(MM3-CBS-REL-PYL)

"Procurement, Supply, Installation, Testing and Commissioning of various Power Supply works including associated Civil works, required for diversion of 220 kV and 33 kV Transmission Lines along with the Transmission towers belonging to M/s Reliance Infrastructure Ltd. in Aarey depot area for Mumbai Metro Line -3"

Addendum No. 1 **Date: 27th April 2017**

Sr. No.	Description	Clause No. and Page No.	Amendment
1.	**Section I: Notice Inviting Tender**	**Clause No. 1.1.3.1 (vi), Page No. 3** A firm, who has purchased the bid document in their name, can submit the tender either as Individual firm or in joint venture/Consortium. However, the lead partner in case of JV shall be one who has experience of ***similar work as defined below***.	**Clause No. 1.1.3.1 (vi), Page No. 3** A firm, who has purchased the bid document in their name, can submit the tender either as Individual firm or in joint venture/Consortium. The tenderer shall submit details of works executed by them to fulfil the work experience **of similar work as defined below,** based on their % shared in previous Contract***. Documentary proof such as completion certificates from client clearly indicating the nature/scope of work, actual completion cost and actual date of completion for such work should be submitted. Experience certificate of an official below the rank of Executive engineer or equivalent will not be accepted as proof for Eligibility. The offers submitted without this documentary proof shall not be evaluated. The work, executed for private client will not be considered for eligibility evaluation. However, the work executed under public sector, government under taking, semi government companies will be considered for Eligibility evaluation. • The client's certificate clearly indicating the amount pertaining to the each similar work shall be furnished by the tenderer along with their submission. *** a) Volume, number of production of any key activity can be demonstrated in one or more contracts combined if executed during same time period. ***b) Volume, number of production of any key activity can be demonstrated in one or more contracts combined among Consortium/JV if executed during same time period.

2.	**Section I: Notice Inviting Tender**	**Clause No. 1.1.3.1 (vii), Page No. 3** The Central / State government department / public sector undertaking / other government entity, PSUs or Government/Private Organisations* must not have banned business with the bidder (any member in case of JV) as on the date of tender submission. Also, no contract of the bidder should have been rescinded / terminated during last 5 years due to non-performance of the bidder or any of JV /Consortium members. The bidder should submit undertaking to this effect in **Appendix 09 of FOT**	**Clause No. 1.1.3.1 (vii), Page No. 3** Tenderer should not have been blacklisted or deregistered by the Central Government, State Government of Maharashtra, any PSU of Government of India and Government of Maharashtra or any public sector undertaking including Metro rail corporation in India during last 5 years. Also, the tenderer must not have failed to take possession or to commence any contract after the award of contract. The bidder should submit undertaking to this effect in **Appendix 18 of FOT**
3.	**Section I: Notice Inviting Tender**	**Clause No. 1.1.3.1 (viii), Page No. 3** Bidder (any member in case of JV/consortium) must not have suffered bankruptcy/ insolvency during the last 5 years. The bidder should submit undertaking to this effect in **Appendix 09 of FOT**	**Clause No. 1.1.3.1 (viii), Page No. 3** Bidder (any member in case of JV/consortium) must not have suffered bankruptcy/ insolvency during the last 5 years. The bidder should submit undertaking to this effect in **Appendix 18 of FOT**
4.	**Section I: Notice Inviting Tender**	**Clause No. 1.1.10 (ii), Page No. 9** (In case of joint venture/consortia, Bank Guarantee for Tender Security shall be in the name of joint venture/consortia and not in name of individual members.)	**Clause No. 1.1.10 (ii), Page No.** (In case of joint venture/consortia, Bank Guarantee for Tender Security shall be in the name of joint venture/consortia. The Tender Security Bank Guarantee shall be submitted by the respective JV/Consortium members of the Contractor in proportion to their percentage shares.)
5.	**Section II: Instruction to Tenderers**	**Clause No. C20, Page No. 19** (In case of joint venture/consortia, Bank Guarantee for Tender Security shall be in the name of joint venture/consortia and not in name of individual members.)	**Clause No. C20, Page No. 19** (In case of joint venture/consortia, Bank Guarantee for Tender Security shall be in the name of joint venture/consortia. The Tender Security Bank Guarantee shall be submitted by the respective JV/Consortium members of the Contractor in proportion to their percentage shares.)

6.	**Section III: Form of Tender**	**Appendix 18, Page No. 68**	**Appendix 18, Page No. 68** Appendix 18 - Revised
7.	**Section VIII: Technical Specification** – 14. Installation of OPGW H/W and Assemblies	**Clause No. 14 a), Page No. 520** a) DISMENTLING OF OPGW AND OPGW ASSEMBLIES The dismantling work of OPGW and its assemblies in respect of the existing 220 kv Tr. Lines shall be done in line with the methodology specified in Clause 2.7.13&2.7.14 of this Section.	**Clause No. 14 a), Page No. 520** **Delete** "..in Clause 2.7.13&2.7.14 of this Section".
8.	**Section VIII: Technical Specification** – 18. Dismantling of AAAC Zebra Conductors and Its Hardwares & Accessories	**Clause No. 18, Page No. 522** The dismantling work of AAAC Zebra conductor and hardware / accessories in respect of the existing 220 kv Tr. Lines shall be done in line with the methodology specified in Clause 2.7.17 of this Section.	**Clause No. 18, Page No. 522** **Delete** "..in Clause 2.7.17 of this Section."

<table>
<tr>
<td>9.</td>
<td>Section VIII: Technical Specification –
20. Bill of Material</td>
<td>Clause No. 20, Page No. 566
Supply BOM
<table>
<tr><th>Sr.no</th><th>Item Description</th><th>UoM</th><th>Qty</th><th>Spare</th><th>Total Qty</th></tr>
<tr><td>1</td><td>245kV Current Transformers</td><td>Nos</td><td>24</td><td>3</td><td>27</td></tr>
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Service BOM
<table>
<tr><th>Sr.no</th><th>Item Description</th><th>UoM</th><th>Qty</th><th>Total Qty</th></tr>
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<td>Clause No. 20, Page No. 566
Supply BOM
<table>
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Service BOM
<table>
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<tr><td>1</td><td>Erection, Installation, Testing and Commissioning of the 245kV Current Transformer</td><td>No</td><td>24</td><td>24</td></tr>
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<td>10.</td>
<td>Section VIII: Technical Specification – 3. Site Power Supply Condition</td>
<td>Clause No. 4. Table No. 3, Page No. 570
<table>
<tr><td>Fault Level</td><td>50kA for 1 sec (415V)
25kA for 1 sec (220V)</td></tr>
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<td>Clause No. 4. Table No. 3, Page No. 570
<table>
<tr><td>Fault Level</td><td>50kA for 1 sec (415V)
DC fault level as per charger & battery rating</td></tr>
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<td>11.</td>
<td>Section VIII: Technical Specification – 6. Design Criteria</td>
<td>Clause No. 4. Table No. 6, Page No. 570
<table><tr><td>2</td><td>Configuration</td><td>Refer to SLD, Annexure III</td></tr></table></td>
<td>Clause No. 4. Table No. 6, Page No. 570
<table><tr><td>2</td><td>Configuration</td><td>Refer to SLD of Battery Charger</td></tr></table></td>
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<td>12.</td>
<td>Section VIII: Technical Specification – 18. ‘Guaranteed Technical Particulars’</td>
<td>Clause No. 18, Page No. 580</td>
<td>Clause No. 18, Page No. 580

Please add<table><tr><th>Sr. No.</th><th>Technical Particulars</th><th>Data by OEM</th></tr><tr><td>17</td><td>Discharge resistor for Battery</td><td>To be provided by bidder</td></tr></table></td>
</tr>
<tr>
<td>13.</td>
<td>Section VIII: Technical Specification – 11. Construction of Chargers’</td>
<td>Clause No. 11, Page No. 593
(ix) All instruments shall be switchboard type, back connected and 72 x 72 mm square size. Accuracy class of all meters shall be ± 1%. Meters shall be provided, if controller display is not suitable for default display indicated in this specification (Clause No. 6.2.1).</td>
<td>Clause No. 11, Page No. 593
Delete
“..(Clause No. 6.2.1).”</td>
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<td>14.</td>
<td>Section VIII: Technical Specification – 18. ‘Guaranteed Technical Particulars (GTP)’</td>
<td>Clause No. 18, From Page No. 609 to Page No 619.

**Table is attached at the end of the document.</td>
<td>Clause No. 18, From Page No. 609 to Page No 619.
Delete.
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<td>15.</td>
<td>Section VIII: Technical Specification – 19. ‘Bill of Material (BOM)’</td>
<td>Clause No. 19, Sr No. 2 (b). Page No. 620
<table>
<tr><td>2</td><td>a. Unloading, erection, testing and commissioning of battery charger at MMRC Substation Yard

b. Training of R-infra Personnel (Refer Clause 1.2 of Spec)</td><td>LS</td><td>1</td></tr>
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<td>Clause No. 19, Sr No. 2 (b). Page No. 620
<table>
<tr><td>2</td><td>a. Unloading, erection, testing and commissioning of battery charger at MMRC Substation Yard

b. Training of R-infra Personnel as per the scope of this specification</td><td>LS</td><td>1</td></tr>
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<td>16.</td>
<td>Section VIII: Technical Specification – 20 ‘List of mandatory spares’</td>
<td>Clause No. 20, Page No. 621
List of mandatory spares
<table>
<tr><th>Sl No</th><th>Description</th><th>Quantity</th></tr>
<tr><td>1</td><td>Rectifier Module</td><td>10% of total quantity of each type</td></tr>
<tr><td>2</td><td>Controller</td><td>1 No of each rating</td></tr>
<tr><td>3</td><td>AC MCCB</td><td>1 No of each rating</td></tr>
<tr><td>4</td><td>DC MCCB</td><td>1 No of each type & rating</td></tr>
<tr><td>5</td><td>AC MCB</td><td>5% of total quantity of each type</td></tr>
<tr><td>6</td><td>DC MCB</td><td>5% of total quantity of each type</td></tr>
<tr><td>7</td><td>Voltage Transducer</td><td>10% of total quantity</td></tr>
<tr><td>8</td><td>Current Transducer</td><td>10% of total quantity</td></tr>
<tr><td>9</td><td>Three Phase Main monitoring board and CT</td><td>1 No of each rating</td></tr>
<tr><td>10</td><td>Blocking Diode</td><td>10% of each rating</td></tr>
<tr><td>11</td><td>Shunt for current sensing of charger, load and battery output</td><td>10% of each rating</td></tr>
<tr><td>12</td><td>DC Contactor</td><td>10% of each type</td></tr>
</table></td>
<td>Clause No. 20, Page No. 621

