



# **CHENNAI METRO RAIL LIMITED**

**CHENNAI METRO RAIL PROJECT PHASE 2, CORRIDOR 4**

**TENDER No. C4-VAC&TVS-12**

**“DESIGN VERIFICATION & VALIDATION, SUPPLY, INSTALLATION, TESTING, COMMISSIONING, SUPPLY OF SPARES & SPECIAL TOOLS, OPERATIONS AND MAINTENANCE DURING TWO (02) YEARS DEFECT LIABILITY PERIOD (DLP) AND FIVE (05) YEARS COMPREHENSIVE ANNUAL MAINTENANCE CONTRACT (CAMC) OF VENTILATION AND AIR CONDITIONING (VAC), TUNNEL VENTILATION SYSTEM (TVS), ASSOCIATED ELECTRICAL AND INTEGRATED SCADA WORKS FOR EIGHT (08) UNDERGROUND STATIONS IN CORRIDOR-4 (C4) FROM LIGHTHOUSE TO KODAMBAKKAM STATION, INCLUDING C4 RELATED TVS SCADA WORKS AT THIRUMAYILAI STATION AND INTEGRATED STATION MANAGEMENT SYSTEMS (ISMS) AT OCC AND BOCC”**

**DATE: 21.12.2023**

**EMPLOYER: CHENNAI METRO RAIL LIMITED**

**COUNTRY: INDIA**

**e-procurement Tender Id- 2023\_CMRL\_775326\_1**

| SL. No                        | Clause No.                                   | Existing Tender Condition  | Amended Tender Condition in Addendum-01   | Remarks                |
|-------------------------------|--|--|---|------------------------|
| <b>Part-1</b>                 |  |  |   |                        |
| 1.                            | Part-1, Section - II<br>Bid Data Sheet (BDS) | <b>ITB 20.3</b><br>(b) In the case of Adjustable Price Contracts, to determine the Contract Price, the fixed portion of the Bid Price shall be adjusted by the factor specified in the BDS.  | <b>Add the new clause BDS 20.3</b><br><u>ITB 20.3 (b) is Not applicable.</u>  | Amended as underlined. |
| 2.                            | Part-1, Section – IV B - Pricing Schedule    | <b>17.1 PRICING SUMMARY</b><br><b>ii. Condition for Price Bid Documents:</b><br><br>b. If any bidder does not comply with the conditions as mentioned above in point (a) and turn to be successful bidder, in that case as mentioned in clause Part-03 PCC 4.2 Performance Security, successful bidder shall submit performance Bank Guarantee (PBG) for the <b>value of 20% of Accepted Contract Price.</b> | <b>17.1 PRICING SUMMARY</b><br><b>ii. Condition for Price Bid Documents:</b><br><br>b. If any bidder does not comply with the conditions as mentioned above in point (a) and turns out to be the successful bidder, <b><u>in that case the successful bidder shall submit performance Bank Guarantee (PBG) of 20% instead of 10% of the Accepted Contract Price as mentioned in Part-03, PCC Clause 4.2 (Performance Security).</u></b> | Amended as underlined. |
| <b>Part-1 BOQ Annexure- I</b> |  |  |   |                        |
| 3.                            | Part-1 BOQ Annexure- I                       | Annexure-I BOQ Rev.01  | <b>Deleted</b><br><b><u>Annexure-I BOQ Rev.01 / Oct.23</u></b><br><br><b>Replaced with Newly added BOQ.</b><br><b><u>Annexure-I BOQ Rev.02 / Dec.23</u></b>   | Amended as underlined. |
| 4.                            | Part-1 BOQ Annexure- I                       | BOQ_815086   | <b>Deleted</b><br><b><u>BOQ 815086</u></b><br><br><b>Replaced with New Price Bid form.</b><br><b><u>New BOQ</u></b>   | Amended as underlined. |

| SL. No  | Clause No.   | Existing Tender Condition  | Amended Tender Condition in Addendum-01   | Remarks               |  |  |                              |                       |   |  |  |  |             |  |           |  |              |                  |   |   |  |          |         |  |  |                              |   |   |  |  |  |             |  |           |  |                      |                  |   |   |                       |
|---|--|--|---|-----------------------|--|--|------------------------------|-----------------------|---|--|--|--|-------------|--|-----------|--|--------------|------------------|---|---|--|----------|---------|--|--|------------------------------|---|---|--|--|--|-------------|--|-----------|--|----------------------|------------------|---|---|-----------------------|
| Part-2  |  |  |   |                       |  |  |                              |                       |   |  |  |  |             |  |           |  |              |                  |   |   |  |          |         |  |  |                              |   |   |  |  |  |             |  |           |  |                      |                  |   |   |                       |
| 5.  | Part-2<br>Employer's requirements,<br>Section – VI,<br>Sub - Section A. Chapter- 7 2   | 7.1.1.6. Full time Stores Manager assisted with 24 x 7 security guards shall be provided for storage yard till end of defects liability period.  | 7.1.1.6 Full time <b><u>Store Incharge</u></b> assisted with 24 x 7 security guards shall be provided for storage yard <b><u>till completion of Project Works.</u></b>  | Amended as underlined |  |  |                              |                       |   |  |  |  |             |  |           |  |              |                  |   |   |  |          |         |  |  |                              |   |   |  |  |  |             |  |           |  |                      |                  |   |   |                       |
| 6.  | Part-2<br>Employer's requirements,<br>Section – VI,<br>Sub - Section B. Appendices- 2  | <div>Table – 13: VAC, TVS &amp; SCADA (VTS) Contractor Vs. <b>Signalling &amp; Train Control (STC) Contractor</b></div> <table><tr><th rowspan="2">Item No.</th><th rowspan="2">Subject</th><th>Contractor A (Follower)<br/>VAC TVS &amp; SCADA (VTS)<br/>Contractor</th><th>Contractor B (Lead)<br/>Signaling &amp; Train Control<br/>Contractor (STC)</th></tr><tr><td>Contract No. - C4-VAC&amp;TVS-12</td><td>Contract No. – ASA 04</td></tr><tr><td colspan="4">Interface description brief/ Key elements (time schedule, physical, functional, ...).</td></tr><tr><td colspan="2">Table #: 13</td><td colspan="2">Rev #: AO</td></tr><tr><td>VTS/TBC<br/>1</td><td>SCR<br/>Furniture</td><td>a) Shall provide the necessary dimensions for TVS/VAC SCADA Equipment's and its cabling at SCR.<br/><br/>b) Shall install TVS/VAC SCADA system at SCR including cabling of TVS/VAC system.<br/><br/>c) Shall monitor and Co-ordinate.</td><td>a) Shall accommodate the space for TVS/VAC SCADA Equipment's and its cabling at SCR.<br/><br/>b) Shall monitor and Co-ordinate.<br/><br/>c) Shall provide the necessary furniture's to accommodate TVS/VAC SCADA Equipment's.</td></tr></table> | Item No.  | Subject               | Contractor A (Follower)<br>VAC TVS & SCADA (VTS)<br>Contractor       | Contractor B (Lead)<br>Signaling & Train Control<br>Contractor (STC) | Contract No. - C4-VAC&TVS-12 | Contract No. – ASA 04 | Interface description brief/ Key elements (time schedule, physical, functional, ...). |  |  |  | Table #: 13 |  | Rev #: AO |  | VTS/TBC<br>1 | SCR<br>Furniture | a) Shall provide the necessary dimensions for TVS/VAC SCADA Equipment's and its cabling at SCR.<br><br>b) Shall install TVS/VAC SCADA system at SCR including cabling of TVS/VAC system.<br><br>c) Shall monitor and Co-ordinate. | a) Shall accommodate the space for TVS/VAC SCADA Equipment's and its cabling at SCR.<br><br>b) Shall monitor and Co-ordinate.<br><br>c) Shall provide the necessary furniture's to accommodate TVS/VAC SCADA Equipment's. | <div>Table – 13: VAC, TVS &amp; SCADA (VTS) Contractor Vs. <b><u>Civil station Contractor (UGC)</u></b></div> <table><tr><th rowspan="2">Item No.</th><th rowspan="2">Subject</th><th>Contractor A (Follower)<br/>VAC TVS &amp; SCADA (VTS)<br/>Contractor</th><th>Contractor B (Lead)<br/><u>Civil station Contractor (UGC)</u></th></tr><tr><td>Contract No. - C4-VAC&amp;TVS-12</td><td><b><u>Contract No. – C04-UG01&amp;UG-02</u></b></td></tr><tr><td colspan="4">Interface description brief/ Key elements (time schedule, physical, functional, ...).</td></tr><tr><td colspan="2">Table #: 13</td><td colspan="2">Rev #: AO</td></tr><tr><td>VTS/<u>UGC</u><br/>1</td><td>SCR<br/>Furniture</td><td>a) Shall provide the necessary dimensions for TVS/VAC SCADA Equipment's and its cabling at SCR.<br/><br/>b) Shall install TVS/VAC SCADA system at SCR including cabling of TVS/VAC system.<br/><br/>c) Shall monitor and Co-ordinate.</td><td>a) Shall accommodate the space for TVS/VAC SCADA Equipment's and its cabling at SCR.<br/><br/>b) Shall monitor and Co-ordinate.<br/><br/>c) Shall provide the necessary furniture's to accommodate TVS/VAC SCADA Equipment's.</td></tr></table> | Item No. | Subject | Contractor A (Follower)<br>VAC TVS & SCADA (VTS)<br>Contractor | Contractor B (Lead)<br><u>Civil station Contractor (UGC)</u> | Contract No. - C4-VAC&TVS-12 | <b><u>Contract No. – C04-UG01&amp;UG-02</u></b> | Interface description brief/ Key elements (time schedule, physical, functional, ...). |  |  |  | Table #: 13 |  | Rev #: AO |  | VTS/ <u>UGC</u><br>1 | SCR<br>Furniture | a) Shall provide the necessary dimensions for TVS/VAC SCADA Equipment's and its cabling at SCR.<br><br>b) Shall install TVS/VAC SCADA system at SCR including cabling of TVS/VAC system.<br><br>c) Shall monitor and Co-ordinate. | a) Shall accommodate the space for TVS/VAC SCADA Equipment's and its cabling at SCR.<br><br>b) Shall monitor and Co-ordinate.<br><br>c) Shall provide the necessary furniture's to accommodate TVS/VAC SCADA Equipment's. | Amended as underlined |
| Item No.  | Subject  | Contractor A (Follower)<br>VAC TVS & SCADA (VTS)<br>Contractor   |   |                       | Contractor B (Lead)<br>Signaling & Train Control<br>Contractor (STC) |  |                              |                       |   |  |  |  |             |  |           |  |              |                  |   |   |  |          |         |  |  |                              |   |   |  |  |  |             |  |           |  |                      |                  |   |   |                       |
|   |  | Contract No. - C4-VAC&TVS-12   | Contract No. – ASA 04   |                       |  |  |                              |                       |   |  |  |  |             |  |           |  |              |                  |   |   |  |          |         |  |  |                              |   |   |  |  |  |             |  |           |  |                      |                  |   |   |                       |
| Interface description brief/ Key elements (time schedule, physical, functional, ...). |  |  |   |                       |  |  |                              |                       |   |  |  |  |             |  |           |  |              |                  |   |   |  |          |         |  |  |                              |   |   |  |  |  |             |  |           |  |                      |                  |   |   |                       |
| Table #: 13   |  | Rev #: AO  |   |                       |  |  |                              |                       |   |  |  |  |             |  |           |  |              |                  |   |   |  |          |         |  |  |                              |   |   |  |  |  |             |  |           |  |                      |                  |   |   |                       |
| VTS/TBC<br>1  | SCR<br>Furniture   | a) Shall provide the necessary dimensions for TVS/VAC SCADA Equipment's and its cabling at SCR.<br><br>b) Shall install TVS/VAC SCADA system at SCR including cabling of TVS/VAC system.<br><br>c) Shall monitor and Co-ordinate.  | a) Shall accommodate the space for TVS/VAC SCADA Equipment's and its cabling at SCR.<br><br>b) Shall monitor and Co-ordinate.<br><br>c) Shall provide the necessary furniture's to accommodate TVS/VAC SCADA Equipment's.             |                       |  |  |                              |                       |   |  |  |  |             |  |           |  |              |                  |   |   |  |          |         |  |  |                              |   |   |  |  |  |             |  |           |  |                      |                  |   |   |                       |
| Item No.  | Subject  | Contractor A (Follower)<br>VAC TVS & SCADA (VTS)<br>Contractor   | Contractor B (Lead)<br><u>Civil station Contractor (UGC)</u>  |                       |  |  |                              |                       |   |  |  |  |             |  |           |  |              |                  |   |   |  |          |         |  |  |                              |   |   |  |  |  |             |  |           |  |                      |                  |   |   |                       |
|   |  | Contract No. - C4-VAC&TVS-12   | <b><u>Contract No. – C04-UG01&amp;UG-02</u></b>   |                       |  |  |                              |                       |   |  |  |  |             |  |           |  |              |                  |   |   |  |          |         |  |  |                              |   |   |  |  |  |             |  |           |  |                      |                  |   |   |                       |
| Interface description brief/ Key elements (time schedule, physical, functional, ...). |  |  |   |                       |  |  |                              |                       |   |  |  |  |             |  |           |  |              |                  |   |   |  |          |         |  |  |                              |   |   |  |  |  |             |  |           |  |                      |                  |   |   |                       |
| Table #: 13   |  | Rev #: AO  |   |                       |  |  |                              |                       |   |  |  |  |             |  |           |  |              |                  |   |   |  |          |         |  |  |                              |   |   |  |  |  |             |  |           |  |                      |                  |   |   |                       |
| VTS/ <u>UGC</u><br>1  | SCR<br>Furniture   | a) Shall provide the necessary dimensions for TVS/VAC SCADA Equipment's and its cabling at SCR.<br><br>b) Shall install TVS/VAC SCADA system at SCR including cabling of TVS/VAC system.<br><br>c) Shall monitor and Co-ordinate.  | a) Shall accommodate the space for TVS/VAC SCADA Equipment's and its cabling at SCR.<br><br>b) Shall monitor and Co-ordinate.<br><br>c) Shall provide the necessary furniture's to accommodate TVS/VAC SCADA Equipment's.             |                       |  |  |                              |                       |   |  |  |  |             |  |           |  |              |                  |   |   |  |          |         |  |  |                              |   |   |  |  |  |             |  |           |  |                      |                  |   |   |                       |
| 7.  | Part-2<br>Employer's requirements,<br>Section – VII,<br>Technical Specifications<br>Sub - section A, <b>Design verification &amp; validation</b> | <b>5. BRIEF ABOUT DDC</b><br>from Madhavaram Milk colony to Kellys Station and Corridor-5 Underground section from Nathamuni station to Kolathur station, Venugopal Nagar station  | <b><u>NOT USED AND DELETED.</u></b>   | Amended               |  |  |                              |                       |   |  |  |  |             |  |           |  |              |                  |   |   |  |          |         |  |  |                              |   |   |  |  |  |             |  |           |  |                      |                  |   |   |                       |
| 8.  | Part-2<br>Employer's requirements,<br>Section – VII,<br>Technical Specifications<br>Sub - section A, <b>Design verification &amp; validation</b> | <b>16. QUALIFICATION OF DESIGN VERIFICATION &amp; VALIDATOR</b><br>16.1. The contractor shall not engage any of <b>Corridor-03&amp;05</b> Detail Design consultant and their Lead Design Checker for Design Verification & Validation.   | <b>16. QUALIFICATION OF DESIGN VERIFICATION &amp; VALIDATOR</b><br>16.1. The contractor shall not engage any of <b><u>Corridor-4</u></b> Detail Design consultant and their Lead Design Checker for Design Verification & Validation. | Amended as underlined |  |  |                              |                       |   |  |  |  |             |  |           |  |              |                  |   |   |  |          |         |  |  |                              |   |   |  |  |  |             |  |           |  |                      |                  |   |   |                       |

| SL. No | Clause No.  | Existing Tender Condition   | Amended Tender Condition in Addendum-01   | Remarks               |
|--------|---|---|---|-----------------------|
| 9.     | Part 2, Section VI-Works Requirements Sub - Section A<br><b>Chapter- 15: Project Site office Establishment</b>  | 15.5.4.7.The Contractor's proposals for the leasing/renting of the offices shall be submitted to the Engineer for review within <b>14 days of LOA</b> (Letter of Acceptance) and ready for occupy for Main project office within <b>45 days from letter of Acceptance</b> . Satellite Site offices shall be ready to occupy 60 days prior to access date of the station.  | 15.5.4.7. The Contractor's proposals for the leasing/renting of the offices shall be submitted to the Engineer for review within <b><u>28 days of LOA (Letter of Acceptance)</u></b> and ready for occupy for Main project office within <b><u>60 days</u></b> from letter of Acceptance. Satellite Site offices shall be ready to occupy 60 days prior to access date of the station.  | Amended as underlined |
| 10.    | Part 2, Section VI-Works Requirements Sub - Section A<br><b>Chapter- 15: Project Site office Establishment</b>  | <b>15.6 PROJECT SITE OFFICES</b><br>15.6.1 The Contractor shall provide following Site Accommodation for the Employer/Engineer Staffs and Contractors<br>a) Main Project office – 1 No (total area minimum 420 Sqm) located within 5km radius from CMRL Head Quarters.<br>b) Satellite Site office – <b>1 no's (total area minimum 100 sqm)</b> located within 2 km radius of the stations where offices are being proposed.<br>15.6.2 Main office shall be located at centralized location of the stretch of contract. The Contractor may opt to arrange for rental accommodation with prior approval of the Engineer/Employer. 1 no's Satellite site office between 3-4 stations within the stretch with prior approval of the Engineer/Employer.   | <b>15.6 PROJECT SITE OFFICES</b><br>15.6.1 The Contractor shall provide following Site Accommodation for the Employer/Engineer Staffs and Contractors<br>a) Main Project office – 1 No (total area minimum 420 Sqm) located within 5km radius from CMRL Head Quarters.<br>b) Satellite Site office – <b><u>2 no's (total area minimum 100 sqm)</u></b> located within 2 km radius of the stations where offices are being proposed.<br><b>15.6.2</b> Main office shall be located at centralized location of the stretch of contract. The Contractor may opt to arrange for rental accommodation with prior approval of the Engineer/Employer. 1 no's Satellite site office between 3-4 stations within the stretch with prior approval of the Engineer/Employer.   | Amended as underlined |
| 11.    | Part – 2, Employer's requirements, Section – VII, Technical Specifications-<br><b>Sub - section B TVS works</b> | <b>2.2.1</b><br>Qualifications of Fan Manufacturer: The fans shall be the product of a manufacturer who has produced industrial grade fans of the types and duties required for the Contract with minimum quantity of 50% supplied for at least five years for subway transit systems or highway tunnels, with period ending on bid submission date. The fans proposed for the Contract shall have at least three years satisfactory in-service experience. A job reference list of at least three locations where the installation of fans of comparable sizes and types to the fans specified in the Employer/Engineer's Requirements have been in satisfactory operation for a minimum period of three years shall be submitted. For each installation listed, the following information shall be furnished: date of commissioning, quantities, model numbers, sizes and capacities of the fans. | <b>2.2.1</b><br>Qualifications of Fan Manufacturer: The fans shall be the product of a manufacturer who has produced industrial grade fans of the types and duties required for the Contract with minimum quantity of 50% <b><u>of the BoQ in this project</u></b> , supplied for at least five years for subway transit systems or highway tunnels, with period ending on bid submission date. The fans proposed for the Contract shall have at least three years satisfactory in-service experience. A job reference list of at least three locations where the installation of fans of comparable sizes and types to the fans specified in the Employer/Engineer's Requirements have been in satisfactory operation for a minimum period of three years shall be submitted. For each installation listed, the following information shall be furnished: date of commissioning, quantities, model numbers, sizes, and capacities of the fans. | Amended as underlined |
| 12.    | Part – 2, Employer's requirements, Section – VII, Technical Specifications-<br><b>Sub - section B TVS works</b> | <b>2.2.5</b><br>Fans shall be statically and dynamically balanced according to ISO 14694/21940 or AMCA 204-05. All fans shall be of minimum class BV-3 for ≤75kW and BV-4 for >75kW motor rating, as per AMCA 204-05 definition or G2.5 as per ISO 21940. A complete spectral analysis shall be carried out to determine each type of fan assembly's resonant frequencies including frame and anti-vibration mountings. Provisions shall be taken, and appropriate isolation pad provided to ensure satisfactory operation over the whole operation range of each unit and considering vibration tolerance of the slab. The above can be carried out in accordance to other international standards, subject to no objection by the Employer/Engineer.  | <b>2.2.5</b><br>Fans shall be statically and dynamically balanced according to ISO 14694/21940 or AMCA 204-05. All fans shall be of minimum class BV-3 for ≤75kW and BV-4 for >75kW motor rating, as per AMCA 204-05 definition or G2.5 as per ISO 21940. A complete spectral analysis <b><u>as per AMCA 204</u></b> shall be carried out to determine each type of fan assembly's resonant frequencies including frame and anti-vibration mountings. Provisions shall be taken, and appropriate isolation pad provided to ensure satisfactory operation over the whole operation range of each unit and considering vibration tolerance of the slab. The above can be carried out in accordance to other international standards, subject to no objection by the Employer/Engineer.  | Amended as underlined |

| SL. No | Clause No.  | Existing Tender Condition  | Amended Tender Condition in Addendum-01   | Remarks               |
|--------|---|--|---|-----------------------|
| 13.    | Part – 2,<br>Employer's<br>requirements,<br>Section – VII,<br>Technical<br>Specifications-<br><b>Sub - section<br/>B TVS works</b>  | <b>2.4.7</b><br>All TVF and OTEF fan housings, including motor mounts and motor supports shall be fabricated of hot rolled, AE 235 or equivalent steel not less than 6 mm thick. Clearance between housing inner diameter and blade tips shall be sufficient to allow for thermal growth difference between blades and steel housing at temperature of 250°C for period of two hours. Welds located in the air stream shall be ground smooth. Flanged rings shall be continuously welded to the outer periphery at each end of the housings, or flanges may be rolled as part of the housing. Flanges shall comply with the standards as per DIN. The welded flanges shall have a minimum thickness of 8mm. The centre of the openings of the flanges shall be spaced at 200 mm, as a maximum. | <b>2.4.7</b><br>All TVF and OTEF fan housings, including motor mounts and motor supports shall be fabricated of <b><u>hot-dip galvanized steel in accordance with ISO 1461 not less than 6 mm thick. The thickness of the hot dip galvanization should be not less than 70 µm, and the additional coating not less than 150 µm.</u></b> Clearance between housing inner diameter and blade tips shall be sufficient to allow for thermal growth difference between blades and steel housing at temperature of 250°C for period of two hours. Welds located in the air stream shall be ground smooth. Flanged rings shall be continuously welded to the outer periphery at each end of the housings, or flanges may be rolled as part of the housing. Flanges shall comply with the standards as per DIN. The welded flanges shall have a minimum thickness of 8mm. The centre of the openings of the flanges shall be spaced at 200 mm, as a maximum. | Amended as underlined |
| 14.    | Part – 2,<br>Employer's<br>requirements,<br>Section – VII,<br>Technical<br>Specifications-<br><b>Sub - section<br/>B TVS works</b>  | <b>2.6.3</b><br>All jet fans shall comply with design reversibility. Jet fan casings shall be made of Stainless Steel 316L grade.  | <b>2.6.3</b><br>All jet fans shall comply with design reversibility. <b><u>Jet fan casings shall be made of hot-dip galvanized steel in accordance with ISO 1461 not less than 4 mm thick.</u></b>  | Amended as underlined |
| 15.    | Part – 2,<br>Employer's<br>requirements,<br>Section – VII,<br>Technical<br>Specifications-<br><b>Sub - section<br/>B TVS works.</b> | <b>2.7.1.4</b><br>It is the contractor's responsibility to ensure that all imported motors shall have the necessary BIS certification as per govt. of India ruling. Three-phase induction motors intended to be installed in Indian territory shall be at least IE2 efficiency class compliance and be certified by BIS (Bureau of Indian Standards) to IS 12615.  | <b>2.7.1.4</b><br><b><u>It is the contractor's responsibility to ensure that all motors shall have the necessary type test certification. Three-phase induction motors intended to be installed in Indian territory shall be at least IE2 efficiency class compliance.</u></b>  | Amended as underlined |
| 16.    | Part – 2,<br>Employer's<br>requirements,<br>Section – VII,<br>Technical<br>Specifications-<br><b>Sub - section<br/>B TVS works</b>  | <b>2.7.21.5</b><br>The motor supports should have a minimum thickness of 10mm and must be securely welded to the fan casing.   | <b>2.7.21.5</b><br>The motor supports should have <b><u>adequate thickness as per OEM certified manufacturing process</u></b> and must be securely welded to the fan casing, subject to NONO from Employer/Engineer.  | Amended as underlined |



| SL. No | Clause No.   | Existing Tender Condition  | Amended Tender Condition in Addendum-01   | Remarks               |
|--------|--|--|---|-----------------------|
| 17.    | Part – 2,<br>Employer's<br>requirements,<br>Section – VII,<br>Technical<br>Specifications-<br><b>Sub - section<br/>B TVS works</b> | <b>2.7.21.6</b><br>The fan motor unit support should have a minimum thickness of 10mm.   | <u>NOT USED AND DELETED.</u>  | Amended               |
| 18.    | Part – 2,<br>Employer's<br>requirements,<br>Section – VII,<br>Technical<br>Specifications-<br><b>Sub – section<br/>B TVS works</b> | <b>2.9.1.9</b><br>Certification shall be provided that x-rays have been taken for 100% of fan blades <b>of all fan types</b> as per ASTM E-155, with notation of the x-ray numbers, and also that zygo/dye-penetration testing has been performed on hubs of all fan types. In addition, a complete list of the identification numbers for all hubs and blades actually installed in each fan shall be provided.   | <b>2.9.1.9</b><br>Certification shall be provided that x-rays have been taken for 100% <b>of fan blades as per ASTM E-155</b> , with notation of the x-ray numbers, and also that zygo/dye-penetration testing has been performed on hubs of all fan types. In addition, a complete list of the identification numbers for all hubs and blades actually installed in each fan shall be provided.  | Amended as underlined |
| 19.    | Part – 2,<br>Employer's<br>requirements,<br>Section – VII,<br>Technical<br>Specifications-<br><b>Sub – section<br/>B TVS works</b> | <b>2.9.1.15</b><br>Tri-Axial Strain Gauge test is must to analyse stresses in blades.  | <b>2.9.1.15</b><br>Tri-Axial Strain Gauge test is must to analyse stresses in blades. <b><u>The test shall be carried out for each fan type, randomly selected by the employer during FAT.</u></b>  | Amended as underlined |
| 20.    | Part – 2,<br>Employer's<br>requirements,<br>Section – VII,<br>Technical<br>Specifications-<br><b>Sub – section<br/>B TVS works</b> | <b>3.1.2</b><br>The expected sizes of the dampers are provided in the BoQ. The final size of the dampers shall be as per the sizes which are Notice of No Objection by the employer/Engineer during the design verification & Validation stage. Any revisions / changes in the damper sizes shall be dealt accordingly on <b>sqmt</b> basis based on the rates quoted by the Contractor.   | <b>3.1.2</b><br>The expected sizes of the dampers are provided in the BoQ. The final size of the dampers shall be as per the sizes which are Notice of No Objection by the employer/Engineer during the design verification & Validation stage. Any revisions / changes in the damper sizes shall be dealt accordingly on <b><u>pro-rata</u></b> basis based on the rates quoted by the Contractor.   | Amended as underlined |
| 21.    | Part – 2,<br>Employer's<br>requirements,<br>Section – VII,<br>Technical<br>Specifications-<br><b>Sub – section<br/>B TVS works</b> | <b>3.1.5</b><br>Individual limit switch shall be provided for every set of damper modules controlled by a actuator in a given damper with parallel control cable connections. There shall be at least two limit switch for each damper.  | <b>3.1.5</b><br>Individual limit switch shall be provided for <b><u>each damper module</u></b> in a given damper with parallel control cable connections. There shall be at least two limit switch for each damper.   | Amended as underlined |
| 22.    | Part – 2,<br>Employer's<br>requirements,<br>Section – VII,<br>Technical<br>Specifications-<br><b>Sub – section<br/>B TVS works</b> | <b>3.4.8.2</b><br>Tunnel ventilation system damper frames shall be a channel cross-section with a web not less than 200 mm and 50 mm flanges with a minimum thickness of 3 mm.; and shall be fabricated of stainless steel AISI 316L plate with reinforcing bosses and dovetail grooves for mounting frames seals shall be integral parts of the channel configuration. The corners of the frame shall be either welded or reinforced by means of riveted gusset plates. | <b>3.4.8.2</b><br>Tunnel ventilation system damper frames shall be a channel cross-section with a web not less than 200 mm and 50 mm flanges with a minimum thickness of 3 mm.; and shall be fabricated of stainless steel AISI 316L plate with reinforcing bosses and dovetail grooves for mounting frames seals shall be integral parts of the channel configuration. <b><u>Alternatively, other methods of mounting frames are acceptable, subject to Employer/Engineer NONO.</u></b> The corners of the frame shall be either welded or reinforced by means of riveted gusset plates. | Amended as underlined |

| SL. No | Clause No.   | Existing Tender Condition   | Amended Tender Condition in Addendum-01   | Remarks                  |
|--------|--|---|---|--------------------------|
| 23.    | Part – 2,<br>Employer's<br>requirements,<br>Section – VII,<br>Technical<br>Specifications-<br><b>Sub – section<br/>B TVS works</b> | Nil   | <b>New clause added.</b><br><br><b><u>3.4.9.5</u></b><br><br><b><u>Limit switch cam should be spring loaded and No mechanical key required to lock the cam. The cam should be spring loaded gear mechanism to keep the cam locked.</u></b>  | Amended as<br>underlined |
| 24.    | Part – 2,<br>Employer's<br>requirements,<br>Section – VII,<br>Technical<br>Specifications-<br><b>Sub – section<br/>B TVS works</b> | <b>3.4.10.6</b><br>Tunnel ventilation system damper actuators whereby fail-safe position is specified by the Employer's Drawings shall be furnished with spring-return devices capable of driving the dampers to their fail-safe positions within a period of 10 seconds after the actuators are fail-safe thus assuring either an open or closed damper as required in the event of power failure. Positions of dampers on power failure shall be indicated on the Site Installation Drawings. Actuator details shall be submitted for Notice of No Objection by the Employer/Engineer prior to ordering spring return type actuators. | <b>3.4.10.6</b><br>Tunnel ventilation system damper actuators whereby fail-safe position is specified by the Employer's Drawings shall be furnished with spring-return devices capable of driving the dampers to their fail-safe positions within a period of <b><u>30 seconds</u></b> after the actuators are fail-safe thus assuring either an open or closed damper as required in the event of power failure. Positions of dampers on power failure shall be indicated on the Site Installation Drawings. Actuator details shall be submitted for Notice of No Objection by the Employer/Engineer prior to ordering spring return type actuators.         | Amended as<br>underlined |
| 25.    | Part – 2,<br>Employer's<br>requirements,<br>Section – VII,<br>Technical<br>Specifications-<br><b>Sub – section<br/>B TVS works</b> | <b>3.4.10.8</b><br>All tunnel ventilation system actuators shall be sized such that the operation of the damper shall take a period between 30 seconds for each opening or closing cycle during the power stroke and less than 10 seconds for the fail-Safe mode.   | <b>3.4.10.8</b><br>All tunnel ventilation system actuators shall be sized such that the operation of the damper shall take a period between 30 seconds for each opening or closing cycle during the power stroke and less than <b><u>30 seconds</u></b> for the fail-Safe mode.   | Amended as<br>underlined |
| 26.    | Part – 2,<br>Employer's<br>requirements,<br>Section – VII,<br>Technical<br>Specifications-<br><b>Sub – section<br/>B TVS works</b> | <b>3.7.11</b><br>Testing of Motorised Smoke Dampers shall be done in accordance with NFPA 105.  | <b><u>NOT USED AND DELETED.</u></b>   | Amended                  |
| 27.    | Part – 2,<br>Employer's<br>requirements,<br>Section – VII,<br>Technical<br>Specifications-<br><b>Sub - section<br/>B TVS works</b> | <b>5.2.2</b><br>Manufacturers should have AMCA certification for sound and air performance.   | <b>5.2.2</b><br>Manufacturers should have <b><u>tested as per AMCA</u></b> for sound and air performance.   | Amended as<br>underlined |
| 28.    | Part – 2,<br>Employer's<br>requirements,<br>Section – VII,<br>Technical<br>Specifications-<br><b>Sub - section<br/>B TVS works</b> | <b>6.8</b><br>A safe and secure, leakproof, fire-rated access door (600 mm X 600 mm) with an SS 316 cage ladder, fire-rated gaskets, and sealant shall be provided as per BS/IS standards in the Metal ducting/OTE ducting for accessing the upline and downline OTE damper. The access door shall have relevant certification for the intended application.  | <b>6.8</b><br>A safe and secure, leakproof, fire-rated access door <b><u>of minimum 4 mm thick of hot dip Galvanised Steel material of 100 micron</u></b> (600 mm X 600 mm) with an SS 316 cage ladder, fire-rated gaskets, and sealant shall be provided as per BS/IS standards in the Metal ducting/OTE ducting for accessing the upline and downline OTE damper. The access door shall have relevant certification for the intended application. <b><u>Access door shall be Self-closing and locking panel include an automatic spring closer, knurled knob lock with a removable key and an interior release so it can be opened from the inside.</u></b> | Amended as<br>underlined |

| SL. No | Clause No.   | Existing Tender Condition   | Amended Tender Condition in Addendum-01   | Remarks               |
|--------|--|---|---|-----------------------|
| 29.    | Part – 2,<br>Employer's<br>requirements,<br>Section – VII,<br>Technical<br>Specifications-<br><b>Sub - section<br/>B TVS works</b> | <b>7.1.3</b><br>Cones shall be of minimum 4mm thickness MS plates and hot dipped galvanised 80-micron factory fabricated.   | <b>7.1.3</b><br>Cones shall be of minimum 4mm thickness MS plates. <b><u>The MS plates shall be Sand blasted, and galvanizing spray painted to 130-micron thickness in factory as per IS standard. In case of any damages to the galvanising coating anytime from dispatch from factory upto installation at site, the contractor shall perform spray painting at site to have uniform 130micron thickness at no additional cost. The RAL number of Painting will be provided by employer/engineer.</u></b> | Amended as underlined |
| 30.    | Part – 2,<br>Employer's<br>requirements,<br>Section – VII,<br>Technical<br>Specifications-<br><b>Sub - section<br/>B TVS works</b> | <b>8.2.1</b><br>Nozzles shall be fabricated as per approved Drawings. All supports shall be of SS 316. All bolts and nuts with nozzle shall be provided with lock nuts and of SS-304 the nozzle installation details shall be as per drawing.                   | <b>8.2.1</b><br>Nozzles shall be fabricated as per approved Drawings. All supports shall be of SS 316. All bolts and nuts with nozzle shall be provided with lock nuts and of SS-304 the nozzle installation details shall be as per <b><u>approved drawing submitted by contractor.</u></b>  | Amended as underlined |
| 31.    | Part – 2,<br>Employer's<br>requirements,<br>Section – VII,<br>Technical<br>Specifications-<br><b>Sub - section<br/>B TVS works</b> | <b>8.2.2</b><br>Lifting lug, Parting flange, flow straightener, Top/bottom sheet, side sheet, jointing sheet, End flange shall be made up of SS-316. Stiffeners shall be used as necessary to prevent deformation of the nozzles due to high pressure airflows. | <b>8.2.2</b><br>Lifting lug, Parting flange, flow straightener, Top/bottom sheet, side sheet, jointing sheet, End flange shall be made up of <b><u>SS-304</u></b> . Stiffeners shall be used as necessary to prevent deformation of the nozzles due to high pressure airflows.  | Amended as underlined |
| 32.    | Part – 2,<br>Employer's<br>requirements,<br>Section – VII,<br>Technical<br>Specifications-<br><b>Sub - section<br/>C VAC works</b> | Nil   | <b>New clause added.</b><br><b><u>2.5.1.8 (d)</u></b><br><br><b><u>The IDU drainpipe should be equipped with a Robust Insulated Flange Type Sight Glass to view the drain water flow and identify clogging.</u></b>   | Amended as underlined |
| 33.    | Part – 2,<br>Employer's<br>requirements,<br>Section – VII,<br>Technical<br>Specifications-<br><b>Sub - section<br/>C VAC works</b> | <b>2.5.3 (d)</b><br>Additional refrigerant shall be charged to VRF circuits with any additional cost to the project and refrigerant requirement calculation shall be submitted based on copper piping length to Engineer/Employer.                              | <b>2.5.3 (d)</b><br>Additional refrigerant shall be charged to VRF circuits <b><u>without</u></b> any additional cost to the project and refrigerant requirement calculation shall be submitted based on copper piping length to Engineer/Employer.   | Amended as underlined |
| 34.    | Part – 2,<br>Employer's<br>requirements,<br>Section – VII,<br>Technical<br>Specifications-<br><b>Sub - section<br/>C VAC works</b> | <b>2.8.3 (d)</b><br>Provide the rigid fencing guard / handrail with stainless steel 316 schedule 50x50x4.5 mm(thickness) as per IS standard for outdoor unit for the safety of the personnel and considering the aesthetic.                                     | <b>2.8.3 (d)</b><br>Provide the rigid fencing guard / handrail <b><u>as per the details in the Part 2 Section-VIII Employer's drawings, adhering to</u></b> IS standard for outdoor unit for the safety of the personnel and considering the aesthetic.   | Amended as underlined |



| SL. No | Clause No.   | Existing Tender Condition  | Amended Tender Condition in Addendum-01   | Remarks                  |
|--------|--|--|---|--------------------------|
| 35.    | Part – 2,<br>Employer's<br>requirements,<br>Section – VII,<br>Technical<br>Specifications-<br><b>Sub - section<br/>C VAC works</b> | Nil  | <b>New clause added.</b><br><b><u>4.4.5 (e)</u></b><br><b><u>The AHU drainpipe should be equipped with a Robust Insulated Flange Type Sight Glass to view the drain water flow and identify clogging.</u></b>   | Amended as<br>underlined |
| 36.    | Part – 2,<br>Employer's<br>requirements,<br>Section – VII,<br>Technical<br>Specifications-<br><b>Sub - section<br/>C VAC works</b> | <b>4.4.7.1 (k)</b><br>The fan and motor shall be statically and dynamically balanced according to ISO 1940, specification G2.5 grade.  | <b>4.4.7.1 (k)</b><br>The fan and motor shall be statically and dynamically balanced according to ISO <b><u>21940</u></b> , specification G2.5 grade.   | Amended as<br>underlined |
| 37.    | Part – 2,<br>Employer's<br>requirements,<br>Section – VII,<br>Technical<br>Specifications-<br><b>Sub - section<br/>C VAC works</b> | <b>4.4.7.2 (j)</b><br>The Motor bearings shall be designed for an average life of at least 1,00,000 hours. (L10 life, ISO 2008-2007, Anti-Friction Bearing Manufacturer's Association). All Motor bearings shall be self-lubrications type.  | <b>4.4.7.2 (j)</b><br>The Motor bearings shall be designed for an average life of at least 1,00,000 hours. (L10 life, <b><u>ISO 281-2007</u></b> , Anti-Friction Bearing Manufacturer's Association). All Motor bearings shall be self-lubrications type.   | Amended as<br>underlined |
| 38.    | Part – 2,<br>Employer's<br>requirements,<br>Section – VII,<br>Technical<br>Specifications-<br><b>Sub - section<br/>C VAC works</b> | <b>5.5.2.2 (e)</b><br>The motors shall be capable of accelerating the driven plant from standstill to rated speed with a terminal voltage of 80% of the nominal supply voltage at 50Hz in less than 4 seconds for low acceleration time application. The locked rotor withstand time at 110% rated voltage under HOT condition shall be at least 3 seconds more than the starting time at 80% of rated voltage for motors with acceleration time up to 20 second at rated voltage. All motors shall be capable of operating continuously at rated torque at any supply voltage between 90% and 110% of the nominal supply voltage at 50Hz. | <b>5.5.2.2 (e)</b><br>The motors shall be capable of accelerating the driven plant from standstill to rated speed with a terminal voltage of 80% of the nominal supply voltage at 50Hz in less than <b><u>20 seconds</u></b> for low acceleration time application. The locked rotor withstand time at 110% rated voltage under HOT condition shall be at least 3 seconds more than the starting time at 80% of rated voltage for motors with acceleration time up to 20 second at rated voltage. All motors shall be capable of operating continuously at rated torque at any supply voltage between 90% and 110% of the nominal supply voltage at 50Hz. | Amended as<br>underlined |
| 39.    | Part – 2,<br>Employer's<br>requirements,<br>Section – VII,<br>Technical<br>Specifications-<br><b>Sub - section<br/>C VAC works</b> | <b>5.5.4 (a)</b><br>All applicable clauses from 5.5.1 above shall be complied with <b>Axial or</b> Direct driven Centrifugal cabinet Fans  | <b>5.5.4 (a)</b><br>All applicable clauses from 5.5.1 above shall be <b><u>complied with Direct driven</u></b> Centrifugal cabinet Fans   | Amended as<br>underlined |
| 40.    | Part – 2,<br>Employer's<br>requirements,<br>Section – VII,<br>Technical<br>Specifications-<br><b>Sub - section<br/>C VAC works</b> | <b>6.1(c)</b><br>All relevant certificates for all Air curtain ( <b>AMCA certificate</b> ) shall be submitted to Engineer/Employer for NONO  | <b>6.1 (c)</b><br>All relevant certificates for all <b><u>Air curtain shall be submitted</u></b> to Engineer/Employer for NONO  | Amended as<br>underlined |

| SL. No | Clause No.   | Existing Tender Condition  | Amended Tender Condition in Addendum-01  | Remarks               |
|--------|--|--|--|-----------------------|
| 41.    | Part – 2,<br>Employer's<br>requirements,<br>Section – VII,<br>Technical<br>Specifications-<br><b>Sub - section<br/>C VAC works</b> | <b>8.3.4 (c)</b><br>Fire/smoke damper manufacturer must supply fire/smoke dampers along with access doors to save installation time at site.   | <b>8.3.4 (c)</b><br>Fire/smoke <u>dampers must be supplied along with</u> access doors to save installation time at site.  | Amended as underlined |
| 42.    | Part – 2,<br>Employer's<br>requirements,<br>Section – VII,<br>Technical<br>Specifications-<br><b>Sub - section<br/>C VAC works</b> | <b>8.3.2.1 (d)</b><br>All Fire Rated Duct supports, and equipment enclosures shall be fabricated from fire rated material as per BS Standard approved, all fire rated duct shall be tested to BS 476 Part 24. Fire Rating shall meet Stability Integrity Insulation 120/120/120 criteria for 250 Deg C temperature Inside duct and Stability and Integrity for 1129 deg C as per ISO-834 Fire Curve for Fire Inside (Type B) and Fire Outside (Type A) to BS 476 Part 24, for duration of not less than two hours whichever higher. All fire rated Ductwork shall have the temperature rating of 1129 deg C for duration of not less than two hours without distortion, buckling or any deleterious effect upon the proper performance and operation during that two-hour period both internally and externally. | <b>8.3.2.1 (d)</b><br>All Fire Rated Duct supports, and equipment enclosures shall be fabricated from fire rated material as per BS Standard approved, all fire rated duct shall be tested to BS 476 Part 24. Fire Rating shall meet Stability Integrity Insulation 120/120/120 criteria for 250 Deg C temperature Inside duct and Stability and Integrity for <b>1029 deg C</b> as per ISO-834 Fire Curve for Fire Inside (Type B) and Fire Outside (Type A) to BS 476 Part 24, for duration of not less than two hours whichever higher. All fire rated Ductwork shall have the temperature rating of <b>1029 deg C</b> for duration of not less than two hours without distortion, buckling or any deleterious effect upon the proper performance and operation during that two-hour period both internally and externally. | Amended as underlined |
| 43.    | Part – 2,<br>Employer's<br>requirements,<br>Section – VII,<br>Technical<br>Specifications-<br><b>Sub - section<br/>C VAC works</b> | <b>8.3.2.1 (f)</b><br>Fire rated duct must retain at least 75 % cross sectional area when tested to BS part 24 for 1129 deg C fire Type A and B during extraction which guarantees that required volume met.   | <b>8.3.2.1 (f)</b><br>Fire rated duct must retain at least 75 % cross sectional area when tested to BS part 24 for <b>1029 deg C</b> fire Type A and B during extraction which guarantees that required volume met.  | Amended as underlined |
| 44.    | Part – 2,<br>Employer's<br>requirements,<br>Section – VII,<br>Technical<br>Specifications-<br><b>Sub - section<br/>C VAC works</b> | <b>8.3.6 (a)</b><br>Flexible ducting used to connect the air distribution accessories and main ductworks shall comply with DW/144 and requirement of resistance to fire penetration and spread of flame.   | <b>8.3.6 (a)</b><br>Flexible ducting used to connect the air distribution accessories and main ductworks shall comply with DW/144 and requirement of resistance to fire penetration and spread of flame. <b><u>The flexible ducting shall be temperature and fire rated to 250 deg.C for 2 hours.</u></b>  | Amended as underlined |
| 45.    | Part – 2,<br>Employer's<br>requirements,<br>Section – VII,<br>Technical<br>Specifications-<br><b>Sub - section<br/>C VAC works</b> | <b>10.3.2 (r)</b><br>Any acoustic enclosure/wall-lining installed shall be one hour 2 hours fire-rated at 250oC. The acoustic lining material shall be rockwool and its thickness shall be as per the requirement, but not lower than 50mm. The lining shall be covered by 0.6mm thick pre-galvanised perforated GI sheet. The contractor shall also substantiate the addition of acoustic lining will not affect the fire resisting period and integrity of the fire-rated enclosure and the plantroom.   | <b>10.3.2 (r)</b><br>Any acoustic enclosure/wall-lining installed shall be one hour 2 hours fire-rated at 250oC. The acoustic lining material shall be rockwool and its thickness shall be as per the requirement, but not lower than 50mm. <b><u>The lining shall be covered by 0.80 mm perforated aluminium sheet.</u></b> The contractor shall also substantiate the addition of acoustic lining will not affect the fire resisting period and integrity of the fire-rated enclosure and the plantroom.   | Amended as underlined |

| SL. No | Clause No.   | Existing Tender Condition   | Amended Tender Condition in Addendum-01  | Remarks               |
|--------|--|---|--|-----------------------|
| 46.    | Part – 2,<br>Employer's<br>requirements,<br>Section – VII,<br>Technical<br>Specifications-<br><b>Sub - section<br/>C VAC works</b> | <b>11 (a)</b><br>Flexible connectors used for duct connections to fan unit shall have same temperature and fire rating as that of the associated fan unit and ductwork system.  | <b>11 (a)</b><br>Flexible connectors used for duct connections to fan unit shall have same temperature and fire rating <b><u>for 250 deg.C for two hours.</u></b>  | Amended as underlined |
| 47.    | Part – 2,<br>Employer's<br>requirements,<br>Section – VII,<br>Technical<br>Specifications-<br><b>Sub - section<br/>C VAC works</b> | <b>12.1 (h)</b><br>Aluminium chicken wire mesh shall be provided above rockwool, Fiberglass and fire wrap (if used) insulation material which is coming in the Indoor application. Wire mesh shall be provided with means of removal for repair and maintenance.  | <u>NOT USED AND DELETED.</u>   | Amended               |
| 48.    | Part – 2,<br>Employer's<br>requirements,<br>Section – VII,<br>Technical<br>Specifications-<br><b>Sub - section<br/>C VAC works</b> | <b>12 INSULATION FOR DUCT &amp; COPPER PIPE</b><br><b>12.1 (i)</b><br>0.6mm thick Stainless Steel (SS 316) chicken wire mesh shall than be wrapped on the insulated duct to hold the insulation.  | <b>12.1 (i)</b><br>0.6mm thick Stainless Steel (SS 316) chicken wire mesh <b><u>of 25mm mesh size</u></b> shall than be wrapped on the insulated duct to hold the insulation.  | Amended as underlined |
| 49.    | Part – 2,<br>Employer's<br>requirements,<br>Section – VII,<br>Technical<br>Specifications-<br><b>Sub - section<br/>C VAC works</b> | <b>12 INSULATION FOR DUCT &amp; COPPER PIPE</b><br><b>12.3.4 (b)</b><br>Insulation exposed to outside environment -Insulation material shall be Closed Cell Elastomeric Nitrile Rubber with factory laminated non-metallic silver jacketing finish on outer surface of insulation. Covering System should be with double layer laminate of aluminium, coated with a special UV protection and a PVC backing material. It shall have following properties.             | 12.3.4 (b)<br>Insulation exposed to outside environment -Insulation material shall be Closed Cell Elastomeric Nitrile Rubber with factory <b><u>treated woven glass cloth laminated on outer surface of insulation along with 0.6mm thick aluminium cladding. Glass Cloth Colours shall be of Black / Grey / Red / Blue subject to NONO of Engineer.</u></b> | Amended as underlined |
| 50.    | Part – 2,<br>Employer's<br>requirements,<br>Section – VII,<br>Technical<br>Specifications-<br><b>Sub - section<br/>C VAC works</b> | <b>12.3.4 (e)</b><br>Non-Metallic silver jacket: The Covering material shall be of 230 microns thickness as per EN 22286 and weight shall be 340 gsm as per EN 22286.   | <u>NOT USED AND DELETED.</u>   | Amended               |
| 51.    | Part – 2,<br>Employer's<br>requirements,<br>Section – VII,<br>Technical<br>Specifications-<br><b>Sub - section<br/>C VAC works</b> | <b>12.3.4 (f)</b><br>Non-Metallic silver jacket: The Covering material shall have the tensile strength of MD - 200 N / 15 mm & CD – 175 N / 15 mm as per EN ISO 527-3 and elongation – MD - 48% & CD – 51% as per EN ISO 527-3. The Covering material shall have the tear strength of MD - 70 N & CD – 28 N as per EN ISO 527-3. Covering material shall have good UV resistance as per ASTM G 26A / ISO 4892-2 Method- A and with good puncture and tear resistance. | <u>NOT USED AND DELETED.</u>   | Amended               |


| SL. No | Clause No.  | Existing Tender Condition  | Amended Tender Condition in Addendum-01   | Remarks                |
|--------|---|--|---|------------------------|
| 52.    | Part – 2,<br>Employer's<br>requirements,<br>Section – VII,<br>Technical<br>Specifications-<br><b>Sub - section<br/>C VAC works</b>  | <b>12 INSULATION FOR DUCT &amp; COPPER PIPE</b><br><b>12.6.3 Fiber glass insulation</b><br>h) The Aluminium foil vapour barrier tape shall have a minimum of 70 mm overlap at all joints and securely sealed.<br>i) Use polyester tape to the insulation joints before fixing of Aluminium foil tape over the insulation joints. | <b>12.6.3 Fiber glass insulation</b><br>h) The <u>Scrim Kraft</u> Aluminium foil (FSK) vapour barrier tape shall have a minimum of 70 mm overlap at all joints and securely sealed.<br>i) Use polyester tape to the insulation joints before fixing of Aluminium foil <u>scrim kraft</u> tape ( <b>high quality laminated strip with glass fibres</b> ) over the insulation joints. <b><u>Test certificate shall be submitted for Aluminium foil.</u></b> | Amended as underlined  |
| 53.    | Part – 2,<br>Employer's<br>requirements,<br>Section – VII,<br>Technical<br>Specifications-<br><b>Sub - section<br/>C VAC works</b>  | <b>12 INSULATION FOR DUCT &amp; COPPER PIPE</b><br><b>12.6.4 Rockwool Insulation</b><br>f) Use normal polyester tape in the insulation joints before pasting of aluminium foil tape.<br>g) Aluminium foil tape (size 75mm) to be wrapped around the joints of the insulation.  | <b>12.6.4 Rockwool Insulation</b><br>f) Use normal polyester tape in the insulation joints before pasting of aluminium foil <u>scrim Kraft</u> tape.<br>g) <u>Scrim Kraft</u> Aluminium foil tape ( <b>high quality laminated strip with glass fibres</b> ) (size 75mm) to be wrapped around the joints of the insulation. <b><u>Test certificate shall be submitted for Aluminium foil.</u></b>  | Amended as underlined  |
| 54.    | Part – 2,<br>Employer's<br>requirements,<br>Section – VII,<br>Technical<br>Specifications-<br><b>Sub - section<br/>C VAC works.</b> | 13. REFRIGERANT GAS LEAK DETECTION SYSTEM  | <u>NOT USED AND DELETED.</u>  | Amended                |
| 55.    | Part – 2,<br>Employer's<br>requirements,<br>Section – VII,<br>Technical<br>Specifications-<br><b>Sub - section<br/>C VAC works</b>  | 19.5.2.4 The shaft shall be of high tensile steel (SS 416) mounted in generously sized bearings. Ball Bearing shall be re greaseable without removal of the bearing from the bearing assembly and minimum working life of 100000 hours/ (L10 life, ISO 2008-2007, Anti-Friction Bearing Manufacturer's Association)              | 19.5.2.4 The shaft shall be of high tensile steel (SS 416) mounted in generously sized bearings. Ball Bearing shall be re greaseable without removal of the bearing from the bearing assembly and minimum working life of 100000 hours/ (L10 life, <b><u>ISO 281-2007</u></b> , Anti-Friction Bearing Manufacturer's Association)   | Amended as underlined. |
| 56.    | Part – 2,<br>Employer's<br>requirements,<br>Section – VII,<br>Technical<br>Specifications-<br><b>Sub - section<br/>C VAC works.</b> | Nil  | <b>New specification added.</b><br><b><u>15.10 Measurement Instruments</u></b><br><b><u>Refer Annexure-02</u></b>   | Amended as underlined. |

| SL. No | Clause No.  | Existing Tender Condition   | Amended Tender Condition in Addendum-01   | Remarks               |
|--------|---|---|---|-----------------------|
| 57.    | Part – 2,<br>Employer's<br>requirements,<br>Section – VII,<br>Technical<br>Specifications-<br><b>Sub - section<br/>D Electrical<br/>works for<br/>VAC and TVS</b> | 2.2.3. The contractor shall have valid type test certificate from accredited testing body of VDE/ ASTA/ASEFA/ KEMA/DEKRA or type test reports by an accredited testing body such CPRI/ERDA or any other NABL accredited testing laboratory according to the required panel rating, The valid certificate shall be submitted to obtain NONO from Employer/Engineer.  | 2.2.3. The <b><u>OEM / Authorized Channel Partner</u></b> shall have valid type test certificate from accredited testing body of VDE/ ASTA/ASEFA/ KEMA/DEKRA or type test reports by an accredited testing body such CPRI/ERDA or any other NABL accredited testing laboratory according to the required panel rating, The valid certificate shall be submitted to obtain NONO from Employer/Engineer.  | Amended as underlined |
| 58.    | Part – 2,<br>Employer's<br>requirements,<br>Section – VII,<br>Technical<br>Specifications-<br><b>Sub - section<br/>D Electrical<br/>works for<br/>VAC and TVS</b> | 2.17.2. MCCBs shall meet the following requirements:<br><br>d. The breaker selection based on ambient of 50 Degrees Celsius and the utilization category shall be A and B appropriate.  | 2.17.2. MCCBs shall meet the following requirements:<br><br>d. The breaker selection based on ambient of 50 Degrees Celsius and the utilization category shall be A <b><u>or B as applicable.</u></b>   | Amended as underlined |
| 59.    | Part – 2,<br>Employer's<br>requirements,<br>Section – VII,<br>Technical<br>Specifications-<br><b>Sub - section<br/>D Electrical<br/>works for<br/>VAC and TVS</b> | 2.17.2. MCCBs shall meet the following requirements:<br><br>g. All incomer MCCB's shall have front adjustable electronic/microprocessor-based releases with LCD/LED display and RS 485/Ethernet communication, adjustment in the range of 40 – 100% for nominal overloads and 2 – 10 times of rated current for short circuit faults. MCCB's shall have releases with earth Fault Protection features, wherever and as indicated in Bill of quantities /SLD. All incomer and outgoing ACB/MCCB's in the essential panels shall not be required to have earth fault protection of equipment with automatic disconnecting system as per the NFPA standards. | 2.17.2. MCCBs shall meet the following requirements:<br><br>g. All incomer MCCB's shall have front adjustable electronic/microprocessor-based releases with LCD/LED display and RS 485/Ethernet communication, adjustment in the range of 40 – 100% for nominal overloads and 2 – 10 times of rated current for short circuit faults. MCCB's shall have releases with earth Fault Protection features, wherever and as indicated in Bill of quantities /SLD. All incomer and outgoing ACB/MCCB's in the essential panels <b><u>are required to have earth fault protection of equipment with automatic disconnecting system subject to NONO from employer / engineer.</u></b> | Amended as underlined |
| 60.    | Part – 2,<br>Employer's<br>requirements,<br>Section – VII,<br>Technical<br>Specifications-<br><b>Sub - section<br/>D Electrical<br/>works for<br/>VAC and TVS</b> | 3.2.4. The cables shall be manufactured in an established factory with inhouse NABL accredited lab setup have certification of Quality management system (ISO 9001) & (ISO 14001) Environmental management system. The valid certificate shall be submitted to obtain NONO from Employer/Engineer.  | 3.2.4. The cables shall be manufactured in an established <b><u>factory setup having</u></b> certification of Quality management system (ISO 9001) and Environmental management system (ISO 14001). The valid certificate shall be submitted to obtain NONO from Employer/Engineer.   | Amended as underlined |



| SL. No | Clause No.  | Existing Tender Condition   | Amended Tender Condition in Addendum-01   | Remarks               |
|--------|---|---|---|-----------------------|
| 61.    | Part – 2,<br>Employer's<br>requirements,<br>Section – VII,<br>Technical<br>Specifications-<br><b>Sub - section<br/>D Electrical<br/>works for<br/>VAC and TVS</b> | <b>2.3. General performance requirements</b><br><br>2.3.6 The panels and associated equipment's shall be certified for the designated category of duty specified. And the panels shall have an insulation voltage of 1000V AC and rated impulse with stand voltage (Vimp) for ACB's and MCCB's shall be 12kV and <b>9kV</b> respectively for withstanding the against transient voltages. | <b>2.3. General performance requirements</b><br><br>2.3.6. The panels and associated equipment's shall be certified for the designated category of duty specified. And the panels shall have an insulation voltage of 1000V AC and rated impulse with stand voltage (Vimp) for ACB's and MCCB's shall be 12kV and <b>8kV</b> respectively for withstanding the against transient voltages.  | Amended as underlined |
| 62.    | Part – 2,<br>Employer's<br>requirements,<br>Section – VII,<br>Technical<br>Specifications-<br><b>Sub - section<br/>D Electrical<br/>works for<br/>VAC and TVS</b> | <b>4.2.7 Cable junction box/Connection box and accessories</b><br><br>a) All junction box with terminal box shall be suitable for 1 Sq.mm to 6 Sq.mm cable termination. And shall be of fire retardant, minimum IP 55, and IK 07 with halogen free product.   | <b>4.2.7 Cable junction box/Connection box and accessories</b><br><br>a) All junction box with terminal box shall be suitable for 1 Sq.mm to 6 Sq.mm cable termination. And shall be of fire retardant, minimum <b>IP 65</b> , and <b>IK 10</b> with halogen free product. <b><u>The size of junction box shall be as per design/functional requirements.</u></b>   | Amended as underlined |
| 63.    | Part 2 /<br>Section VIII /<br>Employer's<br>Drawings / 03-<br>Sub Section-C-<br>TVS&VAC<br>Electrical<br>Layout & SLD<br>Drawing                                  | 03-Sub Section-C-TVS&VAC Electrical Layout & SLD Drawing-<br>ST01 ELEC DRGS BINDER_LIGHT HOUSE.pdf<br>ST03 ELEC DRGS BINDER_KUTCHERY ROAD.pdf<br>ST05 ELEC DRGS BINDER_ALWARPET.pdf<br>ST07 ELEC DRGS BINDER_BOAT CLUB.pdf<br>ST08 ELEC DRGS BINDER_NANDANAM.pdf<br>ST10 ELEC DRGS BINDER_PANAGAL PARK.pdf<br>ST11 ELEC DRGS BINDER_KODAMBAKKAM.pdf                                       | <b>Deleted:</b><br><b><u>03-Sub Section-C-TVS&amp;VAC Electrical Layout &amp; SLD Drawing-</u></b><br><b><u>ST01 ELEC DRGS BINDER_LIGHT HOUSE.pdf</u></b><br><b><u>ST03 ELEC DRGS BINDER_KUTCHERY ROAD.pdf</u></b><br><b><u>ST05 ELEC DRGS BINDER_ALWARPET.pdf</u></b><br><b><u>ST07 ELEC DRGS BINDER_BOAT CLUB.pdf</u></b><br><b><u>ST08 ELEC DRGS BINDER_NANDANAM.pdf</u></b><br><b><u>ST10 ELEC DRGS BINDER_PANAGAL PARK.pdf</u></b><br><b><u>ST11 ELEC DRGS BINDER_KODAMBAKKAM.pdf</u></b><br><br><b>Newly Added:</b><br><b><u>03-Sub Section-C-TVS&amp;VAC Electrical Layout &amp; SLD Drawing-</u></b><br><b><u>ST01 ELEC DRGS BINDER_LIGHT HOUSE_R2.pdf</u></b><br><b><u>ST03 ELEC DRGS BINDER_KUTCHERY ROAD_R2.pdf</u></b><br><b><u>ST05 ELEC DRGS BINDER_ALWARPET_R2.pdf</u></b><br><b><u>ST07 ELEC DRGS BINDER_BOAT CLUB_R2.pdf</u></b><br><b><u>ST08 ELEC DRGS BINDER_NANDANAM_R2.pdf</u></b><br><b><u>ST10 ELEC DRGS BINDER_PANAGAL PARK_R2.pdf</u></b><br><b><u>ST11 ELEC DRGS BINDER_KODAMBAKKAM_R2.pdf</u></b><br><b><u>ST06 ELEC DRGS BINDER_BHARATHIDASAN_R1.pdf</u></b><br><br><b>Refer below Link:</b><br><br><input type="checkbox"/> <a href="#">03-Sub Section-C-TVS&amp;VAC Electrical Layout &amp; SLD Drawing- Addendum-01</a> | Amended as underlined |

