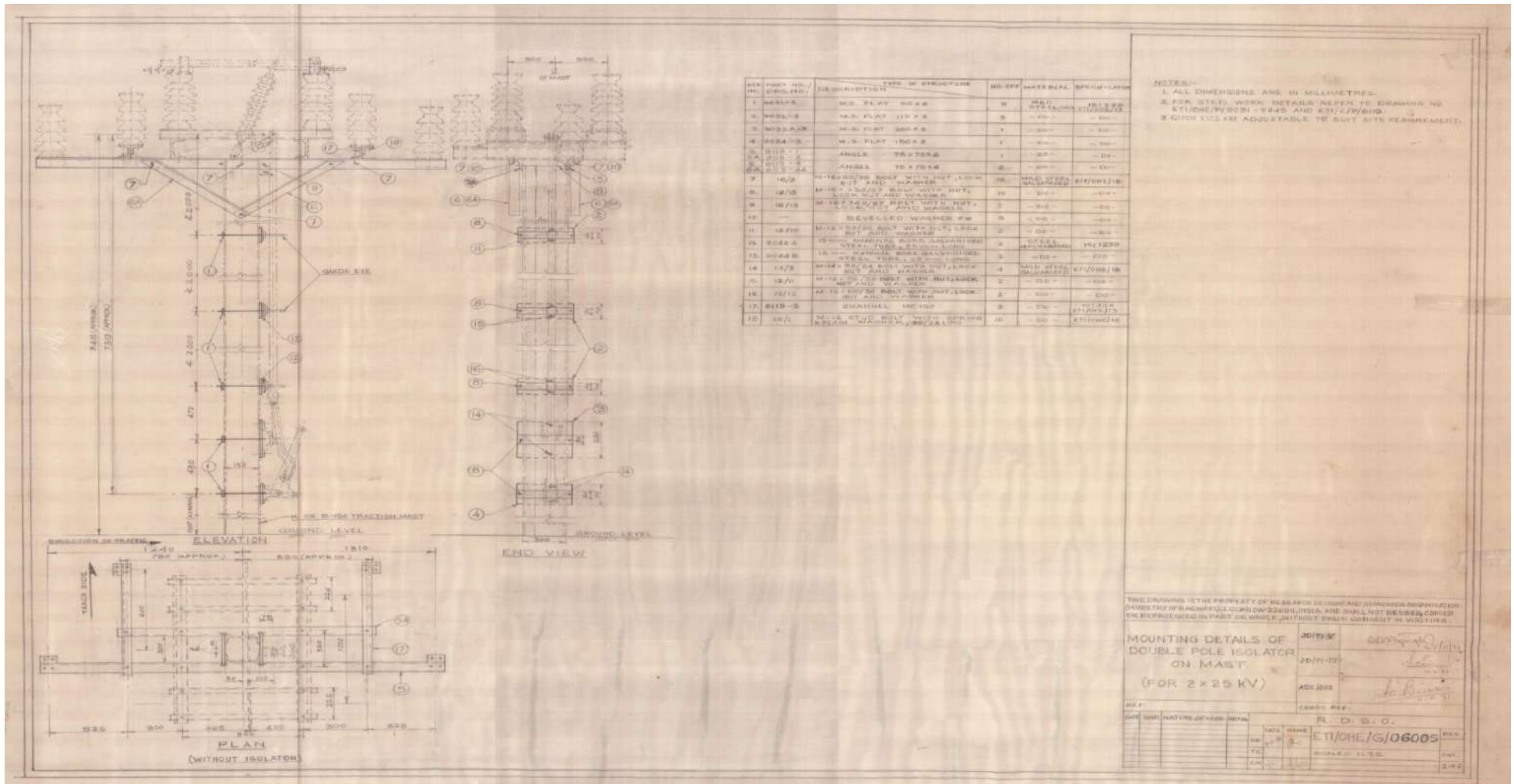
NOTE-

1. ALL DIMENSION ARE IN MM.
2. TOLERANCE OF ± 0.5 MM 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



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)

DDTI - V	$\frac{S0}{13.10.1992}$
ADE/PSI	$\frac{S0}{16.09.1992}$
ADE/OHE	$\frac{S0}{08.09.1992}$

REF.

