

No: SLT16/OCGC/EMP-16/QAQC/GEN/2021/6794

Date: 1st July 2021

To,

PMC-2R

Oriental Consultants Global Consortium
(OCG – OCI – NK – NKI – RITES)

Dedicated Freight Corridor Corporation India Limited (DFCCIL)
3rd Floor, Pragati Maidan, Metro Station Building Complex,
New Delhi – 110 001, INDIA.

Kind Attn.: **Mr. Pramod Kumar Aggarwal**
(Dy. Project Director, The Engineer for Employer)

Dear Sir,

Sub : Contract Agreement No. 2015/HQ/EL/Ph-II/EMP-16/8/SOJITZ-L&T dated 31.03.16 for "Design, supply, installation, testing and commissioning of 2X25 kV overhead equipment, traction sub-stations, switching stations, auto transformer stations and SCADA system on design-build lump sum price basis for JNPT-Makarpura(Vadodara) section (approx 422 kms) of Western dedicated freight corridor (phase-2) (contract package EMP-16)* : **EMP16 – Resubmission of Method Statement for stringing of Aerial Earth Conductor and Feeder Wire.**

Ref : 1. Contract Agreement no. 2015/HQ/EL/Ph-II/EMP-16/8/SOJITZ-L&T dated 31-03-2016 part-2 GS.
2. PMC Letter No – L/OCGC/DFCC/CMT/EMP-16/2105/47317 Dated 22.05.2021

With reference to letter in reference 2, we are resubmitting the method statement for stringing of Aerial Earth conductor and feeder wire. Incorporated the comments given by the engineer and the details as follows.

Sl no	Engineer's Comments	Contractor's Response
1	Please confirm that all the provisions given in clause 2.14.1 & 2.14.2 of part -5A have been complied especially the use of Tension chart for achieving the required Tension. Tension chart to be enclosed with the method statement.	Noted, all the provisions and covered as per clause 2.14.1 & 2.14.2 of part-5A and Tension chart attached in Annexure -A & B

In view of the above, Engineer may kindly arrange to issue NONO to the above Documents

Thanking you and assuring you of our best services all the times,

Yours faithfully,

For Sojitz-L&T Consortium




(Samir Kumar Gupta)

Project Director

CC: 1. DFCCIL - CGM/ South / Mumbai
2. DFCCIL- CGM/ North / Mumbai
3. DFCCIL- CGM/ / Vadodara
4. OCGC - ZMT-1, ZMT-2, ZMT-3

Encl: as above



A Sojitz - L&T Consortium



WDFC Phase-2 Electrical and Mechanical Works Package-16 (EMP-16)

METHOD STATEMENT FOR STRINGING OF AERIAL EARTH CONDUCTOR (AEC) & FEEDER WIRES

Document No. DOC/EMP-16/QAQC/GEN/54 – Rev 1

CONTRACTOR:

SOJITZ - L&T CONSORTIUM
c/o Larsen & Toubro Limited
Railway SBG, Vatika Mindscapes Building
Tower 'A', 8th & 9th Floors
12/3, Delhi – Mathura Road
Near Sarai Khawaja Metro Station
Faridabad – 121003, Haryana

CLIENT:

DEDICATED FREIGHT
CORRIDOR CORPORATION OF
INDIA LIMITED
5th Floor, Pragati Maidan
Metro Station Building
New Delhi – 110001

CONSULTANT:

ORIENTAL CONSULTANTS
GLOBAL CONSORTIUM
3rd Floor, Pragati Maidan
Metro Station Building Complex,
New Delhi – 110001

01	1.07.2021	VM		PGK		SKG	
Rev.	Date	Name	Sign	Name	Sign	Name	Sign
		Prepared by		Reviewed by		Approved by	



Revision History

Revision No.	Revision Date	Revision Details		Approved by
		Clause No.	Revision	
0	15.04.2021		Initial Submission	
1	1.07.2021		The document has been revised as per our response vide letter no. SLT16/DFCCIL/EMP16/QAQC/GEN/2021/6794 DATE: 7.1.2021 against Engineers letter no. L/OCGC/DFCCIL/CMT/EMP-16/2105/47317 DATE : 22.05.2021	



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1. INTRODUCTION

Ministry of Railways (MOR), Government of India has planned to construct a High Axle Load Dedicated Freight Corridor (DFC) covering about 3325 km on two corridors, known as the Eastern and Western Corridors.

The Western Corridor is planned from Jawaharlal Nehru Portat Nhava Sheva (JNPT), Mumbai to Tughlakabad / Dadri near Delhi. The Western Corridor of DFC Project covers a length of about 1,480 RKM (JNPT – Ahmadabad – Palanpur – Rewari – Asoti – Dadri). Western Corridor is planned to be implemented in two phases. The first phase envisages construction of about 915 RKM between Makarpura (Vadodara) and Rewari and second phase is of about 565 RKM consisting of Vadodara-JNPT of about 422 RKM and Rewari – Dadri of about 143 RKM. This document deals with Makarpura (Vadodara) – JNPT section of 2nd phase of the Western Corridor only.

Package-16 consists of 422 Kms of double line electrified track with 2x25 kV AC, 50 Hz, and Overhead Catenary System from Vadodara to JNPT running along the existing Indian Railway Tracks. The route is to be constructed, capable of operating at a maximum train speed of 100 km/h with an initial axle load of 25T.

Formation and bridge structure are to be provided for 32.5T axle load and track structure for 25T axle load. Provisions to raise track and traction structures by 275 mm are considered.



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The proposed alignment between JNPT – Makarpura is located on east side of existing IR. The proposed alignment of DFC is passing generally parallel to the existing IR network between JNPT-Makarpura and taking detours to avoid city congestion. Almost 71% of the proposed DFC alignment passes parallel to the existing IR network and 29% of the alignment passes through detours.

The complete stretch from Makarpura (Vadodara) to JNPT (422 km) has been divided into three sections, viz. Makarpura (Vadodara) to Sachin of about 131 kms, Sachin to Vaitarana about 186 kms and Vaitarana to JNPT of about 102 kms.

Section	TKM	TSS	SWS (SP, SSPs)	Milestone
Makarpura (Vadodara) – Sachin	279	2	14	MS-1
Sachin - Vaitarana	380	3	17	MS-2
Vaitarana - JNPT	237	2	9	MS-3



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2. PURPOSE/SCOPE OF WORK :**2.1. Purpose**

To establish a procedure to carry out the wiring process of Feeder wire & Aerial Earth Conductor in a good workmanship manner and to ensure higher productivity, Quality & Safety aiming towards zero re-work/ rejection & Non- conformities.

2.2. Scope of Work

- A) Wiring of Aerial Earth Conductor
- B) Wiring of Feeder Wire

3. REFERENCE DOCUMENT:

- 3.1. Project Quality Assurance Plan (Document no. DOC/EMP-16/PLNG/OTH/001 Rev.01)
- 3.2. Safety, Health & Environment (SHE) plan and Safety & health monitoring plan (SHMOP) - DOC/EMP-16/SHE/GEN/005 Rev .05
- 3.3. Environment Social Management Plan (ESMP) (Document No. DOC/EMP-16/SHE/GEN/004 Rev.04).
- 3.4. Method statement for Foundation, Mast erection and Grouting.

4. ABBREVIATIONS:

List of frequent used abbreviations in this document are tabulated below:

S.No	Abbreviation	Expansion
1.	OHE	Overhead equipment.
2.	LOP	Layout Plan
3.	CSD	Cross Sectional Details
4.	RRV	Road cum rail vehicle
5.	GFC	Good for construction
6.	FBM	Foundation Bending moment
7.	CAPO	Chief accident prevention officer
8.	QA	Quality assurance
9.	QC	Quality control
10.	SAPO	Senior Accident Prevention Officer
11.	IR	Indian Railways
12.	CENO	Chief Environmental officer
13.	SENO	Senior Environmental Officer
14.	SHO	Safety Health officer
15.	AEC	Aerial Earth Conductor

5. ROLES AND RESPONSIBILITIES:**5.1. Project Director:**

- 5.1.1. Overall in charge of execution of project design, planning and execution of work.
- 5.1.2. Responsible for monitoring the entire process of design, construction and execution of wiring of Feeder wire and Aerial Earth Conductor (AEC) works at site with due adherence of safety & quality.



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5.2. Head Quality

- 5.2.1. Plan & monitors the overall quality of the work carried out at site. Ensure all required QA/QC infrastructure is well in place, all measuring & testing equipment are duly calibrated.
- 5.2.2. Monitors implementation of all requirements as per contract and project quality assurance plan during the execution of the work.
- 5.2.3. Directs quality personnel in accordance with the site requirement.
- 5.2.4. Analyzing the observations of site recordings and report the same to project director and mitigation of non-conformities if any as per relevant control procedures.

5.3. Package Quality lead:

- 5.3.1. Shall have the overall responsibility and authority for implementation of quality in all activities of the section / package.
- 5.3.2. Overseeing the Quality Engineers in the section.
- 5.3.3. Responsible for ensuring that the work is executed in accordance with the Good for Construction (GFC) drawings and other duly approved methodology related documents.
- 5.3.4. Authority to manage the system to bring non-conformance (if any) to management's attention.
- 5.3.5. Surveillance of site works.

5.4. QC Engineer

- 5.4.1. Identify material sources and conduct materials test and ensure conformity as per relevant ITP.
- 5.4.2. Conduct routine tests on materials & workmanship as per ITP for conformance and maintain records.
- 5.4.3. Ensure that tests are performed as per ITP and values are as per acceptance limit.
- 5.4.4. Maintain the records of all the laboratory tests.
- 5.4.5. Verifying the level of the foundation and displacement from the measurements of the auto level and dial gauge arrangement respectively.

5.5. Package manager:

- 5.5.1. Will be responsible for planning and execution of day to day activities in line with contractual requirements.
- 5.5.2. Will be responsible for ensuring work being carried as per approved method statements and GFC drawings.
- 5.5.3. Will be responsible for monitoring of progress of site activities.
- 5.5.4. Will be responsible for implementing Quality control and quality assurance process and procedures in execution activities in close co-ordination with site quality team.
- 5.5.5. Will be responsible for correcting any defects and deficiencies in the erection activities in accordance with specification/norms and communicating the remedial action with quality control and quality assurance team.
- 5.5.6. Responsible for ensuring safety of man, machine by adhering to all safety norms.

5.6. Section in-charge:

- 5.6.1. Reports to the project manager and co-ordinates with the Engineer for day to day activities.
- 5.6.2. Vests the overall responsibility for construction work and site work activities at section level.
- 5.6.3. Responsible for carrying out work with approved method statement and GFC drawings.
- 5.6.4. Implementation of safety and quality procedures.
- 5.6.5. Documentation of all process related reports as per PQAP requirements, technical specifications and Engineer's instruction.
- 5.6.6. Ensure that all the workmen engaged under him are properly trained & have undergone site SHE induction before assigning any task at construction site.

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5.7. Site engineer:

- 5.7.1. Reports to the section in-charge.
- 5.7.2. Responsible for execution of Wiring of Feeder wire and AEC of mast as described in this method statement and along with QC engineer maintain the construction record.
- 5.7.3. Carrying out work only with approved method statement and GFC drawing.
- 5.7.4. RFI submission as per the system according to the activities planned.
- 5.7.5. Co-ordinates and execute the work related to other agencies like, concrete plant, arranging all construction related material, tools & tackles etc.
- 5.7.6. Understand and follow the applicable SHE requirements, ensure hazard/ aspect identification and risk/ impact assessment is done for the work.
- 5.7.7. Give pep talk on SHE requirements to the workmen under him.