| SL. No | Clause No.   | Existing Tender Condition  | Amended Tender Condition in Addendum-01  | Remarks               |             |    |                       |                              |  |                      |                                     |  |       |                       |                                   |                       |                      |  |    |                      |  |                       |
|--------|--|--|--|-----------------------|-------------|----|-----------------------|------------------------------|--|----------------------|-------------------------------------|--|-------|-----------------------|-----------------------------------|-----------------------|----------------------|--|----|----------------------|--|-----------------------|
| 64.    | PART – 2, Employer’s requirements, Section – VII, Technical Specifications Sub - <b>section E, Integrated Station Management System (ISMS)</b> | 5.11.1.2 Modular / Chassis based – should have at least 4 Payload slots after configuring complete redundancy (CPU/Switching Fabric) and support Power over Ethernet (POE, IEEE 802.3af). OS shall support modular or graceful restart.                                      | 5.11.1.2 Modular / Chassis based – should have at least 4 Payload slots after configuring complete redundancy (CPU/Switching Fabric) and support Power over Ethernet (POE, IEEE 802.3af). OS shall support modular or graceful restart.<br><b><u>Operating Temperature range shall be 0 to 60 degC</u></b> | Amended as underlined |             |    |                       |                              |  |                      |                                     |  |       |                       |                                   |                       |                      |  |    |                      |  |                       |
| 65.    | PART – 2, Employer’s requirements, Section – VII, Technical Specifications Sub - <b>section E, Integrated Station Management System (ISMS)</b> | 5.14 CCTV Camera<br><table><tr><th>S.NO.</th><th>DESCRIPTION</th><th>REQUIREMENT</th></tr><tr><td>u.</td><td>Operating Environment</td><td>Maximum upto 70 degC, RH:90%</td></tr></table>  | S.NO.  | DESCRIPTION           | REQUIREMENT | u. | Operating Environment | Maximum upto 70 degC, RH:90% | 5.14 CCTV Camera<br><table><tr><th>S.NO.</th><th>DESCRIPTION</th><th>REQUIREMENT</th></tr><tr><td>u.</td><td>Operating Environment</td><td><b><u>0°c to 50°c, RH:90%</u></b></td></tr></table> | S.NO.                | DESCRIPTION                         | REQUIREMENT  | u.    | Operating Environment | <b><u>0°c to 50°c, RH:90%</u></b> | Amended as underlined |                      |  |    |                      |  |                       |
| S.NO.  | DESCRIPTION  | REQUIREMENT  |  |                       |             |    |                       |                              |  |                      |                                     |  |       |                       |                                   |                       |                      |  |    |                      |  |                       |
| u.     | Operating Environment  | Maximum upto 70 degC, RH:90%   |  |                       |             |    |                       |                              |  |                      |                                     |  |       |                       |                                   |                       |                      |  |    |                      |  |                       |
| S.NO.  | DESCRIPTION  | REQUIREMENT  |  |                       |             |    |                       |                              |  |                      |                                     |  |       |                       |                                   |                       |                      |  |    |                      |  |                       |
| u.     | Operating Environment  | <b><u>0°c to 50°c, RH:90%</u></b>  |  |                       |             |    |                       |                              |  |                      |                                     |  |       |                       |                                   |                       |                      |  |    |                      |  |                       |
| 66.    | PART – 2, Employer’s requirements, Section – VII, Technical Specifications Sub - <b>section E, Integrated Station Management System (ISMS)</b> | 6.2.23 Historian   | <b><u>NOT USED AND DELETED.</u></b>  | Amended.              |             |    |                       |                              |  |                      |                                     |  |       |                       |                                   |                       |                      |  |    |                      |  |                       |
| 67.    | PART – 2, Employer’s requirements, Section – VII, Technical Specifications Sub - <b>section E, Integrated Station Management System (ISMS)</b> | 6.5 HMI – Touch Screen<br><table><tr><th>S.NO.</th><th>DESCRIPTION</th><th>REQUIREMENT</th></tr><tr><td>d.</td><td>Degree of protection</td><td>Minimum IP 65</td></tr><tr><td>h.</td><td>Operating Conditions</td><td>Maximum up to 70 Deg C and 0-95% Rh</td></tr></table> | S.NO.  | DESCRIPTION           | REQUIREMENT | d. | Degree of protection  | Minimum IP 65                | h.   | Operating Conditions | Maximum up to 70 Deg C and 0-95% Rh | 6.5 HMI – Touch Screen<br><table><tr><th>S.NO.</th><th>DESCRIPTION</th><th>REQUIREMENT</th></tr><tr><td>d.</td><td>Degree of protection</td><td>Minimum IP 65 <b><u>for Front Panel and IP20 for Rear Panel.</u></b></td></tr><tr><td>h.</td><td>Operating Conditions</td><td><b><u>0°c to 50°c</u></b> and 0-95% Rh</td></tr></table> | S.NO. | DESCRIPTION           | REQUIREMENT                       | d.                    | Degree of protection | Minimum IP 65 <b><u>for Front Panel and IP20 for Rear Panel.</u></b> | h. | Operating Conditions | <b><u>0°c to 50°c</u></b> and 0-95% Rh | Amended as underlined |
| S.NO.  | DESCRIPTION  | REQUIREMENT  |  |                       |             |    |                       |                              |  |                      |                                     |  |       |                       |                                   |                       |                      |  |    |                      |  |                       |
| d.     | Degree of protection   | Minimum IP 65  |  |                       |             |    |                       |                              |  |                      |                                     |  |       |                       |                                   |                       |                      |  |    |                      |  |                       |
| h.     | Operating Conditions   | Maximum up to 70 Deg C and 0-95% Rh  |  |                       |             |    |                       |                              |  |                      |                                     |  |       |                       |                                   |                       |                      |  |    |                      |  |                       |
| S.NO.  | DESCRIPTION  | REQUIREMENT  |  |                       |             |    |                       |                              |  |                      |                                     |  |       |                       |                                   |                       |                      |  |    |                      |  |                       |
| d.     | Degree of protection   | Minimum IP 65 <b><u>for Front Panel and IP20 for Rear Panel.</u></b>   |  |                       |             |    |                       |                              |  |                      |                                     |  |       |                       |                                   |                       |                      |  |    |                      |  |                       |
| h.     | Operating Conditions   | <b><u>0°c to 50°c</u></b> and 0-95% Rh   |  |                       |             |    |                       |                              |  |                      |                                     |  |       |                       |                                   |                       |                      |  |    |                      |  |                       |

| SL. No               | Clause No.   | Existing Tender Condition   | Amended Tender Condition in Addendum-01   | Remarks                |
|----------------------|--|---|---|------------------------|
| 68.                  | Part 2 /<br>Section VIII /<br>Employer's<br>Drawings / 05 -<br><b>TVS &amp;VAC<br/>ISMS IO List</b>  | 05-Sub Section-E-TVS&VAC ISMS IO List - Employer's Drawings - ISMS IO List.pdf  | <b>Deleted:</b><br><b><u>05-Sub Section-E-TVS&amp;VAC ISMS IO List - Employer's Drawings - ISMS IO List.pdf</u></b><br><br><b>Newly Added:</b><br><b><u>05-Sub Section-E-TVS&amp;VAC ISMS IO List-Addendum-01 - Employer's Drawings - ISMS IO List A2.pdf</u></b><br><br><b>Refer below Link:</b><br><br> <a href="#"><u>05-Sub Section-E-TVS&amp;VAC ISMS IO List-Addendum-01</u></a>   | Amended as underlined  |
| 69.                  | PART – 2,<br>Employer's<br>requirements,<br>Section – VII,<br>Technical<br>Specifications<br>Sub - <b>section<br/>E, Integrated<br/>Station<br/>Management<br/>System<br/>(ISMS)</b> | 5.16.1 The cubicles shall be for indoor use and in the form of free standing, for floor/Wall mounting, Modular (extendable, self-contained, flush fronted cubicles and sectionalized) as necessary to facilitate easy transportation and erection, containing all the equipment indicated on the Employer's Requirements.   | 5.16.1 The cubicles shall be for indoor use and in the form of free standing, for floor/Wall mounting, Modular (extendable, self-contained, flush fronted cubicles and sectionalized) as necessary to facilitate easy transportation and erection, containing all the equipment indicated on the Employer's Requirements. <b><u>The Panel Manufacturer shall have following eligibility criteria:</u></b><br><br><b><u>5.16.1.1 The Manufacturer should have supplied the similar construction and type of panels for Metro stations/ MRT/ Urban Railways/ Light rail/ Airports/ large infra structure projects in the last 5 years ending on bid submission date of contract. The details of project executed shall be submitted.</u></b><br><br><b><u>5.16.1.2 All the panels shall be factory built in accordance with OEM's type tested design (TTA) and should be manufactured and supplied through OEM or Authorised licensed channel partner.</u></b><br><br><b><u>5.16.1.3 The contractor shall have valid type test certificate from accredited testing body of VDE/ ASTA/ ASEFA/ KEMA/DEKRA or type test reports by an accredited testing body such CPRI/ERDA or any other NABL accredited testing laboratory according to the required panel rating. The valid type test certificate for Panel Enclosures shall be submitted to obtain NONO from Employer/Engineer.</u></b><br><br><b><u>5.16.1.4 The panel Enclosure shall be manufactured in an established factory setup have certification of Quality management system (ISO 9001) and Environmental management system (ISO 14001). The panel Integrator shall have certification of Quality management system (ISO 9001). The valid certificate shall be submitted to obtain NONO from Employer/Engineer.</u></b> | Amended as underlined  |
| <b><u>Part-3</u></b> |  |   |   |                        |
| 70.                  | Part-3, Section – X<br><b>Particular<br/>Conditions<br/>(Part A:<br/>Contract<br/>Data)</b>  | <b><u>Total advance payment</u></b><br><b><u>14.2.</u></b> The interest free mobilization advance at the rate of 10 % of the accepted contract amount excluding Provisional Sum, Price Centre "G" (Operation and Maintenance assistance during DLP) and Price Centre "H" (CAMC) in the currencies and proportions is payable against production of <b>Bank guarantee from a public sector bank</b> . And the guarantee shall be in the form of a BG for 110% of the advance amount requested plus GST. Mobilization advance shall be paid in two instalments. | <b><u>Total advance payment</u></b><br><b><u>14.2.</u></b> The interest free mobilization advance at the rate of 10 % of the accepted contract amount excluding Provisional Sum, Price Centre "G" (Operation and Maintenance assistance during DLP) and Price Centre "H" (CAMC) in the currencies and proportions is payable against production of <b>Bank guarantee from Public Sector Bank (PSB), or Scheduled Commercial Banks under The Reserve Bank of India (RBI)</b> . And the guarantee shall   | Amended as underlined. |

| SL. No | Clause No.  | Existing Tender Condition  | Amended Tender Condition in Addendum-01   | Remarks                |
|--------|---|--|---|------------------------|
|        |   | <b>First Instalment:</b><br>First instalment of 50% of the advance shall be paid after signing of the Contract Agreement and submission of required Bank Guarantee in the specified format from requisite banks.<br><b>Second Instalment:</b><br>Second instalment of 50% of the Advance shall be paid after Achievement of KD-01, KD-02 and submission of required Bank Guarantee in the specified format from requisite banks  | be in the form of a BG for 110% of the advance amount requested plus GST. Mobilization advance shall be paid in two instalments.<br><b>First Instalment:</b><br>First instalment of 50% of the advance shall be paid after signing of the Contract Agreement and submission of required Bank Guarantee in the specified format from requisite banks.<br><b>Second Instalment:</b><br>Second instalment of 50% of the Advance shall be paid after Achievement of KD-01, KD-02 and submission of required Bank Guarantee in the specified format from requisite banks   |                        |
| 71.    | Part-3, Section - X<br><b>Particular Conditions (Part B: Specific Provisions)</b> | <b>1.5 Priority of Documents</b><br><b>Replace Sub-Clause 1.5 with the following:</b><br>The documents forming the Contract are to be taken as mutually explanatory of one another. For the purposes of interpretation, the priority of the documents shall be in accordance with the following sequence:<br>a) the Contract Agreement,<br>b) the Letter of Acceptance (LoA),<br>c) Letter of Technical Bid & Letter of Price Bid.<br>d) Addendum/Corrigendum to Bid<br>e) the Particular Conditions of Contract (PCC) – Part A<br>f) the Particular Conditions of Contract (PCC) – Part B<br>g) FIDIC Conditions of Contract for construction for Building and Engineering works designed by the Employer, 2010(GCC)<br>h) Employer's Requirements<br>i. Works Requirements & Appendices<br>ii. Technical Specifications<br>iii. Employer's Drawings<br>i) Pricing Document & Financial Bid<br>j) Schedules, any other documents forming part of the contract.<br><br>If an ambiguity or discrepancy if found in the documents, the Engineer shall issue any necessary clarification or instruction.  | <b>1.5 Priority of Documents</b><br><b>Replace Sub-Clause 1.5 with the following:</b><br>The documents forming the Contract are to be taken as mutually explanatory of one another. For the purposes of interpretation, the priority of the documents shall be in accordance with the following sequence:<br>a) The Contract Agreement,<br>b) The Letter of Acceptance (LoA),<br>c) Letter of Technical Bid & Letter of Price Bid.<br>d) Addendum/Corrigendum to Bid<br>e) The Particular Conditions of Contract (PCC) – Part A<br>f) The Particular Conditions of Contract (PCC) – Part B<br>g) FIDIC Conditions of Contract for construction for Building and Engineering works designed by the Employer, 2010(GCC)<br>h) <u>Employer's requirement -Works Requirements &amp; Appendices</u><br>i) <u>Employer's requirement -Technical Specifications</u><br>j) <u>Pricing Document (BOQ) &amp; Financial Bid</u><br>k) <u>Employer's requirement -Employer's Drawings</u><br>l) <u>Schedules, any other documents forming part of the contract.</u><br><br>If an ambiguity or discrepancy if found in the documents, the Engineer shall issue any necessary clarification or instruction.     | Amended as underlined. |
| 72.    | Part-3, Section - X<br><b>Particular Conditions (Part B: Specific Provisions)</b> | <b>4.2 Performance Security</b><br><b>Replace paragraph 2 of GCC Sub-Clause 4.2 with the following:</b><br>The Contractor shall deliver the Performance Security to the Employer within 28 days after receiving the Letter of Acceptance and shall send a copy to the Engineer. The Performance Security shall be issued by a Public Sector Bank (PSB), or Schedule of Commercial Banks by The Reserve Bank of India (RBI) selected by the Contractor and shall be in the form annexed to the Particular Conditions, as stipulated by the Employer, or in another form approved by the Employer. This Bank Guarantee shall be kept valid up to 28 days beyond the scheduled expiry of the Comprehensive Annual Maintenance Contract (CAMC).<br><b>Replace 6th Paragraph of GCC Sub-Clause 4.2 with the following:</b><br>50% of the Performance security (10% of Accepted Contract amount excluding Price Centre "H") shall be released after Obtaining Taking Over certificate (KD- 06). Balance 50% of the Performance Security shall be released on successful completion of DLP & <b>Achievement of KD-07</b> and on issue of No Claim certificate by the Contractor and accepted by the Employer.<br><b>Add the following to the end of Sub-Clause 4.2:</b> | <b>4.2 Performance Security</b><br><b>Replace paragraph 2 of GCC Sub-Clause 4.2 with the following:</b><br>The Contractor shall deliver the Performance Security to the Employer within 28 days after receiving the Letter of Acceptance and shall send a copy to the Engineer. The Performance Security shall be issued by a Public Sector Bank (PSB), or Schedule of Commercial Banks under The Reserve Bank of India (RBI) selected by the Contractor and shall be in the form annexed to the Particular Conditions, as stipulated by the Employer, or in another form approved by the Employer.<br><u><b>The contractor shall submit two different Performance Securities for Project Works (Including DLP) &amp; CAMC. The first Performance security for Project Works shall be submitted within 28days after receiving the LOA and this Bank Guarantee shall be kept valid up to 28 days beyond the scheduled expiry of the DLP and the second Performance security for CAMC shall be submitted before 28 days of starting the CAMC and this Bank Guarantee shall be kept valid up to 28 days beyond the scheduled expiry of the Comprehensive Annual Maintenance Contract (CAMC).</b></u> | Amended as underlined. |



| SL. No | Clause No.  | Existing Tender Condition  | Amended Tender Condition in Addendum-01   | Remarks  |
|--------|---|--|---|----------|
|        |   | <p>28 days before the completion of Defect Liability Period (DLP), the contractor shall furnish another Performance Security in the form of a Bank guarantee from a public sector bank (PSB) or <b>any Japanese Bank</b> as listed under Schedule of Commercial Banks by The Reserve Bank of India (RBI) for an amount of 10% of the total accepted value for CAMC (Price Centre H). This Bank Guarantee for CAMC shall be kept valid up to 28 days beyond the scheduled expiry of the CAMC period.</p> <p>The Bank Guarantee submitted for CAMC period shall be released on successful completion of the period for CAMC and on issue of No Claim Certificate by the Contractor and accepted by the Employer.</p> <p><b>In case of JV/Consortium, the requirement of Performance Security shall be distributed between/among the members as per their percentage participation. The constituent members shall submit Performance Security (as per their percentage participation in JV / consortium) from their respective bank accounts. Performance Security executed from the bank accounts of JV/Consortium, or any other bank account shall not be accepted.</b></p> | <p><b><u>If the contractor fails to submit the Performance Security for CAMC as stipulated above, the Performance Security for Project Works shall be extended beyond the scheduled expiry of the Comprehensive Annual Maintenance Contract (CAMC) failing which the Performance security for Project Works shall be encashed.</u></b></p> <p><b>Replace 6th Paragraph of GCC Sub-Clause 4.2 with the following:</b><br/>50% of the Performance security (10% of Accepted Contract amount excluding Price Centre “H”) shall be released after Obtaining Taking Over certificate (KD-06). <b><u>Balance 50% of the Performance Security shall be released on successful completion of DLP and on issue of No Claim certificate by the Contractor and accepted by the Employer.</u></b></p> <p><b>Add the following to the end of Sub-Clause 4.2:</b></p> <p>28 days before the completion of Defect Liability Period (DLP), the contractor shall furnish another Performance Security in the form of a <b>Bank guarantee from a public sector bank (PSB) or any listed under Schedule of Commercial Banks</b> by The Reserve Bank of India (RBI) for an amount of 10% of the total accepted value for CAMC (Price Centre H). This Bank Guarantee for CAMC shall be kept valid up to 28 days beyond the scheduled expiry of the CAMC period.</p> <p>The Bank Guarantee submitted for CAMC period shall be released on successful completion of the period for CAMC and on issue of No Claim Certificate by the Contractor and accepted by the Employer.</p> <p><b><u>In case of JV/Consortium, the requirement of Performance Security shall be submitted from their registered JV/Consortium bank account only, and from any other bank account shall not be accepted.</u></b></p> |          |
| 73.    | Part-3, Section - X<br>Particular Conditions<br>(Part B: Specific Provisions) | <p><b>1.7.2 Add the following at the end of Sub-clause 1.7.2.:</b><br/>The contractor will not submit any representation for novation, amalgamation, change in the name of the contract...etc in any form, during the tenure of the contract.</p>  | Deleted.  | Amended. |
| 74.    | Part-3, Section - X<br>Particular Conditions<br>(Part B: Specific Provisions) | <p><b>14.3 Application for Interim Payment Certificates (IPC)</b></p> <p><b>Add the following Sub-Clauses at the end of Sub-Clause 14.3:</b></p> <p><b>14.3.2 Post Payment Audit</b><br/>The Employer reserves the right to carry out a post payment audit and/or technical examination of the Works, and the Final account, including all supporting vouchers, abstracts, etc., and to make a claim on the Contractor for the refund of any excess amount paid to him, if as a result of such examination, any over-payment to him is discovered to have been made in respect of any work done or alleged to have been done by the Contractor, under the Contract. If any under-payment is discovered, the same shall be paid by the Employer to the Contractor. <b>Such payments or recoveries, however, shall not be subject to any interest.</b></p>   | <p><b>14.3 Application for Interim Payment Certificates (IPC)</b></p> <p><b>Add the following Sub-Clauses at the end of Sub-Clause 14.3:</b></p> <p><b>14.3.2 Post Payment Audit</b><br/>The Employer reserves the right to carry out a post payment audit and/or technical examination of the Works, and the Final account, including all supporting vouchers, abstracts, etc., and to make a claim on the Contractor for the refund of any excess amount paid to him, if as a result of such examination, any over-payment to him is discovered to have been made in respect of any work done or alleged to have been done by the Contractor, under the Contract. If any under-payment is discovered, the same shall be paid by the Employer to the Contractor.</p>   | Amended. |



| SL. No | Clause No.   | Existing Tender Condition  | Amended Tender Condition in Addendum-01   | Remarks                |
|--------|--|--|---|------------------------|
| 75.    | Part-3, Section - X<br>Particular Conditions (Part B: Specific Provisions) | <b>20.2 Appointment Of The Dispute Board.</b><br><br>(IV).In case of the Contractor or the Lead Partner of the Contractor (in the case of a Joint Venture or Consortium) being of foreign origin CMRL will ask the successful bidders to propose few names up to a maximum of twenty <b>from Japan</b> for DB Members/Arbitrator and all such names will be abridged and out of the same, ten names will be shortlisted by General Consultants based on their qualifications, experience etc. These shortlisted ten names will be added to the list of 20 member's panel of DB Members / Arbitrator mentioned above. | <b>20.2 Appointment Of The Dispute Board.</b><br><br>(IV).In case of the Contractor or the Lead Partner of the Contractor (in the case of a Joint Venture or Consortium) being of foreign origin CMRL will ask the successful bidders to propose few names up to a <b><u>maximum of twenty for DB Members</u></b> /Arbitrator and all such names will be abridged and out of the same, ten names will be shortlisted by General Consultants based on their qualifications, experience etc. These shortlisted ten names will be added to the list of 20 member's panel of DB Members / Arbitrator mentioned above. | Amended as underlined. |

AGM (Mechanical Systems & GC Services)  
CMRL

| ANNEXURE-I   |  | Addendum-01 |
|--|--|-------------|
| CHENNAI METRO RAIL LIMITED<br>CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4<br>BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS<br>TENDER NO. C4-VAC&TVS-12   |  |             |
| “DESIGN VERIFICATION & VALIDATION, SUPPLY, INSTALLATION, TESTING, COMMISSIONING, SUPPLY OF SPARES & SPECIAL TOOLS, OPERATIONS AND MAINTENANCE DURING TWO (02) YEARS DEFECT LIABILITY PERIOD (DLP) AND FIVE (05) YEARS COMPREHENSIVE ANNUAL MAINTENANCE CONTRACT (CAMC) OF VENTILATION AND AIR CONDITIONING (VAC), TUNNEL VENTILATION SYSTEM (TVS), ASSOCIATED ELECTRICAL AND INTEGRATED SCADA WORKS FOR EIGHT (08) UNDERGROUND STATIONS IN CORRIDOR-4 (C4) FROM LIGHTHOUSE TO KODAMBAKKAM STATION, INCLUDING C4 RELATED TVS SCADA WORKS AT THIRUMAYILAI STATION AND INTEGRATED STATION MANAGEMENT SYSTEMS (ISMS) AT OCC AND BOCC.” |  |             |
| Note   | This document is only a reference for station-wise quantities. |             |
| Price Centre   | ITEMS  |             |
| A  | GENERAL REQUIREMENT  |             |
| B  | DESIGN VERIFICATION AND VALIDATION                             |             |
| C  | VAC WORKS  |             |
| D  | TVS WORKS  |             |
| E  | VAC & TVS ELECTRICAL WORKS                                     |             |
| F  | ISMS SCADA WORKS   |             |
| G  | OPERATION & MAINTENANCE ASSISTANCE DURING -DLP                 |             |
| H  | CAMC TVS/VAC/SCADA &VAC & TVS ELECTRICAL                       |             |
| I  | CUSTOM DUTY  |             |

| CHENNAI METRO RAIL LIMITED<br>CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4<br>BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS<br>TENDER NO. C4-VAC&TVS-12 |          |   |      |     |
|--|----------|---|------|-----|
| PRICE CENTRE-A (GENERAL REQUIREMENT)   |          |   |      |     |
| Sl.No  | Item No. | Item Description  | Unit | Qty |
| 1  |          | PRICE CENTRE-A (GENERAL REQUIREMENT)  |      |     |
| 2  | 1        | Project management cost (Monthly progress report, Interface Management works and Audits, Quality Assurance & Quality Control Audits & Report, Plans and Programs)<br>(Ref Chapter-2 Part-2 Works Requirement) | Lot  | 1   |
| 3  | 2        | Identify & Construction of Main Project Head office till DLP<br>(Ref Chapter-15 of Part-2 Works Requirement )   | Lot  | 1   |
| 4  | 3        | Maintenance of Main Project Head office till DLP<br>(Ref Chapter-15 of Part-2 Works Requirement )   | Lot  | 1   |
| 5  | 4        | Identify & Construction of Project Satellite site office till completion of project works<br>(Ref Chapter-15 of Part-2 Works Requirement )  | Lot  | 2   |
| 6  | 5        | Maintenance of Project Satellite site office till completion of project works<br>(Ref Chapter-15 of Part-2 Works Requirement )  | Lot  | 2   |
| 7  | 6        | Identification,construction and Maintenance of Store yard till completion of project works( minimum 2000 Sq.m)<br>(Ref Chapter-7 of Part-2 Works Requirement )  | Lot  | 1   |
| 8  | 7        | Compliance with Occupational Safety, Health and Environmental Audits (Ref -Section VI A & E of Part -2 & Chapter-2 Part-2 Works Requirement)  | Lot  | 1   |
| 9  | 8        | Submission of Performance PBG till completion of DLP works (Price centre A to G)<br>Ref - Part -1 & Chapter-2 Part-2 Works Requirement  | Lot  | 1   |
| 10   | 9        | Submission of all type of insurance/ CAR Policy/Professional Indemnity Insurance till completion of DLP (Price centre A to G)<br>Ref - Part -3 & Chapter-2 Part-2 Works Requirement                           | Lot  | 1   |
| 11   | 10       | Purchase of Primavera licenses Software till completion of Project (Ref Chapter-2,3 and 6 of Part-2 Works Requirement)  | Lot  | 2   |
| 12   | 11       | Web Primavera licenses<br>(Ref: Chapter 2 of Part-2 Section VI "WORKS REQUIREMENTS")  | Lot  | 2   |
| 13   | 12       | Laptop computer with latest generation or higher which is compatible to software used for BIM to Employer (Ref: Chapter 15 of Part-2 Section VI "WORKS REQUIREMENTS")   | Set  | 3   |

| CHENNAI METRO RAIL LIMITED<br>CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4<br>BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS<br>TENDER NO. C4-VAC&TVS-12 |          |  |           |     |
|--|----------|--|-----------|-----|
| PRICE CENTRE-A (GENERAL REQUIREMENT)   |          |  |           |     |
| Sl.No  | Item No. | Item Description   | Unit      | Qty |
| 14   | 13       | IDA Software for 1D Tunnel Ventilation Design(one year license) including training for Employer  | Set       | 1   |
| 15   | 14       | Purchase of List of Standards for TVS/VAC System as per list (Ref Chapter-1 of Part-2 Works Requirement)   | Lot       | 1   |
| 16   | 15       | Development and implementation of Project Control And Monitoring software (Ref Chapter-22 of Part-2 Works Requirement)   | Lot       | 1   |
| 17   | 16       | Maintenance of Project Control And Monitoring software (Ref Chapter-22 of Part-2 Works Requirement)  | Lot       | 1   |
| 18   | 17       | Development and implementation of Web and mobile-based Comprehensive Maintenance Management System (CMMS) for TVS/VAC - Using Artificial Intelligence<br>(It shall include but not limited to: Supply and Installation of all the required hardwares, softwares, Tablets for O&M Staffs, Internet Connectivity, Cloud subscription/License cost, etc.) (Ref Part-2 Section-VII, Sub Section – E) | Lot       | 1   |
| 19   | 18       | International training/ conference/symposium/seminars for Employer staff(Ref Chapter-10 of part-2 works Requirement)   | Per Staff | 10  |
| 20   | 19       | Deployment of Key Staffs<br>(Ref Appendix-5 of Part-2 Works requirement)   |           |     |
| 21   | a        | Chief Project Manager / Contract Representative  | Lot       | 1   |
| 22   | b        | Deputy Project Manager   | Lot       | 1   |
| 23   | c        | Planning and Programme Manager   | Lot       | 1   |
| 24   | d        | Design Manager – Mechanical  | Lot       | 1   |
| 25   | e        | Design Manager – Electrical & SCADA  | Lot       | 1   |

| CHENNAI METRO RAIL LIMITED<br>CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4<br>BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS<br>TENDER NO. C4-VAC&TVS-12 |          |   |      |     |
|--|----------|---|------|-----|
| PRICE CENTRE-A (GENERAL REQUIREMENT)   |          |   |      |     |
| Sl.No  | Item No. | Item Description                                | Unit | Qty |
| 26   | f        | Interface Manager                               | Lot  | 1   |
| 27   | g        | Procurement Manager                             | Lot  | 1   |
| 28   | h        | Construction Manager – Mechanical               | Lot  | 1   |
| 29   | i        | Construction and T&C Manager – Electrical       | Lot  | 1   |
| 30   | j        | Deputy Construction Manager – Mechanical        | Lot  | 2   |
| 31   | k        | Deputy Construction and T&C Manager – SCADA     | Lot  | 1   |
| 32   | l        | BIM Manager                                     | Lot  | 1   |
| 33   | m        | QA & QC Manager                                 | Lot  | 1   |
| 34   | n        | OHSE Manager                                    | Lot  | 1   |
| 35   | o        | Testing and Commissioning (T&C) Manager for VAC | Lot  | 1   |
| 36   | p        | Testing and Commissioning (T&C) Manager for TVS | Lot  | 1   |
| 37   | q        | Cost & Accounting Manager                       | Lot  | 1   |
| 38   | r        | Project Software Implementation Manager         | Lot  | 1   |



| CHENNAI METRO RAIL LIMITED<br>CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4<br>BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS<br>TENDER NO. C4-VAC&TVS-12 |          |   |      |     |
|--|----------|---|------|-----|
| PRICE CENTRE-A (GENERAL REQUIREMENT)   |          |   |      |     |
| Sl.No  | Item No. | Item Description  | Unit | Qty |
| 39   | 20       | Deployment of Non-Key Staffs<br>(Ref Appendix-5 of Part-2 Works requirement ) |      |     |
| 40   | a        | 3D BIM Modeler – Mechanical   | Lot  | 3   |
| 41   | b        | 3D BIM ModelerElectrical & Electronics  | Lot  | 2   |
| 42   | c        | Testing and Commissioning Engineer – TVS system                               | Lot  | 3   |
| 43   | d        | Testing and Commissioning Engineer – VAC system                               | Lot  | 3   |
| 44   | e        | Testing and Commissioning Engineer - Electrical                               | Lot  | 3   |
| 45   | f        | Testing and Commissioning Engineer - SCADA                                    | Lot  | 2   |
| 46   | g        | OHSE Senior Engineer  | Lot  | 2   |
| 47   | h        | Safety Steward  | Lot  | 6   |
| 48   | i        | Environment Engineer  | Lot  | 1   |

| CHENNAI METRO RAIL LIMITED<br>CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4<br>BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS<br>TENDER NO. C4-VAC&TVS-12 |          |                                   |      |     |
|--|----------|-----------------------------------|------|-----|
| PRICE CENTRE-A (GENERAL REQUIREMENT)   |          |                                   |      |     |
| Sl.No  | Item No. | Item Description                  | Unit | Qty |
| 49   | j        | Document Controller               | Lot  | 1   |
| 50   | k        | QA & QC Engineer                  | Lot  | 3   |
| 51   | l        | Interface Engineer                | Lot  | 2   |
| 52   | m        | Site Engineer –TVS/VAC Mechanical | Lot  | 8   |
| 53   | n        | Site Engineer TVS/VAC Electrical  | Lot  | 4   |
| 54   | o        | Site Engineer - SCADA             | Lot  | 4   |
| 55   | p        | Store Incharge                    | Lot  | 1   |

| CHENNAI METRO RAIL LIMITED<br>CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4<br>BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS<br>TENDER NO. C4-VAC&TVS-12 |          |   |                |          |
|--|----------|---|----------------|----------|
| PRICE CENTRE-B (DESIGN VERIFICATION AND VALIDATION)  |          |   |                |          |
| Sl.No  | Item No. | Description   | Unit           | Quantity |
| 1  |          | PRICE CENTRE-B (DESIGN VERIFICATION AND VALIDATION)   |                |          |
| 2  | 1        | Design Verification and Validation of TVS Design Works which includes but not limited to Acoustic , SES ,CFD Simulation works etc<br>(Ref -SubSection-A, Section VII of Part -2 & Appendices-5, SubSection-B Section VI of Part -2 )                                  | No of Stations | 9        |
| 3  | 2        | Design Verification and Validation of VAC works<br>(Ref -SubSection-A, Section VII of Part -2 )   | No of Stations | 8        |
| 4  | 3        | Design Verification and Validation of TVS/VAC associated Electrical Works (Ref -SubSection-A, Section VII of Part -2)   | No of Stations | 8        |
| 5  | 4        | Design Verification and Validation of ISMS Works (Ref -SubSection-A, Section VII of Part -2)  | No of Stations | 9        |
| 6  | 5        | Submission of RAMS REPORT during Design Verification stage and Submission of Achievement RAMS REPORT before completion of DLP<br>( Ref -SubSection-A, Section VII of Part -2 & Chapter 12 Section VI of Part -2 and Appendices-5, SubSection-B Section VI of Part -2) | Lot            | 1        |
| 7  | 6        | EMC Compliance Report (Ref -Chapter 12 Section VI of Part -2 & Appendices-5, SubSection-B Section VI of Part -2 )   | Lot            | 1        |

CHENNAI METRO RAIL LIMITED

CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4

BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS

TENDER NO. C4-VAC&TVS-12

PRICE CENTRE C - VAC WORKS

| Sl.No | Item.No | Description  | Unit | LIGHTHOUSE (ST01) | KUTCHERY ROAD (ST03) | ALWARPET (ST05) | BHARATHIDASAN (ST06) | BOAT CLUB (ST07) | NANDANAM (ST08) | PANAGAL PARK (ST10) | KODAMBAKKAM (ST11) | TOTAL QUANTITY |
|-------|---------|--|------|-------------------|----------------------|-----------------|----------------------|------------------|-----------------|---------------------|--------------------|----------------|
| 1     | 1       | PRICE CENTRE D - VAC WORKS   |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 2     | 2       | Manufacture, Supply, Delivery, Installation, Testing (Factory acceptance test,Partial acceptance test & System Acceptance Testing), Integrated Testing Commissioning & DLP of following equipment's / materials                                    |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 3     | 3       | Air Handling Units (DX- Coil type) compatible with VFD Motor<br>Following various capacities of Air Handling Units (DX- Coil type) In Accordance with VAC Technical Specifications(Refer Part-2, Section VII, Sub section C, unit 4) and drawings. |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 4     | 3.01    | Air flow capacity - 6937 LPS (6.94CMS), Cooling Load Capacity - 158.1 KW (44.95TR), Total Pressure drop -1840Pascal and compatible with VFD motor  | Nos. |                   |                      |                 |                      |                  |                 |                     | 1                  | 1              |
| 5     | 3.02    | Air flow capacity - 6227 LPS (6.23 CMS), Cooling Load Capacity - 161.3 KW (45.86 TR), Total Pressure drop -1120 Pascal and compatible with VFD motor   | Nos. |                   |                      |                 |                      |                  |                 | 1                   |                    | 1              |
| 6     | 3.03    | Air flow capacity - 6188 LPS (6.19 CMS), Cooling Load Capacity - 163.3 KW (46.43 TR), Total Pressure drop -1040 Pascal and compatible with VFD motor   | Nos. |                   |                      |                 |                      |                  |                 | 1                   |                    | 1              |
| 7     | 3.04    | Air flow capacity - 8082 LPS (8.1CMS), Cooling Load Capacity - 190 KW (54TR), Total Pressure drop -1660 Pascal and compatible with VFD motor   | Nos. | 1                 |                      |                 |                      |                  |                 |                     |                    | 1              |
| 8     | 3.05    | Air flow capacity - 7766 LPS (7.77 CMS), Cooling Load Capacity - 195.1 KW (55.47 TR), Total Pressure drop -1280 Pascal and compatible with VFD motor   | Nos. |                   |                      |                 |                      |                  |                 | 1                   |                    | 1              |
| 9     | 3.06    | Air flow capacity - 7535 LPS (7.54CMS), Cooling Load Capacity - 198.2 KW (56.5TR), Total Pressure drop -1110Pascal and compatible with VFD motor   | Nos. |                   |                      |                 |                      | 1                |                 |                     |                    | 1              |
| 10    | 3.07    | Air flow capacity - 8365 LPS (8.37 CMS), Cooling Load Capacity - 202.8 KW (57.7 TR), Total Pressure drop -1170 Pascal and compatible with VFD motor  | Nos. |                   |                      | 1               |                      |                  |                 |                     |                    | 1              |
| 11    | 3.08    | Air flow capacity - 8472 LPS (8.47 CMS), Cooling Load Capacity - 202.8 KW (57.7 TR), Total Pressure drop -1450 Pascal and compatible with VFD motor  | Nos. |                   |                      | 2               |                      |                  |                 |                     |                    | 2              |
| 12    | 3.09    | Air flow capacity - 9303 LPS (9.3 CMS), Cooling Load Capacity - 222.0 KW (63.12 TR), Total Pressure drop -1530 Pascal and compatible with VFD motor  | Nos. |                   | 1                    |                 |                      |                  |                 |                     |                    | 1              |
| 13    | 3.10    | Air flow capacity - 9530 LPS (9.53 CMS), Cooling Load Capacity - 228.1 KW (64.86 TR), Total Pressure drop -1530 Pascal and compatible with VFD motor   | Nos. |                   | 2                    |                 |                      |                  |                 |                     |                    | 2              |
| 14    | 3.11    | Air flow capacity - 9071 LPS (9.07 CMS), Cooling Load Capacity - 225.1 KW (64.01 TR), Total Pressure drop -1180 Pascal and compatible with VFD motor   | Nos. |                   |                      |                 | 1                    |                  |                 |                     |                    | 1              |
| 15    | 3.12    | Air flow capacity - 9744 LPS (9.75 CMS), Cooling Load Capacity - 236.1 KW (67.13 TR), Total Pressure drop -1870 Pascal and compatible with VFD motor   | Nos. |                   |                      |                 | 2                    |                  |                 |                     |                    | 2              |
| 16    | 3.13    | Air flow capacity - 9825 LPS (9.83 CMS), Cooling Load Capacity - 229.9 KW (65.4 TR), Total Pressure drop -1260 Pascal and compatible with VFD motor  | Nos. |                   | 1                    |                 |                      |                  |                 |                     |                    | 1              |
| 17    | 3.14    | Air flow capacity - 10288 LPS (10.3 CMS), Cooling Load Capacity - 238 KW (67.62 TR), Total Pressure drop -1670 Pascal and compatible with VFD motor  | Nos. | 1                 |                      |                 |                      |                  |                 |                     |                    | 1              |
| 18    | 3.15    | Air flow capacity - 11921 LPS (11.92 CMS), Cooling Load Capacity - 291.30 KW (82.83 TR), Total Pressure drop -1240 Pascal and compatible with VFD motor  | Nos. |                   |                      |                 |                      |                  |                 | 1                   |                    | 1              |
| 19    | 3.16    | Air flow capacity - 14199 LPS (14.2CMS), Cooling Load Capacity - 326 KW (92.7TR), Total Pressure drop -1790 Pascal and compatible with VFD motor   | Nos. |                   |                      |                 |                      |                  |                 |                     | 1                  | 1              |
| 20    | 3.17    | Air flow capacity - 10830 LPS (10.83CMS), Cooling Load Capacity - 327.3 KW (93.06TR), Total Pressure drop -1260 Pascal and compatible with VFD motor   | Nos. |                   |                      |                 |                      |                  |                 |                     | 1                  | 1              |
| 21    | 3.18    | Air flow capacity - 14800 LPS (14.8CMS), Cooling Load Capacity - 340.9 KW (96.9TR), Total Pressure drop -1540 Pascal and compatible with VFD motor   | Nos. |                   |                      |                 |                      | 1                |                 |                     |                    | 1              |
| 22    | 3.19    | Air flow capacity - 12707 LPS (12.71CMS), Cooling Load Capacity - 402 KW (114.2TR), Total Pressure drop -1210 Pascal and compatible with VFD motor   | Nos. | 1                 |                      |                 |                      |                  |                 |                     |                    | 1              |
| 23    | 3.20    | Air flow capacity - 11534 LPS (11.5 CMS), Cooling Load Capacity - 261.8 KW (74.44 TR), Total Pressure drop -1450 Pascal and compatible with VFD motor  | Nos. |                   |                      |                 |                      |                  | 1               |                     |                    | 1              |

CHENNAI METRO RAIL LIMITED

CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4

BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS

TENDER NO. C4-VAC&TVS-12

PRICE CENTRE C - VAC WORKS

| SL.No | Item.No | Description  | Unit | LIGHTHOUSE (ST01) | KUTCHERY ROAD (ST03) | ALWARPET (ST05) | BHARATHIDASAN (ST06) | BOAT CLUB (ST07) | NANDANAM (ST08) | PANAGAL PARK (ST10) | KODAMBAKKAM (ST11) | TOTAL QUANTITY |
|-------|---------|--|------|-------------------|----------------------|-----------------|----------------------|------------------|-----------------|---------------------|--------------------|----------------|
| 24    | 3.21    | Air flow capacity - 12593 LPS (12.6 CMS), Cooling Load Capacity - 296.6 KW (84.34 TR), Total Pressure drop -1540 Pascal and compatible with VFD motor  | Nos. |                   |                      |                 |                      |                  | 1               |                     |                    | 1              |
| 25    | 3.22    | Air flow capacity - 9422 LPS (9.42 CMS), Cooling Load Capacity - 302.1 KW (85.9 TR), Total Pressure drop -1540 Pascal and compatible with VFD motor  | Nos. |                   |                      |                 |                      |                  | 1               |                     |                    | 1              |
| 26    | 4       | <b>VRF Outdoor Units</b><br>Following various capacities of outdoor units (ODU). In Accordance with VAC Technical Specifications(Refer Part-2, Section VII, Sub section C, unit 2) and drawings. |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 27    | 4.01    | 8 HP (6.4 TR)  | Nos. |                   |                      |                 |                      |                  |                 | 2                   |                    | 2              |
| 28    | 4.02    | 10 HP (8 TR)   | Nos. |                   |                      |                 |                      |                  |                 |                     | 1                  | 1              |
| 29    | 4.03    | 12 HP (9.6 TR)   | Nos. |                   |                      |                 |                      |                  |                 |                     | 2                  | 2              |
| 30    | 4.04    | 14 HP (11.2 TR)  | Nos. |                   |                      |                 |                      |                  | 1               |                     |                    | 1              |
| 31    | 4.05    | 16 HP (12.8 TR)  | Nos. |                   |                      |                 |                      |                  |                 |                     | 1                  | 1              |
| 32    | 4.06    | 18 HP (14.4TR)   | Nos. |                   |                      |                 |                      |                  |                 |                     | 1                  | 1              |
| 33    | 4.07    | 20 HP (16TR)   | Nos. |                   |                      |                 |                      |                  |                 |                     | 1                  | 1              |
| 34    | 4.08    | 22 HP (17.6TR)   | Nos. |                   |                      |                 |                      | 2                |                 |                     |                    | 2              |
| 35    | 4.09    | 24 HP (19.2TR)   | Nos. | 1                 |                      |                 |                      |                  |                 |                     |                    | 1              |
| 36    | 4.10    | 28 HP (22.4TR)   | Nos. |                   |                      |                 |                      |                  |                 | 2                   |                    | 2              |
| 37    | 4.11    | 30 HP (24 TR)- Combination of any S No "4.01" to "4.10" of above ODU Capacity  | Nos. |                   | 2                    | 2               |                      |                  |                 |                     |                    | 4              |
| 38    | 4.12    | 36 HP (28.8 TR)- Combination of any S No "4.01" to "4.10" of above ODU Capacity  | Nos. |                   | 2                    | 2               |                      |                  |                 |                     |                    | 4              |
| 39    | 4.13    | 40 HP (32 TR)- Combination of any S No "4.01" to "4.10" of above ODU Capacity  | Nos. |                   |                      |                 |                      |                  |                 | 2                   |                    | 2              |
| 40    | 4.14    | 42 HP (33.6TR)- Combination of any S No "4.01" to "4.10" of above ODU Capacity   | Nos. |                   |                      |                 |                      | 2                |                 |                     |                    | 2              |
| 41    | 4.15    | 52 HP (41.6TR)- Combination of any S No "4.01" to "4.10" of above ODU Capacity   | Nos. |                   |                      |                 |                      |                  |                 |                     | 2                  | 2              |
| 42    | 4.16    | 60 HP (48TR)- Combination of any S No "4.01" to "4.10" of above ODU Capacity   | Nos. | 2                 |                      |                 |                      |                  |                 |                     |                    | 2              |
| 43    | 4.17    | 62 HP (49.6TR)- Combination of any S No "4.01" to "4.10" of above ODU Capacity   | Nos. |                   |                      |                 |                      |                  | 2               |                     |                    | 2              |
| 44    | 4.18    | 64 HP (51.2TR)- Combination of any S No "4.01" to "4.10" of above ODU Capacity   | Nos. |                   |                      |                 |                      |                  |                 | 2                   |                    | 2              |
| 45    | 4.19    | 66 HP (52.8TR)- Combination of any S No "4.01" to "4.10" of above ODU Capacity   | Nos. |                   |                      |                 | 2                    |                  |                 |                     |                    | 2              |
| 46    | 4.20    | 78 HP (62.4TR)- Combination of any S No "4.01" to "4.10" of above ODU Capacity   | Nos. |                   |                      |                 |                      | 1                |                 |                     |                    | 1              |
| 47    | 4.21    | 80 HP (64TR)- Combination of any S No "4.01" to "4.10" of above ODU Capacity   | Nos. |                   | 3                    |                 |                      |                  |                 |                     |                    | 3              |
| 48    | 4.22    | 88 HP (70.4TR)- Combination of any S No "4.01" to "4.10" of above ODU Capacity   | Nos. |                   |                      | 1               |                      |                  |                 |                     |                    | 1              |
| 49    | 4.23    | 90 HP (72TR)-Combination of any S No "4.01" to "4.10" of above ODU Capacity  | Nos. |                   |                      | 2               |                      |                  |                 |                     |                    | 2              |
| 50    | 4.24    | 92 HP (73.6TR)- Combination of any S No "4.01" to "4.10" of above ODU Capacity   | Nos. |                   |                      |                 | 1                    |                  |                 |                     |                    | 1              |
| 51    | 4.25    | 94 HP (75.2TR)- Combination of any S No "4.01" to "4.10" of above ODU Capacity   | Nos. | 1                 |                      |                 |                      |                  |                 |                     |                    | 1              |
| 52    | 4.26    | 96 HP (76.8TR)- Combination of any S No "4.01" to "4.10" of above ODU Capacity   | Nos. |                   |                      |                 | 2                    |                  |                 |                     |                    | 2              |
| 53    | 4.27    | 104 HP (83.2TR)- Combination of any S No "4.01" to "4.10" of above ODU Capacity  | Nos. |                   |                      |                 |                      |                  | 1               |                     |                    | 1              |
| 54    | 4.28    | 114 HP (91.2TR)- Combination of any S No "4.01" to "4.10" of above ODU Capacity  | Nos. |                   |                      |                 |                      |                  |                 | 1                   |                    | 1              |
| 55    | 4.29    | 116 HP (92.8TR)- Combination of any S No "4.01" to "4.10" of above ODU Capacity  | Nos. |                   |                      |                 |                      |                  | 1               |                     |                    | 1              |
| 56    | 4.30    | 120 HP (96TR)- Combination of any S No "4.01" to "4.10" of above ODU Capacity  | Nos. |                   |                      |                 |                      |                  | 1               |                     |                    | 1              |
| 57    | 4.31    | 128 HP (102.4TR)- Combination of any S No "4.01" to "4.10" of above ODU Capacity   | Nos. |                   |                      |                 |                      |                  |                 |                     | 2                  | 2              |
| 58    | 4.32    | 134 HP (107.2TR)- Combination of any S No "4.01" to "4.10" of above ODU Capacity   | Nos. |                   |                      |                 |                      | 1                |                 |                     |                    | 1              |



CHENNAI METRO RAIL LIMITED

CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4

BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS

TENDER NO. C4-VAC&TVS-12

PRICE CENTRE C - VAC WORKS

| SLNo | Item.No | Description   | Unit | LIGHTHOUSE (ST01) | KUTCHERY ROAD (ST03) | ALWARPET (ST05) | BHARATHIDASAN (ST06) | BOAT CLUB (ST07) | NANDANAM (ST08) | PANAGAL PARK (ST10) | KODAMBAKKAM (ST11) | TOTAL QUANTITY |
|------|---------|---|------|-------------------|----------------------|-----------------|----------------------|------------------|-----------------|---------------------|--------------------|----------------|
| 59   | 4.33    | 158 HP (126.4TR)- Combination of any S No "4.01" to "4.10" of above ODU Capacity  | Nos. | 1                 |                      |                 |                      |                  |                 |                     |                    | 1              |
| 60   | 5       | VRF Indoor Units & Accessories<br>Following various capacities of Indoor units(IDU) & Accessories In Accordance with VAC Technical Specifications(Refer Part-2, Section VII, Sub section C, unit 2) and drawings. Including Corded/Cordless Remote controllers for operation of indoor units. :It is the contractor's responsibility to select the appropriate IDU model from the chosen OEM that will meet the minimum cooling load and minimum airflow rate requirement specified in the design documents/drawings. |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 61   | 5.01    | HIGH STATIC DUCTABLE/ CONCEALED INDOOR UNITS  |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 62   | 5.01.01 | 7.1kW (2.0TR)   | Nos. |                   |                      |                 |                      |                  |                 |                     | 1                  | 1              |
| 63   | 5.01.02 | 12.3kW (3.5TR)  | Nos. |                   |                      |                 |                      |                  |                 |                     | 1                  | 1              |
| 64   | 5.01.03 | 14.1kW (4.01TR)   | Nos. |                   |                      |                 |                      |                  | 2               |                     | 2                  | 4              |
| 65   | 5.01.04 | 15.8kW (4.5TR)  | Nos. |                   |                      |                 |                      |                  |                 |                     | 1                  | 1              |
| 66   | 5.01.05 | 18kW (5.12TR)   | Nos. | 2                 | 2                    | 2               |                      | 2                |                 | 2                   |                    | 10             |
| 67   | 5.01.06 | 22.4kW (6.4TR)  | Nos. | 2                 |                      |                 | 2                    |                  |                 |                     |                    | 4              |
| 68   | 5.01.07 | 28kW (7.96TR)   | Nos. | 8                 | 10                   | 10              | 10                   | 10               | 10              | 6                   | 10                 | 74             |
| 69   | 5.01.08 | 40kW (11.37TR)  | Nos. |                   |                      |                 |                      |                  |                 | 4                   |                    | 4              |
| 70   | 5.02    | HI-WALL INDOOR UNITS  |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 71   | 5.02.01 | 2.9 KW (0.8 TR)   | Nos. | 2                 | 2                    | 2               | 2                    | 2                | 2               | 2                   | 2                  | 16             |
| 72   | 5.02.02 | 3.5 KW (1.02 TR)  | Nos. |                   |                      |                 |                      |                  |                 |                     | 1                  | 1              |
| 73   | 5.02.03 | 7.1 KW (2.02 TR)  | Nos. |                   |                      |                 |                      |                  |                 |                     | 1                  | 1              |
| 74   | 5.02.04 | 9 KW (2.5 TR)   | Nos. |                   |                      |                 |                      |                  |                 |                     | 1                  | 1              |
| 75   | 5.03    | CASSETTE TYPE INDOOR UNIT   |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 76   | 5.03.01 | 5.6 KW (1.6 TR)   | Nos. |                   |                      |                 |                      |                  |                 |                     | 1                  | 1              |
| 77   | 5.03.02 | 7.1 KW (2.02 TR)  | Nos. |                   |                      |                 |                      |                  |                 |                     | 1                  | 1              |
| 78   | 5.04    | Expansion Valve Kit & Communication Kit   |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 79   | 5.04.01 | Electronic Expansion Valve & Communication Kit for AHUs including Air temperature sensor, Refrigerant temperature sensor, Remote, Wiring, Hot dip galvanized steel support & other related accessories etc. - In Accordance with VAC Technical Specifications and drawings. (Quantity/Lot shall be based on Number of VRF circuits) (Refer Part-2, Section VII, Sub section C, unit 2)  | Lot  | 5                 | 6                    | 6               | 6                    | 5                | 6               | 6                   | 6                  | 46             |
| 80   | 5.05    | Refrigerant Y-joints & distributor of sizes as required to suit Various capacity of Indoor units (IDU) & AHU In Accordance with VAC Technical Specifications and drawings.(Refer Part-2, Section VII, Sub section C, Unit 2)<br>Note : Bidder should procure Y-Branch joints & distributor joints only from VRF OEM.  | Lot  | 1                 | 1                    | 1               | 1                    | 1                | 1               | 1                   | 1                  | 8              |
| 81   | 5.06    | Central Remote Controller   |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 82   | 5.06.01 | Intelligent Programmable Central Remote Controller(Master Controller) for VRF with digital touch screen type of latest generation and GI powder coated enclosure In Accordance with VAC Technical Specifications and drawings. (Refer Part-2, Section VII, Sub section C, unit 2)   | Nos. | 1                 | 1                    | 1               | 1                    | 1                | 1               | 1                   | 1                  | 8              |
| 83   | 5.06.02 | VRF Touch Screen HMI (22 Inch) with GI powder coated enclosure In Accordance with VAC Technical Specifications (Refer Part-2, Section VII, Sub section C, Unit 2)   | Nos. | 1                 | 1                    | 1               | 1                    | 1                | 1               | 1                   | 1                  | 8              |
| 84   | 5.07    | SS 316 secondary drain pan with insulation for Indoor unit. In Accordance with VAC Technical Specifications and drawings.(Refer Part-2, Section VII, Sub section C, unit 2)   | Nos. | 12                | 12                   | 12              | 12                   | 12               | 12              | 12                  | 12                 | 96             |
| 85   | 5.08    | Design, supply, fabrication, and erection of a modular support structure to accommodate VRV/VRF outdoor units, including associated cable trays for electrical and copper piping, and any required accessories at terrace, roof, or road level locations. complete in all respect as per technical specification.(Quantity/Set shall be based on Number of Outdoor units Module) ( Refer Part-2, Section VII, Sub section C,unit 2.8.2)   | Set  | 21                | 24                   | 24              | 24                   | 23               | 26              | 22                  | 26                 | 190            |
| 86   | 5.09    | Design,supply,fabrication & erection of Canopy roofing for VRV/ VRF Outdoor units with Heavy duty Plastic / Acrylic Sheet and necessary Supporting Steel (SS316) and other accessories as per Standard installation drawing and Technical Specification.( Refer Part-2, Section VII, Sub section C, Unit 2)   | Sqm  | 150               | 120                  | 120             | 120                  | 150              | 150             | 215                 | 150                | 1175           |

CHENNAI METRO RAIL LIMITED

CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4

BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS

TENDER NO. C4-VAC&TVS-12

PRICE CENTRE C - VAC WORKS

| SL.No | Item.No | Description   | Unit | LIGHTHOUSE (ST01) | KUTCHERY ROAD (ST03) | ALWARPET (ST05) | BHARATHIDASAN (ST06) | BOAT CLUB (ST07) | NANDANAM (ST08) | PANAGAL PARK (ST10) | KODAMBAKKAM (ST11) | TOTAL QUANTITY |
|-------|---------|---|------|-------------------|----------------------|-----------------|----------------------|------------------|-----------------|---------------------|--------------------|----------------|
| 87    | 5.10    | Design,supply,fabrication & erection of Stainless Steel(SS316) fencing around VRV/ VRF Outdoor units with door,lock & other accessories for safety as per Standard installation drawing.( Refer Part-2, Section VII, Sub section C, Unit 2)   | Lot  | 1                 | 1                    | 1               | 1                    | 1                | 1               | 1                   | 1                  | 8              |
| 88    | 5.11    | Design,supply,fabrication & erection of Stainless Steel(SS316) cage Ladder / staircase for accessing VRV/ VRF Outdoor units ,Tunnel ventilation dampers & other accessories as per Standard installation drawing.(Refer Part-2, Section VII, Sub section C, Unit 2)   |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 89    | 5.11.01 | 5 Meter Height  | Nos  | 1                 | 1                    | 1               | 1                    | 1                | 1               | 1                   | 1                  | 8              |
| 90    | 5.11.02 | 10 Meter Height   | Nos  | 1                 | 1                    | 1               | 1                    | 1                | 1               | 1                   | 1                  | 8              |
| 91    | 6       | Copper Pipes and Accessories  |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 92    | 6.01    | Following various size of Copper Refrigerant Pipes ,Fittings and other accessories of Gas Pipes& Liquid Pipes In Accordance with VAC Technical Specifications(Refer Part-2, Section VII, Sub section C, unit 3) and drawings.<br>Note: Refrigerant pipe sizes shown in BOQ as per the DDC Design requirement. However, the contractor to select the suitable sizes during design verification & validation to meet the performance requirement based on OEM (Original Equipment Manufacturer) recommendation. |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 93    | 6.01.01 | 54.0 mm O.D -Hard drawn copper tubes  | RMT  | 110               |                      |                 | 126                  | 218              | 596             | 94                  | 28                 | 1172           |
| 94    | 6.01.02 | 44.5 mm O.D -Hard drawn copper tubes  | RMT  |                   |                      |                 |                      |                  |                 |                     | 50                 | 50             |
| 95    | 6.01.03 | 41.3 mm O.D.-Hard drawn copper tubes  | RMT  | 121               | 762                  | 712             | 883                  | 135              | 167             |                     | 360                | 3140           |
| 96    | 6.01.04 | 38.1 mm O.D.-Hard drawn copper tubes  | RMT  | 24                | 114                  | 86              | 12                   | 122              | 46              | 410                 | 21                 | 835            |
| 97    | 6.01.05 | 34.9 mm O.D.-Hard drawn copper tubes  | RMT  | 167               |                      |                 |                      | 92               |                 | 17                  |                    | 276            |
| 98    | 6.01.06 | 31.8 mm O.D.-Hard drawn copper tubes  | RMT  |                   | 13                   |                 |                      | 155              | 49              | 335                 | 6                  | 558            |
| 99    | 6.01.07 | 28.6 mm O.D.-Hard drawn copper tubes  | RMT  | 109               | 126                  | 135             | 165                  | 13               | 317             |                     | 320                | 1185           |
| 100   | 6.01.08 | 25.4 mm O.D.-Hard drawn copper tubes  | RMT  | 107               |                      | 45              | 171                  |                  | 570             |                     |                    | 893            |
| 101   | 6.01.09 | 22.2 mm O.D.-Hard drawn copper tubes  | RMT  | 383               | 965                  | 744             | 883                  | 423              | 32              | 666                 | 513                | 4609           |
| 102   | 6.01.10 | 19.1 mm O.D.-Hard drawn copper tubes  | RMT  | 44                | 49                   | 60              | 14                   | 199              | 49              | 70                  | 26                 | 511            |
| 103   | 6.01.11 | 15.9 mm O.D.-Hard drawn copper tubes  | RMT  | 112               | 139                  | 131             | 161                  | 133              | 112             | 262                 | 328                | 1378           |
| 104   | 6.01.12 | 12.7 mm O.D.-Soft copper tubes  | RMT  | 109               | 57                   | 46              | 44                   | 73               |                 | 196                 | 130                | 655            |
| 105   | 6.01.13 | 9.53 mm O.D.-Soft copper tubes  | RMT  | 6                 | 70                   | 10              | 13                   | 6                |                 | 17                  | 35                 | 157            |
| 106   | 6.01.14 | 6.4 mm O.D.-Soft copper tubes   | RMT  | 7                 | 7                    | 12              | 13                   | 17               |                 | 19                  | 35                 | 110            |
| 107   | 6.02    | Hot dip Galvanized 2mm thick Raceway/Trunking ,1.6 mm thick cover with necessary supports and other accessories In Accordance with VAC Technical Specifications(Refer Part-2, Section VII, Sub section C, unit 3) and drawings.   |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 108   | 6.02.01 | 200 mm wide / 100mm depth / 2 mm thick  | RMT  | 70                | 5                    | 5               |                      | 26               |                 | 15                  | 15                 | 136            |
| 109   | 6.02.02 | 300 mm wide / 100mm depth / 2 mm thick  | RMT  |                   | 16                   | 16              |                      | 29               |                 | 27                  | 4                  | 92             |
| 110   | 6.02.03 | 450 mm wide/ 100mm depth / 2 mm thick   | RMT  | 130               | 78                   | 78              |                      | 25               | 113             | 31                  |                    | 455            |
| 111   | 6.02.04 | 600 mm wide / 100mm depth / 2 mm thick  | RMT  |                   |                      |                 | 16                   | 34               |                 | 22                  |                    | 72             |
| 112   | 6.02.05 | 200 mm wide / 150mm depth / 2 mm thick  | RMT  |                   |                      | 181             | 169                  | 12               | 119             | 11                  |                    | 492            |
| 113   | 6.02.06 | 300 mm wide / 150mm depth / 2 mm thick  | RMT  | 130               | 56                   | 2.35            | 61                   | 131              | 3               | 16                  | 94                 | 493            |
| 114   | 6.02.07 | 350 mm wide / 150mm depth / 2 mm thick  | RMT  |                   |                      | 31              | 16                   | 14               | 35              | 14                  |                    | 110            |
| 115   | 6.02.08 | 450 mm wide / 150mm depth / 2 mm thick  | RMT  |                   |                      |                 | 178                  | 9                |                 | 20                  | 185                | 392            |
| 116   | 6.02.09 | 600 mm wide /150mm depth / 2 mm thick   | RMT  |                   | 256                  | 17.6            | 75                   | 139              | 3               | 197                 | 27                 | 714.6          |
| 117   | 6.02.10 | 750 mm wide /150mm depth / 2 mm thick   | RMT  |                   |                      | 161             | 60                   | 18               | 69              | 15                  |                    | 322.6          |
| 118   | 7       | Following various size of Copper Tubes Insulation made up of closed cell elastomeric Nitrile rubber with factory treated glass woven cloth In Accordance with VAC Technical Specifications (Refer Part-2, Section VII, Sub section C, unit 12) and drawings.  |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 119   | 7.01    | Gas Pipes   |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 120   | 7.01.01 | 32 mm thickness (54.0 mm O.D.)  | RMT  | 138               |                      |                 |                      | 273              | 735             | 118                 | 35                 | 1299           |
| 121   | 7.01.02 | 32 mm thickness (44.5 mm O.D.)  | RMT  |                   |                      |                 | 1104                 |                  |                 |                     | 40                 | 1144           |
| 122   | 7.01.03 | 32 mm thickness (41.3 mm O.D.)  | RMT  | 151               | 952                  | 890             | 15                   | 168              | 205             |                     | 450                | 2831           |
| 123   | 7.01.04 | 32 mm thickness (38.1 mm O.D.)  | RMT  | 30                | 142                  | 108             |                      | 152              | 58              | 513                 | 26                 | 1029           |
| 124   | 7.01.05 | 32 mm thickness (34.9 mm O.D.)  | RMT  | 208               |                      |                 |                      | 115              |                 | 22                  |                    | 345            |
| 125   | 7.01.06 | 32 mm thickness (31.8 mm OD)  | RMT  |                   | 16                   |                 | 206                  | 194              |                 | 418                 | 7                  | 841            |
| 126   | 7.01.07 | 32 mm thickness (28.6 mm O.D.)  | RMT  | 137               | 158                  | 168             | 54                   | 16               | 62              |                     | 400                | 995            |
| 127   | 7.01.08 | 32 mm thickness (25.4 mm O.D.)  | RMT  | 19                |                      |                 |                      |                  | 139             |                     |                    | 158            |
| 128   | 7.01.09 | 32 mm thickness (22.2 mm O.D.)  | RMT  | 119               | 161                  | 56              |                      | 65               |                 | 201                 | 165                | 767            |
| 129   | 7.01.10 | 32 mm thickness (19.1 mm O.D.)  | RMT  |                   |                      |                 |                      |                  |                 |                     | 40                 | 40             |
| 130   | 7.01.11 | 25 mm thickness (15.9 mm O.D.)  | RMT  |                   |                      |                 |                      |                  |                 |                     | 40                 | 40             |
| 131   | 7.01.12 | 25 mm thickness (12.7 mm O.D.)  | RMT  |                   |                      |                 | 17                   |                  |                 |                     | 40                 | 57             |
| 132   | 7.01.13 | 25 mm thickness (9.5 mm O.D.)   | RMT  | 7                 |                      | 13              |                      | 7                |                 | 21                  | 43                 | 91             |
| 133   | 7.02    | Liquid Pipes  |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 134   | 7.02.01 | 13 mm thickness (25.4 mm O.D.)  | RMT  | 115               |                      |                 | 160                  |                  | 397             |                     |                    | 672            |
| 135   | 7.02.02 | 13 mm thickness (22.2 mm O.D.)  | RMT  | 359               | 1045                 | 930             | 1103                 | 463              | 572             | 631                 | 476                | 5579           |
| 136   | 7.02.03 | 13 mm thickness (19.1 mm O.D.)  | RMT  | 55                | 62                   | 75              | 18                   | 249              | 40              | 88                  | 33                 | 620            |
| 137   | 7.02.04 | 13 mm thickness (15.9 mm O.D.)  | RMT  | 139               | 173                  | 164             | 201                  | 166              | 62              | 328                 | 410                | 1643           |
| 138   | 7.02.05 | 13 mm thickness (12.7 mm O.D.)  | RMT  | 137               | 71                   | 58              | 55                   | 92               | 139             | 245                 | 162                | 959            |
| 139   | 7.02.06 | 13 mm thickness (9.5 mm O.D.)   | RMT  |                   | 88                   |                 |                      |                  |                 |                     |                    | 88             |
| 140   | 7.02.07 | 13 mm thickness (6.4 mm O.D.)   | RMT  | 9                 |                      | 14              | 16                   | 21               |                 | 24                  | 43                 | 127            |
| 141   | 8       | Condensate Drain Piping & fitting With insulation and Aluminium cladding In Accordance with VAC Technical Specifications and(Refer Part-2, Section VII, Sub section C, unit 2 & 4 ) drawings.( Price shall include cost of Insulation)  |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 142   | 8.01    | UPVC Pipe and 19 mm closed cell elastomeric Nitrile rubber with factory treated glass woven cloth   |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 143   | 8.01.01 | 40 mm dia   | RMT  |                   |                      |                 |                      |                  |                 |                     | 25                 | 25             |
| 144   | 8.01.02 | 32 mm dia   | RMT  | 7                 | 7                    | 7               | 7                    | 7                | 67              | 11                  | 25                 | 138            |
| 145   | 8.01.03 | 25 mm dia   | RMT  | 51                | 51                   | 51              | 51                   | 51               | 33              |                     | 12                 | 300            |
| 146   | 8.02    | 0.6 mm Aluminium cladding for Drain pipe in accordance with VAC technical specifications (Refer Part-2, Section VII, Sub section C, unit2&4 ) drawings  | Sqm  | 10                | 10                   | 10              | 10                   | 10               | 10              | 10                  | 10                 | 80             |
| 147   | 9.01    | Fire Rated Application : GI Sheet Metal Ducting with necessary supports and other accessories In Accordance with VAC Technical Specifications (Refer Part-2, Section VII, Sub section C, unit 8) and drawings.  |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 148   | 9.01.01 | 0.63 mm thick (24 Gauge)  | Sqm. | 397               | 230                  | 247             | 274                  | 137              | 579             | 240                 | 212                | 2316           |

