GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS
(RAILWAY BOARD)

2025/Proj./PITCMRL/D2/30/119 New Delhi, dated 30.05.2025

Managing Director,
Pune IT City Metro Rail Ltd (PITCMRL),
9th Floor, Vikram Monarch,
CTS No. 1115/A, Ganeshkhind Road,
Shivaji Nagar, Pune,
Maharashtra - 411016

Sub: In-principle approval for 750 V DC Third Rail Traction Power Supply and SCADA System (Annexure D2) for Pune Metro Line III Project of Pune IT City Metro Rail Ltd. (PITCMRL) i.e. from Mann Station (Ch: 39) to Civil Court (Ch: 22126) with 23 elevated stations (PMR01 to PMR23)

Ref: Annexure D-2 and related certificates & documents submitted by PITCMRL on RDSO's online portal dated 02.04.2025, 25.02.2025, 15.01.2025, 05.11.2024 & 31.05.2024

Pune IT City Metro Rail Ltd (PITCMRL)'s request for In-principle approval for 750 V DC Third Rail Traction Power Supply and SCADA System (Annexure D2) for Pune Metro Line III Project of Pune IT City Metro Rail Ltd. (PITCMRL) i.e. from Mann Station (Ch: 39) to Civil Court (Ch: 22126) with 23 elevated stations (PMR01 to PMR23) has been examined in Board's office in consultation with RDSO and approval of the competent authority is hereby conveyed subject to compliance of following conditions:-

1. PITCMRL shall submit Commissioning Report for provisions of Stray Current Monitoring System by March, 2026.

2. PITCMRL shall submit EIG Sanction for the complete Section of Pune Metro Line - 3 project i.e. from Mann Station (Ch: 39) to Civil court Station (Ch: 22126), having detailed chainages of Stations, TSS/RSS/ASS, SP/SSP, Depot, Feeding location etc. before Oscillation Trial.

3. PITCMRL shall submit EMI/EMC validation report for Pune Metro Line III project within the committed timeline of March, 2026.

4. PITCMRL shall submit following safety documents before issue of Interim Speed Certificate –
   a. Safety guidelines for maintenance on 750 V DC Traction System.
   b. Standard format for Power Block Messages
   c. Standard format for Competency certificates
   d. Safety Rules applicable to Permanent Way Staff and S&T Staff for working on 750 V DC Traction line.

5. PITCMRL shall submit following documents before issue of Interim Speed Certificate –
   a. Onsite Software functionality tests and SCADA Integration test report for Pune Metro Project Line 3.
   b. Commissioning Report of Emergency Trip System (ETS) as per NFPA 130.

Contd.....2/

6. PITCMRL shall regularly monitor the performance of following equipment for at least two years from the commencement of the revenue operation and submit feedback for record:
    a. Power Transformer at RSS
    b. Rectifier Traction Transformer
    c. Traction Rectifier
    d. Auxiliary Transformers
    e. 220 kV GIS and 132 kV GIS
    f. 33 kV Circuit Breaker
    g. Bus-Bar and Isolator
    h. Lightning Arrestors
    i. 220 kV and 33 kV AC power cable
    j. DC power Cable
    k. Sandwich Bus duct
    l. Negative Return Panel
    m. High Speed Circuit Breaker (HSCB)
    n. ACDB and DCDB
    o. Dis-connector switch
    p. Load Break Switch
    q. Protective Relay, Control and Relay Panel
    r. Bypass panel
    s. Third Rail Earthing Device
    t. SCADA System
    u. Optical Fibre Cable
    v. Control Cables
    w. Battery
    x. Battery Charger
    y. UPS

7. The following measures are suggested for implementation -
    a. Instead of standby DG set standby Battery storage power backup should be explored for emergency load.
    b. Relay setting should be verified by third party independent agency.
    c. PITCMRL should ensure compliance of Cyber security guidelines issued by National Critical Information Infrastructure Protection Centre (NCIIPC) in liaison with the concerned ministry.

Any dilution in the Stipulation/Compliances as submitted and detailed in Annexure-'D2' suo moto by PITCMRL shall automatically invalidate the technical clearance.