5.8. SHE Director:

- 5.8.1. Review HIRAC (Hazard Identification Risk Assessment and Control) related to various activities for the execution of AEC and feeder wire.
- 5.8.2. Routine and surprise Inspections at work sites and recommended corrective and preventive actions based on observations.
- 5.8.3. Plan & organize SHE awareness among the employees including sub-contractor's employees & workmen.
- 5.8.4. Guide and advise the SHE Team for safe execution of the project AEC & feeder wire work.

5.9. Chief Accident prevention officer (CAPO)/SAPO/SHO:

- 5.9.1. Assesses risk associated with activities and determine, if any, additional control measures are required for other risk found at the site.
- 5.9.2. Ensure for use of PPE as per the guideline by all involved.
- 5.9.3. Ensure for compliance with the requirements of work permit system.
- 5.9.4. Ensure compliance with statutory SHE requirements.
- 5.9.5. Investigate and report all accidents / incidents and near misses.
- 5.9.6. Ensure for availability of requisite medical aids / firefighting equipment.
- 5.9.7. To ensure that work is done as per the Method statement & site execution engineer have a copy of Method statement and aware of his duty and responsibility.
- 5.9.8. To report any unusual issue to his superior and settle the same as per his advice.

5.10. Labour Welfare Officer(s):

- 5.10.1. Ensure for the statutory compliances related to workmen welfare.
- 5.10.2. To maintain various statutory documents/records related to workmen welfare.
- 5.10.3. House accommodation and drinking water facilities.
- 5.10.4. Ensure Health and Hygiene facilities.

5.11. In charge plant & machinery

- 5.11.1. Responsible for healthy working conditions of machinery and equipment.
- 5.11.2. Issues fitness certificate for machinery and equipment.
- 5.11.3. Overall management of heavy equipment, plants and vehicles.
- 5.11.4. Ensure mobilization of equipment according to the mobilization plan.

5.12. Skilled & unskilled workers

- 5.12.1. Reports to the site engineer.
- 5.12.2. Ensure the work permit system before starting the work
- 5.12.3. Ensure PPE while during work
- 5.12.4. Ensure the housekeeping at site
- 5.12.5. Handling of tools and tackles as per the procedure



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6. RESOURCES, EQUIPMENT & MANPOWER REQUIREMENT:**6.1. Manpower (for each activity):**

- A. Construction manager (Common position responsible for other works also) – 1 No
- B. Site engineer / supervisor -1 No
- C. Quality engineer / supervisor – 1 No
- D. Safety engineer / supervisor – 1 No
- E. P & M engineer / supervisor – 1 No
- F. Skilled workers – as per site requirement – 4 Nos
- G. Un skilled workers – as per site requirement – 9-12 Nos

Above manpower requirement is indicative. This may change as per the needs of the hour at the time of actual execution of work.

6.2. Material:

- A. Small Part Steel (SPS) (as per approved drawing) - as per requirement
- B. GI Fasteners (as mentioned in the approved drawing) – as per requirement
- C. Guy Rod Assembly – as per requirement
- D. Mast Anchor Fitting and Guy Rod Fitting – as per requirement
- E. End Clamps – as per requirement
- F. AEC Mast Clamps– as per requirement
- G. 9 Ton Suspension / Termination insulator – as per requirement
- H. Feeder Suspension Clamps – as per requirement
- I. Al Tape and ferrules – as per requirement
- J. AEC and Feeder Conductor Drums – as per requirement

Note:

- I. Quantity of other required material mentioned as "as per requirement" shall be calculated from approved GFC drawing.

6.3. Equipment and tools & tackles :

The following tools and tackles will be used for AEC / feeder wire stringing work:

- A. RRV (Rail cum road vehicle) – 2 Nos.
- B. Rail based man lift (scissor lift) - 2 nos.
- C. Conductor Drum Rail Trolley—2 Nos.
- D. Hook – chook [of capacity 1.5 Ton & 3 Ton] – 2 nos. each
- E. Come along clamp (for AEC & Feeder each) – 3 set each
- F. Roller -100 Nos.
- G. Rope (20mm) – 6 set
- H. Aluminum ladder- 4 Nos. with 13.4 mtrs folding type heavy duty.
- I. Special Discharge Rod – 2 set (required only working nearby electrified line)
- J. Binding Wire – 2 bundle
- K. Dynamometer for measuring tension equipment (of 5 M.T capacity) – 1 no.
- L. 3 Ton capacity D shackle- 6 nos.
- M. 16 mm dia Slings (1.5, 3 & 6 meters long)-6 nos.
- N. 2 lb hammer – 2 nos.
- O. Hack saw frame with blade/ wire cutter– 2 nos.
- P. Measuring tape-5m/15m
- Q. Spanner set (both double end and ring)(of various sizes) – as required
- R. Tommy rod – 2 nos.
- S. Pulley (Single sleeve and double sleeve) –as required
- T. Drum with spindle arrangement with jack set (5-ton capacity for each trolley) – 2 nos.

Above list of equipment is indicative. This may change as per the site requirement during actual execution of work or new innovative plant & machinery may be used in-order to obtain faster project execution in a better and efficient way.

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7. WORK PROCEDURE:

In view of different kinds and nature of execution fronts that may be available for stringing of Aerial Earth Conductor (AEC) & Feeder Wires, this method statement has been devised with different methods.

7.1. General requirement for stringing of AEC and Feeder wire:

- 7.1.1. Check the working condition of the RRV and conductor drum trolley arrangement before proceeding to work section.
- 7.1.2. Coordinate with the other contractors (civil & track and systems) for maneuvering of RRV on the track for removal of hindrances on the track for work section.
- 7.1.3. Working permit and permit to maneuver RRV on the track shall be ensured prior to maneuvering of the equipment.
- 7.1.4. Prior to proceeding for stringing of AEC, installation of required mast anchor & guyrod fitting and guy rod at both sides of the termination locations shall be ensured. In case earth clamp erected prior to stringing, the same also to be confirmed.
- 7.1.5. Load the drum of required tension with tolerances (as required) in accordance with approved LOP on the RRV or trolley.
- 7.1.6. Details of conductor drum like drum number, conductor length shall be noted.
- 7.1.7. Conformity checking shall be carried out to ensure all required materials (fittings, fasteners, ending clamping and others) and tools & tackles loaded.

7.2. Loading and unloading of drums (for both AEC & Feeder wire) :

Irrespective of carrier (trolley with jack- set, RRV or wiring train) following procedure shall be adopted during load and unloading of the conductor drums.

- 7.2.1. Drum shall be lifted gradually from the stocked position or from ground using crane.
- 7.2.2. Conductor drum shall be loaded into spindle arrangement of the carrier (trolley with jack-set, RRV or wiring train).
- 7.2.3. Drum should be locked in its position rigidly on spindle using the locking arrangement provided on the carrier.
- 7.2.4. While unloading, the drum shall be gradually removed from the spindle and stocked at designated position.
- 7.2.5. While loading and unloading drum shall not be allowed to swing, the movement of drum should be controlled through guide rope.

8. WORK PROCEDURE FOR AERIAL EARTH CONDUCTOR (AEC):**8.1. Erection of anchor SPS for AEC:**

- 8.1.1. At termination location of Aerial Earth Conductor (AEC), anchor SPS and guy rod SPS along with guy rod shall be erect in accordance with details provided in the approved drawing.
- 8.1.2. Erection of anchor and guy rod SPS shall be carried out either using rope and pulley assembly or using rail – road-based man lift.
- 8.1.3. In case of SPS erection using rope and pulley assembly following procedures shall be adopted:
 - 8.1.3.1. Shift the suitable type of SPS in accordance with type of mast at termination location prior to erection along with all required fasteners.
 - 8.1.3.2. Assemble the ladder on the mast and fix the pulley at an appropriate position to lift the SPS.
 - 8.1.3.3. Mark the position of anchor and guy rod SPS as per approved drawing from rail level on the mast.
 - 8.1.3.4. Gradually lift the SPS using rope to the marked position through pulley.
 - 8.1.3.5. Fix the SPS and tighten the fasteners with required torque.

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8.1.4. In case of SPS erection using rail – road-based man lift (scissor lift) , following procedures shall be adopted:

- 8.1.4.1. Maneuver the vehicle to the location where SPS need to be erected along with required SPS for that location on the man lift bucket.
- 8.1.4.2. Mark the position of anchor and guy rod SPS as per approved drawing from rail level on the mast.
- 8.1.4.3. Fix the SPS at marked location and ensure the proper tightening the fasteners with required torque.

8.2. Erection of Guy rod at AEC termination locations:

- 8.2.1. Straighten the guy rod properly with no indications of bend (not necessary at dwarf mast locations).
- 8.2.2. Fix the guy rod on the pre-erected SPS and tighten the fasteners, at other end of the guyrod fix the anchor "V" bolt and stirrup assembly and complete the connection of guyrod through this assembly tighten the same with 24 mm bolt.
- 8.2.3. Guy rod on the other side shall erected in the same manner/ method.
- 8.2.4. In case of short guy rod (Dwarf mast locations), fixing of guy rod at mast side shall be carried out through designated SPS (dwarf mast attachment) and anchor bolt assembly.

8.3. Stringing of Aerial Earth Conductor (AEC):

8.3.1. Requirements prior to commencement of stringing:

- 8.3.1.1. Completion of installation Small parts of steel (SPS) at termination locations shall be confirmed.
- 8.3.1.2. Completion of installation of guyrod at termination location shall be confirmed.
- 8.3.1.3. Tension length of conductor drum shall be confirmed.
- 8.3.1.4. Ensure the line block (if required) is granted in prescribed format from DFCC/Railways representative.

8.3.2. Stringing of AEC from country side:

Stringing of Aerial Earth Conductor (AEC) shall be carried out using any of the following methods. The method of stringing shall be on the bases of availability of work front, site conditions and availability of machineries:

1. Stringing of AEC using jack set and ladder (manually)
2. Stringing of AEC using Rail cum road vehicle (RRV)

8.3.2.1. Stringing of AEC using jack set and ladder (manually):

- a) Place the jack set firmly on the ground on one side of the termination. Place the conductor drum on the jack set with support of rigid pipe in the jack set. Ensure that drum on rotating condition.
- b) Uncoil the conductor from the drum manually gradually and drag the conductor manually towards the other (one/starting) end of the termination.
- c) After reaching the termination end, lift the conductor using rope and pulley assembly till the termination point marked on the mast.
- d) Complete the termination of the conductor as per approved drawing.
- e) Lift the conductor at every mast using the rope and pulley arrangement and fix the conductor on the mast using binding wire, rope or roller fixed on the mast.
- f) Complete the stringing of the conductor for entire tension length using the same procedure.
- g) At the (other) termination end, mark the required length of the conductor and cut the remaining from the drum.
- h) Termination of the AEC shall be carried out as per procedure explained in clause 8.3.4 of this document.
- i) Ensure the verticality of the mast after releasing the hook – chook (tirfor).

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- j) Remove the binding wire, rope or roller and fix the earth clamp and transfer the conductor to the earth clamp.

8.3.2.2. Stringing of AEC using rail cum road vehicle (RRV):

- a) After completion of termination of conductor at one end of the tension length, uniformly move the RRV with conductor drum towards other end of the tension length.
- b) Conductor uncoiled from the drum shall be lift to the position of fixing of AEC through either crane or high mast fitted in the RRV.
- c) Termination of the AEC shall be carried out as per procedure explained in clause 8.3.4 of this document.
- d) After completion of termination, ensure verticality of the mast.
- e) Remove the binding wire, rope or roller and fix the earth clamp and transfer the conductor to the earth clamp.