Delete

Table Deleted</td>
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<td>17.</td>
<td>Section VIII: Technical Specification – 7. Technical Specification</td>
<td>Clause No.7, Sr. No. aa (b), Page No. 690
<table><tr><td>aa.</td><td>Training</td><td>a) Bidder shall to ensure the CRP system is made user friendly apart from the detailed demonstrations at site.
b) The Bidder shall arrange necessary training (as per Clause 1.2) to R Infra Engineers during commissioning at site.</td></tr></table></td>
<td>Clause No.7, Sr. No. aa (b), Page No. 690
<table><tr><td>aa.</td><td>Training</td><td>a) Bidder shall to ensure the CRP system is made user friendly apart from the detailed demonstrations at site.
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<td>18.</td>
<td>Section VIII: Technical Specification – 10. Bill of Material</td>
<td>Clause No.10, Sr. No.3 (3), Page No. 696
<table><tr><td>3</td><td>1. Unloading, erection, testing and commissioning of Relay Panel (RP) at MMRC Substation Yard
2. Unloading, erection, testing and commissioning of Relay Panel (RP) at Rinfra Aarey Substation
3. Training of R-infra Personnel (Refer Clause 1.2 of Spec).</td><td>LS</td><td>1</td></tr></table></td>
<td>Clause No.10, Sr. No.3 (3), Page No. 696
<table><tr><td>3</td><td>1. Unloading, erection, testing and commissioning of Relay Panel (RP) at MMRC Substation Yard
2. Unloading, erection, testing and commissioning of Relay Panel (RP) at Rinfra Aarey Substation
3. Training of R-infra Personnel as per specs.</td><td>LS</td><td>1</td></tr></table></td>
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<td>19.</td>
<td>Section VIII: Technical Specification – 11 ‘Guaranteed Technical Particulars (GTP)</td>
<td>Clause No 11 (h), Page No. 701
<table><tr><td rowspan="2">h</td><td rowspan="2">Communication protocol</td><td>IEC 61850 for relays at MMRC Substation</td></tr><tr><td>IEC 103 for relays at RInfra Aarey Substation</td></tr></table></td>
<td>Clause No 11 (h), Page No. 701
<table><tr><td>h</td><td>Communication protocol</td><td>IEC 61850 & IEC-103 for relays at MMRC Termination Yard & RInfra Aarey Substation</td></tr></table></td>
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<td>20.</td>
<td>Section VIII: Technical Specification – 11 ‘Guaranteed Technical Particulars (GTP)</td>
<td>Clause No 11 (i), Page No. 701
<table>
<tr><td rowspan="2">i</td><td rowspan="2">No of ports for SCADA communication</td><td>Dual fiber ports on PRP for 61850 relays at MMRC Substation.</td></tr>
<tr><td>Dual RS 485 port for IEC-103 relays at RInfra Aarey Substation</td></tr>
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<td>Clause No 11 (i), Page No. 701
<table>
<tr><td rowspan="2">i</td><td rowspan="2">No of ports for SCADA communication</td><td>Dual fiber ports on PRP for 61850</td></tr>
<tr><td>Dual RS 485 port for IEC-103</td></tr>
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<td>21.</td>
<td>Section VIII: Technical Specification – 7. ‘Technical Specification - Current Differential Cum Distance Protection Relay</td>
<td>Clause No 7 (j), Page No. 716
<table>
<tr><td>j</td><td>Current Differential Cum Distance Protection Relay</td><td>h) Relay shall have following number of analog and digital input.
• Three phase CT - one (1) No (one CT /phase)
• Single phase CT – one (1) No (for neutral)
• Three phase PT - one (1) No
• Single phase PT - one (1) No (for open delta input)
• Digital Input – Minimum 16No
• Digital output – Minimum 16 No
Digital output shall not be grouped type. It shall be able to use each output signal in separate circuit as per scheme requirement.</td></tr>
</table></td>
<td>Clause No 7 (j), Page No. 716
<table>
<tr><td>j</td><td>Current Differential Cum Distance Protection Relay</td><td>i) Relay shall have following number of analog and digital input.
• Three phase CT - one (1) No (one CT /phase)
• Single phase CT – one (1) No (for neutral)
• Three phase PT - one (1) No
• Single phase PT - one (1) No (for open delta input)
• Digital Input – Minimum 16 No
• Digital output – Minimum 24 No
Digital output shall not be grouped type. It shall be able to use each output signal in separate circuit as per scheme requirement.</td></tr>
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<table>
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<td>22.</td>
<td>Section VIII: Technical Specification – 7. ‘Technical Specification – Bay Control Unit</td>
<td>Clause No 7 (k), Page No. 716
<table><tr><td>k</td><td>Bay Control Unit</td><td>a. Bay Control Unit (BCU) shall be provided for control and monitoring of line bays. SCADA Communication protocol of BCU shall be IEC-103.</td></tr></table></td>
<td>Clause No 7 (k), Page No. 716
<table><tr><td>k</td><td>Bay Control Unit</td><td>a. Bay Control Unit (BCU) shall be provided for control and monitoring of line bays. SCADA Communication protocol of BCU shall be IEC-103 & IEC-61850</td></tr></table></td>
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<td>23.</td>
<td>Section VIII: Technical Specification – 7. ‘Technical Specification - Self-Monitoring for all types of Numerical Relays & Bay Control Unit (BCU)</td>
<td>Clause No 7 (m), Page No. 718
<table><tr><td>m.</td><td>Self-Monitoring for all types of Numerical Relays & Bay Control Unit (BCU)</td><td>b. It shall be possible to report device fail signal on IEC 103 to SCADA. In addition to this, any failure detected shall be annunciated through a dedicated output contact (watchdog).</td></tr></table></td>
<td>Clause No 7 (m), Page No. 718
<table><tr><td>m</td><td>Self-Monitoring for all types of Numerical Relays & Bay Control Unit (BCU)</td><td>b. It shall be possible to report device fail signal on IEC 103 & IEC 61850 to SCADA. In addition to this, any failure detected shall be annunciated through a dedicated output contact (watchdog).</td></tr></table></td>
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<td>24.</td>
<td>Section VIII: Technical Specification – 7. ‘Technical Specification - Communication with SCADA for all types of Numerical relays & BCU</td>
<td>Clause No 7 (q), Page No. 720
<table><tr><td>q.</td><td>Communication with SCADA for all types of Numerical relays & BCU</td><td>c. Communication protocol to SCADA shall be IEC 60870-5-103 & IEC 61850
d. One (1) no RS 485 rear port for communication on IEC 60870-5-103 to SCADA shall be provided.</td></tr></table></td>
<td>Clause No 7 (q), Page No. 720
<table><tr><td>q.</td><td>Communication with SCADA for all types of Numerical relays & BCU</td><td>c. Communication protocol to SCADA shall be IEC 60870-5-103 & IEC 61850
d. Two (2) no RS 485 rear port for communication on IEC 60870-5-103 to SCADA shall be provided and Two Nos FO port on PRP.</td></tr></table></td>
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<td>25.</td>
<td>Section VIII: Technical Specification – 11. Guaranteed Technical Specification (GTP) - Relays</td>
<td>Clause No 11, Sr. No. 5.1 (e), (h), and (i)., Page No. 733
<table>
<tr><td>5.</td><td>Relays</td><td></td><td></td></tr>
<tr><td>5.1</td><td>Distance cum current differential protection relay – Main -I</td><td>Make shall be M/s Siemens, M/s ABB or M/s GE</td><td>Shall be finalized after meeting with M/s Tata</td></tr>
<tr><td>e</td><td>Binary input & binary output</td><td>16 BI & 16 BO + watch dog</td><td></td></tr>
<tr><td>h</td><td>Communication protocol</td><td>IEC 103</td><td></td></tr>
<tr><td>i</td><td>No of ports for SCADA communication</td><td>Dual RS 485 port for relays</td><td></td></tr>
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<td>Clause No 11, Sr. No. 5.1 (e), (h), and (i)., Page No. 733
<table>
<tr><td>5.</td><td>Relays</td><td></td><td></td></tr>
<tr><td>5.1</td><td>Distance cum current differential protection relay – Main -I</td><td>Make shall be M/s Siemens, M/s ABB or M/s GE</td><td>Shall be finalized after meeting with M/s Tata</td></tr>
<tr><td>e</td><td>Binary input & binary output</td><td>16 BI & 24 BO + watch dog</td><td></td></tr>
<tr><td>h</td><td>Communication protocol</td><td>IEC 103 & IEC 61850</td><td></td></tr>
<tr><td>i</td><td>No of ports for SCADA communication</td><td>Dual RS 485 port for IEC 103
Dual FO port for IEC 61850</td><td></td></tr>
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<td>26.</td>
<td>Section VIII: Technical Specification –11. Guaranteed Technical Specification (GTP) - Relays</td>
<td>Clause No 11, Sr. No. 5.2 – (e), (h), and (i), Page No. 733 & 734
<table>
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<tr><td>5.2</td><td>Distance cum current differential protection relay – Main -II</td><td>Make shall be M/s Siemens, M/s ABB or M/s GE</td><td>Shall be finalized after meeting with M/s Tata</td></tr>
<tr><td>e</td><td>Binary input & binary output</td><td>16 BI & 16 BO + watch dog</td><td></td></tr>
<tr><td>h</td><td>Communication protocol</td><td>IEC 103</td><td></td></tr>
<tr><td>i</td><td>No of ports for SCADA communication</td><td>Dual RS 485 port for relays</td><td></td></tr>
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<td>Clause No 11, Sr. No. 5.2 – (e), (h), and (i), Page No. 733 & 734.
<table>
<tr><td>5.</td><td>Relays</td><td></td><td></td></tr>
<tr><td>5.1</td><td>Distance cum current differential protection relay – Main -I</td><td>Make shall be M/s Siemens, M/s ABB or M/s GE</td><td>Shall be finalized after meeting with M/s Tata</td></tr>
<tr><td>e</td><td>Binary input & binary output</td><td>16 BI & 24 BO + watch dog</td><td></td></tr>
<tr><td>h</td><td>Communication protocol</td><td>IEC 103 & IEC 61850</td><td></td></tr>
<tr><td>i</td><td>No of ports for SCADA communication</td><td>Dual RS 485 port for IEC 103
Dual FO port for IEC 61850</td><td></td></tr>
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<td>27.</td>
<td>Section VIII: Technical Specification – 11. Guaranteed Technical Specification (GTP) - Relays</td>
<td>Clause No 11, Sr. No. 5.3 (f) & (g), Page No. 734
<table>
<tr><td>5.3</td><td>Bay control unit (BCU)</td><td></td></tr>
<tr><td>f</td><td>Communication protocol</td><td>IEC 103</td></tr>
<tr><td>g</td><td>No of ports for SCADA communication</td><td>Dual RS 485 port for relays</td></tr>
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<td>Clause No 11, Sr. No. 5.3 (f) & (g), Page No. 734
<table>
<tr><td>5.3</td><td>Bay control unit (BCU)</td><td></td></tr>
<tr><td>f</td><td>Communication protocol</td><td>IEC 103 & IEC 61850</td></tr>
<tr><td>g</td><td>No of ports for SCADA communication</td><td>Dual RS 485 port for IEC 103
Dual FO port for IEC 61850</td></tr>
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28.	**Section VIII: Technical Specification** – 9. Detailed Technical Specification – General Relays	**Clause No. 9, xiv (b), Page No. 746** ***xiv) General Relays*** *(b) Trip Circuit Supervision Relays (95)* Relays for pre-closing and post-closing breaker trip coil supervision shall be provided for all 110 kV/33KV circuit breakers. One (1) relay shall be provided for each trip coil and they shall be connected at the end of tripping loop. Action of the relay shall be annunciated. The relays shall have an inherent limit in time delay of 300 to 400 Mili seconds to prevent operation due to transients. The relay shall operate satisfactorily for 80 to 110% of rated supply voltage. It shall be static type.	**Clause No. 9, xiv (b), Page No. 746** ***xiv) General Relays*** *(b) Trip Circuit Supervision Relays (95)* Relays for pre-closing and post-closing breaker trip coil supervision shall be provided for all 220 kV/33KV circuit breakers. One (1) relay shall be provided for each trip coil and they shall be connected at the end of tripping loop. Action of the relay shall be annunciated. The relays shall have an inherent limit in time delay of 300 to 400 Mili seconds to prevent operation due to transients. The relay shall operate satisfactorily for 80 to 110% of rated supply voltage. It shall be static type.
29.	**Section VIII: Technical Specification**	**Page 788**	**Page 788** **Add Note** All the required quantity and sizes of Power and Control Cables for commissioning of various equipments like Battery Charger, Control & Relay Panels, Fire Fighting Panels, SCADA etc shall be included in the respective item by the Bidders.

30.	**Section X: Tender Drawings**	Drawing No. MM3-CBS-REL-PYL/001 R0 Drawing No. MM3-CBS-REL-PYL/001A R0 Drawing No. MM3-CBS-REL-PYL/002 R0 Drawing No. MM3-CBS-REL-PYL/002A R0 Drawing No. MM3-CBS-REL-PYL/002B R0 Drawing No. MM3-CBS-REL-PYL/003 R0 Drawing No. MM3-CBS-REL-PYL/004 R0 Drawing No. MM3-CBS-REL-PYL/019 R0 Drawing No. MM3-CBS-REL-PYL/27 R0	Drawing No. MM3-CBS-REL-PYL/001 R1 Drawing No. MM3-CBS-REL-PYL/001A R1 Drawing No. MM3-CBS-REL-PYL/002 R1 Drawing No. MM3-CBS-REL-PYL/002A R1 Drawing No. MM3-CBS-REL-PYL/002B R1 Drawing No. MM3-CBS-REL-PYL/003 R1 Drawing No. MM3-CBS-REL-PYL/004 R1 Drawing No. MM3-CBS-REL-PYL/019 R1 Drawing No. MM3-CBS-REL-PYL/27 R1

****Sr. No. 14**

Clause No. 18

From Page No. 609 to Page No 619.

Sl No	Technical Particulars	Data by bidder (Refer Note # 1)
1	Make	
2	Type	
3	Reference standard	IS 4540
4	Rating	To be provided by bidder as per details given in Annexure -1 and SLD (Annexure – A, B, C &D)
i)	Charger rating	
ii)	Output voltage	
iii)	Output current	
5	Nominal Voltage	
i)	Float	
ii)	Boost	
6	Float charger voltage range (V)	
7	Boost charger voltage range (V)	

8	Efficiency of charger	
i)	At light load (50%)	≥ 90%
ii)	At rated load	≥ 90%
9	Power factor at rated voltage / load	≥ 99%
10	Maximum Harmonics at rated load	
i)	With battery connected	≤ 5%
ii)	Without battery connected	≤ 5%
11	Method of voltage control	
i)	In float mode	
ii)	In boost mode	
12	Method of battery current control in float mode	
13	Method of current control in boost mode	
14	Safety factor used for selecting components	
15	Charger dimensions (approx.)	
i)	Width (mm)	
ii)	Depth (mm)	

iii)	Height (mm)	
16	Maximum Heat loss in watts (Approx.)	
17	Degree of protection (IP)	IP42
18	A.C. input	
i)	Voltage ± % variation	415V ± 10%
ii)	Phase	Three (3) Phase four wire (4W)
iii)	Frequency ± % variation	50 Hz ± 5%
iv)	Combined AC voltage & frequency variations	± 10%
v)	System earthing	Solidly earthed
vi)	System short ckt. level	Max 50kA, 1sec @ 415V
19	Input amps at the following loads in (Approx.) addition to supply the battery charging current.	
i)	50 % rated load (A)	
ii)	100 % rated load (A)	
iii)	110 % rated load (A)	
20	Charger maximum inrush current	

21	D.C. Output	
i)	Float charger	
a)	Voltage/ (Volt per Cell)	
b)	Current (A).	
ii)	Boost charger	
a)	Voltage/ Volt per Cell	
b)	Current (Amp).	
22	Type of cooling	
23	Max. temp within cubicle above ambient	
ii)	Rectifier Modules	
24	Performance	
i)	Regulation for 0 - 100 % rated load with +/- 10 % input voltage and +/- 5 % input frequency variation.	
ii)	Ripple content in D.C. output	
a)	With battery	≤ 1%
b)	Without battery	≤ 1%

25	Max. Fault current for the short ckt. at output terminals.	
a)	With Current Operating Device Operative	
b)	With Current Operating Device In Operative	
26	Miscellaneous	
i)	Charger provided with following features	
a)	Automatic voltage regulator	Yes / No
b)	Current limiting circuitry	Yes / No
c)	Smoothing filter circuit	Yes / No
d)	Soft start feature	Yes / No
ii)	Switching device elements provided with	
a)	Surge protection	Yes / No
b)	Fast acting HRC fuse	Yes / No
iii)	Maximum temp. within cubicle above ambient	
a)	Switching Device (Deg. C)	
b)	Blocking diode PIV (Deg. C)	
v)	Charger auxiliary equipment along with necessary alarms furnished as per specs.	

vi)	Cooling	
a)	Type	
b)	No. of fans	
c)	Operating time at full load without forced air cooling	
27	A.C MCCB	
i)	Make	
ii)	Type / Cat no.	
iii)	Reference standard	IS 13947 / IEC 60947
iv)	Rated current (A)	
v)	No of poles	
vi)	Rated service voltage (V)	
vii)	Rated insulation voltage (V)	
viii)	Rated short circuit breaking capacity (kA)	
ix)	Rated short circuit making capacity (kA)	
x)	Breaker opening time (ms)	
xi)	Utilization Category	

32	AC MCB	.
i)	Make	
ii)	Type / Cat no.	
iii)	Reference standard	IS 8828 / IEC 60898 / IEC 13947
iv)	No of poles	
v)	Rated Voltage / Rated Frequency	
vi)	Operational voltage (V)	
vii)	Current range (A)	
viii)	Rated breaking current (kA).	
ix)	Rated insulation Voltage (V)	
x)	Number of auxiliary contacts / Contact configuration (NO / NC)	
xi)	Max contact load @ Voltage (A, V)	
xii)	Shunt trip provided	
xiii)	Fault signal contact provided for remote indication	
33	DC MCCB	.
i)	Make	

ii)	Type / Cat no.	
iii)	Reference standard	IS 13947 / IEC 60947
iv)	Rated current (A)	
v)	No of poles	
vi)	Rated service voltage (V)	
vii)	Rated insulation voltage (V)	
viii)	Rated short circuit breaking capacity (kA)	
ix)	Rated short circuit making capacity (kA)	
x)	Breaker opening time (ms)	
xi)	Utilization Category	
32	DC MCB	.
i)	Make	
ii)	Type / Cat no.	
iii)	Reference standard	IS 8828 / IEC 60898 / IEC 13947 / IEC 60947
iv)	No of poles	
v)	Rated Voltage (V)	

vi)	Operational voltage (V)	
vii)	Current range (A)	
viii)	Rated breaking current (kA).	
ix)	Rated insulation Voltage (V)	
x)	Number of auxiliary contacts / Contact configuration (NO / NC)	
xi)	Max contact load @ Voltage (A, V)	
xii)	Shunt trip provided	
xiii)	Fault signal contact provided for remote indication	
34	Blocking diodes	
i)	Make	
ii)	Type / Cat no.	
iii)	Reference standard	IEC 60146
iv)	Current rating (A)	
a)	One minute (A)	
b)	Two hour (A)	
v)	Peak inverse voltage (V)	

35	Indication lamps	
i)	Make	
ii)	Type / Cat no.	
iii)	Reference standard	IS 13947
iv)	Wattage (w)	
v)	Series resistor (Ohm)	
36	SMPS Module	
i)	Make	
ii)	Type / Cat no.	
iii)	Reference standard	IEC 60146 / IS 4540
iv)	Nominal Input voltage (V)	230V AC ± 10% (Single Phase Unit)
v)	Nominal Input current (A)	
vi)	Input frequency range (Hz)	
vii)	Nominal output voltage (V)	230V AC ± 10% (Single Phase Unit)
viii)	Nominal output current (A)	
viii)	Nominal output power (w)	

ix)	Power factor	
x)	Total harmonic distortion (%)	
xi)	Efficiency (%)	
xii)	Adjustable output voltage range (V)	
xiii)	Voltage ripple (% or V)	
xiv)	Short Circuit Protection Provided	Yes / No
xv)	LED signaling provided for healthiness	
xvi)	Potential free contacts for “General Fault / Hardware fault”	
xvii)	Ambient Temperature of operation	0 to 50 Deg C
xviii)	Cooling	
xix)	Type of construction and dimension	
xx)	Type of enclosure protection class	
xxi)	Weight (kg)	
37	Controller	
i)	Make	
ii)	Type / Cat no.	

iii)	Reference standard	
iv)	Supply voltage range (V)	
v)	Voltage measurement range (V)	
vi)	Current measurement range (mV)	
vii)	Power consumption (W)	
viii)	Voltage measurement input (nos)	
ix)	Current measurement input (nos)	
x)	Temperature measurement input (nos)	
xi)	Digital Input (nos)	
xii)	Digital output (nos)	
xiii)	LCD Display with background lighting provided?	Yes / No
xiv)	Size of LCD Display	
xv)	LED Indicator provided for indication of healthiness	
xvi)	Ambient Temperature (deg C)	
xvii)	Type of construction (Rack or door mounted)	
xviii)	Dimension (H x D x W)	

xix)	Weight (kg)	
xx)	Type of enclosure protection class	
xxi)	USB Interface with laptop provided	Yes / No
xxii)	Data cable for communication of controller to laptop	Yes / No
xxiii)	Latest Software Provided	Yes / No
xxiv)	All interfaces for analog and digital input connection from both DC and AC supply to controller provided ?	
xxv)	Earth fault, under voltage and over voltage protection provided in controller? If not separate relay to be provided ?	
xxvi)	Interface to SCADA	IEC 61850
38	Panel	
i)	Make	
ii)	Type / Cat no.	
iii)	Reference standard	IS 2147
iv)	Enclosure	
a)	Degree of protection	IP 42
b)	Sheet steel thickness	2.0 mm

39	Panel accessories	
i)	Internal lamp with door switch provided. Provide details	Yes / No
ii)	Single phase Space heater with thermostat provided. Provide details	Yes / No
iii)	5A 3-pin receptacle provided	Yes / No
40	Internal wiring	
i)	Insulation	PVC insulated flame retardant low smoke (FRLS)
ii)	Voltage grade	1100 V
iii)	Minimum conductor size	
41	Power terminals	
i)	Make	
ii)	Size / Cat No.	
42	Control Terminals	
i)	Make	
ii)	Size / Cat No.	
iii)	20 % spare terminal furnished?	Yes / No
43	Voltage Transducer	0 – Max voltage at battery charger end / 4-20mA

44	Current Transducer	Output 4-20mA
45	Size of ground bus (mm)	
47	Overall dimension (L. x B x H) mm (approx.) of panel	
48	Approx. weight (approx.) Kg of panel	
49	General arrangement drawings furnished	Yes / No
50	Accessories as specified furnished with battery charger.	Yes / No
51	Mandatory spares furnished as per spec	Yes / No
52	Battery charger sizing is done as per Cl 4.3.2 of specification	
53	Supervision of DC Contactor used for connecting battery supply to load shall be provided	
54	Dual terminals to be provided at each cable termination of charger	
55	Provision shall be provided in the charger to protect against phase reversal of supply	
56	Current and voltage of input supply, charger output, load and battery shall be displayed on LCD. In case feature not available, MFM shall be provided for AC and DC metering.	
57	Any other equipment which is usual and required for trouble free and satisfactory operation of the charger to be added with specification by OEM	To be provided by OEM

Note # 1: Bidder to provide guaranteed technical particulars (GTP) for each rating of charger.