Encl: as above

30.05.25

(Dr. Sanjeev Kumar Garg)
Executive Director/Gati Shakti/U&RRT
Railway Board
Ph: 011-47844368
Email: skg.irse@gov.in

Copy to:

(i) Executive Director/UTHS, RDSO, Manak Nagar, Lucknow w.r.t letter No. UTHS/PUNE-IT/PICMRL/P01/112020 dated 09.04.2025

(ii) OSD/UT & Ex-Officio Joint Secretary, Ministry of Housing & Urban Affairs (MoHUA), NirmanBhavan, New Delhi-110011

(iii)ED/EEM, Railway Board

Annexure-I

750 V DC Third Rail Traction Power Supply and SCADA System for Pune Metro Line III Project of Pune IT City Metro Rail Ltd. (PITCMRL) i.e, from Mann Station (Ch: 39) to Civil Court (Ch: 22126) with 23 elevated stations (PMR01 to PMR23)				
S. N.	System	Features		Standards/Drawings
1.0	POWER SUPPLY: Incoming 220 kV and 132 kV			
1.1	Receiving Substation (RSS)	220 kV/33kV AC (RSS 01 close to PMR 03rd station)		Doc no. PML3-SMO-RSS01-XX-DR-E-001254
		110 kV/33 kV AC (RSS 02 close to PMR 17th station)		Doc no. PML3-SMO-RSS02-XX-DR-E-001211
1.2	Earth Resistance at RSS	<0.5 Ω		IEEE 80:2013, IS 3043
2.0	Power Transformer at RSS	RSS 01	RSS 02	IEC 60076
	Capacity	25/31.2 MVA	25/31.25 MVA	
	Phase of Transformer	Three Phase	Three Phase	
	Vector Group	Ynyn0	Ynyn0	
	Number of Taps and On load Changing on HV side	16 Steps (+6 tap to -9 tap positions) - 15% to +10% in step of 1.667%	16 Steps (+6 tap to -9 tap positions) - 15% to +10% in step of 1.667%	
	Cooling Mode	ONAN/ONAF	ONAN/ONAF	
	Rated Power	25/31.25 MVA	25 /31.25 MVA	
	Temperature Rise above Ambient	Oil- 50 °C Winding- 55 °C	Oil- 50 °C Winding- 55 °C	
	Overload Capacity	10 % for 3 Hours 25 % for 2 Hours 50 % for 10 mint 100 % for 3 mint	10 % for 3 Hours 25 % for 2 Hours 50 % for 10 mint 100 % for 3 mint	
	Temperature Rise above ambient during occasional Overload	Oil- 65 °C Winding- 75 °C	Oil- 65 °C Winding- 75 °C	
	Operating Voltage	220 kV/33 kV	132 kV/33 kV	
	Type	Outdoor	Outdoor	
	Noise Level-Transformer	Not more than 70 db	Not more than 70 db	
	Transformer Oil	Mineral Oil	Mineral Oil	IEC 60296:2012
3.0	Traction Substation (TSS)	33 kV (AC)/0.590 kV/0.590kV (AC)/750VDC		Doc no PML3-SMO-VIA-XX-DR-E-001210
4.0	Transformer – Rectifier unit	• Cast Resin Dry Type Transformer • Capacity: 2250 kVA (02 NOS) • One Primary & Two Secondary Winding • Vector Group: D (+ 7.5°) d0y11 and D (- 7.5°) d0y11 • Cooling Mode: AN • Overload Capacity: • 150 % for 2 Hours • 300 % for 1 minute • Tap Changer: +5% to -5%@±2.5% on HV for HV variation (off circuit tap links) • Insulation Class (HV/LV): F/H • Type : Indoor		IEC 60076-11, IEC 50329, Class VI
5.0	Auxiliary Substation (ASS)	33kV/0.415 kV		Doc no PML3-SMO-VIA-XX-DR-E-001210
5.1	Earth Resistance of ASS	< 1.0 Ω		IS 3043, IEEE 80
6.0	Auxiliary Transformer	• Cast Resin Dry Type Transformer • Capacity: 100 kVA, 500kVA, 2000 kVA • 33 KV/0.415KV, 3 phase • Vector Group: Dyn11 • Cooling Mode: AN • Tap Changer: +5% to -5% @ 2.5% (Off Circuit tap links) • Insulation Class: F/H • Type : Indoor		IEC 60076-11, IS 2026-11

Project Directorate Approved on 30/5/2025 Railway Board

Note: Any suo moto dilution in the stipulation/compliances as submitted by Pune IT City Metro Ltd. (PITCMRL)for Pune Metro Line III Project and detailed above shall automatically invalidate the technical clearance.