CHENNAI METRO RAIL LIMITED

CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4

BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS

TENDER NO. C4-VAC&TVS-12

PRICE CENTRE C - VAC WORKS

| SLNo | Item.No  | Description   | Unit | LIGHTHOUSE (ST01) | KUTCHERY ROAD (ST03) | ALWARPET (ST05) | BHARATHIDASAN (ST06) | BOAT CLUB (ST07) | NANDANAM (ST08) | PANAGAL PARK (ST10) | KODAMBAKKAM (ST11) | TOTAL QUANTITY |
|------|----------|---|------|-------------------|----------------------|-----------------|----------------------|------------------|-----------------|---------------------|--------------------|----------------|
| 149  | 9.01.02  | 0.83 mm thick (22 Gauge)  | Sqm. | 891               | 764                  | 1006            | 970                  | 478              | 2287            | 1186                | 1958               | 9540           |
| 150  | 9.01.03  | 1.00 mm thick (20 Gauge)  | Sqm. | 2112              | 2198                 | 1941            | 2754                 | 2070             | 2455            | 2479                | 2096               | 18105          |
| 151  | 9.01.04  | 1.20 mm thick (18 Gauge)  | Sqm. | 276               | 76                   | 81              | 43                   | 164              | 656             | 252                 | 219                | 1767           |
| 152  | 9.02     | Fire Rated Application : MS angular frame GI Sheet Metal Ducting with necessary supports and other accessories In Accordance with VAC Technical Specifications (Refer Part-2, Section VII, Sub section C, unit 8) and drawings. |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 153  | 9.02.01  | 0.63 mm thick (24 Gauge)  | Sqm  |                   |                      |                 |                      |                  | 15              |                     | 15                 | 30             |
| 154  | 9.02.02  | 0.83 mm thick (22 Gauge)  | Sqm  | 21                |                      |                 |                      |                  |                 |                     |                    | 21             |
| 155  | 9.02.03  | 1.00 mm thick (20 Gauge)  | Sqm  | 38                |                      |                 |                      | 179              |                 |                     |                    | 217            |
| 156  | 9.02.04  | 1.20 mm thick (18 Gauge)  | Sqm  | 474               | 282                  | 282             | 174                  | 186              | 626             | 14                  | 372                | 2410           |
| 157  | 9.03     | Fire-Resistant Paint for fire rated duct. In Accordance with VAC Technical Specifications (Refer Part-2, Section VII, Sub section C, unit 8) and drawings.  | Sqm. | 4630              | 3905                 | 3913            | 4637                 | 3535             | 7280            | 4588                | 5359               | 37847          |
| 158  | 9.04     | Normal ( Non Fire Rated ) Application. GI Sheet Metal Ducting with necessary supports and other accessories In Accordance with VAC Technical Specifications (Refer Part-2, Section VII, Sub section C, unit 8) and drawings.    |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 159  | 9.04.01  | 0.63 mm thick (24 Gauge)  | Sqm  | 98                | 315                  | 315             | 235                  | 283              | 142             | 355                 | 53                 | 1796           |
| 160  | 9.04.02  | 0.83 mm thick (22 Gauge)  | Sqm  | 293               | 687                  | 687             | 631                  | 355              | 676             | 1120                | 161                | 4610           |
| 161  | 9.04.03  | 1.00 mm thick (20 Gauge)  | Sqm  | 564               | 375                  | 375             | 765                  | 1258             | 437             | 637                 | 281                | 4692           |
| 162  | 9.04.04  | 1.20 mm thick (18 Gauge)  | Sqm  | 152               | 35                   | 35              | 11                   | 51               | 598             | 128                 | 35                 | 1045           |
| 163  | 10.01    | Duct Insulation for Normal and Fire-Rated Application. In Accordance with VAC Technical Specifications (Refer Part-2, Section VII, Sub section C, unit 12) and drawings.  |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 164  | 10.01.01 | 50 mm thick rockwool insulation of 105 kg/m3 density ,Suitable adhesive , and other accessories as per drawing and technical specification.   | Sqm. | 50                | 50                   | 50              | 50                   | 50               | 50              | 50                  | 50                 | 400            |
| 165  | 10.01.02 | 50 mm thick rockwool insulation of 120 kg/m3 density ,Suitable adhesive , and other accessories as per drawing and technical specification.   | Sqm. | 2020              | 2344                 | 2344            | 2344                 | 2135             | 3302            | 2288                | 2554               | 19331          |
| 166  | 10.01.03 | 19 mm thick XLPE insulation of 25-30 kg/m3 density ,Suitable adhesive , and other accessories as per drawing and technical specification.   | Sqm. | 50                | 50                   | 50              | 50                   | 50               | 50              | 50                  | 50                 | 400            |
| 167  | 10.02    | 0.6mm thick Aluminium cladding for ducting painted with black color and other accessories in accordance with VAC technical specifications (Refer Part-2, Section VII, Sub section C, unit 12 ) drawings                         | Sqm. | 50                | 50                   | 50              | 50                   | 50               | 50              | 50                  | 50                 | 400            |
| 168  | 10.03    | 0.6mm thick Stainless steel (SS 316) chicken wire mesh for ducting and VRF with other fixing accessories in accordance with VAC technical specifications (Refer Part-2, Section VII, Sub section C, unit 12 ) drawings          | Sqm. | 50                | 50                   | 50              | 50                   | 50               | 50              | 50                  | 50                 | 400            |
| 169  | 11       | Fire Rated Insulated Flexible Ducting and Damper In Accordance with VAC Technical Specifications (Refer Part-2, Section VII, Sub section C, unit 8 ) and drawings.  |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 170  | 11.01    | Insulated flexible ducting dia 200 mm   | Rmt  | 10                | 10                   | 10              | 10                   | 10               | 10              | 10                  | 10                 | 80             |
| 171  | 11.02    | Insulated flexible ducting dia 300 mm   | Rmt  | 10                | 10                   | 10              | 10                   | 10               | 10              | 10                  | 10                 | 80             |
| 172  | 11.03    | Butterfly damper dia 200 mm   | Nos  | 6                 | 6                    | 6               | 6                    | 6                | 6               | 6                   | 6                  | 48             |
| 173  | 11.04    | Butterfly damper dia 300 mm   | Nos  | 6                 | 6                    | 6               | 6                    | 6                | 6               | 6                   | 6                  | 48             |
| 174  | 12       | Factory fabricated flexible duct connector (Canvas) In Accordance with VAC Technical Specifications (Refer Part-2, Section VII, Sub section C, unit 11) and drawings.   |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 175  | 12.01    | Fire rated Flexible duct connector(Canvas) for Normal and fire Application  | Sqm  | 10                | 10                   | 10              | 10                   | 10               | 10              | 10                  | 10                 | 80             |
| 176  | 13       | Grilles/Diffusers In Accordance with VAC Technical Specifications (Refer Part-2, Section VII, Sub section C, Unit 9) and drawings.  |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 177  | 13.01    | Square Supply air & Return air diffuser with VCDs (In various sizes like or to suite site)  | Sqm. | 3                 | 3                    | 3               | 3                    | 3                | 3               | 3                   | 3                  | 24             |

CHENNAI METRO RAIL LIMITED

CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4

BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS

TENDER NO. C4-VAC&TVS-12

PRICE CENTRE C - VAC WORKS

| SL.No | Item.No | Description   | Unit | LIGHTHOUSE (ST01) | KUTCHERY ROAD (ST03) | ALWARPET (ST05) | BHARATHIDASAN (ST06) | BOAT CLUB (ST07) | NANDANAM (ST08) | PANAGAL PARK (ST10) | KODAMBAKKAM (ST11) | TOTAL QUANTITY |
|-------|---------|---|------|-------------------|----------------------|-----------------|----------------------|------------------|-----------------|---------------------|--------------------|----------------|
| 178   | 13.02   | Supply air grilles with VCDs (In various sizes like or to suite site)   | Sqm. |                   | 7.4                  | 7.4             | 10                   | 7                | 8               | 8.42                |                    | 48             |
| 179   | 13.03   | Supply/Return/Exhaust Eggerate Grille with High Temperature VCDs (In various sizes like or to suite site)   | Sqm. | 39                | 27                   | 27              | 40                   | 23.17            | 63              | 28.74               | 61                 | 308            |
| 180   | 13.04   | Fresh air grilles with VCDs (In various sizes like or to suite site)  | Sqm. | 3                 | 2.1                  | 2.1             | 0.6                  | 1.06             | 2               | 1.32                | 1.5                | 14             |
| 181   | 13.05   | Exhaust air grilles (In various sizes like or to suite site)  | Sqm. | 1.5               | 1.6                  | 1.6             | 1.4                  | 1.06             | 2               | 1.32                | 1.5                | 12             |
| 182   | 13.06   | Staircase Pressurization grilles with VCDs (In various sizes like or to suite site)   | Sqm. | 25                | 3.1                  | 3.1             | 2.9                  | 4.58             | 17              | 9.02                | 4                  | 69             |
| 183   | 13.07   | MS Grille for supply and return with High Temperature VCDs (In various sizes like or to suite site)   | Sqm. | 5                 |                      | 5               |                      |                  | 5               | 5                   | 5                  | 25             |
| 184   | 13.08   | Fresh air and exhaust Louvers (VAC & TVS) (In various sizes like or to suite site)  | Sqm. | 21                | 7.9                  | 7.9             | 7.9                  | 12.2             | 6               | 11.55               | 4.5                | 79             |
| 185   | 13.09   | Acoustic Louvers (In various sizes like or to suite site)   | Sqm. | 5                 | 5                    | 10              | 10                   | 3                | 5               | 8                   | 5                  | 51             |
| 186   | 14      | Dampers In Accordance with VAC Technical Specifications (Refer Part-2, Section VII, Sub section C, Unit 9) and drawings.  |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 187   | 14.01   | Volume Control dampers (In various sizes like or to suite site)   | Sqm. | 3                 | 1.2                  | 1.2             | 1.18                 | 2.55             | 2               | 5.44                | 0.75               | 17             |
| 188   | 14.02   | High Temperature Volume Control dampers (In various sizes like or to suite site)  | Sqm. | 11                | 8.5                  | 8.5             | 8.71                 | 5.21             | 14              | 5.68                | 12                 | 74             |
| 189   | 14.03   | Fusible link fire damper (In various sizes like or to suite site)   | Sqm. | 2                 | 1.1                  | 1.1             | 1.18                 | 1.83             | 2               | 2.77                | 1.6                | 14             |
| 190   | 14.04   | Motorized Smoke dampers (In various sizes like or to suite site) With actuator and limit switch   | Sqm. | 32                | 21.4                 | 21.4            | 16.89                | 32.84            | 46              | 47.28               | 30                 | 248            |
| 191   | 14.05   | Motorized Fire & Smoke dampers (In various sizes like or to suite site) With actuator and limit switch  | Sqm. | 3                 | 2                    | 5               |                      |                  | 5               |                     |                    | 15             |
| 192   | 14.06   | Non Return damper (In various sizes like or to suite site)  | Sqm. |                   |                      |                 | 2                    | 2                | 2               |                     |                    | 6              |
| 193   | 14.07   | Pressure Relief Damper (In various sizes like or to suite site)   | Sqm. | 10                | 3.1                  | 3.1             | 3.1                  | 4.95             | 6               | 4.51                | 5.9                | 40.66          |
| 194   | 14.08   | Access Door for Damper (In various sizes like or to suite site)   | Sqm. | 2                 | 2                    | 2               | 2                    | 2                | 2               | 2                   | 2                  | 16             |
| 195   | 15      | Cones (Round to Rectangular transition piece) In Accordance with VAC Technical Specifications (Refer Part-2, Section VII, Sub section C, Unit 8) and drawings.  | Sqm. | 55                | 17                   | 31              | 24                   | 32               | 105             | 66                  | 58                 | 389            |
| 196   | 16      | Vane Axial flow Fans/Mixed flow fans with necessary fixing arrangement and other accessories In Accordance with VAC Technical Specifications (Refer Part-2, Section VII, Sub section C, Unit 5) and drawings. |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 197   | 16.01   | Fresh Air Fan (FAF) with VFD compatible of 2.25cms, 220 Pa External Static Pressure approximately   | Nos. |                   |                      |                 |                      |                  |                 | 1                   |                    | 1              |
| 198   | 16.02   | Fresh Air Fan (FAF) with VFD compatible of 0.97cms, 110 Pa External Static Pressure approximately   | Nos. |                   |                      |                 |                      |                  |                 |                     | 1                  | 1              |
| 199   | 16.03   | Fresh Air Fan (FAF) with VFD compatible of 1.09cms, 400 Pa External Static Pressure approximately   | Nos. |                   |                      |                 |                      |                  |                 | 1                   |                    | 1              |
| 200   | 16.04   | Fresh Air Fan (FAF) with VFD compatible of 2.53cms, 720 Pa External Static Pressure approximately   | Nos. |                   |                      |                 |                      |                  |                 | 1                   |                    | 1              |
| 201   | 16.05   | Fresh Air Fan (FAF) with VFD compatible of 3.2cms, 470 Pa External Static Pressure approximately  | Nos. |                   | 1                    |                 |                      |                  |                 |                     |                    | 1              |
| 202   | 16.06   | Fresh Air Fan (FAF) with VFD compatible of 2.22cms, 170 Pa External Static Pressure approximately   | Nos. |                   | 1                    |                 |                      |                  |                 |                     |                    | 1              |
| 203   | 16.07   | Fresh Air Fan (FAF) with VFD compatible of 3.66cms, 710 Pa External Static Pressure approximately   | Nos. |                   |                      |                 | 1                    |                  |                 |                     |                    | 1              |
| 204   | 16.08   | Fresh Air Fan (FAF) with VFD compatible of 3.6cms, 570 Pa External Static Pressure approximately  | Nos. |                   |                      | 1               |                      |                  |                 |                     |                    | 1              |
| 205   | 16.09   | Fresh Air Fan (FAF) with VFD compatible of 3.3cms, 330 Pa External Static Pressure approximately  | Nos. |                   |                      | 1               |                      |                  |                 |                     |                    | 1              |
| 206   | 16.10   | Fresh Air Fan (FAF) with VFD compatible of 2.05 cms, 670 Pa External Static Pressure approximately  | Nos. |                   |                      |                 | 1                    |                  |                 |                     |                    | 1              |
| 207   | 16.11   | Fresh Air Fan (FAF) with VFD compatible of 1.8cms, 240 Pa External Static Pressure approximately  | Nos. |                   |                      |                 |                      |                  |                 |                     | 1                  | 1              |

CHENNAI METRO RAIL LIMITED

CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4

BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS

TENDER NO. C4-VAC&TVS-12

PRICE CENTRE C - VAC WORKS

| SLNo | Item.No | Description  | Unit | LIGHTHOUSE (ST01) | KUTCHERY ROAD (ST03) | ALWARPET (ST05) | BHARATHIDASAN (ST06) | BOAT CLUB (ST07) | NANDANAM (ST08) | PANAGAL PARK (ST10) | KODAMBAKKAM (ST11) | TOTAL QUANTITY |
|------|---------|--|------|-------------------|----------------------|-----------------|----------------------|------------------|-----------------|---------------------|--------------------|----------------|
| 208  | 16.12   | Fresh Air Fan (FAF) with VFD compatible of 2.7cms, 740 Pa External Static Pressure approximately   | Nos. |                   |                      |                 |                      | 1                |                 |                     |                    | 1              |
| 209  | 16.13   | Fresh Air Fan (FAF) with VFD compatible of 2.24cms, 700 Pa External Static Pressure approximately  | Nos. |                   |                      |                 |                      | 1                |                 |                     |                    | 1              |
| 210  | 16.14   | Fresh Air Fan (FAF) with VFD compatible of 5.27cms, 450 Pa External Static Pressure approximately  | Nos. | 1                 |                      |                 |                      |                  |                 |                     |                    | 1              |
| 211  | 16.15   | Fresh Air Fan (FAF) with VFD compatible of 3.77cms, 430 Pa External Static Pressure approximately  | Nos. |                   |                      |                 |                      |                  | 1               |                     |                    | 1              |
| 212  | 16.16   | Fresh Air Fan (FAF) with VFD compatible of 3.29cms, 680 Pa External Static Pressure approximately  | Nos. |                   |                      |                 |                      |                  | 1               |                     |                    | 1              |
| 213  | 16.17   | Fresh Air Fan (FAF) with VFD compatible of 1.94cms, 510 Pa External Static Pressure approximately  | Nos. |                   |                      |                 |                      |                  | 1               |                     |                    | 1              |
| 214  | 16.18   | Fresh Air Fan (FAF) with VFD compatible of 1.92cms, 140 Pa External Static Pressure approximately  | Nos. | 1                 |                      |                 |                      |                  |                 |                     |                    | 1              |
| 215  | 16.19   | Fresh Air Fan (FAF) with VFD compatible of 5.02cms, 580 Pa External Static Pressure approximately  | Nos. |                   |                      |                 |                      |                  |                 |                     | 1                  | 1              |
| 216  | 16.20   | Fresh Air Fan (FAF) with VFD compatible of 1.92cms, 380 Pa External Static Pressure approximately  | Nos. |                   |                      |                 |                      |                  |                 |                     | 1                  | 1              |
| 217  | 16.21   | Staircase Pressurization Fan (SPF) 10.4 cms, 370 Pa External Static Pressure approximately   | Nos. | 1                 |                      |                 |                      |                  |                 |                     |                    | 1              |
| 218  | 16.22   | Staircase Pressurization Fan (SPF) 10.6 cms, 220 Pa External Static Pressure approximately   | Nos. | 2                 |                      |                 |                      |                  |                 |                     |                    | 2              |
| 219  | 16.23   | Staircase Pressurization Fan (SPF) 10.85 cms, 270 Pa External Static Pressure approximately  | Nos. | 1                 |                      |                 |                      |                  |                 |                     |                    | 1              |
| 220  | 16.24   | Staircase Pressurization Fan (SPF) 8.2 cms, 560 Pa External Static Pressure approximately  | Nos. | 1                 |                      |                 |                      |                  |                 |                     |                    | 1              |
| 221  | 16.25   | Staircase Pressurization Fan (SPF) 16.55cms, 390 Pa External Static Pressure approximately   | Nos. |                   | 1                    |                 |                      |                  |                 |                     |                    | 1              |
| 222  | 16.26   | Staircase Pressurization Fan (SPF) 15.5cms, 870 Pa External Static Pressure approximately  | Nos. |                   |                      |                 |                      |                  |                 | 1                   |                    | 1              |
| 223  | 16.27   | Staircase Pressurization Fan (SPF) 8.5 cms, 230 Pa External Static Pressure approximately  | Nos. |                   |                      | 1               |                      |                  |                 | 1                   |                    | 2              |
| 224  | 16.28   | Staircase Pressurisation Fan (SPF) 8.35cms, 490 Pa External Static Pressure approximately  | Nos. |                   |                      | 1               |                      |                  |                 |                     |                    | 1              |
| 225  | 16.29   | Staircase Pressurization Fan (SPF) 15.5 cms, 870 Pa External Static Pressure approximately   | Nos. |                   |                      |                 |                      | 1                |                 |                     |                    | 1              |
| 226  | 16.30   | Staircase Pressurization Fan (SPF) 10.6 cms, 450 Pa External Static Pressure approximately   | Nos. |                   |                      |                 |                      | 1                |                 |                     |                    | 1              |
| 227  | 16.31   | Staircase Pressurization Fan (SPF) 17.65 cms, 780 Pa External Static Pressure approximately  | Nos. |                   |                      |                 |                      |                  |                 |                     | 1                  | 1              |
| 228  | 16.32   | Staircase Pressurization Fan (SPF) 13.6 cms, 530 Pa External Static Pressure approximately   | Nos. |                   |                      |                 |                      |                  |                 |                     | 1                  | 1              |
| 229  | 16.33   | Staircase Pressurisation Fan (SPF) 16.65cms, 540 Pa External Static Pressure approximately   | Nos. |                   |                      |                 | 1                    |                  |                 |                     |                    | 1              |
| 230  | 16.34   | Staircase Pressurization Fan (SPF) 18.15 cms, 950 Pa External Static Pressure approximately  | Nos. |                   |                      |                 |                      |                  | 1               |                     |                    | 1              |
| 231  | 16.35   | Staircase Pressurization Fan (SPF) 10.85 cms, 540 Pa External Static Pressure approximately  | Nos. |                   |                      |                 |                      |                  | 1               |                     |                    | 1              |
| 232  | 17      | Cabinet (Box type) centrifugal fan with necessary fixing arrangement and other accessories In Accordance with VAC Technical Specifications (Refer Part-2, Section VII, Sub section C, Unit 5) and drawings. Belt driven fans are not acceptable. |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 233  | 17.01   | Toilet Supply Fan (TSF), 2.15 cms 340 Pa External Static Pressure approximately  | Nos. |                   |                      |                 |                      |                  |                 |                     | 1                  | 1              |
| 234  | 17.02   | Toilet exhaust Fan (TEF), 2.5 cms, 400 Pa External Static Pressure approximately   | Nos. |                   |                      |                 |                      |                  |                 |                     | 1                  | 1              |
| 235  | 17.03   | Toilet Supply Fan (TSF), 2.34 cms 810 Pa External Static Pressure approximately  | Nos. |                   |                      |                 |                      |                  | 1               |                     |                    | 1              |
| 236  | 17.04   | Toilet exhaust Fan (TEF), 2.6 cms, 580 Pa External Static Pressure approximately   | Nos. |                   |                      |                 |                      |                  | 1               |                     |                    | 1              |
| 237  | 17.05   | Toilet Supply Fan (TSF), 3.04 cms 340 Pa External Static Pressure approximately  | Nos. |                   | 1                    |                 |                      |                  |                 |                     |                    | 1              |
| 238  | 17.06   | Toilet exhaust Fan (TEF), 3.37 cms, 660 Pa External Static Pressure approximately  | Nos. |                   | 1                    |                 |                      |                  |                 |                     |                    | 1              |
| 239  | 17.07   | Toilet Supply Fan (TSF), 3.64 cms 400 Pa External Static Pressure approximately  | Nos. |                   |                      |                 | 1                    |                  |                 |                     |                    | 1              |
| 240  | 17.08   | Toilet exhaust Fan (TEF), 4.05 cms, 750 Pa External Static Pressure approximately  | Nos. |                   |                      |                 | 1                    |                  |                 |                     |                    | 1              |
| 241  | 17.09   | Toilet Supply Fan (TSF), 2.71 cms 300 Pa External Static Pressure approximately  | Nos. |                   |                      | 1               |                      |                  |                 |                     |                    | 1              |
| 242  | 17.10   | Toilet exhaust Fan (TEF), 3.01 cms, 400 Pa External Static Pressure approximately  | Nos. |                   |                      | 1               |                      |                  |                 |                     |                    | 1              |



CHENNAI METRO RAIL LIMITED

CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4

BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS

TENDER NO. C4-VAC&TVS-12

PRICE CENTRE C - VAC WORKS

| SL.No | Item.No | Description   | Unit | LIGHTHOUSE (ST01) | KUTCHERY ROAD (ST03) | ALWARPET (ST05) | BHARATHIDASAN (ST06) | BOAT CLUB (ST07) | NANDANAM (ST08) | PANAGAL PARK (ST10) | KODAMBAKKAM (ST11) | TOTAL QUANTITY |
|-------|---------|---|------|-------------------|----------------------|-----------------|----------------------|------------------|-----------------|---------------------|--------------------|----------------|
| 243   | 17.11   | Toilet Supply Fan (TSF), 2.04 cms 680 Pa External Static Pressure approximately   | Nos. |                   |                      |                 |                      | 1                |                 |                     |                    | 1              |
| 244   | 17.12   | Toilet exhaust Fan (TEF), 2.27 cms, 710 Pa External Static Pressure approximately   | Nos. |                   |                      |                 |                      | 1                |                 |                     |                    | 1              |
| 245   | 17.13   | Toilet Supply Fan (TSF), 2.79 cms 1020 Pa External Static Pressure approximately  | Nos. |                   |                      |                 |                      |                  |                 | 1                   |                    | 1              |
| 246   | 17.14   | Toilet exhaust Fan (TEF), 3.094 cms, 570 Pa External Static Pressure approximately  | Nos. |                   |                      |                 |                      |                  |                 | 1                   |                    | 1              |
| 247   | 17.15   | Toilet Supply Fan (TSF), 3.00 cms 530 Pa External Static Pressure approximately   | Nos. | 1                 |                      |                 |                      |                  |                 |                     |                    | 1              |
| 248   | 17.16   | Toilet exhaust Fan (TEF), 3.34 cms, 810 Pa External Static Pressure approximately   | Nos. | 1                 |                      |                 |                      |                  |                 |                     |                    | 1              |
| 249   | 18      | Propeller Fans with necessary fixing arrangement and other accessories In Accordance with VAC Technical Specifications (Refer Part-2, Section VII, Sub section C, Unit 5) and drawings.   |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 250   | 18.01   | 355 mm diameter   | Nos. | 2                 | 4                    | 4               | 4                    | 1                | 2               |                     | 2                  | 19             |
| 251   | 18.02   | 400 mm diameter   | Nos. | 6                 |                      |                 |                      |                  |                 |                     |                    | 6              |
| 252   | 18.03   | 500 mm diameter   | Nos. | 6                 | 4                    | 4               | 4                    | 4                | 4               | 7                   | 4                  | 37             |
| 253   | 19      | Air Curtains with necessary fixing arrangement and other accessories In Accordance with VAC Technical Specifications (Refer Part-2, Section VII, Sub section C, Unit 6) and drawings.   |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 254   | 19.01   | 2000 mm length  | Nos. | 1                 | 1                    | 1               | 1                    |                  | 3               | 1                   | 1                  | 9              |
| 255   | 19.02   | 1500 mm length  | Nos. | 6                 | 2                    | 2               | 2                    | 8                | 4               | 4                   | 4                  | 32             |
| 256   | 19.03   | 1000 mm length  | Nos. | 5                 | 2                    | 2               | 2                    | 1                |                 | 1                   | 1                  | 14             |
| 257   | 20      | Tile fan (False Ceiling fan) with necessary fixing arrangement and other accessories In Accordance with VAC Technical Specifications (Refer Part-2, Section VII, Sub section C, Unit 5 ).   |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 258   | 20.01   | 603 mm X 603 mm   | Nos  | 8                 | 8                    | 8               | 8                    | 8                | 8               | 8                   | 8                  | 64             |
| 259   | 21      | High Volume Low Speed Fan (HVLS) with necessary fixing arrangement and other accessories In Accordance with VAC Technical Specifications (Refer Part-2, Section VII, Sub section C, Unit 7) and drawings.   |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 260   | 21.01   | 2.45m dia   | Nos. | 1                 | 1                    | 2               | 2                    | 2                | 2               | 1                   | 1                  | 12             |
| 261   | 22      | Sound Attenuator with necessary fixing arrangement and other accessories (Sizes are indicative , Bidders to supply as per selection of fans & other equipment's), In Accordance with VAC Technical Specifications (Refer Part-2, Section VII, Sub section C, Unit 10) and drawings. |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 262   | 22.01   | Attenuator in AHU - (2800mm W x 1500mm H x 2400mm L)  | Nos. | 1                 |                      |                 |                      |                  |                 |                     |                    | 1              |
| 263   | 22.02   | Attenuator in AHU - (2600mm W x 1550mm H x 1500mm L)  | Nos. |                   |                      |                 |                      |                  | 4               |                     | 1                  | 5              |
| 264   | 22.03   | Attenuator in AHU - (2600mm W x 1700mm H x 1500mm L)  | Nos. |                   |                      |                 |                      |                  |                 |                     | 1                  | 1              |
| 265   | 22.04   | Attenuator in AHU - (2500mm W x 2000mm H x 1500mm L)  | Nos. |                   |                      |                 |                      |                  | 1               |                     |                    | 1              |
| 266   | 22.05   | Attenuator in AHU - (2500mm W x 1000mm H x 1500mm L)  | Nos. |                   |                      |                 |                      |                  |                 |                     | 1                  | 1              |
| 267   | 22.06   | Attenuator in AHU - (2500mm W x 1800mm H x 600mm L)   | Nos. |                   |                      |                 |                      |                  | 1               |                     |                    | 1              |
| 268   | 22.07   | Attenuator in AHU - (2500mm W x 2000mm H x 1200mm L)  | Nos. |                   |                      |                 |                      | 1                |                 |                     |                    | 1              |
| 269   | 22.08   | Attenuator in AHU - (2500mm W x 1650mm H x 1500mm L)  | Nos. |                   | 1                    | 1               | 1                    |                  |                 |                     |                    | 3              |
| 270   | 22.09   | Attenuator in AHU - (2500mm W x 1500mm H x 600mm L)   | Nos. |                   |                      |                 |                      | 1                |                 |                     |                    | 1              |
| 271   | 22.10   | Attenuator in AHU - (1700mm W x 1150mm H x 900mm L)   | Nos. |                   |                      |                 |                      |                  | 1               |                     |                    | 1              |
| 272   | 22.11   | Attenuator in AHU - (1650mm W x 1500mm H x 1500mm L)  | Nos. |                   |                      |                 |                      |                  |                 |                     | 1                  | 1              |
| 273   | 22.12   | Attenuator in AHU - (2250mm W x 800mm H x 600mm L)  | Nos. | 1                 |                      |                 |                      |                  |                 |                     |                    | 1              |
| 274   | 22.13   | Attenuator in AHU - (2050mm W x 1650mm H x 900mm L)   | Nos. |                   | 1                    | 1               | 1                    |                  |                 |                     |                    | 3              |
| 275   | 22.14   | Attenuator in AHU - (2000mm W x 2250mm H x 1200mm L)  | Nos. |                   |                      |                 |                      | 1                |                 |                     |                    | 1              |
| 276   | 22.15   | Attenuator in AHU - (2000mm W x 1500mm H x 600mm L)   | Nos. |                   |                      |                 |                      | 1                |                 |                     |                    | 1              |

CHENNAI METRO RAIL LIMITED

CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4

BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS

TENDER NO. C4-VAC&TVS-12

PRICE CENTRE C - VAC WORKS

| SLNo | Item.No | Description  | Unit | LIGHTHOUSE (ST01) | KUTCHERY ROAD (ST03) | ALWARPET (ST05) | BHARATHIDASAN (ST06) | BOAT CLUB (ST07) | NANDANAM (ST08) | PANAGAL PARK (ST10) | KODAMBAKKAM (ST11) | TOTAL QUANTITY |
|------|---------|--|------|-------------------|----------------------|-----------------|----------------------|------------------|-----------------|---------------------|--------------------|----------------|
| 277  | 22.16   | Attenuator in AHU - (2000mm W x 1450mm H x 1500mm L) | Nos. | 1                 |                      |                 |                      |                  |                 |                     |                    | 1              |
| 278  | 22.17   | Attenuator in AHU - (1750mm W x 1400mm H x 1000mm L) | Nos. |                   |                      |                 |                      |                  |                 | 1                   |                    | 1              |
| 279  | 22.18   | Attenuator in AHU - (1500mm W x 1050mm H x 1200mm L) | Nos. |                   |                      |                 |                      |                  |                 |                     | 1                  | 1              |
| 280  | 22.19   | Attenuator in AHU - (1700mm W x 1150mm H x 600mm L)  | Nos. |                   |                      |                 |                      |                  |                 |                     | 1                  | 1              |
| 281  | 22.20   | Attenuator in AHU - (1600mm W x 1400mm H x 900mm L)  | Nos. |                   |                      |                 |                      |                  | 1               |                     |                    | 1              |
| 282  | 22.21   | Attenuator in AHU - (1600mm W x 1100mm H x 1500mm L) | Nos. |                   |                      |                 |                      |                  |                 |                     | 1                  | 1              |
| 283  | 22.22   | Attenuator in AHU - (1500mm W x 2500mm H x 1200mm L) | Nos. | 1                 |                      |                 |                      |                  |                 |                     |                    | 1              |
| 284  | 22.23   | Attenuator in AHU - (1500mm W x 1000mm H x 600mm L)  | Nos. |                   |                      |                 |                      |                  | 1               |                     |                    | 1              |
| 285  | 22.24   | Attenuator in AHU - (1500mm W x 900mm H x 600mm L)   | Nos. |                   |                      |                 |                      |                  | 1               |                     |                    | 1              |
| 286  | 22.25   | Attenuator in AHU - (1500mm W x 1050mm H x 1200mm L) | Nos. |                   |                      |                 |                      |                  |                 |                     | 1                  | 1              |
| 287  | 22.26   | Attenuator in AHU - (1500mm W x 950mm H x 1500mm L)  | Nos. |                   |                      |                 |                      |                  |                 | 1                   |                    | 1              |
| 288  | 22.27   | Attenuator in AHU - (1400mm W x 1200mm H x 1800mm L) | Nos. |                   |                      |                 |                      |                  |                 | 1                   |                    | 1              |
| 289  | 22.28   | Attenuator in AHU - (1400mm W x 1200mm H x 1200mm L) | Nos. |                   |                      |                 |                      | 1                |                 |                     |                    | 1              |
| 290  | 22.29   | Attenuator in AHU - (1400mm W x 1100mm H x 1000mm L) | Nos. |                   |                      |                 |                      |                  |                 | 1                   |                    | 1              |
| 291  | 22.30   | Attenuator in AHU - (1400mm W x 1000mm H x 1500mm L) | Nos. |                   |                      |                 |                      |                  |                 | 1                   |                    | 1              |
| 292  | 22.31   | Attenuator in AHU - (1100mm W x 600mm H x 900mm L)   | Nos. |                   |                      |                 |                      |                  | 1               |                     |                    | 1              |
| 293  | 22.32   | Attenuator in AHU - (900mm W x 500mm H x 600mm L)    | Nos. |                   |                      |                 |                      |                  | 1               |                     |                    | 1              |
| 294  | 22.33   | Attenuator in AHU - (1350mm W x 1000mm H x 600mm L)  | Nos. |                   |                      |                 |                      |                  |                 |                     | 1                  | 1              |
| 295  | 22.34   | Attenuator in AHU - (1250mm W x 950mm H x 1200mm L)  | Nos. |                   |                      |                 |                      | 1                |                 |                     |                    | 1              |
| 296  | 22.35   | Attenuator in AHU - (1200mm W x 1000mm H x 600mm L)  | Nos. |                   | 1                    | 1               | 1                    |                  |                 |                     |                    | 3              |
| 297  | 22.36   | Attenuator in AHU - (1200mm W x 900mm H x 1000mm L)  | Nos. |                   |                      |                 |                      |                  |                 |                     | 1                  | 1              |
| 298  | 22.37   | Attenuator in AHU - (1150mm W x 900mm H x 1800mm L)  | Nos. |                   | 1                    | 1               | 1                    |                  |                 |                     |                    | 3              |
| 299  | 22.38   | Attenuator in AHU - (1150mm W x 900mm H x 1500mm L)  | Nos. |                   |                      |                 |                      |                  |                 | 1                   |                    | 1              |
| 300  | 22.39   | Attenuator in AHU - (1000mm W x 850mm H x 1800mm L)  | Nos. |                   | 1                    | 1               | 1                    |                  |                 |                     |                    | 3              |
| 301  | 22.40   | Attenuator in SPF - (2500mm W x 1500mm H x 1500mm L) | Nos. |                   |                      |                 |                      |                  |                 |                     | 1                  | 1              |
| 302  | 22.41   | Attenuator in SPF - (2500mm W x 1500mm H x 1200mm L) | Nos. |                   |                      |                 |                      |                  |                 |                     | 1                  | 1              |
| 303  | 22.42   | Attenuator in SPF - (2500mm W x 1500mm H x 900mm L)  | Nos. | 1                 |                      |                 |                      |                  |                 |                     |                    | 1              |
| 304  | 22.43   | Attenuator in SPF - (2500mm W x 1500mm H x 600mm L)  | Nos. | 5                 |                      |                 |                      |                  |                 | 1                   | 2                  | 8              |
| 305  | 22.44   | Attenuator in SPF - (1600mm W x 1200mm H x 600mm L)  | Nos. |                   | 2                    | 2               | 2                    |                  |                 |                     |                    | 6              |
| 306  | 22.45   | Attenuator in SPF - (2200mm W x 1900mm H x 600mm L)  | Nos. |                   |                      |                 |                      |                  | 2               |                     |                    | 2              |
| 307  | 22.46   | Attenuator in SPF - (2000mm W x 1250mm H x 900mm L)  | Nos. |                   |                      |                 |                      |                  | 1               |                     |                    | 1              |
| 308  | 22.47   | Attenuator in SPF - (2000mm W x 1250mm H x 600mm L)  | Nos. |                   |                      |                 |                      |                  | 1               |                     |                    | 1              |
| 309  | 22.48   | Attenuator for AHU                                   | Sqm  | 10                | 10                   | 10              | 10                   | 10               | 10              | 10                  | 10                 | 80             |

CHENNAI METRO RAIL LIMITED

CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4

BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS

TENDER NO. C4-VAC&TVS-12

PRICE CENTRE C - VAC WORKS

| SL.No | Item.No | Description   | Unit | LIGHTHOUSE (ST01) | KUTCHERY ROAD (ST03) | ALWARPET (ST05) | BHARATHIDASAN (ST06) | BOAT CLUB (ST07) | NANDANAM (ST08) | PANAGAL PARK (ST10) | KODAMBAKKAM (ST11) | TOTAL QUANTITY |
|-------|---------|---|------|-------------------|----------------------|-----------------|----------------------|------------------|-----------------|---------------------|--------------------|----------------|
| 310   | 23      | 50mm thick Rock wool insulation, Density 105 Kg/m3 acoustic lining , finished with 0.80 mm perforated aluminium sheet with necessary fixing arrangement and other accessories In Accordance with VAC Technical Specifications (Refer Part-2, Section VII, Sub section C, Unit 10) and drawings. | Sqm. | 200               | 200                  | 200             | 200                  | 200              | 200             | 200                 | 200                | 1600           |
| 311   | 24      | Fire Stopper with necessary fixing arrangement and other accessories In Accordance with VAC Technical Specifications (Refer Part-2, Section VII, Sub section C, Unit 14) and drawings.  | Sqm  | 100               | 100                  | 100             | 100                  | 100              | 100             | 100                 | 100                | 800            |
| 312   | 25      | Design, fabrication, supply, and erection of a hot-dip galvanized steel structure, compliant with ASTM standards and having a minimum 80-micron coating thickness, along with other accessories for supporting Fans, Attenuators and Air curtain to provide a complete solution in all aspects. | Kgs  | 500               | 500                  | 500             | 500                  | 500              | 500             | 500                 | 500                | 4000           |
| 313   | 26      | Design,Providing and laying RCC foundation for supporting Fans ,AHU ,VRF/Chiller for complete in all aspect.  | Cum  | 50                | 50                   | 50              | 50                   | 50               | 50              | 50                  | 50                 | 400            |
| 315   | 27      | Measurement Instruments with necessary probes and casing In Accordance with VAC Technical Specifications (Refer Part-2, Section VII, Sub section C, Unit 15.10).  |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 316   | 27.01   | Thermal Imager  | Nos. | 1                 |                      |                 |                      |                  |                 |                     |                    | 1              |
| 317   | 27.02   | Multipurpose Air Capture Hood   | Nos. |                   |                      | 1               |                      |                  |                 |                     |                    | 1              |
| 318   | 27.03   | Multifunctional Measurement device for IAQ Measurement  | Nos. | 1                 |                      |                 |                      |                  |                 |                     |                    | 1              |
| 319   | 27.04   | Portable Digital 4-Way Manifold gauge for VRF System.   | Nos. |                   | 1                    |                 |                      |                  |                 |                     |                    | 1              |
| 320   | 27.05   | Refrigerant gas leak detection device   | Nos. |                   |                      | 1               |                      |                  |                 |                     |                    | 1              |

CHENNAI METRO RAIL LIMITED

CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4

BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS

TENDER NO. C4-VAC&TVS-12

PRICE CENTRE D- TVS WORKS

| SLNo | Item.No | Description  | Unit | LIGHTHOUSE (ST01) | KUTCHERY ROAD (ST03) | ALWARPET (ST05) | BHARATHIDASAN (ST06) | BOAT CLUB (ST07) | NANDANAM (ST08) | PANAGAL PARK (ST10) | KODAMBAKKAM (ST11) | TOTAL QUANTITY |
|------|---------|--|------|-------------------|----------------------|-----------------|----------------------|------------------|-----------------|---------------------|--------------------|----------------|
| 1    | 1       | PRICE CENTRE C - TVS WORKS   |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 2    | 2       | Manufacture, Supply, Delivery, Installation, Testing (Factory acceptance test, Partial acceptance test & System Acceptance Testing), Integrated Testing Commissioning & DLP of following equipment's / materials                             |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 3    | 3       | TUNNEL VENTILATION FAN UNITS<br>In Accordance with TVS Technical Specifications (Refer Part-2, Section VII, Sub section B, Content 2 - FAN AND MOTOR UNITS) and Drawings   |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 4    | 3.01    | Truly Reversible Multi Duty point axial flow fans, 415V / 3 PHASE / 50Hz, 2.3m-2.6m Impeller diameter Range, 100/100 cum/s, ESP 1230/1260 Pa (Duty points 1/2 Respectively) with their VFD compatible motor                                  | Nos. | 2                 |                      |                 |                      |                  |                 |                     |                    | 2              |
| 5    | 3.02    | Truly Reversible Multi Duty point axial flow fans, 415V / 3 PHASE / 50Hz, 2.3m-2.6m Impeller diameter Range, 100/100/60 cum/s, ESP 1060/1000/1400 Pa (Duty points 1/2/3 Respectively) with their VFD compatible motor                        | Nos. | 2                 |                      |                 |                      |                  |                 |                     |                    | 2              |
| 6    | 3.03    | Truly Reversible Multi Duty point axial flow fans, 415V / 3 PHASE / 50Hz, 1.4m-1.8m Impeller diameter Range, 40/20 cum/s, ESP 890/560 Pa (Duty points 1/2 Respectively) with their VFD compatible motor                                      | Nos. | 2                 |                      |                 |                      |                  |                 |                     |                    | 2              |
| 7    | 3.04    | Truly Reversible Multi Duty point axial flow fans, 415V / 3 PHASE / 50Hz, 1.8m-2.2m Impeller diameter Range, 60/60/60 cum/s, ESP 1510/660/1070 Pa (Duty points 1/2/3 Respectively) with their VFD compatible motor                           | Nos. |                   | 4                    | 4               | 4                    |                  |                 |                     |                    | 12             |
| 8    | 3.05    | Uni-directional Multi Duty point axial flow fans, 415V / 3 PHASE / 50Hz, 1.2m-1.6m Impeller diameter Range, 20/20/23.6/10 cum/s, ESP 640/470/1380/1130 Pa (Duty points 1/2/3/4 Respectively) with their VFD compatible motor                 | Nos. |                   | 2                    | 2               | 2                    |                  |                 |                     |                    | 6              |
| 9    | 3.06    | Uni-directional Multi Duty point axial flow fans, 415V / 3 PHASE / 50Hz, 1.2m-1.6m Impeller diameter Range, 20/20/16.4 cum/s, ESP 650/470/1050 Pa (Duty points 1/2/3 Respectively) with their VFD compatible motor                           | Nos. |                   | 2                    | 2               | 2                    |                  |                 |                     |                    | 6              |
| 10   | 3.07    | Truly Reversible Multi Duty point axial flow fans, 415V / 3 PHASE / 50Hz, 1.8m-2.2m Impeller diameter Range, 60/60/60/60/60 cum/s, ESP 1430/590/1670/950/830 Pa (Duty points 1/2/3/4/5 Respectively) with their VFD compatible motor         | Nos. |                   |                      |                 |                      | 2                |                 |                     |                    | 2              |
| 11   | 3.08    | Uni-directional Multi Duty point axial flow fans, 415V / 3 PHASE / 50Hz, 1.4m-1.8m Impeller diameter Range, 40/20/20/30/30 cum/s, ESP 1340/430/970/850/990 Pa (Duty points 1/2/3/4/5 Respectively) with their VFD compatible motor           | Nos. |                   |                      |                 |                      | 2                |                 |                     |                    | 2              |
| 12   | 3.09    | Truly Reversible Multi Duty point axial flow fans, VERTICALLY MOUNTED, 415V / 3 PHASE / 50Hz, 1.8m-2.2m Impeller diameter Range, 60/60/60/60 cum/s, 1420/620/1770/1230 Pa (Duty points 1/2/3/4 Respectively) with their VFD compatible motor | Nos. |                   |                      |                 |                      |                  | 2               |                     |                    | 2              |
| 13   | 3.1     | Uni-directional Multi Duty point axial flow fans, 415V / 3 PHASE / 50Hz, 1.4m-1.8m Impeller diameter Range, 40/20 cum/s, 1230/540 Pa (Duty points 1/2 Respectively) with their VFD compatible motor  | Nos. |                   |                      |                 |                      |                  | 2               |                     |                    | 2              |
| 14   | 3.11    | Truly Reversible Multi Duty point axial flow fans, 415V / 3 PHASE / 50Hz, 2.3m-2.6m Impeller diameter Range, 60/60/100/100 cum/s, ESP 1670/1120/1120/1060 Pa (Duty points 1/2/3/4 Respectively) with their VFD compatible motor              | Nos. |                   |                      |                 |                      |                  |                 | 2                   |                    | 2              |
| 15   | 3.12    | Truly Reversible Multi Duty point axial flow fans, 415V / 3 PHASE / 50Hz, 2.3m-2.6m Impeller diameter Range, 100/100/60/100 cum/s, ESP 1090/990/1450/1310 Pa (Duty points 1/2/3/4 Respectively) with their VFD compatible motor              | Nos. |                   |                      |                 |                      |                  |                 | 2                   |                    | 2              |
| 16   | 3.13    | Uni-directional Multi Duty point axial flow fans, 415V / 3 PHASE / 50Hz, 1.4m-1.8m Impeller diameter Range, 40/20 cum/s, ESP 1110/340 Pa (Duty points 1/2 Respectively) with their VFD compatible motor                                      | Nos. |                   |                      |                 |                      |                  |                 | 2                   |                    | 2              |
| 17   | 3.14    | Truly Reversible Multi Duty point axial flow fans, 415V / 3 PHASE / 50Hz, 1.8m-2.2m Impeller diameter Range, 60/60/60/60/60 cum/s, ESP 1510/590/1660/900/810 Pa (Duty points 1/2/3/4/5 Respectively) with their VFD compatible motor         | Nos. |                   |                      |                 |                      |                  |                 |                     | 2                  | 2              |

CHENNAI METRO RAIL LIMITED

CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4

BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS

TENDER NO. C4-VAC&TVS-12

PRICE CENTRE D- TVS WORKS

| SLNo | Item.No | Description  | Unit | LIGHTHOUSE (ST01) | KUTCHERY ROAD (ST03) | ALWARPET (ST05) | BHARATHIDASAN (ST06) | BOAT CLUB (ST07) | NANDANAM (ST08) | PANAGAL PARK (ST10) | KODAMBAKKAM (ST11) | TOTAL QUANTITY |
|------|---------|--|------|-------------------|----------------------|-----------------|----------------------|------------------|-----------------|---------------------|--------------------|----------------|
| 18   | 3.15    | Uni-directional Multi Duty point axial flow fans, 415V / 3 PHASE / 50Hz, 1.4m-1.8m Impeller diameter Range, 40/20/20/30/30 cum/s, ESP 1140/380/1200/1160/950 Pa (Duty points 1/2/3/4/5 Respectively) with their VFD compatible motor | Nos. |                   |                      |                 |                      |                  |                 |                     | 2                  | 2              |
| 19   | 4       | STATION SMOKE EXTRACTION FAN UNITS<br>In Accordance with TVS Technical Specifications (Refer Part-2, Section VII, Sub section B, Content 2 - FAN AND MOTOR UNITS) and VAC drawings   |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 20   | 4.01    | Uni-directional Multi Duty point axial flow fans, 415V / 3 PHASE / 50Hz, 0.8m-1.2m Impeller diameter Range, 3.5/8.4 cum/s, ESP 450/1020 Pa (Duty points 1/2 Respectively) with their VFD compatible motor                            | Nos. | 2                 |                      |                 |                      |                  |                 |                     |                    | 2              |
| 21   | 4.02    | Uni-directional Multi Duty point axial flow fans, 415V / 3 PHASE / 50Hz, 1.4m-1.8m Impeller diameter Range, 40/30/30 cum/s, ESP 1200/1160/1170 Pa (Duty points 1/2/3 Respectively) with their VFD compatible motor                   | Nos. | 2                 |                      |                 |                      |                  |                 |                     |                    | 2              |
| 22   | 4.03    | Uni-directional Multi Duty point axial flow fans, 415V / 3 PHASE / 50Hz, 1.4m-1.8m Impeller diameter Range, 20/30/30 cum/s, ESP 1200/1260/950 Pa (Duty points 1/2/3/4/5 Respectively) with their VFD compatible motor                | Nos. |                   |                      |                 |                      |                  | 2               |                     |                    | 2              |
| 23   | 4.04    | Uni-directional Multi Duty point axial flow fans, 415V / 3 PHASE / 50Hz, 0.7m-1.1m Impeller diameter Range, 7.36/9.75 cum/s, ESP 1270/1390 Pa (Duty points 1/2 Respectively) with their VFD compatible motor                         | Nos. |                   |                      |                 |                      |                  |                 | 4                   |                    | 4              |
| 24   | 4.05    | Uni-directional Multi Duty point axial flow fans, 415V / 3 PHASE / 50Hz, 1.05m-1.45m Impeller diameter Range, 15 cum/s, ESP 550 Pa (Duty points 1 Respectively) with their VFD compatible motor                                      | Nos. |                   |                      |                 |                      |                  |                 | 2                   |                    | 2              |
| 25   | 4.06    | Uni-directional Multi Duty point axial flow fans, 415V / 3 PHASE / 50Hz, 1.2m-1.6m Impeller diameter Range, 30 cum/s, ESP 990 Pa (Duty points 1 Respectively) with their VFD compatible motor  | Nos. |                   |                      |                 |                      |                  |                 | 2                   |                    | 2              |
| 26   | 5       | TUNNEL VENTILATION MOTORISED DAMPER UNIT<br>In Accordance with TVS Technical Specifications (Refer Part-2, Section VII, Sub section B, Content 3 - DAMPERS AND DAMPER ACTUATORS) and Drawings  |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 27   | 5.01    | Damper size: 3600mm X 5600mm   | Nos. | 2                 |                      |                 |                      |                  |                 |                     |                    | 2              |
| 28   | 5.02    | Damper size: 4000mm X 1500mm   | Nos. |                   |                      |                 |                      | 1                | 1               | 3                   | 2                  | 7              |
| 29   | 5.03    | Damper size: 3900mm X 1400mm   | Nos. | 2                 |                      |                 |                      |                  |                 |                     |                    | 2              |
| 30   | 5.04    | Damper size: 5000mm X 2000mm   | Nos. | 2                 |                      |                 |                      |                  |                 | 2                   |                    | 4              |
| 31   | 5.05    | Damper size: 3365mm X 1350mm   | Nos. | 2                 |                      |                 |                      |                  |                 |                     |                    | 2              |
| 32   | 5.06    | Damper size: 2500mm X 1600mm   | Nos. | 1                 |                      |                 |                      |                  |                 |                     |                    | 1              |
| 33   | 5.07    | Damper size: 2500mm X 2500mm   | Nos. | 2                 |                      |                 |                      | 2                | 2               | 2                   |                    | 8              |
| 34   | 5.08    | Damper size: 5500mm X 3650mm   | Nos. |                   | 2                    | 2               | 2                    |                  |                 |                     |                    | 6              |
| 35   | 5.09    | Damper size: 3500mm X 3500mm   | Nos. | 6                 | 4                    | 4               | 4                    | 2                | 2               | 4                   | 2                  | 28             |
| 36   | 5.10    | Damper size: 3300mm X 3050mm   | Nos. |                   | 2                    | 2               | 2                    |                  |                 |                     |                    | 6              |
| 37   | 5.11    | Damper size: 2800mm X 2150mm   | Nos. |                   | 2                    | 2               | 2                    |                  |                 |                     |                    | 6              |
| 38   | 5.12    | Damper size: 7500mm X 2670mm   | Nos. |                   | 2                    | 2               | 2                    |                  |                 |                     |                    | 6              |
| 39   | 5.13    | Damper size: 7700mm X 2600mm   | Nos. |                   | 2                    | 2               | 2                    |                  |                 |                     |                    | 6              |
| 40   | 5.14    | Damper size: 2200mm X 2100mm   | Nos. |                   | 4                    | 4               | 4                    |                  |                 |                     |                    | 12             |
| 41   | 5.15    | Damper size: 3000mm X 2000mm   | Nos. |                   | 2                    | 2               | 2                    | 6                | 7               | 5                   | 6                  | 30             |
| 42   | 5.16    | Damper size: 2350mm X 1700mm   | Nos. |                   | 4                    | 4               | 4                    |                  |                 |                     |                    | 12             |
| 43   | 5.17    | Damper size: 5750mm X 3600mm   | Nos. |                   |                      |                 |                      | 4                | 3               | 2                   | 5                  | 14             |
| 44   | 5.18    | Damper size: 3900mm X 2600mm   | Nos. |                   |                      |                 |                      | 2                |                 |                     | 3                  | 5              |
| 45   | 5.19    | Damper size: 2750mm X 2100mm   | Nos. |                   |                      |                 |                      | 1                |                 |                     |                    | 1              |



CHENNAI METRO RAIL LIMITED

CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4

BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS

TENDER NO. C4-VAC&TVS-12

PRICE CENTRE D- TVS WORKS

| SLNo | Item.No | Description   | Unit | LIGHTHOUSE (ST01) | KUTCHERY ROAD (ST03) | ALWARPET (ST05) | BHARATHIDASAN (ST06) | BOAT CLUB (ST07) | NANDANAM (ST08) | PANAGAL PARK (ST10) | KODAMBAKKAM (ST11) | TOTAL QUANTITY |
|------|---------|---|------|-------------------|----------------------|-----------------|----------------------|------------------|-----------------|---------------------|--------------------|----------------|
| 46   | 5.20    | Damper size: 4450mm X 4300mm  | Nos. |                   |                      |                 |                      | 1                |                 |                     |                    | 1              |
| 47   | 5.21    | Damper size: 3550mm X 2834mm  | Nos. |                   |                      |                 |                      | 1                |                 |                     |                    | 1              |
| 48   | 5.22    | Damper size: 4900mm X 4100mm  | Nos. |                   |                      |                 |                      | 1                |                 |                     |                    | 1              |
| 49   | 5.23    | Damper size: 2500mm X 2000mm  | Nos. |                   |                      |                 |                      | 1                |                 |                     |                    | 1              |
| 50   | 5.24    | Damper size: 7850mm X 2600mm  | Nos. |                   |                      |                 |                      |                  | 1               |                     |                    | 1              |
| 51   | 5.25    | Damper size: 3850mm X 2600mm  | Nos. |                   |                      |                 |                      |                  |                 | 2                   |                    | 2              |
| 52   | 5.26    | Damper size: 3500mm X 1850mm  | Nos. |                   |                      |                 |                      |                  |                 | 1                   |                    | 1              |
| 53   | 5.27    | Damper size: 4800mm X 4050mm  | Nos. |                   |                      |                 |                      |                  |                 | 1                   |                    | 1              |
| 54   | 5.28    | Damper size: 4500mm X 4500mm  | Nos. |                   |                      |                 |                      |                  |                 | 2                   |                    | 2              |
| 55   | 5.29    | Damper size: 5400mm X 3900mm  | Nos. |                   |                      |                 |                      |                  |                 |                     | 1                  | 1              |
| 56   | 5.30    | Damper size: 4000mm X 3650mm  | Nos. |                   |                      |                 |                      |                  |                 |                     | 1                  | 1              |
| 57   | 5.31    | Damper size: 3250mm X 1950mm  | Nos. |                   |                      |                 |                      |                  |                 |                     | 2                  | 2              |
| 58   | 5.32    | Damper size: 4750mm X 4200mm  | Nos. | 2                 |                      |                 |                      |                  |                 |                     |                    | 2              |
| 59   | 5.33    | Damper size: 5000mm X 4000mm  | Nos. |                   |                      |                 |                      |                  |                 | 2                   |                    | 2              |
| 60   | 5.34    | Damper size: 8500mm X 2600mm  | Nos. |                   |                      |                 |                      |                  | 1               |                     |                    | 1              |
| 61   | 5.35    | Damper size: 4000mm X 2500mm  | Nos. |                   |                      |                 |                      |                  | 2               |                     |                    | 2              |
| 62   | 5.36    | Damper size: 3600mm X 2500mm  | Nos. |                   |                      |                 |                      |                  | 1               |                     |                    | 1              |
| 63   | 6       | TUNNEL VENTILATION SOUND ATTENUATORS<br>In Accordance with TVS Technical Specifications (Refer Part-2, Section VII, Sub section B , Content 5 - SOUND ATTENUATORS) and Drawings |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 64   | 6.01    | Sound attenuators for TVF: 3.5m(W) x 3.5m(H) x 2.15m(L)   | Nos. | 8                 | 8                    | 8               | 8                    | 4                | 3               | 8                   | 4                  | 51             |
| 65   | 6.02    | Sound attenuators for TVF: 3.5m(W) x 3.5m(H) x 1.5m(L)  | Nos. |                   | 2                    |                 |                      |                  |                 |                     |                    | 2              |
| 66   | 6.03    | Sound attenuators for TVF: 3.5m(W) x 3.5m(H) x 1.0m(L)  | Nos. |                   |                      |                 |                      |                  |                 | 2                   |                    | 2              |
| 67   | 6.04    | Sound attenuators for OTEF, 2.5m(W) x 2.5m(H) x 1.705m(L)   | Nos. | 4                 |                      |                 |                      | 4                | 8               | 4                   |                    | 20             |
| 68   | 6.05    | Sound attenuators for OTEF, 2.35m(W) x 1.7m(H) x 1.705m(L)  | Nos. |                   | 8                    | 8               | 8                    |                  |                 |                     |                    | 24             |
| 69   | 6.06    | Sound attenuators for OTEF, 3.25m(W) x 1.95m(H) x 1.705m(L)   | Nos. |                   |                      |                 |                      |                  |                 |                     | 2                  | 2              |
| 70   | 6.07    | Sound attenuators for OTEF, 4.5m(W) x 3.35m(H) x 1.705m(L)  | Nos. |                   |                      |                 |                      |                  |                 |                     | 1                  | 1              |
| 71   | 6.08    | Sound attenuators for SEF, 3.0m(W) x 3.0m(H) x 1.705m(L)  | Nos. | 1                 |                      |                 |                      |                  |                 |                     |                    | 1              |
| 72   | 6.09    | Sound attenuators for SEF, 3.5m(W) x 2.8m(H) x 1.705m(L)  | Nos. | 1                 |                      |                 |                      |                  |                 |                     |                    | 1              |
| 73   | 6.1     | Sound attenuators for SEF, 1.5m(W) x 1.15m(H) x 1.705m(L)   | Nos. | 2                 |                      |                 |                      |                  |                 |                     |                    | 2              |
| 74   | 6.11    | Sound attenuators for SEF, 2.0m(W) x 2.0m(H) x 1.5m(L)  | Nos. |                   |                      |                 |                      |                  |                 | 8                   |                    | 8              |
| 75   | 6.12    | Sound attenuators for SEF, 1.2m(W) x 1.0m(H) x 2.15m(L)   | Nos. |                   |                      |                 |                      |                  |                 | 1                   |                    | 1              |
| 76   | 6.13    | Sound attenuators for SEF, 1.0m(W) x 1.2m(H) x 1.8m(L)  | Nos. |                   |                      |                 |                      |                  |                 | 1                   |                    | 1              |
| 77   | 7       | SLIDING PLATE DAMPERS for Overtrack Exhaust. In Accordance with TVS Technical Specifications (Refer Part-2, Section VII, Sub section B, Content 6 - OTE SLIDING PLATE DAMPERS)  | sqm  | 72                | 72                   | 72              | 72                   | 72               | 72              | 72                  | 72                 | 576            |