8.3.3. Stringing of AEC from track side:

Stringing of Aerial Earth Conductor (AEC) shall be carried out using any of the following methods. The method of stringing shall be on the bases of availability of work front, site conditions and availability of machineries:

- a) Stringing of AEC using push trolley and ladder trolley (manually)
- b) Stringing of AEC using RRV and working platform
- c) Stringing of AEC using wiring train and working platform

8.3.3.2. Stringing of AEC using push trolley and ladder trolley (manually)

- a) After obtaining required permit to move on the track, maneuver the push trolley with jack set in which drum loaded and ladder trolley on the track on the working track (either up or down).
- b) Commence the stringing of AEC by terminating one end at pre-erected anchor fittings. Termination arrangement shall be as approved drawing (LOP).
- c) Uncoil the conductor from drum and lay the conductor over the pre-laid wooden rollers (in a span of 25 meters) to avoid damaging of conductor.
- d) Maneuver the push trolley and ladder trolley in a uniform speed while uncoiling the conductor gradually from the drum.
- e) Place the aluminum ladder near the mast where AEC to be installed along with pulley and rope arrangement.
- f) Lift the laid conductor using pulley and rope assembly through the ladder and transfer the conductor to the other side of the mast (from track side to country side) manually.
- g) Support the AEC at country side using any one among binding wire or rope or roller fixed on the mast.
- h) Continue the stringing of AEC in the similar process till reaching other end of the termination.
- i) Termination of the AEC shall be carried out as per procedure explained in clause 8.3.4 of this document.
- j) After completion of termination, ensure verticality of the mast.
- k) In case stringing carried out on the rollers, change the rollers and erect earth conductor clamp.
- l) After completion close down the work advice the workmen to keep all tools and material in the safe place and also get down from Deck/heavy ladders.
- m) Ensure the strands of conductor not damaged during the stringing.
- n) After the completion of stringing record the balance length of conductor and seal the end of the conductor.

8.3.3.3. Stringing of AEC using RRV and working platform:

- a) After obtaining required permit to move on the track, maneuver the RRV with conductor drum and rail- road based working platform on the working track (either up or down).

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- b) Commence the stringing of AEC by terminating one end at pre-erected anchor fittings. Termination arrangement shall be as approved drawing (LOP).
- c) Uncoil the conductor from drum and shall be lifted to require height using either crane fixed at the RRV or high mast fixed at the RRV, the conductor shall be controlled through rope – pulley assembly fitted at the rail based working platform following the RRV.
- d) Transfer the conductor through the other side of the mast (from track side to country side) manually using rope – pulley assembly.
- e) Support the AEC at country side using any one among binding wire or rope or roller fixed on the mast.
- f) Maneuver the RRV or ladder trolley in a uniform speed while uncoiling the conductor gradually from the drum.
- g) Continue the stringing of AEC in the similar process till reaching other end of the termination.
- h) Termination of the AEC shall be carried out as per procedure explained in clause 8.3.4 of this document.
- i) After completion of termination, ensure verticality of the mast.
- j) After completion close down the work advise the workmen to keep all tools and material in the safe place and also get down from Deck/heavy ladders.
- k) Ensure the strands of conductor not damaged during the stringing.
- l) After the completion of stringing record the balance length of conductor and seal the end of the conductor.

8.3.3.4. Stringing of AEC using wiring train and working platform

- a) The procedure for the stringing AEC using wiring train shall remain same of procedure explained in stringing AEC using RRV (clause 8.3.2.2 of this method statement).
- b) The conductor shall be uncoiled from the drum loaded on the wiring train through the flexible / adjustable mast fitted on the wiring train.

8.3.4. Termination of AEC wire:

- 8.3.4.1. Fix the "come along clamp" on the conductor and gradually apply load on the conductor using hook chook (tirfor) till achieving require load.
- 8.3.4.2. Apply the load steadily with Tirfor , until the dynamometer reaches the desired tension as required from tension chart (Annexure – A)
- 8.3.4.3. After achieving the required load and proper tension on the conductor, mark the termination point on the conductor and cut the remaining / excess conductor.
- 8.3.4.4. Fix the AEC ending clamp on the conductor and fix it rigidity. Terminate the conductor by fixing conductor with ending clamp on the pre-erected anchor SPS.
- 8.3.4.5. After properly terminating the conductor, gradually release the load on the hook-chook and remove the same once entire load is removed.

9. STRINGING OF FEEDER WIRE:

9.1. Erection of SPS for Feeder for feeder suspension and termination:

- 9.1.1. SPS for feeder suspension arrangement shall be erect at all locations (either cross arm with suspension arrangement or super mast with cross arm and suspension).
- 9.1.2. At termination location of Feeder wire, anchor SPS and guy rod SPS along with guy rod shall be erect in accordance with details provided in the approved drawing.
- 9.1.3. Erection of all feeder related SPS shall be carried out either using rope and pulley assembly or using rail – road based man lift.
- 9.1.4. In case of SPS erection using rope and pulley assembly following procedures shall be adopted:



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- 9.1.4.1. Shift the suitable type of SPS in accordance with type of mast at termination location prior to erection along with all required fasteners.
- 9.1.4.2. Assemble the ladder on the mast and fix the pulley at an appropriate position to lift the SPS.
- 9.1.4.3. Mark the position of anchor and guy rod SPS as per approved drawing from rail level on the mast.
- 9.1.4.4. Gradually lift the SPS using rope to the marked position through pulley.
- 9.1.4.5. Fix the SPS and tighten the fasteners with required torque.

9.1.5. In case of SPS erection using rail – road based man lift, following procedures shall be adopted:

- 9.1.5.1. Maneuver the vehicle to the location where SPS need to be erected along with required SPS for that location on the man lift bucket.
- 9.1.5.2. Mark the position of anchor and guy rod SPS as per approved drawing from rail level on the mast.
- 9.1.5.3. Fix the SPS at marked location and ensure the proper tightening the fasteners with required torque.

9.2. Erection of Guy rod of at feeder termination locations:

- 9.2.1. Straighten the guy rod properly with no indications of bend (not necessary at dwarf mast locations).
- 9.2.2. Fix the guy rod on the pre-erected SPS and tighten the fasteners, at other end of the guyrod fix the anchor "V" bolt and stirrup assembly and complete the connection of guyrod through this assembly tighten the same with 24 mm bolt.
- 9.2.3. Guy rod on the other side shall erected in the same manner/ method.
- 9.2.4. In case of short guy rod (Dwarf mast locations), fixing of guy rod at mast side shall be carried out through designated SPS (dwarf mast attachment) and anchor bolt assembly.

9.3. STRINGING OF FEEDER WIRE:

9.3.1. Requirements prior to commencement of stringing:

- 9.3.1.1. Completion of installation of suspension arrangement (SPS) with suspension insulator and anchor & guyrod SPS at termination locations shall be confirmed.
- 9.3.1.2. Completion of installation of guyrod at termination location shall be confirmed.
- 9.3.1.3. Tension length of conductor drum shall be confirmed.
- 9.3.1.4. Ensure the line block (if required) is granted in prescribed format from DFCC/Railways representative.

1.1.1. Stringing of Feeder wire from country side:

Stringing of Feeder wire shall be carried out using any of the following methods. The method of stringing shall be on the bases of availability of work front, site conditions and availability of machineries. However, this method of stringing may not be feasible for the tension lengths in which feeder wire crosses to track side from country side or vice versa.

1. Stringing of feeder using jack set and ladder (manually)
2. Stringing of feeder using Rail cum road vehicle (RRV)

1.1.1.1. Stringing of Feeder wire using jack set and ladder (manually):

- a) Place the jack set firmly on the ground on one side of the termination. Place the conductor drum on the jack set with support of rigid pipe in the jack set. Ensure that drum on rotating condition.
- b) Uncoil the conductor from the drum manually gradually and drag the conductor manually towards the other (one) end of the termination.
- c) After reaching the termination end, lift the conductor using rope and pulley assembly till the termination point marked on the mast.
- d) Complete the termination of the conductor as per approved drawing.

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- e) Lift the conductor at every mast using the rope and pulley arrangement and fix the conductor on the mast using binding wire, rope or roller fixed on the mast.
- f) Complete the stringing of the conductor for entire tension length using the same procedure.
- g) Termination of the AEC shall be carried out as per procedure explained in clause 9.3.4 of this document.
- h) Ensure the verticality of the mast after releasing the hook – chook (tirfor).
- i) Remove the binding wire, rope or roller and fix the suspension clamp and transfer the conductor to the Suspension clamp.

1.1.1.2. Stringing of Feeder wire using rail cum road based vehicle (RRV):

- a) After completion of termination of conductor at one end of the tension length, uniformly move the RRV with conductor drum towards other end of the tension length.
- b) Conductor uncoiled from the drum shall be lift to the position of fixing of Feeder wire through either crane or high mast fitted in the RRV.
- c) Fix the conductor on the mast using binding wire, rope or roller fixed on the mast.
- d) Termination of the AEC shall be carried out as per procedure explained in clause 9.3.4 of this document.
- e) Ensure the verticality of the mast after releasing the hook – chook (tirfor).
- f) Remove the binding wire, rope or roller and fix the suspension clamp and transfer the conductor to the suspension clamp.

1.1.2. Stringing of Feeder wire from track side:

Stringing of Feeder wire shall be carried out using any of the following methods. The method of stringing shall be on the bases of availability of work front, site conditions and availability of machineries:

- a) Stringing of Feeder wire using push trolley and ladder trolley (manually)
- b) Stringing of Feeder wire using RRV and working platform
- c) Stringing of Feeder wire using wiring train and working platform

1.1.2.2. Stringing of Feeder wire using push trolley and ladder trolley (manually)

- a) After obtaining required permit to move on the track, maneuver the push trolley with jack set in which drum loaded and ladder trolley on the track on the working track (either up or down).
- b) Commence the stringing of Feeder wire by terminating one end at pre-erected anchor fittings. Termination arrangement shall be as approved drawing (LOP).
- c) Uncoil the conductor from drum and lay the conductor over the pre-laid wooden rollers (in a span of 25 meters) to avoid damaging of conductor.
- d) Maneuver the push trolley and ladder trolley in a uniform speed while uncoiling the conductor gradually from the drum.
- e) Place the aluminum ladder near the mast where Feeder wire to be installed along with pulley and rope arrangement.
- f) Lift the laid conductor using pulley and rope assembly through the ladder and transfer the conductor to the other side of the mast (from track side to country side) manually.
- g) Support the Feeder wire at country side using any one among binding wire or rope or roller fixed on the mast.
- h) Continue the stringing of Feeder wire in the similar process till reaching other end of the termination.
- i) Termination of the AEC shall be carried out as per procedure explained in clause 9.3.4 of this document.
- j) Ensure the verticality of the mast after releasing the hook – chook (tirfor).
- k) In case stringing carried out on the rollers, change the rollers and erect suspension clamp.

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- l) Wherever the feeder wire crosses to track side from country side, suspension height of the feeder will be varied. In these conditions, the height of the ladder trolley shall be increased to support the stringing of the feeder wire at increased height.
- m) After completion close down the work advise the workmen to keep all tools and material in the safe place and also get down from Deck/heavy ladders.
- n) Ensure the strands of conductor not damaged during the stringing.
- o) After the completion of stringing record the balance length of conductor and seal the end of the conductor.