7.0	Gas Insulated Switchgear	3Ph, 220kV, 2000A, 50Hz, 50kA for 3 sec, Indoor Gas Insulated Switchgear	IEC 62271-1,IEC 62271-100, IEC 62271-203, IEC 61869-1/2,3
		3Ph, 132kV, 2000A, 50Hz, 40kA for 3 sec, Indoor Gas Insulated Switchgear	IEC 62271-1,IEC 62271-100, IEC 62271-203, IEC 61869-2,3
8.0	750 V DC Traction System (Bottom Current Collection)		
8.1	Conductor Rail (Third Rail)	Steel & aluminium (Co-Extruded)	As per design requirement of Pune Metro Line III Project of Pune IT City Metro Rail Ltd.
8.2	Nominal Current	4500 A DC	
8.3	Nominal Voltage	750 V DC	
8.4	Designed voltage	1000 V DC	
8.5	Transient Voltage	3000 V DC	
8.6	Max. Electrical Resistance at 20° C	6.35 μΩ/meter	
8.7	Maximum Heat Rise at an Ambient Temp. of 40° C	45° C	
8.8	Short Circuit Level (1 Sec)	50 kA	
8.9	Linear mass	17.20 kg/meter	
8.10	Thickness of Stainless Steel Strip	6.0 mm	
8.11	Chromium Content in Stainless Steel Strip	Chromium 16.15 %	
9.0	Cables (AC & DC)	• 750 VDC Positive Cable • 400 sq.mm, 1C, XLPE, Copper (Cu), • Voltage grade: 1.8/3.3 kV , DC Cable • Conductor: Flexible circular Plain Copper Class 5 • Outer Sheath : FRLSH PVC Type, ST-2 Sheathed, UV Resistance, Anti rodent & Anti termite • Colour - Red	IEC 60502-1, IEC 60228, IEC 60332-1
		• 750 VDC Negative Cable • 400 sq.mm, 1C, XLPE, Copper (Cu) • Voltage grade: 0.6/1 kV , DC Cable • Conductor: Flexible circular Plain Copper Class 5 • Outer Sheath : FRLSH PVC Type, ST-2 Sheathed, UV Resistance, Anti rodent & Anti termite • Colour – Black	IEC 60502-1, IEC 60228, IEC 60332-1
		• 220 kV EHV AC Power Cable • 500 sq mm, Single core, Cu/XLPE/HDPE outer Sheath Power Cable • Conductor Screen Material - Extruded Semi Conducting Compound layer • Insulation Screen Material (Non-metallic): Extruded Semi conducting Compound layer • Metallic Sheath Material : Corrugated Aluminium Sheath Seam-welded • Outer Sheath Material: Extruded HDPE Type ST7 AT, Overall graphite coated, Black colour	IEC 62067, IS 7098-3, IEC 60228

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		• 132 kV EHV AC Power Cable • 500 sq mm, Single core, Cu/XLPE/HDPE outer Sheath Power Cable • Conductor Screen Material - Extruded Semi Conducting Compound layer • Insulation Screen Material (Non-metallic): Extruded Semi conducting Compound layer • Metallic Sheath Material : Corrugated Aluminium Sheath Seam-welded • Outer Sheath Material: Extruded HDPE Type ST7 AT & AR, Overall graphite coated, Black colour	IEC 62067, IS 7098-3, IEC 60228
		• 33 kV AC Power Cable • 300 sq mm, Single core, AL/XLPE/AL tape Armour/FRLS PVC Power Cable • Conductor Screen Material - Extruded Semi Conducting Compound • Insulation Screen Material : Extruded Semi conducting Compound (Bonded Type) • Nominal Screen Material (Metallic): Helically applied Plain copper wires with open helix copper tape • Outer Sheath Material: FRLS PVC TYPE ST-2 Black colour, Graphite Coating	IEC 60502-2, IEC 60228, IEC 60332-1, IEC 60332-3 Cat A
		• 33 kV AC Power Cable • 120 sq mm, Single core, AL/XLPE/AL tape Armour/FRLS PVC Power Cable • Conductor Screen Material - Extruded Semi Conducting Compound • Insulation Screen Material : Extruded Semi conducting Compound (Bonded Type) • Nominal Screen Material (Metallic): Helically applied Plain copper wires with open helix copper tape • Outer Sheath Material: FRLS PVC TYPE ST-2 Black colour	IEC 60502-2, IEC 60228, IEC 60332-1, IEC 60332-3 Cat A Project Directorate Approved on 30/5/2025 Railway Board
10.0	Insulator	Bulk moulding compound (BMC) insulator	As per Design requirement of Pune Metro Line 3 Project
10.1	Creepage Distance	159.1 mm	
10.2	Fume index	≤ 20 (F1 classification)	
10.3	Impact Resistance (Min)	400 J/m (Minimum)	
10.4	Deflection Temperature	190 °C at 1.82 N/mm2	
10.5	Water Absorption	0.3 % (Max) in 24 hrs at 23°C	
10.6	Dielectric Strength	10 kV/mm	
10.7	Flame Spread Index	15 (Max)	
11.0	Horizontal & Vertical Clearances of Third Rail	As per Pune Metro Line 3's SOD, approved by Railway Board	
12.0	Stay Current Mitigation System	Pune Metro Line - 3 Rail Project has followed Stray Current Monitoring System (SCMS) as per EN 50122-2	EN 50122-2 (latest)