CHENNAI METRO RAIL LIMITED

CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4

BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS

TENDER NO. C4-VAC&TVS-12

PRICE CENTRE D- TVS WORKS

| SLNo | Item.No | Description   | Unit | LIGHTHOUSE (ST01) | KUTCHERY ROAD (ST03) | ALWARPET (ST05) | BHARATHIDASAN (ST06) | BOAT CLUB (ST07) | NANDANAM (ST08) | PANAGAL PARK (ST10) | KODAMBAKKAM (ST11) | TOTAL QUANTITY |
|------|---------|---|------|-------------------|----------------------|-----------------|----------------------|------------------|-----------------|---------------------|--------------------|----------------|
| 78   | 8       | TUNNEL VENTILATION NOZZLES.- In Accordance with TVS Technical Specifications & Drawings, (Refer Part-2, Section VII, Sub section B, Content 8 - NOZZLES) Nozzles Design and supports to suite the Drawings.   | sqm  | 250               | 400                  | 400             | 400                  | 350              | 350             | 350                 | 350                | 2850           |
| 79   | 9       | FLEXIBLE CONNECTOR - In Accordance with TVS Technical Specifications (Refer Part-2, Section VII, Sub section B, Content 4 - FLEXIBLE CONNECTORS FOR TVF AND OTEF FANS) and Drawings   | Sqm  | 25                | 15                   | 15              | 15                   | 10               | 15              | 30                  | 10                 | 135            |
| 80   | 10      | TUNNEL VENTILATION FAN TRANSITION PIECES - In Accordance with TVS Technical Specifications (Refer Part-2, Section VII, Sub Section B, Chapter 7 - TRASITION PIECES (CONES)) and TVS drawings  |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 81   | 10.01   | Transition Piece: 2300-2600mm round internal diameter to 3500mm x 3500mm (internal) rectangle; Length: 2m   | Nos. | 8                 |                      |                 |                      |                  |                 | 8                   |                    | 16             |
| 82   | 10.02   | Transition Piece: 1800-2200mm round internal diameter to 3500mm x 3500mm (internal) rectangle; Length: 2m   | Nos. |                   | 8                    | 8               | 8                    | 4                | 2               |                     | 4                  | 34             |
| 83   | 10.03   | Transition Piece: 1200-1600mm round internal diameter to 2350mm x 1700mm (internal) rectangle; Length: 1.2m   | Nos. |                   | 8                    | 8               | 8                    |                  |                 |                     |                    | 24             |
| 84   | 10.04   | Transition Piece: 1400-1800mm round internal diameter to 2500mm x 2500mm (internal) rectangle; Length: 1.2m   | Nos. | 4                 |                      |                 |                      | 4                | 8               | 4                   |                    | 20             |
| 85   | 10.05   | Transition Piece: 1400-1800mm round internal diameter to 3250mm x 1950mm (internal) rectangle; Length: 2m   | Nos. |                   |                      |                 |                      |                  |                 |                     | 2                  | 2              |
| 86   | 10.06   | Transition Piece: 1050-1450mm round internal diameter to 2000mm x 2000mm (internal) rectangle; Length: 0.91m  | Nos. |                   |                      |                 |                      |                  |                 | 4                   |                    | 4              |
| 87   | 10.07   | Transition Piece: 700-1100mm round internal diameter to 800mm x 800mm (internal) rectangle; Length: 0.4m  | Nos. |                   |                      |                 |                      |                  |                 | 8                   |                    | 8              |
| 88   | 10.08   | Transition Piece: 1200-1600mm round internal diameter to 2000mm x 2000mm (internal) rectangle; Length: 0.725m   | Nos. |                   |                      |                 |                      |                  |                 | 4                   |                    | 4              |
| 89   | 10.09   | Transition Piece: 800-1200mm round internal diameter to 1200mm x 800mm (internal) rectangle; Length: 0.4m   | Nos. | 4                 |                      |                 |                      |                  |                 |                     |                    | 4              |
| 90   | 11      | Fire rated leakproof Access door (Size - 600 mm x 600 mm) In Accordance with TVS Technical Specifications (Refer Part-2, Section VII, Sub section B, Content 6 - OTE SLIDING PLATE DAMPERS)   | Nos. | 2                 | 2                    | 2               | 2                    | 2                | 2               | 2                   | 2                  | 16             |
| 91   | 12      | Design, fabrication, supply, and erection of a hot-dip galvanized steel structure, compliant with ASTM standards and having a minimum 80-micron coating thickness, along with other accessories for supporting fans, attenuators, and cones (Transition Piece) to provide a complete solution in all aspects. | Kgs  | 8750              | 3500                 | 3500            | 3500                 | 3000             | 500             | 7000                | 2000               | 31750          |

| CHENNAI METRO RAIL LIMITED<br>CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4<br>BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS<br>TENDER NO. C4-VAC&TVS-12 |        |  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
|--|--------|--|------|----------------------|-------------------------|--------------------|-------------------------|---------------------|--------------------|------------------------|--------------------|----------------|
| PRICE CENTRE E - VAC & TVS ELECTRICAL WORKS  |        |  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| Ref. No  | Sl.No. | Description  | Unit | LIGHTHOUSE<br>(ST01) | KUTCHERY ROAD<br>(ST03) | ALWARPET<br>(ST05) | BHARATHIDASAN<br>(ST06) | BOAT CLUB<br>(ST07) | NANDANAM<br>(ST08) | PANAGAL PARK<br>(ST10) | KODAMBAKKAM (ST11) | TOTAL QUANTITY |
| 1  | 1      | PRICE CENTRE E - VAC & TVS ELECTRICAL WORKS  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 2  | 2      | General<br>Manufacture, Supply, Delivery, Installation, Testing (Factory acceptance test,Partial acceptance test & System Acceptance Testing), Integrated Testing Commissioning & DLP of following equipment's / materials   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 3  | 3      | LV Switchboards / MCC's / Distribution Boards  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 4  | 3.1    | VAC PANEL - NON ESSENTIAL -Smart Panel with Mimic Diagram,TTA form 4b, type 6 panel, IP54 conforming to specification as specified in Part-2 section VII sub section D Unit-02 and drawings. (Fully Front Accessible panel)  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 5  | 3.1.1  | Incomer:<br>1) Motorized MCCB of 400A,4P,415V and 25kA. Having microprocessor based trip unit with adjustable over load, adjustable short circuit and adjustable earth fault with LCD/LED display and provision for remote tripping, Start/stop push button.<br>2) Surge protection device (SPD) Type-II with inbuilt fuse suitable to withstand required short circuit current<br>3) LED indication lamp for ON, OFF & TRIP, Phase Indication for R,Yand B and Emergency stop push button.<br>4) Auto / Manual Selector Switch with key operated and 1 No TNC switch.<br>5) Digital MFM and 3 Nos. CTs, 400/5A, 10VA, CL-0.5, for metering. | Set  | 1                    |                         |                    |                         |                     |                    |                        |                    | 1              |
| 6  | 3.1.2  | Busbar : rated 400 Amps, suitable to withstand symmetrical fault level of 25kA for 1 sec. at 415V as specified in Part-2 section VII sub section D Unit-02 Clause 2.6  | Lot  | 1                    |                         |                    |                         |                     |                    |                        |                    | 1              |
| 7  | 3.1.3  | ISMS Connectivity:<br>All the breakers should be provided with control and monitoring facilities,Smart Panel facility with Local touch screen, control panel in front side of the panel. Required PLCs ,relays, contactors ,IO cards, Ethernet switches,SMPS,Control Transformers, cabling works., etc. for functional requirement as specified in Part-2 Section VII Subsection D Unit No.2 Clause 2.28 and drawings. Smart Panel shall be interfacing with ISMS system through Modbus TCP/IP for Control & monitoring.   | Lot  | 1                    |                         |                    |                         |                     |                    |                        |                    | 1              |
| 8  | 3.1.4  | OUTGOING FEEDERS   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 9  | 3.1.5  | 1 nos of 63A,TPN MCCB and 3 no's of 32A TP MCCB 415V,25kA with suitable space provision for 37kW VFD unit with bypass Starter (Soft Starter) for AHU, .Having microprocessor trip unit with adjustable protection against over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP , lamp test and Emergency stop push buttons.. Auto manual selector switch,VFD/SS Selector switch with respective Start/stop pushbuttons.  | Set  | 2                    |                         |                    |                         |                     |                    |                        |                    | 2              |
| 10   | 3.1.6  | 1 nos of 63A,TPN MCCB and 2 no's of 32A TP MCCB 415V,25kA with suitable space provision for 30kW VFD unit with bypass Starter (Soft Starter) for AHU, .Having microprocessor trip unit with adjustable protection against over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP , lamp test and Emergency stop push buttons.. Auto manual selector switch,VFD/SS Selector switch with respective Start/stop pushbuttons.  | Set  | 1                    |                         |                    |                         |                     |                    |                        |                    | 1              |
| 11   | 3.1.7  | 32A,TP MCCB, 415V, 25kA suitable space provision for 7.5kW VFD unit (FAF) . Having microprocessor trip unit with over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP, Start/stop, Emergency stop push buttons.  | Set  | 1                    |                         |                    |                         |                     |                    |                        |                    | 1              |
| 12   | 3.1.8  | 32A,TP MCCB, 415V, 25kA suitable space provision for 0.55kW VFD unit (FAF) . Having microprocessor trip unit with over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP, Start/stop, Emergency stop push buttons.   | Set  | 1                    |                         |                    |                         |                     |                    |                        |                    | 1              |
| 13   | 3.1.9  | 16A,TP MPCB, 415V, 25kA with 3kW DOL unit (TSF) . Having microprocessor trip unit with over load, short circuit. And LED indication lamps for ON,OFF,TRIP, Start/stop, Emergency stop push buttons.  | Set  | 1                    |                         |                    |                         |                     |                    |                        |                    | 1              |

| CHENNAI METRO RAIL LIMITED<br>CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4<br>BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS<br>TENDER NO. C4-VAC&TVS-12 |        |  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
|--|--------|--|------|----------------------|-------------------------|--------------------|-------------------------|---------------------|--------------------|------------------------|--------------------|----------------|
| PRICE CENTRE E - VAC & TVS ELECTRICAL WORKS  |        |  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| Ref. No  | Sl.No. | Description  | Unit | LIGHTHOUSE<br>(ST01) | KUTCHERY ROAD<br>(ST03) | ALWARPET<br>(ST05) | BHARATHIDASAN<br>(ST06) | BOAT CLUB<br>(ST07) | NANDANAM<br>(ST08) | PANAGAL PARK<br>(ST10) | KODAMBAKKAM (ST11) | TOTAL QUANTITY |
| 14   | 3.1.10 | 16A,TP MPCB, 415V, 25kA with 4kW DOL unit (TEF) . Having microprocessor trip unit with over load, short circuit. And LED indication lamps for ON,OFF,TRIP, Start/stop, Emergency stop push buttons.  | Set  | 1                    |                         |                    |                         |                     |                    |                        |                    | 1              |
| 15   | 3.1.11 | 32A,4P MCCB, 415V, 25kA Having microprocessor trip unit with over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP, Start/stop, Emergency stop push buttons.  | Set  | 1                    |                         |                    |                         |                     |                    |                        |                    | 1              |
| 16   | 3.1.12 | SPARE:-  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 17   | 3.1.13 | 63A,TPN MCCB, 415V, 25kA. Having microprocessor trip unit with adjustable protection against over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP.   | Set  | 1                    |                         |                    |                         |                     |                    |                        |                    | 1              |
| 18   | 3.1.14 | 32A,4P MCCB, 415V, 25kA. Having microprocessor trip unit with adjustable protection against over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP.  | Set  | 1                    |                         |                    |                         |                     |                    |                        |                    | 1              |
| 19   | 3.1.15 | Panel Enclosure & other Accessories (Exhaust fan, louvers, etc.) as specified in Part-2 section VII sub section D Unit-02 Clause 2.4   | Lot  | 1                    |                         |                    |                         |                     |                    |                        |                    | 1              |
| 20   | 3.2    | VAC PANEL -01- NON ESSENTIAL (Smart Panel) with Mimic Diagram,TTA form 4b, type 6 panel, IP54 conforming to specification as specified in Part-2 section VII sub section D Unit-02 and drawings. (Fully Front Accessible panel)  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 21   | 3.2.1  | Incomer:<br>1) Motorized ACB of 1000A,4P,415V and 50kA. Having microprocessor based trip unit with adjustable over load, adjustable short circuit and adjustable earth fault with LCD/LED display and provision for remote tripping, Start/stop push button.<br>2) Surge protection device (SPD) Type-II with inbuilt fuse suitable to withstand required short circuit current<br>3) LED indication lamp for ON, OFF & TRIP, Phase Indication for R,Yand B and Emergency stop push button.<br>4) Auto / Manual Selector Switch with key operated and 1 No TNC switch.<br>5) Digital MFM and 3 Nos. CTs,1000/5A, 10VA, CL-0.5, for metering. | Set  |                      |                         |                    | 1                       |                     |                    |                        |                    | 1              |
| 22   | 3.2.2  | Busbar : rated 1000 Amps, suitable to withstand symmetrical fault level of 50kA for 1 sec. at 415V as specified in Part-2 section VII sub section D Unit-02 Clause 2.6   | Lot  |                      |                         |                    | 1                       |                     |                    |                        |                    | 1              |
| 23   | 3.2.3  | ISMS Connectivity:<br>All the breakers should be provided with control and monitoring facilities,Smart Panel facility with Local touch screen, control panel in front side of the panel. Required PLCs ,relays, contactors ,IO cards, Ethernet switches,SMPS,Control Transformers, cabling works., etc. for functional requirement as specified in Part-2 Section VII Subsection D Unit No.2 Clause 2.28 and drawings. Smart Panel shall be interfacing with ISMS system through Modbus TCP/IP for Control & monitoring.   | Lot  |                      |                         |                    | 1                       |                     |                    |                        |                    | 1              |
| 24   | 3.2.4  | OUTGOING FEEDERS   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 25   | 3.2.5  | 800A,4P ACB,415V,50kA. Having microprocessor trip unit with adjustable protection against over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP.and lamp test push button   | Set  |                      |                         |                    | 1                       |                     |                    |                        |                    | 1              |
| 26   | 3.2.6  | 1 nos of 63A,TPN MCCB and 3 no's of 32A TP MCCB 415V, 25kA with suitable space provision for 18.5kW VFD unit with bypass Starter (Soft Starter) for AHU, Having microprocessor trip unit with adjustable protection against over load, short circuit, earth fault. And LED indication lamps for ON,OFF,TRIP,lamp test and Emergency stop push buttons.. Auto manual selector switch,VFD/SS Selector switch with respective Start/stop pushbuttons.   | Set  |                      |                         |                    | 1                       |                     |                    |                        |                    | 1              |
| 27   | 3.2.7  | 1 nos of 63A,TPN MCCB and 3 no's of 32A TP MCCB 415V, 25kA with suitable space provision for 30kW VFD unit with bypass Starter (Soft Starter) for AHU, Having microprocessor trip unit with adjustable protection against over load, short circuit, earth fault. And LED indication lamps for ON,OFF,TRIP , lamp test and Emergency stop push buttons.. Auto manual selector switch,VFD/SS Selector switch with respective Start/stop pushbuttons.   | Set  |                      |                         |                    | 1                       |                     |                    |                        |                    | 1              |

| CHENNAI METRO RAIL LIMITED<br>CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4<br>BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS<br>TENDER NO. C4-VAC&TVS-12 |        |   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
|--|--------|---|------|----------------------|-------------------------|--------------------|-------------------------|---------------------|--------------------|------------------------|--------------------|----------------|
| PRICE CENTRE E - VAC & TVS ELECTRICAL WORKS  |        |   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| Ref. No  | Sl.No. | Description   | Unit | LIGHTHOUSE<br>(ST01) | KUTCHERY ROAD<br>(ST03) | ALWARPET<br>(ST05) | BHARATHIDASAN<br>(ST06) | BOAT CLUB<br>(ST07) | NANDANAM<br>(ST08) | PANAGAL PARK<br>(ST10) | KODAMBAKKAM (ST11) | TOTAL QUANTITY |
| 28   | 3.2.8  | 32A TP MCCB, 415V, 25kA suitable space provision for 5.5 kW VFD unit (FAF) Having microprocessor trip unit with adjustable protection against over load, short circuit, earth fault. And LED indication lamps for ON,OFF,TRIP Start/stop, Emergency stop push buttons.  | Set  |                      |                         |                    | 1                       |                     |                    |                        |                    | 1              |
| 29   | 3.2.9  | 32A,TP MCCB, 415V, 25kA suitable space provision for 3kW VFD unit (FAF) . Having microprocessor trip unit with adjustable protection against over load, short circuit, earth fault. And LED indication lamps for ON,OFF,TRIP Start/stop, Emergency stop push buttons.   | Set  |                      |                         |                    | 1                       |                     |                    |                        |                    | 1              |
| 30   | 3.2.10 | 16A,TP MPCB, 415V, 25kA with 3kW DOL Starter unit (TSF) . Having microprocessor trip unit with over load, short circuit. And LED indication lamps for ON,OFF,TRIP, Start/stop, Emergency stop push buttons.   | Set  |                      |                         |                    | 1                       |                     |                    |                        |                    | 1              |
| 31   | 3.2.11 | 16A,TP MPCB, 415V, 25kA with 5.5kW DOL Starter unit (TEF) . Having microprocessor trip unit with over load, short circuit. And LED indication lamps for ON,OFF,TRIP, Start/stop, Emergency stop push buttons.   | Set  |                      |                         |                    | 1                       |                     |                    |                        |                    | 1              |
| 32   | 3.2.12 | SPARE:-   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 33   | 3.2.13 | 63A,TPN MCCB,415V,25kA. Having microprocessor trip unit with adjustable protection against over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP.and lamp test push button   | Set  |                      |                         |                    | 1                       |                     |                    |                        |                    | 1              |
| 34   | 3.2.14 | 32A,TP MCCB,415V,25kA. Having microprocessor trip unit with adjustable protection against over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP.and lamp test push button  | Set  |                      |                         |                    | 1                       |                     |                    |                        |                    | 1              |
| 35   | 3.2.15 | Panel Enclosure & other Accessories (Exhaust fan, louvers, etc.) as specified in Part-2 section VII sub section D Unit-02 Clause 2.4  | Lot  |                      |                         |                    | 1                       |                     |                    |                        |                    | 1              |
| 36   | 3.3    | VAC PANEL -01- NON ESSENTIAL (Smart Panel)with Mimic Diagram,TTA form 4b, type 6 panel, IP54 conforming to specification as specified in Part-2 section VII sub section D Unit-02 and drawings. (Fully Front Accessible panel)  |      |                      | 1                       |                    |                         |                     |                    |                        |                    | 1              |
| 37   | 3.3.1  | Incomer:<br>1) Motorized MCCB of 630A,4P,415V and 25kA. Having microprocessor based trip unit with adjustable over load, adjustable short circuit and adjustable earth fault with LCD/LED display and provision for remote tripping, Start/stop push button.<br>2) Surge protection device (SPD) Type-II with inbuilt fuse suitable to withstand required short circuit current<br>3) LED indication lamp for ON, OFF & TRIP, Phase Indication for R,Yand B and Emergency stop push button.<br>4) Auto / Manual Selector Switch with key operated and 1 No TNC switch.<br>5) Digital MFM and 3 Nos. CTs,630/5A, 10VA, CL-0.5, for metering. | Set  |                      | 1                       |                    |                         |                     |                    |                        |                    | 1              |
| 38   | 3.3.2  | Busbar : rated 630 Amps, suitable to withstand symmetrical fault level of 25kA for 1 sec. at 415V as specified in Part-2 section VII sub section D Unit-02 Clause 2.6   | Lot  |                      | 1                       |                    |                         |                     |                    |                        |                    | 1              |
| 39   | 3.3.3  | ISMS Connectivity:<br>All the breakers should be provided with control and monitoring facilities,Smart Panel facility with Local touch screen, control panel in front side of the panel. Required PLCs ,relays, contactors ,IO cards, Ethernet switches,SMPS,Control Transformers, cabling works., etc. for functional requirement as specified in Part-2 Section VII Subsection D Unit No.2 Clause 2.28 and drawings. Smart Panel shall be interfacing with ISMS system through Modbus TCP/IP for Control & monitoring.  | Lot  |                      | 1                       |                    |                         |                     |                    |                        |                    | 1              |
| 40   | 3.3.4  | OUTGOING FEEDERS  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 41   | 3.3.5  | 400A,4P MCCB,415V,25kA. Having microprocessor trip unit with adjustable protection against over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP.and lamp test push button   | Set  |                      | 1                       |                    |                         |                     |                    |                        |                    | 1              |

| CHENNAI METRO RAIL LIMITED<br>CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4<br>BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS<br>TENDER NO. C4-VAC&TVS-12 |        |   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
|--|--------|---|------|----------------------|-------------------------|--------------------|-------------------------|---------------------|--------------------|------------------------|--------------------|----------------|
| PRICE CENTRE E - VAC & TVS ELECTRICAL WORKS  |        |   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| Ref. No  | Sl.No. | Description   | Unit | LIGHTHOUSE<br>(ST01) | KUTCHERY ROAD<br>(ST03) | ALWARPET<br>(ST05) | BHARATHIDASAN<br>(ST06) | BOAT CLUB<br>(ST07) | NANDANAM<br>(ST08) | PANAGAL PARK<br>(ST10) | KODAMBAKKAM (ST11) | TOTAL QUANTITY |
| 42   | 3.3.6  | 1 nos of 63A,TPN MCCB and 2 no's of 32A TP MCCB 415V,25kA with suitable space provision for 18.5kW VFD unit with bypass Starter (Soft Starter) for AHU, Having microprocessor trip unit with adjustable protection against over load, short circuit, earth fault. And LED indication lamps for ON,OFF,TRIP, lamp test and Emergency stop push buttons.. Auto manual selector switch,VFD/SS Selector switch with respective Start/stop pushbuttons.  | Set  |                      | 1                       |                    |                         |                     |                    |                        |                    | 1              |
| 43   | 3.3.7  | 1 nos of 63A,TPN MCCB and 2 no's of 32A TP MCCB 415V, 25kA with suitable space provision for 30kW VFD unit with bypass Starter (Soft Starter) for AHU, Having microprocessor trip unit with adjustable protection against over load, short circuit , earth fault. And LED indication lamps for ON,OFF,TRIP, lamp test and Emergency stop push buttons.. Auto manual selector switch,VFD/SS Selector switch with respective Start/stop pushbuttons.  | Set  |                      | 2                       |                    |                         |                     |                    |                        |                    | 2              |
| 44   | 3.3.8  | 32A, TP MCCB, 415V, 25kA suitable space provision for 3 kW VFD unit (FAF) Having microprocessor trip unit with adjustable protection against over load, short circuit, earth fault. And LED indication lamps for ON,OFF,TRIP Start/stop, Emergency stop push buttons.   | Set  |                      | 1                       |                    |                         |                     |                    |                        |                    | 1              |
| 45   | 3.3.9  | 32A,TP MCCB, 415V, 25kA suitable space provision for 1.5 kW VFD unit (FAF) . Having microprocessor trip unit with adjustable protection against over load, short circuit, earth fault. And LED indication lamps for ON,OFF,TRIP Start/stop, Emergency stop push buttons.  | Set  |                      | 1                       |                    |                         |                     |                    |                        |                    | 1              |
| 46   | 3.3.10 | SPARE:-   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 47   | 3.3.11 | 400A,4P MCCB,415V,25kA. Having microprocessor trip unit with adjustable protection against over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP.and lamp test push button   | Set  |                      | 1                       |                    |                         |                     |                    |                        |                    | 1              |
| 48   | 3.3.12 | 63A,TPN MCCB,415V,25kA. Having microprocessor trip unit with adjustable protection against over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP.and lamp test push button   | Set  |                      | 1                       |                    |                         |                     |                    |                        |                    | 1              |
| 49   | 3.3.13 | Panel Enclosure & other Accessories (Exhaust fan, louvers, etc.) as specified in Part-2 section VII sub section D Unit-02 Clause 2.4  | Lot  |                      | 1                       |                    |                         |                     |                    |                        |                    | 1              |
| 50   | 3.4    | VAC PANEL -01- NON ESSENTIAL (Smart Panel)with Mimic Diagram,TTA form 4b, type 6 panel, IP54 conforming to specification as specified in Part-2 section VII sub section D Unit-02 and drawings. (Fully Front Accessible panel)  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 51   | 3.4.1  | Incomer:<br>1) Motorized MCCB of 630A,4P,415V and 25kA. Having microprocessor based trip unit with adjustable over load, adjustable short circuit and adjustable earth fault with LCD/LED display and provision for remote tripping, Start/stop push button.<br>2) Surge protection device (SPD) Type-II with inbuilt fuse suitable to withstand required short circuit current<br>3) LED indication lamp for ON, OFF & TRIP, Phase Indication for R,Yand B and Emergency stop push button.<br>4) Auto / Manual Selector Switch with key operated and 1 No TNC switch.<br>5) Digital MFM and 3 Nos. CTs,630/5A, 10VA, CL-0.5, for metering. | Set  |                      |                         | 1                  |                         |                     |                    |                        |                    | 1              |
| 52   | 3.4.2  | Busbar : rated 630 Amps, suitable to withstand symmetrical fault level of 25kA for 1 sec. at 415V as specified in Part-2 section VII sub section D Unit-02 Clause 2.6   | Lot  |                      |                         | 1                  |                         |                     |                    |                        |                    | 1              |
| 53   | 3.4.3  | ISMS Connectivity:<br>All the breakers should be provided with control and monitoring facilities,Smart Panel facility with Local touch screen, control panel in front side of the panel. Required PLCs ,relays, contactors ,IO cards, Ethernet switches,SMPS,Control Transformers, cabling works., etc. for functional requirement as specified in Part-2 Section VII Subsection D Unit No.2 Clause 2.28 and drawings. Smart Panel shall be interfacing with ISMS system through Modbus TCP/IP for Control & monitoring.  | Lot  |                      |                         | 1                  |                         |                     |                    |                        |                    | 1              |



| CHENNAI METRO RAIL LIMITED<br>CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4<br>BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS<br>TENDER NO. C4-VAC&TVS-12 |        |  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
|--|--------|--|------|----------------------|-------------------------|--------------------|-------------------------|---------------------|--------------------|------------------------|--------------------|----------------|
| PRICE CENTRE E - VAC & TVS ELECTRICAL WORKS  |        |  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| Ref. No  | Sl.No. | Description  | Unit | LIGHTHOUSE<br>(ST01) | KUTCHERY ROAD<br>(ST03) | ALWARPET<br>(ST05) | BHARATHIDASAN<br>(ST06) | BOAT CLUB<br>(ST07) | NANDANAM<br>(ST08) | PANAGAL PARK<br>(ST10) | KODAMBAKKAM (ST11) | TOTAL QUANTITY |
| 54   | 3.4.4  | OUTGOING FEEDERS   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 55   | 3.4.5  | 400A,4P MCCB,415V,25kA. Having microprocessor trip unit with adjustable protection against over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP.and lamp test push button  | Set  |                      |                         | 1                  |                         |                     |                    |                        |                    | 1              |
| 56   | 3.4.6  | 1 nos of 63A,TPN MCCB and 3 no's of 32A TP MCCB 415V,25kA with suitable space provision for 30kW VFD unit with bypass Starter (Soft Starter) for AHU, Having microprocessor trip unit with adjustable protection against over load, short circuit, earth fault. And LED indication lamps for ON,OFF,TRIP, lamp test and Emergency stop push buttons.. Auto manual selector switch,VFD/SS Selector switch with respective Start/stop pushbuttons. | Set  |                      |                         | 3                  |                         |                     |                    |                        |                    | 3              |
| 57   | 3.4.7  | 32A,TP MCCB, 415V, 25kA suitable space provision for 5.5 kW VFD unit (FAF) Having microprocessor trip unit with adjustable protection against over load, short circuit, earth fault. And LED indication lamps for ON,OFF,TRIP Start/stop, Emergency stop push buttons.   | Set  |                      |                         | 1                  |                         |                     |                    |                        |                    | 1              |
| 58   | 3.4.8  | 32A,TP MCCB, 415V, 25kA suitable space provision for 3kW VFD unit (FAF) . Having microprocessor trip unit with adjustable protection against over load, short circuit, earth fault. And LED indication lamps for ON,OFF,TRIP Start/stop, Emergency stop push buttons.  | Set  |                      |                         | 1                  |                         |                     |                    |                        |                    | 1              |
| 59   | 3.4.9  | 16A,TP MPCB, 415V, 25kA with 2.2kW DOL Starter unit (TSF) . Having microprocessor trip unit with over load, short circuit. And LED indication lamps for ON,OFF,TRIP, Start/stop, Emergency stop push buttons.  | Set  |                      |                         | 1                  |                         |                     |                    |                        |                    | 1              |
| 60   | 3.4.10 | 16A,TP MPCB, 415V, 25kA with 4kW DOL Starter unit (TEF) . Having microprocessor trip unit with over load, short circuit. And LED indication lamps for ON,OFF,TRIP, Start/stop, Emergency stop push buttons.  | Set  |                      |                         | 1                  |                         |                     |                    |                        |                    | 1              |
| 61   | 3.4.11 | SPARE:-  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 62   | 3.4.12 | 400A,4P MCCB,415V,25kA. Having microprocessor trip unit with adjustable protection against over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP.and lamp test push button  | Set  |                      |                         | 1                  |                         |                     |                    |                        |                    | 1              |
| 63   | 3.4.13 | 63A,TPN MCCB,415V,25kA. Having microprocessor trip unit with adjustable protection against over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP.and lamp test push button  | Set  |                      |                         | 1                  |                         |                     |                    |                        |                    | 1              |
| 64   | 3.4.14 | Panel Enclosure & other Accessories (Exhaust fan, louvers, etc.) as specified in Part-2 section VII sub section D Unit-02 Clause 2.4   | Lot  |                      |                         | 1                  |                         |                     |                    |                        |                    | 1              |
| 65   | 3.3    | VAC PANEL -02  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 66   | 3.3.1  | VAC PANEL -02 - NON ESSENTIAL (Smart Panel)with Mimic Diagram,TTA form 4b, type 6 panel, IP54 conforming to specification as specified in Part-2 Section VII SubSection-D Unit-02 and drawings. (Fully Front Accessible panel)   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |

| CHENNAI METRO RAIL LIMITED<br>CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4<br>BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS<br>TENDER NO. C4-VAC&TVS-12 |        |  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
|--|--------|--|------|----------------------|-------------------------|--------------------|-------------------------|---------------------|--------------------|------------------------|--------------------|----------------|
| PRICE CENTRE E - VAC & TVS ELECTRICAL WORKS  |        |  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| Ref. No  | Sl.No. | Description  | Unit | LIGHTHOUSE<br>(ST01) | KUTCHERY ROAD<br>(ST03) | ALWARPET<br>(ST05) | BHARATHIDASAN<br>(ST06) | BOAT CLUB<br>(ST07) | NANDANAM<br>(ST08) | PANAGAL PARK<br>(ST10) | KODAMBAKKAM (ST11) | TOTAL QUANTITY |
| 67   | 3.3.2  | Incomer:<br>1) Motorized MCCB of 400A,4P,415V and 25kA. Having microprocessor based trip unit with adjustable over load, adjustable short circuit and adjustable earth fault with LCD/LED display and provision for remote tripping, Start/stop push button.<br>2) Surge protection device (SPD) Type-II with inbuilt fuse suitable to withstand required short circuit current<br>3) LED indication lamp for ON, OFF & TRIP, Phase Indication for R,Yand B and lamp test & Emergency stop push button.<br>4) Auto / Manual Selector Switch with key operated and 1 No TNC switch.<br>5) Digital MFM and 3 Nos. CTs, 400/5A, 10VA, CL-0.5, for metering. | Set  |                      | 1                       |                    |                         |                     |                    |                        |                    | 1              |
| 68   | 3.3.3  | Busbar : rated 400 Amps, suitable to withstand symmetrical fault level of 25kA for 1 sec. at 415V as specified in Part-2 Section VII Subsection D Unit-02 Clause 2.6   | Lot  |                      | 1                       |                    |                         |                     |                    |                        |                    | 1              |
| 69   | 3.3.4  | <b>ISMS Connectivity:</b><br>All the breakers should be provided with control and monitoring facilities,Smart Panel facility with Local touch screen, control panel in front side of the panel. Required PLCs ,relays, contactors ,IO cards, Ethernet switches,SMPS,Control Transformers, cabling works., etc. for functional requirement as specified in Part-2 Section VII Subsection D Unit No.2 Clause 2.28 and drawings. Smart Panel shall be interfacing with ISMS system through Modbus TCP/IP for Control & monitoring.  | Lot  |                      | 1                       |                    |                         |                     |                    |                        |                    | 1              |
| 70   | 3.3.5  | <b>OUTGOING FEEDERS</b>  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 71   | 3.3.6  | 200A,4P MCCB,415V,25kA. Having microprocessor trip unit with over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP.   | Set  |                      | 1                       |                    |                         |                     |                    |                        |                    | 1              |
| 72   | 3.3.7  | 1 nos of 63A,TPN MCCB and 3 no's of 32A TP MCCB 415V,25kA with suitable space provision for 30kW VFD unit with bypass Starter (Soft Starter) for AHU.Having microprocessor trip unit with adjustable protection against over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP, lamp test and Emergency stop push buttons.. Auto manual selector switch,VFD/SS Selector switch with respective Start/stop pushbuttons.   | Set  |                      | 1                       |                    |                         |                     |                    |                        |                    | 1              |
| 73   | 3.3.8  | 32A,TP MCCB, 415V, 25kA suitable space provision for 1.10kW VFD unit (FAF),Having microprocessor trip unit with over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP, Start/stop,lamp test & Emergency stop push buttons.  | Set  |                      | 1                       |                    |                         |                     |                    |                        |                    | 1              |
| 74   | 3.3.9  | 16A,TP MPCB, 415V, 25kA with 2.2kW DOL Starter unit (TSF) . Having microprocessor trip unit with over load, short circuit. And LED indication lamps for ON,OFF,TRIP, Start/stop, Emergency stop push buttons.  | Set  |                      | 1                       |                    |                         |                     |                    |                        |                    | 1              |
| 75   | 3.3.10 | 16A,TP MPCB, 415V, 25kA with 3.70kW DOL Starter unit (TEF) . Having microprocessor trip unit with over load, short circuit. And LED indication lamps for ON,OFF,TRIP, Start/stop, Emergency stop push buttons.   | Set  |                      | 1                       |                    |                         |                     |                    |                        |                    | 1              |
| 76   | 3.3.11 | <b>SPARE:-</b>   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 77   | 3.3.12 | 200A,4P MCCB,415V,25kA. Having microprocessor trip unit with over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP,and lamp test push button.   | Set  |                      | 1                       |                    |                         |                     |                    |                        |                    | 1              |
| 78   | 3.3.15 | Panel Enclosure & other Accessories (Exhaust fan, louvers, etc.) as specified in Part-2 Section VII Subsection D Unit-02 Clause 2.4  | Lot  |                      | 1                       |                    |                         |                     |                    |                        |                    | 1              |
| 79   | 3.4    | <b>VAC PANEL -02 - NON ESSENTIAL (Smart Panel)with Mimic Diagram,TTA form 4b, type 6 panel, IP54 conforming to specification as specified in Part-2 Section VII SubSection-D Unit-02 and drawings. (Fully Front Accessible panel)</b>  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 80   | 3.4.1  | Incomer:<br>1) Motorized MCCB of 630A,4P,415V and 25kA. Having microprocessor based trip unit with adjustable over load, adjustable short circuit and adjustable earth fault with LCD/LED display and provision for remote tripping, Start/stop push button.<br>2) Surge protection device (SPD) Type-II with inbuilt fuse suitable to withstand required short circuit current<br>3) LED indication lamp for ON, OFF & TRIP, Phase Indication for R,Yand B and lamp test & Emergency stop push button.<br>4) Auto / Manual Selector Switch with key operated and 1 No TNC switch.<br>5) Digital MFM and 3 Nos. CTs, 630/5A, 10VA, CL-0.5, for metering. | Set  |                      |                         | 1                  |                         |                     |                    |                        |                    | 1              |
| 81   | 3.4.2  | Busbar : rated 630 Amps, suitable to withstand symmetrical fault level of 25kA for 1 sec. at 415V as specified in Part-2 Section VII Subsection D Unit-02 Clause 2.6   | Lot  |                      |                         | 1                  |                         |                     |                    |                        |                    | 1              |

| CHENNAI METRO RAIL LIMITED<br>CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4<br>BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS<br>TENDER NO. C4-VAC&TVS-12 |        |  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
|--|--------|--|------|----------------------|-------------------------|--------------------|-------------------------|---------------------|--------------------|------------------------|--------------------|----------------|
| PRICE CENTRE E - VAC & TVS ELECTRICAL WORKS  |        |  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| Ref. No  | Sl.No. | Description  | Unit | LIGHTHOUSE<br>(ST01) | KUTCHERY ROAD<br>(ST03) | ALWARPET<br>(ST05) | BHARATHIDASAN<br>(ST06) | BOAT CLUB<br>(ST07) | NANDANAM<br>(ST08) | PANAGAL PARK<br>(ST10) | KODAMBAKKAM (ST11) | TOTAL QUANTITY |
| 82   | 3.4.3  | <b>ISMS Connectivity:</b><br>All the breakers should be provided with control and monitoring facilities,Smart Panel facility with Local touch screen, control panel in front side of the panel. Required PLCs ,relays, contactors ,IO cards, Ethernet switches,SMPS,Control Transformers, cabling works., etc. for functional requirement as specified in Part-2 Section VII Subsection D Unit No.2 Clause 2.28 and drawings. Smart Panel shall be interfacing with ISMS system through Modbus TCP/IP for Control & monitoring.  | Lot  |                      |                         | 1                  |                         |                     |                    |                        |                    | 1              |
| 83   | 3.4.4  | <b>OUTGOING FEEDERS</b>  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 84   | 3.4.5  | 630A,4P MCCB,415V,25kA. Having microprocessor trip unit with over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP.   | Set  |                      |                         | 1                  |                         |                     |                    |                        |                    | 1              |
| 85   | 3.4.6  | 1 nos of 63A,TPN MCCB and 3 no's of 32A TP MCCB 415V,25kA with suitable space provision for 18.5kW VFD unit with bypass Starter (Soft Starter) for AHU.Having microprocessor trip unit with adjustable protection against over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP, lamp test and Emergency stop push buttons.. Auto manual selector switch,VFD/SS Selector switch with respective Start/stop pushbuttons.   | Set  |                      |                         | 1                  |                         |                     |                    |                        |                    | 1              |
| 86   | 3.4.7  | 16A,TP MCCB, 415V, 25kA suitable space provision for 2.2kW VFD unit (FAF),Having microprocessor trip unit with over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP, Start/stop,lamp test & Emergency stop push buttons.   | Set  |                      |                         | 1                  |                         |                     |                    |                        |                    | 1              |
| 87   | 3.4.8  | <b>SPARE:-</b>   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 88   | 3.4.9  | 63A,TPN MCCB,415V,25kA. Having microprocessor trip unit with over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP.   | Set  |                      |                         | 1                  |                         |                     |                    |                        |                    | 1              |
| 89   | 3.4.10 | Panel Enclosure & other Accessories (Exhaust fan, louvers, etc.) as specified in Part-2 Section VII Subsection D Unit-02 Clause 2.4  | Lot  |                      |                         | 1                  |                         |                     |                    |                        |                    | 1              |
| 90   | 3.5    | <b>VAC PANEL -02 - NON ESSENTIAL (Smart Panel)with Mimic Diagram,TTA form 4b, type 6 panel, IP54 conforming to specification as specified in Part-2 Section VII SubSection-D Unit-02 and drawings. (Fully Front Accessible panel)</b>  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 91   | 3.5.1  | Incomer:<br>1) Motorized MCCB of 200A,4P,415V and 25kA. Having microprocessor based trip unit with adjustable over load, adjustable short circuit and adjustable earth fault with LCD/LED display and provision for remote tripping, Start/stop push button.<br>2) Surge protection device (SPD) Type-II with inbuilt fuse suitable to withstand required short circuit current<br>3) LED indication lamp for ON, OFF & TRIP, Phase Indication for R,Yand B and lamp test & Emergency stop push button.<br>4) Auto / Manual Selector Switch with key operated and 1 No TNC switch.<br>5) Digital MFM and 3 Nos. CTs, 200/5A, 10VA, CL-0.5, for metering. | Set  |                      |                         |                    | 1                       |                     |                    |                        |                    | 1              |
| 92   | 3.5.2  | Busbar : rated 200 Amps, suitable to withstand symmetrical fault level of 25kA for 1 sec. at 415V as specified in Part-2 Section VII Subsection D Unit-02 Clause 2.6   | Lot  |                      |                         |                    | 1                       |                     |                    |                        |                    | 1              |
| 93   | 3.5.3  | <b>ISMS Connectivity:</b><br>All the breakers should be provided with control and monitoring facilities,Smart Panel facility with Local touch screen, control panel in front side of the panel. Required PLCs ,relays, contactors ,IO cards, Ethernet switches,SMPS,Control Transformers, cabling works., etc. for functional requirement as specified in Part-2 Section VII Subsection D Unit No.2 Clause 2.28 and drawings. Smart Panel shall be interfacing with ISMS system through Modbus TCP/IP for Control & monitoring.  | Lot  |                      |                         |                    | 1                       |                     |                    |                        |                    | 1              |
| 94   | 3.5.4  | <b>OUTGOING FEEDERS</b>  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 95   | 3.5.5  | 1 nos of 63A,TPN MCCB and 3 no's of 32A TP MCCB 415V,25kA with suitable space provision for 37kW VFD unit with bypass Starter (Soft Starter) for AHU.Having microprocessor trip unit with adjustable protection against over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP, lamp test and Emergency stop push buttons.. Auto manual selector switch,VFD/SS Selector switch with respective Start/stop pushbuttons.   | Set  |                      |                         |                    | 2                       |                     |                    |                        |                    | 2              |
| 96   | 3.5.6  | 32A,TP MCCB, 415V, 25kA suitable space provision for 7.5kW VFD unit (FAF),Having microprocessor trip unit with over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP, Start/stop,lamp test & Emergency stop push buttons.   | Set  |                      |                         |                    | 1                       |                     |                    |                        |                    | 1              |
| 97   | 3.5.7  | <b>SPARE:-</b>   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 98   | 3.5.8  | 63A,TPN MCCB,415V,25kA. Having microprocessor trip unit with over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP.   | Set  |                      |                         |                    | 1                       |                     |                    |                        |                    | 1              |
| 99   | 3.5.9  | Panel Enclosure & other Accessories (Exhaust fan, louvers, etc.) as specified in Part-2 Section VII Subsection D Unit-02 Clause 2.4  | Lot  |                      |                         |                    | 1                       |                     |                    |                        |                    | 1              |

| CHENNAI METRO RAIL LIMITED<br>CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4<br>BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS<br>TENDER NO. C4-VAC&TVS-12 |        |   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
|--|--------|---|------|----------------------|-------------------------|--------------------|-------------------------|---------------------|--------------------|------------------------|--------------------|----------------|
| PRICE CENTRE E - VAC & TVS ELECTRICAL WORKS  |        |   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| Ref. No  | Sl.No. | Description   | Unit | LIGHTHOUSE<br>(ST01) | KUTCHERY ROAD<br>(ST03) | ALWARPET<br>(ST05) | BHARATHIDASAN<br>(ST06) | BOAT CLUB<br>(ST07) | NANDANAM<br>(ST08) | PANAGAL PARK<br>(ST10) | KODAMBAKKAM (ST11) | TOTAL QUANTITY |
| 100  | 3.6    | VAC PANEL - NON ESSENTIAL (Smart Panel) with Mimic Diagram,TTA form 4b, type 6 panel, IP54 conforming to specification as specified in Part-2 Section VII SubSection-D Unit-02 and drawings. (Fully Front Accessible panel)   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 101  | 3.6.1  | Incomer:<br>1) ACB of 1000A,4P,415V and 50kA. Having microprocessor based trip unit with adjustable over load, adjustable short circuit and adjustable earth fault with LCD/LED display and provision for remote tripping, Start/stop push button.<br>2) Surge protection device (SPD) Type-II with inbuilt fuse suitable to withstand required short circuit current<br>3) LED indication lamp for ON, OFF & TRIP, Phase Indication for R,Yand B and Emergency stop push button.<br>4) Auto / Manual Selector Switch with key operated and 1 No TNC switch.<br>5) Digital MFM and 3 Nos. CTs, 1000/5A, 10VA, CL-0.5, for metering. | Set  |                      |                         |                    |                         | 1                   |                    |                        |                    | 1              |
| 102  | 3.6.2  | Busbar : rated 1000 Amps, suitable to withstand symmetrical fault level of 50kA for 1 sec. at 415V as specified in Part-2 Section VII Subsection D Unit-02 Clause 2.6   | Lot  |                      |                         |                    |                         | 1                   |                    |                        |                    | 1              |
| 103  | 3.6.3  | <b>ISMS Connectivity:</b><br>All the breakers should be provided with control and monitoring facilities,Smart Panel facility with Local touch screen, control panel in front side of the panel. Required PLCs ,relays, contactors ,IO cards, Ethernet switches,SMPS,Control Transformers, cabling works., etc. for functional requirement as specified in Part-2 Section VII Subsection D Unit No.2 Clause 2.28 and drawings. Smart Panel shall be interfacing with ISMS system through Modbus TCP/IP for Control & monitoring.   | Lot  |                      |                         |                    |                         | 1                   |                    |                        |                    | 1              |
| 104  | 3.6.4  | OUTGOING FEEDERS  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 105  | 3.6.5  | 1 nos of 100A,TPN MCCB and 4 no's of 32A TP MCCB 415V,25kA with suitable space provision for 55kW VFD unit with bypass Starter (Soft Starter) for AHU.Having microprocessor trip unit with adjustable protection against over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP, lamp test and Emergency stop push buttons.. Auto manual selector switch,VFD/SS Selector switch with respective Start/stop pushbuttons.   | Set  |                      |                         |                    |                         | 1                   |                    |                        |                    | 1              |
| 106  | 3.6.6  | 1 nos of 63A,TPN MCCB and 2 no's of 32A TP MCCB 415V,25kA with suitable space provision for 18.5kW VFD unit with bypass Starter (Soft Starter)for AHU.Having microprocessor trip unit with adjustable protection against over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP, lamp test and Emergency stop push buttons.. Auto manual selector switch,VFD/SS Selector switch with respective Start/stop pushbuttons.   | Set  |                      |                         |                    |                         | 1                   |                    |                        |                    | 1              |
| 107  | 3.6.7  | 1 nos of 63A,TPN MCCB and 2 no's of 32A TP MCCB 415V,25kA with suitable space provision for 22kW VFD unit with bypass Starter (Soft Starter) for AHU.Having microprocessor trip unit with adjustable protection against over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP, lamp test and Emergency stop push buttons.. Auto manual selector switch,VFD/SS Selector switch with respective Start/stop pushbuttons.  | Set  |                      |                         |                    |                         | 1                   |                    |                        |                    | 1              |
| 108  | 3.6.8  | 800A,4P, ACB, 415V, 50kA, . Having microprocessor trip unit with adjustable protection against over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP .   | Set  |                      |                         |                    |                         | 1                   |                    |                        |                    | 1              |
| 109  | 3.6.9  | 32A,4P MCCB, 415V, 25kA, . Having microprocessor trip unit with adjustable protection against over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP.   | Set  |                      |                         |                    |                         | 1                   |                    |                        |                    | 1              |
| 110  | 3.6.10 | 32A,TP MCCB, 415V, 25kA suitable space provision for 4kW VFD unit (FAF) . Having microprocessor trip unit with over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP, Start/stop, Emergency stop push buttons.   | Set  |                      |                         |                    |                         | 1                   |                    |                        |                    | 1              |
| 111  | 3.6.11 | 32A,TP MCCB, 415V, 25kA suitable space provision for 3kW VFD unit (FAF) . Having microprocessor trip unit with over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP, Start/stop, Emergency stop push buttons.   | Set  |                      |                         |                    |                         | 1                   |                    |                        |                    | 1              |

| CHENNAI METRO RAIL LIMITED<br>CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4<br>BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS<br>TENDER NO. C4-VAC&TVS-12 |        |  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
|--|--------|--|------|----------------------|-------------------------|--------------------|-------------------------|---------------------|--------------------|------------------------|--------------------|----------------|
| PRICE CENTRE E - VAC & TVS ELECTRICAL WORKS  |        |  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| Ref. No  | Sl.No. | Description  | Unit | LIGHTHOUSE<br>(ST01) | KUTCHERY ROAD<br>(ST03) | ALWARPET<br>(ST05) | BHARATHIDASAN<br>(ST06) | BOAT CLUB<br>(ST07) | NANDANAM<br>(ST08) | PANAGAL PARK<br>(ST10) | KODAMBAKKAM (ST11) | TOTAL QUANTITY |
| 112  | 3.6.12 | 16A,TP MPCB, 415V, 25kA with 3kW DOL Starter unit (TSF/TEF) . Having microprocessor trip unit with over load, short circuit. And LED indication lamps for ON,OFF,TRIP, Start/stop, Emergency stop push buttons.  | Set  |                      |                         |                    |                         | 2                   |                    |                        |                    | 2              |
| 113  | 3.6.13 | SPARES:-   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 114  | 3.6.14 | 100A,TPN MCCB, 415V, 25kA, . Having microprocessor trip unit with adjustable protection against over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP.  | Set  |                      |                         |                    |                         | 1                   |                    |                        |                    | 1              |
| 115  | 3.6.15 | 63A,TPN MCCB, 415V, 25kA, . Having microprocessor trip unit with adjustable protection against over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP.   | Set  |                      |                         |                    |                         | 1                   |                    |                        |                    | 1              |
| 116  | 3.6.16 | Panel Enclosure & other Accessories (Exhaust fan, louvers, etc.) as specified in Part-2 Section VII Subsection D Unit-02 Clause 2.4  | Lot  |                      |                         |                    |                         | 1                   |                    |                        |                    | 1              |
| 117  | 3.7    | VAC PANEL - NON ESSENTIAL (Smart Panel) with Mimic Diagram,TTA form 4b, type 6 panel, IP54 conforming to specification as specified in Part-2 Section VII SubSection-D Unit-02 and drawings. (Fully Front Accessible panel)  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 118  | 3.7.1  | Incomer:<br>1) Motorized MCCB of 400A,4P,415V and 25kA. Having microprocessor based trip unit with adjustable over load, adjustable short circuit and adjustable earth fault with LCD/LED display and provision for remote tripping, Start/stop push button.<br>2) Surge protection device (SPD) Type-II with inbuilt fuse suitable to withstand required short circuit current<br>3) LED indication lamp for ON, OFF & TRIP, Phase Indication for R,Yand B and Emergency stop push button.<br>4) Auto / Manual Selector Switch with key operated and 1 No TNC switch.<br>5) Digital MFM and 3 Nos. CTs, 400/5A, 10VA, CL-0.5, for metering. | Set  |                      |                         |                    |                         |                     | 1                  |                        |                    | 1              |
| 119  | 3.7.2  | Busbar : rated 400 Amps, suitable to withstand symmetrical fault level of 25kA for 1 sec. at 415V as specified in Part-2 Section VII Subsection D Unit-02 Clause 2.6   | Lot  |                      |                         |                    |                         |                     | 1                  |                        |                    | 1              |
| 120  | 3.7.3  | ISMS Connectivity:<br>All the breakers should be provided with control and monitoring facilities,Smart Panel facility with Local touch screen, control panel in front side of the panel. Required PLCs ,relays, contactors ,IO cards, Ethernet switches,SMPS,Control Transformers, cabling works., etc. for functional requirement as specified in Part-2 Section VII Subsection D Unit No.2 Clause 2.28 and drawings. Smart Panel shall be interfacing with ISMS system through Modbus TCP/IP for Control & monitoring.   | Lot  |                      |                         |                    |                         |                     | 1                  |                        |                    | 1              |
| 121  | 3.7.4  | OUTGOING FEEDERS   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 122  | 3.7.5  | 1 nos of 100A, TPN MCCB and 3 no's of 32A TP MCCB, 415V, 25kA with suitable space provision for 37kW VFD unit with bypass Starter (Soft Starter) for AHU Having Micro processor trip unit with adjustable protection against over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP, lamp test and Emergency stop push buttons.. Auto manual selector switch,VFD/SS Selector switch with respective Start/stop pushbuttons.  | Set  |                      |                         |                    |                         |                     | 2                  |                        |                    | 2              |
| 123  | 3.7.6  | 1 nos of 63A,TPN MCCB and 3 no's of 32A TP MCCB 415V, 25kA with suitable space provision for 30kW VFD unit with bypass Starter (Soft Starter) for AHU, Having Micro processor trip unit with adjustable protection against over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP, lamp test and Emergency stop push buttons.. Auto manual selector switch,VFD/SS Selector switch with respective Start/stop pushbuttons.  | Set  |                      |                         |                    |                         |                     | 1                  |                        |                    | 1              |
| 124  | 3.7.7  | 1 nos of 63A,TPN MCCB and 2 no's of 32A TP MCCB 415V, 25kA with suitable space provision for 22kW VFD unit with bypass Starter (Soft Starter) for AHU, Having Micro processor trip unit with adjustable protection against over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP, lamp test and Emergency stop push buttons.. Auto manual selector switch,VFD/SS Selector switch with respective Start/stop pushbuttons.  | Set  |                      |                         |                    |                         |                     | 1                  |                        |                    | 1              |
| 125  | 3.7.8  | 32A,TP MCCB, 415V, 25kA suitable space provision for 5.5kW VFD unit (FAF) . Having Micro processor trip unit with over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP, Start/stop, Emergency stop push buttons.   | Set  |                      |                         |                    |                         |                     | 1                  |                        |                    | 1              |
| 126  | 3.7.9  | 32A,TP MCCB, 415V, 25kA suitable space provision for 2.2kW VFD unit (FAF) . Having Micro processor trip unit with over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP, Start/stop, Emergency stop push buttons.   | Set  |                      |                         |                    |                         |                     | 1                  |                        |                    | 1              |

| CHENNAI METRO RAIL LIMITED<br>CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4<br>BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS<br>TENDER NO. C4-VAC&TVS-12 |        |  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
|--|--------|--|------|----------------------|-------------------------|--------------------|-------------------------|---------------------|--------------------|------------------------|--------------------|----------------|
| PRICE CENTRE E - VAC & TVS ELECTRICAL WORKS  |        |  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| Ref. No  | Sl.No. | Description  | Unit | LIGHTHOUSE<br>(ST01) | KUTCHERY ROAD<br>(ST03) | ALWARPET<br>(ST05) | BHARATHIDASAN<br>(ST06) | BOAT CLUB<br>(ST07) | NANDANAM<br>(ST08) | PANAGAL PARK<br>(ST10) | KODAMBAKKAM (ST11) | TOTAL QUANTITY |
| 127  | 3.7.10 | 32A,TP MCCB, 415V, 25kA suitable space provision for 4kW VFD unit (FAF) . Having Micro processor trip unit with over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP, Start/stop, Emergency stop push buttons.   | Set  |                      |                         |                    |                         |                     | 1                  |                        |                    | 1              |
| 128  | 3.7.11 | 16A,TP MPCB, 415V, 25kA with 5.50kW DOL Starter unit (TSF) . Having microprocessor trip unit with over load, short circuit. And LED indication lamps for ON,OFF,TRIP, Start/stop, Emergency stop push buttons.   | Set  |                      |                         |                    |                         |                     | 1                  |                        |                    | 1              |
| 129  | 3.7.12 | 16A,TP MPCB, 415V, 25kA with 3.0kW DOL Starter unit (TEF) . Having microprocessor unit with over load, short circuit. And LED indication lamps for ON,OFF,TRIP, Start/stop, Emergency stop push buttons.   | Set  |                      |                         |                    |                         |                     | 1                  |                        |                    | 1              |
| 130  | 3.7.13 | 32A,4P,415V,25kA, MCCB with Start/stop push buttons , Having Micro processor trip unit with over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP.  | Set  |                      |                         |                    |                         |                     | 1                  |                        |                    | 1              |
| 131  | 3.7.14 | SPARES:-   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 132  | 3.7.15 | 100A,TP MCCB, 415V, 25kA, . Having microprocessor trip unit with adjustable protection against over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP.   | Set  |                      |                         |                    |                         |                     | 1                  |                        |                    | 1              |
| 133  | 3.7.16 | 63A,TP MCCB, 415V, 25kA, . Having microprocessor trip unit with adjustable protection against over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP.  | Set  |                      |                         |                    |                         |                     | 1                  |                        |                    | 1              |
| 134  | 3.7.17 | Panel Enclosure & other Accessories (Exhaust fan, louvers, etc.) as specified in Part-2 Section VII Subsection D Unit-02 Clause 2.4  | Set  |                      |                         |                    |                         |                     | 1                  |                        |                    | 1              |
| 135  | 3.8    | VAC PANEL -01 NON ESSENTIAL (Smart Panel) with Mimic Diagram,TTA form 4b, type 6 panel, IP54 conforming to specification as specified in Part-2 Section VII SubSection-D Unit-02 and drawings. (Fully Front Accessible panel)  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 136  | 3.8.1  | Incomer:<br>1) Motorized MCCB of 630A,4P,415V and 36kA. Having microprocessor based trip unit with adjustable over load, adjustable short circuit and adjustable earth fault with LCD/LED display and provision for remote tripping, Start/stop push button.<br>2) Surge protection device (SPD) Type-II with inbuilt fuse suitable to withstand required short circuit current<br>3) LED indication lamp for ON, OFF & TRIP, Phase Indication for R,Yand B and Emergency stop push button.<br>4) Auto / Manual Selector Switch with key operated and 1 No TNC switch.<br>5) Digital MFM and 3 Nos. CTs, 630/5A, 10VA, CL-0.5, for metering. | Set  |                      |                         |                    |                         |                     |                    | 1                      |                    | 1              |
| 137  | 3.8.2  | Busbar : rated 630 Amps, suitable to withstand symmetrical fault level of 36kA for 1 sec. at 415V as specified in Part-2 Section VII Subsection D Unit-02 Clause 2.6   | Lot  |                      |                         |                    |                         |                     |                    | 1                      |                    | 1              |
| 138  | 3.8.3  | ISMS Connectivity:<br>All the breakers should be provided with control and monitoring facilities,Smart Panel facility with Local touch screen, control panel in front side of the panel. Required PLCs ,relays, contactors ,IO cards, Ethernet switches,SMPS,Control Transformers, cabling works., etc. for functional requirement as specified in Part-2 Section VII Subsection D Unit No.2 Clause 2.28 and drawings. Smart Panel shall be interfacing with ISMS system through Modbus TCP/IP for Control & monitoring.   | Lot  |                      |                         |                    |                         |                     |                    | 1                      |                    | 1              |
| 139  | 3.8.4  | OUTGOING FEEDERS   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 140  | 3.8.5  | 1 nos of 63A,TPN MCCB and 2 no's of 32A TP MCCB 415V,25kA with suitable space provision for 18.5kW VFD unit with bypass Starter (Soft Starter) for AHU, .Having micro processor trip unit with adjustable protection against over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP, lamp test and Emergency stop push buttons.. Auto manual selector switch,VFD/SS Selector switch with respective Start/stop pushbuttons.  | Set  |                      |                         |                    |                         |                     |                    | 1                      |                    | 1              |



| CHENNAI METRO RAIL LIMITED<br>CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4<br>BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS<br>TENDER NO. C4-VAC&TVS-12 |        |   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
|--|--------|---|------|----------------------|-------------------------|--------------------|-------------------------|---------------------|--------------------|------------------------|--------------------|----------------|
| PRICE CENTRE E - VAC & TVS ELECTRICAL WORKS  |        |   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| Ref. No  | Sl.No. | Description   | Unit | LIGHTHOUSE<br>(ST01) | KUTCHERY ROAD<br>(ST03) | ALWARPET<br>(ST05) | BHARATHIDASAN<br>(ST06) | BOAT CLUB<br>(ST07) | NANDANAM<br>(ST08) | PANAGAL PARK<br>(ST10) | KODAMBAKKAM (ST11) | TOTAL QUANTITY |
| 141  | 3.8.6  | 1 nos of 63A,TPN MCCB and 2 no's of 32A TP MCCB 415V,25kA with suitable space provision for 22kW VFD unit with bypass Starter (Soft Starter) for AHU, .Having micro processor trip unit with adjustable protection against over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP, lamp test and Emergency stop push buttons.. Auto manual selector switch,VFD/SS Selector switch with respective Start/stop pushbuttons.   | Set  |                      |                         |                    |                         |                     |                    | 1                      |                    | 1              |
| 142  | 3.8.7  | 32A,TP MCCB, 415V, 25kA suitable space provision for 1.50kW VFD unit (FAF) . Having micro processor trip unit with over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP, Start/stop, Emergency stop push buttons.   | Set  |                      |                         |                    |                         |                     |                    | 1                      |                    | 1              |
| 143  | 3.8.8  | 32A,TP MCCB, 415V, 25kA suitable space provision for 0.25kW VFD unit (FAF) . Having micro processor trip unit with over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP, Start/stop, Emergency stop push buttons.   | Set  |                      |                         |                    |                         |                     |                    | 1                      |                    | 1              |
| 144  | 3.8.9  | 63A,4P, MCCB, 415V, 25kA. Having micro processor unit with adjustable protection against over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP.  | Set  |                      |                         |                    |                         |                     |                    | 1                      |                    | 1              |
| 145  | 3.8.10 | 400A,4P MCCB, 415V, 25kA, - Having micro processor trip unit with adjustable protection against over load, short circuit, earth fault. And LED indication lamps for ON,OFF,TRIP.  | Set  |                      |                         |                    |                         |                     |                    | 1                      |                    | 1              |
| 146  | 3.8.11 | SPARE   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 147  | 3.8.12 | 400A,4P MCCB, 415V, 25kA, - Having micro processor trip unit with adjustable protection against over load, short circuit, earth fault. And LED indication lamps for ON,OFF,TRIP.  | Set  |                      |                         |                    |                         |                     |                    | 1                      |                    | 1              |
| 148  | 3.8.13 | 63A,4P, MCCB, 415V, 25kA. Having micro processor unit with adjustable protection against over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP.  | Set  |                      |                         |                    |                         |                     |                    | 1                      |                    | 1              |
| 149  | 3.8.14 | Panel Enclosure & other Accessories (Exhaust fan, louvers, etc.) as specified in Part-2 Section VII Subsection D Unit-02 Clause 2.4   | Lot  |                      |                         |                    |                         |                     |                    | 1                      |                    | 1              |
| 150  | 3.9    | VAC PANEL -02 NON ESSENTIAL (Smart Panel) with Mimic Diagram,TTA form 4b, type 6 panel, IP54 conforming to specification as specified in Part-2 Section VII SubSection-D Unit-02 and drawings. (Fully Front Accessible panel)   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 151  | 3.9.1  | Incomer:<br>1) Motorized MCCB of 630A,4P,415V and 25kA. Having microprocessor based trip unit with adjustable over load, adjustable short circuit and adjustable earth fault with LCD/LED display and provision for remote tripping, Start/stop push button.<br>2) Surge protection device (SPD) Type-II with inbuilt fuse suitable to withstand required short circuit current<br>3) LED indication lamp for ON, OFF & TRIP, Phase Indication for R,Yand B and Emergency stop push button.<br>4) Auto / Manual Selector Switch with key operated and 1 No TNC switch.<br>5) Digital MFM and 3 Nos. CTs,630/5A, 10VA, CL-0.5, for metering. | Set  |                      |                         |                    |                         |                     |                    | 1                      |                    | 1              |
| 152  | 3.9.2  | Busbar : rated 630 Amps, suitable to withstand symmetrical fault level of 25kA for 1 sec. at 415V as specified in Part-2 Section VII Subsection D Unit-02 Clause 2.6  | Lot  |                      |                         |                    |                         |                     |                    | 1                      |                    | 1              |
| 153  | 3.9.3  | ISMS Connectivity:<br>All the breakers should be provided with control and monitoring facilities,Smart Panel facility with Local touch screen, control panel in front side of the panel. Required PLCs ,relays, contactors ,IO cards, Ethernet switches,SMPS,Control Transformers, cabling works., etc. for functional requirement as specified in Part-2 Section VII Subsection D Unit No.2 Clause 2.28 and drawings. Smart Panel shall be interfacing with ISMS system through Modbus TCP/IP for Control & monitoring.  | Lot  |                      |                         |                    |                         |                     |                    | 1                      |                    | 1              |
| 154  | 3.9.4  | OUTGOING FEEDERS  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 155  | 3.9.5  | 1 nos of 63A,TPN MCCB and 3 no's of 32A TP MCCB 415V,25kA with suitable space provision for 30kW VFD unit with bypass Starter (Soft Starter) for AHU,. Having microprocessor trip unit with adjustable protection against over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP, lamp test and Emergency stop push buttons.. Auto manual selector switch,VFD/SS Selector switch with respective Start/stop pushbuttons.  | Set  |                      |                         |                    |                         |                     |                    | 1                      |                    | 1              |