ADDENDUM NO. 1
(Attachments)

(a) implementation of the project, if the personnel would be involved in any capacity on the same project.

vi. A firm, who has purchased the bid document in their name, can submit the tender either as Individual firm or in joint venture/Consortium. The tenderer shall submit details of works executed by them to fulfil the work experience **of similar work as defined below,** based on their % shared in previous Contract*******. Documentary proof such as completion certificates from client clearly indicating the nature/scope of work, actual completion cost and actual date of completion for such work should be submitted. Experience certificate of an official below the rank of Executive engineer or equivalent will not be accepted as proof for Eligibility. The offers submitted without this documentary proof shall not be evaluated. The work, executed for private client will not be considered for eligibility evaluation. However, the work executed under public sector, government under taking, semi government companies will be considered for Eligibility evaluation.

• The client's certificate clearly indicating the amount pertaining to the each similar work shall be furnished by the tenderer along with their submission.

******* a) Volume, number of production of any key activity can be demonstrated in one or more contracts combined if executed during same time period.

******* b) Volume, number of production of any key activity can be demonstrated in one or more contracts combined among Consortium/JV if executed during same time period.

vii. Tenderer should not have been blacklisted or deregistered by the Central Government, State Government of Maharashtra, any PSU of Government of India and Government of Maharashtra or any public sector undertaking including Metro rail corporation in India during last 5 years. Also, the tenderer must not have failed to take possession or to commence any contract after the award of contract. The bidder should submit undertaking to this effect in **Appendix 18 of FOT.**

viii. Bidder (any member in case of JV/consortium) must not have suffered bankruptcy/ insolvency during the last 5 years. The bidder should submit undertaking to this effect in **Appendix 18 of FOT**

ix. Non-Substantial Partners in Case of JV/Consortium

a. Lead partner must have a minimum of 26% participation in the JV/Consortium.
b. Partners having less than 26% participation will be termed as non-substantial partner and will not be considered for evaluation which means that their financial soundness and work experience shall not be considered for evaluation of JV/Consortium.
c. In case of JV/Consortium, change in constitution or percentage participation shall not be permitted at any stage after their submission of application otherwise the applicant shall be treated as non-responsive.

1.1.1.1 Minimum Eligibility Criteria:

A. The bidders individually or as consortium/ JV should fulfil the following **Eligibility Criteria**:

(a) For Supply, Erection, Testing & Commissioning of EHV/HV Transmission Towers, Termination Yard Equipments & associated Civil Works:

The Bidder should have achieved the following eligibility criteria of having successfully completed **Similar works**** during the last 7 years preceding 31st January, 2017:

Three Similar works** completed, costing not less than Rs. 8 Crores each.

or

Two Similar works** completed costing not less than Rs. 10 Crores each.

or

One Similar work** completed costing not less than Rs. 16 Crores.

Similar Work(s)** is defined as ***"Supply, Testing and Commissioning of EHV/HV Transmission Towers of 110 kV and above voltage level and/or Procurement, Supply, Erection, Testing and commissioning of various Switchyard Equipments like CTs, LAs, CR Panels, SCADA and associated Equipments like ACDB, DCDB, Battery, Battery Chargers etc. for major Transmission utilities, PSUs or Government/Leading Private organisations****."

b. For the balance Tender Security/Earnest Money, Irrevocable bank guarantee issued by a Scheduled Commercial Bank (including Schedule Commercial Foreign Banks) in India, in the form given in Annexure 6, of the Instruction to Tenderers (ITT), payable at Mumbai shall be submitted before the tender closing date as mentioned in NIT.

(In case of joint venture/consortia, Bank Guarantee for Tender Security shall be in the name of joint venture/consortia. The Tender Security Bank Guarantee shall be submitted by the respective JV/Consortium members of the Contractor in proportion to their percentage shares.) The Tender Security shall remain valid for a period of 56 days beyond the validity period for the tender.The tenderer shall upload the scanned copy of the Bank Guarantee as part of Envelope A on the online MMRC e-tendering portal only. The bidder shall submit the original Bank Guarantee, before the deadline of submission of bid at the office of the Executive Director (Electrical), MMRDA Building, 5th Floor, A-Block, Bandra Kurla Complex, Bandra –East, Mumbai-400051, India

1.1.1 Submission of Tenders shall be closed on e-tendering portal of MMRC on the date & time of submission prescribed in NIT after which no tender shall be accepted. It shall be the responsibility of the bidder / bidder to ensure that his tender is submitted online on e-tendering portal of MMRC before the deadline of submission. MMRC will not be responsible for non-receipt of tender documents due to any delay and/or loss etc.

1.1.2 Tender Document can be downloaded for reference purpose from the e-Tendering Portal of MMRC during the period mentioned in the tender notice. Interested Bidders have to make online payment of Rs. 25,000/- (Rupees Twenty-Five Thousand only) inclusive of MVAT (non-refundable) as Tender Processing Fee using online payment gateway during bid preparation using i.e. Debit Card/Credit Card/Net-Banking. Tender Fee receipt can be system generated during bid preparation by the Bidder.

1.1.3 The lowest tenderer will have to submit the rate analysis of all major items if called for.

1.1.4 Tenders shall be valid for a period of **180 days** (both days inclusive i.e. the date of submission of tender and the last date of period of validity of the tender) from the date of submission of Tenders and shall be accompanied with a tender security of the requisite amount as per **Clause C22 of ITT**.

1.1.5 MMRC reserves the right to accept or reject any or all proposals without assigning any reasons. No tenderer shall have any cause of action or claim against the MMRC for rejection of his proposal**.**

Date: 10th April, 2017
Place: Mumbai
No.: MMRC/MM3/REL-PYL/NIT/18

Executive Director (Electrical)
Mumbai Metro Rail Corporation Ltd.

C.15 Pricing Document

The Pricing Document is included in Bill of Quantities; **Section IX**. The Tenderer shall complete the Document in accordance with the instructions given in Bill of Quantity. The completed Pricing Document including price of minor deviations for such deviation as mentioned in Appendix 11 of FOT shall be submitted.

The price of each such minor deviation will be the price which the Tenderer agrees to offer to the employer from his quoted offer, if deviation is agreed by the employer. Any such deviation without a price shall not be considered and will be treated as withdrawn by the tenderer. Any other deviation mentioned anywhere in the submission other than in Appendix-11 of FOT shall be considered as if mentioned inadvertently by the tenderer and shall be considered as withdrawn without any confirmation from the tenderer.

The Tenderer is to note that the completion period must be adhered to strictly failing which Liquidated Damages shall be levied to the contractor.

C.16 Currencies of Tender and Payment

The Tenderer shall quote his price only in INR and the Payment also shall be made in INR only

C.17 Tender Index

The tenderer shall include with his tender an index **Appendix 7 to the FOT** which cross refers all of the Employer's tender requirements elaborated in these documents to all the individual sections within Contract Technical Package and Contract Financial Package which the Tenderer intends to be the responses to each and every one of those requirements.

C.18 Modification, Substitution and Withdrawal of Tenders

Except where expressly permitted by these instructions, the Tenderer shall not make or cause to be made any alteration, erasure or obliteration to the text of the documents prepared by the Employer and submitted by the Tenderer with or as part of his Tender.

The Tenderer's modification or withdrawal notice shall be prepared, sealed, marked and delivered, with the outer and inner envelopes additionally marked "MODIFICATION" or "WITHDRAWAL", as appropriate.

No Tender may be modified by the Tenderer after the deadline for submission of Tenders.

Withdrawal of a tender during the interval between the deadline for submission of bids and the expiration of the period of bid validity specified in the Form of Tender shall result in the forfeiture of the Tender Guarantee.

C.19 Pricing Condition, Qualification, Deviation etc.

Tenderer shall further note that except for deviations listed in Appendix F of ITT, tender shall be deemed to comply with all the requirements in the tender documents including employer's requirements, without any extra cost to the employer irrespective of any mention to contrary, anywhere else in the tender.

C.20 Earnest Money Deposit/ Tender Security: -

Earnest money deposit for this work will be Rs. 42,39,000/- only. The Tenderer shall submit with his Tender a Tender Security for the sum mentioned in NIT in the following forms:
a. An amount of INR 1,00,000 (Rupees One Lakh) Through RTGS/NEFT/Net Banking/Credit card/Debit Card
b. For the balance Tender Security/Earnest Money, Irrevocable bank guarantee issued by a Scheduled Commercial Bank (including Schedule Commercial Foreign Banks) in India, in the form given in Annexure 6, of the Instruction to Tenderers (ITT), payable at Mumbai shall be submitted before the tender closing date as mentioned in NIT.

(In case of joint venture/consortia, Bank Guarantee for Tender Security shall be in the name of joint venture/consortia. The Tender Security Bank Guarantee shall be submitted by the respective JV/Consortium members of the Contractor in proportion to their percentage shares.) The Tender Security shall remain valid for a period of 56 days beyond the validity period for the tender.

FORM OF TENDER – APPENDIX-18

Undertaking for not rescind/terminated or debar to participate in tender

Tenderer should not have been blacklisted or deregistered by the Central Government, State Government of Maharashtra, any PSU of Government of India and Government of Maharashtra or any public sector undertaking including Metro rail corporation in India during last 5 years. Also, the tenderer must not have failed to take possession or to commence any contract after the award of contract.

(Contractor)

Signature of the authorized signatory

(f) All conductors stringing equipment shall have a special earthing bar welded to the frame for attachment of the earth clamp.

(g) All cable segments shall include service loops as specified in this specification

(h) The maximum allowable stringing tension, maximum allowable torsional shear stress, crush strength and other physical parameters of the cable shall not be exceeded.

(i) Optical fiber attenuation shall be measured after installation and before splicing.

(j) Any increase in attenuation or step discontinuity in attenuation shall not be acceptable and shall constitute a cable segment failure.

Note: - In the event of cable damage or fiber damage the complete section shall be replaced without any mid span joints.

14. INSTALLATION OF OPGW H/W AND ASSEMBLIES

The OPGW H/W set shall be assembled and attached by the contractor in accordance with the manufacturer's instructions / recommendations.

a) DISMENTLING OF OPGW AND OPGW ASSEMBLIES

The dismantling work of OPGW and its assemblies in respect of the existing 220 kv Tr. Lines shall be done in line with the methodology specified.

15. INSTALLATION OF INSULATOR

Handling and Transportation

a) The polymer long rod insulators shall be handled carefully to avoid damage of any kind. All insulator string or strings shall be properly cradled or supported during installation to prevent chipping or bending of pins. All insulators shall be clean and all other parts shall be free from dirt and dust. Only clean rags free from any abrasive materials shall be used for cleaning insulators. Wire brushes shall not be used for the cleaning of any parts, metal or otherwise. Workmen shall not climb on insulators strings at any time.

b) If the insulators are damaged in any way, the contractor shall replace the damaged insulators as directed by the MMRC at no additional cost.

Insulator Assembly

a) The insulator strings shall be assembled properly and due care shall be taken to avoid any damage to insulator and its hardware. Insulators and hardware shall be locked properly by fully insertion of R-clip/W clip into its position. Each complete suspension insulator string shall be so installed that it will be in a vertical position.

b) All cotter pins shall be carefully installed and checked to ensure that they are properly seated. All insulator cotter key eyes shall face top up and in position. While lifting the insulator string, the bending or straining the ball pins of the insulators shall be avoided.

c) For transposition, where called for by the MMRC, the use of special hardware and fittings must be made available by the contractor. Necessary hardware is to be supplied by the contractor at no additional cost.

18. DISMENTLING OF AAAC ZEBRA CONDUCTORS AND ITS HARDWARES & ACCESSORIES

The dismantling work of AAAC Zebra conductor and hardware / accessories in respect of the existing 220 kv Tr. Lines shall be done in line with the methodology specified.

19. DISMENTALLING OF EXISTING M/C & D/C TOWERS

Bidder shall arrange for dismantling existing multi-circuit and double circuit transmission line towers only after completion of new tower erection and conductor stringing. Vendor shall arrange for required tools and plants for tower dismantling work. Experienced fitters shall be deployed by Vendor for this work. Tower dismantling work to be carried in parts (Member by member and section wise) and no tower member shall be damaged during dismantling work. Tag welded tower members below tower waist level shall be dismantled only after tag welded Nut & Bolts.

Proper stacking of dismantled tower members shall be done and after joint measurement, same shall be returned to MMRC/ RInfra designated store within 120km limit from site.

20. TOOLS & EQUIPMENT

Tools and equipment shall be inspected at the site by the MMRC after the approval of the stringing plan but prior to commencing the stringing work.

21. Snatch-block

a) Snatch-block shall be designed especially for stringing the conductors and shall have grooves of a shape and size in accordance with the manufacture's printed instructions for the conductor size used.

b) The sheaves shall be equipped with high quality ball or roller bearings. The material of the sheaves shall be aluminum alloy or material lined with bonded neoprene or equivalent as approved by the MMRC.

c) The sheaves shall have free and easy movement in the blocks and be free of any damage to the conductor contact surface. Sheaves which do not run freely or which hinder the stringing operation shall be immediately replaced.

22. Reel Stands

Reel stands shall be sturdy and provision shall be made for breaking the reels.

23. Running Lines

Running lines shall be made of steel or manila hemp or nylon or other material approval by the MMRC. The running line shall be strong enough for stringing work.

24. Come-Along

Come-along shall be of the type that it can be installed anywhere on the conductor to grip it more firmly when the holding power grows automatically as the tension of the conductor increases.

25. Compressors for Joints and Dead-End Connector Assemblies

Suitable hydraulic compressors equipped with pressure gauge and dies shall be used for tension joints and compression dead-end connector assemblies of the conductor and shall also possess functions thoroughly satisfying the jointing of the conductor as required in these specifications.

17	ISF(Instrument security factor)	Vendor to define	
18	Extended primary current	Vendor to define	
19	Centre of gravity of CT	Vendor to define	

20. Bill of Material

1.1.20.1 Supply BOM

Sr. no	Item Description	UoM	Qty	Spare	Total Qty
1	245kV Current Transformers	Nos	24	2	26

1.1.20.2 Service BOM

Sr. no	Item Description	UoM	Qty	Total Qty
1	Erection ,Installation, Testing and Commissioning of the 245kV Current Transformer	No	24	24

Fault Level	50kA for 1 sec (415V) DC fault level as per charger & battery rating
DC System	220V, +10% to -15% (at DCDB)
DC System Earthing	Unearthed

5. Technical Particulars

Sl No	Requirement	Parameter
1	Application	Station back up battery
2	Ambient Temperature	
2.1	a) Maximum	50 º C
2.1	b) Minimum	10 º C
3	Type	Nickel Cadmium (Ni Cd)
4	Battery nominal voltage and allowable voltage variation	a. 220 V DC b. Variation - 10% to –15% at DCDB
5	Number of cells per battery	As per battery sizing calculation.
6	End cell voltage	As per battery sizing calculation
7	Battery Ah rating (Capacity at 27°C for 5-hour rate to a final voltage of 1 V, as defined in IS 10918)	100Ah
8	Proposed Method of working :	
8.1	a) Nominal cell voltage	1.2 V per cell
8.2	b) Float Charging	1.4-1.42 * V per cell **(refer Note)**
8.3	c) Boost charging (after complete discharge)	1.50 - 1.70* V per cell **(refer Note)**
9	Location of battery bank	Indoor
10	Mounting of battery bank	On steel racks

Note: Asterisk (*) marked figures are tentative only. Actual figures shall be decided based on approved battery sizing and cell selection calculation furnished by OEM.