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13.0	Over Voltage Protection Device (OVPD) :	a. Maximum System Voltage : 3000 VDC b. Rated Permanent Current : 1500A c. Rated Short time current : 50 kA for 250 ms	EN 50122-1, EN 50122-3, EN 61439-2, EN 50124
14.0	Control, Relay & Protection System	1. High Voltage (Income & Bus-Bar) Protection a. Directional power relay b. Instantaneous over current relay/Definite time over current c. Local breaker failure protection d. Instantaneous over current to earth relay e. AC inverse time over current relay f. Time delayed Earth fault overcurrent g. AC directional over current h. Directional earth Fault relay i. Differential protective relay for line differential 2. Power Transformer Protection: a. Differential protective relay for Transformer differential b. Differential protective relay for high impedance restricted earth fault protection c. Differential protective relay for low impedance restricted earth fault protection d. Instantaneous over current relay/Definite time over current e. AC inverse time over current relay f. Tank over pressure g. Ground detector relay for tank protection h. Breaker failure/Local breaker failure protection i. Machine or Transformer thermal relay j. Liquid level switch k. Instantaneous over current to earth relay l. Time delayed Earth fault overcurrent 3. 33 kV Level Protection: a. Instantaneous over current relay/Definite time over current b. Instantaneous over current to earth relay c. AC inverse time over current relay d. Time delayed Earth fault overcurrent e. Trip circuit supervision 86 Lockout relay f. AC directional over current g. Directional earth Fault relay h. Differential protective relay for line differential i. Lockout relay	Project Directorate Approved on 30/5/2025 Railway Board

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		4. Auxiliary Transformers: a. Instantaneous over current relay/Definite time over current b. Breaker failure c. Instantaneous over current to earth relay d. AC inverse time over current relay e. Time delayed Earth fault overcurrent f. Machine or Transformer thermal relay g. Trip circuit supervision h. Lockout relay 5. . Rectifier Protection: a. 1st Diode Failure Alarm b. 2nd Diode Failure (58T) c. Rectifier over temperature alarm-120 deg d. Rectifier over temperature trip – 130 deg e. Door Interlock f. Frame fault 6. 750 V DC Incomer : a. Under Voltage b. Over voltage Relay c. Frame Fault protection d. DC overcurrent-Imax e. DC overcurrent-Imax rev f. Rate of rise DC overcurrent time protection g. Rate of rise DC overcurrent time protection h. Definite time DC overcurrent time protection i. Definite time DC overcurrent time protection-reverse j. Lockout relay 7. 750 VDC Outgoing HSCB Feeder for Third Rail. a. Under Voltage b. Frame Fault protection c. Over voltage Relay d. (IDS-Primary release of the High-Speed Circuit Breaker) e. Overcurrent Imax reverse f. Rate of rise DC overcurrent time protection g. Rate of rise DC overcurrent time protection h. Definite time DC overcurrent time protection i. Definite time DC overcurrent time protection-reverse j. DC load measuring reclosing relay (DC line test with auto reclosure) k. Automatic selective control or transfer relay l. Lockout relay	Project Directorate Approved on 30/5/2025 Railway Electrification

Note: Any suo moto dilution in the stipulation/compliances as submitted by Pune IT City Metro Ltd. (PITCMRL)for Pune Metro Line III Project and detailed above shall automatically invalidate the technical clearance.

<table>
<tr><td>15.0</td><td>SCADA</td><td>

In SCADA System -
a) RTU is provided with redundant Ethernet switches
b) Redundant communication server
c) Redundant communication Links between RTU & CFE
d) Redundant application cum database server
Data Transfer Protocol followed as per IEC 60870-5-104
Network Protocol between RTU & Relay is found as per IEC 61850.
Dataspeed-100mbps

</td><td>IEC 60870-5- 104 ,
IEC 61850,</td></tr>
<tr><td></td><td></td><td>
<table>
<tr><td rowspan="3">Battery</td><td>Capacity</td><td>250AH</td><td>208 AH</td></tr>
<tr><td>Material</td><td>Ni-Cd</td><td>Ni-Cd</td></tr>
<tr><td>No. of Cell</td><td>85</td><td>85</td></tr>
</table>
</td><td>IEC 62259,
IEC 60410</td></tr>
<tr><td></td><td></td><td>UPS: 400 KVA, 340V to 460V AC input, 415V AC Output , 50Hz</td><td>IEC 62040-3-2011</td></tr>
<tr><td></td><td></td><td>Battery Charger : 110 V DC/ 80A Dual Float Cum Boost Charger</td><td>IEC 60146-1-1:2009
IS 16539 (part 1/Sec 1): 2017</td></tr>
<tr><td></td><td></td><td>SCADA software</td><td>As per Design Aspects of Pune Metro Line III Rail project</td></tr>
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