| CHENNAI METRO RAIL LIMITED<br>CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4<br>BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS<br>TENDER NO. C4-VAC&TVS-12 |        |  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
|--|--------|--|------|----------------------|-------------------------|--------------------|-------------------------|---------------------|--------------------|------------------------|--------------------|----------------|
| PRICE CENTRE E - VAC & TVS ELECTRICAL WORKS  |        |  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| Ref. No  | SL.No. | Description  | Unit | LIGHTHOUSE<br>(ST01) | KUTCHERY ROAD<br>(ST03) | ALWARPET<br>(ST05) | BHARATHIDASAN<br>(ST06) | BOAT CLUB<br>(ST07) | NANDANAM<br>(ST08) | PANAGAL PARK<br>(ST10) | KODAMBAKKAM (ST11) | TOTAL QUANTITY |
| 156  | 3.9.6  | 1 nos of 63A,TPN, MCCB and 2 no's of 32A TP MCCB 415V,25kA with suitable space provision for 15kW VFD unit with bypass Starter (Soft Starter) for AHU. Having microprocessor trip unit with adjustable protection against over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP, lamp test and Emergency stop push buttons.. Auto manual selector switch,VFD/SS Selector switch with respective Start/stop pushbuttons.   | Set  |                      |                         |                    |                         |                     |                    | 1                      |                    | 1              |
| 157  | 3.9.7  | 32A,TP MCCB, 415V, 25kA suitable space provision for 4kW VFD unit (FAF) . Having microprocessor trip unit unit with over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP, Start/stop, Emergency stop push buttons.   | Set  |                      |                         |                    |                         |                     |                    | 1                      |                    | 1              |
| 158  | 3.9.8  | 32A,TP MCCB, 415V, 25kA suitable space provision for 1.5kW VFD unit (FAF) . Having microprocessor trip unit with over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP, Start/stop, Emergency stop push buttons.  | Set  |                      |                         |                    |                         |                     |                    | 1                      |                    | 1              |
| 159  | 3.9.9  | 100A,TP MCCB,415V,25kA.suitable space provision for 37kW VFD (EXF), Having microprocessor trip unit with adjustable protection against over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP, Start/stop,Emergency stop push buttons.   | Set  |                      |                         |                    |                         |                     |                    | 2                      |                    | 2              |
| 160  | 3.9.10 | 16A,TP MPCB, 415V, 16kA.suitable 5.5KW (TSF), Star-Delta starter with over load, short circuit. And LED indication lamps for ON,OFF,TRIP, Start/stop, Emergency stop push buttons.   | Set  |                      |                         |                    |                         |                     |                    | 1                      |                    | 1              |
| 161  | 3.9.11 | 16A,TP MPCB, 415V, 16kA. With 3KW (TEF), DOL starter with over load, short circuit. And LED indication lamps for ON,OFF,TRIP, Start/stop, Emergency stop push buttons.   | Set  |                      |                         |                    |                         |                     |                    | 1                      |                    | 1              |
| 162  | 3.9.12 | 400A,4P MCCB, 415V, 25kA, - Having Mirocprocessor trip unit with adjustable protection against over load, short circuit and adjustable earth fault .And LED indication lamps for ON,OFF,TRIP.  | Set  |                      |                         |                    |                         |                     |                    | 1                      |                    | 1              |
| 163  | 3.9.13 | SPARE  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 164  | 3.9.14 | 400A,4P MCCB, 415V, 25kA, - Having Mirocprocessor trip unit with adjustable protection against over load, short circuit and adjustable earth fault .And LED indication lamps for ON,OFF,TRIP.  | Set  |                      |                         |                    |                         |                     |                    | 1                      |                    | 1              |
| 165  | 3.9.15 | 63A,TPN MCCB, 415V, 25kA. Having microprocessor trip unit with adjustable protection against over load, short circuit and adjustable earth fault , And LED indication lamps for ON,OFF,TRIP.   | Set  |                      |                         |                    |                         |                     |                    | 1                      |                    | 1              |
| 166  | 3.9.16 | Panel Enclosure & other Accessories (Exhaust fan, louvers, etc.) as specified in Part-2 Section VII Subsection D Unit-02 Clause 2.4  | Lot  |                      |                         |                    |                         |                     |                    | 1                      |                    | 1              |
| 167  | 3.10   | VAC PANEL - NON ESSENTIAL (Smart Panel) with Mimic Diagram,TTA form 4b, type 6 panel, IP54 conforming to specification as specified in Part-2 Section VII SubSection-D Unit-02 and drawings. (Fully Front Accessible panel)  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 168  | 3.10.1 | Incomer:<br>1) Motorized MCCB of 400A,4P,415V and 25kA. Having microprocessor based trip unit with adjustable over load, adjustable short circuit and adjustable earth fault with LCD/LED display and provision for remote tripping, Start/stop push button.<br>2) Surge protection device (SPD) Type-II with inbuilt fuse suitable to withstand required short circuit current<br>3) LED indication lamp for ON, OFF & TRIP, Phase Indication for R,Yand B and Emergency stop push button.<br>4) Auto / Manual Selector Switch with key operated and 1 No TNC switch.<br>5) Digital MFM and 3 Nos. CTs, 400/5A, 10VA, CL-0.5, for metering. | Set  |                      |                         |                    |                         |                     |                    |                        | 1                  | 1              |
| 169  | 3.10.2 | Busbar : rated 400 Amps, suitable to withstand symmetrical fault level of 25kA for 1 sec. at 415V as specified in Part-2 Section VII Subsection D Unit-02 Clause 2.6   | Lot  |                      |                         |                    |                         |                     |                    |                        | 1                  | 1              |

| CHENNAI METRO RAIL LIMITED<br>CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4<br>BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS<br>TENDER NO. C4-VAC&TVS-12 |         |   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
|--|---------|---|------|----------------------|-------------------------|--------------------|-------------------------|---------------------|--------------------|------------------------|--------------------|----------------|
| PRICE CENTRE E - VAC & TVS ELECTRICAL WORKS  |         |   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| Ref. No  | SL.No.  | Description   | Unit | LIGHTHOUSE<br>(ST01) | KUTCHERY ROAD<br>(ST03) | ALWARPET<br>(ST05) | BHARATHIDASAN<br>(ST06) | BOAT CLUB<br>(ST07) | NANDANAM<br>(ST08) | PANAGAL PARK<br>(ST10) | KODAMBAKKAM (ST11) | TOTAL QUANTITY |
| 170  | 3.10.3  | <b>ISMS Connectivity:</b><br>All the breakers should be provided with control and monitoring facilities,Smart Panel facility with Local touch screen, control panel in front side of the panel. Required PLCs ,relays, contactors ,IO cards, Ethernet switches,SMPS,Control Transformers, cabling works., etc. for functional requirement as specified in Part-2 Section VII Subsection D Unit No.2 Clause 2.28 and drawings. Smart Panel shall be interfacing with ISMS system through Modbus TCP/IP for Control & monitoring. | Lot  |                      |                         |                    |                         |                     |                    |                        | 1                  | 1              |
| 171  | 3.10.4  | <b>OUTGOING FEEDERS</b>   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 172  | 3.10.5  | 1 nos of 100A,TP MCCB and 4 no's of 32A TP MCCB 415V, 25kA with suitable space provision for 55kW VFD unit with bypass Starter (Soft Starter)for AHU Having Micro processor trip unit with adjustable protection against over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP, lamp test and Emergency stop push buttons.. Auto manual selector switch,VFD/SS Selector switch with respective Start/stop pushbuttons.   | Set  |                      |                         |                    |                         |                     |                    |                        | 1                  | 1              |
| 173  | 3.10.6  | 1 nos of 63A,TP MCCB and 3no's of 32A TP MCCB 415V, 25kA with suitable space provision for 30kW VFD unit with bypass Starter (Soft Starter) for AHU, Having Micro processor trip unit with adjustable protection against over load, short circuit and adjustable earth fault And LED indication lamps for ON,OFF,TRIP, lamp test and Emergency stop push buttons.. Auto manual selector switch,VFD/SS Selector switch with respective Start/stop pushbuttons.   | Set  |                      |                         |                    |                         |                     |                    |                        | 1                  | 1              |
| 174  | 3.10.7  | 1 nos of 63A,TP MCCB and 2 no's of 32A TP MCCB 415V, 25kA with suitable space provision for 30kW VFD unit with bypass Starter (Soft Starter) for AHU, Having Micro processor trip unit with adjustable protection against over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP, lamp test and Emergency stop push buttons.. Auto manual selector switch,VFD/SS Selector switch with respective Start/stop pushbuttons.  | Set  |                      |                         |                    |                         |                     |                    |                        | 1                  | 1              |
| 175  | 3.10.8  | 32A,TP MCCB, 415V, 25kA suitable space provision for 7.5kW VFD unit (FAF) . Having Micro processor trip unit with over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP, Start/stop, Emergency stop push buttons.  | Set  |                      |                         |                    |                         |                     |                    |                        | 1                  | 1              |
| 176  | 3.10.9  | 32A,TP MCCB, 415V, 25kA suitable space provision for 1.50kW VFD unit (FAF) . Having Micro processor trip unit with over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP, Start/stop, Emergency stop push buttons.   | Set  |                      |                         |                    |                         |                     |                    |                        | 1                  | 1              |
| 177  | 3.10.10 | 16A,TP MPCB, 415V, 25kA with 1.50kW DOL Starter unit (TSF) . Having microprocessor trip unit with over load, short circuit. And LED indication lamps for ON,OFF,TRIP, Start/stop, Emergency stop push buttons.  | Set  |                      |                         |                    |                         |                     |                    |                        | 1                  | 1              |
| 178  | 3.10.11 | 16A,TP MPCB, 415V, 25kA with 2.20kW DOL Starter unit (TEF) . Having microprocessor trip unit with over load, short circuit. And LED indication lamps for ON,OFF,TRIP, Start/stop, Emergency stop push buttons.  | Set  |                      |                         |                    |                         |                     |                    |                        | 1                  | 1              |
| 179  | 3.10.12 | 32A,4P,415V,25kA, MCCB with Start/stop push buttons , Having Micro processor trip unit with over load, short circuit and adjustable earth fault . And LED indication lamps for ON,OFF,TRIP.   | Set  |                      |                         |                    |                         |                     |                    |                        | 1                  | 1              |
| 180  | 3.10.13 | <b>SPARES:-</b>   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |

| CHENNAI METRO RAIL LIMITED<br>CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4<br>BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS<br>TENDER NO. C4-VAC&TVS-12 |         |   |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
|--|---------|---|------|-------------------|----------------------|-----------------|----------------------|------------------|-----------------|---------------------|--------------------|----------------|
| PRICE CENTRE E - VAC & TVS ELECTRICAL WORKS  |         |   |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| Ref. No  | Sl.No.  | Description   | Unit | LIGHTHOUSE (ST01) | KUTCHERY ROAD (ST03) | ALWARPET (ST05) | BHARATHIDASAN (ST06) | BOAT CLUB (ST07) | NANDANAM (ST08) | PANAGAL PARK (ST10) | KODAMBAKKAM (ST11) | TOTAL QUANTITY |
| 181  | 3.10.14 | 100A,TP MCCB, 415V, 25kA, Having Micro processor trip unit with adjustable protection against over load, short circuit and adjustable earth fault And LED indication lamps for ON,OFF,TRIP.   | Set  |                   |                      |                 |                      |                  |                 |                     | 1                  | 1              |
| 182  | 3.10.15 | 63A,TPN MCCB, 415V, 25kA, Having Micro processor trip unit with adjustable protection against over load, short circuit and adjustable earth fault And LED indication lamps for ON,OFF,TRIP.   | Set  |                   |                      |                 |                      |                  |                 |                     | 1                  | 1              |
| 183  | 3.10.16 | Panel Enclosure & other Accessories (Exhaust fan, louvers, etc.) as specified in Part-2 Section VII Subsection D Unit-02 Clause 2.4   | Lot  |                   |                      |                 |                      |                  |                 |                     | 1                  | 1              |
| 184  | 3.11    | <b>VRV PANEL -01 NON-ESSENTIAL (Smart Panel) with Mimic Diagram, TTA form 4b, type 6 panel, IP54 conforming to specification specified in Part-2 Section VII SubSection-D Unit-02 and drawings. (Fully Front Accessible panel)</b>  |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 185  | 3.11.1  | Incomer:<br>1) 630A,4P,415V,25kA, Motorized MCCB Having microprocessor based trip unit with adjustable over load, adjustable short circuit and adjustable earth fault with LCD/LED display and provision for remote tripping,start/stop push button.<br>2) Surge protection device (SPD) Type-II with inbuilt fuse suitable to withstand required short circuit current.<br>3) LED indication lamp for ON, OFF & TRIP, Phase Indication for R, Y and B and Emergency stop & Lamp test Push buttons<br>4) Auto / Manual Selector Switch with key operated and 1 No TNC switch<br>5) Digital MFM and 3 Nos. CTs, 630/5A, 10VA, CL-0.5 for metering. | Set  | 1                 |                      |                 |                      |                  |                 |                     |                    | 1              |
| 186  | 3.11.2  | Busbar: rated 630 Amps, suitable to withstand symmetrical fault level of 25kA for 1 second at 415V as specified in Part-2 Section VII Subsection D Unit-02 Clause 2.7   | Lot  | 1                 |                      |                 |                      |                  |                 |                     |                    | 1              |
| 187  | 3.11.3  | <b>ISMS Connectivity:</b><br>All the breakers should be provided with control and monitoring facilities,Smart Panel facility with Local touch screen, control panel in front side of the panel. Required PLCs ,relays, contactors ,IO cards, Ethernet switches,SMPS,Control Transformers, cabling works., etc. for functional requirement as specified in Part-2 Section VII Subsection D Unit No.2 Clause 2.28 and drawings. Smart Panel shall be interfacing with ISMS system through Modbus TCP/IP for Control & monitoring.   | Lot  | 1                 |                      |                 |                      |                  |                 |                     |                    | 1              |
| 188  | 3.11.4  | <b>OUTGOING FEEDERS</b>   |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 189  | 3.11.5  | 40A,4P MCCB, 415V, 25kA, Having Micro processor trip unit with LSIG Protection. And LED indication lamps for ON,OFF,TRIP. KWH Meter shall be considered and shall be based on circuit wise (Cooling)  | Set  | 25                |                      |                 |                      |                  |                 |                     |                    | 25             |
| 190  | 3.11.6  | <b>SPARE:-</b>  |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 191  | 3.11.7  | 40A,4P MCCB, 415V, 25kA, Having Micro processor trip unit with LSIG Protection. And LED indication lamps for ON,OFF,TRIP.   | Set  | 5                 |                      |                 |                      |                  |                 |                     |                    | 5              |
| 192  | 3.11.8  | Panel Enclosure & other Accessories as specified in Part-2 Section VII Subsection D Clause 2.4  | Lot  | 1                 |                      |                 |                      |                  |                 |                     |                    | 1              |
| 193  | 3.12    | <b>VRV PANEL -01 NON-ESSENTIAL (Smart Panel) with Mimic Diagram, TTA form 4b, type 6 panel, IP54 conforming to specification specified in Part-2 Section VII SubSection-D Unit-02 and drawings. (Fully Front Accessible panel)</b>  |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 194  | 3.12.1  | Incomer:<br>1) 400A,4P,415V,25kA, Motorized MCCB Having microprocessor based trip unit with adjustable over load, adjustable short circuit and adjustable earth fault with LCD/LED display and provision for remote tripping,start/stop push button.<br>2) Surge protection device (SPD) Type-II with inbuilt fuse suitable to withstand required short circuit current.<br>3) LED indication lamp for ON, OFF & TRIP, Phase Indication for R, Y and B and Emergency stop & Lamp test Push buttons<br>4) Auto / Manual Selector Switch with key operated and 1 No TNC switch<br>5) Digital MFM and 3 Nos. CTs, 400/5A, 10VA, CL-0.5 for metering. | Set  |                   | 1                    | 1               |                      |                  |                 |                     |                    | 2              |
| 195  | 3.12.2  | Busbar: rated 400 Amps, suitable to withstand symmetrical fault level of 25kA for 1 second at 415V as specified in Part-2 Section VII Subsection D Unit-02 Clause 2.7   | Lot  |                   | 1                    | 1               |                      |                  |                 |                     |                    | 2              |
| 196  | 3.12.3  | <b>ISMS Connectivity:</b><br>All the breakers should be provided with control and monitoring facilities,Smart Panel facility with Local touch screen, control panel in front side of the panel. Required PLCs ,relays, contactors ,IO cards, Ethernet switches,SMPS,Control Transformers, cabling works., etc. for functional requirement as specified in Part-2 Section VII Subsection D Unit No.2 Clause 2.28 and drawings. Smart Panel shall be interfacing with ISMS system through Modbus TCP/IP for Control & monitoring.   | Lot  |                   | 1                    | 1               |                      |                  |                 |                     |                    | 2              |
| 197  | 3.12.4  | <b>OUTGOING FEEDERS</b>   |      |                   |                      |                 |                      |                  |                 |                     |                    |                |

| CHENNAI METRO RAIL LIMITED<br>CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4<br>BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS<br>TENDER NO. C4-VAC&TVS-12 |        |   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
|--|--------|---|------|----------------------|-------------------------|--------------------|-------------------------|---------------------|--------------------|------------------------|--------------------|----------------|
| PRICE CENTRE E - VAC & TVS ELECTRICAL WORKS  |        |   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| Ref. No  | Sl.No. | Description   | Unit | LIGHTHOUSE<br>(ST01) | KUTCHERY ROAD<br>(ST03) | ALWARPET<br>(ST05) | BHARATHIDASAN<br>(ST06) | BOAT CLUB<br>(ST07) | NANDANAM<br>(ST08) | PANAGAL PARK<br>(ST10) | KODAMBAKKAM (ST11) | TOTAL QUANTITY |
| 198  | 3.12.5 | 40A,4P MCCB, 415V, 25kA, Having Micro processor trip unit with LSIG Protection. And LED indication lamps for ON,OFF,TRIP. KWH Meter shall be considered and shall be based on circuit wise (Cooling)  | Set  |                      | 16                      | 8                  |                         |                     |                    |                        |                    | 24             |
| 199  | 3.12.6 | SPARE:-   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 200  | 3.12.7 | 40A,4P MCCB, 415V, 25kA, Having Micro processor trip unit with LSIG Protection. And LED indication lamps for ON,OFF,TRIP.   | Set  |                      | 4                       | 2                  |                         |                     |                    |                        |                    | 6              |
| 201  | 3.12.8 | Panel Enclosure & other Accessories as specified in Part-2 Section VII Subsection D Unit -2 Clause 2.4  | Lot  |                      | 1                       | 1                  |                         |                     |                    |                        |                    | 2              |
| 202  | 3.13   | VRV PANEL -01 NON-ESSENTIAL (Smart Panel) with Mimic Diagram, TTA form 4b, type 6 panel, IP54 conforming to specification specified in Part-2 Section VII SubSection-D Unit-02 and drawings. (Fully Front Accessible panel)   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 203  | 3.13.1 | Incomer:<br>1) 800A,4P,415V,50kA, Motorized ACB Having microprocessor based trip unit with adjustable over load, adjustable short circuit and adjustable earth fault with LCD/LED display and provision for remote tripping,start/stop push button.<br>2) Surge protection device (SPD) Type-II with inbuilt fuse suitable to withstand required short circuit current.<br>3) LED indication lamp for ON, OFF & TRIP, Phase Indication for R, Y and B and Emergency stop & Lamp test Push buttons<br>4) Auto / Manual Selector Switch with key operated and 1 No TNC switch<br>5) Digital MFM and 3 Nos. CTs, 800/5A, 10VA, CL-0.5 for metering.  | Set  |                      |                         |                    | 1                       |                     |                    |                        |                    | 1              |
| 204  | 3.13.2 | Busbar: rated 800 Amps, suitable to withstand symmetrical fault level of 50kA for 1 second at 415V as specified in Part-2 Section VII Subsection D Unit-02 Clause 2.7   | Lot  |                      |                         |                    | 1                       |                     |                    |                        |                    | 1              |
| 205  | 3.13.3 | ISMS Connectivity:<br>All the breakers should be provided with control and monitoring facilities,Smart Panel facility with Local touch screen, control panel in front side of the panel. Required PLCs ,relays, contactors ,IO cards, Ethernet switches,SMPS,Control Transformers, cabling works., etc. for functional requirement as specified in Part-2 Section VII Subsection D Unit No.2 Clause 2.28 and drawings. Smart Panel shall be interfacing with ISMS system through Modbus TCP/IP for Control & monitoring.  | Lot  |                      |                         |                    | 1                       |                     |                    |                        |                    | 1              |
| 206  | 3.13.4 | OUTGOING FEEDERS  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 207  | 3.13.5 | 40A,4P MCCB, 415V, 25kA, Having Micro processor trip unit with LSIG Protection. And LED indication lamps for ON,OFF,TRIP. KWH Meter shall be considered and shall be based on circuit wise (Cooling)  | Set  |                      |                         |                    | 22                      |                     |                    |                        |                    | 22             |
| 208  | 3.13.6 | 32A,4P MCCB, 415V, 25kA, Having Micro processor trip unit with adjustable protection against over load, short circuit and earth fault And LED indication lamps for ON,OFF,TRIP.   | Set  |                      |                         |                    | 1                       |                     |                    |                        |                    | 1              |
| 209  | 3.13.7 | SPARE:-   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 210  | 3.13.8 | 40A,4P MCCB, 415V, 25kA, Having Micro processor trip unit with LSIG Protection. And LED indication lamps for ON,OFF,TRIP.   | Set  |                      |                         |                    | 5                       |                     |                    |                        |                    | 5              |
| 211  | 3.13.9 | Panel Enclosure & other Accessories as specified in Part-2 Section VII Subsection D Unit -2 Clause 2.4  | Lot  |                      |                         |                    | 1                       |                     |                    |                        |                    | 1              |
| 212  | 3.14   | VRV PANEL-02 NON-ESSENTIAL (Smart Panel) with Mimic Diagram, TTA form 4b, type 6 panel, IP54 conforming to specification specified in Part-2 Section VII SubSection-D Unit-02 and drawings. (Fully Front Accessible panel)  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 213  | 3.14.1 | Incomer:<br>1) 200A,4P,415V,25kA, Motorized MCCB Having microprocessor based trip unit with adjustable over load, adjustable short circuit and adjustable earth fault with LCD/LED display and provision for remote tripping,start/stop push button.<br>2) Surge protection device (SPD) Type-II with inbuilt fuse suitable to withstand required short circuit current.<br>3) LED indication lamp for ON, OFF & TRIP, Phase Indication for R, Y and B and Emergency stop & Lamp test Push buttons<br>4) Auto / Manual Selector Switch with key operated and 1 No TNC switch<br>5) Digital MFM and 3 Nos. CTs, 200/5A, 10VA, CL-0.5 for metering. | Set  |                      | 1                       |                    |                         |                     |                    |                        |                    | 1              |
| 214  | 3.14.2 | Busbar: rated 200 Amps, suitable to withstand symmetrical fault level of 25kA for 1 second at 415V as specified in Part-2 Section VII Subsection D Unit-02 Clause 2.6   | Lot  |                      | 1                       |                    |                         |                     |                    |                        |                    | 1              |
| 215  | 3.14.3 | ISMS Connectivity:<br>All the breakers should be provided with control and monitoring facilities,Smart Panel facility with Local touch screen, control panel in front side of the panel. Required PLCs ,relays, contactors ,IO cards, Ethernet switches,SMPS,Control Transformers, cabling works., etc. for functional requirement as specified in Part-2 Section VII Subsection D Unit No.2 Clause 2.28 and drawings. Smart Panel shall be interfacing with ISMS system through Modbus TCP/IP for Control & monitoring.  | Lot  |                      | 1                       |                    |                         |                     |                    |                        |                    | 1              |
| 216  | 3.14.4 | OUTGOING FEEDERS  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 217  | 3.14.5 | 40A,4P MCCB, 415V, 25kA, Having Micro processor trip unit with LSIG Protection. And LED indication lamps for ON,OFF,TRIP. KWH Meter shall be considered and shall be based on circuit wise (Cooling)  | Set  |                      | 10                      |                    |                         |                     |                    |                        |                    | 10             |



| CHENNAI METRO RAIL LIMITED<br>CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4<br>BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS<br>TENDER NO. C4-VAC&TVS-12 |        |   |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
|--|--------|---|------|-------------------|----------------------|-----------------|----------------------|------------------|-----------------|---------------------|--------------------|----------------|
| PRICE CENTRE E - VAC & TVS ELECTRICAL WORKS  |        |   |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| Ref. No  | Sl.No. | Description   | Unit | LIGHTHOUSE (ST01) | KUTCHERY ROAD (ST03) | ALWARPET (ST05) | BHARATHIDASAN (ST06) | BOAT CLUB (ST07) | NANDANAM (ST08) | PANAGAL PARK (ST10) | KODAMBAKKAM (ST11) | TOTAL QUANTITY |
| 218  | 3.14.6 | 32A,4P MCCB, 415V, 25kA, Having Micro processor trip unit with adjustable protection against over load, short circuit and earth fault And LED indication lamps for ON,OFF,TRIP, Start/stop push buttons.  | Set  |                   | 1                    |                 |                      |                  |                 |                     |                    | 1              |
| 219  | 3.14.7 | SPARE:-   |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 220  | 3.14.8 | 40A,4P MCCB, 415V, 25kA, Having Micro processor trip unit with LSIG Protection. And LED indication lamps for ON,OFF,TRIP.   | Set  |                   | 2                    |                 |                      |                  |                 |                     |                    | 2              |
| 221  | 3.14.9 | Panel Enclosure & other Accessories as specified in Part-2 Section VII Subsection D Clause 2.4  | Lot  |                   | 1                    |                 |                      |                  |                 |                     |                    | 1              |
| 222  | 3.15   | VRV PANEL-02 NON-ESSENTIAL (Smart Panel) with Mimic Diagram, TTA form 4b, type 6 panel, IP54 conforming to specification specified in Part-2 Section VII SubSection-D Unit-02 and drawings. (Fully Front Accessible panel)  |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 223  | 3.15.1 | Incomer:<br>1) 630A,4P,415V,25kA, Motorized MCCB Having microprocessor based trip unit with adjustable over load, adjustable short circuit and adjustable earth fault with LCD/LED display and provision for remote tripping,start/stop push button.<br>2) Surge protection device (SPD) Type-II with inbuilt fuse suitable to withstand required short circuit current.<br>3) LED indication lamp for ON, OFF & TRIP, Phase Indication for R, Y and B and Emergency stop & Lamp test Push buttons<br>4) Auto / Manual Selector Switch with key operated and 1 No TNC switch<br>5) Digital MFM and 3 Nos. CTs, 630/5A, 10VA, CL-0.5 for metering. | Set  |                   |                      | 1               |                      |                  |                 |                     |                    | 1              |
| 224  | 3.15.2 | Busbar: rated 630 Amps, suitable to withstand symmetrical fault level of 25kA for 1 second at 415V as specified in Part-2 Section VII Subsection D Unit-02 Clause 2.6   | Lot  |                   |                      | 1               |                      |                  |                 |                     |                    | 1              |
| 225  | 3.15.3 | ISMS Connectivity:<br>All the breakers should be provided with control and monitoring facilities,Smart Panel facility with Local touch screen, control panel in front side of the panel. Required PLCs ,relays, contactors ,IO cards, Ethernet switches,SMPS,Control Transformers, cabling works., etc. for functional requirement as specified in Part-2 Section VII Subsection D Unit No.2 Clause 2.28 and drawings. Smart Panel shall be interfacing with ISMS system through Modbus TCP/IP for Control & monitoring.  | Lot  |                   |                      | 1               |                      |                  |                 |                     |                    | 1              |
| 226  | 3.15.4 | OUTGOING FEEDERS  |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 227  | 3.15.5 | 40A,4P MCCB, 415V, 25kA, Having Micro processor trip unit with LSIG Protection. And LED indication lamps for ON,OFF,TRIP. KWH Meter shall be considered and shall be based on circuit wise (Cooling)  | Set  |                   |                      | 20              |                      |                  |                 |                     |                    | 20             |
| 228  | 3.15.6 | 32A,4P,415V,25kA, MCCB with Start/stop push buttons , Having microprocessor trip unit with over load, short circuit and earth fault . And LED indication lamps for ON,OFF,TRIP.   | Set  |                   |                      | 1               |                      |                  |                 |                     |                    | 1              |
| 229  | 3.15.7 | SPARE:-   |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 230  | 3.15.8 | 40A,4P MCCB, 415V, 25kA, Having Micro processor trip unit with LSIG Protection. And LED indication lamps for ON,OFF,TRIP.   | Set  |                   |                      | 5               |                      |                  |                 |                     |                    | 5              |
| 231  | 3.15.9 | Panel Enclosure & other Accessories as specified in Part-2 Section VII Subsection D Clause 2.4  | Lot  |                   |                      | 1               |                      |                  |                 |                     |                    | 1              |
| 232  | 3.16   | VRV PANEL -01 NON-ESSENTIAL (Smart Panel) with Mimic Diagram, TTA form 4b, type 6 panel, IP54 conforming to specification specified in Part-2 Section VII SubSection-D Unit-02 and drawings. (Fully Front Accessible panel)   |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 233  | 3.16.1 | Incomer:<br>1) 800A,4P,415V,50kA, ACB Having microprocessor based trip unit with adjustable over load, adjustable short circuit and adjustable earth fault with LCD/LED display and provision for remote tripping,start/stop push button.<br>2) Surge protection device (SPD) Type-II with inbuilt fuse suitable to withstand required short circuit current.<br>3) LED indication lamp for ON, OFF & TRIP, Phase Indication for R, Y and B and Emergency stop & Lamp test Push buttons<br>4) Auto / Manual Selector Switch with key operated and 1 No TNC switch<br>5) Digital MFM and 3 Nos. CTs, 800/5A, 10VA, CL-0.5 for metering.            | Set  |                   |                      |                 |                      | 1                |                 |                     |                    | 1              |
| 234  | 3.16.2 | Busbar: rated 800 Amps, suitable to withstand symmetrical fault level of 50kA for 1 second at 415V as specified in Part-2 Section VII Subsection D Unit-02 Clause 2.7   | Lot  |                   |                      |                 |                      | 1                |                 |                     |                    | 1              |
| 235  | 3.16.3 | ISMS Connectivity:<br>All the breakers should be provided with control and monitoring facilities,Smart Panel facility with Local touch screen, control panel in front side of the panel. Required PLCs ,relays, contactors ,IO cards, Ethernet switches,SMPS,Control Transformers, cabling works., etc. for functional requirement as specified in Part-2 Section VII Subsection D Unit No.2 Clause 2.28 and drawings. Smart Panel shall be interfacing with ISMS system through Modbus TCP/IP for Control & monitoring.  | Lot  |                   |                      |                 |                      | 1                |                 |                     |                    | 1              |
| 236  | 3.16.4 | OUTGOING FEEDERS  |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 237  | 3.16.5 | 40A,4P MCCB, 415V, 25kA, Having Micro processor trip unit with LSIG Protection. And LED indication lamps for ON,OFF,TRIP. KWH Meter shall be considered and shall be based on circuit wise (Cooling)  | Set  |                   |                      |                 |                      | 27               |                 |                     |                    | 27             |
| 238  | 3.16.6 | SPARE:-   |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 239  | 3.16.7 | 40A,4P MCCB, 415V, 25kA, Having Micro processor trip unit with LSIG Protection. And LED indication lamps for ON,OFF,TRIP.   | Set  |                   |                      |                 |                      | 6                |                 |                     |                    | 6              |
| 240  | 3.16.8 | Panel Enclosure & other Accessories as specified in Part-2 Section VII Subsection D Unit -2 Clause 2.4  | Lot  |                   |                      |                 |                      | 1                |                 |                     |                    | 1              |



| CHENNAI METRO RAIL LIMITED<br>CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4<br>BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS<br>TENDER NO. C4-VAC&TVS-12 |        |   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
|--|--------|---|------|----------------------|-------------------------|--------------------|-------------------------|---------------------|--------------------|------------------------|--------------------|----------------|
| PRICE CENTRE E - VAC & TVS ELECTRICAL WORKS  |        |   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| Ref. No  | Sl.No. | Description   | Unit | LIGHTHOUSE<br>(ST01) | KUTCHERY ROAD<br>(ST03) | ALWARPET<br>(ST05) | BHARATHIDASAN<br>(ST06) | BOAT CLUB<br>(ST07) | NANDANAM<br>(ST08) | PANAGAL PARK<br>(ST10) | KODAMBAKKAM (ST11) | TOTAL QUANTITY |
| 241  | 3.17   | VRV PANEL NON-ESSENTIAL (Smart Panel) with Mimic Diagram, TTA form 4b, type 6 panel, IP54 conforming to specification specified in Part-2 Section VII SubSection-D Unit-02 and drawings. (Fully Front Accessible panel)   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 242  | 3.17.1 | Incomer:<br>1) 1000A,4P,415V,50kA, Motorized ACB draw out type Having microprocessor based trip unit with adjustable over load, adjustable short circuit and adjustable earth fault with LCD/LED display and provision for remote tripping, Start/stop push button.<br>2) Surge protection device (SPD) Type-II with inbuilt fuse suitable to withstand required short circuit current.<br>3) LED indication lamp for ON, OFF & TRIP, Phase Indication for R,Yand B, Lamp Test and Emergency stop push button.<br>4) Auto / Manual Selector Switch with key operated and 1 No TNC switch.<br>5) Digital MFM and 3 Nos. CTs, 1000/5A, 10VA, CL-0.5 for metering. | Set  |                      |                         |                    |                         |                     | 1                  |                        |                    | 1              |
| 243  | 3.17.2 | Busbar: rated 1000 Amps, suitable to withstand symmetrical fault level of 50kA for 1 second at 415V as specified in Part-2 Section VII Subsection D Unit-02 Clause 2.7  | Lot  |                      |                         |                    |                         |                     | 1                  |                        |                    | 1              |
| 244  | 3.17.3 | ISMS Connectivity:<br>All the breakers should be provided with control and monitoring facilities,Smart Panel facility with Local touch screen, control panel in front side of the panel. Required PLCs ,relays, contactors ,IO cards, Ethernet switches,SMPS,Control Transformers, cabling works., etc. for functional requirement as specified in Part-2 Section VII Subsection D Unit No.2 Clause 2.28 and drawings. Smart Panel shall be interfacing with ISMS system through Modbus TCP/IP for Control & monitoring.  | Lot  |                      |                         |                    |                         |                     | 1                  |                        |                    | 1              |
| 245  | 3.17.4 | OUTGOING FEEDERS  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 246  | 3.17.5 | 40A,4P MCCB, 415V, 25kA, Having Micro processor trip unit with LSIG Protection. And LED indication lamps for ON,OFF,TRIP. KWH Meter shall be considered and shall be based on circuit wise (Cooling)  | Set  |                      |                         |                    |                         |                     | 28                 |                        |                    | 28             |
| 247  | 3.17.6 | SPARE:-   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 248  | 3.17.7 | 40A,4P MCCB, 415V, 25kA, Having Micro processor trip unit with LSIG Protection. And LED indication lamps for ON,OFF,TRIP.   | Set  |                      |                         |                    |                         |                     | 6                  |                        |                    | 6              |
| 249  | 3.17.8 | Panel Enclosure & other Accessories as specified in Part-2 Section VII Subsection D Clause 2.4  | Lot  |                      |                         |                    |                         |                     | 1                  |                        |                    | 1              |
| 250  | 3.18   | VRV PANEL -01 NON-ESSENTIAL (Smart Panel) with Mimic Diagram, TTA form 4b, type 6 panel, IP54 conforming to specification specified in Part-2 Section VII SubSection-D Unit-02 and drawings. (Fully Front Accessible panel)   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 251  | 3.18.1 | Incomer:<br>1) 400A,4P,415V,25kA, Motorized MCCB Having microprocessor based trip unit with adjustable over load, adjustable short circuit and adjustable earth fault with LCD/LED display and provision for remote tripping,start/stop push button.<br>2) Surge protection device (SPD) Type-II with inbuilt fuse suitable to withstand required short circuit current.<br>3) LED indication lamp for ON, OFF & TRIP, Phase Indication for R, Y and B and Emergency stop & Lamp test Push buttons<br>4) Auto / Manual Selector Switch with key operated and 1 No TNC switch<br>5) Digital MFM and 3 Nos. CTs, 400/5A, 10VA, CL-0.5 for metering.               | Set  |                      |                         |                    |                         |                     |                    | 1                      |                    | 1              |
| 252  | 3.18.2 | Busbar: rated 400 Amps, suitable to withstand symmetrical fault level of 25kA for 1 second at 415V as specified in Part-2 Section VII Subsection D Unit-02 Clause 2.7   | Lot  |                      |                         |                    |                         |                     |                    | 1                      |                    | 1              |
| 253  | 3.18.3 | ISMS Connectivity:<br>All the breakers should be provided with control and monitoring facilities,Smart Panel facility with Local touch screen, control panel in front side of the panel. Required PLCs ,relays, contactors ,IO cards, Ethernet switches,SMPS,Control Transformers, cabling works., etc. for functional requirement as specified in Part-2 Section VII Subsection D Unit No.2 Clause 2.28 and drawings. Smart Panel shall be interfacing with ISMS system through Modbus TCP/IP for Control & monitoring.  | Lot  |                      |                         |                    |                         |                     |                    | 1                      |                    | 1              |
| 254  | 3.18.4 | OUTGOING FEEDERS  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 255  | 3.18.5 | 40A,4P MCCB, 415V, 25kA, Having Micro processor trip unit with LSIG Protection. And LED indication lamps for ON,OFF,TRIP. KWH Meter shall be considered and shall be based on circuit wise (Cooling)  | Set  |                      |                         |                    |                         |                     |                    | 18                     |                    | 18             |
| 256  | 3.18.6 | SPARE:-   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 257  | 3.18.7 | 40A,4P MCCB, 415V, 25kA, Having Micro processor trip unit with LSIG Protection. And LED indication lamps for ON,OFF,TRIP.   | Set  |                      |                         |                    |                         |                     |                    | 4                      |                    | 4              |
| 258  | 3.18.8 | Panel Enclosure & other Accessories as specified in Part-2 Section VII Subsection D Clause 2.4  | Lot  |                      |                         |                    |                         |                     |                    | 1                      |                    | 1              |
| 259  | 3.19   | VRV PANEL -02 NON-ESSENTIAL (Smart Panel) with Mimic Diagram, TTA form 4b, type 6 panel, IP54 conforming to specification specified in Part-2 Section VII SubSection-D Unit-02 and drawings. (Fully Front Accessible panel)   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |

| CHENNAI METRO RAIL LIMITED<br>CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4<br>BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS<br>TENDER NO. C4-VAC&TVS-12 |        |   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
|--|--------|---|------|----------------------|-------------------------|--------------------|-------------------------|---------------------|--------------------|------------------------|--------------------|----------------|
| PRICE CENTRE E - VAC & TVS ELECTRICAL WORKS  |        |   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| Ref. No  | Sl.No. | Description   | Unit | LIGHTHOUSE<br>(ST01) | KUTCHERY ROAD<br>(ST03) | ALWARPET<br>(ST05) | BHARATHIDASAN<br>(ST06) | BOAT CLUB<br>(ST07) | NANDANAM<br>(ST08) | PANAGAL PARK<br>(ST10) | KODAMBAKKAM (ST11) | TOTAL QUANTITY |
| 260  | 3.19.1 | Incomer:<br>1) 400A,4P,415V,25kA, Motorized MCCB Having microprocessor based trip unit with adjustable over load, adjustable short circuit and adjustable earth fault with LCD/LED display and provision for remote tripping,start/stop push button.<br>2) Surge protection device (SPD) Type-II with inbuilt fuse suitable to withstand required short circuit current.<br>3) LED indication lamp for ON, OFF & TRIP, Phase Indication for R, Y and B and Emergency stop & Lamp test Push buttons<br>4) Auto / Manual Selector Switch with key operated and 1 No TNC switch<br>5) Digital MFM and 3 Nos. CTs,400/5A, 10VA, CL-0.5 for metering.  | Set  |                      |                         |                    |                         |                     |                    | 1                      |                    | 1              |
| 261  | 3.19.2 | Busbar: rated 400 Amps, suitable to withstand symmetrical fault level of 25kA for 1 second at 415V as specified in Part-2 Section VII Subsection D Unit-02 Clause 2.6   | Lot  |                      |                         |                    |                         |                     |                    | 1                      |                    | 1              |
| 262  | 3.19.3 | <b>ISMS Connectivity:</b><br>All the breakers should be provided with control and monitoring facilities,Smart Panel facility with Local touch screen, control panel in front side of the panel. Required PLCs ,relays, contactors ,IO cards, Ethernet switches,SMPS,Control Transformers, cabling works., etc. for functional requirement as specified in Part-2 Section VII Subsection D Unit No.2 Clause 2.28 and drawings. Smart Panel shall be interfacing with ISMS system through Modbus TCP/IP for Control & monitoring.   | Lot  |                      |                         |                    |                         |                     |                    | 1                      |                    | 1              |
| 263  | 3.19.4 | <b>OUTGOING FEEDERS</b>   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 264  | 3.19.5 | 40A,4P MCCB, 415V, 25kA, Having Micro processor trip unit with LSIG Protection. And LED indication lamps for ON,OFF,TRIP. KWH Meter shall be considered and shall be based on circuit wise (Cooling)  | Set  |                      |                         |                    |                         |                     |                    | 10                     |                    | 10             |
| 265  | 3.19.6 | <b>SPARE:-</b>  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 266  | 3.19.7 | 40A,4P MCCB, 415V, 25kA, Having Micro processor trip unit with LSIG Protection. And LED indication lamps for ON,OFF,TRIP.   | Set  |                      |                         |                    |                         |                     |                    | 2                      |                    | 2              |
| 267  | 3.19.8 | Panel Enclosure & other Accessories as specified in Part-2 Section VII Subsection D Clause 2.4  | Lot  |                      |                         |                    |                         |                     |                    | 1                      |                    | 1              |
| 268  | 3.20   | <b>VRV PANEL NON-ESSENTIAL (Smart Panel) with Mimic Diagram, TTA form 4b, type 6 panel, IP54 conforming to specification specified in Part-2 Section VII SubSection-D Unit-02 and drawings. (Fully Front Accessible panel)</b>  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 269  | 3.20.1 | Incomer:<br>1) 630A,4P,415V,36kA, Motorized MCCB Having microprocessor based trip unit with adjustable over load, adjustable short circuit and adjustable earth fault with LCD/LED display and provision for remote tripping,start/stop push button.<br>2) Surge protection device (SPD) Type-II with inbuilt fuse suitable to withstand required short circuit current.<br>3) LED indication lamp for ON, OFF & TRIP, Phase Indication for R, Y and B and Emergency stop & Lamp test Push buttons<br>4) Auto / Manual Selector Switch with key operated and 1 No TNC switch<br>5) Digital MFM and 3 Nos. CTs, 630/5A, 10VA, CL-0.5 for metering. | Set  |                      |                         |                    |                         |                     |                    |                        | 1                  | 1              |
| 270  | 3.20.2 | Busbar: rated 630 Amps, suitable to withstand symmetrical fault level of 36kA for 1 second at 415V as specified in Part-2 Section VII Subsection D Unit-02 Clause 2.7   | Lot  |                      |                         |                    |                         |                     |                    |                        | 1                  | 1              |
| 271  | 3.20.3 | <b>ISMS Connectivity:</b><br>All the breakers should be provided with control and monitoring facilities,Smart Panel facility with Local touch screen, control panel in front side of the panel. Required PLCs ,relays, contactors ,IO cards, Ethernet switches,SMPS,Control Transformers, cabling works., etc. for functional requirement as specified in Part-2 Section VII Subsection D Unit No.2 Clause 2.28 and drawings. Smart Panel shall be interfacing with ISMS system through Modbus TCP/IP for Control & monitoring.   | Lot  |                      |                         |                    |                         |                     |                    |                        | 1                  | 1              |
| 272  | 3.20.4 | <b>OUTGOING FEEDERS</b>   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 273  | 3.20.5 | 40A,4P MCCB, 415V, 25kA, Having Micro processor trip unit with LSIG Protection. And LED indication lamps for ON,OFF,TRIP. KWH Meter shall be considered and shall be based on circuit wise (Cooling)  | Set  |                      |                         |                    |                         |                     |                    |                        | 30                 | 30             |
| 274  | 3.20.6 | <b>SPARE:-</b>  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 275  | 3.20.7 | 40A,4P MCCB, 415V, 25kA, Having Micro processor trip unit with LSIG Protection. And LED indication lamps for ON,OFF,TRIP.   | Set  |                      |                         |                    |                         |                     |                    |                        | 6                  | 6              |
| 276  | 3.20.8 | Panel Enclosure & other Accessories as specified in Part-2 Section VII Subsection D Clause 2.4  | Lot  |                      |                         |                    |                         |                     |                    |                        | 1                  | 1              |
| 277  | 3.21   | <b>OTEF PANEL-01 with Mimic panel, Form 2b panel, IP 54 conforming to LV panels specification specified in Part-2 Section VII Sub Section-D Unit 2 and drawings.</b>  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |

| CHENNAI METRO RAIL LIMITED<br>CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4<br>BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS<br>TENDER NO. C4-VAC&TVS-12 |         |   |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
|--|---------|---|------|-------------------|----------------------|-----------------|----------------------|------------------|-----------------|---------------------|--------------------|----------------|
| PRICE CENTRE E - VAC & TVS ELECTRICAL WORKS  |         |   |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| Ref. No  | Sl.No.  | Description   | Unit | LIGHTHOUSE (ST01) | KUTCHERY ROAD (ST03) | ALWARPET (ST05) | BHARATHIDASAN (ST06) | BOAT CLUB (ST07) | NANDANAM (ST08) | PANAGAL PARK (ST10) | KODAMBAKKAM (ST11) | TOTAL QUANTITY |
| 278  | 3.21.1  | Incomer:-<br>1) 400A,4P,415V,25kA, Motorized MCCB (with Electrical & Mechanical interlock capable of Automatic Change over of power supplies). Having microprocessor based trip unit with adjustable over load, adjustable short circuit and adjustable earth fault with LCD/LED display and provision for remote tripping,Start/stop push button.<br>2) Surge protection device (SPD) Type-II with inbuilt fuse suitable to withstand required short circuit current.<br>3) LED indication lamp for ON, OFF & TRIP, Phase Indication for R, Y and B & Lamp test Push buttons.<br>4) Auto / Manual Selector Switch with key operated and 1 No TNC switch.<br>5) Digital MFM and 3 Nos. CTs, 400/5A, 10VA, CL-0.5 for metering.              | Set  | 2                 |                      |                 |                      |                  |                 |                     |                    | 2              |
| 279  | 3.21.2  | Busbar - Rated 400 Amps, suitable to withstand symmetrical fault level of 25kA for 1 second at 415 volts as specified in Part-2 Section VII Subsection D Unit 02 Clause 2.6 and drawings  | Lot  | 1                 |                      |                 |                      |                  |                 |                     |                    | 1              |
| 280  | 3.21.3  | <b>OUT GOING FEEDERS</b>  |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 281  | 3.21.4  | 200A,TP MCCB,415V,25kA. Having Thermal magnetic trip unit with over load, short circuit. And LED indication lamps for ON,OFF,TRIP,and lamp test push button.  | Set  | 2                 |                      |                 |                      |                  |                 |                     |                    | 2              |
| 282  | 3.21.5  | 63A,TP MCCB, 415V, 25kA suitable space provision for 30kW VFD unit (LEXF) . Having Thermal magnetic trip unit with over load, short circuit. And LED indication lamps for ON,OFF,TRIP, Start/stop push buttons.   | Set  | 2                 |                      |                 |                      |                  |                 |                     |                    | 2              |
| 283  | 3.21.6  | 6A,240V,16kA,DP,MPCB along with contactor (for Control & Monitoring) with OLR, LED display lamps on,off,trip, 3-Way Selector Switch with Key (Auto/Manual/Power On)   | Set  | 10                |                      |                 |                      |                  |                 |                     |                    | 10             |
| 284  | 3.21.7  | <b>SPARE:-</b>  |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 285  | 3.21.8  | 200A,TP MCCB,415V,25kA. Having Thermal magnetic trip unit with over load, short circuit. And LED indication lamps for ON,OFF,TRIP,and lamp test push button.  | Set  | 1                 |                      |                 |                      |                  |                 |                     |                    | 1              |
| 286  | 3.21.9  | 63A,TP MCCB,415V,25kA. Having Thermal magnetic trip unit with over load, short circuit. And LED indication lamps for ON,OFF,TRIP,and lamp test push button.   | Set  | 1                 |                      |                 |                      |                  |                 |                     |                    | 1              |
| 287  | 3.21.10 | 6A,240V,16kA,DP,MPCB along with contactor (for Control & Monitoring) with OLR, LED display lamps on,off,trip, 3-Way Selector Switch with Key (Auto/Manual/Power On)   | Set  | 1                 |                      |                 |                      |                  |                 |                     |                    | 1              |
| 288  | 3.21.11 | Panel Enclosure & other Accessories as specified in Part-2 Section VII Subsection D Unit 2 Clause 2.4 and drawings  | Lot  | 1                 |                      |                 |                      |                  |                 |                     |                    | 1              |
| 289  | 3.22    | <b>TVS PANEL-01 ESSENTIAL with Mimic Diagram, TTA form 4b, type 6 panel, IP54 conforming to LV panels specification specified in Part-2 Section VII SubSection-D Unit-02 and drawings. (Fully Front Accessible panel)</b>   |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 290  | 3.22.1  | Incomer<br>1) 800A,4P,415V,50kA, Motorized ACB draw out type (with Electrical & Mechanical interlock capable of Automatic Change over of power supplies). Having microprocessor based trip unit with adjustable over load, adjustable short circuit and adjustable earth fault with LCD/LED display and Provision for remote tripping of ACB<br>2) Surge protection device (SPD) Type-II with inbuilt fuse suitable to withstand required short circuit current.<br>3) LED indication lamp for ON, OFF & TRIP, Phase Indication for R, Y and B and Emergency stop & Lamp test Push buttons.<br>4) Auto / Manual Selector Switch with key operated and 1 No TNC switch.<br>5) Digital MFM and 3 Nos. CTs, 800/5A, 10VA, CL-0.5 for metering. | Set  | 2                 |                      |                 |                      |                  |                 |                     |                    | 2              |
| 291  | 3.22.2  | Busbar: rated 800 Amps, suitable to withstand symmetrical fault level of 50kA for 1 sec. at 415V as specified in Part-2 Section VII Subsection D Unit-02 Clause 2.6   | Lot  | 1                 |                      |                 |                      |                  |                 |                     |                    | 1              |
| 292  | 3.22.3  | <b>OUT GOING FEEDERS</b>  | Lot  |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 293  | 3.22.4  | 630A,TP MCCB,415V,25kA. Having microprocessor based trip unit with adjustable protection against over load, short circuit. And LED indication lamps for ON,OFF,TRIP.  | Set  | 2                 |                      |                 |                      |                  |                 |                     |                    | 2              |
| 294  | 3.22.5  | 32A 4P, MCCB, 415V,25kA,Having Thermal magnetic trip unit with adjustable protection against over load, short circuit.And LED indication lamps for ON,OFF,TRIP  | Set  | 3                 |                      |                 |                      |                  |                 |                     |                    | 3              |
| 295  | 3.22.6  | 32A TP, MCCB, 415V,25kA with suitable space provision for 7.5kW SoftStarter (SPF). Having Thermal trip unit with adjustable protection against over load, short circuit.And LED indication lamps for ON,OFF,TRIP and Start/stop push buttons.   | Set  | 2                 |                      |                 |                      |                  |                 |                     |                    | 2              |
| 296  | 3.22.7  | 32A TP, MCCB, 415V,25kA with suitable space provision for 5.5kW SoftStarter (SPF). Having Thermal trip unit with adjustable protection against over load, short circuit.And LED indication lamps for ON,OFF,TRIP and Start/stop push buttons.   | Set  | 2                 |                      |                 |                      |                  |                 |                     |                    | 2              |
| 297  | 3.22.8  | <b>SPARE:-</b>  |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 298  | 3.22.9  | 630A,TP MCCB,415V,25kA. Having microprocessor based trip unit with adjustable protection against over load, short circuit. And LED indication lamps for ON,OFF,TRIP.  | Set  | 1                 |                      |                 |                      |                  |                 |                     |                    | 1              |
| 299  | 3.22.10 | 32A 4P, MCCB, 415V,25kA,Having Thermal magnetic trip unit with adjustable protection against over load, short circuit.And LED indication lamps for ON,OFF,TRIP  | Set  | 1                 |                      |                 |                      |                  |                 |                     |                    | 1              |
| 300  | 3.22.11 | Panel Enclosure & other accessories as specified in Part-2 Section VII Subsection D Unit-02 Clause 2.4  | Lot  | 1                 |                      |                 |                      |                  |                 |                     |                    | 1              |

| CHENNAI METRO RAIL LIMITED<br>CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4<br>BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS<br>TENDER NO. C4-VAC&TVS-12 |         |  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
|--|---------|--|------|----------------------|-------------------------|--------------------|-------------------------|---------------------|--------------------|------------------------|--------------------|----------------|
| PRICE CENTRE E - VAC & TVS ELECTRICAL WORKS  |         |  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| Ref. No  | Sl.No.  | Description  | Unit | LIGHTHOUSE<br>(ST01) | KUTCHERY ROAD<br>(ST03) | ALWARPET<br>(ST05) | BHARATHIDASAN<br>(ST06) | BOAT CLUB<br>(ST07) | NANDANAM<br>(ST08) | PANAGAL PARK<br>(ST10) | KODAMBAKKAM (ST11) | TOTAL QUANTITY |
| 301  | 3.23    | TVS PANEL-02 ESSENTIAL with Mimic Diagram, TTA form 4b, type 6 panel, IP54 conforming to LV panels specification specified in Part-2 Section VII SubSection-D Unit-02 and drawings. (Fully Front Accessible panel)   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 302  | 3.23.1  | Incomer<br>1) 630A,4P,415V,25kA, Motorized MCCB (with Electrical & Mechanical interlock capable of Automatic Change over of power supplies). Having microprocessor based trip unit with adjustable over load, adjustable short circuit and adjustable earth fault with LCD/LED display and Provision for remote tripping of MCCB.<br>2) Surge protection device (SPD) Type-II with inbuilt fuse suitable to withstand required short circuit current.<br>3) LED indication lamp for ON, OFF & TRIP, Phase Indication for R, Y and B and Emergency stop & Lamp test Push buttons.<br>4) Auto / Manual Selector Switch with key operated and 1 No TNC switch.<br>5) Digital MFM and 3 Nos. CTs, 630/5A, 10VA, CL-0.5 for metering.                   | Set  | 2                    |                         |                    |                         |                     |                    |                        |                    | 2              |
| 303  | 3.23.2  | Busbar: rated 630 Amps, suitable to withstand symmetrical fault level of 25kA for 1 sec. at 415V as specified in Part-2 Section VII Subsection D Unit-02 Clause 2.6  | Lot  | 1                    |                         |                    |                         |                     |                    |                        |                    | 1              |
| 304  | 3.23.3  | OUT GOING FEEDERS  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 305  | 3.23.4  | 630A,TP MCCB,415V,25kA. Having microprocessor based trip unit with adjustable protection against over load, short circuit. And LED indication lamps for ON,OFF,TRIP.   | Set  | 2                    |                         |                    |                         |                     |                    |                        |                    | 2              |
| 306  | 3.23.5  | 32A 4P,MCCB, 415V,25kA,Having Thermal magnetic trip unit with adjustable protection against over load, short circuit.And LED indication lamps for ON,OFF,TRIP  | Set  | 2                    |                         |                    |                         |                     |                    |                        |                    | 2              |
| 307  | 3.23.6  | 32A TP, MCCB, 415V,25kA with suitable space provision for 11kW SoftStarter (SPF). Having Thermal trip unit with adjustable protection against over load, short circuit.And LED indication lamps for ON,OFF,TRIP and Start/stop push buttons.   | Set  | 1                    |                         |                    |                         |                     |                    |                        |                    | 1              |
| 308  | 3.23.7  | 200A,TP MCCB,415V,25kA. Having microprocessor based trip unit with adjustable protection against over load, short circuit. And LED indication lamps for ON,OFF,TRIP.   | Set  | 2                    |                         |                    |                         |                     |                    |                        |                    | 2              |
| 309  | 3.23.8  | SPARE:-  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 310  | 3.23.9  | 630A,TP MCCB,415V,25kA. Having microprocessor based trip unit with adjustable protection against over load, short circuit. And LED indication lamps for ON,OFF,TRIP.   | Set  | 1                    |                         |                    |                         |                     |                    |                        |                    | 1              |
| 311  | 3.23.10 | 200A,TP MCCB,415V,25kA. Having microprocessor based trip unit with adjustable protection against over load, short circuit. And LED indication lamps for ON,OFF,TRIP.   | Set  | 1                    |                         |                    |                         |                     |                    |                        |                    | 1              |
| 312  | 3.23.11 | Panel Enclosure & other accessories as specified in Part-2 Section VII Subsection D Unit-02 Clause 2.4   | Lot  | 1                    |                         |                    |                         |                     |                    |                        |                    | 1              |
| 313  | 3.24    | TVS PANEL -01 ESSENTIAL with Mimic Diagram, TTA form 4b, type 6 panel, IP54 conforming to LV panels specification specified in Part-2 Section VII SubSection-D Unit-02 and drawings. (Fully Front Accessible panel)  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 314  | 3.24.1  | Incomer<br>1) 800A,4P,415V,50kA, , Motorized ACB draw out type (with Electrical & Mechanical interlock capable of Automatic Change over of power supplies) Having microprocessor based trip unit with adjustable over load, adjustable short circuit and adjustable earth fault with LCD/LED display and Provision for remote tripping of ACB<br>2) Surge protection device (SPD) Type-II with inbuilt fuse suitable to withstand required short circuit current.<br>3) LED indication lamp for ON, OFF & TRIP, Phase Indication for R, Y and B and Emergency stop & Lamp test Push buttons.<br>4) 2 Nos Auto / Manual Selector Switch with key operated and 1 No TNC switch.<br>5) Digital MFM and 3 Nos. CTs, 800/5A, 10VA, CL-0.5 for metering. | Set  |                      | 2                       | 2                  | 2                       |                     |                    |                        |                    | 6              |
| 315  | 3.24.2  | Busbar: rated 800 Amps, suitable to withstand symmetrical fault level of 50kA for 1 sec. at 415V as specified in Part-2 Section VII Subsection D Unit-02 Clause 2.6  | Lot  |                      | 1                       | 1                  | 1                       |                     |                    |                        |                    | 3              |
| 316  | 3.24.3  | OUT GOING FEEDERS  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 317  | 3.24.4  | 400A,TP MCCB,415V,25kA. Having microprocessor trip unit with adjustable protection against over load, short circuit. And LED indication lamps for ON,OFF,TRIP  | Set  |                      | 2                       | 2                  | 2                       |                     |                    |                        |                    | 6              |
| 318  | 3.24.5  | 200A,TP MCCB,415V,25kA Having Thermal magnetic trip unit with adjustable protection against over load, short circuit. And LED indication lamps for ON,OFF,TRIP   | Set  |                      | 2                       | 2                  | 2                       |                     |                    |                        |                    | 6              |
| 319  | 3.24.6  | 32A,4P MCCB,415V,25kA. Having Thermal magnetic trip unit with adjustable protection against over load, short circuit. And LED indication lamps for ON,OFF,TRIP.  | Set  |                      | 3                       | 3                  | 3                       |                     |                    |                        |                    | 9              |
| 320  | 3.24.7  | 32A,TP MCCB, 415V,25kA, suitable space provision for 4kW (SPF) SoftStarter . Having Thermal magnetic based trip unit with adjustable protection against over load, short circuit. And LED indication lamps for ON,OFF,TRIP, Start/stop push buttons.   | Set  |                      | 0                       | 1                  | 0                       |                     |                    |                        |                    | 1              |
| 321  | 3.24.8  | SPARE:-  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 322  | 3.24.9  | 400A,TP MCCB,415V,25kA.Having microprocessor trip unit with adjustable protection against over load, short circuit. And LED indication lamps for ON,OFF,TRIP.  | Set  |                      | 1                       | 1                  | 1                       |                     |                    |                        |                    | 3              |
| 323  | 3.24.10 | 200A,TP MCCB,415V,25kA. Having Thermal magnetic trip unit with adjustable protection against over load, short circuit. And LED indication lamps for ON,OFF,TRIP.   | Set  |                      | 1                       | 1                  | 1                       |                     |                    |                        |                    | 3              |
| 324  | 3.24.11 | Panel Enclosure & other Accessories (Exhaust fan, louvers, etc.) as specified in Part-2 Section VII Subsection D Unit-02 Clause 2.4  | Lot  |                      | 1                       | 1                  | 1                       |                     |                    |                        |                    | 3              |

| CHENNAI METRO RAIL LIMITED<br>CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4<br>BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS<br>TENDER NO. C4-VAC&TVS-12 |         |   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
|--|---------|---|------|----------------------|-------------------------|--------------------|-------------------------|---------------------|--------------------|------------------------|--------------------|----------------|
| PRICE CENTRE E - VAC & TVS ELECTRICAL WORKS  |         |   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| Ref. No  | Sl.No.  | Description   | Unit | LIGHTHOUSE<br>(ST01) | KUTCHERY ROAD<br>(ST03) | ALWARPET<br>(ST05) | BHARATHIDASAN<br>(ST06) | BOAT CLUB<br>(ST07) | NANDANAM<br>(ST08) | PANAGAL PARK<br>(ST10) | KODAMBAKKAM (ST11) | TOTAL QUANTITY |
| 325  | 3.25    | TVS PANEL -02 ESSENTIAL with Mimic Diagram, TTA form 4b, type 6 panel, IP54 conforming to LV panels specification specified in Part-2 Section VII SubSection-D Unit-02 and drawings. (Fully Front Accessible panel)   | Each |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 326  | 3.25.1  | Incomer<br>1) 630A,4P,415V,25kA, , Motorized MCCB draw out type (with Electrical & Mechanical interlock capable of Automatic Change over of power supplies) Having microprocessor based trip unit with adjustable over load, adjustable short circuit and adjustable earth fault with LCD/LED display and Provision for remote tripping of MCCB<br>2) Surge protection device (SPD) Type-II with inbuilt fuse suitable to withstand required short circuit current.<br>3) LED indication lamp for ON, OFF & TRIP, Phase Indication for R, Y and B and Emergency stop Push buttons.<br>4) Auto / Manual Selector Switch with key operated and 1 No TNC switch.<br>5) Digital MFM and 3 Nos. CTs, 630/5A, 10VA, CL-0.5 for metering.    | Set  |                      | 2                       | 2                  | 2                       |                     |                    |                        |                    | 6              |
| 327  | 3.25.2  | Busbar: rated 630 Amps, suitable to withstand symmetrical fault level of 25kA for 1 sec. at 415V as specified in Part-2 Section VII Subsection D Unit-02 Clause 2.6   | Lot  |                      | 1                       | 1                  | 1                       |                     |                    |                        |                    | 3              |
| 328  | 3.25.3  | OUT GOING FEEDERS   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 329  | 3.25.4  | 400A,TP MCCB,415V,25kA.Having microprocessor trip unit with adjustable protection against over load, short circuit. And LED indication lamps for ON,OFF,TRIP.   | Set  |                      | 2                       | 2                  | 2                       |                     |                    |                        |                    | 6              |
| 330  | 3.25.5  | 100A,TP MCCB,415V,25kA. Having Thermal magnetic based trip unit with adjustable protection against over load, short circuit. And LED indication lamps for ON,OFF,TRIP.  | Set  |                      | 2                       | 2                  | 2                       |                     |                    |                        |                    | 6              |
| 331  | 3.25.6  | 32A,4P MCCB,415V,25kA. Having Thermal magnetic trip unit with adjustable protection against over load, short circuit. And LED indication lamps for ON,OFF,TRIP.   | Set  |                      | 3                       | 3                  | 3                       |                     |                    |                        |                    | 9              |
| 332  | 3.25.7  | 32A,TP MCCB, 415V,25kA, Suitable Space Provision for 7.5kW (SPF) SoftStarter. Having Thermal magnetic based trip unit with adjustable protection against over load, short circuit. And LED indication lamps for ON,OFF,TRIP, Start/stop push buttons.   | Set  |                      | 0                       | 1                  | 0                       |                     |                    |                        |                    | 1              |
| 333  | 3.25.8  | 63A,TP MCCB, 415V,25kA, Suitable Space Provision for 22kW (SPF) SoftStarter. Having Thermal magnetic based trip unit with adjustable protection against over load, short circuit. And LED indication lamps for ON,OFF,TRIP, Start/stop push buttons.  | Set  |                      | 0                       | 0                  | 1                       |                     |                    |                        |                    | 1              |
| 334  | 3.25.9  | 63A,TP MCCB, 415V,25kA, Suitable Space Provision for 18.5kW (SPF) SoftStarter. Having Thermal magnetic based trip unit with adjustable protection against over load, short circuit. And LED indication lamps for ON,OFF,TRIP, Start/stop push buttons.  | Set  |                      | 1                       | 0                  | 0                       |                     |                    |                        |                    | 1              |
| 335  | 3.25.10 | SPARE:-   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 336  | 3.25.11 | 400A,TP MCCB,415V,25kA.Having microprocessor trip unit with adjustable protection against over load, short circuit. And LED indication lamps for ON,OFF,TRIP.   | Set  |                      | 1                       | 1                  | 1                       |                     |                    |                        |                    | 3              |
| 337  | 3.25.12 | 100A,TP MCCB,415V,25kA. Having Thermal magnetic based trip unit with adjustable protection against over load, short circuit. And LED indication lamps for ON,OFF,TRIP.  | Set  |                      |                         | 1                  | 1                       |                     |                    |                        |                    | 2              |
| 338  | 3.25.13 | 63A,TP MCCB,415V,25kA. Having Thermal magnetic based trip unit with adjustable protection against over load, short circuit. And LED indication lamps for ON,OFF,TRIP.   | Set  |                      | 1                       |                    | 0                       |                     |                    |                        |                    | 1              |
| 339  | 3.25.14 | Panel Enclosure & other accessories as specified in Part-2 Section VII Subsection D Unit-02 Clause 2.4  | Lot  |                      | 1                       | 1                  | 1                       |                     |                    |                        |                    | 3              |
| 340  | 3.26    | TVS PANEL ESSENTIAL with Mimic Diagram, TTA form 4b, type 6 panel, IP54 conforming to LV panels specification specified in Part-2 Section VII SubSection-D Unit-02 and drawings. (Fully Front Accessible panel)   | Each |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 341  | 3.26.1  | Incomer<br>1) 1000A,4P,415V,50kA, ACB draw out type (with Electrical & Mechanical interlock capable of Automatic Change over of power supplies). Having microprocessor based trip unit with adjustable over load, adjustable short circuit and adjustable earth fault with LCD/LED display and Provision for remote tripping of ACB<br>2) Surge protection device (SPD) Type-II with inbuilt fuse suitable to withstand required short circuit current.<br>3) LED indication lamp for ON, OFF & TRIP, Phase Indication for R, Y and B and lamp test and Emergency stop Push buttons.<br>4) Auto / Manual Selector Switch with key operated and 1 No TNC switch.<br>5) Digital MFM and 3 Nos. CTs, 1000/5A, 10VA, CL-0.5 for metering. | Set  |                      |                         |                    |                         | 2                   |                    |                        |                    | 2              |
| 342  | 3.26.2  | Busbar: rated 1000 Amps, suitable to withstand symmetrical fault level of 50kA for 1 sec. at 415V as specified in Part-2 Section VII Subsection D Unit-02 Clause 2.6  | Lot  |                      |                         |                    |                         | 1                   |                    |                        |                    | 1              |
| 343  | 3.26.3  | OUT GOING FEEDERS   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 344  | 3.26.4  | 400A,TP MCCB,415V,25kA. Having microprocessor based trip unit with adjustable protection against over load, short circuit. And LED indication lamps for ON,OFF,TRIP.  | Set  |                      |                         |                    |                         | 2                   |                    |                        |                    | 2              |
| 345  | 3.26.5  | 200A,TP MCCB,415V,25kA. Having Thermal magnetic trip unit with adjustable protection against over load, short circuit. And LED indication lamps for ON,OFF,TRIP.  | Set  |                      |                         |                    |                         | 2                   |                    |                        |                    | 2              |