6. Design Criteria

1	Application	Reliable sources of D.C. power for control, indication, Protection, annunciation, SCADA, SDH and emergency lighting.
2	Configuration	Refer to SLD of Battery Charger
3	Type	Shall be stationary Nickel Cadmium Pocket plate type (KPH) confirming to IS: 10918

9.5	Specific gravity of electrolyte at the end of full charging at 27°C	
9.6	Specific gravity of electrolyte at the end of full discharging at 5hrs rate at 27°C	
10	**Racks**	To be provided by bidder
10.1	Number of racks per battery	
10.2	Number of cells per rack	
10.3	Type of racks (rows / tiers)	
10.4	Material of rack	Steel rack, hot dipped galvanized coated with three coats of anti-alkali paint
10.5	Racks provided with numbering tags for cells	
10.6	Rack Dimension & Weights	To be provided by bidder
10.7	Overall dimension (L x B x H)	To be provided by bidder
10.8	Approximate Weight	To be provided by bidder
11	Ventilation requirement (m3/hr.)	To be provided by bidder
12	Method of transportation of the batteries	To be provided by bidder
13	Expected life of battery	Min 20 years
14	Heat load of battery	To be provided by bidder
15	Maximum safe boost charging current	To be provided by bidder
16	Battery layout drawing furnished	To be provided by bidder
17	Discharge resistor for Battery	To be provided by bidder

19. Bill of Material

Sl No	Description	Quantity	
1	220V, 100Ah NiCd battery along with associated accessories listed below	2 Nos	
a)	Battery discharge resistor for 100Ah battery	1 No	
b)	Battery Rack	Steel– Treated, hot dipped galvanized steel with three coats of alkali/acid resistant, anti-corrosive and flame proof coating–	

11. Construction of Chargers

(i) Each battery charger panel shall be freestanding, floor mounted, metal enclosed and self-supporting. Doors shall have concealed hinges and neoprene gaskets. Panels shall be provided with necessary base frames and anchor bolts. All panels shall be of the same height so as to form a panel line-up, which shall have good aesthetic appearance.

(ii) Each panel shall be provided with CFL lamp, 3 pin, 5A receptacle and MCB protected 240V AC single phase space heater with thermostat control. Thermostat shall have variable setting range. Lamps shall be operated by door limit switch. Lamp, heater and receptacle circuits shall have individual switch fuse units.

(iii) The charger enclosures shall be metal enclosed for indoor service, vermin proof and free standing. The charger enclosures shall be fabricated from structural / CRCA sheet steel. The panel shall be fabricated by using minimum 2mm thick CRCA a sheet steel. Wherever required suitable stiffeners shall be provided. The panels shall be provided with suitable louvers for ventilation backed by SS wire mesh. They must be suitable for use in a tropical climate. Hinged doors shall be provided at the front and back as required. Inter panel sheet steel barriers of 2mm thick shall be provided. All doors and covers shall have gasket. All cabinets shall be provided with suitable lifting lugs.

(iv) The charger panels shall be dust and vermin proof with minimum IP-42 degree ingress protection.

(v) Location of electronic modules shall be such that temperature rise of the location in no case will exceed limits stipulated in relevant standards.

(vi) Bus bars shall be colour coded and live parts shall be shrouded to ensure complete safety to personnel doing routine inspection by opening the panel doors. All the equipments inside the panel and on the doors shall have suitable nameplates and devices tag number as per the schematic diagram. All wires shall be ferruled and terminals shall be numbered.

(vii) The insulation for all equipment where provided shall be heat resistant, moisture proof and tropicalized.

(viii) All control switches shall be rotary stay put type having knob handle showing function and positions. Switch shall be triple or single pole as per requirement. The switch handle shall have provision for pad locking in on and off position. All power switches shall be air insulated load break type. Vendor shall ensure that all equipment/ components such as incomer switches, outgoing dc switches, MCCB, push buttons, indicating lamps, charger mode selector switches, voltage control switches, annunciator windows etc. are suitably located on the charger door such that they can be operated without opening the front door. Power switches shall be provided with a door interlock. However, all other selector/control switches, push buttons, indicating lamps, annunciator, meters, control & monitoring unit etc. shall necessarily be installed on the front panel door as specified above.

(ix) All instruments shall be switchboard type, back connected and 72 x 72 mm square size. Accuracy class of all meters shall be ± 1%. Meters shall be provided, if controller display is not suitable for default display indicated in this specification.

(x) Control wiring connections within the panels shall be carried out with flexible,1100V grade, PVC insulated flame retardant low smoke (FRLS), BIS marked wires having stranded copper conductors. Copper strip connections shall preferably be used for currents

	b) Front communication cord with laptop for controller - 2Nos c) USB Converter (if applicable) – 1 per controller		
	d) Spare Equipments-	No	1
	d.1. Rectifier Module	Nos	2
	d.2. Controller along with accessories for fully operation of unit	Nos	1
	d.3. AC MCCB	Nos	1
	d.4. DC MCCB	Nos	2
	d.5. AC MCB (4 Pole & 2Pole)	5% of total quantity of each type	
	d.6. DC MCB	5% of total quantity of each type	
	d.7. AC Voltage Transducer	Nos	1
	d.8. DC Voltage Transducer	Nos	1
	d.9. AC Current Transducer	Nos	1
	d.10. DC Current Transducer	Nos	1
	d.11. Three Phase Main monitoring board and CT	Each type	1
	d.12. Blocking Diode	Nos	2
	d.13. Shunt for current sensing of charger, load and battery output	Nos	2
	d.14. DC Contactor	Nos	1
	d.15. Surge Protection device	Nos	1
2	a. Unloading, erection, testing and commissioning of battery charger at MMRC Substation Yard b. Training of R-infra Personnel as per the scope of this specification	LS	1

Note: The above bill of material is indicative to bidder for supply of specified package. Final bill of material (Items and quantity of each item) shall be based on approved scheme drawing. Bidder to consider all the items / equipment required in adequate quantity to meet the Employer's scheme requirement

~~20. List of mandatory spares~~

~~Sl No~~	~~Description~~	~~Quantity~~
~~1~~	~~Rectifier Module~~	~~10% of total quantity of each type~~
~~2~~	~~Controller~~	~~1 No of each rating~~
~~3~~	~~AC MCCB~~	~~1 No of each rating~~
~~4~~	~~DC MCCB~~	~~1 No of each type & rating~~
~~5~~	~~AC MCB~~	~~5% of total quantity of each type~~
~~6~~	~~DC MCB~~	~~5% of total quantity of each type~~
~~7~~	~~Voltage Transducer~~	~~10% of total quantity~~
~~8~~	~~Current Transducer~~	~~10% of total quantity~~
~~9~~	~~Three Phase Main monitoring board and CT~~	~~1 No of each rating~~
~~10~~	~~Blocking Diode~~	~~10% of each rating~~
~~11~~	~~Shunt for current sensing of charger, load and battery output~~	~~10% of each rating~~
~~12~~	~~DC Contactor~~	~~10% of each type~~

		which open on a fault, it shall be possible at site to change annunciators from "close to fault" to "open to fault" and vice versa. h) Scheme for Alarm accept and reset option shall be provided.
x.	Ethernet switch	i) Ethernet switch shall be industrially hardened, fully managed, specifically designed to operate reliably in electrically harsh and climatically demanding utility substation and industrial environments. j) It shall have Ethernet port (fiber ports/electrical port) suitable for various standard end connectors like ST, SC, LC, RJ45, MTRJ etc suitable for major vendor IEDs k) Location of power connectors and Ethernet port shall be user selectable preferably both shall be on rear side. LED indicators shall be provided on front side l) It shall work on universal (AC or DC) high voltage range (88-300VDC or 85-264VAC) aux voltage supply. It shall have dual aux supply option. m) It shall have minimum five (5) fiber ports and three (3) nos electrical port n) Switch shall be provided with conformal coating and with cable support brackets. o) It shall have self-diagnostic feature and error signal shall be reported on potential free contact p) Two (2) nos of Ethernet switch per panel shall be provided at MMRC substation
y.	Others	a) Panels at Aarey substation shall have provision to mount LIU. LIU is 19" rack mounted and of height 2U. Mounting details shall be provided at the time of detailed engineering.
z.	Guarantee	a) Performance of CRP shall be guaranteed for minimum three (3) years from the date of supply or two (2) years from the date of successful commissioning at site whichever is shorter. b) Within guarantee / warranty period, if the device needs to be shifted to suppliers works for repairs, supplier shall bear the cost of spares, software, transportation, transit insurance (to & fro) etc for repair at works. c) On receipt of complaint from Buyer, Supplier shall ensure to attend the complaint within seven (7) days of reporting. In case GOODS need to be sent back to factory for repair, Supplier shall arrange his representative to collect the material from site within seven (7) days of report of complaint. Transit insurance will be in Supplier's scope. Repaired / replaced GOODS shall be redelivered at site within 21 days after receipt of complaint. While redelivering GOODS, Supplier's representative shall verify proper functioning of repaired GOODS. d) All the expenses for maintaining supplied instrument "healthy and in working condition" to be borne by Supplier during guarantee period.
aa.	Training	a) Bidder shall to ensure the CRP system is made user friendly apart from the detailed demonstrations at site. b) The Bidder shall arrange necessary training to R Infra Engineers during commissioning at site as per this specification.
bb.	Documentation	g) Bidder shall note that the drawings, data and manuals listed in Table-1 are minimum requirements only.

	d.3). DC Supervision relay	No	2
	d.4) MCB with two aux contacts	No	5
	d.5). Switch	No	1
	d.6) Annunciator	No	1
	d.7) TTB	No	1
3	1. Unloading, erection, testing and commissioning of Relay Panel (RP) at MMRC Substation Yard 2. Unloading, erection, testing and commissioning of Relay Panel (RP) at Rinfra Aarey Substation 3. Training of R-infra Personnel as per specs.	LS	1

Note: The above bill of material is indicative to bidder for supply of specified package. Final bill of material (Items and quantity of each item) shall be based on approved scheme drawing. Bidder to consider all the items / equipment required in adequate quantity to meet the Buyer's scheme requirement**.**

11. Guaranteed Technical Particulars (GTP)

1.0	**Panel (Control & Relay Panel)**	**Requirement**	**Data to be filled by Bidder**
1.1	Make	Bidder to specify	
1.2	Type	Bidder to specify	
1.3	Dimension of panel	600 (W) x 800 (D) x 2315 (H) including base frame anti-vibration pad	
1.4	Reference Standard	As per codes standards indicated in specification	
1.5	**Construction**		
a	Degree of protection	IP54	
b	CRCA Sheet metal thickness in mm	a. 3 mm for load bearing members of the panels b.2 mm for non load bearing members	
1.6	**Equipment Mounting**		
a	Relays and switches are flush / semi-flush mounted?	Yes / No	

e	Binary input & binary output	16 BI & 14 BO + watch dog	
f	Number of channels for differential protection	Two number (redundant)	
g	Mode of communication of differential protection	Direct connectivity between relay using single mode fiber. Distance between station is @ 2km.	
h	Communication protocol	IEC 61850 & IEC-103 for relays at MMRC Substation & RInfra Aarey Substation	
i	No of ports for SCADA communication	Dual fiber ports on PRP for 61850	
		Dual RS 485 port for IEC-103	
j	Aux supply	220V DC	
k	Ordering code of relay at MMRC Substation	Bidder to provide details	
l	Ordering code of relay at Rinfra Aarey Substation	Bidder to provide details	
6.1.2	**Distance cum current differential protection relay – Main -II**		
a	Make / Type of relay	Bidder to provide data	
b	Number of 3 phase CT /PT	1No each	
c	Number of 1 phase CT /PT	1No each	
d	Secondary rating of CT/VT	1A / 110V	
e	Binary input & binary output	16 BI & 14 BO + watch dog	
f	Number of channels for differential protection	Two number (redundant)	
g	Mode of communication of differential protection	Direct connectivity between relay using single mode fiber. Distance between station is @ 2km.	
h	Communication protocol	IEC 61850 & IEC 103	

		h) Relay shall have following number of analog and digital input. • Three phase CT - one(1) No (one CT /phase) • Single phase CT – one(1) No (for neutral) • Three phase PT - one(1) No • Single phase PT - one(1) No (for open delta input) • Digital Input – Minimum 16No • Digital output – Minimum 24No • Digital output shall not be grouped type. It shall be able to use each output signal in separate circuit as per scheme requirement.
k.	Bay Control Unit (BCU)	a) Bay Control Unit (BCU) shall be provided for control and monitoring of line bays. SCADA Communication protocol of BCU shall be IEC-103 & IEC-61850 b) Closing command from SCADA shall be hard wired to digital input of BCU. c) Closing interlocks of switches (breaker, isolator & earth switch) shall be built in BCU. It shall have sufficient digital input and digital output to meet scheme requirement. d) It shall have Mimic control panel to display the bay configuration graphically, status of the bay, analog measurements and alarms. e) It shall be possible to perform control operation (Open &Close) of various switching elements (breaker, isolator and earth switch) of bay using the keypad on local user interface. Relay shall be equipped with large LCD for Local operation from relay front facia. Additionally physical TNC switch shall be provided for breaker operation. f) Local / Remote switch shall be available on BCU to control mode of operation. It shall be possible to use status of this switch in closing / opening interlocks of control switches (breaker, isolator & earth switch). Additionally physical L/R switch shall also be provided on panel. g) Interlocking Function to prevent unsafe operation of GIS equipment such as circuit breakers, isolators, earth switches etc. Interlocking shall be implemented on bay level by user-friendly menu-driven configuration software within the BCU. An over-riding / bypass function for bay-level interlocking shall be provided at appropriate security level for maintenance or during emergency conditions. The bidder shall provide details of their design during Biding. The interlocking logic shall be defined during the details engineering phase to prevent illegal operation. Closing interlock

	Control Unit (BCU)	b) It shall have the facility to record minimum eight (8) no oscillographic records each of length two (2) seconds. Total time of recording including pre and post fault record time shall be settable. c) It shall record oscillography records of all connected analog and digital channels (DI & DO) for each trigger. d) Sampling rate of oscillographic record shall be minimum 16 samples per power system cycle (800Hz) e) Events shall be generated and recorded in the relay during operation of the device regarding the status of device functions, measured data, protection setting and configuration change, status of digital input, status of digital output , status of LED , status of logic created in the relay etc f) Relay shall record trip logs for all protection trip issued by the relay. Details given in trip log shall be time stamped with events and waveforms recorded in the relay. Details like date of occurrence, time of operation of various functions; fault current etc shall be recorded in chronological order. g) It shall record min five hundred (500) time tagged events. h) It shall be possible to extract disturbance records from relay via through laptop locally and remote through communication PC. The data shall be available in COMTRADE (Common Format for Transient Data Exchange) format.
m.	Self-Monitoring for all types of Numerical Relays & Bay Control Unit (BCU)	a) The relay & BCU shall have comprehensive self-diagnostic feature. This feature shall continuously monitor the healthiness of hardware and software elements of the relay and shall generate alarm in case of any abnormality. The fault diagnosis information shall be displayed on the LCD (HMI) and also available through the communication port. b) It shall be possible to report device fail signal on IEC 103 & IEC 61850 to SCADA. In addition to this, any failure detected shall be annunciated through a dedicated output contact (watchdog).
n.	Environmental Conditions	h) Operating temperature – 0 - 50ºC i) Storage temperature - ¯25 - 70ºC j) Humidity range - 5 - 100% non-condensing k) Degree of protection – IP 51

		f. Length of data cable for connecting relay to laptop shall be of minimum four (4) meter.
q.	Communication with SCADA for all types of Numerical relays & BCU	c) Communication protocol to SCADA shall be IEC 60870-5-103 & IEC 61850 d) Two (2) no RS 485 rear port for communication on IEC 60870-5-103 to SCADA shall be provided and Two Nos FO port on PRP
r.	HMI (Human Machine Interface) for all types of Numerical relays & BCU	a) Front panel user interface shall consist of an LCD display, navigation key pad, function keys, LEDs etc. The user interface and menu texts shall be in English. LEDs shall be user configurable. b) HMI (Human Machine Interface) shall have provision to view and perform setting changes. In addition HMI should display the measured quantities, operation indications and time tagged events. c) Password protection shall be independently applied to the front user interface, front communication port and rear communication port. Password protection shall be available for view, control and setting change etc
s.	Terminal block and connection for Relay & BCU	a) Heavy duty terminal block shall be provided on rear side for CT and VT inputs (as applicable) to relay and meters. Terminals for power supply, digital input, digital output and communication port shall be provided on rear side. Terminal block for analog input shall be suitable for ring lug connection. Minimum cross-section of cables is 2.5 mm2 for CT & PT and1.5 mm2 for control cable. b) Provision for case grounding shall be provided on rear side (two stud connection) and shall be suitable for ring lug connection.