1.1.2.3. Stringing of Feeder wire using RRV and working platform:

- a) After obtaining required permit to move on the track, maneuver the RRV with conductor drum and rail- road based working platform on the working track (either up or down).
- b) Commence the stringing of Feeder wire by terminating one end at pre-erected anchor fittings. Termination arrangement shall be as approved drawing (LOP).
- c) Uncoil the conductor from drum and shall be lifted to require height using crane fixed at the RRV, the conductor shall be controlled through rope – pulley assembly fitted at the rail based working platform following the RRV.
- d) Transfer the conductor through the other side of the mast (from track side to country side) manually using rope – pulley assembly.
- e) Support the Feeder wire at country side using any one among binding wire or rope or roller fixed on the mast.
- f) Maneuver the RRV or ladder trolley in a uniform speed while uncoiling the conductor gradually from the drum.
- g) Continue the stringing of Feeder wire in the similar process till reaching other end of the termination.
- h) Termination of the AEC shall be carried out as per procedure explained in clause 9.3.4 of this document.
- i) Ensure the verticality of the mast after releasing the hook – chook (tirfor).
- j) In case stringing carried out on the rollers, change the rollers and erect earth conductor clamp.
- k) Wherever the feeder wire crosses to track side from country side, suspension height of the feeder will be varied. In these conditions, the height of the working platform shall be increased to support the stringing of the feeder wire at increased height.
- l) Stringing of feeder at these locations shall be carried out manually using rope and pulley assembly.
- m) After completion close the work and advise the workmen to keep all tools and material in the safe place and get down from Deck/heavy ladders.
- n) Ensure the strands of conductor not damaged during the stringing.
- o) After the completion of stringing record, the balance length of conductor and seal the end of the conductor.

1.1.2.4. Stringing of Feeder wire using wiring train and working platform

- a) The procedure for the stringing Feeder wire using wiring train shall remain same of procedure explained in stringing Feeder wire using RRV (clause 8.3.2.2 of this method statement).
- b) The conductor shall be uncoiled from the drum loaded on the wiring train through the flexible / adjustable mast fitted on the wiring train.

1.1.3. Termination of feeder wire:

- 1.1.3.1. Fix the "come along clamp" on the conductor and gradually apply load on the conductor using hook chook (tirfor) till achieving require load.
- 1.1.3.2. After achieving the required load and proper tension on the conductor, mark the termination point of the conductor and cut the excess conductor from the marked point.
- 1.1.3.3. Ensure the proper seating of keeper and Tightness of the strain clamp with proper direction of rivets and then support the wire on termination.

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- 1.1.3.4. Fix the conductor ending clamp and terminate the conductor on pre-erected anchor fittings at mast.
- 1.1.3.5. After completing termination of the conductor, gradually decrease the load on the hook-chook and remove the same.

2. QUALITY ASSURNACE AND QULAIITY CONTROL:

1. Conductor drum should be free and smooth to rotate during uncoiling of the conductor.
2. Conductor should be free from damages and strands of the conductor should be free from breakage.
3. After stringing, the height of the AEC should be verified (randomly) in accordance with approved drawing.
4. Conductor should be free from twist during and after stringing.
5. Conductor should be suspended using suspension clamp or aerial earth clamp only. This should be verified after completion of changing of rollers.

3. SAFETY, HEALTH & ENVIRONMENT:

Safe work plan and Risk assessment for the entire work has been explained in appendix – 1.

4. CONCLUSION:

Thus, the objective of this document is be achieved by describing the detailed methodology to adopted during wiring of AEC and Feeder wire by using, manual & mechanized methods, by duly ensuring the quality of work with all possible required safety precautions.

5. ANNEXURES:

1. Inspection and test plan (ITP) - 1 no of page
2. Checklist - 1 no of page
3. Annexure -A - 1 no of page
4. Annextue -B - 1 no of page



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Annexure- # 1 Inspection and Test Plan

SI no	Main Activity	Test	Specification and other reference documents	Acceptable criteria	Inspection by-		Frequency	Verifying documents	Remarks
					SLT-16	Eng's			
1	Requirements before commencement of erection activities								
1.1	Verification of readiness of the work section - verification of erection of SPS, Guyrod and other required fittings	Physical verification	Approved layour plan (LOP)	All required SPS, Guyrod and other fittings should be erected in accordance with approved LOP	H	R	Once prior to commencement of stringing	Check list	
1.2	Verification of correctness of conductor drum, availability of all required materials and tools and tackles	Physical verification	Approved layour plan (LOP) & site conditions	Drum should be as per approved LOP of the section under work. All required materials and tools & tackles should be as per requirement					
2	Requirments during commencement of construction activities								
2.1	Verification of Conductor	Physical verification	Approved Method statement / Drawing	Conductor should be free from twist and other visible damages during stringing	H	W	After completion of Stringing and termination	Check list	
3	Requirments after completion of construction activities								
3.1	Fixing of suspension clamps or earth clamps	Physical verification	Approved Method statement	1. Feeder wire should be suspended through suspension clamp 2. AEC should be connected to mast through earth clamp	H	W	After completion of Stringing and termination	Check list	
Legend : W - witness inspection point H - Mandatory Hold point for inspection R- Document review									



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Annexure- 2 Checklist (For Stringing of Aerial Earth Conductor)

WDFC/EMP-16/CL/OHE/01			
 मेडीकेटेड फ्रेट कोरीडोर		 sojitz L&T <small>A Sojitz - L&T Consortium</small>	
PMC-2R OCG CONSORTIUM			
Check List for AEC / Feeder wire stringing			
PROJECT	: WDFC PHASE- 2 EMP-16 : JNPT – MAKARPURA (VADODARA)		
EMPLOYER	: DFCCIL		
ENGINEER	: PMC-2R OCG CONSORTIUM		
CONTRACTOR	: SOJITZ - L&T CONSORTIUM		
RFI Ref. No :		Date :	
Stringing of	AEC <input type="checkbox"/>	Feeder wire	<input type="checkbox"/>
Tension length details			
Tension length		Location (starting and ending)	
Wire run no (if any)		Drum no	
S.no	Description	Observation YES / NO / NA	Remarks (if any)
1	Permit to work and manoeuvring of rail based vehicle obtained prior to commencement of work		
2	Termination of conductor at starting of tension length carried out as per approved drawing		
3	Conductor properly connected at each mast either using roller or suspension clamp. In case of AEC connection to mast done using earth connector clamp.		
4	At other end of the termination, tension applied on the conductor as per approved drawing / method statement.		
5	Conductor was free from twist and other visible damages after stringing		
6	Termination of conductor carried out in accordance with approved drawing		
7	Rollers were replaced (wherever rollers used for stringing)		
8	Drum sealed after completion of stringing		
9	work permit closed after reaching siding or halting location in line with guidelines		
10			
SLT		PMC-2R (OCGC)	



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Annexure-A : TENSION CHART FOR 288 SQMM AAAC FEEDER WIRE (Ref : Rites Manual vol-4)									
Temperature/Eq. Span	27	31.5	36	40.5	45	49.5	54		
	Tension	Tension	Tension	Tension	Tension	Tension	Tension	Tension	Tension
-2.50	1826	1783	1735	1681	1622	1557	1489		
0.00	1730	1689	1641	1588	1530	1467	1400		
5.00	1541	1500	1454	1403	1348	1289	1227		
10.00	1352	1314	1270	1222	1171	1118	1063		
15.00	1166	1130	1090	1047	1003	957	912		
20.00	983	951	917	882	846	811	777		
25.00	806	782	757	731	707	684	663		
30.00	642	628	615	603	591	581	572		
35.00	500	500	500	500	500	500	500		
40.00	390	402	413	423	431	438	444		
45.00	313	333	351	366	379	391	401		
50.00	262	285	305	323	339	354	366		



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Annexure-B : TENSION CHART FOR 93.3 SQMM ACSR AERIAL EARTH WIRE (Ref : Rites Manual voll-4)

Temperature/E.q. Span	27	31.5	36	40.5	45	49.5	54
	Tension	Tension	Tension	Tension	Tension	Tension	Tension
-2.50	1051	1045	1038	1030	1021	1012	1002
0.00	1014	1008	1001	993	985	975	965
5.00	939	933	927	919	912	903	894
10.00	864	859	853	846	839	831	823
15.00	790	785	780	774	768	761	753
20.00	716	712	708	703	697	692	686
25.00	643	640	636	633	629	625	620
30.00	571	569	567	565	563	561	558
35.00	500	500	500	500	500	500	500
40.00	432	434	437	439	442	444	447
45.00	367	373	378	383	389	394	399
50.00	309	317	326	334	343	350	358



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APPENDIX – 1**SHE WORK PROCEDURE****1. INTRODUCTION:**

The purpose this procedure is to prevent the risks and control the incidents and injuries, while Stringing of Feeder Wire and Aerial Earth Conductor on OHE Masts.

2. PERSON INVOLVED:

- A) Construction Manager
- B) Site Engineer
- C) Site Supervisors
- D) Machine Operators
- E) Workmen

3. GENERAL SAFETY REQUIREMENT, WHILE STRINGING OF FEEDER WIRE & AERIAL EARTH CONDUCTOR ON OHE MASTS:

All safety measures as required for the activities shall be strictly adhered besides following the obligatory safety measures & requirements before starting the work activities at site:

- a) All working personnel shall undergo screening and pre-employment medical examination, safety induction training and then issued with Safety Cards / ID Cards before putting them on the job to ensure safe execution of the work activities.
- b) The workman assigned to the job shall be provided with mandatory Personal Protective Equipment (PEEs) like: Safety Helmet, Safety Shoes, Reflective Jacket including safety harness, if required and ID & Safety Cards.
- c) An adequately stocked first aid box shall be available at the work site.
- d) Toolbox talk shall be conducted related to work activity before the commencement of the work activity by the site execution engineer.
- e) All hand tools and power tools shall be inspected by the site in-charge and safety in-charge prior to commencement of the work activity.
- f) Barricades, handrails, signage, caution tapes or other appropriate warning devices shall be provided to protect the site personnel as well as workmen from the hazards encountered at the work site.
- g) Ensure that no inflammable materials are kept unsafely at work sites during the work activity.
- h) Any untoward entry by public / any moving vehicle in the cordoned working area shall be restricted.
- i) Vigilant consideration shall be given to the safety of site personnel as well as workmen and equipment during clearing operation.
- j) If work activity is to be carried out night hours, then the area shall be provided with sufficient light / illumination conforming to 50 LUX and prior permission of Client through PMC.
- k) No person shall work under the influence of alcohol / abused drugs.

4. SAFETY REQUIREMENTS FOR WORKING NEAR RUNNING TRACKS OF INDIAN RAILWAYS:

Whenever, work to be executed near to running Indian Railway track, the following safety measures shall be followed:

- a) When work to be executed within 3.5 m from center line of existing Indian Railway track, power block with traffic block shall be obtained from the concern Indian Railway Authority through PMC & client. Red banner flag shall be place at both end of possession area at an distance of 100 meter from the work area and a Flag man deployed at both end,

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- b) When work to be executed between 3.5 meter to 6.0m from center line of existing Indian Railway track, a barricading shall be placed along the possession area at a distance of 3.5m from the center of track. Ensured that no part of vehicle / construction equipment infringes into the schedule of dimensions of Railway.
- c) When work to be executed beyond 6.0m from center line of existing Indian Railway track, it should be ensured that no vehicle / construction equipment infringes demarcation line marked at 6.0 m from center of existing Indian Railway track and ensure soft barricading.
- d) Any material unloaded along Indian Railway track will be kept clear of moving dimensions and stacked at minimum 4.0m distance from the center of running Indian Railway track.
- e) Movement of vehicle / working of machineries will not be permitted during night. In case night working is to be adopted proper fencing / hard barricading at 3.5 m from track center of running track will be erected to ensure that no infringement of moving dimension takes place. Suitable lighting arrangements should be ensured conforming to 50 LUX and direction of light do not produce glaring effect to Loco pilot eyes.
- f) Working at existing railway station area for modification of existing siding / line will be done after approval of plan and with permit to work from Indian Railway Authority, as and when required.
- g) Flag man shall be deployed if work activity will be carried out within 6.0 m from center line of existing Indian Railway track.

