File No.RDSO-RDSO/759/2022-O/o PED/TI/RDSO

भारतसरकार - रेलमंत्रालय - अनुसंधानअभिकल्पऔरमानकसंगठन,मानकनगर,लखनऊ-226011
Government of India - Ministry of Railways
Research Designs & Standards Organisation, Manak Nagar, Lucknow – 226011

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No. RDSO/759/2022 Dated, the 12th June, 2023

To,

The Principal Chief Electrical Engineer,

(i) Central Railway, Station Building, Mumbai CST – 400 001
(ii) Eastern Railway, Fairlie Place, Kolkata-700 001.
(iii) East Central Railway, Hajipur-844 101.
(iv) East Coast Railway, Bhubaneshwar -751 023.
(v) Northern Railway, Baroda House, New Delhi - 110 001.
(vi) North Central Railway, Allahabad -211 015.
(vii) North Eastern Railway, Gorakhpur -273 012.
(viii) North Frontier Railway, Mailgaon - 781 011.
(ix) North Western Railway, Jaipur – 302 017.
(x) Southern Railway, Park Town, Chennai- 600 003.
(xi) South Central Railway, Railnilayam, Secunderabad-500371
(xii) South Eastern Railway, Garden Reach, Kolkata- 700 043.
(xiii) South East Central, Railway, Bilaspur -495 004.
(xiv) South West Railway, DRM's Office, Hubli-580 028.
(xv) Western Railway, Churchgate, Mumbai-400 020.
(xvi) West Central Railway, Jabalpur - 482 001.
(xvii) Konkan Railway, Belapur Bhavan, Navi Mumbai – 400614

(b) Chief Administrative Officer, Central Organisation for Railway Electrification, Nawab Yusuf Road, Allahabad-211000.

विषय/Sub: General Guidelines for OHE design in **concourse area** for station development projects.

****

Technical Instruction No. TI/IN/0047 for "General Guidelines to Zonal Railways for OHE design in concourse area for station development projects" has been prepared and enclosed herewith for further n/a at your end."

This is issued with the approval of competent authority.

(Girraj Kishore)
Joint Director/(TI-2)
[*For Director General (TI)*]

Encl: As above

GOVERNMENT OF INDIA
Ministry of Railways

GENERAL GUIDELINES
TO
ZONAL RAILWAYS
FOR
OHE DESIGN
IN
CONCOURSE AREA
IN
STATION DEVELOPMENT PROJECTS

INSTRUCTION No. TI/IN/0047

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

(For official use only)

JUNE 2023

TITLE: GUIDELINES FOR DESIGN OF OHE UNDER THE CONCOURSE COMING IN STATION AREAS ON INDIAN RAILWAYS

INSTRUCTION NO.: TI/IN/0047

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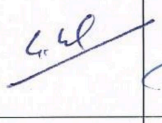
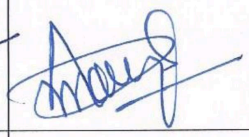
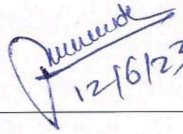
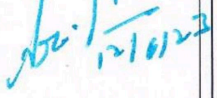
Signature				
Date	12.06.23	12-06-2023	12/6/23	12/6/23
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ASSISTED BY:

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ii) Shri Mukesh Kumar, Senior Section Engineer,

INDEX

1.0 INTRODUCTION

Many references are being received regarding Technical requirement for finalization of Design for 1X25kV and 2x25 kV OHE under the concourse area in connection with the Redevelopment/Development of Railway Station.

The 25kV OHE will be required to be installed on the ceiling / soffit of the structure built over the track space. OHE Portal upright can also be integrated with steel/RCC structure supporting the platform shelter.

The IRSDCL (Indian Railway Station Development Corporation Limited) report regarding Modification in OHE in connection with Redevelopment of Railway Station accepted by Railway Board (MTR) vide letter no 2003/RE/161/1 Vol-III/Pt. Dated 19/27.09.2017 and the same was circulated to all zonal railways vide TI/OHE/IRSDCL/2017 dated 31.10.2017.

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Based on the IRSDCL Report and directives issued by Railway Board, Guidelines for design of OHE under the concourse coming in station areas on Indian Railways incorporating latest provisions of IRSOD (BG) Revised-2022, Guidelines has been prepared for guidance that would be applicable while redeveloping the existing stations electrified with 1X25kV AC OHE/2X25kV AC OHE for Electric Traction.

2.0 General Guidelines:

2.1 A study should be carried out covering the following aspects:

(a) Minimum height of the bottom of the beam, which should comply with all the extant regulations.

(b) The concourse structure shall be designed such as to allow the standard OHE equipment to be used. The fixing arrangements (bolts/holes/plates etc.) shall be provided suitably in the concourse structure for OHE arrangement.

(c) Earthing of concourse structure: If the OHE is hung from the concourse structure, proper earthing requirement for steel / concrete structures.

(d) Openings in the concourse on sides: Any special requirements for the design of concourse, which will ensure protection of OHE (so that nothing can be thrown on the OHE / tracks).

(e) Addressing bird menace: The bottom of beams and other arrangements shall be such as not to provide any space for the birds to sit and/or nest as this can create safety issues with OHE. If this cannot be ensured, protection measures required for catenary wires under the concourse.

(f) While designing the concourse structure, it shall be possible to provide OHE even at locations where the main beams of concourse structure are not there. Arrangement shall be there for future tracks.

(g) The concourse structure shall be designed keeping the present and future planned OHE loads in mind. There are several different types of arrangements including single set of wires, double set of wires, anchored wires and ATD arrangement etc. The absolute loads for these arrangements in all three directions need to be considered in design. It is desirable that the maximum spans / maximum wind loads be considered so that flexibility for future modification of OHE is there.