5.1	**Distance cum current differential protection relay – Main -I**	Make shall be M/s Siemens, M/s ABB or M/s GE	Shall be finalized after meeting with M/s Tata
a	Make / Type of relay	Bidder to provide data	
b	Number of 3 phase CT & PT	1No each	
c	Number of 1 phase CT & PT	1No each	
d	Secondary rating of CT & VT	1A / 110V	
e	Binary input & binary output	16 BI & 24 BO + watch dog	
f	Number of channels for differential protection	Two number (redundant)	
g	Mode of communication of differential protection	Using multiplexer through fiber based protocol IEEE C37.94	
h	Communication protocol	IEC 103 & IEC 61850	
i	No of ports for SCADA communication	Dual RS 485 port for IEC 103 Dual FO port for IEC 61850	
j	Aux supply	220V DC	
k	Ordering code of relay Main-I relay	Bidder to provide details	
5.2	**Distance cum current differential protection relay – Main -II**	Make shall be M/s Siemens, M/s ABB or M/s GE	Shall be finalized after meeting with M/s Tata
a	Make / Type of relay	Bidder to provide data	
b	Number of 3 phase CT & PT	1No each	
c	Number of 1 phase CT & PT	1No each	
d	Secondary rating of CT/VT	1A / 110V	
e	Binary input & binary output	16 BI & 24 BO + watch dog	
f	Number of channels for differential protection	Two number (redundant)	

g	Mode of communication of differential protection	Using multiplexer through electrical based protocol ITU-T G703	
h	Communication protocol	IEC 103 & IEC 61850	
i	No of ports for SCADA communication	Dual RS 485 port for IEC 103 Dual FO port for IEC 61850	
j	Aux supply	220V DC	
k	Ordering code of relay Main-I relay	Bidder to provide details	
5.3	**Bay control unit (BCU)**		
a	Make / Type of relay	Bidder to provide data	
b	Number of 3 phase CT& PT	1No each	
c	Number of 1 phase CT & /PT	1No each	
d	Secondary rating of CT/VT	1A / 110V	
e	Binary input & binary output	40 BI & 25 BO + watch dog	
f	Communication protocol	IEC 103 & IEC 61850	
g	No of ports for SCADA communication	Dual RS 485 port for IEC 103 Dual FO port for IEC 61850	
h	Aux supply	220V DC	
i	Ordering code of BCU	Bidder to provide details	
5.4	**DC supervision relay**		
a	Make	Bidder to provide data	
b	Type	Bidder to provide data	
c	Reference standard	IEC 60255	
d	Rated voltage of coil (V)	220V DC	
e	Type and No of contact	Scheme requirement + 20% spare	

xiii) ***Overload Trimming***

An overload trimming feature shall be provided for each lines bay and IV/LV windings of transformer. 02 nos. self-reset type trip relays for each bay with flag indication shall be provided for load shedding. Local and remote operated IN/OUT relays shall be provided for OLTS scheme.

xiv) ***General Relays***

(a) Tripping Relays (86)

High speed tripping relays shall be provided for trip functions of various protection schemes. The operating time of the relay shall not be more than 20 ms. The pick-up value of the relay shall be in the range of 50 to 60% of rated voltage. Healthiness of the tripping relays shall be supervised by suitable tripping relay supervision relay. It shall be static type. Wherever reset type relays are prescribed these should be provided with a local and remote reset facility. There should be an illuminated RESET pushbutton for local indication.

(b) Trip Circuit Supervision Relays (95)

Relays for pre-closing and post-closing breaker trip coil supervision shall be provided for all 220 kV/33KV circuit breakers. One (1) relay shall be provided for each trip coil and they shall be connected at the end of tripping loop. Action of the relay shall be annunciated. The relays shall have an inherent limit in time delay of 300 to 400 Mili seconds to prevent operation due to transients. The relay shall operate satisfactorily for 80 to 110% of rated supply voltage. It shall be static type.

(c) DC Supply Supervision (80)

DC supply of each protection and alarm scheme shall be monitored by no volt relays. The relay on operation shall give annunciation.

Two DC feeders shall cater to DC power requirements for relay panel. Under normal circumstances, one set of trip circuits shall be supplied by one feeder and another set of trip circuits shall be supplied by the second feeder. For this purpose, two sets of DC bus bars shall run for entire length of panels. Provision shall be made to feed the entire length of panel from one supply during outage of other supply by manual changeover. The BIDDER shall include the required equipment for the same.

(d) IN/OUT and Trip transfer relays:

Latched type IN/OUT relays for Auto reclose, LBBU, Carrier, instantaneous IN/OUT, U/F and df/dt, 87 L, 87 B IN/OUT and OLTS IN/OUT shall be provided. These shall have local as well as remote set / reset facility from SCADA. These relays shall have 6 NO & 2 NC contacts.

xv) ***General Requirements of Numerical Relay***

Numerical relays shall have a data port for local access using Hand-held device / Notebook PC (with software). All the numerical relays shall have common software. Each relay shall have IEC 61850 port which can be used for SCADA applications and for remote downloading of DR waveforms. The relay communication protocol used shall support time stamping and waveform file transfer. The relay shall synchronize with the existing GPS clock/ Gateway on SNTP protocol.
Details of Numerical relay communication ports are as follows:

Communication	Front: Ethernet port/ USB port (along with necessary cables) Rear: Redundant FO port (for SCADA integration and accessing DR from remote via Tata Power automation WAN) SNTP protocol support (for Time Sync).

2. Valid copy of Company Registration Certificate (duly notarized) in case of Public Ltd. Co. / Pvt. Ltd. Co., copy of Partnership deed (duly notarized) in case of partnership firm, Affidavit disclosing sole proprietorship (duly notarized) in case of sole proprietorship business, as the case may be, should be furnished along with the offer.

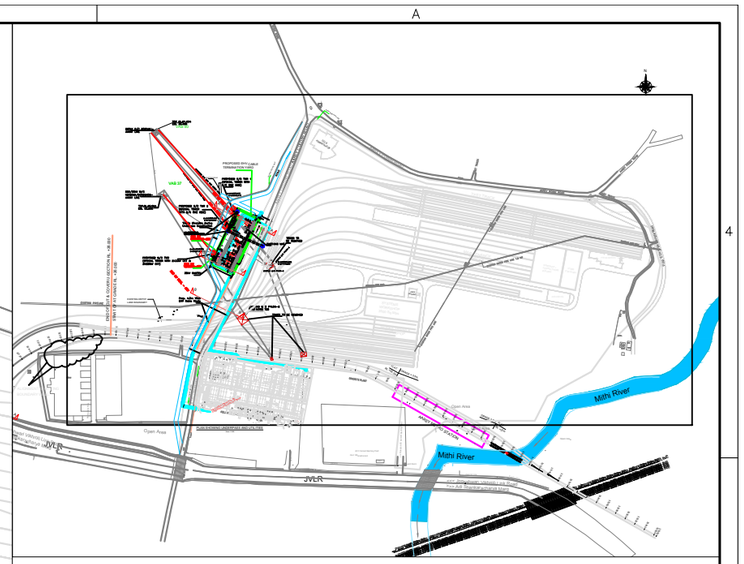
11. Annexure- I : Bill Of Quantity (BOQ)

1.	Supply and Installation of Comm Scope 4 pair CAT 6 UTP Cable	700 Mtrs
2.	Supply and Installation of Steel reinforced PVC Conduits for Cat6 cables	550 Mtrs
3.	Supply and Installation of PVC Casing for Cat6 cables	150 Mtrs
4.	Installation, training, testing, commissioning along with integration of this site setup with existing Rinfra Camera setup	Lumpsum

Note: All the required quantity and sizes of Power and Control Cables for commissioning of various equipments like Battery Charger, Control & Relay Panels, Fire Fighting Panels, SCADA etc shall be included in the respective item by the Bidders.

TOP RL.61.634
EGL 35.400
VAB 90
220kV D/C BORIVALI–AARAY LINE
VAB 37
220/33kV M/C VERSOVA/GOREGAON–AARAY LINE
TOP.RL.68.094
EGL 52.600
PROPOSED S/C (ONE SIDE CROSS ARM)
PROPOSED S/C EXISTING ROAD ONE SIDE CROSS ARM
220 KV TPC - RBVL
220 KV RBVL
PROPOSED EHV CABLE TERMINATION YARD
PROPOSED S/C TWR 1 (SPECIAL TOWER WITH S/C ONE SIDE)
N=2116873.933
E=279308.113
PROPOSED S/C TWR 2 (SPECIAL TOWER WITH S/C ONE SIDE)
N=2116840.424
E=279292.520
Traffic Diversion During Underpass Construction
FIRE HYDRANT TO BE PROVIDED BY PRESENT TENDER
220 KV GOREGAON–ARY
N=2116793.049
E=279271.511
PROPOSED M/C TWR (SPECIAL TOWER WITH 2X33kV CKT & 2X220kV CKT)
220 KV VERSOVA–ARY
33kV GANTRY
220 KV RBVL – ARY
EXISTING DEPOT LAND BOUNDARY
Prop. 4.0m Wide EHV Cable Route
EXISTING PIPELINE
EXISTING M/C PYLON–2
N=2116780.725
TOWER TO BE REMOVED
Prop. Underpass
PROPOSED PIPE LINE
AAREY COLONY ROAD
AAREY POWAI ROAD
OCC & ADMINISTRATION
EARTHING MAT
TOWER TO BE REMOVED
EXISTING D/C PYLON–2
N=2116879.236
E=277176.255
EXISTING D/C PYLON–2
EXISTING PIPE LINE
SYSTEMS WORKSHOP 3500 Sq.Mtrs
WORKS TRAINS & WORKSHOP
STABLING SHEDS FOR 10 TRAINS
CONCRETE PLANT
220 KV AAREY RECEIVING STATION RELIANCE ENERGY LIMITED
RELIANCE PLANT
33KV CABLE TRENCH TO BE EXTENDED UPTO 33KV GIS ROOM
RAMP PORTION >>> Road To Aarey Milk Colony
FLAT RL =26.0m
GRADE = 3.
END OF CUT & COVER U-SECTION RL. +26.000
START OF AT GRADE RL. +26.000
32240 32260 32280 32300 32320 32340 32360 32380 32400 32420 32440 32460 32480 32500 32520 32540 32560 32580 32600 32620 32640 32660 32680 32700 32720 32740 32760 32780 32800 32820 32840

KEYPLAN



LEGENDS :

- PROSED M/C TOWER
- PROSED S/C TOWER
- TOWER TO BE REMOVED
- CT & LA
- EXISTING EHV LINES
- PROPOSED 220kV O/H
- PROPOSED 33kV O/H
- PROPOSED EHV CABLE ROUTE
- STREET LIGHT POLE

REV.	DATE	PREP.	APPROVED	DESCRIPTION
D				
C				
B				
01	27.04.2017	VP	KLS	EXISTING ROAD CONNECTED TO PERMANENT ROAD & FIRE HYDRANT ROUTE SHOWN

INTERIM CONSULTANCY SERVICES FOR MUMBAI METRO RAIL PROJECT,LINE No. 3 COLABA- BANDRA-SEEPZ

	NAME	SIGN
DESIGN BY	IC	KS
CHECKED BY	IC	NS
APPROVED BY	GC	KLS
	RELIANCE	SH
	MMRC	MD

FOR TENDER ONLY

PROJECT:- MUMBAI METRO LINE 3 COLABA-BANDRA-SEEPZ

TITLE:- PROPOSED LAYOUT OF EHV 220 kV-33 kV TERMINATION YARD

SCALE: AS SHOWN(A1) DATE:- JAN, 2017 DRAWING NO. :- MM3-CBS-REL-PYL/001

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6-17-19 Shinbashi,
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AECOM
9/F, Infinity Tower C,
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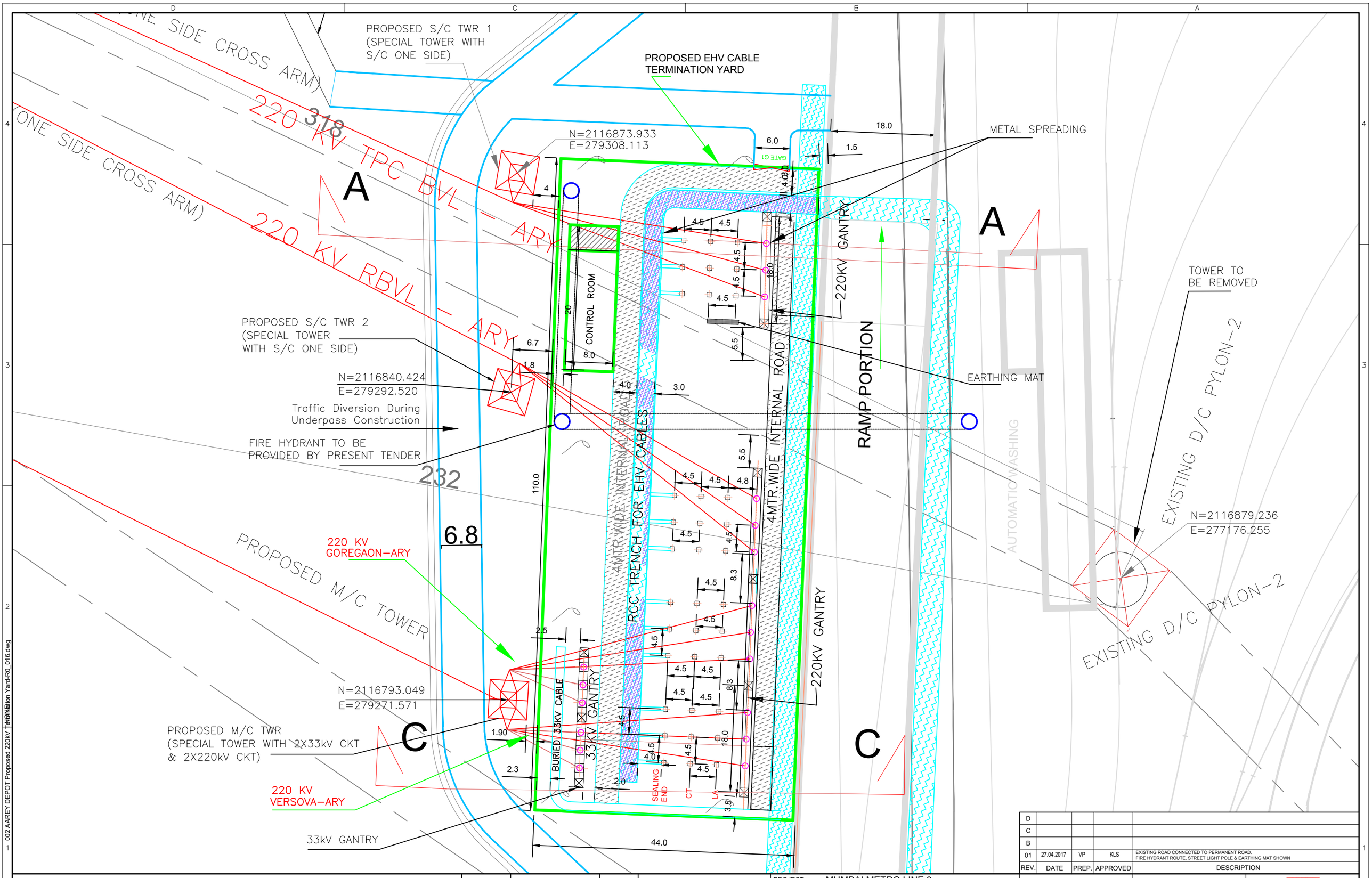
002 AAREY DEPOT Proposed 220kV Termination Yard-R0_016.dwg
28/04/2017
28-Apr-17



REV.	DATE	PREP.	APPROVED	DESCRIPTION
D				
C				
B				
01	27.04.2017	VP	KLS	EXISTING ROAD CONNECTED TO PERMANENT ROAD. FIRE HYDRANT ROUTE, STREET LIGHT POLE & EARTHING MAT SHOWN