5. SAFETY REQUIREMENTS FOR WORKING ON OR ADJACENT TO DFCC TRACK:

The following safety measures shall be followed by all Site personal and workmen when the works carried out on or Adjacent to DFCC track:

- a) All site personal & Operators should undergo Operational Safety awareness training program by the Civil contractor (IRCON & TATA) being the landlord of formation and track and possess valid "Track Access Card" before engaging them at work site.
- b) Ensure proper Authority to Proceed, Block / Track Possession should be taken from the Control room of Civil contractor before starting of any work activity on or adjacent to DFCC track.
- c) Ensure provision of Red banner flags at min of 100 m from the work location at both Up & Down line for safe and controlled movement of RRVs & RBVs at the track.
- d) Ensure deployment of the Signalmen / Flagmen (with Tri color torch, Red & Green hand flags and Whistle) at both sides of the track, so that driver of the RRVs / RBVs and the working group can be indicated and alerted about the arrival of the vehicle.
- e) Ensure stoppage of the work activities for time being, when RRVs / RBVs approaches the nearest track at the work site and resume the work activity, when these vehicles have passed through the work sites.
- f) Ensure GPS tracking system should be installed on all the RRVs and RBVs before commissioning at the track and the Drivers / Operators of these vehicles should be undergone CRO / Operational Safety awareness training.

6. SAFETY DURING ERECTION OF GUY ROD, EARTH CLAMP ASSEMBLY, SUPER MASTS, ETC.

The below safety precautionary measures should be followed during erecting Guy rod, Earth clamps & Super masts on OHE masts:

- a) Proper permit to Work at Height shall be taken before commencement of height works.
- b) Provide adequate access and egress to all site personal & workmen for work at height like, Ladders, Ladder trolley, Vertical Carrying Platform (VCP) vehicle or any similar other means.
- c) Ensure TPI of all lifting tools & tackles and lifting gears, mechanized equipment, crane, wiring train etc. by a competent person and ensure availability of TPI certificates at worksite.
- d) Ensure handrails are provided on the working platform of Ladder trolley / VCP.
- e) Ensure usage of Pulley and rope arrangements for lifting of any material from ground level to height. Don't allow anyone to throw any kind of materials nor tools.
- f) Provide Tools bag to all workmen who working at height to carry all tools and tackles to height.

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- g) Don't allow any person to stand / work directly below the work area where work at height being carried out.
- h) Ensure tightness of bolts before leaving the work spot to prevent fall of fittings from OHE masts.
- i) Ensure persons allowed on the working platform of Ladder trolley / VCP according to the load capacity designed.
- j) In case using of ladders for inspection, ensure the slope ratio of 4:1(Height to Base) to avoid collapsing of ladders.
- k) Ladders should be securely tied at a strong support or guided through guy rope for the stability.
- l) Ensure ladders shall not be used for carrying load at height.
- m) Don't allow more than one person working on one ladder at a time.

7. SAFETY DURING LOADING & UNLOADING OF CONDUCTOR DRUMS:

- a) No crane shall be subjected to a load greater than its rated load carrying capacity at given radius and boom length as per load chart with 15% safety margin. Load chart to be provided in all cranes.
- b) Ensure ASLI of the crane should be in working condition.
- c) All lifting equipment shall be carried out load test by competent person as per statutory requirement and ensure the availability of Third-Party Inspection certificates.
- d) Only tested tools, tackles and slings shall be used at site.
- e) Ensure color coding have done to all lifting equipment, tools & tackles, etc. as per the quarterly color-coding scheme.
- f) Every hoist hook shall be fitted with a safety latch.
- g) Operators must have valid driving license and Competency certificate issued to the Operator after examining his operating skills.
- h) Where ground conditions are not adequate to resist unreasonable settlement, crane mast shall be utilized to distribute the load of cranes.
- i) Ensure the Cranes should be deployed at even & compacted surface and its out riggers shall be fully extended & wooden blocks / iron sheet sole plate shall be placed underneath the out riggers base plates of these equipment.
- j) During loading / unloading, tag lines shall be used to control movement of the load. Only competent & authorized persons, who are familiar with the specific hazard of the operation shall be deployed in the work area, where operations are being carried out.
- k) No person should be allowed to work or stand in the path of crane movement. Always ensure Banksman / Signaller available while reversing of crane or other heavy machineries.
- l) No person should be allowed to stand or work beneath the suspended load (conductor drum).
- m) Crane shall not be operated anywhere near a power line unless the operator has a signaller to guide him, when any part of the boom, cable or load is approaching the minimum safe distance from the power line.

Minimum safe distance from power lines is:

Power lines (Capacity in KV)	Minimum or safe distance
400 kV	7.3 m
275 kV	7.0 m
132 kV	6.7 m
33-86 kV	6.0 m
11-33 kV	5.2 m



8. SAFETY DURING STRINGING OF FEEDER WIRE & AERIAL EARTH CONDUCTOR ON OHE MASTS MANUALLY / THROUGH VCP:

- a) Select the lifting tools and tackles according to the load required at work site.
- b) Ensure that selected lifting tools & tackles were tested by a Competent Person and availability of Third-Party Inspection Certificate.
- c) Ensure physical verification of lifting tools & tackles and the same color coded as per the Quarterly color-coded scheme.

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- d) During stringing activity, the speed of the RRV & VCP shall be maintained at 5 Kmph.
- e) Proper permit to Work at Height shall be taken before commencement of height works.
- f) Provide proper and adequate access and egress to all site personal & workmen for work at height like, Ladders, Ladder trolley, Vertical Carrying Platform (VCP) vehicle or some other means.
- g) Ensure persons allowed on the working platform of Ladder trolley / VCP according to the load capacity designed. (4:1 safety factor)
- h) Ensure handrails are provided on the working platform of Ladder trolley / VCP.
- i) Only metallic Ladders shall be selected according to the work condition (like height, manufactured material, required strength, etc.)
- j) Ensure the slope ratio of 4:1 to avoid collapsing of ladders.
- k) Do not allow more than one person working on one ladder at a time.
- l) Pulley & rope arrangements shall be used to lift any materials / conductor to the height.
- m) Ensure that no person gets contact with the conductors in bare hands or allows to work near to the conductor during stringing.
- n) In case any live electrical line found near to the stringing activity location, proper electrical shut down permit should be taken before starting of work activity.
- o) To eliminate the induction current effect on the conductor, which is stringing, it shall be earthed through discharge rod.
- p) Adequate housekeeping should be maintained in working platform of Ladder trolley / VCP to prevent slip, trip & fall hazard.
- q) No person shall be allowed to work at site under the influence of alcohol / abused drugs.

9. PPEs REQUIRED:

The table below summarizes the types of Personal Protective Equipment (PPEs), which shall be used, when stringing of Feeder Wire & Aerial Earth conductor.

Body Part	Equipment	Reason
Head, Face and Eyes	Hard hat (Helmet), Safety Goggles, Nose mask	Protects from: <ul style="list-style-type: none"> • Fall of material • Unwanted particles from conductor drum. • Dust / fine particles
Hands	Cut resistant Hand gloves, Leather Hand gloves	Protects against: <ul style="list-style-type: none"> • Sharp edges, broken wooden pieces from drum, cutting tools, Conductor, etc.
Feet	Safety Shoes	Protects against: <ul style="list-style-type: none"> • Sharp / protruding parts if any • Fall of material on feet.
Full body	Safety Harness	Protects against: <ul style="list-style-type: none"> • Fall from height.

10. GENERAL SAFETY PRECAUTIONS FOR CONSTRUCTION MACHINERY AND EQUIPMENT:

10.1 Inspections and Certifications:

- a. Before deployment of the Construction Machinery / Equipment / Vehicle at work sites, the following Obligatory safety requirements / devices shall be checked and ensured:

- Construction Machinery / Equipment / Vehicle and all lifting tools & tackles shall be certified by a competent person and TPI Certificates should be available.
- Valid Registration certificate of the Construction Machinery / Equipment / Vehicle.
- Valid PUC (Pollution under Control) certificate of the Construction Machinery / Equipment / Vehicle.
- Driver shall have a valid driving license & competency certificate issued by P&M Head.



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- Construction Machinery / Equipment / Vehicle fitness certificate with sticker shall be ensured by a competent P&M person at the work site.
 - Audible reverse alarm / horn, wind shield, front & back lights and delay start device.
- b. Pre-operation inspection of the Construction Machinery / Equipment / Vehicle shall be done through checklist before starting the work activity to ensure that the Construction Machinery / Equipment / Vehicle is in safe working condition. Checklist is a part of SHE Plan.
 - c. Smoking, welding, or open flame shall not be allowed within 20 feet of any equipment being refueled.

10.2 Safety while work on high Embankment:

- a. There is hazard of persons / Cranes working near to edge of the embankment formation may skid from the high embankment owing to loose soil at the edge, therefore all such vehicles or machinery shall operate from minimum 01 meter away from the edge of formation embankment.
- b. Working group / operator shall be trained about this Hazards and control measure.
- c. Persons working below may get hit with fall of equipment or material from height may cause to serious injuries and property damage. To avoid such loss-making events following precautions shall be taken.
 - Keep working at minimum 01-meter safe distance from edges of the embankment always.
 - Follow safe material transportation practices to avoid accidental fall of loose material from vehicle during transportation.
 - Proper lighting and visibility of sign boards for safe movement of vehicles and persons on embankment area shall be ensured.
 - Safe access to reach the top of the embankment surface shall be provided.

10.3 Stand-By Emergency Vehicle:

- a. A vehicle shall be kept ready along with first aid kit to meet the emergency situation at work site.
- b. Ensure availability of CO₂ Fire extinguisher at work site.
- c. Ensure Emergency Contact number is displayed and communicated to all Site personal & Workmen.

11. ANNEXURES:

Hazard Identification, Risk Assessment & Control measures, and Environmental Aspect & Impact:

- a) Stringing of Feeder Wire & Aerial Earth Conductor on OHE Masts.
- b) Safety Checklist / Formats.



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SOJITZ-L&T CONSORTIUM
WDFC-PHASE 2-EMP16 (GOTHAN TSS)

SHE RISK ASSESSMENT

Name of the Project: WDFC, Phase-II, EMP-16,

Business Unit: MLBU

Activity considered: Stringing of AEC (Areal Earth Conductor) and Feeder wire on OHE mast

Date: 15.04.2021.