| CHENNAI METRO RAIL LIMITED<br>CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4<br>BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS<br>TENDER NO. C4-VAC&TVS-12 |         |   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
|--|---------|---|------|----------------------|-------------------------|--------------------|-------------------------|---------------------|--------------------|------------------------|--------------------|----------------|
| PRICE CENTRE E - VAC & TVS ELECTRICAL WORKS  |         |   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| Ref. No  | SL.No.  | Description   | Unit | LIGHTHOUSE<br>(ST01) | KUTCHERY ROAD<br>(ST03) | ALWARPET<br>(ST05) | BHARATHIDASAN<br>(ST06) | BOAT CLUB<br>(ST07) | NANDANAM<br>(ST08) | PANAGAL PARK<br>(ST10) | KODAMBAKKAM (ST11) | TOTAL QUANTITY |
| 346  | 3.26.6  | 32A,4P MCCB,415V,25kA. Having Thermal magnetic trip unit with adjustable protection against over load, short circuit. And LED indication lamps for ON,OFF,TRIP.   | Set  |                      |                         |                    |                         | 5                   |                    |                        |                    | 5              |
| 347  | 3.26.7  | 63A,TP MCCB, 415V,25kA, suitable Space Provision for 30kW SoftStarter (SPF). Having Thermal magnetic trip unit with adjustable protection against over load, short circuit.And LED indication lamps for ON,OFF,TRIP, Start/stop push buttons.   | Set  |                      |                         |                    |                         | 1                   |                    |                        |                    | 1              |
| 348  | 3.26.8  | 32A,TP MCCB, 415V 25kA, suitable Space Provision for 11kW SoftStarter (SPF). Having Thermal magnetic trip unit with adjustable protection against over load, short circuit. And LED indication lamps for ON,OFF,TRIP, Start/stop push buttons.  | Set  |                      |                         |                    |                         | 1                   |                    |                        |                    | 1              |
| 349  | 3.26.9  | SPARES:-  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 350  | 3.26.10 | 400A,TP MCCB,415V,25kA. Having microprocessor based trip unit with adjustable protection against over load, short circuit. And LED indication lamps for ON,OFF,TRIP.  | Set  |                      |                         |                    |                         | 1                   |                    |                        |                    | 1              |
| 351  | 3.26.11 | 200A,TP MCCB,415V,25kA. Having Thermal magnetic trip unit with adjustable protection against over load, short circuit. And LED indication lamps for ON,OFF,TRIP.  | Set  |                      |                         |                    |                         | 1                   |                    |                        |                    | 1              |
| 352  | 3.26.12 | Panel Enclosure & other accessories as specified in Part-2 Section VII Subsection D Unit-02 Clause 2.4  | Lot  |                      |                         |                    |                         | 1                   |                    |                        |                    | 1              |
| 353  | 3.27    | TVS PANEL ESSENTIAL with Mimic Diagram, TTA form 4b, type 6 panel, IP54 conforming to LV panels specification specified in Part-2 Section VII SubSection-D Unit-02 and drawings. (Fully Front Accessible panel)   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 354  | 3.27.1  | Incomer<br>1) 1250A,4P,415V,50kA, ACB draw out type (with Electrical & Mechanical interlock capable of Automatic Change over of power supplies). Having microprocessor based trip unit with adjustable over load, adjustable short circuit and adjustable earth fault with LCD/LED display and Provision for remote tripping of ACB<br>2) Surge protection device (SPD) Type-II with inbuilt fuse suitable to withstand required short circuit current.<br>3) LED indication lamp for ON, OFF & TRIP, Phase Indication for R, Y and B and lamp test and Emergency stop Push buttons.<br>4) Auto / Manual Selector Switch with key operated and 1 No TNC switch.<br>5) Digital MFM and 3 Nos. CTs, 1250/5A, 10VA, CL-0.5 for metering.         | Set  |                      |                         |                    |                         |                     | 2                  |                        |                    | 2              |
| 355  | 3.27.2  | Busbar: rated 1250A Amps, suitable to withstand symmetrical fault level of 50kA for 1 sec. at 415V as specified in Part-2 Section VII Subsection D Unit-02 Clause 2.6   | Lot  |                      |                         |                    |                         |                     | 1                  |                        |                    | 1              |
| 356  | 3.27.3  | OUT GOING FEEDERS   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 357  | 3.27.4  | 400A,TP MCCB,415V,25kA. Having microprocessor based trip unit with adjustable protection against over load, short circuit. And LED indication lamps for ON,OFF,TRIP.  | Set  |                      |                         |                    |                         |                     | 2                  |                        |                    | 2              |
| 358  | 3.27.5  | 200A,TP MCCB,415V,25kA. Having Thermal magnetic trip unit with adjustable protection against over load, short circuit. And LED indication lamps for ON,OFF,TRIP.  | Set  |                      |                         |                    |                         |                     | 4                  |                        |                    | 4              |
| 359  | 3.27.6  | 63A,4P MCCB,415V,25kA. Having Thermal magnetic trip unit with adjustable protection against over load, short circuit. And LED indication lamps for ON,OFF,TRIP.   | Set  |                      |                         |                    |                         |                     | 2                  |                        |                    | 2              |
| 360  | 3.27.7  | 32A,4P MCCB,415V,25kA. Having Thermal magnetic trip unit with adjustable protection against over load, short circuit. And LED indication lamps for ON,OFF,TRIP.   | Set  |                      |                         |                    |                         |                     | 1                  |                        |                    | 1              |
| 361  | 3.27.8  | 63A,TP MCCB, 415V,25kA, suitable Space Provision for 37kW SoftStarter (SPF). Having Thermal magnetic trip unit with adjustable protection against over load, short circuit.And LED indication lamps for ON,OFF,TRIP, Start/stop push buttons.   | Set  |                      |                         |                    |                         |                     | 1                  |                        |                    | 1              |
| 362  | 3.27.9  | 32A,TP MCCB, 415V,25kA, suitable Space Provision for 15kW SoftStarter (SPF). Having Thermal magnetic trip unit with adjustable protection against over load, short circuit. And LED indication lamps for ON,OFF,TRIP, Start/stop push buttons.  | Set  |                      |                         |                    |                         |                     | 1                  |                        |                    | 1              |
| 363  | 3.27.10 | SPARES:-  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 364  | 3.27.11 | 400A,TP MCCB,415V,25kA. Having microprocessor trip unit with adjustable protection against over load, short circuit. And LED indication lamps for ON,OFF,TRIP   | Set  |                      |                         |                    |                         |                     | 1                  |                        |                    | 1              |
| 365  | 3.27.12 | 200A,TP MCCB,415V,25kA.Having Thermal magnetic trip unit with adjustable protection against over load, short circuit. And LED indication lamps for ON,OFF,TRIP  | Set  |                      |                         |                    |                         |                     | 1                  |                        |                    | 1              |
| 366  | 3.27.13 | Panel Enclosure & other accessories as specified in Part-2 Section VII Subsection D Unit-02 Clause 2.4  | Lot  |                      |                         |                    |                         |                     | 1                  |                        |                    | 1              |
| 367  | 3.28    | TVS PANEL-01 ESSENTIAL with Mimic Diagram, TTA form 4b, type 6 panel, IP54 conforming to LV panels specification specified in Part-2 Section VII SubSection-D Unit-02 and drawings. (Fully Front Accessible panel)  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 368  | 3.28.1  | Incomer<br>1) 1250A,4P,415V,50kA, Motorized ACB draw out type (with Electrical & Mechanical interlock capable of Automatic Change over of power supplies). Having microprocessor based trip unit with adjustable over load, adjustable short circuit and adjustable earth fault with LCD/LED display and Provision for remote tripping of ACB<br>2) Surge protection device (SPD) Type-II with inbuilt fuse suitable to withstand required short circuit current.<br>3) LED indication lamp for ON, OFF & TRIP, Phase Indication for R, Y and B and Emergency stop & Lamp test Push buttons.<br>4) Auto / Manual Selector Switch with key operated and 1 No TNC switch.<br>5) Digital MFM and 3 Nos. CTs, 1250/5A, 10VA, CL-0.5 for metering. | Set  |                      |                         |                    |                         |                     |                    | 2                      |                    | 2              |



| CHENNAI METRO RAIL LIMITED<br>CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4<br>BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS<br>TENDER NO. C4-VAC&TVS-12 |         |   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
|--|---------|---|------|----------------------|-------------------------|--------------------|-------------------------|---------------------|--------------------|------------------------|--------------------|----------------|
| PRICE CENTRE E - VAC & TVS ELECTRICAL WORKS  |         |   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| Ref. No  | Sl.No.  | Description   | Unit | LIGHTHOUSE<br>(ST01) | KUTCHERY ROAD<br>(ST03) | ALWARPET<br>(ST05) | BHARATHIDASAN<br>(ST06) | BOAT CLUB<br>(ST07) | NANDANAM<br>(ST08) | PANAGAL PARK<br>(ST10) | KODAMBAKKAM (ST11) | TOTAL QUANTITY |
| 369  | 3.28.2  | Busbar: rated 1250 Amps, suitable to withstand symmetrical fault level of 50kA for 1 sec. at 415V as specified in Part-2 Section VII Subsection D Unit-02 Clause 2.6  | Lot  |                      |                         |                    |                         |                     |                    | 1                      |                    | 1              |
| 370  | 3.28.3  | OUT GOING FEEDERS   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 371  | 3.28.4  | 630A TP,MCCB, 415V,25kA, Having microprocessor based trip unit with adjustable protection against over load, short circuit.And LED indication lamps for ON,OFF,TRIP   | Set  |                      |                         |                    |                         |                     |                    | 2                      |                    | 2              |
| 372  | 3.28.5  | 200A TP,MCCB, 415V,25kA, Having Thermal magnetic trip unit with adjustable protection against over load, short circuit.And LED indication lamps for ON,OFF,TRIP   | Set  |                      |                         |                    |                         |                     |                    | 2                      |                    | 2              |
| 373  | 3.28.6  | 63A 4P, MCCB, 415V,25kA,Having Thermal magnetic trip unit with adjustable protection against over load, short circuit.And LED indication lamps for ON,OFF,TRIP  | Set  |                      |                         |                    |                         |                     |                    | 1                      |                    | 1              |
| 374  | 3.28.7  | 32A 4P MCCB, 415V,25kA,Having Thermal magnetic trip unit with adjustable protection against over load, short circuit.And LED indication lamps for ON,OFF,TRIP   | Set  |                      |                         |                    |                         |                     |                    | 2                      |                    | 2              |
| 375  | 3.28.8  | 63A,TP MCCB, 415V,25kA, suitable Space Provision for 22kW VFD (SEF). Having Thermal magnetic based trip unit with adjustable protection against over load, short circuit. And LED indication lamps for ON,OFF,TRIP. Start/stop , Emergency stop push buttons.   | Set  |                      |                         |                    |                         |                     |                    | 2                      |                    | 2              |
| 376  | 3.28.9  | 63A,TP MCCB, 415V,25kA, suitable Space Provision for 30kW SoftStarter (SPF). Having Thermal magnetic based trip unit with adjustable protection against over load, short circuit. And LED indication lamps for ON,OFF,TRIP.Start/stop push buttons.   | Set  |                      |                         |                    |                         |                     |                    | 1                      |                    | 1              |
| 377  | 3.28.10 | SPARE:-   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 378  | 3.28.11 | 630A TP,MCCB, 415V,25kA, Having microprocessor based trip unit with adjustable protection against over load, short circuit.And LED indication lamps for ON,OFF,TRIP   | Set  |                      |                         |                    |                         |                     |                    | 1                      |                    | 1              |
| 379  | 3.28.12 | 200A TP,MCCB, 415V,25kA, Having Thermal magnetic trip unit with adjustable protection against over load, short circuit.And LED indication lamps for ON,OFF,TRIP   | Set  |                      |                         |                    |                         |                     |                    | 1                      |                    | 1              |
| 380  | 3.28.13 | Panel Enclosure & other accessories as specified in Part-2 Section VII Subsection D Unit-02 Clause 2.4  | Lot  |                      |                         |                    |                         |                     |                    | 1                      |                    | 1              |
| 381  | 3.29    | TVS PANEL-02 ESSENTIAL with Mimic Diagram, TTA form 4b, type 6 panel, IP54 conforming to LV panels specification specified in Part-2 Section VII SubSection-D Unit-02 and drawings. (Fully Front Accessible panel)  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 382  | 3.29.1  | Incomer<br>1) 800A,4P,415V,50kA, Motorized ACB draw out type (with Electrical & Mechanical interlock capable of Automatic Change over of power supplies). Having microprocessor based trip unit with adjustable over load, adjustable short circuit and adjustable earth fault with LCD/LED display and Provision for remote tripping of ACB<br>2) Surge protection device (SPD) Type-II with inbuilt fuse suitable to withstand required short circuit current.<br>3) LED indication lamp for ON, OFF & TRIP, Phase Indication for R, Y and B and Emergency stop & Lamp test Push buttons.<br>4) Auto / Manual Selector Switch with key operated and 1 No TNC switch.<br>5) Digital MFM and 3 Nos. CTs, 800/5A, 10VA, CL-0.5 for metering. | Set  |                      |                         |                    |                         |                     |                    | 2                      |                    | 2              |
| 383  | 3.29.2  | Busbar: rated 800 Amps, suitable to withstand symmetrical fault level of 50kA for 1 sec. at 415V as specified in Part-2 Section VII Subsection D Unit-02 Clause 2.6   | Lot  |                      |                         |                    |                         |                     |                    | 1                      |                    | 1              |
| 384  | 3.29.3  | OUT GOING FEEDERS   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 385  | 3.29.4  | 630A TP,MCCB, 415V,25kA,Having micro processor trip unit with adjustable protection against over load, short circuit.And LED indication lamps for ON,OFF,TRIP   | Set  |                      |                         |                    |                         |                     |                    | 2                      |                    | 2              |
| 386  | 3.29.5  | 32A 4P,MCCB, 415V,25kA,Having Thermal magnetic trip unit with adjustable protection against over load, short circuit.And LED indication lamps for ON,OFF,TRIP   | Set  |                      |                         |                    |                         |                     |                    | 2                      |                    | 2              |
| 387  | 3.29.6  | 200A TP,MCCB, 415V,25kA,Having Thermal magnetic trip unit with adjustable protection against over load, short circuit.And LED indication lamps for ON,OFF,TRIP  | Set  |                      |                         |                    |                         |                     |                    | 2                      |                    | 2              |
| 388  | 3.29.7  | 32A,TP MCCB, 415V,25kA, suitable Space Provision for 4kW SoftStarter (SPF). Having Thermal magnetic based trip unit with adjustable protection against over load, short circuit. And LED indication lamps for ON,OFF,TRIP.Start/stop push buttons.  | Set  |                      |                         |                    |                         |                     |                    | 1                      |                    | 1              |
| 389  | 3.29.8  | 63A 4P,MCCB, 415V,25kA,Having Thermal magnetic trip unit with adjustable protection against over load, short circuit.And LED indication lamps for ON,OFF,TRIP   | Set  |                      |                         |                    |                         |                     |                    | 1                      |                    | 1              |
| 390  | 3.29.9  | SPARE:-   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 391  | 3.29.10 | 630A TP,MCCB, 415V,25kA,Having micro processor trip unit with adjustable protection against over load, short circuit.And LED indication lamps for ON,OFF,TRIP   | Set  |                      |                         |                    |                         |                     |                    | 1                      |                    | 1              |

| CHENNAI METRO RAIL LIMITED<br>CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4<br>BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS<br>TENDER NO. C4-VAC&TVS-12 |         |   |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
|--|---------|---|------|-------------------|----------------------|-----------------|----------------------|------------------|-----------------|---------------------|--------------------|----------------|
| PRICE CENTRE E - VAC & TVS ELECTRICAL WORKS  |         |   |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| Ref. No  | Sl.No.  | Description   | Unit | LIGHTHOUSE (ST01) | KUTCHERY ROAD (ST03) | ALWARPET (ST05) | BHARATHIDASAN (ST06) | BOAT CLUB (ST07) | NANDANAM (ST08) | PANAGAL PARK (ST10) | KODAMBAKKAM (ST11) | TOTAL QUANTITY |
| 392  | 3.29.11 | 200A TP,MCCB, 415V,25kA,Having Thermal magnetic trip unit with adjustable protection against over load, short circuit.And LED indication lamps for ON,OFF,TRIP  | Set  |                   |                      |                 |                      |                  |                 | 1                   |                    | 1              |
| 393  | 3.29.12 | Panel Enclosure & other accessories as specified in Part-2 Section VII Subsection D Unit-02 Clause 2.4  | Lot  |                   |                      |                 |                      |                  |                 | 1                   |                    | 1              |
| 394  | 3.30    | TVS PANEL ESSENTIAL with Mimic Diagram, TTA form 4b, type 6 panel, IP54 conforming to LV panels specification specified in Part-2 Section VII SubSection-D Unit-02 and drawings. (Fully Front Accessible panel)   |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 395  | 3.30.1  | Incomer<br>1) 1000A,4P,415V,50kA, ACB draw out type (with Electrical & Mechanical interlock capable of Automatic Change over of power supplies). Having microprocessor based trip unit with adjustable over load, adjustable short circuit and adjustable earth fault with LCD/LED display and Provision for remote tripping of ACB<br>2) Surge protection device (SPD) Type-II with inbuilt fuse suitable to withstand required short circuit current.<br>3) LED indication lamp for ON, OFF & TRIP, Phase Indication for R, Y and B and lamp test and Emergency stop Push buttons.<br>4) Auto / Manual Selector Switch with key operated and 1 No TNC switch.<br>5) Digital MFM and 3 Nos. CTs, 1000/5A, 10VA, CL-0.5 for metering. | Set  |                   |                      |                 |                      |                  |                 |                     | 2                  | 2              |
| 396  | 3.30.2  | Busbar: rated 1000A Amps, suitable to withstand symmetrical fault level of 50kA for 1 sec. at 415V as specified in Part-2 Section VII Subsection D Unit-02 Clause 2.6   | Lot  |                   |                      |                 |                      |                  |                 |                     | 1                  | 1              |
| 397  | 3.30.3  | OUT GOING FEEDERS   |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 398  | 3.30.4  | 400A,TP MCCB,415V,25kA. Having microprocessor based trip unit with adjustable protection against over load, short circuit. And LED indication lamps for ON,OFF,TRIP.  | Set  |                   |                      |                 |                      |                  |                 |                     | 2                  | 2              |
| 399  | 3.30.5  | 200A,TP MCCB,415V,25kA. Having Thermal magnetic trip unit with adjustable protection against over load, short circuit. And LED indication lamps for ON,OFF,TRIP.  | Set  |                   |                      |                 |                      |                  |                 |                     | 2                  | 2              |
| 400  | 3.30.6  | 32A,4P MCCB,415V,25kA. Having Thermal magnetic trip unit with adjustable protection against over load, short circuit. And LED indication lamps for ON,OFF,TRIP.   | Set  |                   |                      |                 |                      |                  |                 |                     | 1                  | 1              |
| 401  | 3.30.7  | 63A,4P MCCB,415V,25kA. Having Thermal magnetic trip unit with adjustable protection against over load, short circuit. And LED indication lamps for ON,OFF,TRIP.   | Set  |                   |                      |                 |                      |                  |                 |                     | 2                  | 2              |
| 402  | 3.30.8  | 63A,TP MCCB, 415V,25kA, suitable Space Provision for 30kW SoftStarter (SPF). Having Thermal magnetic trip unit with adjustable protection against over load, short circuit.And LED indication lamps for ON,OFF,TRIP, Start/stop push buttons.   | Set  |                   |                      |                 |                      |                  |                 |                     | 1                  | 1              |
| 403  | 3.30.9  | 32A,TP MCCB, 415V,25kA, suitable for SoftStarter for 15kW (SPF). Having Thermal magnetic trip unit with adjustable protection against over load, short circuit. And LED indication lamps for ON,OFF,TRIP, Start/stop, Emergency stop push buttons.  | Set  |                   |                      |                 |                      |                  |                 |                     | 1                  | 1              |
| 404  | 3.30.10 | SPARES:-  |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 405  | 3.30.11 | 400A,TP MCCB,415V,25kA. Having microprocessor based trip unit with adjustable protection against over load, short circuit. And LED indication lamps for ON,OFF,TRIP.  | Set  |                   |                      |                 |                      |                  |                 |                     | 1                  | 1              |
| 406  | 3.30.12 | 200A,TP MCCB,415V,25kA. Having Thermal magnetic trip unit with adjustable protection against over load, short circuit. And LED indication lamps for ON,OFF,TRIP.  | Set  |                   |                      |                 |                      |                  |                 |                     | 1                  | 1              |
| 407  | 3.30.13 | Panel Enclosure & other accessories as specified in Part-2 Section VII Subsection D Unit-02 Clause 2.4  | Lot  |                   |                      |                 |                      |                  |                 |                     | 1                  | 1              |
| 408  | 3.31    | VAC PDB conforming to LV panels specification specified in Part-2 Section VII SubSection-D Unit-02 and drawings.  |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 409  | 3.31.1  | Incomer -<br>1) 32A,4P,415V,25kA, MCCB with Start/stop push buttons ,<br>2) LED indication lamp for ON, OFF & TRIP, Phase Indication for R, Y and B and Lamp test Push button<br>3) Auto / Manual Selector Switch with key operated.  | Set  | 1                 | 1                    | 1               | 1                    | 1                | 1               |                     | 1                  | 7              |
| 410  | 3.31.2  | Busbar: Rated 32A Amps, suitable to withstand symmetrical fault level of 25kA for 1 second at 415 volts as specified in Part-2 Section VII Subsection D Unit 02 Clause 2.6 and drawings.  | Lot  | 1                 | 1                    | 1               | 1                    | 1                | 1               |                     | 1                  | 7              |
| 411  | 3.31.3  | Outgoing feeders :6A,240V,16kA,DP,MPCB along with contactor (for Control & Monitoring), on,off indication lamp and selector switch.   | Set  | 34                | 23                   | 17              | 17                   | 23               | 26              |                     | 24                 | 164            |
| 412  | 3.31.4  | SPARE:-   |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 413  | 3.31.5  | 6A,240V,16kA,DP,MPCB along with contactor (for Control & Monitoring), on,off indication lamp and selector switch.   | Set  | 7                 | 5                    | 4               | 4                    | 5                | 5               |                     | 5                  | 35             |

| CHENNAI METRO RAIL LIMITED<br>CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4<br>BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS<br>TENDER NO. C4-VAC&TVS-12 |        |   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
|--|--------|---|------|----------------------|-------------------------|--------------------|-------------------------|---------------------|--------------------|------------------------|--------------------|----------------|
| PRICE CENTRE E - VAC & TVS ELECTRICAL WORKS  |        |   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| Ref. No  | Sl.No. | Description   | Unit | LIGHTHOUSE<br>(ST01) | KUTCHERY ROAD<br>(ST03) | ALWARPET<br>(ST05) | BHARATHIDASAN<br>(ST06) | BOAT CLUB<br>(ST07) | NANDANAM<br>(ST08) | PANAGAL PARK<br>(ST10) | KODAMBAKKAM (ST11) | TOTAL QUANTITY |
| 414  | 3.31.6 | Panel Enclosure & other Accessories as specified in Part-2 Section VII Subsection D unit 2 Clause 2.4 and drawings  | Lot  | 1                    | 1                       | 1                  | 1                       | 1                   | 1                  |                        | 1                  | 7              |
| 415  | 3.32   | <b>VAC PDB conforming to LV panels specification specified in Part-2 Section VII SubSection-D Unit-02 and drawings.</b>   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 416  | 3.32.1 | Incomer -<br>1) 63A,4P,415V,25kA, MCCB with Start/stop push buttons ,<br>2) LED indication lamp for ON, OFF & TRIP, Phase Indication for R, Y and B and Lamp test Push button<br>3) Auto / Manual Selector Switch with key operated.  | Set  |                      |                         |                    |                         |                     |                    | 1                      |                    | 1              |
| 417  | 3.32.2 | Busbar: Rated 63A Amps, suitable to withstand symmetrical fault level of 25kA for 1 second at 415 volts as specified in Part-2 Section VII Subsection D Unit 02 Clause 2.6 and drawings.  | Lot  |                      |                         |                    |                         |                     |                    | 1                      |                    | 1              |
| 418  | 3.32.3 | Outgoing feeders :6A,240V,16kA,DP,MPCB along with contactor (for Control & Monitoring), on,off indication lamp and selector switch.   | Set  |                      |                         |                    |                         |                     |                    | 21                     |                    | 21             |
| 419  | 3.32.4 | Outgoing feeders :16A,240V,16kA,DP,MPCB along with contactor (for Control & Monitoring), on,off indication lamp and selector switch.  | Set  |                      |                         |                    |                         |                     |                    | 4                      |                    | 4              |
| 420  | 3.32.5 | <b>SPARE:-</b>  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 421  | 3.32.6 | 6A,240V,16kA,DP,MPCB along with contactor (for Control & Monitoring), on,off indication lamp and selector switch.   | Set  |                      |                         |                    |                         |                     |                    | 4                      |                    | 4              |
| 422  | 3.32.7 | 16A,240V,16kA,DP,MPCB along with contactor (for Control & Monitoring), on,off indication lamp and selector switch.  | Set  |                      |                         |                    |                         |                     |                    | 1                      |                    | 1              |
| 423  | 3.32.8 | Panel Enclosure & other Accessories as specified in Part-2 Section VII Subsection D unit 2 Clause 2.4 and drawings  | Lot  |                      |                         |                    |                         |                     |                    | 1                      |                    | 1              |
| 424  | 3.33   | <b>TVS DAMPER PANEL-01 with Mimic panel, Form 2b panel, IP 54 conforming to LV panels specification specified in Part-2 Section VII Sub Section-D Unit 2 and drawings.</b>  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 425  | 3.33.1 | Incomer:-<br>1) 32A,4P,415V,25kA, Motorized MCCB (with Electrical & Mechanical interlock capable of Automatic Change over of power supplies). Having microprocessor based trip unit with adjustable over load, adjustable short circuit and adjustable earth fault with LCD/LED display and provision for remote tripping,Start/stop push button for MCCB.<br>2) Surge protection device (SPD) Type-II with inbuilt fuse suitable to withstand required short circuit current.<br>3) LED indication lamp for ON, OFF & TRIP, Phase Indication for R, Y and B & Lamp test Push buttons.<br>4) Auto / Manual Selector Switch with key operated.<br>5) Digital MFM and 3 Nos. CTs, 32/5A, 10VA, CL-0.5 for metering. | Set  | 2                    |                         |                    |                         |                     |                    |                        |                    | 2              |
| 426  | 3.33.2 | Busbar - Rated 32 Amps, suitable to withstand symmetrical fault level of 25kA for 1 second at 415 volts as specified in Part-2 Section VII Subsection D Unit 02 Clause 2.6 and drawings   | Lot  | 1                    |                         |                    |                         |                     |                    |                        |                    | 1              |
| 427  | 3.33.3 | Outgoing feeders :6A,240V,16kA,DP,MPCB along with contactor (for Control & Monitoring) with OLR, LED display lamps on,off,trip, 3-Way Selector Switch with Key (Auto/Manual/Power On)   | Set  | 12                   |                         |                    |                         |                     |                    |                        |                    | 12             |
| 428  | 3.33.4 | <b>SPARE:-</b>  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 429  | 3.33.5 | 6A,240V,16kA,DP,MPCB along with contactor (for Control & Monitoring) with OLR, LED display lamps on,off,trip, 3-Way Selector Switch with Key (Auto/Manual/Power On)   | Set  | 2                    |                         |                    |                         |                     |                    |                        |                    | 2              |
| 430  | 3.33.6 | Panel Enclosure & other Accessories as specified in Part-2 Section VII Subsection D Unit 2 Clause 2.4 and drawings  | Lot  | 1                    |                         |                    |                         |                     |                    |                        |                    | 1              |
| 431  | 3.34   | <b>TVS DAMPER PANEL-02 with Mimic panel, Form 2b panel, IP 54 conforming to LV panels specification specified in Part-2 Section VII Sub Section-D Unit 2 and drawings.</b>  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |

| CHENNAI METRO RAIL LIMITED<br>CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4<br>BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS<br>TENDER NO. C4-VAC&TVS-12 |        |  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
|--|--------|--|------|----------------------|-------------------------|--------------------|-------------------------|---------------------|--------------------|------------------------|--------------------|----------------|
| PRICE CENTRE E - VAC & TVS ELECTRICAL WORKS  |        |  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| Ref. No  | Sl.No. | Description  | Unit | LIGHTHOUSE<br>(ST01) | KUTCHERY ROAD<br>(ST03) | ALWARPET<br>(ST05) | BHARATHIDASAN<br>(ST06) | BOAT CLUB<br>(ST07) | NANDANAM<br>(ST08) | PANAGAL PARK<br>(ST10) | KODAMBAKKAM (ST11) | TOTAL QUANTITY |
| 432  | 3.34.1 | Incomer:-<br>1) 32A,4P,415V,25kA, Motorized MCCB (with Electrical & Mechanical interlock capable of Automatic Change over of power supplies). Having microprocessor based trip unit with adjustable over load, adjustable short circuit and adjustable earth fault with LCD/LED display and provision for remote tripping,Start/stop push button for MCCB.<br>2) Surge protection device (SPD) Type-II with inbuilt fuse suitable to withstand required short circuit current.<br>3) LED indication lamp for ON, OFF & TRIP, Phase Indication for R, Y and B & Lamp test Push buttons.<br>4) Auto / Manual Selector Switch with key operated.<br>5) Digital MFM and 3 Nos. CTs, 32/5A, 10VA, CL-0.5 for metering.    | Set  | 2                    |                         |                    |                         |                     |                    |                        |                    | 2              |
| 433  | 3.34.2 | Busbar - Rated 32 Amps, suitable to withstand symmetrical fault level of 25kA for 1 second at 415 volts as specified in Part-2 Section VII Subsection D Unit 02 Clause 2.6 and drawings  | Lot  | 1                    |                         |                    |                         |                     |                    |                        |                    | 1              |
| 434  | 3.34.3 | Outgoing feeders :6A,240V,16kA,DP,MPCB along with contactor (for Control & Monitoring) with OLR, LED display lamps on,off,trip, 3-Way Selector Switch with Key (Auto/Manual/Power On)  | Set  | 16                   |                         |                    |                         |                     |                    |                        |                    | 16             |
| 435  | 3.34.4 | SPARE:-  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 436  | 3.34.5 | 6A,240V,16kA,DP,MPCB along with contactor (for Control & Monitoring) with OLR, LED display lamps on,off,trip, 3-Way Selector Switch with Key (Auto/Manual/Power On)  | Set  | 3                    |                         |                    |                         |                     |                    |                        |                    | 3              |
| 437  | 3.34.6 | Panel Enclosure & other Accessories as specified in Part-2 Section VII Subsection D Unit 2 Clause 2.4 and drawings   | Lot  | 1                    |                         |                    |                         |                     |                    |                        |                    | 1              |
| 438  | 3.35   | TVS DAMPER PANEL-01 with Mimic panel, Form 2b panel, IP 54 conforming to LV panels specification specified in Part-2 Section VII Sub Section-D Unit 2 and drawings.  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 439  | 3.35.1 | Incomer:-<br>1) 32A,4P,415V,25kA, Motorized MCCB (with Electrical & Mechanical interlock capable of Automatic Change over of power supplies). Having microprocessor based trip unit with adjustable over load, adjustable short circuit and adjustable earth fault with LCD/LED display and provision for remote tripping,Start/stop push button for MCCB.<br>2) Surge protection device (SPD) Type-II with inbuilt fuse suitable to withstand required short circuit current.<br>3) LED indication lamp for ON, OFF & TRIP, Phase Indication for R, Y and B & Lamp test Push buttons.<br>4) Auto / Manual Selector Switch with key operated.<br>5) Digital MFM and 3 Nos. CTs, 32/5A, 10VA, CL-0.5 for metering.    | Set  |                      | 2                       | 2                  | 2                       |                     |                    |                        |                    | 6              |
| 440  | 3.35.2 | Busbar - Rated 32 Amps, suitable to withstand symmetrical fault level of 25kA for 1 second at 415 volts as specified in Part-2 Section VII Subsection D Unit 02 Clause 2.6 and drawings  | Lot  |                      | 1                       | 1                  | 1                       |                     |                    |                        |                    | 3              |
| 441  | 3.35.3 | Outgoing feeders :6A,240V,16kA,DP,MPCB along with contactor (for Control & Monitoring) with OLR, LED display lamps on,off,trip, 3-Way Selector Switch with Key (Auto/Manual/Power On)  | Set  |                      | 24                      | 24                 | 24                      |                     |                    |                        |                    | 72             |
| 442  | 3.35.4 | SPARE:-  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 443  | 3.35.5 | 6A,240V,16kA,DP,MPCB along with contactor (for Control & Monitoring) with OLR, LED display lamps on,off,trip, 3-Way Selector Switch with Key (Auto/Manual/Power On)  | Set  |                      | 5                       | 5                  | 5                       |                     |                    |                        |                    | 15             |
| 444  | 3.35.6 | Panel Enclosure & other Accessories as specified in Part-2 Section VII Subsection D unit 2 Clause 2.4 and drawings   | Lot  |                      | 1                       | 1                  | 1                       |                     |                    |                        |                    | 3              |
| 445  | 3.36   | TVS DAMPER PANEL-02 with Mimic panel, Form 2b panel, IP 54 conforming to LV panels specification specified in Part-2 Section VII Sub Section-D Unit 2 and drawings.  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 446  | 3.36.1 | Incomer:-<br>1) 32A,4P,415V,25kA,Motorized MCCB (with Electrical & Mechanical interlock capable of Automatic Change over of power supplies). Having microprocessor based trip unit with adjustable over load, adjustable short circuit and adjustable earth fault with LCD/LED display and provision for remote tripping,Start/stop push button for MCCB.<br>2) Surge protection device (SPD) Type-II with inbuilt fuse suitable to withstand required short circuit current.<br>3) LED indication lamp for ON, OFF & TRIP, Phase Indication for R, Y and B and & Lamp test Push buttons.<br>4) Auto / Manual Selector Switch with key operated.<br>5) Digital MFM and 3 Nos. CTs, 32/5A, 10VA, CL-0.5 for metering. | Set  |                      | 2                       | 2                  | 2                       |                     |                    |                        |                    | 6              |
| 447  | 3.36.2 | Busbar - Rated 32 Amps, suitable to withstand symmetrical fault level of 25kA for 1 second at 415 volts as specified in Part-2 Section VII Subsection D Unit 02 Clause 2.6 and drawings  | Lot  |                      | 1                       | 1                  | 1                       |                     |                    |                        |                    | 3              |

| CHENNAI METRO RAIL LIMITED<br>CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4<br>BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS<br>TENDER NO. C4-VAC&TVS-12 |        |   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
|--|--------|---|------|----------------------|-------------------------|--------------------|-------------------------|---------------------|--------------------|------------------------|--------------------|----------------|
| PRICE CENTRE E - VAC & TVS ELECTRICAL WORKS  |        |   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| Ref. No  | Sl.No. | Description   | Unit | LIGHTHOUSE<br>(ST01) | KUTCHERY ROAD<br>(ST03) | ALWARPET<br>(ST05) | BHARATHIDASAN<br>(ST06) | BOAT CLUB<br>(ST07) | NANDANAM<br>(ST08) | PANAGAL PARK<br>(ST10) | KODAMBAKKAM (ST11) | TOTAL QUANTITY |
| 448  | 3.36.3 | Outgoing feeders :6A,240V,16kA,DP,MPCB along with contactor (for Control & Monitoring) with OLR, LED display lamps on,off,trip, 3-Way Selector Switch with Key (Auto/Manual/Power On)   | Set  |                      | 24                      | 24                 | 24                      |                     |                    |                        |                    | 72             |
| 449  | 3.36.4 | SPARE:-   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 450  | 3.36.5 | 6A,240V,16kA,DP,MPCB along with contactor (for Control & Monitoring) with OLR, LED display lamps on,off,trip, 3-Way Selector Switch with Key (Auto/Manual/Power On)   | Set  |                      | 5                       | 5                  | 5                       |                     |                    |                        |                    | 15             |
| 451  | 3.36.6 | Panel Enclosure & other Accessories as specified in Part-2 Section VII Subsection D Unit 2 Clause 2.4 and drawings  | Lot  |                      | 1                       | 1                  | 1                       |                     |                    |                        |                    | 3              |
| 452  | 3.37   | TVS DAMPER PANEL-01 with Mimic panel, Form 2b panel, IP 54 conforming to LV panels specification specified in Part-2 Section VII Sub Section-D Unit 2 and drawings.   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 453  | 3.37.1 | Incomer:-<br>1) 32A,4P,415V,25kA,Motorized MCCBs (with Electrical & Mechanical interlock capable of Automatic Change over of power supplies). Having microprocessor based trip unit with adjustable over load, adjustable short circuit and adjustable earth fault with LCD/LED display and provision for remote tripping,Start/stop push button for MCCBs.<br>2) Surge protection device (SPD) Type-II with inbuilt fuse suitable to withstand required short circuit current.<br>3) LED indication lamp for ON, OFF & TRIP, Phase Indication for R, Y and B and Emergency stop Push buttons.<br>4) Auto / Manual Selector Switch with key operated.<br>5) Digital MFM and 3 Nos. CTs, 32/5A, 10VA, CL-0.5 for metering. | Set  |                      |                         |                    |                         | 2                   |                    |                        |                    | 2              |
| 454  | 3.37.2 | Busbar - Rated 32 Amps, suitable to withstand symmetrical fault level of 25kA for 1 second at 415 volts as specified in Part-2 Section VII Subsection D Unit 02 Clause 2.6 and drawings   | Lot  |                      |                         |                    |                         | 1                   |                    |                        |                    | 1              |
| 455  | 3.37.3 | Outgoing feeders :6A,240V,16kA,DP,MPCB along with contactor (for Control & Monitoring) with OLR, LED display lamps on,off,trip, 3-Way Selector Switch with Key (Auto/Manual/Power On)   | Set  |                      |                         |                    |                         | 22                  |                    |                        |                    | 22             |
| 456  | 3.37.4 | SPARES:-  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 457  | 3.37.5 | 6A,240V,16kA,DP,MPCB along with contactor (for Control & Monitoring) with OLR, LED display lamps on,off,trip, 3-Way Selector Switch with Key (Auto/Manual/Power On)   | Set  |                      |                         |                    |                         | 5                   |                    |                        |                    | 5              |
| 458  | 3.37.6 | Panel Enclosure & other Accessories as specified in Part-2 Section VII Subsection D Unit 2 Clause 2.4 and drawings  | Lot  |                      |                         |                    |                         | 1                   |                    |                        |                    | 1              |
| 459  | 3.38   | TVS DAMPER PANEL-02 with Mimic panel, Form 2b panel, IP 54 conforming to LV panels specification specified in Part-2 Section VII Sub Section-D Unit 2 and drawings.   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 460  | 3.38.1 | Incomer:-<br>1) 32A,4P,415V,25kA, Motorized MCCB (with Electrical & Mechanical interlock capable of Automatic Change over of power supplies). Having microprocessor based trip unit with adjustable over load, adjustable short circuit and adjustable earth fault with LCD/LED display and provision for remote tripping,Start/stop push button for MCCB.<br>2) Surge protection device (SPD) Type-II with inbuilt fuse suitable to withstand required short circuit current.<br>3) LED indication lamp for ON, OFF & TRIP, Phase Indication for R, Y and B and Emergency stop Push buttons.<br>4) Auto / Manual Selector Switch with key operated.<br>5) Digital MFM and 3 Nos. CTs, 32/5A, 10VA, CL-0.5 for metering.  | Set  |                      |                         |                    |                         | 2                   |                    |                        |                    | 2              |
| 461  | 3.38.2 | Busbar - rated 32 Amps, suitable to withstand symmetrical fault level of 25kA for 1 second at 415 volts as specified in Part-2 Section VII Subsection D Unit 02 Clause 2.6 and drawings   | Lot  |                      |                         |                    |                         | 1                   |                    |                        |                    | 1              |
| 462  | 3.38.3 | Outgoing feeders :6A,240V,16kA,DP,MPCB along with contactor (for Control & Monitoring) with OLR, LED display lamps on,off,trip, 3-Way Selector Switch with Key (Auto/Manual/Power On)   | Set  |                      |                         |                    |                         | 20                  |                    |                        |                    | 20             |
| 463  | 3.38.4 | SPARES:-  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 464  | 3.38.5 | 6A,240V,16kA,DP,MPCB along with contactor (for Control & Monitoring) with OLR, LED display lamps on,off,trip, 3-Way Selector Switch with Key (Auto/Manual/Power On)   | Set  |                      |                         |                    |                         | 4                   |                    |                        |                    | 4              |
| 465  | 3.38.6 | Panel Enclosure & other Accessories as specified in Part-2 Section VII Subsection D Unit 2 Clause 2.4 and drawings  | Lot  |                      |                         |                    |                         | 1                   |                    |                        |                    | 1              |



| CHENNAI METRO RAIL LIMITED<br>CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4<br>BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS<br>TENDER NO. C4-VAC&TVS-12 |        |  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
|--|--------|--|------|----------------------|-------------------------|--------------------|-------------------------|---------------------|--------------------|------------------------|--------------------|----------------|
| PRICE CENTRE E - VAC & TVS ELECTRICAL WORKS  |        |  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| Ref. No  | Sl.No. | Description  | Unit | LIGHTHOUSE<br>(ST01) | KUTCHERY ROAD<br>(ST03) | ALWARPET<br>(ST05) | BHARATHIDASAN<br>(ST06) | BOAT CLUB<br>(ST07) | NANDANAM<br>(ST08) | PANAGAL PARK<br>(ST10) | KODAMBAKKAM (ST11) | TOTAL QUANTITY |
| 466  | 3.39   | TVS DAMPER PANEL-01 with Mimic panel, Form 2b panel, IP 54 conforming to LV panels specification specified in Part-2 Section VII Sub Section-D Unit 2 and drawings.  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 467  | 3.39.1 | Incomer:-<br>1) 63A,4P,415V,25kA, Motorized MCCBs (with Electrical & Mechanical interlock capable of Automatic Change over of power supplies). Having microprocessor based trip unit with adjustable over load, adjustable short circuit and adjustable earth fault with LCD/LED display and provision for remote tripping,Start/stop push button for MCCBs.<br>2) Surge protection device (SPD) Type-II with inbuilt fuse suitable to withstand required short circuit current.<br>3) LED indication lamp for ON, OFF & TRIP, Phase Indication for R, Y and B and Emergency stop Push buttons.<br>4) Auto / Manual Selector Switch with key operated.<br>5) Digital MFM and 3 Nos. CTs, 63/5A, 10VA, CL-0.5 for metering. | Set  |                      |                         |                    |                         |                     | 2                  |                        |                    | 2              |
| 468  | 3.39.2 | Busbar - Rated 63 Amps, suitable to withstand symmetrical fault level of 25kA for 1 second at 415 volts as specified in Part-2 Section VII Subsection D Unit 02 Clause 2.6 and drawings  | Lot  |                      |                         |                    |                         |                     | 1                  |                        |                    | 1              |
| 469  | 3.39.3 | Outgoing feeders :6A,240V,16kA,DP,MPCB along with contactor (for Control & Monitoring) with OLR, LED display lamps on,off,trip, 3-Way Selector Switch with Key (Auto/Manual/Power On)  | Set  |                      |                         |                    |                         |                     | 38                 |                        |                    | 38             |
| 470  | 3.39.4 | SPARES:-   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 471  | 3.39.5 | 6A,240V,16kA,DP,MPCB along with contactor (for Control & Monitoring) with OLR, LED display lamps on,off,trip, 3-Way Selector Switch with Key (Auto/Manual/Power On)  | Set  |                      |                         |                    |                         |                     | 8                  |                        |                    | 8              |
| 472  | 3.39.6 | Panel Enclosure & other Accessories as specified in Part-2 Section VII Subsection D unit 2 Clause 2.4 and drawings   | Lot  |                      |                         |                    |                         |                     | 1                  |                        |                    | 1              |
| 473  | 3.40   | TVS DAMPER PANEL-01 with Mimic panel, Form 2b panel, IP 54 conforming to LV panels specification specified in Part-2 Section VII Sub Section-D Unit 2 and drawings.  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 474  | 3.40.1 | Incomer:-<br>1) 63A,4P,415V,25kA, Motorized MCCB (with Electrical & Mechanical interlock capable of Automatic Change over of power supplies). Having microprocessor based trip unit with adjustable over load, adjustable short circuit and adjustable earth fault with LCD/LED display and provision for remote tripping,Start/stop push button for MCCB.<br>2) Surge protection device (SPD) Type-II with inbuilt fuse suitable to withstand required short circuit current.<br>3) LED indication lamp for ON, OFF & TRIP, Phase Indication for R, Y and B & Lamp test Push buttons.<br>4) Auto / Manual Selector Switch with key operated.<br>5) Digital MFM and 3 Nos. CTs, 63/5A, 10VA, CL-0.5 for metering.          | Set  |                      |                         |                    |                         |                     |                    | 2                      |                    | 2              |
| 475  | 3.40.2 | Busbar - Rated 63 Amps, suitable to withstand symmetrical fault level of 25kA for 1 second at 415 volts as specified in Part-2 Section VII Subsection D Unit 02 Clause 2.6 and drawings  | Lot  |                      |                         |                    |                         |                     |                    | 1                      |                    | 1              |
| 476  | 3.40.3 | Outgoing feeders :6A,240V,16kA,DP,MPCB along with contactor (for Control & Monitoring) with OLR, LED display lamps on,off,trip, 3-Way Selector Switch with Key (Auto/Manual/Power On)  | Set  |                      |                         |                    |                         |                     |                    | 34                     |                    | 34             |
| 477  | 3.40.4 | SPARE:-  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 478  | 3.40.5 | 6A,240V,16kA,DP,MPCB along with contactor (for Control & Monitoring) with OLR, LED display lamps on,off,trip, 3-Way Selector Switch with Key (Auto/Manual/Power On)  | Set  |                      |                         |                    |                         |                     |                    | 7                      |                    | 7              |
| 479  | 3.40.6 | Panel Enclosure & other Accessories as specified in Part-2 Section VII Subsection D Unit 2 Clause 2.4 and drawings   | Lot  |                      |                         |                    |                         |                     |                    | 1                      |                    | 1              |
| 480  | 3.41   | TVS DAMPER PANEL-02 with Mimic panel, Form 2b panel, IP 54 conforming to LV panels specification specified in Part-2 Section VII Sub Section-D Unit 2 and drawings.  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 481  | 3.41.1 | Incomer:-<br>1) 32A,4P,415V,25kA, Motorized MCCB (with Electrical & Mechanical interlock capable of Automatic Change over of power supplies). Having microprocessor based trip unit with adjustable over load, adjustable short circuit and adjustable earth fault with LCD/LED display and provision for remote tripping,Start/stop push button for MCCB.<br>2) Surge protection device (SPD) Type-II with inbuilt fuse suitable to withstand required short circuit current.<br>3) LED indication lamp for ON, OFF & TRIP, Phase Indication for R, Y and B & Lamp test Push buttons.<br>4) Auto / Manual Selector Switch with key operated.<br>5) Digital MFM and 3 Nos. CTs, 32/5A, 10VA, CL-0.5 for metering.          | Set  |                      |                         |                    |                         |                     |                    | 2                      |                    | 2              |



| CHENNAI METRO RAIL LIMITED<br>CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4<br>BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS<br>TENDER NO. C4-VAC&TVS-12 |        |  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
|--|--------|--|------|----------------------|-------------------------|--------------------|-------------------------|---------------------|--------------------|------------------------|--------------------|----------------|
| PRICE CENTRE E - VAC & TVS ELECTRICAL WORKS  |        |  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| Ref. No  | Sl.No. | Description  | Unit | LIGHTHOUSE<br>(ST01) | KUTCHERY ROAD<br>(ST03) | ALWARPET<br>(ST05) | BHARATHIDASAN<br>(ST06) | BOAT CLUB<br>(ST07) | NANDANAM<br>(ST08) | PANAGAL PARK<br>(ST10) | KODAMBAKKAM (ST11) | TOTAL QUANTITY |
| 482  | 3.41.2 | Busbar - Rated 32 Amps, suitable to withstand symmetrical fault level of 25kA for 1 second at 415 volts as specified in Part-2 Section VII Subsection D Unit 02 Clause 2.6 and drawings  | Lot  |                      |                         |                    |                         |                     |                    | 1                      |                    | 1              |
| 483  | 3.41.3 | Outgoing feeders :6A,240V,16kA,DP,MPCB along with contactor (for Control & Monitoring) with OLR, LED display lamps on,off,trip, 3-Way Selector Switch with Key (Auto/Manual/Power On)  | Set  |                      |                         |                    |                         |                     |                    | 16                     |                    | 16             |
| 484  | 3.41.4 | SPARE:-  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 485  | 3.41.5 | 6A,240V,16kA,DP,MPCB along with contactor (for Control & Monitoring) with OLR, LED display lamps on,off,trip, 3-Way Selector Switch with Key (Auto/Manual/Power On)  | Set  |                      |                         |                    |                         |                     |                    | 4                      |                    | 4              |
| 486  | 3.41.6 | Panel Enclosure & other Accessories as specified in Part-2 Section VII Subsection D Unit 2 Clause 2.4 and drawings   | Lot  |                      |                         |                    |                         |                     |                    | 1                      |                    | 1              |
| 487  | 3.42   | TVS DAMPER PANEL-01 with Mimic panel, Form 2b panel, IP 54 conforming to LV panels specification specified in Part-2 Section VII Sub Section-D Unit 2 and drawings.  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 488  | 3.42.1 | Incomer:-<br>1) 63A,4P,415V,25kA, Motorized MCCBs (with Electrical & Mechanical interlock capable of Automatic Change over of power supplies). Having microprocessor based trip unit with adjustable over load, adjustable short circuit and adjustable earth fault with LCD/LED display and provision for remote tripping,Start/stop push button for MCCBs.<br>2) Surge protection device (SPD) Type-II with inbuilt fuse suitable to withstand required short circuit current.<br>3) LED indication lamp for ON, OFF & TRIP, Phase Indication for R, Y and B and Emergency stop Push buttons.<br>4) Auto / Manual Selector Switch with key operated.<br>5) Digital MFM and 3 Nos. CTs, 63/5A, 10VA, CL-0.5 for metering. | Set  |                      |                         |                    |                         |                     |                    |                        | 2                  | 2              |
| 489  | 3.42.2 | Busbar - Rated 63 Amps, suitable to withstand symmetrical fault level of 25kA for 1 second at 415 volts as specified in Part-2 Section VII Subsection D Unit 02 Clause 2.6 and drawings  | Lot  |                      |                         |                    |                         |                     |                    |                        | 1                  | 1              |
| 490  | 3.42.3 | Outgoing feeders :6A,240V,16kA,DP,MPCB along with contactor (for Control & Monitoring) with OLR, LED display lamps on,off,trip, 3-Way Selector Switch with Key (Auto/Manual/Power On)  | Set  |                      |                         |                    |                         |                     |                    |                        | 44                 | 44             |
| 491  | 3.42.4 | SPARES:-   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 492  | 3.42.5 | 6A,240V,16kA,DP,MPCB along with contactor (for Control & Monitoring) with OLR, LED display lamps on,off,trip, 3-Way Selector Switch with Key (Auto/Manual/Power On)  | Set  |                      |                         |                    |                         |                     |                    |                        | 9                  | 9              |
| 493  | 3.42.6 | Panel Enclosure & other Accessories as specified in Part-2 Section VII Subsection D Unit 2 Clause 2.4 and drawings   | Lot  |                      |                         |                    |                         |                     |                    |                        | 1                  | 1              |
| 494  | 3.43   | VAC DAMPER PANEL-01 with Mimic panel, Form 2b panel, IP54 conforming to LV panels specification specified in Part-2 Section VII SubSection-D Unit-02 and drawings.   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 495  | 3.43.1 | Incomer:<br>1) 32A,4P,415V, 25kA, MCCB . Having microprocessor based trip unit with adjustable over load, adjustable short circuit and adjustable earth fault with LCD/LED display and provision for remote tripping,Start/stop push button for MCCB.<br>2) Surge protection device (SPD) Type-II with inbuilt fuse suitable to withstand required short circuit current.<br>3) LED indication lamp for ON, OFF & TRIP, Phase Indication for R, Y and B Lamp test Push buttons.<br>4) Auto / Manual Selector Switch with key operated.<br>5) Digital MFM and 3 Nos. CTs, 32/5A, 10VA, CL-0.5 for metering.   | Set  | 1                    |                         |                    |                         |                     |                    |                        |                    | 1              |
| 496  | 3.43.2 | Busbar: rated 32 Amps, suitable to withstand symmetrical fault level of 25kA for 1 second at 415 volts as specified in Part-2 Section VII Subsection D Unit 02 Clause 2.6 and drawings.  | Lot  | 1                    |                         |                    |                         |                     |                    |                        |                    | 1              |
| 497  | 3.43.3 | Outgoing feeders :6A,240V,16kA,DP,MPCB along with contactor (for Control & Monitoring) with OLR, LED display lamps on,off,trip, 3-Way Selector Switch with Key (Auto/Manual/Power On) and push button for lamp test  | Set  | 25                   |                         |                    |                         |                     |                    |                        |                    | 25             |
| 498  | 3.43.4 | SPARE:-  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 499  | 3.43.5 | 6A,240V,16kA,DP,MPCB along with contactor (for Control & Monitoring) with OLR, LED display lamps on,off,trip, 3-Way Selector Switch with Key (Auto/Manual/Power On) and push button for lamp test  | Set  | 5                    |                         |                    |                         |                     |                    |                        |                    | 5              |
| 500  | 3.43.6 | Panel Enclosure & other Accessories as specified in Part-2 Section VII Subsection D Unit 2 Clause 2.4 and drawings   | Lot  | 1                    |                         |                    |                         |                     |                    |                        |                    | 1              |
| 501  | 3.44   | VAC DAMPER PANEL-01 with Mimic panel, Form 2b panel, IP54 conforming to LV panels specification specified in Part-2 Section VII SubSection-D Unit-02 and drawings.   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |

| CHENNAI METRO RAIL LIMITED<br>CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4<br>BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS<br>TENDER NO. C4-VAC&TVS-12 |        |  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
|--|--------|--|------|----------------------|-------------------------|--------------------|-------------------------|---------------------|--------------------|------------------------|--------------------|----------------|
| PRICE CENTRE E - VAC & TVS ELECTRICAL WORKS  |        |  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| Ref. No  | Sl.No. | Description  | Unit | LIGHTHOUSE<br>(ST01) | KUTCHERY ROAD<br>(ST03) | ALWARPET<br>(ST05) | BHARATHIDASAN<br>(ST06) | BOAT CLUB<br>(ST07) | NANDANAM<br>(ST08) | PANAGAL PARK<br>(ST10) | KODAMBAKKAM (ST11) | TOTAL QUANTITY |
| 502  | 3.44.1 | Incomer:<br>1) 32A,4P,415V, 25kA, MCCB . Having microprocessor based trip unit with adjustable over load, adjustable short circuit and adjustable earth fault with LCD/LED display and provision for remote tripping,Start/stop push button for MCCB.<br>2) Surge protection device (SPD) Type-II with inbuilt fuse suitable to withstand required short circuit current.<br>3) LED indication lamp for ON, OFF & TRIP, Phase Indication for R, Y and B Lamp test Push buttons.<br>4) Auto / Manual Selector Switch with key operated.<br>5) Digital MFM and 3 Nos. CTs, 32/5A, 10VA, CL-0.5 for metering.                               | Set  |                      | 1                       | 1                  | 1                       |                     |                    |                        |                    | 3              |
| 503  | 3.44.2 | Busbar: rated 32Amps, suitable to withstand symmetrical fault level of 25kA for 1 second at 415 volts as specified in Part-2 Section VII Subsection D Unit 02 Clause 2.6 and drawings.   | Lot  |                      | 1                       | 1                  | 1                       |                     |                    |                        |                    | 3              |
| 504  | 3.44.3 | Outgoing feeders :6A,240V,16kA,DP,MPCB along with contactor (for Control & Monitoring) with OLR, LED display lamps on,off,trip, 3-Way Selector Switch with Key (Auto/Manual/Power On) and push button for lamp test  | Set  |                      | 22                      | 20                 | 22                      |                     |                    |                        |                    | 64             |
| 505  | 3.44.4 | SPARE:-  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 506  | 3.44.5 | 6A,240V,16kA,DP,MPCB along with contactor (for Control & Monitoring) with OLR, LED display lamps on,off,trip, 3-Way Selector Switch with Key (Auto/Manual/Power On) and push button for lamp test  | Set  |                      | 5                       | 4                  | 5                       |                     |                    |                        |                    | 14             |
| 507  | 3.44.6 | Panel Enclosure & other Accessories as specified in Part-2 Section VII Subsection D Unit 2 Clause 2.4 and drawings   | Lot  |                      | 1                       | 1                  | 1                       |                     |                    |                        |                    | 3              |
| 508  | 3.45   | VAC DAMPER PANEL-02 with Mimic panel, Form 2b panel, IP54 conforming to LV panels specification specified in Part-2 Section VII SubSection-D Unit-02 and drawings.   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 509  | 3.45.1 | Incomer:<br>1) 32A,4P,415V, 25kA, MCCB . Having microprocessor based trip unit with adjustable over load, adjustable short circuit and adjustable earth fault with LCD/LED display and provision for remote tripping,Start/stop push button for MCCB.<br>2) Surge protection device (SPD) Type-II with inbuilt fuse suitable to withstand required short circuit current.<br>3) LED indication lamp for ON, OFF & TRIP, Phase Indication for R, Y and B and Lamp test Push buttons.<br>4) Auto / Manual Selector Switch with key operated.<br>5) Digital MFM and 3 Nos. CTs, 32/5A, 10VA, CL-0.5 for metering.                           | Set  |                      | 1                       | 1                  | 1                       |                     |                    |                        |                    | 3              |
| 510  | 3.45.2 | Busbar: rated 32Amps, suitable to withstand symmetrical fault level of 25kA for 1 second at 415 volts as specified in Part-2 Section VII Subsection D Unit 02 Clause 2.7 and drawings.   | Lot  |                      | 1                       | 1                  | 1                       |                     |                    |                        |                    | 3              |
| 511  | 3.45.3 | Outgoing feeders :6A,240V,16kA,DP,MPCB along with contactor (for Control & Monitoring) with OLR, LED display lamps on,off,trip, 3-Way Selector Switch with Key (Auto/Manual/Power On) and push button for lamp test  | Set  |                      | 18                      | 19                 | 18                      |                     |                    |                        |                    | 55             |
| 512  | 3.45.4 | SPARE:-  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 513  | 3.45.5 | 6A,240V,16kA,DP,MPCB along with contactor (for Control & Monitoring) with OLR, LED display lamps on,off,trip, 3-Way Selector Switch with Key (Auto/Manual/Power On) and push button for lamp test  | Set  |                      | 4                       | 4                  | 4                       |                     |                    |                        |                    | 12             |
| 514  | 3.45.6 | Panel Enclosure & other Accessories as specified in Part-2 Section VII Subsection D Unit 2 Clause 2.4 and drawings   | Lot  |                      | 1                       | 1                  | 1                       |                     |                    |                        |                    | 3              |
| 515  | 3.46   | VAC DAMPER PANEL with Mimic panel, Form 2b panel, IP54 conforming to LV panels specification specified in Part-2 Section VII SubSection-D Unit-02 and drawings.  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 516  | 3.46.1 | Incomer:<br>1) 32A,4P,415V, 25kA, Motorised MCCB . Having microprocessor based trip unit with adjustable over load, adjustable short circuit and adjustable earth fault with LCD/LED display and provision for remote tripping,Start/stop push button for MCCB.<br>2) Surge protection device (SPD) Type-II with inbuilt fuse suitable to withstand required short circuit current.<br>3) LED indication lamp for ON, OFF & TRIP, Phase Indication for R, Y and B and Lamp test, Emergency stop Push buttons.<br>4) Auto / Manual Selector Switch with key operated.<br>5) Digital MFM and 3 Nos. CTs, 32/5A, 10VA, CL-0.5 for metering. | Set  |                      |                         |                    |                         | 1                   |                    |                        |                    | 1              |
| 517  | 3.46.2 | Busbar: Rated 32 Amps, suitable to withstand symmetrical fault level of 25kA for 1 second at 415 volts as specified in Part-2 Section VII Subsection D Unit 02 Clause 2.7 and drawings.  | Lot  |                      |                         |                    |                         | 1                   |                    |                        |                    | 1              |
| 518  | 3.46.3 | Outgoing feeders :6A,240V,16kA,DP,MPCB along with contactor (for Control & Monitoring) with OLR, LED display lamps on,off,trip, 3-Way Selector Switch with Key (Auto/Manual/Power On) and push button for lamp test  | Set  |                      |                         |                    |                         | 27                  |                    |                        |                    | 27             |
| 519  | 3.46.4 | SPARES:-   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |

| CHENNAI METRO RAIL LIMITED<br>CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4<br>BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS<br>TENDER NO. C4-VAC&TVS-12 |        |   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
|--|--------|---|------|----------------------|-------------------------|--------------------|-------------------------|---------------------|--------------------|------------------------|--------------------|----------------|
| PRICE CENTRE E - VAC & TVS ELECTRICAL WORKS  |        |   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| Ref. No  | Sl.No. | Description   | Unit | LIGHTHOUSE<br>(ST01) | KUTCHERY ROAD<br>(ST03) | ALWARPET<br>(ST05) | BHARATHIDASAN<br>(ST06) | BOAT CLUB<br>(ST07) | NANDANAM<br>(ST08) | PANAGAL PARK<br>(ST10) | KODAMBAKKAM (ST11) | TOTAL QUANTITY |
| 520  | 3.46.5 | 6A,240V,16kA,DP,MPCB along with contactor (for Control & Monitoring) with OLR, LED display lamps on,off,trip, 3-Way Selector Switch with Key (Auto/Manual/Power On) and push button for lamp test   | Set  |                      |                         |                    |                         | 6                   |                    |                        |                    | 6              |
| 521  | 3.46.6 | Panel Enclosure & other Accessories as specified in Part-2 Section VII Subsection D Unit 2 Clause 2.4 and drawings  | Lot  |                      |                         |                    |                         | 1                   |                    |                        |                    | 1              |
| 522  | 3.47   | VAC DAMPER PANEL with Mimic panel, Form 2b panel, IP54 conforming to LV panels specification specified in Part-2 Section VII SubSection-D Unit-02 and drawings.   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 523  | 3.47.1 | Incomer:<br>1) 32A,4P,415V, 25kA,Motorised MCCB . Having microprocessor based trip unit with adjustable over load, adjustable short circuit and adjustable earth fault with LCD/LED display and provision for remote tripping,Start/stop push button for MCCB.<br>2) Surge protection device (SPD) Type-II with inbuilt fuse suitable to withstand required short circuit current.<br>3) LED indication lamp for ON, OFF & TRIP, Phase Indication for R, Y and B and Lamp test, Emergency stop Push buttons.<br>4) Auto / Manual Selector Switch with key operated.<br>5) Digital MFM and 3 Nos. CTs, 32/5A, 10VA, CL-0.5 for metering. | Set  |                      |                         |                    |                         |                     | 1                  |                        |                    | 1              |
| 524  | 3.47.2 | Busbar: Rated 32 Amps, suitable to withstand symmetrical fault level of 25kA for 1 second at 415 volts as specified in Part-2 Section VII Subsection D Unit 02 Clause 2.7 and drawings.   | Lot  |                      |                         |                    |                         |                     | 1                  |                        |                    | 1              |
| 525  | 3.47.3 | Outgoing feeders :6A,240V,16kA,DP,MPCB along with contactor (for Control & Monitoring) with OLR, LED display lamps on,off,trip, 3-Way Selector Switch with Key (Auto/Manual/Power On) and push button for lamp test   | Set  |                      |                         |                    |                         |                     | 38                 |                        |                    | 38             |
| 526  | 3.47.4 | SPARES:-  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 527  | 3.47.5 | 6A,240V,16kA,DP,MPCB along with contactor (for Control & Monitoring) with OLR, LED display lamps on,off,trip, 3-Way Selector Switch with Key (Auto/Manual/Power On) and push button for lamp test   | Set  |                      |                         |                    |                         |                     | 8                  |                        |                    | 8              |
| 528  | 3.47.6 | Panel Enclosure & other Accessories as specified in Part-2 Section VII Subsection D Unit 2 Clause 2.4 and drawings  | Lot  |                      |                         |                    |                         |                     | 1                  |                        |                    | 1              |
| 529  | 3.48   | VAC DAMPER PANEL-01 with Mimic panel, Form 2b panel, IP54 conforming to LV panels specification specified in Part-2 Section VII SubSection-D Unit-02 and drawings.  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 530  | 3.48.1 | Incomer:<br>1) 32A,4P,415V, 25kA, MCCB . Having microprocessor based trip unit with adjustable over load, adjustable short circuit and adjustable earth fault with LCD/LED display and provision for remote tripping,Start/stop push button for MCCB.<br>2) Surge protection device (SPD) Type-II with inbuilt fuse suitable to withstand required short circuit current.<br>3) LED indication lamp for ON, OFF & TRIP, Phase Indication for R, Y and B Lamp test Push buttons.<br>4) Auto / Manual Selector Switch with key operated.<br>5) Digital MFM and 3 Nos. CTs, 32/5A, 10VA, CL-0.5 for metering.                              | Set  |                      |                         |                    |                         |                     |                    | 1                      |                    | 1              |
| 531  | 3.48.2 | Busbar: rated 32 Amps, suitable to withstand symmetrical fault level of 25kA for 1 second at 415 volts as specified in Part-2 Section VII Subsection D Unit 02 Clause 2.6 and drawings.   | Lot  |                      |                         |                    |                         |                     |                    | 1                      |                    | 1              |
| 532  | 3.48.3 | Outgoing feeders :6A,240V,16kA,DP,MPCB along with contactor (for Control & Monitoring) with OLR, LED display lamps on,off,trip, 3-Way Selector Switch with Key (Auto/Manual/Power On) and push button for lamp test   | Set  |                      |                         |                    |                         |                     |                    | 25                     |                    | 25             |
| 533  | 3.48.4 | SPARE:-   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 534  | 3.48.5 | 6A,240V,16kA,DP,MPCB along with contactor (for Control & Monitoring) with OLR, LED display lamps on,off,trip, 3-Way Selector Switch with Key (Auto/Manual/Power On) and push button for lamp test   | Set  |                      |                         |                    |                         |                     |                    | 5                      |                    | 5              |
| 535  | 3.48.6 | Panel Enclosure & other Accessories as specified in Part-2 Section VII Subsection D Unit 2 Clause 2.4 and drawings  | Lot  |                      |                         |                    |                         |                     |                    | 1                      |                    | 1              |
| 536  | 3.49   | VAC DAMPER PANEL-02 with Mimic panel, Form 2b panel, IP54 conforming to LV panels specification specified in Part-2 Section VII SubSection-D Unit-02 and drawings.  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |

| CHENNAI METRO RAIL LIMITED<br>CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4<br>BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS<br>TENDER NO. C4-VAC&TVS-12 |        |   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
|--|--------|---|------|----------------------|-------------------------|--------------------|-------------------------|---------------------|--------------------|------------------------|--------------------|----------------|
| PRICE CENTRE E - VAC & TVS ELECTRICAL WORKS  |        |   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| Ref. No  | Sl.No. | Description   | Unit | LIGHTHOUSE<br>(ST01) | KUTCHERY ROAD<br>(ST03) | ALWARPET<br>(ST05) | BHARATHIDASAN<br>(ST06) | BOAT CLUB<br>(ST07) | NANDANAM<br>(ST08) | PANAGAL PARK<br>(ST10) | KODAMBAKKAM (ST11) | TOTAL QUANTITY |
| 537  | 3.49.1 | Incomer:<br>1) 32A,4P,415V, 25kA, MCCB . Having microprocessor based trip unit with adjustable over load, adjustable short circuit and adjustable earth fault with LCD/LED display and provision for remote tripping,Start/stop push button for MCCB.<br>2) Surge protection device (SPD) Type-II with inbuilt fuse suitable to withstand required short circuit current.<br>3) LED indication lamp for ON, OFF & TRIP, Phase Indication for R, Y and B and Lamp test Push buttons.<br>4) Auto / Manual Selector Switch with key operated.<br>5) Digital MFM and 3 Nos. CTs, 32/5A, 10VA, CL-0.5 for metering.                          | Set  |                      |                         |                    |                         |                     |                    | 1                      |                    | 1              |
| 538  | 3.49.2 | Busbar: rated 32 Amps, suitable to withstand symmetrical fault level of 25kA for 1 second at 415 volts as specified in Part-2 Section VII Subsection D Unit 02 Clause 2.7 and drawings.   | Lot  |                      |                         |                    |                         |                     |                    | 1                      |                    | 1              |
| 539  | 3.49.3 | Outgoing feeders :6A,240V,16kA,DP,MPCB along with contactor (for Control & Monitoring) with OLR, LED display lamps on,off,trip, 3-Way Selector Switch with Key (Auto/Manual/Power On) and push button for lamp test   | Set  |                      |                         |                    |                         |                     |                    | 22                     |                    | 22             |
| 540  | 3.49.4 | SPARE:-   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 541  | 3.49.5 | 6A,240V,16kA,DP,MPCB along with contactor (for Control & Monitoring) with OLR, LED display lamps on,off,trip, 3-Way Selector Switch with Key (Auto/Manual/Power On) and push button for lamp test   | Set  |                      |                         |                    |                         |                     |                    | 5                      |                    | 5              |
| 542  | 3.49.6 | Panel Enclosure & other Accessories as specified in Part-2 Section VII Subsection D Unit 2 Clause 2.4 and drawings  | Lot  |                      |                         |                    |                         |                     |                    | 1                      |                    | 1              |
| 543  | 3.50   | VAC DAMPER PANEL with Mimic panel, Form 2b panel, IP54 conforming to LV panels specification specified in Part-2 Section VII SubSection-D Unit-02 and drawings.   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 544  | 3.50.1 | Incomer:<br>1) 32A,4P,415V, 25kA,Motorised MCCB . Having microprocessor based trip unit with adjustable over load, adjustable short circuit and adjustable earth fault with LCD/LED display and provision for remote tripping,Start/stop push button for MCCB.<br>2) Surge protection device (SPD) Type-II with inbuilt fuse suitable to withstand required short circuit current.<br>3) LED indication lamp for ON, OFF & TRIP, Phase Indication for R, Y and B and Lamp test, Emergency stop Push buttons.<br>4) Auto / Manual Selector Switch with key operated.<br>5) Digital MFM and 3 Nos. CTs, 32/5A, 10VA, CL-0.5 for metering. | Set  |                      |                         |                    |                         |                     |                    |                        | 1                  | 1              |
| 545  | 3.50.2 | Busbar: Rated 32 Amps, suitable to withstand symmetrical fault level of 25kA for 1 second at 415 volts as specified in Part-2 Section VII Subsection D Unit 02 Clause 2.7 and drawings.   | Lot  |                      |                         |                    |                         |                     |                    |                        | 1                  | 1              |
| 546  | 3.50.3 | Outgoing feeders :6A,240V,16kA,DP,MPCB along with contactor (for Control & Monitoring) with OLR, LED display lamps on,off,trip, 3-Way Selector Switch with Key (Auto/Manual/Power On) and push button for lamp test   | Set  |                      |                         |                    |                         |                     |                    |                        | 29                 | 29             |
| 547  | 3.50.4 | SPARES:-  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 548  | 3.50.5 | 6A,240V,16kA,DP,MPCB along with contactor (for Control & Monitoring) with OLR, LED display lamps on,off,trip, 3-Way Selector Switch with Key (Auto/Manual/Power On) and push button for lamp test   | Set  |                      |                         |                    |                         |                     |                    |                        | 6                  | 6              |
| 549  | 3.50.6 | Panel Enclosure & other Accessories as specified in Part-2 Section VII Subsection D Unit 2 Clause 2.4 and drawings  | Lot  |                      |                         |                    |                         |                     |                    |                        | 1                  | 1              |
| 550  | 3.51   | SCADA DB (6 Way - 7 Segment DB) conforming to LV panels specification specified in Part-2 Section VII SubSection-D Unit 02 and drawings   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 551  | 3.51.1 | Incomer:<br>1) 32A,4P,415V,25kA, MCCB ,Having Thermal Magnetic trip unit with Start/stop push buttons having Automatic interlock between Incomers capable of Automatic Change over of power supplies.<br>2) LED indication lamp for ON, OFF & TRIP, Phase Indication for R, Y and B and Emergency stop Push button<br>3) Auto / Manual Selector Switch with key operated.   | Set  | 2                    | 2                       | 2                  | 2                       | 2                   | 2                  | 2                      | 2                  | 16             |
| 552  | 3.51.2 | Busbar - Rated 32 Amps, suitable to withstand symmetrical fault level of 25kA for 1 second at 415 volts as specified in Part-2 Section VII Subsection D Unit 02 Clause 2.6 and drawings   | Lot  | 1                    | 1                       | 1                  | 1                       | 1                   | 1                  | 1                      | 1                  | 8              |
| 553  | 3.51.3 | Sub Incomer :25A DP, RCBO (100 mA Sensitivity)  | Set  | 3                    | 3                       | 3                  | 3                       | 3                   | 3                  | 3                      | 3                  | 24             |
| 554  | 3.51.4 | Outgoing feeders: 16A,10kA,SP,MCB (Spread equally in each phase)  | Set  | 18                   | 18                      | 18                 | 18                      | 18                  | 18                 | 18                     | 18                 | 144            |
| 555  | 3.51.5 | Distribution board Enclosure and other accessories  | Lot  | 1                    | 1                       | 1                  | 1                       | 1                   | 1                  | 1                      | 1                  | 8              |

| CHENNAI METRO RAIL LIMITED<br>CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4<br>BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS<br>TENDER NO. C4-VAC&TVS-12 |       |  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
|--|-------|--|------|----------------------|-------------------------|--------------------|-------------------------|---------------------|--------------------|------------------------|--------------------|----------------|
| PRICE CENTRE E - VAC & TVS ELECTRICAL WORKS  |       |  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| Ref. No  | SLNo. | Description  | Unit | LIGHTHOUSE<br>(ST01) | KUTCHERY ROAD<br>(ST03) | ALWARPET<br>(ST05) | BHARATHIDASAN<br>(ST06) | BOAT CLUB<br>(ST07) | NANDANAM<br>(ST08) | PANAGAL PARK<br>(ST10) | KODAMBAKKAM (ST11) | TOTAL QUANTITY |
| 556  | 4     | Variable Frequency drive as specified Part-2 Section VII Subsection D Unit 5.    |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 557  | 4.1   | 355 kW VFD drive Panel with Dynamic Breaking resistor (TVS Fan)                  | Nos  |                      |                         |                    |                         |                     |                    | 2                      |                    | 2.0            |
| 558  | 4.2   | 315 kW VFD drive Panel with Dynamic Breaking resistor (TVS Fan)                  | Nos  | 2                    |                         |                    |                         |                     |                    | 2                      |                    | 4.0            |
| 559  | 4.3   | 250 kW VFD drive Panel with Dynamic Breaking resistor (TVS Fan)                  | Nos  | 2                    |                         |                    |                         |                     |                    |                        |                    | 2.0            |
| 560  | 4.4   | 200 kW VFD drive Panel with Dynamic Breaking resistor (TVS Fan)                  | Nos  |                      | 4                       | 4                  | 4                       | 2                   | 2                  |                        | 2                  | 18.0           |
| 561  | 4.5   | 110 kW VFD drive Panel with Dynamic Breaking resistor (TVS Fan)                  | Nos  |                      |                         |                    |                         |                     |                    |                        | 1                  | 1.0            |
| 562  | 4.6   | 110 kW VFD drive Panel (OTEF Fan)  | Nos  |                      |                         |                    |                         | 2                   |                    |                        |                    | 2.0            |
| 563  | 4.7   | 90 kW VFD drive Panel (OTEF Fan)   | Nos  | 2                    |                         |                    |                         |                     | 2                  | 2                      | 2                  | 8.0            |
| 564  | 4.8   | 75 kW VFD drive Panel (OTEF Fan)   | Nos  |                      | 2                       | 2                  | 2                       |                     |                    |                        |                    | 6.0            |
| 565  | 4.9   | 55 kW VFD drive Panel (OTEF Fan)   | Nos  |                      |                         |                    |                         |                     |                    |                        | 1                  | 1.0            |
| 566  | 4.10  | 37 kW VFD drive Panel (OTEF Fan)   | Nos  |                      | 2                       | 2                  | 2                       |                     |                    |                        |                    | 6.0            |
| 567  | 4.11  | 90 kW VFD drive (SEF Fan)  | Nos  | 2                    |                         |                    |                         |                     |                    |                        |                    | 2.0            |
| 568  | 4.12  | 75 kW VFD drive Panel (SEF Fan)  | Nos  |                      |                         |                    |                         |                     | 2                  | 2                      |                    | 4.0            |
| 569  | 4.13  | 22 kW VFD drive (SEF Fan) suitable for mounting within TVS & VAC PANEL ESSENTIAL | Nos  |                      |                         |                    |                         |                     |                    | 2                      |                    | 2.0            |
| 570  | 4.14  | 37 kW VFD drive (EXF Fan) suitable for mounting within VAC panel                 | Nos  |                      |                         |                    |                         |                     |                    | 2                      |                    | 2.0            |
| 571  | 4.15  | 30 kW VFD drive (LEXF Fan) suitable for mounting within OTEF PANEL               | Nos  | 2                    |                         |                    |                         |                     |                    |                        |                    | 2.0            |
| 572  | 4.16  | 55kW VFD drive (AHU) suitable for mounting within VAC panel                      | Nos  |                      |                         |                    |                         | 1                   |                    |                        | 1                  | 2.0            |
| 573  | 4.17  | 45kW VFD drive (AHU) suitable for mounting within VAC panel                      | Nos  |                      |                         |                    |                         |                     |                    |                        | 1                  | 1.0            |
| 574  | 4.18  | 37kW VFD drive (AHU) suitable for mounting within VAC panel                      | Nos  | 2                    |                         |                    | 2                       |                     | 2                  |                        |                    | 6.0            |
| 575  | 4.19  | 30kW VFD drive (AHU) suitable for mounting within VAC panel                      | Nos  | 1                    | 3                       | 3                  | 1                       |                     | 1                  | 1                      | 2                  | 12.0           |
| 576  | 4.20  | 22kW VFD drive (AHU) suitable for mounting within VAC panel                      | Nos  |                      |                         |                    |                         | 1                   | 1                  | 1                      |                    | 3.0            |
| 577  | 4.21  | 20kW VFD drive (AHU) suitable for mounting within VAC panel                      | Nos  |                      |                         |                    |                         |                     |                    |                        | 1                  | 1.0            |
| 578  | 4.22  | 18.5kW VFD drive (AHU) suitable for mounting within VAC panel                    | Nos  |                      | 1                       | 1                  | 1                       | 1                   |                    | 1                      |                    | 5.0            |

| CHENNAI METRO RAIL LIMITED<br>CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4<br>BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS<br>TENDER NO. C4-VAC&TVS-12 |        |   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
|--|--------|---|------|----------------------|-------------------------|--------------------|-------------------------|---------------------|--------------------|------------------------|--------------------|----------------|
| PRICE CENTRE E - VAC & TVS ELECTRICAL WORKS  |        |   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| Ref. No  | Sl.No. | Description   | Unit | LIGHTHOUSE<br>(ST01) | KUTCHERY ROAD<br>(ST03) | ALWARPET<br>(ST05) | BHARATHIDASAN<br>(ST06) | BOAT CLUB<br>(ST07) | NANDANAM<br>(ST08) | PANAGAL PARK<br>(ST10) | KODAMBAKKAM (ST11) | TOTAL QUANTITY |
| 579  | 4.23   | 15kW VFD drive (AHU) suitable for mounting within VAC panel                       | Nos  |                      |                         |                    |                         |                     |                    | 1                      |                    | 1.0            |
| 580  | 4.24   | 11 kW VFD drive (AHU) suitable for mounting within VAC panel                      | Nos  |                      |                         |                    |                         |                     |                    |                        | 1                  | 1.0            |
| 581  | 4.25   | 7.5kW VFD drive (AHU) suitable for mounting within VAC panel                      | Nos  |                      |                         |                    |                         |                     |                    |                        | 1                  | 1.0            |
| 582  | 4.26   | 5.5kW VFD drive (AHU) suitable for mounting within VAC panel                      | Nos  |                      |                         |                    |                         |                     |                    |                        | 1                  | 1.0            |
| 583  | 4.27   | 4kW VFD drive (AHU) suitable for mounting within VAC panel                        | Nos  |                      |                         |                    |                         |                     |                    |                        | 1                  | 1.0            |
| 584  | 4.28   | 3.7kW VFD drive (AHU) suitable for mounting within VAC panel                      | Nos  |                      |                         |                    |                         |                     |                    |                        | 1                  | 1.0            |
| 585  | 4.29   | 7.5kW VFD drive (FAF) suitable for mounting within VAC panel                      | Nos  | 1                    |                         |                    | 1                       |                     |                    |                        | 1                  | 3.0            |
| 586  | 4.30   | 5.5kW VFD drive (FAF) suitable for mounting within VAC panel                      | Nos  |                      |                         | 1                  | 1                       |                     | 1                  |                        |                    | 3.0            |
| 587  | 4.31   | 4kW VFD drive (FAF) suitable for mounting within VAC panel                        | Nos  |                      |                         |                    |                         | 1                   | 1                  | 1                      |                    | 3.0            |
| 588  | 4.32   | 3kW VFD drive (FAF) suitable for mounting within VAC panel                        | Nos  |                      | 1                       | 1                  | 1                       | 1                   |                    |                        |                    | 4.0            |
| 589  | 4.33   | 2.2kW VFD drive (FAF) suitable for mounting within VAC panel                      | Nos  |                      |                         | 1                  |                         |                     | 1                  |                        |                    | 2.0            |
| 590  | 4.34   | 1.5kW VFD drive (FAF) suitable for mounting within VAC panel                      | Nos  |                      | 1                       |                    |                         |                     |                    | 2                      | 1                  | 4.0            |
| 591  | 4.35   | 1.1kW VFD drive (FAF) suitable for mounting within VAC panel                      | Nos  |                      | 1                       |                    |                         |                     |                    |                        |                    | 1.0            |
| 592  | 4.36   | 0.55kW VFD drive (FAF) suitable for mounting within VAC panel                     | Nos  | 1                    |                         |                    |                         |                     |                    |                        |                    | 1.0            |
| 593  | 4.37   | 0.25kW VFD drive (FAF) suitable for mounting within VAC panel                     | Nos  |                      |                         |                    |                         |                     |                    | 1                      |                    | 1.0            |
| 594  | 5      | SoftStarter as specified Part-2 Section VII Subsection D Unit 6                   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 595  | 5.1    | 75kW SoftStarter (SEF) suitable for mounting within TVS & VAC PANEL ESSENTIAL     | Nos  |                      |                         |                    |                         |                     |                    |                        | 1                  | 1.0            |
| 596  | 5.2    | 55kW SoftStarter (SEF) suitable for mounting within TVS & VAC PANEL ESSENTIAL     | Nos  |                      |                         |                    |                         |                     |                    |                        | 1                  | 1.0            |
| 597  | 5.3    | 37kW SoftStarter (SPF) suitable for mounting within TVS & VAC PANEL ESSENTIAL     | Nos  |                      |                         |                    |                         |                     | 1                  |                        |                    | 1.0            |
| 598  | 5.4    | 30kW SoftStarter (SPF) suitable for mounting within TVS & VAC PANEL ESSENTIAL     | Nos  |                      |                         |                    |                         | 1                   |                    | 1                      | 1                  | 3.0            |
| 599  | 5.5    | 22kW SoftStarter (SPF) suitable for mounting within TVS & VAC PANEL ESSENTIAL     | Nos  |                      |                         |                    | 1                       |                     | 1                  |                        |                    | 1.0            |
| 600  | 5.6    | 18.5 kW SoftStarter (SPF) suitable for mounting within TVS & VAC PANEL ESSENTIAL  | Nos  |                      | 1                       |                    |                         |                     |                    |                        |                    | 1.0            |
| 601  | 5.7    | 15kW SoftStarter (SPF/SEF) suitable for mounting within TVS & VAC PANEL ESSENTIAL | Nos  |                      |                         |                    |                         |                     | 1                  |                        | 1                  | 2.0            |



| CHENNAI METRO RAIL LIMITED<br>CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4<br>BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS<br>TENDER NO. C4-VAC&TVS-12 |        |  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
|--|--------|--|------|----------------------|-------------------------|--------------------|-------------------------|---------------------|--------------------|------------------------|--------------------|----------------|
| PRICE CENTRE E - VAC & TVS ELECTRICAL WORKS  |        |  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| Ref. No  | Sl.No. | Description  | Unit | LIGHTHOUSE<br>(ST01) | KUTCHERY ROAD<br>(ST03) | ALWARPET<br>(ST05) | BHARATHIDASAN<br>(ST06) | BOAT CLUB<br>(ST07) | NANDANAM<br>(ST08) | PANAGAL PARK<br>(ST10) | KODAMBAKKAM (ST11) | TOTAL QUANTITY |
| 602  | 5.8    | 11kW SoftStarter (SPF) suitable for mounting within TVS & VAC PANEL ESSENTIAL  | Nos  | 1                    |                         |                    |                         | 1                   |                    |                        |                    | 2.0            |
| 603  | 5.9    | 7.5 kW SoftStarter (SPF) suitable for mounting within TVS & VAC PANEL ESSENTIAL  | Nos  | 2                    |                         | 1                  |                         |                     |                    |                        |                    | 3.0            |
| 604  | 5.10   | 5.5 kW SoftStarter (SPF) suitable for mounting within TVS & VAC PANEL ESSENTIAL  | Nos  | 2                    |                         |                    |                         |                     |                    |                        |                    | 2.0            |
| 605  | 5.11   | 4kW SoftStarter (SPF) suitable for mounting within TVS & VAC PANEL ESSENTIAL   | Nos  |                      |                         | 1                  |                         |                     |                    | 1                      |                    | 2.0            |
| 606  | 5.12   | 55kW BYPASS SOFT STARTER (AHU) suitable for mounting within VAC panel  | Nos  |                      |                         |                    |                         | 1                   |                    |                        | 1                  | 2.0            |
| 607  | 5.13   | 45kW BYPASS SOFT STARTER (AHU) suitable for mounting within VAC panel  | Nos  |                      |                         |                    |                         |                     |                    |                        | 1                  | 1.0            |
| 608  | 5.14   | 37kW BYPASS SOFT STARTER (AHU) suitable for mounting within VAC panel  | Nos  | 2                    |                         |                    | 2                       |                     | 2                  |                        |                    | 6.0            |
| 609  | 5.15   | 30kW BYPASS SOFT STARTER (AHU) suitable for mounting within VAC panel  | Nos  | 1                    | 3                       | 3                  | 1                       |                     | 1                  | 1                      | 2                  | 12.0           |
| 610  | 5.16   | 22kW BYPASS SOFT STARTER (AHU) suitable for mounting within VAC panel  | Nos  |                      |                         |                    |                         | 1                   | 1                  | 1                      |                    | 3.0            |
| 611  | 5.17   | 18.5kW BYPASS SOFT STARTER (AHU) suitable for mounting within VAC panel  | Nos  |                      | 1                       | 1                  | 1                       | 1                   |                    | 1                      |                    | 5.0            |
| 612  | 5.18   | 15kW BYPASS SOFT STARTER (AHU) suitable for mounting within VAC panel  | Nos  |                      |                         |                    |                         |                     |                    | 1                      |                    | 1.0            |
| 613  | 6      | Other accessories<br>Supply and fixing of the following safety equipments in Aux. Sub.Station/Mechanical room/TVS panel room as per detailed descriptions given below and as per relevant IE rules & code of standard practice |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 614  | 6.1    | 1000 mm wide 2mm thick Insulating mat in front of all panels in ASS Rooms, Mechanical room, TVS Panel/DB Rooms and other rooms as required. as specified Part-2 Section VII Subsection D Unit 2 Clause 2.26                    | RMT  | 40                   | 50                      | 50                 | 50                      | 35                  | 30                 | 50                     | 30                 | 335            |
| 615  | 6.2    | Laminated standard shock treatment charts in Tamil, English & Hindi in ASS, Mechanical Room, TVSPanel/DB Room and Pump room  | Lot  | 4                    | 6                       | 6                  | 6                       | 4                   | 4                  | 6                      | 4                  | 40             |
| 616  | 6.3    | Danger plate as per approved Style & sample written in Tamil, English & Hindi for MV installations as required as per IE rules, IEC and IS 2551 (latest) in Mechanical room, TVS Panel/DB Rooms                                | Lot  | 5                    | 5                       | 5                  | 5                       | 5                   | 5                  | 5                      | 5                  | 40             |
| 617  | 6.4    | Glass framed SLD board (A1 size) in all equipment rooms  | Nos  | 4                    | 6                       | 6                  | 6                       | 4                   | 4                  | 6                      | 4                  | 40             |
| 618  | 6.5    | Glass framed Drawing board (A2 size) in all equipment rooms  | Nos  | 4                    | 6                       | 6                  | 6                       | 4                   | 4                  | 6                      | 4                  | 40             |
| 619  | 6.6    | Glass framed Drawing/Layout board (A3 size) in all equipment rooms   | Nos  | 4                    | 6                       | 6                  | 6                       | 4                   | 4                  | 6                      | 4                  | 40             |
| 620  | 7      | LV POWER CABLES  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 621  | 7.1    | CABLES (Non Fire Survival type Cable) and Termination includes gland with shrouds, lugs, necessary earthing arrangements conforming to cables specification specified in Part-2 Section VII SubSection-D Unit-03 and drawings. |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 622  | 7.1.1  | 4c X 300 Sq.mm Cu Conductor  | RMT  |                      |                         |                    |                         |                     |                    |                        | 100                | 100            |
| 623  | 7.1.2  | 4c X 240 Sq.mm Cu Conductor  | RMT  |                      | 140                     | 140                | 140                     |                     |                    |                        |                    | 420            |
| 624  | 7.1.3  | 4c X 185 Sq.mm Cu Conductor  | RMT  | 170                  |                         |                    |                         |                     |                    | 440                    |                    | 610            |
| 625  | 7.1.4  | 4c X 150 Sq.mm Cu Conductor  | RMT  |                      |                         |                    |                         |                     |                    |                        | 100                | 100            |
| 626  | 7.1.5  | 4c X 120 Sq.mm Cu Conductor  | RMT  |                      | 285                     | 285                | 285                     |                     |                    |                        |                    | 855            |

| CHENNAI METRO RAIL LIMITED<br>CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4<br>BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS<br>TENDER NO. C4-VAC&TVS-12 |        |                             |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
|--|--------|-----------------------------|------|----------------------|-------------------------|--------------------|-------------------------|---------------------|--------------------|------------------------|--------------------|----------------|
| PRICE CENTRE E - VAC & TVS ELECTRICAL WORKS  |        |                             |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| Ref. No  | Sl.No. | Description                 | Unit | LIGHTHOUSE<br>(ST01) | KUTCHERY ROAD<br>(ST03) | ALWARPET<br>(ST05) | BHARATHIDASAN<br>(ST06) | BOAT CLUB<br>(ST07) | NANDANAM<br>(ST08) | PANAGAL PARK<br>(ST10) | KODAMBAKKAM (ST11) | TOTAL QUANTITY |
| 627  | 7.1.6  | 4c X 95 Sq.mm Cu Conductor  | RMT  |                      |                         |                    |                         |                     |                    |                        | 50                 | 50             |
| 628  | 7.1.7  | 4c X 70 Sq.mm Cu Conductor  | RMT  |                      |                         |                    |                         |                     |                    |                        | 60                 | 60             |
| 629  | 7.1.8  | 4c X 50 Sq.mm Cu Conductor  | RMT  |                      |                         |                    |                         |                     |                    |                        | 80                 | 80             |
| 630  | 7.1.9  | 4c X 35 Sq.mm Cu Conductor  | RMT  |                      |                         |                    |                         |                     |                    |                        | 20                 | 20             |
| 631  | 7.1.10 | 4c X 25Sq.mm Cu Conductor   | RMT  |                      |                         |                    |                         |                     |                    |                        | 100                | 100            |
| 632  | 7.1.11 | 4c X 16 Sq.mm Cu Conductor  | RMT  |                      |                         |                    |                         |                     |                    | 755                    |                    | 755            |
| 633  | 7.1.12 | 4c X 10 Sq.mm Cu Conductor  | RMT  | 1120                 |                         |                    |                         | 1285                | 1660               | 590                    | 1380               | 6035           |
| 634  | 7.1.13 | 4c X 6 Sq.mm Cu Conductor   | RMT  |                      |                         |                    |                         |                     |                    |                        | 100                | 100            |
| 635  | 7.1.14 | 4c X 4 Sq.mm Cu Conductor   | RMT  |                      |                         |                    |                         |                     |                    |                        | 50                 | 50             |
| 636  | 7.1.15 | 4c X 2.5 Sq.mm Cu Conductor | RMT  |                      |                         |                    |                         |                     |                    | 60                     |                    | 60             |
| 637  | 7.1.16 | 4c X 1.5 Sq.mm Cu Conductor | RMT  |                      |                         |                    |                         |                     |                    | 20                     |                    | 20             |
| 638  | 7.1.17 | 3c X 300 Sq.mm Cu Conductor | RMT  |                      |                         |                    |                         |                     |                    | 30                     |                    | 30             |
| 639  | 7.1.18 | 3c X 240 Sq.mm Cu Conductor | RMT  |                      |                         |                    |                         |                     |                    | 80                     |                    | 80             |
| 640  | 7.1.19 | 3c X 185 Sq.mm Cu Conductor | RMT  |                      |                         |                    |                         |                     |                    | 50                     |                    | 50             |
| 641  | 7.1.20 | 3c X 150 Sq.mm Cu Conductor | RMT  |                      |                         |                    |                         |                     |                    | 10                     |                    | 10             |
| 642  | 7.1.21 | 3c X 120 Sq.mm Cu Conductor | RMT  |                      |                         |                    |                         |                     |                    | 30                     |                    | 30             |
| 643  | 7.1.22 | 3c X 95 Sq.mm Cu Conductor  | RMT  |                      |                         |                    |                         |                     |                    | 100                    |                    | 100            |
| 644  | 7.1.23 | 3c X 70 Sq.mm Cu Conductor  | RMT  |                      |                         |                    |                         |                     | 85                 | 430                    | 70                 | 585            |
| 645  | 7.1.24 | 3c X 50 Sq.mm Cu Conductor  | RMT  |                      |                         |                    |                         |                     |                    |                        | 30                 | 30             |
| 646  | 7.1.25 | 3c X 35 Sq.mm Cu Conductor  | RMT  |                      | 245                     | 245                | 245                     |                     |                    |                        |                    | 735            |
| 647  | 7.1.26 | 3c X 25 Sq.mm Cu Conductor  | RMT  |                      | 180                     | 180                | 180                     |                     | 170                |                        | 140                | 850            |
| 648  | 7.1.27 | 3c X 16 Sq.mm Cu Conductor  | RMT  |                      | 70                      | 70                 | 70                      |                     |                    | 520                    |                    | 730            |
| 649  | 7.1.28 | 3c X 10 Sq.mm Cu Conductor  | RMT  | 460                  | 120                     | 120                | 120                     | 150                 | 230                | 200                    | 190                | 1590           |
| 650  | 7.1.29 | 3c X 6 Sq.mm Cu Conductor   | RMT  | 40                   | 185                     | 185                | 185                     | 135                 |                    | 250                    |                    | 980            |
| 651  | 7.1.30 | 3c X 4 Sq.mm Cu Conductor   | RMT  |                      |                         |                    |                         |                     |                    | 790                    |                    | 790            |
| 652  | 7.1.31 | 3c X 2.5 Sq.mm Cu Conductor | RMT  | 3345                 | 2320                    | 2320               | 2320                    | 960                 | 1195               | 1180                   | 995                | 14635          |
| 653  | 7.1.32 | 2c X 4 Sq.mm Cu Conductor   | RMT  |                      |                         |                    |                         | 100                 |                    |                        |                    | 100            |
| 654  | 7.1.33 | 2c X 2.5 Sq.mm Cu Conductor | RMT  |                      |                         |                    |                         |                     | 50                 |                        |                    | 50             |

| CHENNAI METRO RAIL LIMITED<br>CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4<br>BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS<br>TENDER NO. C4-VAC&TVS-12 |        |   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
|--|--------|---|------|----------------------|-------------------------|--------------------|-------------------------|---------------------|--------------------|------------------------|--------------------|----------------|
| PRICE CENTRE E - VAC & TVS ELECTRICAL WORKS  |        |   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| Ref. No  | Sl.No. | Description   | Unit | LIGHTHOUSE<br>(ST01) | KUTCHERY ROAD<br>(ST03) | ALWARPET<br>(ST05) | BHARATHIDASAN<br>(ST06) | BOAT CLUB<br>(ST07) | NANDANAM<br>(ST08) | PANAGAL PARK<br>(ST10) | KODAMBAKKAM (ST11) | TOTAL QUANTITY |
| 655  | 7.1.34 | 2c X 1.5 Sq.mm Cu Conductor   | RMT  | 480                  | 320                     | 320                | 320                     | 220                 | 1008               | 340                    | 840                | 3848           |
| 656  | 7.2    | CABLES (Fire Survival type Cable) and Termination includes gland with shrouds, lugs, necessary earthing arrangements conforming to cables specification specified in Part-2 Section VII SubSection-D Unit no.03 and drawings. |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 657  | 7.2.1  | 4c X 300 Sq.mm Cu Conductor   | RMT  |                      |                         |                    |                         | 765                 |                    | 3450                   |                    | 4215           |
| 658  | 7.2.2  | 4c X 240 Sq.mm Cu Conductor   | RMT  | 1115                 | 1090                    | 1090               | 1090                    |                     |                    | 80                     |                    | 4465           |
| 659  | 7.2.3  | 4c X 185 Sq.mm Cu Conductor   | RMT  | 2385                 |                         |                    |                         |                     | 750                |                        | 625                | 3760           |
| 660  | 7.2.4  | 4c X 150 Sq.mm Cu Conductor   | RMT  | 400                  | 160                     | 160                | 160                     |                     |                    |                        |                    | 880            |
| 661  | 7.2.5  | 4c X 120 Sq.mm Cu Conductor   | RMT  | 248                  | 250                     | 250                | 250                     |                     |                    |                        |                    | 998            |
| 662  | 7.2.6  | 4c X 95 Sq.mm Cu Conductor  | RMT  |                      |                         |                    |                         |                     | 100                |                        |                    | 100            |
| 663  | 7.2.7  | 4c X 70 Sq.mm Cu Conductor  | RMT  |                      | 240                     | 240                | 240                     |                     |                    |                        |                    | 720            |
| 664  | 7.2.8  | 4c X 50 Sq.mm Cu Conductor  | RMT  |                      |                         |                    | 100                     |                     |                    |                        |                    | 100            |
| 665  | 7.2.9  | 4c X 35 Sq.mm Cu Conductor  | RMT  |                      |                         |                    |                         | 200                 |                    |                        |                    | 200            |
| 666  | 7.2.10 | 4c X 25Sq.mm Cu Conductor   | RMT  | 580                  |                         |                    |                         |                     | 350                |                        | 290                | 1220           |
| 667  | 7.2.11 | 4c X 16 Sq.mm Cu Conductor  | RMT  | 540                  | 420                     | 420                | 420                     | 130                 |                    | 345                    |                    | 2275           |
| 668  | 7.2.12 | 4c X 10 Sq.mm Cu Conductor  | RMT  | 1840                 | 610                     | 610                | 610                     | 1120                | 912                | 1070                   | 760                | 7532           |
| 669  | 7.2.13 | 4c X 6 Sq.mm Cu Conductor   | RMT  | 60                   |                         |                    |                         |                     |                    |                        |                    | 60             |
| 670  | 7.2.14 | 4c X 4 Sq.mm Cu Conductor   | RMT  |                      |                         |                    |                         |                     |                    |                        | 100                | 100            |
| 671  | 7.2.15 | 4c X 2.5 Sq.mm Cu Conductor   | RMT  |                      |                         |                    |                         |                     |                    |                        | 100                | 100            |
| 672  | 7.2.16 | 4c X 1.5 Sq.mm Cu Conductor   | RMT  |                      |                         |                    |                         |                     |                    |                        | 100                | 100            |
| 673  | 7.2.17 | 3c X 300 Sq.mm Cu Conductor   | RMT  |                      |                         |                    |                         |                     |                    | 525                    |                    | 525            |
| 674  | 7.2.18 | 3c X 240 Sq.mm Cu Conductor   | RMT  | 315                  |                         |                    |                         |                     |                    |                        |                    | 315            |
| 675  | 7.2.19 | 3c X 185 Sq.mm Cu Conductor   | RMT  |                      |                         |                    |                         | 155                 |                    |                        |                    | 155            |
| 676  | 7.2.20 | 3c X 150 Sq.mm Cu Conductor   | RMT  | 210                  |                         |                    |                         |                     | 795                |                        | 660                | 1665           |
| 677  | 7.2.21 | 3c X 120 Sq.mm Cu Conductor   | RMT  | 50                   |                         |                    |                         |                     |                    | 60                     |                    | 110            |
| 678  | 7.2.22 | 3c X 95 Sq.mm Cu Conductor  | RMT  |                      |                         |                    |                         |                     |                    | 285                    |                    | 285            |
| 679  | 7.2.23 | 3c X 70 Sq.mm Cu Conductor  | RMT  | 270                  | 1610                    | 1610               | 1610                    | 410                 |                    | 655                    |                    | 6165           |
| 680  | 7.2.24 | 3c X 50 Sq.mm Cu Conductor  | RMT  |                      |                         |                    |                         |                     |                    |                        | 100                | 100            |
| 681  | 7.2.25 | 3c X 35 Sq.mm Cu Conductor  | RMT  |                      |                         |                    |                         |                     |                    |                        | 100                | 100            |
| 682  | 7.2.26 | 3c X 25 Sq.mm Cu Conductor  | RMT  | 625                  |                         |                    |                         |                     | 770                |                        | 640                | 2035           |
| 683  | 7.2.27 | 3c X 16 Sq.mm Cu Conductor  | RMT  | 100                  | 730                     | 730                | 730                     |                     |                    |                        |                    | 2290           |
| 684  | 7.2.28 | 3c X 10 Sq.mm Cu Conductor  | RMT  | 2865                 |                         |                    |                         | 40                  | 350                | 1080                   | 290                | 4625           |
| 685  | 7.2.29 | 3c X 6 Sq.mm Cu Conductor   | RMT  | 40                   | 505                     | 505                | 505                     | 110                 |                    | 1120                   |                    | 2785           |
| 686  | 7.2.30 | 3c X 4 Sq.mm Cu Conductor   | RMT  |                      |                         |                    |                         | 365                 |                    | 4020                   |                    | 4385           |
| 687  | 7.2.31 | 3c X 2.5 Sq.mm Cu Conductor   | RMT  |                      |                         |                    |                         |                     |                    |                        | 100                | 100            |
| 688  | 7.2.32 | 2c X 4 Sq.mm Cu Conductor   | RMT  |                      |                         |                    |                         |                     |                    |                        | 100                | 100            |
| 689  | 7.2.33 | 2c X 2.5 Sq.mm Cu Conductor   | RMT  | 6855                 | 6320                    | 6320               | 6320                    | 4025                | 9240               | 5010                   | 7700               | 51790          |
| 690  | 7.2.34 | 2c X 1.5 Sq.mm Cu Conductor   | RMT  | 670                  | 495                     | 495                | 495                     | 310                 | 810                | 565                    | 675                | 4515           |
| 691  | 7.2.35 | 2c X 1 Sq.mm Cu Conductor   | RMT  |                      |                         |                    |                         |                     |                    |                        | 100                | 100            |
| 692  | 7.3    | CONTROL CABLES (FS cable) and Termination includes gland with shrouds, lugs, necessary earthing arrangements conforming to cables specification specified in Part-2 Section VII SubSection-E (ISMS) Unit no.08 and drawings.  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 693  | 7.3.1  | 8c X 1.5 sq. mm Cu Conductor (FS)   | RMT  |                      |                         |                    |                         |                     |                    |                        | 80                 | 80             |
| 694  | 7.3.2  | 10c X 1.5 sq. mm Cu Conductor (FS)  | RMT  |                      |                         |                    |                         |                     |                    |                        | 80                 | 80             |
| 695  | 7.3.3  | 3c X 1.5 Sq.mm Cu Conductor (FS)  | RMT  | 6855                 | 6320                    | 6320               | 6320                    | 4025                | 9240               | 5010                   | 7700               | 51790          |
| 696  | 7.3.4  | 2c X 1.5 Sq.mm Cu Conductor (FS)  | RMT  |                      |                         |                    |                         |                     |                    |                        | 80                 | 80             |
| 697  | 7.3.5  | 2c X 1.5 Sq.mm Cu Conductor (Non.FS)  | RMT  |                      |                         |                    |                         |                     |                    |                        | 80                 | 80             |
| 698  | 8      | CABLE TRAY  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 699  | 8.1    | Perforated type cable tray and accessories with suitable Modular brackets/supports conforming to specification specified in Part-2 section VII Sub section-D Unit no.04 and drawings  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 700  | 8.1.1  | 600 mm wide x 75 mm deep x 2 mm thick   | RMT  | 195                  | 15                      | 445                | 135                     | 60                  | 205                | 565                    | 390                | 2010           |
| 701  | 8.1.2  | 450 mm wide x 75 mm deep x 2 mm thick   | RMT  | 245                  | 75                      | 380                | 295                     | 35                  | 255                | 300                    | 150                | 1735           |
| 702  | 8.1.3  | 300 mm wide x 50 mm deep x 2 mm thick   | RMT  | 615                  | 525                     | 640                | 345                     | 230                 | 260                | 590                    | 250                | 3455           |
| 703  | 8.1.4  | 200 mm wide x 50 mm deep x 2 mm thick   | RMT  | 95                   | 300                     | 180                | 200                     | 450                 | 170                | 640                    | 170                | 2205           |
| 704  | 8.1.5  | 150mm wide x 50mm deep x 2 mm thick   | RMT  | 940                  | 265                     | 500                | 800                     | 315                 | 260                | 1430                   | 210                | 4720           |
| 705  | 8.1.6  | 100mm wide x 50mm deep x 2 mm thick   | RMT  | 1150                 | 495                     | 735                | 460                     | 975                 | 1050               | 2005                   | 955                | 7825           |
| 706  | 8.1.7  | 50mm wide x 50mm deep x 2 mm thick  | RMT  | 10                   | 10                      | 10                 | 10                      | 10                  | 15                 | 10                     | 10                 | 85             |
| 707  | 8.2    | Ladder type cable tray and accessories with suitable Modular brackets/supports conforming to specification specified in Part-2 section VII Sub section-D Unit 04 and drawings   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 708  | 8.2.1  | 600 mm wide x 75 mm deep x 2 mm thick   | RMT  | 20                   | 20                      | 20                 | 20                      | 20                  | 25                 | 20                     | 20                 | 165            |
| 709  | 8.2.2  | 450 mm wide x 75 mm deep x 2 mm thick   | RMT  | 20                   | 20                      | 20                 | 20                      | 20                  | 25                 | 20                     | 20                 | 165            |
| 710  | 8.2.3  | 300 mm wide x 50 mm deep x 2 mm thick   | RMT  | 20                   | 20                      | 20                 | 20                      | 20                  | 25                 | 20                     | 20                 | 165            |
| 711  | 8.3    | Cable tray covers and accessories with suitable Modular brackets/supports conforming to specification specified in Part-2 section VII Sub section-D Unit 04 and drawings  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 712  | 8.3.1  | 600 mm wide x 75 mm deep x 1.6 mm thick   | RMT  | 40                   | 5                       | 90                 | 30                      | 15                  | 45                 | 115                    | 80                 | 420            |

| CHENNAI METRO RAIL LIMITED<br>CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4<br>BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS<br>TENDER NO. C4-VAC&TVS-12 |        |   |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
|--|--------|---|------|-------------------|----------------------|-----------------|----------------------|------------------|-----------------|---------------------|--------------------|----------------|
| PRICE CENTRE E - VAC & TVS ELECTRICAL WORKS  |        |   |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| Ref. No  | Sl.No. | Description   | Unit | LIGHTHOUSE (ST01) | KUTCHERY ROAD (ST03) | ALWARPET (ST05) | BHARATHIDASAN (ST06) | BOAT CLUB (ST07) | NANDANAM (ST08) | PANAGAL PARK (ST10) | KODAMBAKKAM (ST11) | TOTAL QUANTITY |
| 713  | 8.3.2  | 450 mm widex 75 mm deep x 1.6 mm thick  | RMT  | 50                | 15                   | 80              | 60                   | 10               | 55              | 60                  | 30                 | 360            |
| 714  | 8.3.3  | 300 mm wide x 50 mm deep x 1.6 mm thick   | RMT  | 125               | 105                  | 130             | 70                   | 50               | 55              | 120                 | 50                 | 705            |
| 715  | 8.3.4  | 200 mm wide x 50 mm deep x 1.6 mm thick   | RMT  | 20                | 60                   | 40              | 40                   | 90               | 35              | 130                 | 35                 | 450            |
| 716  | 8.3.5  | 150mm wide x 50mm deep x 1.6 mm thick   | RMT  | 190               | 55                   | 100             | 160                  | 65               | 55              | 290                 | 45                 | 960            |
| 717  | 8.3.6  | 100mm wide x 50mm deep x 1.6 mm thick   | RMT  | 230               | 100                  | 150             | 95                   | 200              | 210             | 405                 | 195                | 1585           |
| 718  | 8.3.7  | 50mm wide x 50mm deep x 1.6 mm thick  | RMT  | 5                 | 5                    | 5               | 5                    | 5                | 5               | 5                   | 5                  | 40             |
| 719  | 9      | Supply & Installation for closing of wall and floor penetrations which has multiple non combustibile penetrants with Mortar based UL listed firestop system to provide 2 Hr Fire rating.                                | Sq.m | 20                | 20                   | 20              | 20                   | 20               | 20              | 20                  | 20                 | 160            |
| 720  | 10     | Supply and installation for closing of wall and floor penetrations which has cable tray penetrants with intumescent sealant based UL listed firestop system to provide 2 Hr Fire rating and water resistant properties. | Sq.m | 20                | 20                   | 20              | 20                   | 20               | 20              | 20                  | 20                 | 160            |
| 721  | 11     | EARTHING PROTECTION conforming to earthing specification specified in Part-2 Section VII SubSection-D Unit 07 and drawings  |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 722  | 11.1   | GI Strips/wire for interconnecting the earthing stations ,panels,DBs, Equipments as per specifications & drawing as required.   |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 723  | 11.1.1 | 50 mm x 10 mm GI strip  | RMT  | 10                | 10                   | 10              | 10                   | 10               | 15              | 10                  | 10                 | 85.0           |
| 724  | 11.1.2 | 50 mm x 6 mm GI strip   | RMT  |                   |                      |                 |                      | 30               | 40              |                     | 32                 | 102.0          |
| 725  | 11.1.3 | 40 mm x 6 mm GI strip   | RMT  | 265               | 300                  | 300             | 300                  | 85               | 125             | 265                 | 105                | 1745.0         |
| 726  | 11.1.4 | 25 mm x 6 mm GI strip   | RMT  | 1600              | 275                  | 275             | 275                  | 310              | 445             | 1600                | 375                | 5155.0         |
| 727  | 11.1.5 | 25 mm x 3 mm GI strip   | RMT  | 1610              | 540                  | 540             | 540                  | 820              | 1180            | 1610                | 980                | 7820.0         |
| 728  | 11.1.6 | 10 SWG / 4 mm diameter, copper Wire   | RMT  | 2975              | 2535                 | 2535            | 2535                 | 3000             | 4320            | 2975                | 3600               | 24475.0        |
| 729  | 11.1.7 | 8 SWG / 4 mm diameter, copper Wire  | RMT  | 255               |                      |                 |                      |                  |                 | 255                 |                    | 510.0          |
| 730  | 11.2   | PVC insulated, FRLSH, Copper Cables for Earthing in green colour, for interconnecting the earth station with METs / CETs of the following sizes with accessories as per specifications & drawing as required.           |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 731  | 11.2.1 | 1Cx35 Sq. mm, Cu Cable  | RMT  | 20                | 20                   | 20              | 20                   | 20               | 20              | 20                  | 20                 | 160            |
| 732  | 11.2.2 | 1Cx25 Sq. mm, Cu Cable  | RMT  | 20                | 20                   | 20              | 20                   | 20               | 20              | 20                  | 20                 | 160            |
| 733  | 11.2.3 | 1Cx16 Sq. mm, Cu Cable  | RMT  | 20                | 20                   | 20              | 20                   | 20               | 20              | 20                  | 20                 | 160            |
| 734  | 11.2.4 | 1Cx10 Sq. mm, Cu Cable  | RMT  | 200               | 200                  | 200             | 200                  | 200              | 200             | 200                 | 200                | 1600           |
| 735  | 11.2.5 | 1Cx6 Sq. mm, Cu Cable   | RMT  | 20                | 20                   | 20              | 20                   | 20               | 20              | 20                  | 20                 | 160            |
| 736  | 11.2.6 | 1 X 2.5 sq. mm, Cu  | RMT  | 50                | 50                   | 50              | 50                   | 50               | 50              | 50                  | 50                 | 400            |
| 737  | 11.2.7 | 1 x 4 sq. mm, Cu  | RMT  | 50                | 50                   | 50              | 50                   | 50               | 50              | 50                  | 50                 | 400            |
| 738  | 12     | Wiring & Accessories  |      |                   |                      |                 |                      |                  |                 |                     |                    |                |
| 739  | 12.1   | 3 Phase, 100A TP Disconnecter switch, in a Poly Carbonate IP-65 enclosure, (as specified in Part-2 section VII Sub section-D unit 4 Clause 4.2.5 and drawings)  | Nos  |                   |                      |                 |                      |                  |                 |                     | 1                  | 1              |
| 740  | 12.2   | 3 Phase, 100A TPN Disconnecter switch, with 100A FP RCBO of 300mA sensitivity, in a Poly Carbonate IP-65 enclosure, (as specified in Part-2 section VII Sub section-D unit 4 Clause 4.2.5 and drawings)                 | Nos  |                   |                      |                 |                      |                  |                 |                     | 1                  | 1              |
| 741  | 12.3   | 3 Phase, 63A TP Disconnecter switch, in a Poly Carbonate IP-65 enclosure, (as specified in Part-2 section VII Sub section-D unit 4 Clause 4.2.5 and drawings)   | Nos  |                   |                      |                 |                      |                  |                 |                     | 1                  | 1              |
| 742  | 12.4   | 3 Phase, 63A TPN Disconnecter switch, in a Poly Carbonate IP-65 enclosure, (as specified in Part-2 section VII Sub section-D unit 4 Clause 4.2.5 and drawings)  | Nos  |                   |                      |                 |                      |                  |                 |                     | 1                  | 1              |
| 743  | 12.5   | 3 Phase, 32A TP Disconnecter switch, in a Poly Carbonate IP-65 enclosure, (as specified in Part-2 section VII Sub section-D unit 4 Clause 4.2.5 and drawings)   | Nos  |                   |                      |                 |                      |                  |                 |                     | 1                  | 1              |
| 744  | 12.6   | 3 Phase, 40A TPN Disconnecter switch, in a Poly Carbonate IP-65 enclosure, (as specified in Part-2 section VII Sub section-D unit 4 Clause 4.2.5 and drawings)  | Nos  | 25                | 30                   | 30              | 30                   | 27               | 36              | 28                  | 30                 | 236            |
| 745  | 12.6   | 3 Phase, 32A TPN Disconnecter switch, in a Poly Carbonate IP-65 enclosure, (as specified in Part-2 section VII Sub section-D unit 4 Clause 4.2.5 and drawings)  | Nos  |                   |                      |                 |                      |                  |                 |                     | 1                  | 1              |
| 746  | 12.7   | 3 Phase, 20A TP Disconnecter switch, in a Poly Carbonate IP-65 enclosure, (as specified in Part-2 section VII Sub section-D unit 4 Clause 4.2.5 and drawings)   | Nos  |                   |                      |                 |                      |                  |                 |                     | 1                  | 1              |
| 747  | 12.8   | 3 Phase, 20A TPN Disconnecter switch, in a Poly Carbonate IP-65 enclosure, (as specified in Part-2 section VII Sub section-D unit 4 Clause 4.2.5 and drawings)  | Nos  |                   |                      |                 |                      |                  |                 |                     | 1                  | 1              |
| 748  | 12.9   | 3 Phase, 16A TP Disconnecter switch,in a Poly Carbonate IP-65 enclosure, (as specified in Part-2 section VII Sub section-D Clause 4.2.5 and drawings)   | Nos  | 2                 | 2                    | 2               | 2                    | 2                | 2               | 2                   | 2                  | 16             |
| 749  | 12.10  | 1 Phase, 16A DP Disconnecter switch, in a Poly Carbonate IP-65 enclosure, (as specified in Part-2 section VII Sub section-D unit 4 Clause 4.2.5 and drawings)   | Nos  |                   |                      |                 |                      |                  |                 |                     | 1                  | 1              |
| 750  | 12.11  | 3 Phase, 10A TPN Disconnecter switch,in a Poly Carbonate IP-65 enclosure, (as specified in Part-2 section VII Sub section-D unit 4 Clause 4.2.5 and drawings)   | Nos  |                   |                      |                 |                      |                  |                 |                     | 1                  | 1              |
| 751  | 12.12  | 3 Phase, 10A TP Disconnecter switch,in a Poly Carbonate IP-65 enclosure, (as specified in Part-2 section VII Sub section-D unit 4 Clause 4.2.5 and drawings)  | Nos  |                   |                      |                 |                      |                  |                 |                     | 1                  | 1              |
| 752  | 12.13  | 1 Phase, 6A DP Disconnecter switch, in a Poly Carbonate IP-65 enclosure, (as specified in Part-2 section VII Sub section-D unit 4 Clause 4.2.5 and drawings)  | Nos  | 6                 | 6                    | 6               | 6                    | 6                | 6               | 6                   | 6                  | 48             |
| 753  | 12.14  | 1 Phase, 3 pin, 16A 240V Modular unswitched socket on a suitable size mounting boxes (as specified in Part-2 section VII Sub section-D unit 4 Clause 4.2.4 and drawings)  | Nos  | 22                | 20                   | 20              | 20                   | 22               | 22              | 22                  | 22                 | 170            |
| 754  | 12.15  | 1 Phase, 5 pin, 6/16A, 240V Modular socket with switch on a suitable size mounting boxes (as specified in Part-2 section VII Sub section-D unit 4 Clause 4.2.4 and drawings)  | Nos  | 6                 | 6                    | 6               | 6                    | 6                | 6               | 6                   | 6                  | 48             |

| CHENNAI METRO RAIL LIMITED<br>CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4<br>BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS<br>TENDER NO. C4-VAC&TVS-12 |       |   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
|--|-------|---|------|----------------------|-------------------------|--------------------|-------------------------|---------------------|--------------------|------------------------|--------------------|----------------|
| PRICE CENTRE E - VAC & TVS ELECTRICAL WORKS  |       |   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| Ref. No  | SLNo. | Description   | Unit | LIGHTHOUSE<br>(ST01) | KUTCHERY ROAD<br>(ST03) | ALWARPET<br>(ST05) | BHARATHIDASAN<br>(ST06) | BOAT CLUB<br>(ST07) | NANDANAM<br>(ST08) | PANAGAL PARK<br>(ST10) | KODAMBAKKAM (ST11) | TOTAL QUANTITY |
| 755  | 12.16 | Mushroom head with Key lockable, 3 Phase, Emergency push Button box, (as specified in Part-2 section VII Sub section-D unit 4 Clause 4.2.6 and drawings)  | Nos  | 20                   | 20                      | 20                 | 20                      | 15                  | 15                 | 25                     | 15                 | 150            |
| 756  | 12.17 | Polycarbonate cable junction boxes, IP-66 (IK-10) (as specified in Part-2 section VII Sub section-D unit 4 Clause 4.2.7 and drawings)   | Nos  | 56                   | 48                      | 48                 | 48                      | 42                  | 44                 | 50                     | 44                 | 380            |
| 757  | 13    | Wiring for the following 16A socket outlet point with 3 x 4 sq. mm, 1100V grade as per BS-7211 FRLSH copper conductor wires in heavy gauge GI conduit surface run with GI saddles. as per specifications as specified in Part-2 section VII sub section D unit 3 clause 3.4.1 and drawings as required  |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 758  | 13.1  | One no. 6/16A socket outlet point controlled by one 16A switch.   | Nos  | 16                   | 16                      | 16                 | 16                      | 16                  | 16                 | 16                     | 16                 | 128            |
| 759  | 13.2  | Secondary or looping 2 Nos. 6A or 1 No. 16A socket outlet points wiring above using 3 x 4 sq. mm copper (P+N+PE) wires (Non fire survival) in 25mm dia GI conduit for socket outlets including providing terminal block, ceiling rose & other accessories etc as required (excluding the cost of switches, sockets & switch boxes) as per specificationsas specified in Part-2 section VII sub section D Unit 3 clause 3.4.1 and drawings as required | Nos  | 16                   | 16                      | 16                 | 16                      | 16                  | 16                 | 16                     | 16                 | 128            |
| 760  | 14    | Wiring for the following 16A socket outlet point with 3 x 4 sq. mm, 1100 Volt grade as per BS-7211 (for wires) & BS 6387 (for cables) copper conductor wires in heavy gauge GI conduit surface run with GI saddles. as per specifications as specified in Part-2 section VII sub section D unit 3 clause 3.4.1 and drawings as required   |      |                      |                         |                    |                         |                     |                    |                        |                    |                |
| 761  | 14.1  | One no. 6/16A socket outlet point controlled by one 16A switch.( UPS socket outlets)  | Nos  | 5                    | 5                       | 5                  | 5                       | 5                   | 5                  | 5                      | 5                  | 40             |
| 762  | 14.2  | Secondary or looping 2 Nos. 6A or 1 No. 16A socket outlet points wiring above using 3 x 4 sq. mm copper (P+N+PE) wires (Fire survival) in 25mm dia GI conduit for socket outlets including providing terminal block, ceiling rose & other accessories etc as required (excluding the cost of switches, sockets & switch boxes)as per specifications as specified in Part-2 section VII sub section D unit 3 clause 3.4.1 and drawings as required     | Nos  | 3                    | 3                       | 3                  | 3                       | 3                   | 3                  | 3                      | 3                  | 24             |