INTERIM CONSULTANCY SERVICES
FOR MUMBAI METRO RAIL PROJECT,LINE No. 3
COLABA- BANDRA-SEEPZ

	NAME	SIGN
DESIGN BY	IC	KS
CHECKED BY	IC	NS
APPROVED BY	GC	KLS
	RELIANCE	SH
	MMRC	MD

FOR TENDER ONLY

SCALE: AS SHOWN(A1) DATE:- JAN, 2017

PROJECT:- MUMBAI METRO LINE 3
COLABA-BANDRA-SEEPZ

TITLE:- PROPOSED LAYOUT OF EHV 220 kV-33 kV TERMINATION YARD (DETAILED VIEW)

DRAWING NO. :- MM3-CBS-REL-PYL/001A

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AECOM
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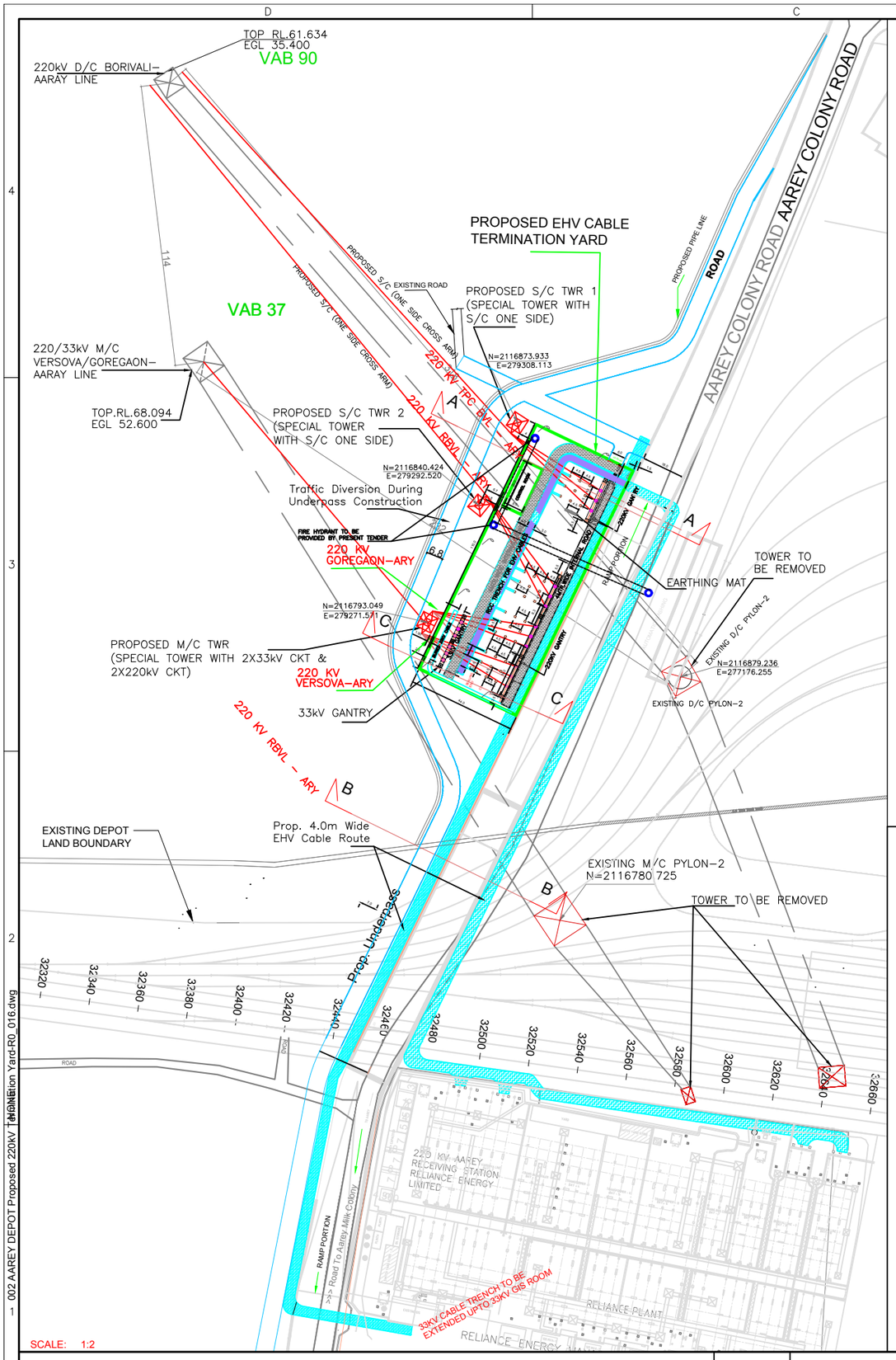
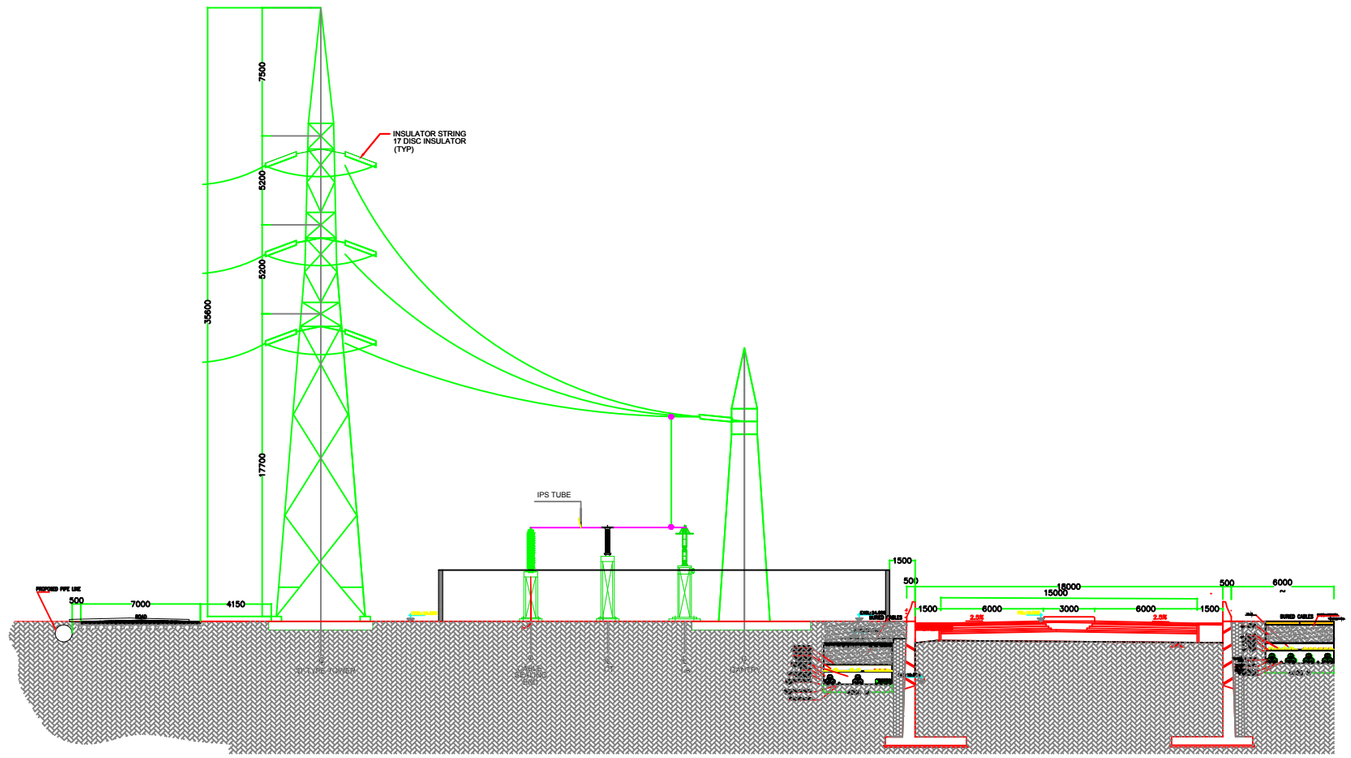
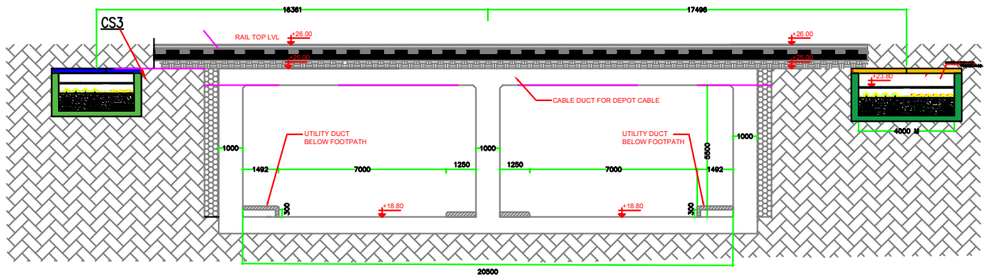
Kurla (W), Mumbai 400098
India



SCALE: 1:2



(CROSS SECTION AT APPROACHES)
SECTION A-A
SCALE: 1:350



(CROSS SECTION AT UNDER PASS)
SECTION B-B
SCALE: 1:250

LEGENDS :

- PROSED M/C TOWER
- PROSED S/C TOWER
- TOWER TO BE REMOVED
- CT & LA
- EXISTING EHV LINES
- PROPOSED 220kV O/H
- PROPOSED 33kV O/H
- PROPOSED EHV CABLE ROUTE
- STREET LIGHT POLE

REV.	DATE	PREP.	APPROVED	DESCRIPTION
D				
C				
B				
01	27.04.2017	VP	KLS	EXISTING ROAD CONNECTED TO PERMANENT ROAD & FIRE HYDRANT ROUTE SHOWN

INTERIM CONSULTANCY SERVICES
FOR MUMBAI METRO RAIL PROJECT,LINE No. 3
COLABA- BANDRA-SEEPZ

	NAME	SIGN
DESIGN BY	IC	KS
CHECKED BY	IC	NS
APPROVED BY	GC	KLS
	RELIANCE	SH
	MMRC	MD

FOR TENDER ONLY

SCALE: AS SHOWN(A1) DATE:- JAN, 2017

PROJECT:- MUMBAI METRO LINE 3
COLABA-BANDRA-SEEPZ

TITLE:- PROPOSED LAYOUT OF EHV 220 kV-33 kV TERMINATION YARD
(CONCEPT DRAWING)

DRAWING NO. :- MM3-CBS-REL-PYL/002

PADECO Co., Ltd.
Shin-Onarimon Bldg.
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Fax: +81-3-5733-0856

AECOM
9/F, Infinity Tower C,
DLF Cyber City, DLF Phase –II,
Gurgaon – 122 002, Haryana – India
Tel : +91 124 4830100
Fax: +91 124 4830373

THE Louis Berger Group , Inc., USA
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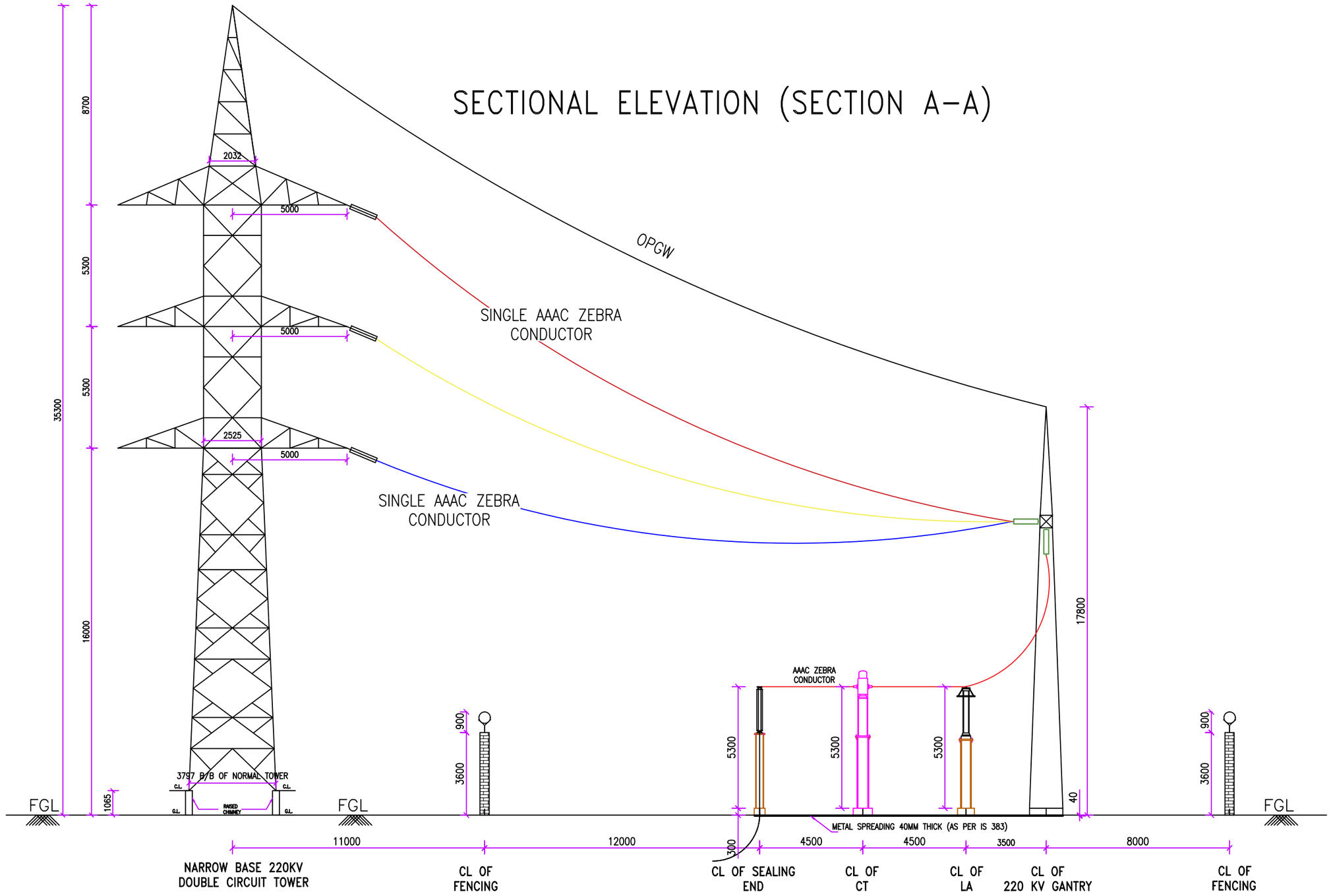
1250 23rd St. NW
Washington, DC 20037,
USA.
A-615/616, Kohinoor City,
Kurla (W), Mumbai 400098
India

28-Apr-17

28/04/2017 — 002 AAREY DEPOT Proposed 220KV Termination Yard-R0_016.dwg

SECTIONAL ELEVATION (SECTION A-A)



REV.	DATE	PREP.	APPROVED	DESCRIPTION
D				
C				
B				
01	27.04.2017	VP	KLS	METAL SPREADING SHOWN & BOUNDARY WALL MODIFIED.