Ref: WDFC/EMP-16/SLT/SHE/034 REV 00



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Sl. No	Activity	Hazard / Environmental Aspect			Existing Control Measure	Probability	Severity	Risk/ Impact	Additional Control Measures (if a list is exhaustive, Give only a doc Ref no. of the Safe Work Method)	Residual Risk / Impact	Action by
		Source / Situation / Act	Possible Outcome	People at risk							
01		Hit by Train running on existing IR track.	Fatality or LTI with long severity	Staff & Worker	1. Barricading shall be done at 3.5 meter from the center of existing adjacent IR track when working within 3.5 meter to 6.0 meter from the Indian railway track, respectively. 2. A training shall be imparted to staff & labours for Railway safety prior to deployment for the work.	3	5	15	1. Work shall be done under the supervision only. 2. Site supervisor shall ensure that no site staff/workers cross or go on operational track of IR without the consent of IR Authority. 3. Site supervisor to ensure that no site staff or workers including himself use the mobile phone or headset/ear plugs when working nearby IR track. 4. Use of PPE by all at the site.	1x5=5 L	Site execution engineer & Safety team
02	Working on DFCC Track or adjacent to IR Track	Hit by work train on DFCC Track	Fatality or LTI with long severity	Staff & Worker	1. Prior Permit to work for the movement of Track equipments/Rail mounted vehicle for the work in intended chainage shall be obtained from the Landlord of Track contractor (IRCON-CTP-12 area)/TATA-CTP-11 & 13). 2. Red banner flag (Day time) & Red signal lights shall be placed on possession area border in each direction on both track, 100 meters away from the work area to control the movement of RRVs and other rail mounted vehicles. 3. Trained signalmen/flagmen shall be deployed at both ends at nominated place with tri-colour torch (Red, Green & yellow) & whistle during night / poor visibility & Red & green flag and whistle at daytime. 4. Toolbox talk shall be done prior to commencement of work including the movement of rail mounted equipments etc.	3	5	15	1. Work shall be done under the supervision only. 2. Use of PPE by all at the site. 3. No lone working is permitted under any circumstances. 4. Site supervisor to ensure that no site staff or workers including himself use the mobile phone or headset/ear plugs when working nearby IR track. 5. GPS tracing system shall be installed in all RRVs and Rail mounted equipments to check their respective position periodically.	1x5=5 L	Site execution engineer/Safety staff



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03	Installation of Guy rod, Earth clamp, super Mast, Cross arm & insulator arrangement.	Fall from height (Mast /Vertical carrying platform	Fatality or LTI with long severity	Staff & Worker	<ol style="list-style-type: none"> 1. Issuance of Permit to work at height prior to commencement of work. 2. Provision of handrail on work platform. 3. Use of full body safety harness when working at height. 	3	5	15	<ol style="list-style-type: none"> 1. Workers having passed acrophobia test & received the JOB specification training only shall be deployed. 2. No Supervisor, No work 	Site execution engineer	1x5-5 L
04		Fall of objects from height	Major injury or LTI with severity	Staff & Worker	<ol style="list-style-type: none"> 1. No person shall stand underneath the work are at the time of height work. 2. Workers would be provided with tools bag to carry tools for the purpose. 3. Throwing of tools, materials etc would be strictly prohibited. 4. Use of pulley and lanyards for lifting and disposing the materials to ground level during erection. 	3	4	12	<ol style="list-style-type: none"> 1. Ensuring the tightness of bolts of erected equipments before coming down from the height work. 2. Conduct TBT and sensitize the workers about the hazards and associated risk prior to commencement of work. 	Site execution engineer	1x4-4 L
05		TPI not done of crane	Major injury or LTI with severity	Staff & Worker	<ol style="list-style-type: none"> 1. Make sure that TPI of crane has been done by the competent person and same or certified copy of same is available at the site. 	3	3	09	<ol style="list-style-type: none"> 1. Pre and post inspection of crane shall be done by the P&M staff on daily basis. 	Site engineer /PM/Safety Staff	1x3-3 L
06	Loading & Unloading of conductor Drums.	Incompetent crane operator & signalmen.	LTI with severity	Operator, Staff & Worker	<ol style="list-style-type: none"> 1. Ensure that deployed operator is competent and medically fit for the work. 2. Operator has the valid driving license. 3. Banksman/signalmen are trained and competent one. 	3	3	09	<ol style="list-style-type: none"> 1. No one other than the operator shall operate the crane. 2. Operator shall be briefed about the task at the worksite and about the associated risk. 3. Package manager shall check the skill & competency prior to issuance of authority for operating at site. 	Site engineer /Package Manager	1x3-3 L
07	Loading & Unloading of AEC and feeder wire conductor drum	Selection of unsuitable equipment for lifting work	LTI	Operator, Staff & Worker	<ol style="list-style-type: none"> 2. Equipment shall be Selected as per the weight of the load. No work shall commence until inspected by P&M and safety staff & permitted to commence the work. 	3	3	09	<ol style="list-style-type: none"> 1. No supervisor, no work. 2. Conduct TBT daily emphasising current scenario of worksite and risk. 	Site engineer /PM/Safety staff	1x3-3 L
08		TPI not done of tools and tackles	LTI	Operator, Staff & Worker	<ol style="list-style-type: none"> 1. Make sure that TPI of tools and tackles have been done by the competent person and same or certified copy of same is available at the site. 	2	3	6	<ol style="list-style-type: none"> 1. Pre and post inspection of tools and tackles shall be done by the P&M staff on daily basis. 	Site engineer /PM/Safety staff	1x3-3 L



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09	Topping of crane	Major Injury	Operator, Staff & Worker	<ol style="list-style-type: none"> Obtain Permit to work & follow it. Select crane as per the load criteria. Place the crane on plain and compacted ground. 	3	4	12	<ol style="list-style-type: none"> Out rigger fully extended, and its base plate placed on the sole plate. Swing area to be barricaded. Risk associated of ongoing task be discussed in TBT on daily basis. 	1x4=4 L	Site engineer
10	Live Overhead electrical line nearby	Fatality / electrical shock	Operator, Staff & Worker	<ol style="list-style-type: none"> Always keep a clearance of 6 meter from any overhead lines. Obtain shut down permit from the owner of electrical utility to work nearby. Ensure for Earthing of electrical overhead lines till completion of task. 	4	5	20	<ol style="list-style-type: none"> Follow LOTO system. One SHE electrical engineer shall be present at the site to supervise and oversee the work. Electrical safety aspect shall be discussed in TBT before starting work 	1x5=5 L	Site engineer
11	Hit by conductor drum	Major Injury	Staff & Worker	<ol style="list-style-type: none"> No one shall be allowed stand nearby the drum when loading/unloading. 	3	4	12	<ol style="list-style-type: none"> Tag line shall be used to control the movement of drum from a safe distance. 	1x4=4 L	Site engineer
12	Hit by crane.	Major Injury	Staff & Worker	<ol style="list-style-type: none"> No person shall be allowed to come in crane maneuver area. Work shall be done in close supervision. 	3	4	12	<ol style="list-style-type: none"> Crane manoeuvre area shall be barricaded. Ensure for reverse horn working. Pre & post checking of crane be done before & after the work daily. 	1x4=4 L	Site engineer /P&M
13	Fall of conductor drum	Major Injury	Staff & Worker	<ol style="list-style-type: none"> Do not use damaged slings or rope for lifting work. No person shall stand nearby the load during the lifting work operation. 	3	4	12	<ol style="list-style-type: none"> Periodic maintenance of crane to detect any damaged hoist rope. Periodic maintenance of slings/ropes Barricading of work area of crane. 	1x4=4 L	Site engineer /P&M
14	TPI not done of tools and tackles	Major Injury	Staff & Worker	<ol style="list-style-type: none"> Make sure that TPI of tools and tackles have been done by the competent person and same or certified copy of same is available at the site. 	2	3	6	<ol style="list-style-type: none"> Pre & post checking of tools and tackles be done before & after the work daily. 	1x3=3 L	Site engineer /P&M
15	Stringing of feeder wire & Aerial Earth Conductor	Major Injury	Staff & Worker	<ol style="list-style-type: none"> Ensure for proper access & egress on height work platform. Use suitable ladder trolley, MEWP or mechanized, like vertical carry platform for work at height. Provide safety harness besides basic PPE. 	3	4	12	<ol style="list-style-type: none"> Job specific training shall be given to worker prior to commencement of work. No supervisor, no work. 	1x4=4 L	Site supervisor/P&M/Safety staff



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Sl. No.	Description of Hazard	Major Injury	Staff & Worker	Control Measures	Frequency	Severity	Residual Risk	Responsible Person	
16	Inadequate strength of working platform (ladder trolley /VCP)	Major Injury	Staff & Worker	1. Weight of no. of staff, tools & materials shall not exceed the rated capacity of the work platform. 2. Periodic inspection shall be done to check the worthiness of work platform.	2	4	2	1. Job specific training shall be given to worker prior to commencement of work. 2. No supervisor, no work.	Site supervisor/P&M/Safety staff
17	Fall of person from height (ladder /Trolley /MEWP/VCP).	Fatality Major Injury	Staff & Worker	1. Obtain permit to work for height work prior to work. 2. Ensure to have handrail at height work platform. 3. Use safety harness along with basic PPE.	3	5	15	1. Job specific training shall be given to worker prior to commencement of work. 2. No supervisor, No work.	Site supervisor/P&M/Safety staff
18	Failure of ladder	Fatality Major Injury	Staff & Worker	1. Only metallic ladder of approved design & strength as per ACTM shall be used. 2. Ladder shall be placed at a ratio of 4:1 when using it for inspection work only. 3. Conduct daily inspection of ladder to detect & rectify the same before use. 4. Only one person use the ladder at a time.	3	4	12	1. Ladder shall be secured properly at the top or bottom. 2. Always use 03-point contact while using the ladder. 3. No carrying of load is permitted using ladder. 4. No supervisor, No work.	Site supervisor/P&M/Safety staff
19	Over speeding of vehicle during stringing	LTI	Staff & Worker	1. Operator shall be instructed to make him aware about the risk of over speeding the vehicle more than 05 KMPH.	2	3	6	1. Use of wheel stopper shall be done to prevent the unwanted movement of work vehicle due to the gradient. 2. Periodic preventive shall be done specially of hand brake and service brake.	P&M /Safety staff
20.	Protruding parts of work platform	Minor Injury	Staff & Worker	1. Daily inspection shall be carried out of work at height platform to ensure no part of work platform protruding which can harm the user during the use.	2	2	4	1. Housekeeping shall be done on daily basis prior to commencement of work	Site supervisor/P&M /Safety
21	Hit by conductor of AEC/feeder	Minor Injury	Staff & Worker	1. Pulley & rope shall be used handle the conductor. 2. Worker & staff shall use hand gloves for handling the conductor while stringing firmly.	2	2	4	1. Job specific training shall be done to all concerned deputied for this work. 2. Safety instruction shall be given on daily basis during the TBT.	Site supervisor/P&M /Safety