3.0 OHE SYSTEM REQUIREMENTS:

While designing OHE System in Station Area, following OHE parameters should be considered:

(a) Standard Contact wire height at support should be 5.6m/5.55m with 100mm/50mm Presag respectively.

(b) In conventional (1X25kV) 65/107 OHE, tension in Contact and Catenary wire should be 1200/1200 kgf & in 2X25kV System, tension in Contact and Catenary wire should be 1200/1200 kgf in 65/107 OHE or 1500/1500kgf tension in 125/150 OHE.

(c) OHE gradient & Relative gradient outside the station concourse structure (overhead structure) shall be 2mm/m and 1mm/m respectively. Level OHE gradient should be maintained under overhead structure.

(d) Minimum dropper length shall not be less than 200mm.

(e) Rail level shall not be raised (other than 20mm for track maintenance allowance) and permanent bench mark shall be provided to indicate the maximum level of track to be maintained.

(f) OHE spans under concourse area may be selected in line with civil structure design and may not be standard spans.

(g) Minimum height of the bottom most part of the supporting member/structure above the rail level should not be less than 8.03m with 1400mm encumbrance (5.55m contact wire height at support +1.4m encumbrance + 0.2m extended bracket tube + 0.110m distance between catenary to bracket tube + 0.2m short time clearance + 0.05m Oscillation of contact wire + 0.02m track maintenance margin + 500mm additional clearance for civil structure tolerance and conductor diameters). Similarly for other values of encumbrances adopted as per site condition, the height of concourse is given in Para No. 4.0.

(h) For the station being developed / redeveloped, the OHE spans need to be kept in line with the civil structure. For example, if beams are spaced @20m, the OHE span may be selected as 20m or 40m. Dropper schedule for any span can be worked out as per the methodology provided in Chapter 2 (Dropper Schedule), Part IV (Overhead Equipment) of Treatise on Electric Traction Distribution issued by IRIEEN.

(i) Overall proposed vertical clearance of approximately 770 mm between top most portion of Bracket tube and bottom most part of concourse should be maintained (It includes 20mm track maintenance allowance, 250mm minimum Electrical Clearance and 500 mm additional clearance; civil structure tolerance, conductor diameter is included in it).

(j) It should be ensured that minimum clearance of feeder wire at mid span from Rail level should not be less than 5.2m as per clause 58 of CEA guidelines.

(k) Feeder wire should be provided at a distance of minimum 950mm from cantilever assembly as per RDSO Drawing No. ETI/OHE/G/6000 Rev. B. Necessary arrangement for fixing of feeder wire with 9-Tonne Insulator

should be made while casting. 91.97mm^2 ACSR aerial earth conductor should run at the back side on drop arms.

(l) Drop arm over platform should be avoided. If it is unavoidable, vertical clearance of Drop arm from platform should be as per Diagram No. 2 (standard Dimensions in Stations to suit 25kV A.C. Traction Schedule-I chapter II) of IRSOD(BG) revised – 2022. It should also be ensured that no live conductor should be run over platform as per Para 20.4 of Appendix-I of ACTM Volume-II, Part-II.

(m) For 2X 25 OHE system, guidelines regarding OHE parameters, provision of AEC, BEC, Negative feeder etc. given in the RDSO Instruction TI/IN/0042 should be referred.

(n) The design load for each support of OHE cantilevers shall consider two OHEs (65/125 sq. mm catenary wire and 107/150 sq. mm contact wire). The design shall have the following features:

Locations, where foundation bolts are provided for OHE support structure, shall be indicated in the document submitted to the concern division.

(o) Anchor load of 2400/3000 kgf, on beam structure as well as on the face of the station concourse shall be considered in design of concourse. From safety point of view of structures, the broken wire impact on structures due to Anchor load i.e. 2400/3000 Kg should also be considered.

(p) To prevent bird menace, appropriate measures such as closed sections, RSJ/BFB drop arms etc. are recommended so as not to provide any space for birds to make nests. Suitable arrangement for the cantilever support should be done.

(q) To prevent monkey menace, the walls towards the trackside shall have no windows and ledges etc. which can be used by monkey.

(r) Concourse design should not permit any possibilities of physical contact with live parts (in line with EN 50122-1) and which eliminates possibility of throwing any object on live OHE shall be adopted.

(s) All the latest directives of Railway Board & RDSO for installations of OHE shall be ensured.

(t) All the latest stipulation given in IRSOD (BG)-2022, ACTM 2022 and CEA Regulation should be ensured.

4.0 MINIMUM HEIGHT OF OVERLINE STATION STRUCTURE FOR DIFFERENT CASES:

Case-I: Refer to figure 1a, 1b, 1c below for schematic arrangement for (cantilever suspended from concrete beam).