INTERIM CONSULTANCY SERVICES
FOR MUMBAI METRO RAIL PROJECT,LINE No. 3
COLABA- BANDRA-SEEPZ

	NAME	SIGN
DESIGN BY	IC	KS
CHECKED BY	IC	NS
APPROVED BY	GC	KLS
	RELIANCE	SH
	MMRC	MD

FOR TENDER ONLY

SCALE: AS SHOWN(A1) DATE:- JAN, 2017

PROJECT:- MUMBAI METRO LINE 3
COLABA-BANDRA-SEEPZ

TITLE:- SECTIONAL ELEVATION OF 220KV DC TOWER

DRAWING NO. :- MM3-CBS-REL-PYL/002A

PADECO Co., Ltd.
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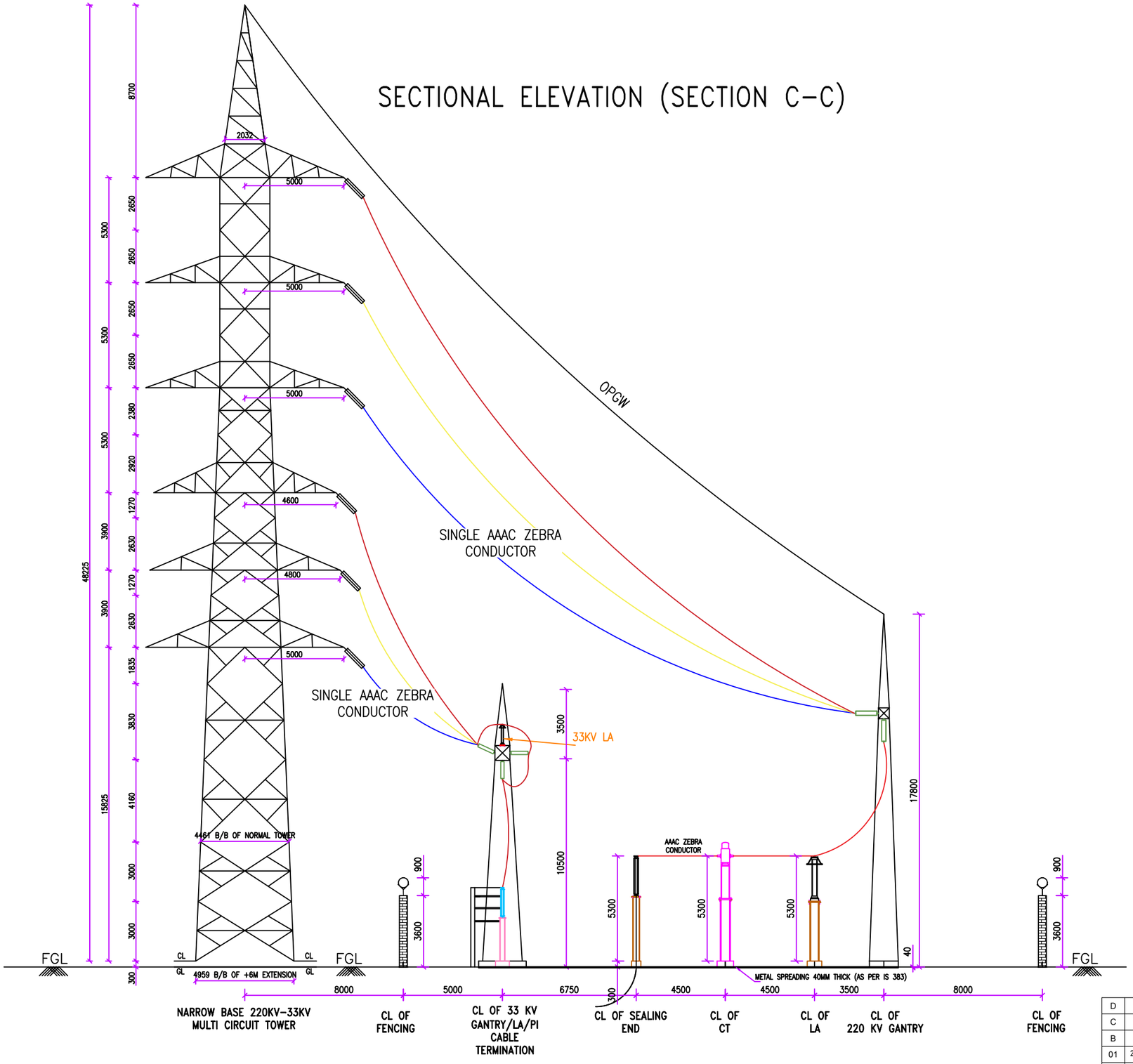
SECTIONAL ELEVATION (SECTION C–C)



REV.	DATE	PREP.	APPROVED	DESCRIPTION
D				
C				
B				
01	27.04.2017	VP	KLS	METAL SPREADING SHOWN & BOUNDARY WALL MODIFIED.

INTERIM CONSULTANCY SERVICES
FOR MUMBAI METRO RAIL PROJECT,LINE No. 3
COLABA- BANDRA-SEEPZ

	NAME	SIGN
DESIGN BY	IC	KS
CHECKED BY	IC	NS
APPROVED BY	GC	KLS
	RELIANCE	SH
	MMRC	MD

FOR TENDER ONLY

SCALE: AS SHOWN(A1) DATE:- JAN, 2017

PROJECT:- MUMBAI METRO LINE 3
COLABA-BANDRA-SEEPZ

TITLE:- SECTIONAL ELEVATION OF 220-33KV MC TOWER

DRAWING NO. :- MM3-CBS-REL-PYL/002B

PADECO Co., Ltd.
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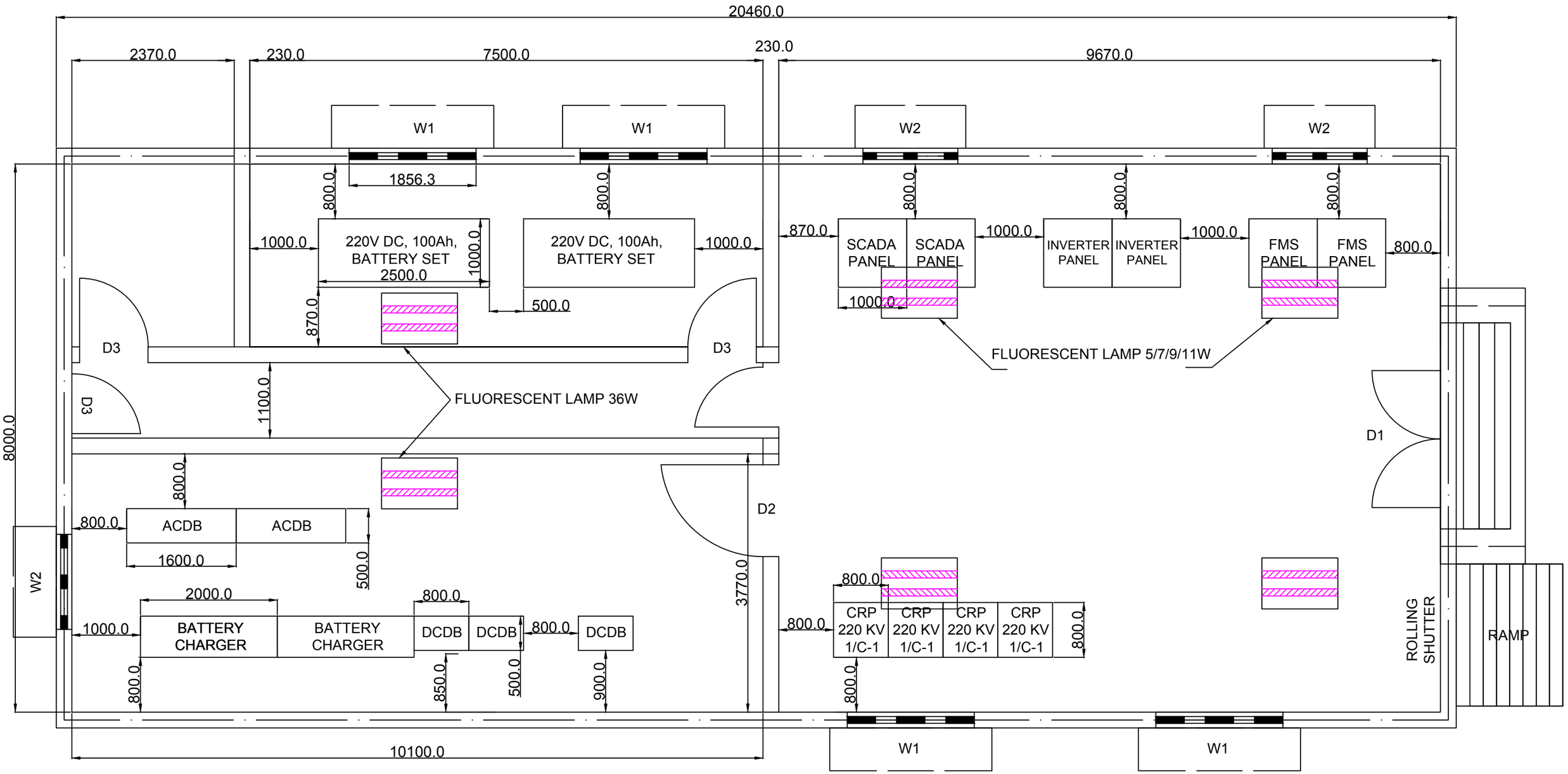
27-Apr-17

27/04/2017 → MML3-CBS-REL-PYL-002A_Sectional Elevation of 220kV MC & DC 02A,J2B.dwg



LEGENDS :

FLUORESCENT LAMP

REV.	DATE	PREP.	APPROVED	DESCRIPTION
D				
C				
B				
01	27.04.2017	VP	KLS	CONTROL ROOM & COMPOUND LIGHTING SHOWN.

INTERIM CONSULTANCY SERVICES
FOR MUMBAI METRO RAIL PROJECT,LINE No. 3
COLABA- BANDRA-SEEPZ

	NAME	SIGN
DESIGN BY	IC	KS
CHECKED BY	IC	NS
APPROVED BY	GC	KLS
	RELIANCE	SH
	MMRC	MD

FOR TENDER ONLY

SCALE: AS SHOWN(A1) DATE:- JAN, 2017

PROJECT:- MUMBAI METRO LINE 3
COLABA-BANDRA-SEEPZ

TITLE:-
LAYOUT OF
CONTROL ROOM

DRAWING NO. :- MM3-CBS-REL-PYL/003

PADECO Co., Ltd.
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PROPOSED S/C TWR 2
(SPECIAL TOWER
WITH S/C ONE SIDE)

N=2116840.424
E=279292.520

Traffic Diversion During
Underpass Construction

FIRE HYDRANT TO BE
PROVIDED BY PRESENT TENDER

220 KV
GOREGAON-ARY

PROPOSED M/C TOWER

N=2116793.049
E=279271.571

PROPOSED M/C TWR
(SPECIAL TOWER WITH 2X33kV CKT &
2X220kV CKT)

220 KV
VERSOVA-ARY

33kV GANTRY

EARTHING MAT

TRENCH TYPE-2

TRENCH TYPE-3

TRENCH TYPE-4

TRENCH TYPE-5A

TRENCH TYPE-2

TRENCH TYPE-5

TRENCH TYPE-2A

TRENCH TYPE-2A

TRENCH TYPE-2A

TRENCH TYPE-3

TRENCH TYPE-1

EXISTING DEPOT
LAND BOUNDARY

220 KV AAREY
RECEIVING STATION
RELIANCE ENERGY
LIMITED

RELIANCE PLANT

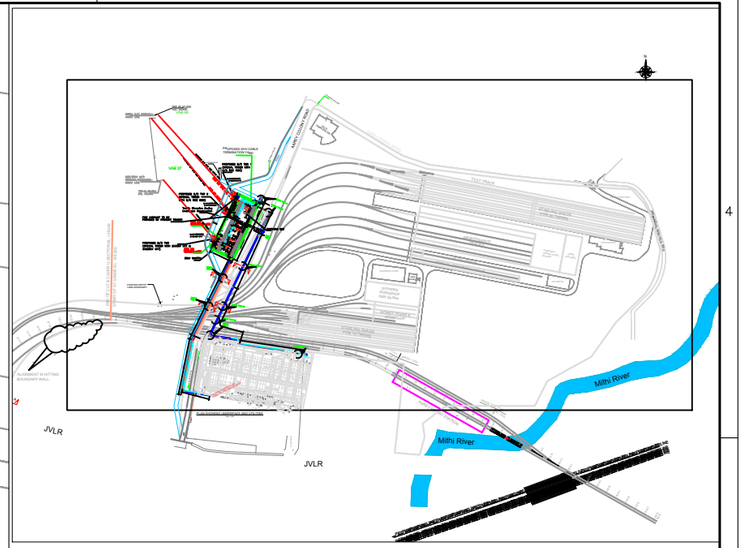
RELIANCE ENERGY

>>> Road To Aarey Milk Colony

33KV CABLE TRENCH TO BE
EXTENDED UPTO 33KV GIS ROOM

STABL
FOR 1

KEYPLAN



LEGENDS :

- PROSED M/C TOWER
- PROSED S/C TOWER
- TOWER TO BE REMOVED
- CT & LA
- EXISTING EHV LINES
- PROPOSED 220kV O/H
- PROPOSED 33kV O/H
- PROPOSED EHV CABLE ROUTE
- STREET LIGHT POLE

REV.	DATE	PREP.	APPROVED	DESCRIPTION
D				
C				
B				
01	27.04.2017	VP	KLS	TRENCH TYPES MARKING SHOWN.

MMRC

INTERIM CONSULTANCY SERVICES
FOR MUMBAI METRO RAIL PROJECT,LINE No. 3
COLABA- BANDRA-SEEPZ

	NAME	SIGN
DESIGN BY	IC	KS
CHECKED BY	IC	NS
APPROVED BY	GC	KLS
	RELIANCE	SH
	MMRC	MD

FOR TENDER ONLY

SCALE: AS SHOWN(A1) DATE:- JAN, 2017

PROJECT:- MUMBAI METRO LINE 3
COLABA-BANDRA-SEEPZ

TITLE:-
PROPOSED LAYOUT OF EHV 220 kV-33 kV
CABLE TRENCH (KEY PLAN)

DRAWING NO. :- MM3-CBS-REL-PYL/GAD/004

SHEET 2:3

PADECO Co., Ltd.
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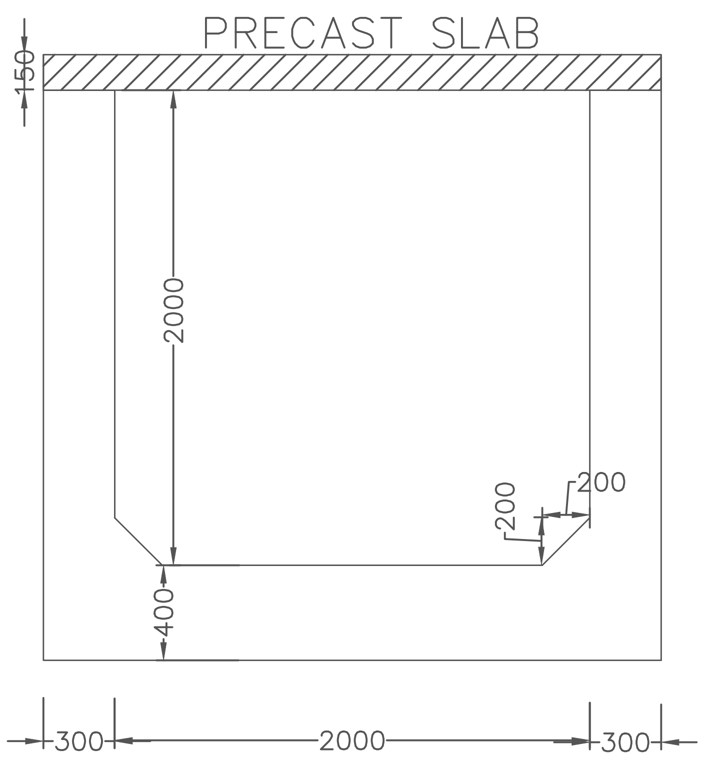
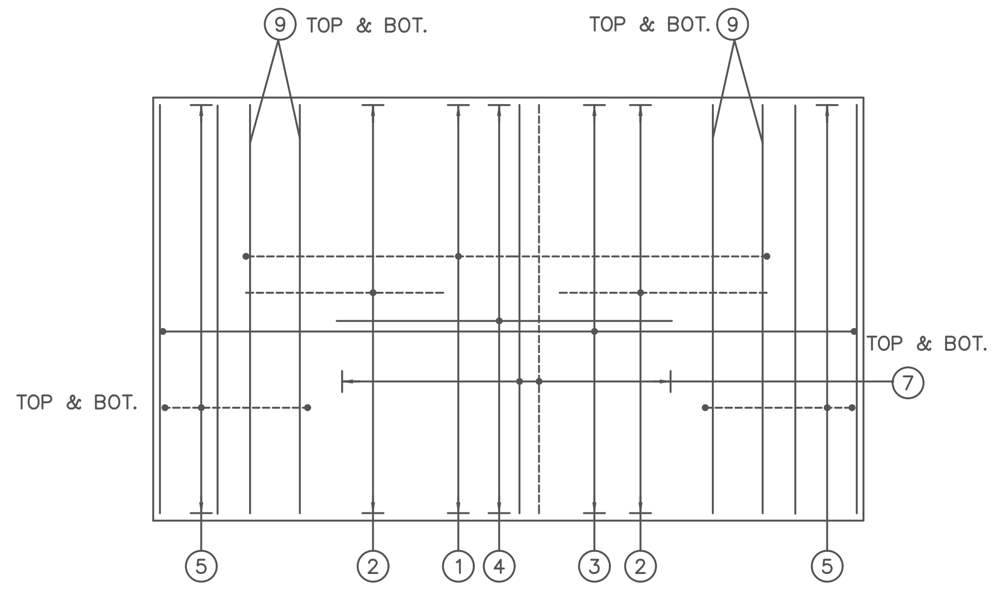
India