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22		Induced EMF current in AEC & feeder wire due to the mutual induction from Charged OHE or Overhead lines.	Electric shock/Fatality due to shock	Staff & Worker	<ol style="list-style-type: none"> All OHE must shall be earthed to drain the induced current in the AEC/Feeder wire in proximity and parallel to charged OHE or overhead line. Hand gloves and safety shoes of 1000 Vac Capacity shall be used by staff/labours. 	4	5	20	<ol style="list-style-type: none"> Additional discharge rods shall be deployed at not more than 1000-meter distance over the AEC/Feeder wire. Work shall be done within the earth section, earthing at both side of work area not exceeding to 1000 meter. 	1x5=5 L	Site supervisor/ Safety Electrical engineer
23		Slip, Trip & Fall at working platform	Minor injury	Staff & Worker	<ol style="list-style-type: none"> Good housekeeping at regular interval of working platform. 	2	2	4	<ol style="list-style-type: none"> Only required tools & tackles shall be kept on the platform. Ensure for good housekeeping 	1x2=2 L	Site Supervisor
24		Working under the influence of abused drugs/Alcohol.	Major injury and health effect	Any one at work site	<ol style="list-style-type: none"> No one shall be permitted to come to site under the influence of alcohol/abused drugs. 	2	2	4	<ol style="list-style-type: none"> Breath analyser shall be used to check the staff / workers for having consumed the alcohol/abused drugs. 	1x2=2 L	Safety staff/ Site supervisor.
25	Environmental Aspect / impact for AEC / Feeder wire Stringing	Excessive Smoke from the vehicle /Equipments	Localised effect	Operator, Staff, Worker & surrounding community (Air pollution)		2	3	6	<ol style="list-style-type: none"> Internal Environmental monitoring shall be done to check the air quality at the work site. Periodic maintenance of engine, air filter for less smoking 	1x3=3 L	Safety staff/P&M staff
26		Noise	Minor effect			2	4	4	<ol style="list-style-type: none"> Job rotation / periodic rest shall be done amongst the workers and staff Monitoring noise level and corrective action by giving break in work period to reduce the acute noise issue. 	1x2=2 L	Site Engineer/ Safety Staff/P&M staff
27		Fugitive dust emission	Minor effect			4	2	8	<ol style="list-style-type: none"> Periodical water sprinkling at worksite to subside the dust. 	2x2=4 L	



28	Fire in equipment	Major effect		1. CO ₂ Fire extinguishers shall be provisioned in the equipment. 2. No flammable materials shall be stored in 20 feet from the heat generation source, like, engine, exhaust mufflers.	2	4	8	1. Fire fitting training imparted to all. 2. Periodic maintenance of equipment and no obstruction in ventilation system.	2x2=4 L	
29	Leakage of Hydraulic oil	Localised effect	Soil pollution	1. Ensure for no leakage of hydraulic oil from hydraulic system, pipeline, valve etc.	2	3	6	1. Job specification training given to site personal for corrective action in case of leakage found. 2. Periodic maintenance to check seals etc of hydraulic oil system. 3. Use dip try to spillage of oil on the ground.	1x3=3 L	
30	Leakage of battery acid	Technician /workmen	Major effect	1. Follow the safe method of handling of Lead acid battery as per the manufacturer instruction.	2	2	4	1. Job specification training shall be given to site personal for battery handling. 2. Use of rubber hand gloves for dealing with battery	1x2=2 L	P&M staff
31	Pandemic COVID-19 Social distancing/ Disinfection spray /Sanitization	Severe infection, Fatal	Workmen, supervisor, Engineer	1. Explain the causes and symptoms of covid-19 regularly. 2. Before entering the work location all staff and workmen are screened with thermal scanner and tested for SpO ₂ with Pulse Oximeter for O ₂ saturation not below 95%. 3. Ensure the social distance during travelling and at the workplace. 4. Regularly sanitize the tools and tackles, apparatus.	4	3	12	1. Conduct a regular toolbox talk and brief the Do's & Don'ts of covid-19. 2. Ensure the nose mask, hand gloves and PPE's at site. 3. Regular use of hand wash with sanitizer or soap water. 4. Did not mix the team members with others. 5. No unknown person shall mingle with working gang.	2x3=6 L	Site Engineer r/ Safety Engineer r



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32	Working at night/poor visibility condition.	at infringement to SOD of IR. Topping of construction equipment	Loss of Railway/SLT property /Loss of life/ LTI	Operator, Staff & Workmen Railway passenger	<ol style="list-style-type: none"> Obtain the night working permission from the Railway authority through - client - PMC. Follow the working protocol for night working / working during the poor visibility. work area shall be illuminated with 100 LUX light intensity. Light arrangement shall be made to ensure that it is not creating glaring effect to loco-pilots eyes of IR when working in parallel section. Vehicle movement not to exceed 10 KMPH. TBT to all staff for emergency rescue plan/ Compliance of PPE by all staff. 	2	4	8	Depute Marshalling staff with torch, whistle, and signalling /marshalling light.	1x4=4 L	Site Engineer / Safety Engineer
33	Adverse weather condition (lightening/thunder)	Thunderstorm and lightening	Grievous injury or fatality	Operator, Staff & Worker	<ol style="list-style-type: none"> To Locate the thunderstorm from the worksite, count the seconds between a flash of lightning and the clap of thunder. Roughly for every three seconds gives you about a kilometer. Seek shelter quickly if the length of time between the lightning flash and the clap of thunder is 30 seconds or less. Keep all metal and electrical objects more than 20 metres away from all personal of site. Avoid water and find a low-lying open place that is a safe distance from trees, poles, or metal objects. Water will transmit strikes from further away and lightning likes to strike high objects. 	3	4	12	<ol style="list-style-type: none"> Suspend activities for at least 30 minutes after the last clap of thunder of 30 seconds or less. If no shelter is available, crouch low, with as little of your body touching the ground as possible using safety shoes. Stay away 100 feet from concrete floors or walls of bridge or structure. Ensure for PPE compliance by all at the site. Explain about the lightning and thunderstorm in Toolbox Talk 	1x4=4 L	Site Engineer and SHE Engineer
34	Adverse weather condition (High wind)	Collapse of temporary structure	Grievous injury or fatality	Operator, Staff & Workmen	<ol style="list-style-type: none"> No temporary structure shall be used other than the beach umbrella / Canopy as rest shed. During high wind, all umbrella/Canopy shall be folded and secured. All staff to take shelter at the bottom of formation at the toe line of alignment against the direction of wind. 	2	4	8	<ol style="list-style-type: none"> Stop the work in case of wind speed is more than 40 KMPH. Use goggles to protect the eyes from dust. 	1x4=4 L	Site Engineer and SHE Engineer



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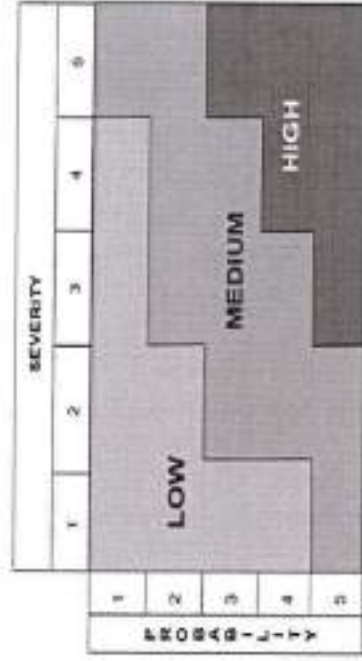
35	Adverse weather condition (Hot & Humid & rainy environment)	ILL health / Minor Injury	Loss of manpower/ hours	Operator, Staff & Workmen	<ol style="list-style-type: none"> 1. Arrangement of rest shed for workers to take breaks in cooler, shaded areas, and rest regularly during summer season. 2. No work in sun from 1200h – 1500 h in open worksite. 3. Arrangement for cool drinking water to avoid dehydration. 4. Arrangement of glucose during summer. 5. Avoid more than 02 hours continuous working at open worksite. 6. Take rest in rest shed for 15 minutes after 02 or less hours of work. 7. Work in rotation. 8. No work shall be done during the rain. 9. Provide raincoat to all workmen for protection from rain. 10. On commencement of rain stop the work and stable the construction equipment on level ground. 	2	3	6	<ol style="list-style-type: none"> 1. Loose clothing during the summer season by workers/staff. 2. Provide workers to use goggles in summer. 3. Ensure for proper access and egress to worksite with contingency plan for safe stopping work and shed for workmen on start of rain. 	1x3=3 L	Site Engineer and SHE Engineer
		Fall from height	Lost time injury	Operator, Staff & Workmen	<ol style="list-style-type: none"> 1. Barricade the edges of bridge to deter workmen & staff to go near to bridge edge. 2. Move the construction equipment at 05 KMPH. 3. Use mechanised Height work platform with handrail and full body harness for the stringing of wire on OHE Mast. 4. While moving the construction Equipments near the bridge, ensure for edge protection at minimum 01 meter away from the formation edge and also from abutment portion of bridge. 	2	3	6	<ol style="list-style-type: none"> 1. Toolbox talk to workmen for fall protection. 2. Alert the workmen and staff towards the Tripping and falling hazards. 	1x3=3 L	Site Engineer and SHE Engineer



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Probability Descriptions (The highest category will always be used)	
VALUE	Status
5	Very much likely
4	Most Likely
3	Likely
2	Unlikely
1	Most Unlikely

Severity Descriptions (The highest category shall always be used)			
VALUE	Result of Hazard to Personnel		Severity of the Environmental impact
	Safety	Health	
5	Single or multiple Fatality	Terminal illness	Massive effect
4	Serious Injury requiring hospitalisation	Unemployable due to illness	Major effect
3	Lost Time Injury	Intense health effect	Localized effect
2	Injury requiring Medical Treatment but not Lost Time	Minor health effect	Minor effect
1	First Aid treatment only	Slight health effect	Slight effect



Site In-charge

AK Singh,
SHE Director,
EMP-16



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Safety Check list / Formats



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Sojitz-Larsen & Toubro Consortium
WDFC Phase-2, EMP-16 Project

Ref: WDFC/EMP-16/SLT/SHE/006 Rev 00

Safety checklist for OHE wiring

Name of the Project :
Job Number :
Area/ Location :
Name of concerned Engineer/ Supervisor:



Risk control measures/guidelines for OHE wiring		Action taken (Yes/No/NA)	Remarks
General guidelines			
1	Ensure all tools & tackles are inspected and certified by third party (if required)		
2	Ensure availability of proper access like ladder, rail trolley or RRV or wiring train at site		
3	If required, block protection (traffic & power) should be taken from Railway authority		
4	Ensure trained signaller is deployed with flags and whistle for watching the train movement and for cautioning the workforce when working within 6 m of the existing IR track		
5	Impart training on height work, OHE safety & track work safety to all workforce including security guard & flagman		
6	Ensure use of safety harness with double lanyard for height work along with fall arrestor and provision of lifeline		
8	Do not allow workmen to climb on OHE mast/boom, without ladder, safety harness & fall arrestor. No permission to climb on the contact/catenary wire		
9	Ensure supervision by competent person all the time		
Risk Control measures/guidelines for OHE wiring through wiring wagon			
1	Do not halt the wiring train under the charged OHE		
2	No workmen/security guard/staff/local public be allowed to climb on the top of the wiring wagon without work permit by concerned site in charge		



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3	Wiring wagon access ladder should be locked to avoid unauthorized climbing while halting the wagon during ideal condition		
4	Warning signage in local language (25 KV charged OHE do not climb) should be displayed in bold letter at prominent places in wiring wagon		
5	Ensure hand rail, mid rail & toe board arrangement be made at the top of the wiring wagon (work platform)		
6	Rubber mat (25 KV resistance) should be provided on the working platform of wiring wagon		
Risk Control measures/guidelines for OHE work under power block			
1	Before start of work, give pep talk and work specific training to all employees involved in OHE work.		
2	After getting the power block, put discharge rod on both side of the work area (in case OHE was previously charged)		
3	Induction tester should be used for measuring the presence of induction current		
4	Ensure all materials are removed from the track after completion of OHE work		
5	Ensure proper communication with interconnected locations		
6	Ensure proper usage of additional PPE like-Electrical insulation hand gloves & gumboots during power block work		
Checked by: Site section in charge		Inspected by: SHE Dept.	
Name:		Name:	
Designation:		Designation:	
Signature:		Signature:	
Date:		Date:	