DATE	MOD	NATURE OF MOD.	INITIALS			R. D. S. O.	
				DATE	NAME	ETI/OHE/G/06008	
				OR	15	SE-	
				TC		SCALE : NTS	
				CK	SE-	SESCALE -	
						SESCALE -	

ANNEXURE 40

GOVERNMENT OF INDIA
MINISTRY OF RAILWAY
RAILWAY BOARD

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

Policy Circular No. TRD/2012/2

New Delhi, dated: 07.05.12

Chief Electrical Engineers,
Zonal RailwaysChief Electrical Engineers,
CORE/AllahabadExecutive
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

3933
22/10/12
महाप्रबलक (प्रशासन) कार्यालय
19/खुद-म.व. रेल, गाजीपुर
रजि. नं. 19/खुद-म.व. रेल, गाजीपुर
दिनांक 22/10/12

GOVERNMENT OF INDIA
MINISTRY OF RAILWAY
RAILWAY BOARD

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

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

New Delhi, dated: 18.10.12


ECR Chief Electrical Engineers,
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.

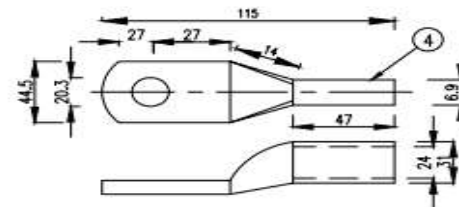
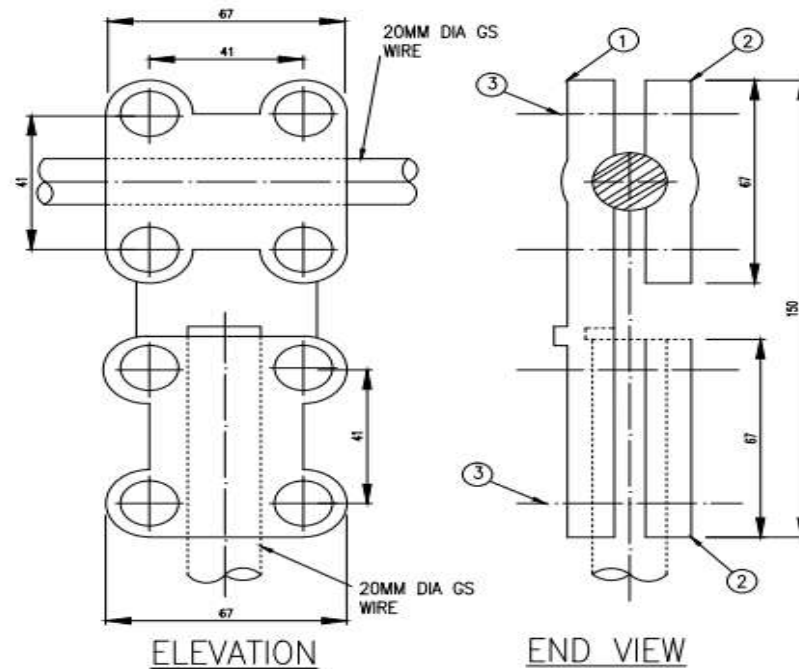
All other conditions stipulated in Board's policy circular under reference (copy enclosed) will remain same.

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	8
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 $\pm 5\%$; FROM 51 TO 100 mm : $\pm 4\%$;
 FROM 101 TO 300mm : 3%

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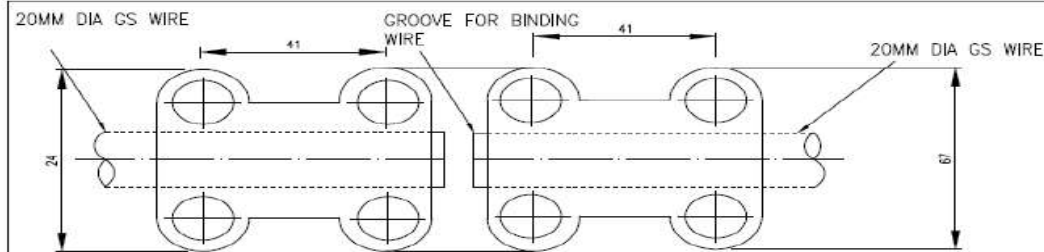
TEE CONNECTOR SUITABLE
FOR 20mm GS WIRE TO 20
mm DIA GS WIRE

ED-II

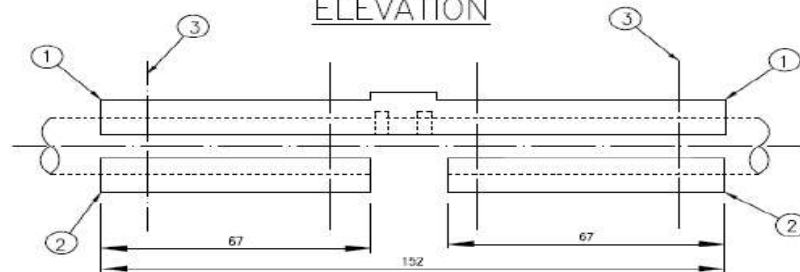
(BHARADJ CHAUDHARY)