27-Apr-17

27/04/2017 — CABLE ROUTE FROM TERMINATION YARD TO R-INFRA SS-GAD-004.dwg



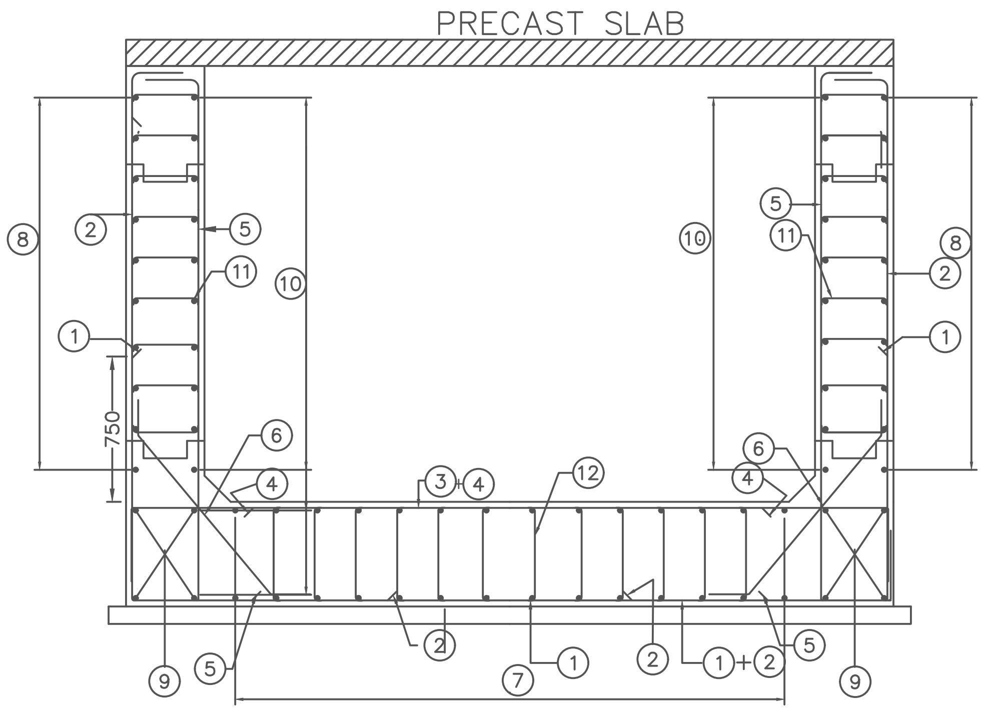
DIMENSION DETAILS OF U- BOX



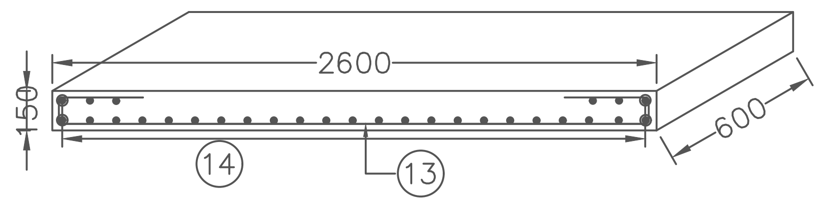
BOTTOM SLAB REINF. PLAN
(HAUNCH LINES NOT SHOWN FOR CLARITY)

SCHEDULE OF REINFORCEMENT

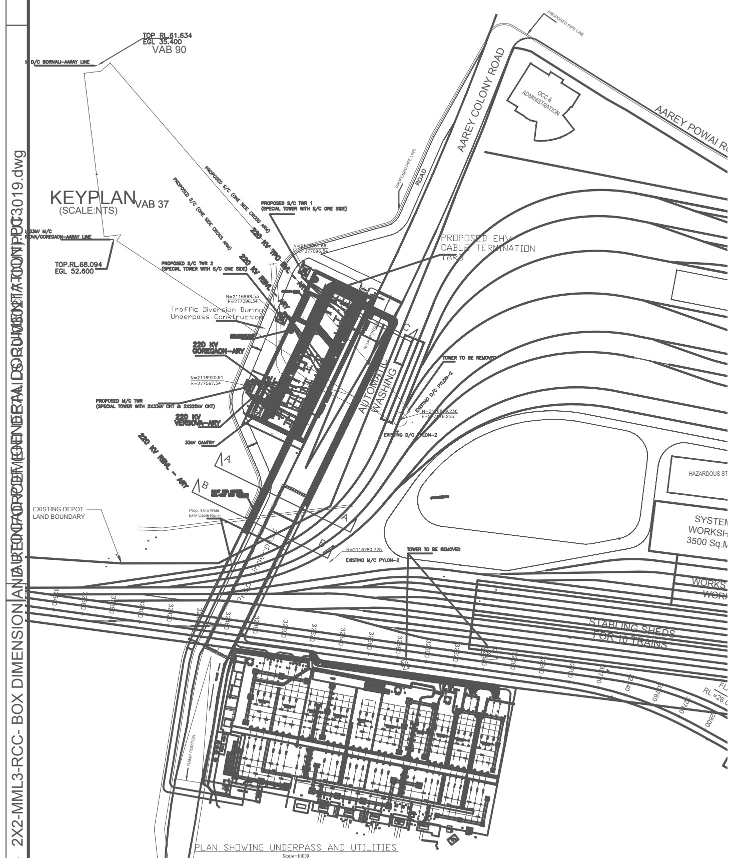
1		ϕ12@150 c/c
2		ϕ12@150 c/c
3		ϕ12@150 c/c
4		ϕ12@150 c/c
5		ϕ12@150 c/c
6	250 250	ϕ12@200 c/c
7		ϕ10@150 c/c
8		ϕ10@150 c/c
9		4 -ϕ12
10		ϕ10@150 c/c
11	LINK	ϕ10@150 c/c (x300 TRANSVERSE)
12	LINK	ϕ10@150 c/c (x300 TRANSVERSE)
13		ϕ12@150 c/c
14		ϕ10@100 c/c



REINF. DETAILS OF SINGLE CELL BOX



REINF. DETAILS FOR PRECAST SLAB



NOTES
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.
2. CONCRETE GRADE FOR RC BOX SHALL BE M40
3. REINFORCEMENT BARS SHALL BE HIGH YIELD STRENGTH DEFORMED BARS (DENOTED AS ϕ) HAVING YIELD STRENGTH OF Fe 500 Mpa AND CONFORMING TO IS 1786
4. THE REINFORCEMENT OF RAILING POSTS SHALL BE INCORPORATED BEFORE CASTING OF THE RC BOX
5. LAPS SHALL BE STAGGERED MINIMUM LAP LENGTH AND ANCHORAGE LENGTH SHALL BE 57ϕ FOR BOTTOM BARS & 57ϕ FOR TOP BARS.
6. SBC CONSIDERED IN THE DESIGN IS 15T/M2(Please reconfirm SBC at site before casting).

REV.	DATE	PREP.	APPROVED	DESCRIPTION
D				
C				
B				
01	27.04.2017	VP	KLS	PRECAST SLAB MODIFIED.

MMRC

INTERIM CONSULTANCY SERVICES FOR MUMBAI METRO RAIL PROJECT,LINE No. 3 COLABA- BANDRA-SEEPZ

	NAME	SIGN
DESIGN BY	VIT	VIT
CHECKED BY	AKS	AKS
	GC	KLS
APPROVED BY	RELIANCE	SH
	MMRC	MD

FOR TENDER ONLY

SCALE: AS SHOWN(A1) DATE:- JAN, 2017

PROJECT:- MUMBAI METRO LINE 3 COLABA-BANDRA-SEEPZ

TITLE:- RCC BOX DIMENSION AND REINFORCEMENT DETAILS FOR SINGLE CELL CABLE DUCT

DRAWING NO. :- MM3-CBS-REL-PYL/019

PADECO Co., Ltd. Shin-Onarimon Bldg. 6-17-19 Shinbashi, Minato-ku Tokyo 105-0004 Japan Tel: +81-3-5733-0855 Fax: +81-3-5733-0856

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27-Apr-17

27/04/2017

EXISTING ROAD

PERMANENT ROAD DIVERSION (IN THE SCOPE OF PRESENT TENDER)

TEMPORARY ROAD DIVERSION

PROPOSED EHV CABLE TERMINATION YARD

PERMANENT ROAD DIVERSION

EARTHING MAT

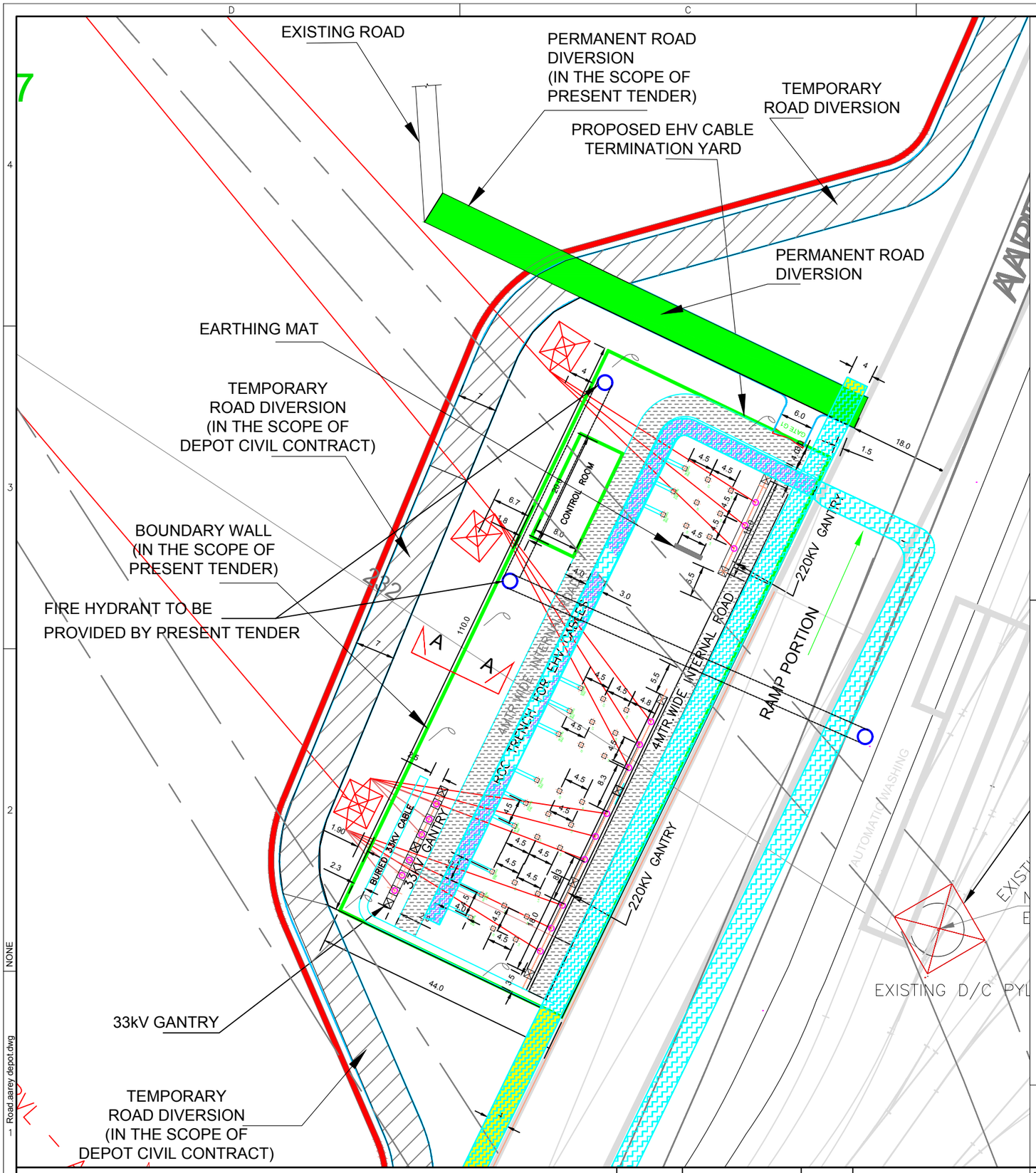
TEMPORARY ROAD DIVERSION (IN THE SCOPE OF DEPOT CIVIL CONTRACT)

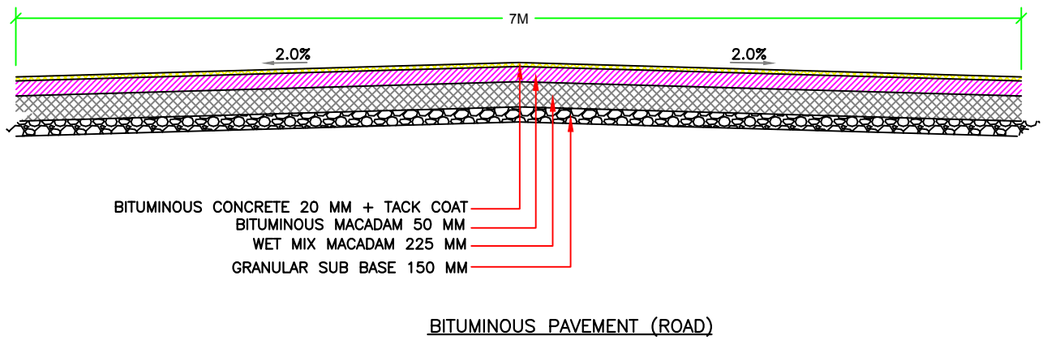
BOUNDARY WALL (IN THE SCOPE OF PRESENT TENDER)

FIRE HYDRANT TO BE PROVIDED BY PRESENT TENDER

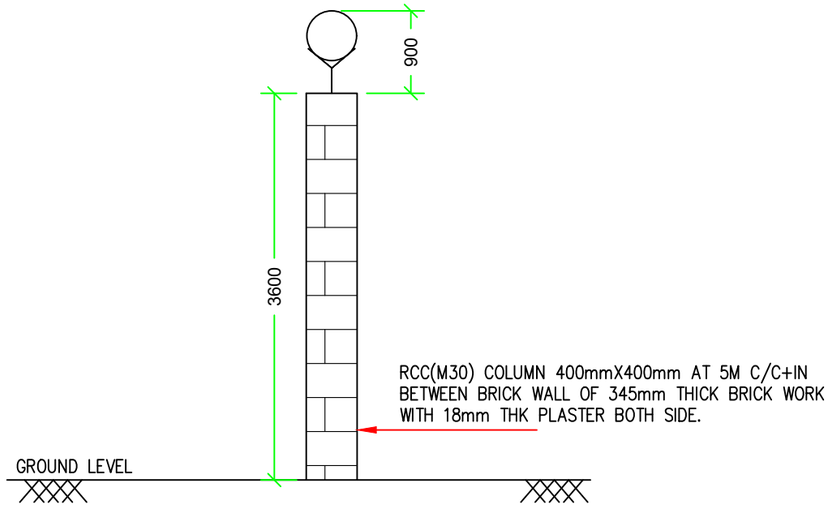
33kV GANTRY

TEMPORARY ROAD DIVERSION (IN THE SCOPE OF DEPOT CIVIL CONTRACT)





BITUMINOUS PAVEMENT (ROAD)



BOUNDARY WALL

SECTION A-A

LEGENDS :

PERMANENT ROAD DIVERSION	STREET LIGHT POLE
TEMPORARY ROAD DIVERSION	

REV.	DATE	PREP.	APPROVED	DESCRIPTION
D				
C				
B				
01	27.04.2017	VP	KLS	BOUNDARY WALL SECTION & EARTHING MAT SHOWN. EXISTING ROAD CONNECTED TO PERMANENT ROAD

INTERIM CONSULTANCY SERVICES FOR MUMBAI METRO RAIL PROJECT,LINE No. 3 COLABA- BANDRA-SEEPZ

	NAME	SIGN
DESIGN BY	IC	KS
CHECKED BY	IC	NS
APPROVED BY	GC	KLS
	RELIANCE	SH
	MMRC	MD

FOR TENDER ONLY

SCALE: AS SHOWN(A1) | DATE:- JAN, 2017

PROJECT:- MUMBAI METRO LINE 3 COLABA-BANDRA-SEEPZ

TITLE:- SECTION OF PROPOSED ROAD AND BOUNDARY WALL

DRAWING NO. :- MM3-CBS-REL-PYL/027

PADECO Co., Ltd.
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9/F, Infinity Tower C,
DLF Cyber City, DLF Phase –II,
Gurgaon – 122 002, Haryana – India
Tel : +91 124 4830100
Fax: +91 124 4830373

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28-Apr-17

28/04/2017 1 - Road aarey depot.dwg NONE