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 	Sojitz-Larsen & Toubro Consortium (WDFC Phase-2, EMP-16 Project)	
	Tool Box Talk Report	

SERIAL NUMBER	NAME	DESIGNATION	SIGNATURE
01			
02			
03			
04			
05			
06			
07			
08			
09			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			



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Sojitz-Larsen & Toubro Consortium**WDFC Phase-2, EMP-16 Project**

Ref: WDFC/EMP-16/SLT/SHE/016 Rev 00

Permit To Work At Height

Name of the Project : _____ Date: _____

Job Number : _____

Area / Location : _____

Permit required from time: _____ to time: _____

Name of the Performing Agency: _____

Risk Control measures to prevent Fall of Person	Done	Not Required
1. Whether Safe access to work place is provided 2. Whether the edge protection provided adequate 3. Is the work area away from the vicinity of moving objects 4. Whether work platform is adequate with respect to strength and dimension. 5. Is the working platform fully boarded? 6. Work platforms provided with guard rail. 7. Are the workmen screened for working at height? 8. Adequate fall protection arrangement made (Static line, Double Lanyard harness, Fall Arrestor, Safety Net)		
Risk Control measures for avoiding Fall of Materials		
1. Work at more than one elevation at the same segment is restricted. 2. Walkways, aisles & all overhead workplaces cleared of loose material. 3. Whether all tools & tackles inspected before use. 4. Whether hand tools & handling materials secured against accidental fall? 5. Workmen provided with bag / box to carry bolt, nuts & hand tools. 6. Whether area below, where the height work being performed is cordoned and unauthorised entries are avoided.		
Permit Requested By: Name : Designation: Signature:	Issuing Authority: Name : Designation: Signature:	
Closing of the Permit Time _____ & Date _____ at which the permit is closed.		
Name of the Issuing Authority: Designation: Signature:		



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Sojitz-Larsen & Toubro Consortium
WDFC Phase-2, EMP-16 Project

Ref: WDFC/EMP-16/SLT/SHE/018 Rev 00

Permit to Work on Plant, Machinery and Other Power Driving Equipment/ Work Permit**Which has moving parts which are not protected?**

Name of the equipment:

Area / Location :

Clearance required for: (Time) _____ to _____ on _____ (Date)

Nature of the job to be done:

Requested by:

Name:

Designation: Designation:

Date & Time:

Approved by:

Name:

Designation: Designation:

Date & Time:

Equipment de-energized at _____ (Time) _____ (Date)

Fuses removed		Yes / No
Circuit Breaker	Lowered / Removed	Yes / No
Danger Tag provided		Yes / No
Lock provided		Yes / No
Earthing Lead No.	Provided	Yes / No

Authorized Signature:

Name:

Designation:

Date & Time:

We have completed job on the above equipment & we certify that

1. The equipment is clear of all the men doing the job
2. All tools and tackles have been removed
3. Whole of the area has been cleared
4. The equipment can be energised

Signature:

Name:

Designation:

Date & Time:

Equipment Energised at _____ (Time) _____ (Date)

Earthing Lead No. Provided Yes / No

Authorized Signature:

Name:

Designation:

Date & Time:



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Sojitz-Larsen & Toubro Consortium
WDFC Phase-2, EMP-16 Project

Ref: WDFC/EMP-16/SLT/SHE/019 Rev 00

Electrical Work Permit**1. Requisition for permit to work**

To:

Department/ Utility/ Permit issuer:

Place of Work:

The Details of Line/Equipment/Utility to be shut down:

The purpose of Shut Down:

Approximate Duration of Shut Down

From: Date _____ Time _____ To: Date _____ Time _____

Critical Precautions and Necessary arrangements for safe execution are,

a) Earthing	
b) Caution Tags to be provided	
c) if any	

Name of person required permit: Date _____ Time _____

Designation: _____ (Signature)

2. Acknowledgement by Issuer

I hereby declare that Line/Equipment/Utility area specified above is permitted to work with necessary safety arrangements for the above mentioned duration and the same will not be made alive till the permit is cancelled by the concerned.

Name of the Person Issued: _____ Date: _____ Time: _____
(Signature)

3. Requisition for Cancellation of permit

I hereby declare that all the men and material/tools under my charge have been withdrawn and warned that it is no longer safe to work on the Line/Equipment/Utility specified and the same is ready for charging.

Name of the permittee: _____ Date: _____ Time: _____
(Signature)

4. Cancellation of permit

I hereby declare this work permit has been cancelled after the clear inspection of the above area.

Name of the Person Issued: _____ Date: _____ Time: _____
(Signature)



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WDFC Phase-2, EMP-16 Project

Ref: WDFC/EMP-16/SLT/SHE/020 Rev 00

Permit to Work near Overhead transmission lines which are only 5 m from centre line of IR track

1. Requisition for permit to work

To:

Department/ Utility/ Permit issuer:

Place of Work:

The Details of Line/Equipment/Utility to be shut down:

The purpose of Shut Down:

Approximate Duration of Shut Down

From: Date _____ Time _____ To: Date _____ Time _____

Critical Precautions and Necessary arrangements for safe execution are,

MINIMUM CLEARANCE BETWEEN THE OVERHEAD LINE & RAILWAY TRACK & RAILWAY STRUCTURES ETC.

1. Clearances Over the Track
(i) Minimum height above rail level of the lowest portion of any conductor of a crossing, including guard wire, under, conditions of maximum sag shall be as follows:

S. No.	Voltages	Broad, Meter & Narrow gauges
1.	up to and including 11 kV	Normally by Cable
2.	Above 11 kV & up to 66kV	14.10 Meters
3.	Above 66 kV & up to 132 kV	14.60 Meters
4.	Above 132 kV & up to 220 kV	15.40 Meters
5.	Above 220 kV & 400 kV	17.90 Meters

Crossing shall not be located over a booster transformer, traction switching station, traction Substation or a track cabin location in an electrified area. Structures, the height above the rail level of the highest high tension line shall be taken into account for calculating the clearances.

2. Clearances from the Traction Mast or Structure
The distance between any of the crossing conductors and the nearest traction mast or structure under the most adverse conditions shall not be less than 5 meters. |

3. Minimum Vertical Clearance Between Power Line Crossings
The minimum vertical clearances to be maintained between any of the Railways power line crossings at the same or at different voltages shall be as specified in Rule 37 of the Indian Electricity Rules 1956 (As amended up to November 1984).

4. Minimum Clearance Between Highest Traction Conductor And Lowest Crossing Conductor
Minimum clearances between the highest traction conductor and the lowest crossing conductor shall be maintained, as per details given in the following table.

Table 9-II

Voltage	Broad, meter & Narrow gauge (in Meters)
up to & including 33-kV	4.44
Above 33 kV & up to and including 66 kV	4.44
Above 66 kV and up to 110 kV	4.75



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For 110 kV and 132 kV	5.05
For 220 kV	6.58
For 400 kV	9.71

Name of person required permit: Date _____ Time _____

Designation: _____ (Signature)

2. Acknowledgement by Issuer

I hereby declare that Line/Equipment/Utility area specified above is permitted to work with necessary safety arrangements for the above mentioned duration and the same will not be made alive till the permit is cancelled by the concerned.

Name of the Person Issued: _____ Date: _____ Time: _____
(Signature)

3. Requisition for Cancellation of permit

I hereby declare that all the men and material/tools under my charge have been withdrawn and warned that it is no longer safe to work on the Line/Equipment/Utility specified and the same is ready for charging.

Name of the permittee: _____ Date: _____ Time: _____
(Signature)

4. Cancellation of permit

I hereby declare this work permit has been cancelled after the clear inspection of the above area.

Name of the Person Issued: _____ Date: _____ Time: _____
(Signature)



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Sojitz-Larsen & Toubro Consortium
WDFC Phase-2, EMP-16 Project

Ref: WDFC/EMP-16/SLT/SHE/066 Rev 00

Full body Harness Inspection Checklist

Name of the project & Job No :

Make :

Serial Number :

Year of Manufacturing:

Inspected by :

Date:

Sl.No	POINTS	OBSERVATIONS	MEASURES
	VISUAL INSPECTION		
1	Harness belts and seams Labelled and identification well readable. Pictogram for user and Anchor points marking visible No fissures, signs of wear, twisted strap None of the stitches getting opened. Free from paint, oil and grease Bottom straps and leg straps Shoulder straps		
2	Metal fitting No deformation, fissures, or corrosion Buckle of Leg straps Safety loop for the back (for the lanyard) Safety loop for chest straps		
3	Plastic fittings		



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	Complete holding rings (3 nos each at chest strap, 2 nos each at leg strap) Back plate of Harness		
4	Double Lanyard Condition No fissures, signs of wear, twisted.		
5	Scaffold hook (both end) No deformation, fissures, corrosion The rivet connection are not damaged.		
FUNCTIONAL INSPECTION			
6	Leg straps / buckle Waist straps / buckle Chest strap / buckle The scaffold hook can only be opened by pushing the safety lever. It automatically snaps when the lever is released. While snapping end notch rests in designated groove.		

Name & Signature of SAPO / SHO |



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Sojitz-Larsen & Toubro Consortium
WDFC Phase-2, EMP-16 Project

Ref: WDFC/EMP-16/SLT/SHE/079 Rev 00

HAND TOOLS & POWER TOOLS CHECKLIST

Sr. No.	Description	Yes/ No
1	Are all tools and equipment used by employees at their workplace in good condition?	
2	Are broken or fractured handles of hammers, axes and similar equipment replaced promptly?	
3	Are worn or bent wrenches replaced regularly?	
4	Are appropriate handles used on files and similar tools?	
5	Are appropriate safety goggles, face shields, etc. used while using hand tools or equipment which might produce flying materials or be subject to breakage?	
6	Are jacks checked periodically to ensure they are in good operating condition?	
7	Are tool handles wedged tightly in the head of all tools?	
8	Are tool cutting edges kept sharp so the tool will move smoothly without binding or skipping?	
9	Are tools stored in dry, secure locations where they won't be tampered with?	
10	Are grinders, saws and similar equipment provided with appropriate safety guards?	
11	Are power tools used with the correct shield, guard, or attachment, recommended by the manufacturer?	
12	Are rotating or moving parts of equipment guarded to prevent physical contact?	
13	Are all cord-connected, electrically operated tools and equipment effectively grounded or of the approved double insulated type?	
14	Are portable fans provided with full guards or screens having openings 1/2 inch or less?	
15	Is hoisting equipment available and used for lifting heavy objects, and are hoist ratings and characteristics appropriate for the task?	
16	Are pneumatic and hydraulic hoses on power operated tools checked regularly for deterioration or damage?	

Checked by: _____

Signature: _____



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Sojitz-Larsen & Toubro Consortium
WDFC Phase-2, EMP-16 Project

Fire Prevention and Protection

Ref: WDFC/EMP-16/SLT/SHE/086 Rev 00

Name of Project :
Job No. :
Date :

Fire Prevention and Protection	STATUS		
	YES	NO	N/A
No Smoking" signs posted			
Flammable liquid safely stored in approved containers away from combustibles			
Trash/rubbish removal done on a regular basis			
Heat-producing appliances well ventilated			
Electrical equipment turned off when not in use			
Malfunctioning electrical equipment immediately reported or taken out of service			
Area kept clean and tidy			
Fire detection and alarm systems tested regularly			

Checked by: _____ Signature: _____



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WDFC Phase-2, EMP-16 Project

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Lockout/ Tag out

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