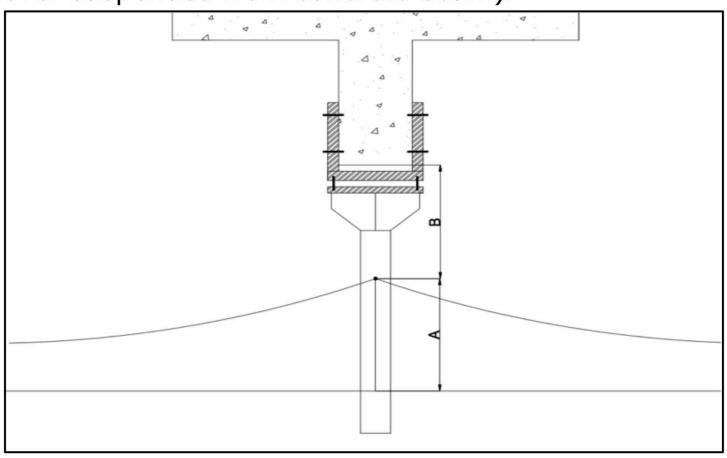

Figure 1a: Cantilever suspended from concrete beam

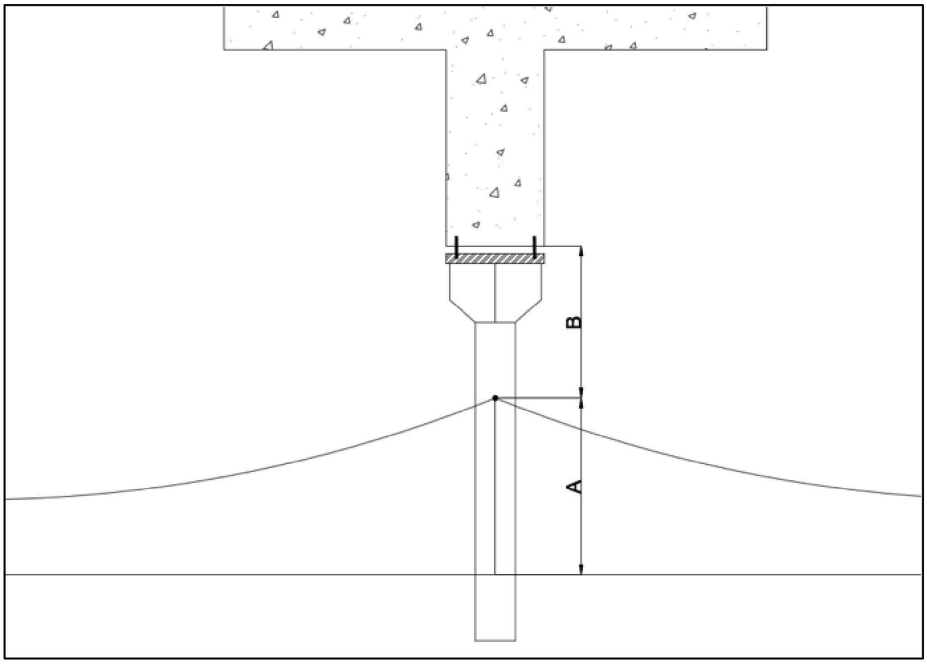

Figure 1b: Cantilever suspended from concrete beam (different fixing arrangement)

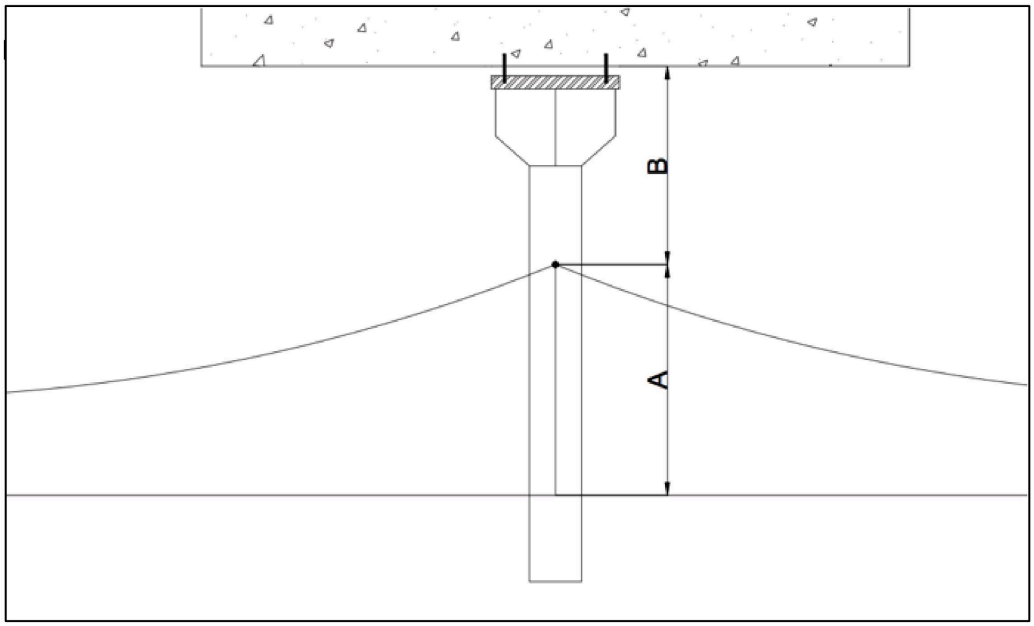

Figure 1c: Cantilever suspended from concrete beam (different fixing arrangement)

'A' is encumbrance in the above figures
'B' is minimum gap between bottom most point of beam and top most point of live parts i.e. top point of bracket tube (refer figure 2 below)

4.1 In figure 2 / 3, case of lower suspension distance (say 1.8m) (distance between mast face and catenary wire) is considered, which will be most onerous in this respect.

Hence B = 770mm (electrical clearance) + 310mm (Vertical distance between Catenary wire and bracket tube top) = 1080mm