REF.	DATE	MOD.	NATURE OF MOD.	INITIALS	DATE	NAME	CROSS REF :-
							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 $\pm 5\%$: FROM 51 TO 100 mm : $\pm 4\%$;
 FROM 101 TO 300mm : 3%

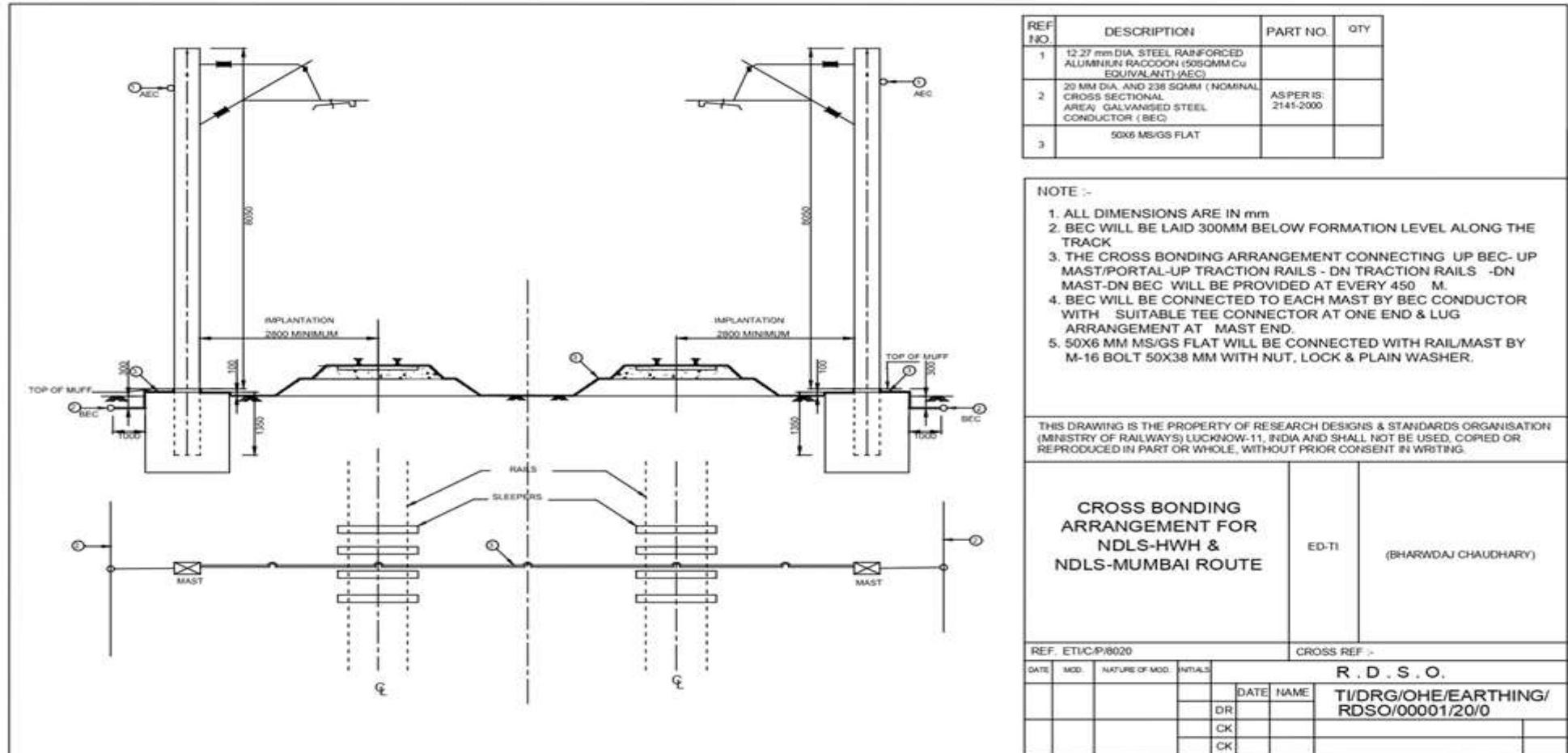
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STRAIGHT CONNECTOR SUITABLE FOR 20MM DIA. GS WIRE TO 20MM DIA GS WIRE		ED-TI	(SHARWADJ CHAUDHARY)
REF.	CROSS REF :-		
DATE	MOD.	NATURE OF MOD.	INITIALS
			DATE NAME
			DR
			CK
			CK

R . D . S . O.

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

ANNEXURE 44



ANNEXURE 45



BEC ARRENGMENT ON BRIDGES AND PLATFORM COPING

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.



(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.


(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-dropping 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.


 11.12.2020
(Manish Gupta)
Executive Director (EEM)
Railway Board