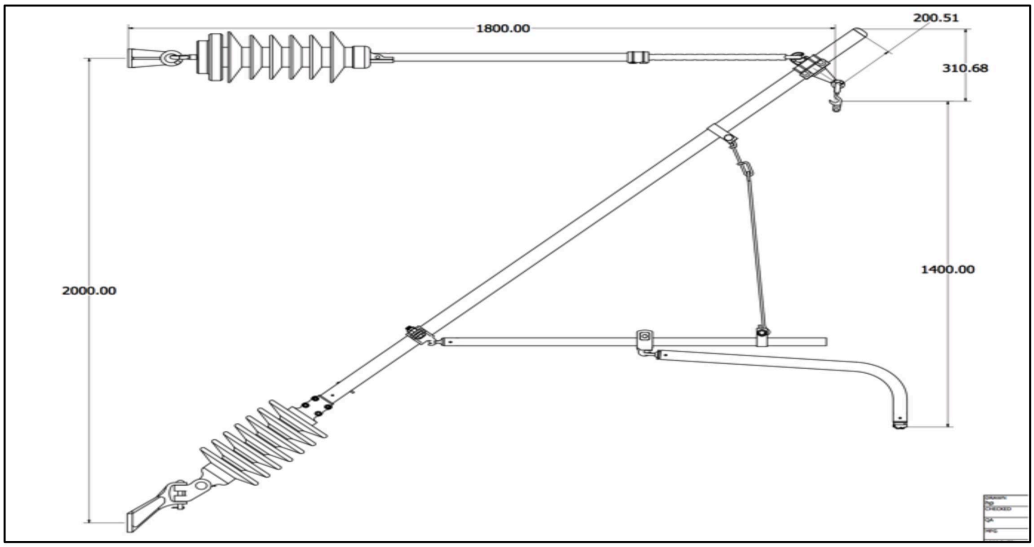

Figure 2: Vertical distance between catenary wire and bracket tube top

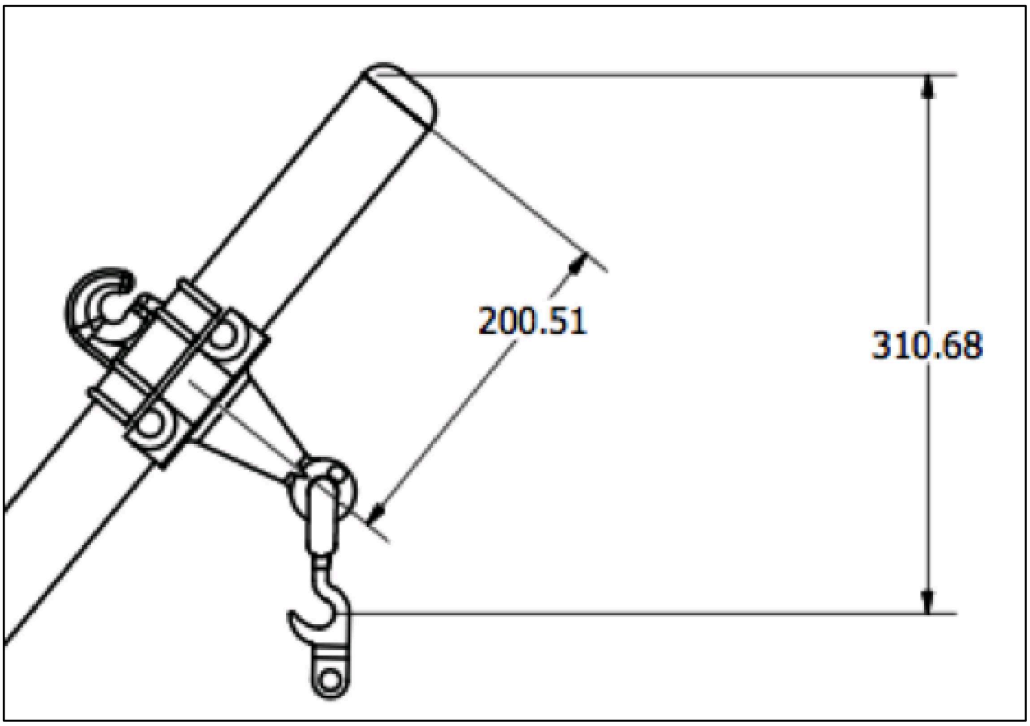

Figure 3: Vertical distance between catenary wire and bracket tube top

The minimum height of concourse should be determined as under:

Contact wire height from rail level at support with 50mm pre sag	5550mm
Vertical distance between catenary wire and top point of bracket tube	310mm
Vertical distance between top point of live part of bracket tube and bottom most part of beam(B)-(250mm Electrical Clearance + 20mm Track	770mm

maintenance margin + 500mm additional clearance including civil structure tolerance & conductor diameter)	
The minimum height of lowest portion of across the track beam from rail level	= 5550mm +310mm+770mm + Encumbrance

Minimum overline structure height determined with different encumbrance for Case-I will be as under:

Minimum overline structure height (in mm) for 5550mm contact wire height at support for different encumbrances				
400	**500**	**600**	**750**	**900**
7030	7130	7230	7380	7530

Case II: In this case, the cantilever support point is kept some distance away from beam. Since the additional vertical space (800-1000mm or so) is available in the non-beam region of the structure, the vertical distance (310mm) between catenary wire and bracket tube top (refer figure 2/3) need not be considered from bottom of the beam. This design will require consideration of additional bending moment on the OHE support structure. Refer to figure below:

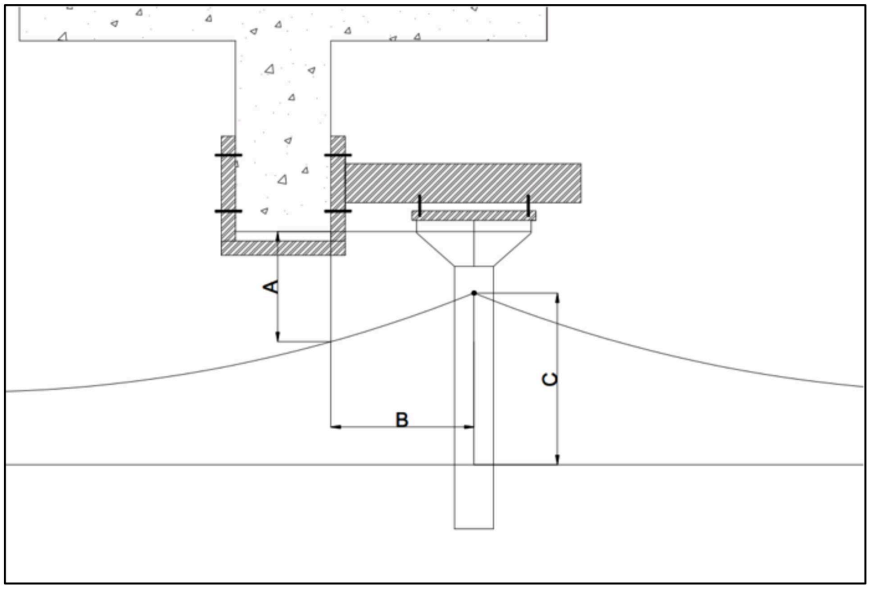

Figure- 4

Further, the catenary will sag a bit away from its support point, and hence the 500mm clearance (between catenary wire and beam bottom – 'A' in above figure) will need to be measured from its actual position rather than suspension point location.
For B = 1000mm, reduction of vertical distance and minimum overline structure height determined with different encumbrance for Case-II will be as under:

Minimum overline structure height for 5550mm high contact wire for different encumbrances (Height of Overline structure -5550mm+Encumbrance+770mm)				
400	**500**	**600**	**750**	**900**
6720	6820	6920	7070	7220

Note: 1. In the above calculations Contact wire height 5550mm at support has been considered.

2. The extra vertical clearance of 275mm for raising of track in future has not be considered for the OHE design purpose.

3. The minimum encumbrance should be kept 600mm for concourse structure height approximately 7000mm.

4. While selecting the encumbrance & OHE span, minimum dropper length should not be less than 200mm.

5. 0 EARTHING / GROUNDING ARRANGEMENTS:

5.1 Structure Earthing

The station structure will need to be earthed as per usual practice of building grounding, irrespective of traction system. The codes to be followed in this respect are IS 3043, IS 2309 etc.

5.2 OHE support earthing : Bonding & Earthing should be as per Earthing & Bonding Code ETI/OHE/71-Rev.1. 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).

5.2.1 Normally, the OHE masts/structures are bonded to rails (return circuit) and hence any insulator puncture will lead to completion of circuit and tripping of relevant circuit breaker.

5.2.2 In the instant case, the structure bonds between suspended OHE structure (drop arm etc.) is not feasible. Therefore, an earth wire of appropriate section may have to be run connecting masts / portals nearest to the concourse and all the OHE support structure (drop arms) suspended from the concourse. See the schematic below:

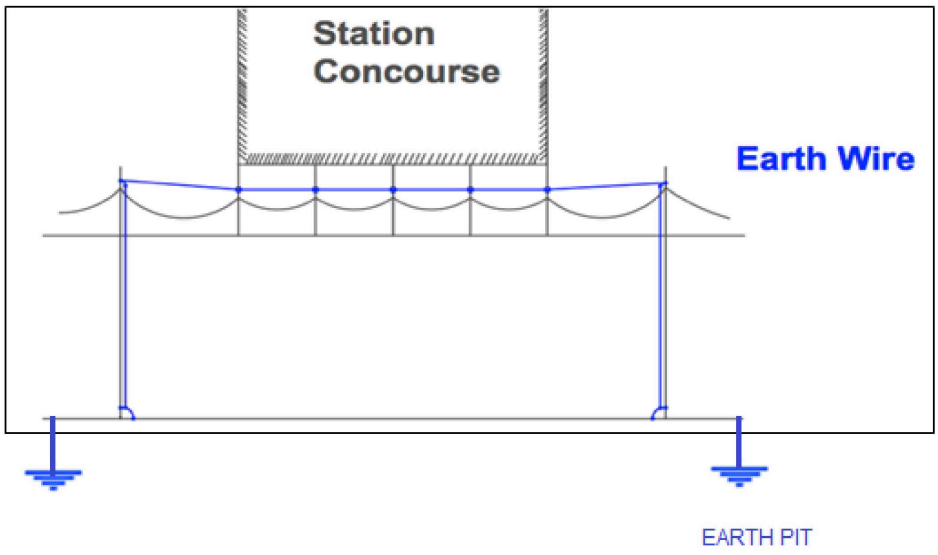

Figure 5: Earth wire for OHE structure below concourse

Notes:

(i) The earth wire shall be connected to an earth as well as to the traction rails at both ends just outside the concourse.

(ii) In case all the rails are track circuited, the earth wire shall be connected to an earth at both ends just outside the concourse.

(iii) If length of the earth wire exceeds 1000m, the stipulation in regard to making it discontinuous as contained in Para 3.4 of Bonding & Earthing code ETI-OHE/71-Rev.1 should be followed.

5.2.3 Further, the earth wires of different tracks can be cross-connected to ensure adequate redundancy of earth connections. See the schematic below:

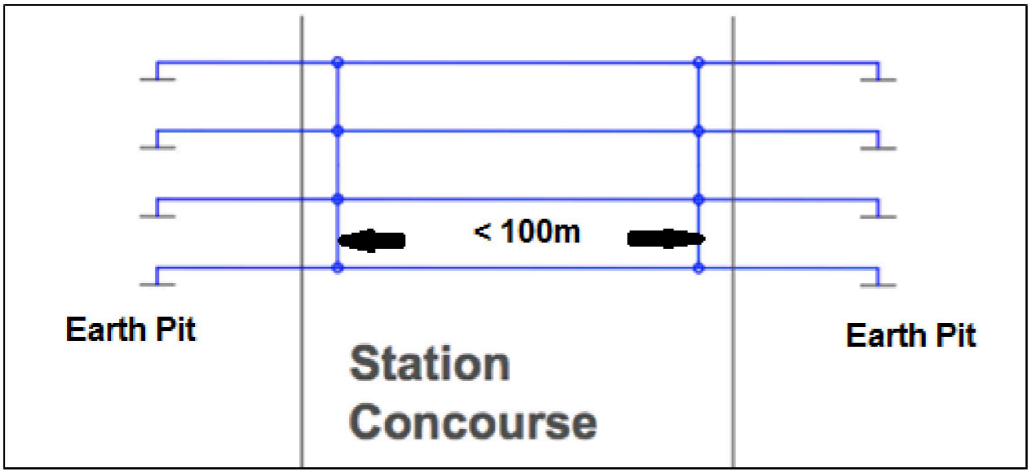

Figure 6: Cross connection of earth wire for redundancy

The cross connection can also be effected with embedded earth strips in the roof slab with earth terminals brought out in either side for construction to structures.

The cross section of an earth wire used for bonding traction masts or structures or supports or the metallic parts supporting the traction overhead equipment in a tunnel or in double rail-track-circuited section shall be not less than 50 mm^2 copper equivalent. Capacity of 93.3 mm^2 AAC (All Aluminium Alloy Conductor) conductor is similar to 50 mm^2 of copper. Hence 93.3 mm^2 AAC as per IS 398 – Part II (or equivalent ACSR) conductor may be used for this purpose.

5.2.4 **Bonding of metallic parts inside a concourse:** The OHE under a 100-200m long concourse structure is a situation similar to tunnel in respect of earthing of OHE support structures. An earth wire connecting all non-current metallic parts, which form parts of the supports for the overhead equipment, shall be run inside the concourse. The earth wire shall be connected to an earth as well as to the traction rails at both ends just outside the concourse. In case, all the rails are track circuited, the earth wire shall be connected to an earth at both ends just outside the concourse. If the length of the earth wire exceeds 1000m, the stipulation in regard to making it electrically discontinuous as contained in Earthing and bonding code should be followed.

5.2.5 The FTA anchor body structure in the concourse area (if used) shall also be earthed by bonding it through the ACSR earthing conductor as above.

5.2.6 **Girder concourse structure supporting OHE:** Bonding & Earthing should be as per Part-II of Earthing & Bonding Code ETI/OHE/71-Rev.1.

As per clause no. 6.3 of BSEN 50122-1 (2011), the reinforcement of the RCC structure in which the OHE support structures & anchor fasteners are installed, shall be earthed and bonded to return rails.

Earthing & Bonding Scheme should be validated by the appropriate agency.

6. OHE loading for structure design

6.1 OHE system weight data

The following are the OHE weight data:

SN	Description	Particular	Remarks
1	Contact wire (107 mm2)	0.952kg/m	If 150 mm^2, then the weight is 1.34 kg/m
2	Catenary wire (65 mm2)	0.5973 kg/m	If 125 mm^2, then the weight is 1.191 kg/m
3	Feeder Wire	-	If 238 mm^2 All aluminium spider conductor, then the weight is 0.654 kg per m/ If 232 mm^2 All aluminium alloy conductor, then the weight is 0.637 kg per meter/If 288 mm^2 All aluminium alloy conductor (AAAC), then the weight is 0.794kg/m
4	Aerial Earth Conductor	-	If 91.97 mm^2 ACSR Conductor, weight is 0.319kg/m
5	OHE weight kg per meter	1.6 kg/m	With some allowance for dropper weights; If higher capacity OHE(150mm^2/125mm^2), then the weight is 2.6 kg/m
6	Earth wire weight	0.437 kg/m	
7	Cantilever assembly weight	60 kg	
8	Weight of maintainer with tools	100 kg	May not be relevant in the instant case, but still conservatively considered
9	Section insulator weight	50 kg	
10	Cut in insulator weight	15 kg	
11	Drop arm bracket assembly weight with SPS	146 kg	DA length of 2375mm with RSJ (8x6”), having unit weight of 53.39kg/m considered
12	Spreader bar weight with SPS (each)	18 kg	1250m length, C channel 150mm x 75mm

6.2 Cases considered

The onerous case could be installing two OHEs on support (one normal and other out-of-run) and running through the length of covered area and one OHE having cut-in insulator.

The situation of OHE termination with ATD inside covered area is not foreseen.

However, OHE termination with FTA arrangement either on face of station structure or at any intermediate concrete beam may be possible and hence considered (though it is not recommended).

6.3 Loads for 72m Span with conductor 65mm^2/107mm^2 for 1200/1200 kg tension.

6.3.1 Vertical Load

OHE weight (2 nos.) = 2 x [72 x (1.6 + 0.437)]	= 294 kg
Cantilever weight (2 nos.) = 2 x 60 kg	= 120 kg
Maintainer weight	= 100 kg
Cut-in insulator weight = 2 x 15	= 30kg
Drop Arm / Spreader arm (2 nos.) / SPS weight	= 182
Total vertical load	= 294 + 120 + 100 + 30 + 182 = 726 kg
Add extra for unforeseen	25 kg

The case with one OHE and section insulator installed in that span will be less onerous than the above one.

6.3.2 Transverse loads

Radial load due to stagger (200mm) of both catenary and contact wire = 1200/72 x (2*0.2 + 2*0.2) = 13.33 Kg. (for each)	= 27 kg (approx.)
Radial load due to stagger of out-of-run OHE is not considered as that OHE can be taken terminated in straight line on concrete beam	= 0
Wind load (considering wind pressure of 216 kg/m^2, high capacity OHE, contact wire diameter 12.24 mm and catenary wire diameter 10.5 mm) = 1.05*0.75*(0.01224 + 0.0105)*216*72=278.5 Kg	= 279 Kg

Note: In Indian Railway OHEs, the catenary wire is not staggered normally, but in many systems (such DFCCIL) the catenary wire is also staggered. For future considerations, the catenary wire is also considered staggered for loading purpose.

6.3.3 FTA load on beam.

FTA load on beam structure (directly installed on concrete beam) = 2400 kgf (in longitudinal direction).The tension used by IR with 107mm^2/65mm^2 combination is 1200 kgf each i.e. 2400 kgf total. Anchor load of 2400 kgf, on beam structure as well as on the face of the station concourse shall be considered in design of concourse. From safety point of view of structures, the broken wire impact on structures due to Anchor load i.e. 2400 Kg should also be considered.

Additionally, the jerk load of OHE breaking shall also be considered.

6.3.4 Other than the OHE loading described above, the station planning shall consider loads for future proposals, alterations, augmentation etc.

6.3.5 The loads shall be considered as follows:

(a) High capacity OHE with 2 OHEs shall be considered for all locations, whether or not the same is currently having 2 OHEs;
(b) For every 5 tracks or part thereof, FTA load for one track shall be considered in design of concourse, which can be in any of the tracks;

6.4 Loads for 72m Span with conductor 125 mm^2/150 mm^2 for 1500/1500 kg tension.

6.4.1 Vertical Load

High capacity OHE OHE weight (2 nos.) = 2 x [72 x (2.6 + 0.437)]	= 438 kg
Cantilever weight (2 nos.) = 2 x 60 kg	= 120 kg
Maintainer weight	= 100 kg
Cut-in insulator weight = 2 x 15	= 30kg
Drop Arm / Spreader arm (2 nos.) / SPS weight	= 182
Total vertical load	= 438 + 120 + 100 + 30 + 182 = 870 kg
Add extra for unforeseen	25 kg

The case with one OHE and section insulator installed in that span will be less onerous than the above one.

6.4.2 Transverse loads

Radial load due to stagger (200mm) of both catenary and contact wire = 1500/72 x (2*0.2 + 2*0.2) = 16.66 Kg. (for each)	= 34 kg (approx.)
Radial load due to stagger of out-of-run OHE is not considered as that OHE can be taken terminated in straight line on concrete beam	= 0
Wind load (considering wind pressure of 216 kg/m2, high capacity OHE, contact wire diameter 14.5 mm and catenary wire diameter 14mm) = 1.05*0.75*(0.0145 + 0.014)*216*72=349 Kg	= 349 Kg

Note: In Indian Railway OHEs, the catenary wire is not staggered normally, but in many systems (such DFCCIL) the Catenary wire is also staggered. For future considerations, the Catenary is also considered staggered for loading purpose.

6.4.3 FTA load on beam.

FTA load on beam structure (directly installed on concrete beam) = 2400 kgf (in longitudinal direction).The tension used by IR with 150 mm^2/125 mm^2 combination is 1500 kgf each i.e. 3000 kgf total. Anchor load of 3000 kgf, on beam structure as well as on the face of the station concourse shall be considered in design of concourse. From safety point of view of

structures, the broken wire impact on structures due to Anchor load i.e. 3000 Kg should also be considered.
Additionally, the jerk load of OHE breaking shall also be considered.

6.4.4 Other than the OHE loading described above, the station planning shall consider loads for future proposals, alterations, augmentation etc.

6.4.5 The loads shall be considered as follows:

(a) High capacity OHE with 2 OHEs shall be considered for all locations, whether or not the same is currently having 2 OHEs;
(b) For every 5 tracks or part thereof, FTA load for one track shall be considered in design of concourse, which can be in any of the tracks;

6.5 The design of support brackets shall be duly proof checked. The design shall have the following features:--

(a) Maintenance instructions shall be given i.e. how the repairs/ replacement work shall be done. This shall be essential feature of design and a maintenance manual shall be prepared and handed over to TRD Department in Division responsible for maintaining the OHE.
(b) Spare foundation bolt for OHE structure to be provided at each concrete beam.

6.6 Fixing Arrangements:-

(a) For safety design of structures, all loads & bending moment should be calculated considering 72m OHE span i.e. maximum from Civil structural point of view. The minimum vertical loads and bending moment arising due to suspension of OHE cantilever along with Drop Arm with Girder/Slab of structures should be approximate 900 Kg (Vertical Load) and 1200 Kg. m (Bending Moment) respectively.
(b) The above mentioned loads and bending moment should be taken while designing of civil structures.
(c) The clamp type fixing arrangement should be preferred from maintenance aspect.
(d) If fixing arrangement is proposed to be erected on Girder/Slab of structures the proper structural design should be done considering all additional loads from safety aspect as per codal provision.
(e) It is suggested that the fixing arrangement should be designed and embedded while casting of structures with the consultation of concerned TRD department as per lay out plan of OHE cantilever assembly at required expected interval from future aspect of RE works.

7.0 Bird menace

All other provisions regarding bird nesting in ACTM are in respect of maintenance / inspection and mitigation measures (e.g. removing the bird nests etc.) should be followed.

The following measures are recommended for avoiding bird menace:

(a) If the structure consists of closed sections which don't permit birds to sit or make nests, such as concrete beams / slab system no special precautions are required
(b) For structures which permit birds to sit or make nests such as in case of steel plate girders / trusses etc. measures given in RDSO SMI No. TI/MI/0050 Rev. 2 should be followed:

(c) Drop arms of RSJ/BFB sections only shall be used and the fabricated / laced drop arms shall not be used.

8.0 Safety regulations

8.1.1 EN 50122-1 (Jan 2011) or IEC 62128-1 (2013) "Railway applications – Fixed installations – Electrical safety, earthing and the return circuit – Part 1: Protective provisions against electric shock" elaborates the requirements from the safety perspective.

8.1.2 The basic safety clearances are described in figure 4 of EN 50122-1, which is produced below as figure 7:

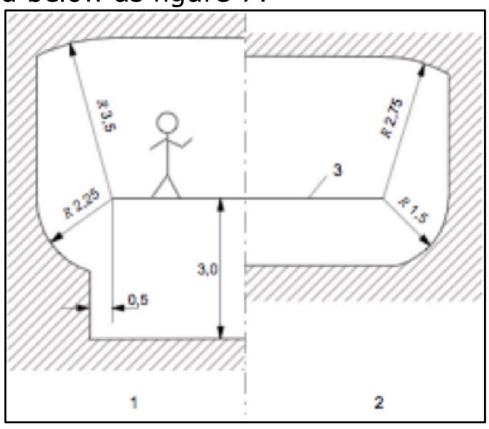

Figure 7: Minimum clearances to accessible live parts on the outside of vehicles as well as to live parts of overhead contact line systems from standing surfaces accessible to persons for high voltages (figure 4 of EN 50122-1)
[1 – public areas; 2 – restricted areas; 3 – standing surface]

The instant case of station development relates to public area (1).

8.1.3 The above-referred EN/IEC further provides for designs of obstacles in case the above clearances are not possible to be achieved (ref Para 5.3.2.2 "Obstacles and standing surfaces above live parts"). Such provisions for 25kV ac traction system are provided in figure A.2 of EN 50122-1, which is produced below as figure 8.

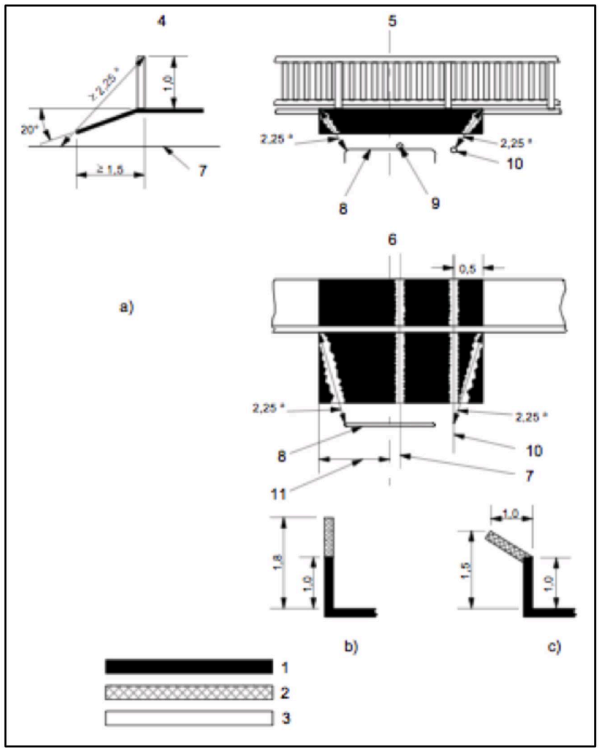

Figure 8: Examples of obstacles along the sides of standing surfaces in public areas for protection against direct contact when live parts on the outside of vehicles or live parts of an overhead contact line system for high voltages (figure A.2 of EN 50122-1)

Key

1 – solid wall design or obstacle confirming to degree of protection IP3X as defined in EN 60529
2 – mesh screen with a maximum 1200 mm2 mesh size (can also be solid wall design)
3 – railing, mesh construction (can also be solid wall design)
4 – side view
5 – front view
6 – plan view
7 – contact wire catenary line feeder
8 – pantograph
9 – contact wire
10 – line feeder
11 – half pantograph zone

8.1.4 IR ACTM basically derives the safety clearance of 2m from live parts and safety screens (on FOBs, ROBs etc.) from the above EN/IEC only. All the regulations basically relates to elimination of possibility of accessing live parts from the standing / working surfaces.

PHOTOGRAPHS OF OHE ARRANGEMENT AT RAILWAY STATIONS:

Examples of DMRC's Pragati Maidan station and UK's Birmingham railway station is shown in below pictures, which does not have openings on the sides above tracks.

Figure 9: Pragati Maidan Metro station

Figure 10a: Birmingham Railway Station

Figure 10b: Birmingham Railway Station

Figure 11: OHE suspension arrangement at DMRC's Tuglakabad station (1)

Figure 12: OHE suspension arrangement at DMRC's Tuglakabad station (2)

Figure 13: OHE suspension arrangement at DMRC's Tuglakabad station (3)

Figure 14: Nerul Station of Central Railway (1)

Figure 15: Nerul Station of Central Railway (2)

Figure 16: Khargar Station of Central Railway

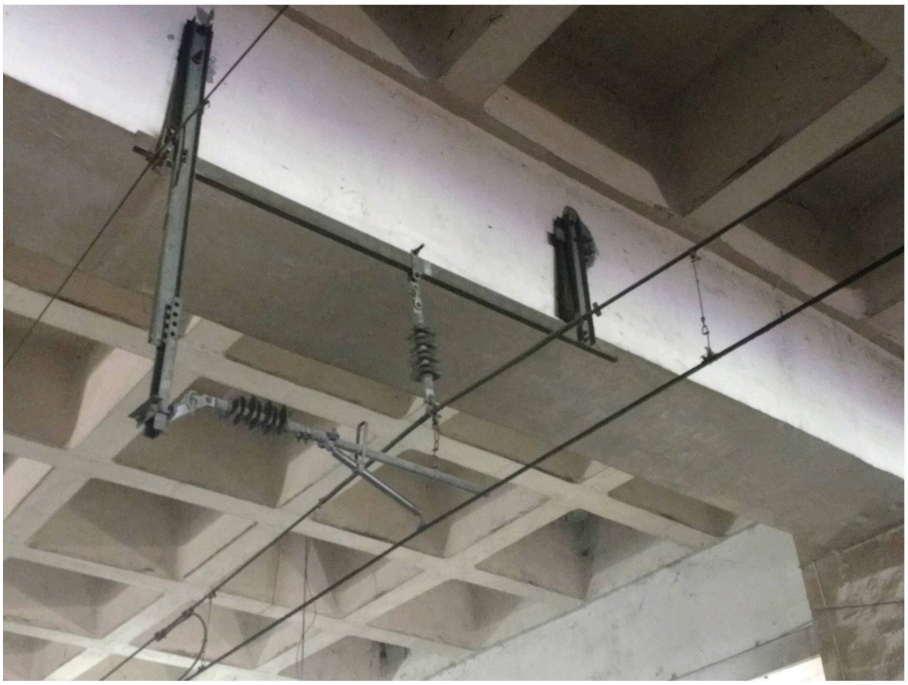

Figure 17: Belapur Station of Central Railway

Figure 18: Churchgate Station of Western Railway