CHENNAI METRO RAIL LIMITED  
CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4  
BILL OF QUANTITIES (TVS &VAC WORKS) FOR TVS-12 UG STATIONS AND OCC & BOCC  
TENDER NO. C4-VAC&TVS-12

| PRICE CENTRE F - ISMS WORKS |         |  |      |                      |                         |              |                    |                         |                     |                    |                        |                       |     |      |                |
|-----------------------------|---------|--|------|----------------------|-------------------------|--------------|--------------------|-------------------------|---------------------|--------------------|------------------------|-----------------------|-----|------|----------------|
| REF.NO.                     | S.NO.   | DESCRIPTION  | UNIT | LIGHTHOUSE<br>(ST01) | KUTCHERY ROAD<br>(ST03) | THIRUMAYILAI | ALWARPET<br>(ST05) | BHARATHIDASAN<br>(ST06) | BOAT CLUB<br>(ST07) | NANDANAM<br>(ST08) | PANAGAL PARK<br>(ST10) | KODAMBAKKAM<br>(ST11) | OCC | BOCC | TOTAL QUANTITY |
| 1                           | 1       | PRICE CENTRE - F (ISMS WORKS)  |      |                      |                         |              |                    |                         |                     |                    |                        |                       |     |      |                |
| 2                           | 2       | General:<br>ISMS System shall provide with Manufacturing, Supply, Installation, Testing(FAT, SAT,PAT, etc), Integrated Testing and Commissioning along with operational acceptance along with DLP for two years. |      |                      |                         |              |                    |                         |                     |                    |                        |                       |     |      |                |
| 3                           | 3       | SCADA Central Processing Equipment (Server )<br>(Refer Section VII, Sub Section E, Clause 5.2)   | Nos. | 1                    | 1                       | 1            | 1                  | 1                       | 1                   | 1                  | 1                      | 1                     | 0   | 0    | 9              |
| 4                           | 4       | Optical Mouse and Keyboard<br>(Refer Section VII, Sub Section E, Clause 5.7 & 5.8)   | Nos. | 1                    | 1                       | 1            | 1                  | 1                       | 1                   | 1                  | 1                      | 1                     | 5   | 5    | 19             |
| 5                           | 5       | Antivirus Software<br>(Refer Section VII, Sub Section E, Clause 5.9)   | Nos. | 1                    | 1                       | 1            | 1                  | 1                       | 1                   | 1                  | 1                      | 1                     | 5   | 5    | 19             |
| 6                           | 6       | Standard MS Office Package<br>(Refer Section VII, Sub Section E, Clause 5.6)   | Nos. | 1                    | 1                       | 1            | 1                  | 1                       | 1                   | 1                  | 1                      | 1                     | 5   | 5    | 19             |
| 7                           | 7       | SCADA Colour Monitor(32 Inch monitor)<br>(Refer Section VII, Sub section E, Clause 5.3)  | Nos. | 1                    | 1                       | 1            | 1                  | 1                       | 1                   | 1                  | 1                      | 1                     | 0   | 0    | 9              |
| 8                           | 8       | SCADA Printers<br>(Refer Section VII, Sub section E, Clause 5.10)  | Nos. | 1                    | 1                       | 1            | 1                  | 1                       | 1                   | 1                  | 1                      | 1                     | 1   | 1    | 11             |
| 9                           | 9       | NETWORK SWITCHES:<br>(Refer Section VII, Sub section E, Clause 5.11)   |      |                      |                         |              |                    |                         |                     |                    |                        |                       |     |      |                |
| 10                          | 9.1     | At Stations- OFC Ethernet Switches-L3 , 12 port (04 OFC port + 8 Ethernet Ports) {Managed}<br>(Refer Section VII, Sub section E, Clause 5.11.1)  | Nos. | 2                    | 2                       | 2            | 2                  | 2                       | 2                   | 2                  | 2                      | 2                     | 0   | 0    | 18             |
| 11                          | 9.2     | At Stations - OFC Ethernet Switches-L2 - 8 port (02 OFC port + 06 Ethernet Ports) {Unmanaged} (Refer Section VII, Sub section E, Clause 5.11.2)  | Nos. | 4                    | 4                       | 2            | 4                  | 4                       | 2                   | 0                  | 4                      | 0                     | 0   | 0    | 24             |
| 12                          | 9.3     | At Stations - OFC Ethernet Switches-L2 - 12 port (02 OFC port + 10 Ethernet Ports) {Unmanaged} (Refer Section VII, Sub section E, Clause 5.11.2)   | Nos. | 4                    | 4                       | 2            | 4                  | 4                       | 2                   | 4                  | 4                      | 4                     | 0   | 0    | 32             |
| 13                          | 9.4     | OFC Ethernet Switches-L3 , 14 port (02 OFC port + 12 Ethernet Ports) {Managed}<br>(Refer Section VII, Sub section E, Clause 5.11.1)  | Nos. | 0                    | 0                       | 0            | 0                  | 0                       | 0                   | 0                  | 0                      | 0                     | 2   | 2    | 4              |
| 14                          | 9.5     | Network Switch Rack<br>(Refer Section VII, Sub section E, Clause 5.12)   | Nos. | 1                    | 1                       | 1            | 1                  | 1                       | 1                   | 1                  | 1                      | 1                     | 0   | 0    | 9              |
| 15                          | 9.6     | Network Server Rack for OCC & BOCC<br>(Refer Section VII, Sub section E, Clause 5.13.1)  | Nos. | 0                    | 0                       | 0            | 0                  | 0                       | 0                   | 0                  | 0                      | 0                     | 2   | 2    | 4              |
| 16                          | 9.7     | Network Server Rack for Station Server and OCC & BOCC Workstations<br>(Refer Section VII, Sub section E, Clause 5.13.2)  | Nos. | 1                    | 1                       | 1            | 1                  | 1                       | 1                   | 1                  | 1                      | 1                     | 3   | 3    | 15             |
| 17                          | 10      | SCADA VAC HMI Touch Screen (12 Inch)<br>(Refer Section VII, Sub section E, Clause 6.5)   | Nos. | 1                    | 1                       | 0            | 1                  | 1                       | 1                   | 1                  | 1                      | 1                     | 0   | 0    | 8              |
| 18                          | 11      | ISMS PLC, Remote I/O and It's Sub-components and Mounting Panel (For I/O distribution refer I/O Schedule) (Refer Section VII, Sub section E, Clause 4.1 to 4.8 , 4.11 & 5.16)                                    |      |                      |                         |              |                    |                         |                     |                    |                        |                       |     |      |                |
| 19                          | 11.1    | Main PLC (Primary PLC)   |      |                      |                         |              |                    |                         |                     |                    |                        |                       |     |      |                |
| 20                          | 11.1.1  | Minimum SIL-2 CPU(Primary)   | Nos  | 1                    | 1                       | 2            | 1                  | 1                       | 1                   | 1                  | 1                      | 1                     | 0   | 0    | 10             |
| 21                          | 11.1.2  | RIO Communication Module   | Nos  | 2                    | 2                       | 2            | 2                  | 2                       | 2                   | 2                  | 2                      | 2                     | 0   | 0    | 18             |
| 22                          | 11.1.3  | SIL-2 DI(8 Ch)   | Nos  | 0                    | 0                       | 1            | 0                  | 0                       | 0                   | 1                  | 0                      | 1                     | 0   | 0    | 3              |
| 23                          | 11.1.4  | SIL-2 DI(16 Ch)  | Nos  | 0                    | 0                       | 1            | 0                  | 0                       | 1                   | 1                  | 0                      | 1                     | 0   | 0    | 4              |
| 24                          | 11.1.5  | SIL-2 DI(32 Ch)  | Nos  | 0                    | 1                       | 0            | 1                  | 1                       | 1                   | 1                  | 1                      | 1                     | 0   | 0    | 7              |
| 25                          | 11.1.6  | SIL-2 DI(64 Ch)  | Nos  | 2                    | 2                       | 3            | 2                  | 2                       | 3                   | 3                  | 3                      | 3                     | 0   | 0    | 23             |
| 26                          | 11.1.7  | SIL-2 DO(8 Ch)   | Nos  | 1                    | 1                       | 0            | 1                  | 1                       | 0                   | 0                  | 0                      | 0                     | 0   | 0    | 4              |
| 27                          | 11.1.8  | SIL-2 DO(16 Ch)  | Nos  | 0                    | 1                       | 0            | 1                  | 1                       | 0                   | 0                  | 0                      | 0                     | 0   | 0    | 3              |
| 28                          | 11.1.9  | SIL-2 DO(32 Ch)  | Nos  | 1                    | 1                       | 3            | 1                  | 1                       | 3                   | 3                  | 3                      | 3                     | 0   | 0    | 19             |
| 29                          | 11.1.10 | SIL-2 AI(8 Ch)   | Nos  | 0                    | 1                       | 0            | 0                  | 0                       | 0                   | 0                  | 0                      | 0                     | 0   | 0    | 1              |
| 30                          | 11.1.11 | SIL-2 AI(16 Ch)  | Nos  | 1                    | 1                       | 2            | 1                  | 1                       | 2                   | 2                  | 2                      | 2                     | 0   | 0    | 14             |
| 31                          | 11.1.12 | SIL-2 AO(4 Ch)   | Nos  | 0                    | 1                       | 0            | 0                  | 0                       | 0                   | 0                  | 0                      | 0                     | 0   | 0    | 1              |
| 32                          | 11.1.13 | SIL-2 AO(8 Ch)   | Nos  | 0                    | 1                       | 0            | 0                  | 0                       | 0                   | 0                  | 0                      | 0                     | 0   | 0    | 1              |
| 33                          | 11.1.14 | Non Safe DI(8 Ch)  | Nos  | 1                    | 0                       | 1            | 0                  | 0                       | 0                   | 0                  | 0                      | 0                     | 0   | 0    | 2              |
| 34                          | 11.1.15 | Non Safe DI(16 Ch)   | Nos  | 0                    | 1                       | 0            | 1                  | 1                       | 0                   | 0                  | 0                      | 0                     | 0   | 0    | 3              |
| 35                          | 11.1.16 | Non Safe DI(32 Ch)   | Nos  | 1                    | 0                       | 0            | 0                  | 0                       | 0                   | 1                  | 0                      | 1                     | 0   | 0    | 3              |
| 36                          | 11.1.17 | Non Safe DI(64 Ch)   | Nos  | 0                    | 1                       | 0            | 0                  | 0                       | 0                   | 0                  | 0                      | 0                     | 0   | 0    | 1              |
| 37                          | 11.1.18 | Non Safe DO(8 Ch)  | Nos  | 0                    | 1                       | 0            | 0                  | 0                       | 0                   | 0                  | 0                      | 0                     | 0   | 0    | 1              |
| 38                          | 11.1.19 | Non Safe DO(16 Ch)   | Nos  | 0                    | 1                       | 0            | 0                  | 0                       | 0                   | 0                  | 0                      | 0                     | 0   | 0    | 1              |
| 39                          | 11.1.20 | Non Safe DO(32 Ch)   | Nos  | 0                    | 1                       | 0            | 0                  | 0                       | 0                   | 0                  | 0                      | 0                     | 0   | 0    | 1              |
| 40                          | 11.1.21 | Non Safe AI(8 Ch)  | Nos  | 0                    | 1                       | 1            | 1                  | 1                       | 0                   | 0                  | 0                      | 0                     | 0   | 0    | 4              |
| 41                          | 11.1.22 | Non Safe AI(16 Ch)   | Nos  | 1                    | 1                       | 1            | 1                  | 1                       | 0                   | 4                  | 0                      | 4                     | 0   | 0    | 13             |



CHENNAI METRO RAIL LIMITED  
CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4  
BILL OF QUANTITIES (TVS &VAC WORKS) FOR TVS-12 UG STATIONS AND OCC & BOCC  
TENDER NO. C4-VAC&TVS-12

| PRICE CENTRE F - ISMS WORKS |         |   |      |                      |                         |              |                    |                         |                     |                    |                        |                       |     |      |                |
|-----------------------------|---------|---|------|----------------------|-------------------------|--------------|--------------------|-------------------------|---------------------|--------------------|------------------------|-----------------------|-----|------|----------------|
| REF.NO.                     | S.NO.   | DESCRIPTION   | UNIT | LIGHTHOUSE<br>(ST01) | KUTCHERY ROAD<br>(ST03) | THIRUMAYILAI | ALWARPET<br>(ST05) | BHARATHIDASAN<br>(ST06) | BOAT CLUB<br>(ST07) | NANDANAM<br>(ST08) | PANAGAL PARK<br>(ST10) | KODAMBAKKAM<br>(ST11) | OCC | BOCC | TOTAL QUANTITY |
| 42                          | 11.1.23 | Non Safe AO(4 Ch)   | Nos  | 1                    | 1                       | 0            | 1                  | 1                       | 0                   | 0                  | 0                      | 0                     | 0   | 0    | 4              |
| 43                          | 11.1.24 | Non Safe AO(8 Ch)   | Nos  | 0                    | 0                       | 1            | 0                  | 0                       | 1                   | 1                  | 1                      | 1                     | 0   | 0    | 5              |
| 44                          | 11.1.25 | Serial Communication Module   | Nos  | 1                    | 1                       | 1            | 1                  | 1                       | 1                   | 1                  | 1                      | 1                     | 0   | 0    | 9              |
| 45                          | 11.1.26 | PLC Enclosure   | Lot  | 1                    | 1                       | 1            | 1                  | 1                       | 1                   | 1                  | 1                      | 1                     | 0   | 0    | 9              |
| 46                          | 11.1.27 | Misceleneous components (PLC configuration required components like Backplane, Redundant Power supply in Rack module, Connectors, MCB's, Surge Protection Device, Dual Bulk Power supply, diode oring module, terminal blocks(8/16/20/24/32/64/128), relays, LIU accessories, Pushbutton, Indication lamps, Internal wires, Alarm buzzer, Louvers,LED Light, Fans, etc.,) | Lot  | 1                    | 1                       | 1            | 1                  | 1                       | 1                   | 1                  | 1                      | 1                     | 0   | 0    | 9              |
| 47                          | 11.2    | Secondary PLC   |      |                      |                         |              |                    |                         |                     |                    |                        |                       |     |      |                |
| 48                          | 11.2.1  | Minimum SIL-2 CPU(Secondary)  | Nos  | 1                    | 1                       | 0            | 1                  | 1                       | 1                   | 1                  | 1                      | 1                     | 0   | 0    | 8              |
| 49                          | 11.2.2  | RIO Communication Module  | Nos  | 2                    | 2                       | 0            | 2                  | 2                       | 2                   | 2                  | 1                      | 2                     | 0   | 0    | 15             |
| 50                          | 11.2.3  | SIL-2 DI(8 Ch)  | Nos  | 1                    | 0                       | 0            | 0                  | 0                       | 0                   | 1                  | 0                      | 1                     | 0   | 0    | 3              |
| 51                          | 11.2.4  | SIL-2 DI(16 Ch)   | Nos  | 1                    | 0                       | 0            | 0                  | 0                       | 1                   | 1                  | 0                      | 1                     | 0   | 0    | 4              |
| 52                          | 11.2.5  | SIL-2 DI(32 Ch)   | Nos  | 0                    | 1                       | 0            | 1                  | 1                       | 1                   | 1                  | 0                      | 1                     | 0   | 0    | 6              |
| 53                          | 11.2.6  | SIL-2 DI(64 Ch)   | Nos  | 1                    | 2                       | 0            | 2                  | 2                       | 1                   | 0                  | 2                      | 0                     | 0   | 0    | 10             |
| 54                          | 11.2.7  | SIL-2 DO(8 Ch)  | Nos  | 0                    | 1                       | 0            | 1                  | 1                       | 1                   | 1                  | 0                      | 1                     | 0   | 0    | 6              |
| 55                          | 11.2.8  | SIL-2 DO(16 Ch)   | Nos  | 1                    | 1                       | 0            | 1                  | 1                       | 0                   | 0                  | 1                      | 0                     | 0   | 0    | 5              |
| 56                          | 11.2.9  | SIL-2 DO(32 Ch)   | Nos  | 1                    | 1                       | 0            | 1                  | 1                       | 1                   | 1                  | 1                      | 1                     | 0   | 0    | 8              |
| 57                          | 11.2.10 | SIL-2 AI(16 Ch)   | Nos  | 2                    | 1                       | 0            | 1                  | 1                       | 0                   | 0                  | 2                      | 0                     | 0   | 0    | 7              |
| 58                          | 11.2.11 | Non Safe DI(8 Ch)   | Nos  | 0                    | 0                       | 0            | 0                  | 0                       | 0                   | 1                  | 0                      | 1                     | 0   | 0    | 2              |
| 59                          | 11.2.12 | Non Safe DI(16 Ch)  | Nos  | 0                    | 1                       | 0            | 1                  | 1                       | 1                   | 1                  | 1                      | 1                     | 0   | 0    | 7              |
| 60                          | 11.2.13 | Non Safe DI(32 Ch)  | Nos  | 0                    | 0                       | 0            | 0                  | 0                       | 0                   | 1                  | 0                      | 1                     | 0   | 0    | 2              |
| 61                          | 11.2.14 | Non Safe DI(64 Ch)  | Nos  | 0                    | 0                       | 0            | 0                  | 0                       | 3                   | 2                  | 0                      | 2                     | 0   | 0    | 7              |
| 62                          | 11.2.15 | Non Safe DO(8 Ch)   | Nos  | 0                    | 0                       | 0            | 0                  | 0                       | 1                   | 0                  | 0                      | 0                     | 0   | 0    | 1              |
| 63                          | 11.2.16 | Non Safe DO(16 Ch)  | Nos  | 0                    | 0                       | 0            | 0                  | 0                       | 0                   | 1                  | 0                      | 1                     | 0   | 0    | 2              |
| 64                          | 11.2.17 | Non Safe DO(32 Ch)  | Nos  | 0                    | 0                       | 0            | 0                  | 0                       | 1                   | 1                  | 0                      | 1                     | 0   | 0    | 3              |
| 65                          | 11.2.18 | Non Safe AI(8 Ch)   | Nos  | 1                    | 0                       | 0            | 0                  | 0                       | 0                   | 1                  | 1                      | 1                     | 0   | 0    | 4              |
| 66                          | 11.2.19 | Non Safe AI(16 Ch)  | Nos  | 0                    | 1                       | 0            | 1                  | 1                       | 4                   | 2                  | 0                      | 2                     | 0   | 0    | 11             |
| 67                          | 11.2.20 | Non Safe AO(4 Ch)   | Nos  | 0                    | 1                       | 0            | 1                  | 1                       | 0                   | 0                  | 1                      | 0                     | 0   | 0    | 4              |
| 68                          | 11.2.21 | Non Safe AO(8 Ch)   | Nos  | 1                    | 0                       | 0            | 0                  | 0                       | 1                   | 1                  | 0                      | 1                     | 0   | 0    | 4              |
| 69                          | 11.2.22 | Serial Communication Module   | Nos  | 1                    | 1                       | 0            | 1                  | 1                       | 1                   | 1                  | 1                      | 1                     | 0   | 0    | 8              |
| 70                          | 11.2.23 | PLC Enclosure   | Lot  | 1                    | 1                       | 0            | 1                  | 1                       | 1                   | 1                  | 1                      | 1                     | 0   | 0    | 8              |
| 71                          | 11.2.24 | Misceleneous components (PLC configuration required components like Backplane, Redundant Power supply in Rack module, Connectors, MCB's, Surge Protection Device, Dual Bulk Power supply, diode oring module, terminal blocks(8/16/20/24/32/64/128), relays, LIU accessories, Pushbutton, Indication lamps, Internal wires, Alarm buzzer, Louvers,LED Light, Fans, etc.,) | Lot  | 1                    | 1                       | 0            | 1                  | 1                       | 1                   | 1                  | 1                      | 1                     | 0   | 0    | 8              |
| 72                          | 11.3    | Remote I/O-1  |      |                      |                         |              |                    |                         |                     |                    |                        |                       |     |      |                |
| 73                          | 11.3.1  | RIO Communication Module  | Nos  | 2                    | 2                       | 0            | 2                  | 2                       | 0                   | 0                  | 2                      | 0                     | 0   | 0    | 10             |
| 74                          | 11.3.2  | SIL-2 DI(32 Ch)   | Nos  | 0                    | 1                       | 0            | 1                  | 1                       | 0                   | 0                  | 1                      | 0                     | 0   | 0    | 4              |
| 75                          | 11.3.3  | SIL-2 DI(64 Ch)   | Nos  | 2                    | 1                       | 0            | 1                  | 1                       | 0                   | 0                  | 1                      | 0                     | 0   | 0    | 6              |
| 76                          | 11.3.4  | SIL-2 DO(8 Ch)  | Nos  | 1                    | 1                       | 0            | 1                  | 1                       | 0                   | 0                  | 0                      | 0                     | 0   | 0    | 4              |
| 77                          | 11.3.5  | SIL-2 DO(32 Ch)   | Nos  | 1                    | 1                       | 0            | 1                  | 1                       | 0                   | 0                  | 1                      | 0                     | 0   | 0    | 5              |
| 78                          | 11.3.6  | SIL-2 AI(16 Ch)   | Nos  | 1                    | 1                       | 0            | 1                  | 1                       | 0                   | 0                  | 1                      | 0                     | 0   | 0    | 5              |
| 79                          | 11.3.7  | Non Safe DI(8 Ch)   | Nos  | 1                    | 1                       | 0            | 1                  | 1                       | 0                   | 0                  | 0                      | 0                     | 0   | 0    | 4              |
| 80                          | 11.3.8  | Non Safe DI(64 Ch)  | Nos  | 3                    | 1                       | 0            | 1                  | 1                       | 0                   | 0                  | 3                      | 0                     | 0   | 0    | 9              |
| 81                          | 11.3.9  | Non Safe DO(8 Ch)   | Nos  | 1                    | 0                       | 0            | 0                  | 0                       | 0                   | 0                  | 1                      | 0                     | 0   | 0    | 2              |
| 82                          | 11.3.10 | Non Safe DO(16 Ch)  | Nos  | 1                    | 1                       | 0            | 1                  | 1                       | 0                   | 0                  | 0                      | 0                     | 0   | 0    | 4              |
| 83                          | 11.3.11 | Non Safe DO(32 Ch)  | Nos  | 1                    | 0                       | 0            | 0                  | 0                       | 0                   | 0                  | 1                      | 0                     | 0   | 0    | 2              |
| 84                          | 11.3.12 | Non Safe AI(16 Ch)  | Nos  | 3                    | 2                       | 0            | 2                  | 2                       | 0                   | 0                  | 3                      | 0                     | 0   | 0    | 12             |
| 85                          | 11.3.13 | Non Safe AO(4 Ch)   | Nos  | 0                    | 1                       | 0            | 1                  | 1                       | 0                   | 0                  | 0                      | 0                     | 0   | 0    | 3              |
| 86                          | 11.3.14 | Non Safe AO(8 Ch)   | Nos  | 1                    | 1                       | 0            | 1                  | 1                       | 0                   | 0                  | 1                      | 0                     | 0   | 0    | 5              |
| 87                          | 11.3.15 | Serial Communication Module   | Nos  | 1                    | 1                       | 0            | 1                  | 1                       | 0                   | 0                  | 1                      | 0                     | 0   | 0    | 5              |
| 88                          | 11.3.16 | PLC Enclosure   | Lot  | 1                    | 1                       | 0            | 1                  | 1                       | 0                   | 0                  | 1                      | 0                     | 0   | 0    | 5              |

CHENNAI METRO RAIL LIMITED  
CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4  
BILL OF QUANTITIES (TVS &VAC WORKS) FOR TVS-12 UG STATIONS AND OCC & BOCC  
TENDER NO. C4-VAC&TVS-12

| PRICE CENTRE F - ISMS WORKS |         |   |      |                      |                         |              |                    |                         |                     |                    |                        |                       |     |      |                |
|-----------------------------|---------|---|------|----------------------|-------------------------|--------------|--------------------|-------------------------|---------------------|--------------------|------------------------|-----------------------|-----|------|----------------|
| REF.NO.                     | S.NO.   | DESCRIPTION   | UNIT | LIGHTHOUSE<br>(ST01) | KITCHERY ROAD<br>(ST03) | THIRUMAYILAI | ALWARPET<br>(ST05) | BHARATHIDASAN<br>(ST06) | BOAT CLUB<br>(ST07) | NANDANAM<br>(ST08) | PANAGAL PARK<br>(ST10) | KODAMBAKKAM<br>(ST11) | OCC | BOCC | TOTAL QUANTITY |
| 89                          | 11.3.17 | Misceleneous components (PLC configuration required components like Backplane, Redundant Power supply in Rack module, Connectors, MCB's, Surge Protection Device, Dual Bulk Power supply, diode oring module, terminal blocks(8/16/20/24/32/64/128), relays, LIU accessories, Pushbutton, Indication lamps, Internal wires, Alarm buzzer, Louvers,LED Light, Fans, etc..) | Lot  | 1                    | 1                       | 0            | 1                  | 1                       | 0                   | 0                  | 1                      | 0                     | 0   | 0    | 5              |
| 90                          | 11.4    | Remote I/O-2  |      |                      |                         |              |                    |                         |                     |                    |                        |                       |     |      |                |
| 91                          | 11.4.1  | RIO Communication Module  | Nos  | 2                    | 2                       | 0            | 2                  | 2                       | 0                   | 0                  | 2                      | 0                     | 0   | 0    | 10             |
| 92                          | 11.4.2  | SIL-2 DI(8 Ch)  | Nos  | 0                    | 1                       | 0            | 1                  | 1                       | 0                   | 0                  | 1                      | 0                     | 0   | 0    | 4              |
| 93                          | 11.4.3  | SIL-2 DI(16 Ch)   | Nos  | 0                    | 1                       | 0            | 1                  | 1                       | 0                   | 0                  | 1                      | 0                     | 0   | 0    | 4              |
| 94                          | 11.4.4  | SIL-2 DI(64 Ch)   | Nos  | 2                    | 1                       | 0            | 1                  | 1                       | 0                   | 0                  | 1                      | 0                     | 0   | 0    | 6              |
| 95                          | 11.4.5  | SIL-2 DO(8 Ch)  | Nos  | 0                    | 1                       | 0            | 1                  | 1                       | 0                   | 0                  | 0                      | 0                     | 0   | 0    | 3              |
| 96                          | 11.4.6  | SIL-2 DO(16 Ch)   | Nos  | 1                    | 0                       | 0            | 0                  | 0                       | 0                   | 0                  | 0                      | 0                     | 0   | 0    | 1              |
| 97                          | 11.4.7  | SIL-2 DO(32 Ch)   | Nos  | 1                    | 1                       | 0            | 1                  | 1                       | 0                   | 0                  | 1                      | 0                     | 0   | 0    | 5              |
| 98                          | 11.4.8  | SIL-2 AI(16 Ch)   | Nos  | 1                    | 1                       | 0            | 1                  | 1                       | 0                   | 0                  | 1                      | 0                     | 0   | 0    | 5              |
| 99                          | 11.4.9  | Non Safe DI(8 Ch)   | Nos  | 1                    | 0                       | 0            | 0                  | 0                       | 0                   | 0                  | 0                      | 0                     | 0   | 0    | 1              |
| 100                         | 11.4.10 | Non Safe DI(64 Ch)  | Nos  | 0                    | 2                       | 0            | 2                  | 2                       | 0                   | 0                  | 1                      | 0                     | 0   | 0    | 7              |
| 101                         | 11.4.11 | Non Safe DO(8 Ch)   | Nos  | 0                    | 1                       | 0            | 1                  | 1                       | 0                   | 0                  | 0                      | 0                     | 0   | 0    | 3              |
| 102                         | 11.4.12 | Non Safe DO(16 Ch)  | Nos  | 0                    | 0                       | 0            | 0                  | 0                       | 0                   | 0                  | 1                      | 0                     | 0   | 0    | 1              |
| 103                         | 11.4.13 | Non Safe DO(32 Ch)  | Nos  | 0                    | 1                       | 0            | 1                  | 1                       | 0                   | 0                  | 0                      | 0                     | 0   | 0    | 3              |
| 104                         | 11.4.14 | Non Safe AI(8 Ch)   | Nos  | 1                    | 0                       | 0            | 0                  | 0                       | 0                   | 0                  | 1                      | 0                     | 0   | 0    | 2              |
| 105                         | 11.4.15 | Non Safe AI(16 Ch)  | Nos  | 0                    | 2                       | 0            | 2                  | 2                       | 0                   | 0                  | 1                      | 0                     | 0   | 0    | 7              |
| 106                         | 11.4.16 | Non Safe AO(4 Ch)   | Nos  | 1                    | 0                       | 0            | 0                  | 0                       | 0                   | 0                  | 0                      | 0                     | 0   | 0    | 1              |
| 107                         | 11.4.17 | Non Safe AO(8 Ch)   | Nos  | 0                    | 1                       | 0            | 1                  | 1                       | 0                   | 0                  | 1                      | 0                     | 0   | 0    | 4              |
| 108                         | 11.4.18 | Serial Communication Module   | Nos  | 1                    | 1                       | 0            | 1                  | 1                       | 0                   | 0                  | 1                      | 0                     | 0   | 0    | 5              |
| 109                         | 11.4.19 | PLC Enclosure   | Lot  | 1                    | 1                       | 0            | 1                  | 1                       | 0                   | 0                  | 1                      | 0                     | 0   | 0    | 5              |
| 110                         | 11.4.20 | Misceleneous components (PLC configuration required components like Backplane, Redundant Power supply in Rack module, Connectors, MCB's, Surge Protection Device, Dual Bulk Power supply, diode oring module, terminal blocks(8/16/20/24/32/64/128), relays, LIU accessories, Pushbutton, Indication lamps, Internal wires, Alarm buzzer, Louvers,LED Light, Fans, etc..) | Lot  | 1                    | 1                       | 0            | 1                  | 1                       | 0                   | 0                  | 1                      | 0                     | 0   | 0    | 5              |
| 111                         | 11.5    | Non SIL CPU   |      |                      |                         |              |                    |                         |                     |                    |                        |                       |     |      |                |
| 112                         | 11.5.1  | Non SIL CPU   | Nos  | 0                    | 0                       | 0            | 0                  | 0                       | 2                   | 0                  | 0                      | 0                     | 0   | 0    | 2              |
| 113                         | 11.5.2  | RIO Communication Module  | Nos  | 0                    | 0                       | 0            | 0                  | 0                       | 2                   | 0                  | 0                      | 0                     | 0   | 0    | 2              |
| 114                         | 11.5.3  | Non Safe DI(8 Ch)   | Nos  | 0                    | 0                       | 0            | 0                  | 0                       | 1                   | 0                  | 0                      | 0                     | 0   | 0    | 1              |
| 115                         | 11.5.4  | Non Safe DI(16 Ch)  | Nos  | 0                    | 0                       | 0            | 0                  | 0                       | 1                   | 0                  | 0                      | 0                     | 0   | 0    | 1              |
| 116                         | 11.5.5  | Non Safe DI(32 Ch)  | Nos  | 0                    | 0                       | 0            | 0                  | 0                       | 1                   | 0                  | 0                      | 0                     | 0   | 0    | 1              |
| 117                         | 11.5.6  | Non Safe DI(64 Ch)  | Nos  | 0                    | 0                       | 0            | 0                  | 0                       | 1                   | 0                  | 0                      | 0                     | 0   | 0    | 1              |
| 118                         | 11.5.7  | Non Safe DO(8 Ch)   | Nos  | 0                    | 0                       | 0            | 0                  | 0                       | 1                   | 0                  | 0                      | 0                     | 0   | 0    | 1              |
| 119                         | 11.5.8  | Non Safe DO(16 Ch)  | Nos  | 0                    | 0                       | 0            | 0                  | 0                       | 1                   | 0                  | 0                      | 0                     | 0   | 0    | 1              |
| 120                         | 11.5.9  | Non Safe DO(32 Ch)  | Nos  | 0                    | 0                       | 0            | 0                  | 0                       | 1                   | 0                  | 0                      | 0                     | 0   | 0    | 1              |
| 121                         | 11.5.10 | Non Safe AI(8 Ch)   | Nos  | 0                    | 0                       | 0            | 0                  | 0                       | 1                   | 0                  | 0                      | 0                     | 0   | 0    | 1              |
| 122                         | 11.5.11 | Non Safe AI(16 Ch)  | Nos  | 0                    | 0                       | 0            | 0                  | 0                       | 1                   | 0                  | 0                      | 0                     | 0   | 0    | 1              |
| 123                         | 11.5.12 | Non Safe AO(4 Ch)   | Nos  | 0                    | 0                       | 0            | 0                  | 0                       | 1                   | 0                  | 0                      | 0                     | 0   | 0    | 1              |
| 124                         | 11.5.13 | Non Safe AO(8 Ch)   | Nos  | 0                    | 0                       | 0            | 0                  | 0                       | 1                   | 0                  | 0                      | 0                     | 0   | 0    | 1              |
| 125                         | 11.5.14 | Serial Communication Module   | Nos  | 0                    | 0                       | 0            | 0                  | 0                       | 1                   | 0                  | 0                      | 0                     | 0   | 0    | 1              |
| 126                         | 11.5.15 | PLC Enclosure   | Lot  | 0                    | 0                       | 0            | 0                  | 0                       | 1                   | 0                  | 0                      | 0                     | 0   | 0    | 1              |
| 127                         | 11.5.16 | Misceleneous components (PLC configuration required components like Backplane, Redundant Power supply in Rack module, Connectors, MCB's, Surge Protection Device, Dual Bulk Power supply, diode oring module, terminal blocks(8/16/20/24/32/64/128), relays, LIU accessories, Pushbutton, Indication lamps, Internal wires, Alarm buzzer, Louvers,LED Light, Fans, etc..) | Lot  | 0                    | 0                       | 0            | 0                  | 0                       | 1                   | 0                  | 0                      | 0                     | 0   | 0    | 1              |
| 128                         | 12*     | Station Software  |      |                      |                         |              |                    |                         |                     |                    |                        |                       |     |      |                |
| 129                         | 12.1    | SIL-2 PLC SOFTWARE<br>SIL-2 Programming Software license Supply and Development in stations (Refer Section VII, Sub section E, Clause 4.9 & 4.10)   | Lot  | 1                    | 1                       | 1            | 1                  | 1                       | 1                   | 1                  | 1                      | 1                     | 0   | 0    | 9              |
| 130                         | 12.2    | Non SIL PLC SOFTWARE<br>Non SIL Programming Software license Supply and Development in stations (Refer Section VII, Sub section E, Clause 4.11)   | Lot  | 0                    | 0                       | 0            | 0                  | 0                       | 1                   | 0                  | 0                      | 0                     | 0   | 0    | 1              |
| 131                         | 12.3    | SCADA Software:<br>ISMS SCADA software license Supply and Development based on the Employer requirements in Stations. (Refer Section VII, Sub section E, Clause 6.1 to 6.4)   | Lot  | 1                    | 1                       | 1            | 1                  | 1                       | 1                   | 1                  | 1                      | 1                     | 0   | 0    | 9              |
| 132                         | 13      | CCTV Cameras with supporting accessories (CCTV Supporting software -Cost is Inclusive in SCADA Software) (Refer Section VII, Sub section E, Clause 5.14)  | Lot  | 4                    | 4                       | 1            | 4                  | 4                       | 2                   | 2                  | 4                      | 2                     | 0   | 0    | 27             |
| 133                         | 14      | OCC/BOCC Workstation<br>(Refer Section VII, Sub section E, Clause 5.4)  | Nos. | 0                    | 0                       | 0            | 0                  | 0                       | 0                   | 0                  | 0                      | 0                     | 3   | 3    | 6              |
| 134                         | 15      | OCC/BOCC Server<br>(Refer Section VII, Sub section E, Clause 5.1)   | Nos. | 0                    | 0                       | 0            | 0                  | 0                       | 0                   | 0                  | 0                      | 0                     | 2   | 2    | 4              |

CHENNAI METRO RAIL LIMITED  
CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4  
BILL OF QUANTITIES (TVS &VAC WORKS) FOR TVS-12 UG STATIONS AND OCC & BOCC  
TENDER NO. C4-VAC&TVS-12

| PRICE CENTRE F - ISMS WORKS |       |   |      |                      |                         |              |                    |                         |                     |                    |                        |                       |     |      |                |
|-----------------------------|-------|---|------|----------------------|-------------------------|--------------|--------------------|-------------------------|---------------------|--------------------|------------------------|-----------------------|-----|------|----------------|
| REF.NO.                     | S.NO. | DESCRIPTION   | UNIT | LIGHTHOUSE<br>(ST01) | KITCHERY ROAD<br>(ST03) | THIRUMAYILAI | ALWARPET<br>(ST05) | BHARATHIDASAN<br>(ST06) | BOAT CLUB<br>(ST07) | NANDANAM<br>(ST08) | PANAGAL PARK<br>(ST10) | KODAMBAKKAM<br>(ST11) | OCC | BOCC | TOTAL QUANTITY |
| 135                         | 16    | OCC/BOCC Monitor (32 Inch)<br>(Refer Section VII, Sub section E, Clause 5.3)  | Nos. | 0                    | 0                       | 0            | 0                  | 0                       | 0                   | 0                  | 0                      | 0                     | 3   | 3    | 6              |
| 136                         | 17    | OCC/BOCC IBP HMI Touch Screen (15 Inch)<br>(Refer Section VII, Sub section E, Clause 6.5)   | Nos. | 0                    | 0                       | 0            | 0                  | 0                       | 0                   | 0                  | 0                      | 0                     | 1   | 1    | 2              |
| 137                         | 18    | OCC - Redundant hot stand by SIL-2 PLC, I/O modules and It's Sub-components and Mounting Panel (For I/O distribution refer I/O Schedule) (Refer Section VII, Sub section E, Clause 4.1 to 4.8 & 5.16)   |      |                      |                         |              |                    |                         |                     |                    |                        |                       |     |      |                |
| 138                         | 18.1  | SIL-2 CPU   | Nos  | 0                    | 0                       | 0            | 0                  | 0                       | 0                   | 0                  | 0                      | 0                     | 2   | 0    | 2              |
| 139                         | 18.2  | SIL-2 DI(32 Ch)   | Nos  | 0                    | 0                       | 0            | 0                  | 0                       | 0                   | 0                  | 0                      | 0                     | 5   | 0    | 5              |
| 140                         | 18.3  | Non Safe DO(32 Ch)  | Nos  | 0                    | 0                       | 0            | 0                  | 0                       | 0                   | 0                  | 0                      | 0                     | 10  | 0    | 10             |
| 141                         | 18.4  | PLC Enclosure - (Corridor-4 - 9 UG stations)  | Lot  | 0                    | 0                       | 0            | 0                  | 0                       | 0                   | 0                  | 0                      | 0                     | 1   | 0    | 1              |
| 142                         | 18.5  | Misceleneous components (PLC configuration required components like Backplane, Redundant Power supply in Rack module, Connectors, MCB's, Surge Protection Device, Dual Bulk Power supply, diode oring module, terminal blocks(8/16/20/24/32/64/128), relays, LIU accessories, Pushbutton, Indication lamps, Internal wires, Alarm buzzer, Louvers,LED Light, Fans, Mode Mimics, etc.) | Lot  | 0                    | 0                       | 0            | 0                  | 0                       | 0                   | 0                  | 0                      | 0                     | 1   | 0    | 1              |
| 143                         | 19    | BOCC - Redundant hot stand by SIL-2 PLC, I/O modules and It's Sub-components and Mounting Panel (For I/O distribution refer I/O Schedule) (Refer Section VII, Sub section E, Clause 4.1 to 4.8 & 5.16)  |      |                      |                         |              |                    |                         |                     |                    |                        |                       |     |      |                |
| 144                         | 19.1  | SIL-2 CPU   | Nos  | 0                    | 0                       | 0            | 0                  | 0                       | 0                   | 0                  | 0                      | 0                     | 0   | 2    | 2              |
| 145                         | 19.2  | SIL-2 DI(32 Ch)   | Nos  | 0                    | 0                       | 0            | 0                  | 0                       | 0                   | 0                  | 0                      | 0                     | 0   | 5    | 5              |
| 146                         | 19.3  | Non Safe DO(32 Ch)  | Nos  | 0                    | 0                       | 0            | 0                  | 0                       | 0                   | 0                  | 0                      | 0                     | 0   | 10   | 10             |
| 147                         | 19.4  | PLC Enclosure - (Corridor-4 - 9 UG stations)  | Lot  | 0                    | 0                       | 0            | 0                  | 0                       | 0                   | 0                  | 0                      | 0                     | 0   | 1    | 1              |
| 148                         | 19.5  | Misceleneous components (PLC configuration required components like Backplane, Redundant Power supply in Rack module, Connectors, MCB's, Surge Protection Device, Dual Bulk Power supply, diode oring module, terminal blocks(8/16/20/24/32/64/128), relays, LIU accessories, Pushbutton, Indication lamps, Internal wires, Alarm buzzer, Louvers,LED Light, Fans, Mode Mimics, etc.) | Lot  | 0                    | 0                       | 0            | 0                  | 0                       | 0                   | 0                  | 0                      | 0                     | 0   | 1    | 1              |
| 149                         | 20*   | OCC & BOCC Software   |      |                      |                         |              |                    |                         |                     |                    |                        |                       |     |      |                |
| 150                         | 20.1  | PLC SOFTWARE<br>SIL-2 Programming Software license Supply and Development in OCC (Refer Section VII, Sub section E, Clause 4.9 & 4.10) - (Corridor-4 - 9 UG stations)   | Lot  | 0                    | 0                       | 0            | 0                  | 0                       | 0                   | 0                  | 0                      | 0                     | 1   | 0    | 1              |
| 151                         | 20.2  | PLC SOFTWARE<br>SIL-2 Programming Software license Supply and Development in BOCC(Refer Section VII, Sub section E, Clause 4.9 & 4.10) - (Corridor-4 - 9 UG stations)   | Lot  | 0                    | 0                       | 0            | 0                  | 0                       | 0                   | 0                  | 0                      | 0                     | 0   | 1    | 1              |
| 152                         | 20.3  | SCADA Software:<br>ISMS SCADA software license Supply and Development based on the Employer requirements in OCC. (Refer Section VII, Sub section E, Clause 6.1 to 6.4) - (Corridor-4 - 9 UG stations)   | Lot  | 0                    | 0                       | 0            | 0                  | 0                       | 0                   | 0                  | 0                      | 0                     | 1   | 0    | 1              |
| 153                         | 20.4  | SCADA Software:<br>ISMS SCADA software license Supply and Development based on the Employer requirements in BOCC. (Refer Section VII, Sub section E, Clause 6.1 to 6.4) - (Corridor-4 - 9 UG stations)  | Lot  | 0                    | 0                       | 0            | 0                  | 0                       | 0                   | 0                  | 0                      | 0                     | 0   | 1    | 1              |
| 154                         | 21*   | Cyber Security (Refer Section VII, Sub section E, Clause 6.4.4)   | Lot  | 1                    | 1                       | 1            | 1                  | 1                       | 1                   | 1                  | 1                      | 1                     | 1   | 1    | 11             |
| 155                         | 22    | Programming Maintenance Terminal(PMT)<br>(Refer Section VII, Sub section E, Clause 5.5)   | Nos  | 1                    | 1                       | 1            | 1                  | 1                       | 1                   | 1                  | 1                      | 1                     | 2   | 2    | 13             |
| 156                         | 23    | Sensors & Instruments<br>(Refer Section VII, Sub section E, Clause 7 to 7.20)   |      |                      |                         |              |                    |                         |                     |                    |                        |                       |     |      |                |
| 157                         | 23.1  | CO2 Sensor  | Nos  | 4                    | 5                       | 0            | 5                  | 5                       | 4                   | 4                  | 5                      | 4                     | 0   | 0    | 36             |
| 158                         | 23.2  | Differential Pressure Switch (Air)  | Nos  | 6                    | 8                       | 0            | 8                  | 8                       | 6                   | 6                  | 8                      | 6                     | 0   | 0    | 56             |
| 159                         | 23.3  | Differential Pressure Switch (Water)  | Nos  | 0                    | 1                       | 0            | 0                  | 0                       | 0                   | 0                  | 0                      | 0                     | 0   | 0    | 1              |
| 160                         | 23.4  | Differential Pressure Transmitter (Water)   | Nos  | 0                    | 1                       | 0            | 0                  | 0                       | 0                   | 0                  | 0                      | 0                     | 0   | 0    | 1              |
| 161                         | 23.5  | Tunnel Air Velocity Sensor/ Atmosphere Air Velocity Sensor  | Nos  | 5                    | 5                       | 4            | 5                  | 5                       | 5                   | 5                  | 5                      | 5                     | 0   | 0    | 44             |
| 162                         | 23.6  | Air Velocity Sensor (for Nozzle and Tunnel opening)   | Nos  | 6                    | 8                       | 8            | 8                  | 8                       | 8                   | 8                  | 8                      | 8                     | 0   | 0    | 70             |
| 163                         | 23.7  | Trackway Air temperature Transmitter  | Nos  | 2                    | 2                       | 2            | 2                  | 2                       | 2                   | 2                  | 2                      | 2                     | 0   | 0    | 18             |
| 164                         | 23.8  | Train Detection Sensor  | Nos  | 4                    | 4                       | 4            | 4                  | 4                       | 4                   | 4                  | 4                      | 4                     | 0   | 0    | 36             |
| 165                         | 23.9  | PM -10 & 2.5 sensor   | Nos  | 2                    | 4                       | 0            | 4                  | 4                       | 2                   | 3                  | 2                      | 3                     | 0   | 0    | 24             |
| 166                         | 23.10 | Duct Smoke Detector   | Nos  | 3                    | 4                       | 0            | 4                  | 4                       | 3                   | 3                  | 4                      | 3                     | 0   | 0    | 28             |
| 167                         | 23.11 | Water Level Switch  | Nos  | 0                    | 1                       | 0            | 0                  | 0                       | 0                   | 0                  | 0                      | 0                     | 0   | 0    | 1              |
| 168                         | 23.12 | Water Level Transmitter   | Nos  | 0                    | 1                       | 0            | 0                  | 0                       | 0                   | 0                  | 0                      | 0                     | 0   | 0    | 1              |
| 169                         | 23.13 | Duct type Temperature and Humidity Sensors  | Nos  | 6                    | 8                       | 0            | 8                  | 8                       | 6                   | 6                  | 8                      | 6                     | 0   | 0    | 56             |
| 170                         | 23.14 | Public Area and Room Temperature and Humidity Sensors   | Nos  | 11                   | 15                      | 0            | 15                 | 15                      | 11                  | 13                 | 11                     | 13                    | 0   | 0    | 104            |
| 171                         | 23.15 | Ambient Temperature and Humidity Sensors  | Nos  | 1                    | 1                       | 0            | 1                  | 1                       | 1                   | 1                  | 1                      | 1                     | 0   | 0    | 8              |
| 172                         | 23.16 | Hydrogen Sensor   | Nos  | 1                    | 1                       | 0            | 1                  | 1                       | 1                   | 1                  | 1                      | 1                     | 0   | 0    | 8              |

CHENNAI METRO RAIL LIMITED  
CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4  
BILL OF QUANTITIES (TVS &VAC WORKS) FOR TVS-12 UG STATIONS AND OCC & BOCC  
TENDER NO. C4-VAC&TVS-12

| PRICE CENTRE F - ISMS WORKS |         |   |      |                      |                         |              |                    |                         |                     |                    |                        |                       |     |      |                |
|-----------------------------|---------|---|------|----------------------|-------------------------|--------------|--------------------|-------------------------|---------------------|--------------------|------------------------|-----------------------|-----|------|----------------|
| REF.NO.                     | S.NO.   | DESCRIPTION   | UNIT | LIGHTHOUSE<br>(ST01) | KUTCHERY ROAD<br>(ST03) | THIRUMAYILAI | ALWARPET<br>(ST05) | BHARATHIDASAN<br>(ST06) | BOAT CLUB<br>(ST07) | NANDANAM<br>(ST08) | PANAGAL PARK<br>(ST10) | KODAMBAKKAM<br>(ST11) | OCC | BOCC | TOTAL QUANTITY |
| 173                         | 23.17   | Pressure Transmitter (Air)  | Nos  | 0                    | 0                       | 0            | 0                  | 0                       | 0                   | 0                  | 0                      | 16                    | 0   | 0    | 16             |
| 174                         | 23.18   | Multi Channel Displays  | Lot  | 1                    | 1                       | 0            | 1                  | 1                       | 1                   | 1                  | 1                      | 1                     | 0   | 0    | 8              |
| 175                         | 24      | Cable Containment(Perforated Cable trays) System along with accessories(bends, supports, etc) (Refer Section VII, Sub section E, Clause 9)  |      |                      |                         |              |                    |                         |                     |                    |                        |                       |     |      |                |
| 176                         | 24.1    | 600 mm wide x 75 mm deep  | RMT  | 365                  | 440                     | 50           | 440                | 440                     | 220                 | 245                | 330                    | 245                   | 0   | 0    | 2775           |
| 177                         | 24.2    | 450 mm wide x 75 mm deep  | RMT  | 95                   | 110                     | 75           | 110                | 110                     | 55                  | 65                 | 85                     | 65                    | 0   | 0    | 770            |
| 178                         | 24.3    | 300 mm wide x 50 mm deep  | RMT  | 305                  | 330                     | 250          | 330                | 330                     | 165                 | 185                | 275                    | 185                   | 0   | 0    | 2355           |
| 179                         | 24.4    | 200 mm wide x 50 mm deep  | RMT  | 0                    | 50                      | 0            | 0                  | 0                       | 0                   | 0                  | 0                      | 0                     | 0   | 0    | 50             |
| 180                         | 24.5    | 150 mm wide x 50 mm deep  | RMT  | 125                  | 165                     | 75           | 165                | 165                     | 85                  | 95                 | 110                    | 95                    | 0   | 0    | 1080           |
| 181                         | 24.6    | 100 mm wide x 50 mm deep  | RMT  | 425                  | 550                     | 300          | 550                | 550                     | 275                 | 305                | 385                    | 305                   | 165 | 165  | 3975           |
| 182                         | 24.7    | 50 mm wide x 50 mm deep   | RMT  | 95                   | 110                     | 300          | 110                | 110                     | 55                  | 65                 | 85                     | 65                    | 0   | 0    | 995            |
| 183                         | 24.8    | 25 mm GI Conduit  | RMT  | 185                  | 275                     | 300          | 275                | 275                     | 140                 | 155                | 165                    | 155                   | 100 | 100  | 2125           |
| 184                         | 25      | Cables( Refer Section VII, Sub section E, Clause 8.1 to 8.6)  |      |                      |                         |              |                    |                         |                     |                    |                        |                       |     |      |                |
| 185                         | 25.1    | Control Cable - Fire Survival Cables  |      |                      |                         |              |                    |                         |                     |                    |                        |                       |     |      |                |
| 186                         | 25.1.1  | 1 Pair Cable * 1.0 SQ.mm  | RMT  | 0                    | 50                      | 0            | 0                  | 0                       | 0                   | 0                  | 0                      | 0                     | 0   | 0    | 50             |
| 187                         | 25.1.2  | 2 Pair Cable * 1.0 SQ.mm  | RMT  | 0                    | 50                      | 0            | 0                  | 0                       | 0                   | 0                  | 0                      | 0                     | 0   | 0    | 50             |
| 188                         | 25.1.3  | 3 Pair Cable * 1.0 SQ.mm  | RMT  | 0                    | 50                      | 0            | 0                  | 0                       | 0                   | 0                  | 0                      | 0                     | 0   | 0    | 50             |
| 189                         | 25.1.4  | 4 Pair Cable * 1.0 SQ.mm  | RMT  | 0                    | 50                      | 0            | 0                  | 0                       | 0                   | 0                  | 0                      | 0                     | 0   | 0    | 50             |
| 190                         | 25.1.5  | 6 Pair Cable * 1.0 SQ.mm  | RMT  | 580                  | 290                     | 90           | 290                | 290                     | 125                 | 420                | 390                    | 420                   | 0   | 0    | 2895           |
| 191                         | 25.1.6  | 2 Core Cable * 1.0 SQ.mm  | RMT  | 1630                 | 535                     | 155          | 535                | 535                     | 455                 | 975                | 935                    | 975                   | 0   | 0    | 6730           |
| 192                         | 25.1.7  | 4 Core Cable * 1.0 SQ.mm  | RMT  | 25                   | 50                      | 20           | 50                 | 50                      | 270                 | 390                | 55                     | 390                   | 0   | 0    | 1300           |
| 193                         | 25.1.8  | 6 Core Cable * 1.0 SQ.mm  | RMT  | 70                   | 0                       | 30           | 0                  | 0                       | 20                  | 0                  | 40                     | 0                     | 0   | 0    | 160            |
| 194                         | 25.1.9  | 8 Core Cable * 1.0 SQ.mm  | RMT  | 505                  | 190                     | 50           | 190                | 190                     | 50                  | 45                 | 210                    | 45                    | 0   | 0    | 1475           |
| 195                         | 25.1.10 | 10 Core Cable * 1.0 SQ.mm   | RMT  | 445                  | 230                     | 30           | 230                | 230                     | 60                  | 110                | 400                    | 110                   | 0   | 0    | 1845           |
| 196                         | 25.1.11 | 12 Core Cable * 1.0 SQ.mm   | RMT  | 1030                 | 1385                    | 365          | 1385               | 1385                    | 700                 | 1005               | 2115                   | 1005                  | 0   | 0    | 10375          |
| 197                         | 25.2    | Control Cable- Non Fire Survival Cables   |      |                      |                         |              |                    |                         |                     |                    |                        |                       |     |      |                |
| 198                         | 25.2.1  | 1 Pair Cable * 1.0 SQ.mm  | RMT  | 2695                 | 4265                    | 1605         | 4265               | 4265                    | 4670                | 6280               | 3720                   | 8280                  | 0   | 0    | 40045          |
| 199                         | 25.2.2  | 2 Pair Cable * 1.0 SQ.mm  | RMT  | 1155                 | 1395                    | 0            | 1395               | 1395                    | 1340                | 1720               | 1465                   | 1720                  | 0   | 0    | 11585          |
| 200                         | 25.2.3  | 3 Pair Cable * 1.0 SQ.mm  | RMT  | 0                    | 50                      | 0            | 0                  | 0                       | 0                   | 0                  | 0                      | 0                     | 0   | 0    | 50             |
| 201                         | 25.2.4  | 4 Pair Cable * 1.0 SQ.mm  | RMT  | 0                    | 50                      | 0            | 0                  | 0                       | 0                   | 0                  | 0                      | 0                     | 0   | 0    | 50             |
| 202                         | 25.2.5  | 6 Pair Cable * 1.0 SQ.mm  | RMT  | 0                    | 50                      | 0            | 0                  | 0                       | 0                   | 0                  | 0                      | 0                     | 0   | 0    | 50             |
| 203                         | 25.2.6  | 2 Core Cable * 1.0 SQ.mm  | RMT  | 735                  | 1715                    | 440          | 1715               | 1715                    | 1230                | 1890               | 1595                   | 1890                  | 0   | 0    | 12925          |
| 204                         | 25.2.7  | 4 Core Cable * 1.0 SQ.mm  | RMT  | 820                  | 1025                    | 0            | 1025               | 1025                    | 1755                | 1615               | 1700                   | 1615                  | 0   | 0    | 10580          |
| 205                         | 25.2.8  | 6 Core Cable * 1.0 SQ.mm  | RMT  | 240                  | 230                     | 0            | 230                | 230                     | 145                 | 250                | 195                    | 250                   | 0   | 0    | 1770           |
| 206                         | 25.2.9  | 8Core Cable * 1.0 SQ.mm   | RMT  | 50                   | 0                       | 0            | 0                  | 0                       | 20                  | 25                 | 40                     | 25                    | 0   | 0    | 160            |
| 207                         | 25.2.10 | 10 Core Cable * 1.0 SQ.mm   | RMT  | 30                   | 65                      | 0            | 65                 | 65                      | 20                  | 0                  | 100                    | 0                     | 0   | 0    | 345            |
| 208                         | 25.2.11 | 12 Core Cable * 1.0 SQ.mm   | RMT  | 920                  | 645                     | 0            | 645                | 645                     | 670                 | 955                | 1240                   | 955                   | 0   | 0    | 6675           |
| 209                         | 25.3    | Fiber optical armoured single mode cable( Refer Section VII, Sub Section E, Clause 10.2)  | RMT  | 3100                 | 1260                    | 400          | 1260               | 1260                    | 1100                | 520                | 2385                   | 520                   | 0   | 0    | 11805          |
| 210                         | 25.4    | CAT 6 cable (Refer Section VII, Sub Section E, Clause 10.1)   | RMT  | 1145                 | 830                     | 200          | 830                | 830                     | 730                 | 625                | 1395                   | 625                   | 700 | 700  | 8610           |
| 211                         | 26      | Submission of V Cycle Documents (TVS-12 contractor shall develop the V life cycle documents for all 9 UG stations (Corridor 4) and for the overall V life cycle document development from the OCC and BOCC level) as part of SIL-2 Assessment and support ISA for the SIL-2 Certification (Refer Section VII, Sub Section E, Clause 11) | Lot  | 0                    | 0                       | 0            | 0                  | 0                       | 0                   | 0                  | 0                      | 0                     | 1   | 0    | 1              |
| 212                         | 27      | Office Chair for stations and OCC & BOCC scada operator ( Refer Section VII, Sub section E, Clause 5.15)  | Nos  | 2                    | 2                       | 2            | 2                  | 2                       | 2                   | 2                  | 2                      | 2                     | 2   | 2    | 22             |

| CHENNAI METRO RAIL LIMITED<br>CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4<br>BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS<br>TENDER NO. C4-VAC&TVS-12   |          |  |           |     |
|--|----------|--|-----------|-----|
| Assist During Defect Liability Period (2 years period) and Operation and maintenance for Complete Tunnel Ventilation system, Ventilation and Air Conditioning system, TVS/VAC& E&M SCADA, TVS/VAC ELECTRICAL systems installed in all Underground Station and OCC & BOCC |          |  |           |     |
| Price Centre-G(Operation & Maintenance and Assistance during DLP)  |          |  |           |     |
| Sl.No  | Item No. | Description of Work  | Unit      | Qty |
| 1  |          | Price Centre-G(Operation & Maintenance and Assistance during DLP)  |           |     |
| 2  |          | Assist During DLP (Ref Chapter-19, Section VI of Part -2)  |           |     |
| 3  | 1        | Class room Training for Employer's staffs for TVS/VAC Systems  | Per Staff | 100 |
| 4  | 2        | On-Site Training for Employer's staffs for TVS/VAC Systems   | Per Staff | 100 |
| 5  | 3        | Identify & Construction of DLP office cum storage (Minimum 300Sqm)<br>(Ref Chapter-19, Section VI of Part -2 )   | Lot       | 1   |
| 6  | 4        | Maintenance of DLP office (Minimum 300Sqm)<br>(Ref Chapter-19, Section VI of Part -2 )   | Lot       | 1   |
| 7  |          | Operation & Maintenance (Ref Chapter-21, Section VI of Part -2 )   |           |     |
| 8  | 5        | O&M Manager  | Lot       | 1   |
| 9  | 6        | Junior Engineer /Electrical/Mechanical/AC  | Lot       | 5   |
| 10   | 7        | TVS/VAC Operator for Underground Stations  | Lot       | 32  |
| 11   | 8        | TVS/VAC Operator at OCC & BOCC   | Lot       | 4   |
| 12   | 9        | Maintenance of Web and Mobile App based Comprehensive Maintenance Management System (CMMS) for TVS/VAC during DLP period (Ref Chapter-21, Section VI Part -2 ) | Lot       | 1   |

| CHENNAI METRO RAIL LIMITED<br>CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4<br>BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS<br>TENDER NO. C4-VAC&TVS-12  |          |  |               |      |
|---|----------|--|---------------|------|
| During CAMC (5 years period- CAMC Starts after Completion of Defect liability Period), all-inclusive Operation and maintenance contract for Complete Tunnel Ventilation system, Ventilation and Air Conditioning system, TVS/VAC& E&M SCADA, TVS/VAC ELECTRICAL systems installed in all Underground Station and OCC & BOCC |          |  |               |      |
| Price Centre-H (CAMC TVS/VAC/SCADA &VAC & TVS ELECTRICAL)   |          |  |               |      |
| Sl.No   | Item No. | Description of Work  | Unit          | Qty  |
| 1   |          | Price Centre-H (CAMC TVS/VAC/SCADA &VAC & TVS ELECTRICAL)  |               |      |
| 2   | 1        | CAMC of Tunnel Ventilation System equipment's installed in one side Stations and associated tunnels including Electrical and ISMS (Ref Chapter 20 Section VI of Part -2 )  | No of Station | 3    |
| 3   | 2        | CAMC of Tunnel Ventilation System equipment's installed in both side stations and associated tunnels including Electrical and ISMS (Ref Chapter 20 Section VI of Part -2 ) | No of Station | 5    |
| 4   | 3        | CAMC of Ventilation and Air Conditioning system for VRF system equipment's installed stations including Electrical and ISMS (Ref Chapter 20 Section VI of Part -2 )        | Ton           | 2500 |
| 5   | 4        | CAMC of Thirumayilai Station ISMS systems (Ref Chapter 20 Section VI of Part -2 )  | No of Station | 1    |
| 6   |          | Operation & Maintenance<br>(Ref Chapter 21 Section VI of Part -2 )   |               |      |
| 7   | 5        | O&M Manager  | Lot           | 1    |
| 8   | 6        | Junior Engineer /Electrical/Mechanical/AC  | Lot           | 5    |
| 9   | 7        | Technicians /Electrical/Fitter/AC  | Lot           | 32   |
| 10  | 8        | TVS/VAC Operator at OCC & BOCC   | Lot           | 4    |
| 11  | 9        | Maintenance of Web and Mobile App based Comprehensive Maintenance Management System (CMMS) for TVS/VAC during CAMC period<br>(Ref Chapter-21, Section VI Part -2 )         | Lot           | 1    |
| 12  | 10       | Maintenance of CAMC office (Continuation of DLP office of Minimum 300 Sqm)<br>(Ref Chapter 20 Section VI of Part -2 )  | Lot           | 1    |
| 13  | 11       | Submission of Performance PBG for CAMC (Price Centre H)  | Lot           | 1    |
| 14  | 12       | Submission of all type of insurance/ CAR Policy/ Professional Indemnity Insurance (Ref) for CAMC (Price Centre H)  | Lot           | 1    |
|   |          | GRAND TOTAL FOR ANNUAL MAINTENANCE WORKS   |               |      |



| CHENNAI METRO RAIL LIMITED<br>CHENNAI METRO RAIL PROJECT PHASE - II, CORRIDOR - C4<br>BILL OF QUANTITIES (TVS &VAC WORKS) FOR EIGHT UNDERGROUND STATIONS<br>TENDER NO. C4-VAC&TVS-12 |  |
|--|--|
| Price Centre-I (Custom duty TVS/VAC/SCADA &VAC & TVS ELECTRICAL)   |  |
| Sl.No  | Customs Duty Component   |
| 1  | Price Centre-I (Custom duty TVS/VAC/SCADA &VAC & TVS ELECTRICAL) |
| 2  | Basic Custom Duty  |
| 3  | IGST   |
| 4  | Social Welfare Surcharges  |

## **Annexure -II**

Chennai Metro Rail Project-Phase 2, Corridor 4  
Tender No C4-VAC&TVS-12  
Addendum 1

Employer's Requirements  
VAC Technical Specifications

### **15.10 Measurement Instruments**

- a. The Contractor should supply non-recoverable (will not be returned or reclaimed by the contractor at the project's conclusion) measurement instruments to the Employer/ Engineer throughout the project phase.
- b. The supplied instruments shall be serviced and calibrated during the Project phase, Comprehensive Annual Maintenance Contract (CAMC) and Defects Liability Period (DLP) as per the Original Equipment Manufacturer (OEM) recommendations.
- c. Instruments used by the contractors for testing and commissioning shall not be included /claimed in the Bill of Quantities (BOQ) as part of measurement instruments.
- d. All measurement instruments meet legal and safety standards applicable to the specific industry and project.
- e. Personnel responsible for using these instruments shall receive adequate training from the OEM to handle and operate them effectively.
- f. Measurement Instruments shall be manufactured in a factory / facility registered to ISO 9001 (Quality management system).
- g. All the Instruments shall be calibrated in NABL Accredited labs. The OEM shall have calibration and service centre in India.
- h. All the Instruments shall be type tested and Declaration of conformity shall be submitted.
- i. Measurement instruments shall be provided with a user Manual and robust casing in which all the devices and probes fit perfectly without any damage. The robust casing shall only be supplied by the instruments' OEM.
- j. The instruments shall be user-friendly and supplied with all the necessary accessories for use in low-height, high-height applications, remote location measurements, etc.
- k. All the Instruments, Probes, accessories shall be part of Single manufacturer.
- l. All necessary accessories, including wired and wireless (Bluetooth) probes, casings, etc., shall be provided for all the instruments for complete instrument operation without any additional cost to the employer.

#### **15.10.1 Thermal Imager**

- a. The proposed thermal image Should the following functions but not limited to
  - i. Detect hotspots and anomalies in the HVAC equipment's such as Heat exchangers, electrical, VFD and electronic components.
  - ii. Airflow pattern Analysis, Identifying Poor insulation.
  - iii. Room temperature pattern analysis

| <b>Thermal Imaging Camera</b> |   |                        |
|-------------------------------|---|------------------------|
| <b>Parameters</b>             | <b>Specification</b>                      | <b>Range</b>           |
| <b>Performance Parameters</b> | Temperature Range in Degree Celsius       | -20 to +650 Deg        |
|                               | Temperature measuring accuracy of reading | ± 2% oC                |
|                               | Minimum Focus distance                    | 10 cm                  |
| <b>Additional features</b>    | Warranty                                  | 24 months              |
|                               | Safety Conformity                         | 2g/IEC 60068-2-6, IP54 |

## Annexure -II

Chennai Metro Rail Project-Phase 2, Corridor 4  
Tender No C4–VAC&TVS-12  
Addendum 1

Employer's Requirements  
VAC Technical Specifications

|                                      |  |  |
|--------------------------------------|--|--|
| <b>Image and optical data</b>        | Lens identification                                  | Manual   |
|                                      | Thermal Sensitivity                                  | 40mK or better   |
|                                      | IR resolution (pixels)                               | 320X240  |
|                                      | Digital Zoom   | 2x,4x  |
|                                      | Image frequency                                      | 9  |
|                                      | Focus  | Manual   |
|                                      | Horizontal view Field                                | 30 or better   |
|                                      | Vertical view Field                                  | 23 or better   |
| <b>Detector specification</b>        | F-number   | f/1.3  |
|                                      | Spectral range                                       | 7.5-14   |
|                                      | Detector type  | Uncooled micro bolometer   |
| <b>Image presentation and modes</b>  | Display Resolution (pixels)                          | 320x240  |
|                                      | Colour pallettes                                     | Iron, Rainbow, Rainbow HC, white hot, Black hot, Article, Lava, Gray or better |
|                                      | Display Type   | Touch  |
|                                      | Digital Camera (Mega pixels)                         | 5  |
|                                      | Image modes  | Infrared, visual, IR Fusion, Picture in picture                                |
|                                      | Display size in inches                               | 3-4 inch   |
| <b>Indicators</b>                    | Alarms Signal  | Audible alarm/Visual with above temperature                                    |
| <b>Measurement &amp; Analysis</b>    | Measurement presets                                  | Max. Temperature, Line/Area Thermography, Min Temperature, Centre Temperature  |
|                                      | Spot meter   | 2  |
| <b>Data storage and streaming</b>    | Image file format                                    | JPEG   |
|                                      | Storage media  | 2 GB or more   |
| <b>Battery specifications</b>        | Battery Type   | Rechargeable Li-ion battery  |
|                                      | Battery operating time in hours                      | 3.5-4 hours  |
| <b>Operating temperature</b>         | Operating temperature range in Degree Celsius        | (-15 to 50)  |
| <b>Storage Conditions</b>            | Storage temperature range in Degree Celsius          | (-40 to 70)  |
| <b>Test Report details and Tests</b> | Conformity to Dry Heat, Cold Test and Damp heat test | Required   |

## Annexure -II

Chennai Metro Rail Project-Phase 2, Corridor 4  
Tender No C4–VAC&TVS-12  
Addendum 1

Employer's Requirements  
VAC Technical Specifications

|  |   |          |
|--|---|----------|
|  | Availability of the test report from NABL accredited lab to prove conformity to the specification | Required |
|--|---|----------|

### 15.10.2 Multipurpose Air Capture Hood

- a. Equipment should be a Multifunction product able to measure air flow, velocity, Temperature, Differential pressure, Absolute pressure.

| AIR FLOW MEASUREMENT                      |                                    |
|---|------------------------------------|
| Measurement range                         | 40 to 4000 m <sup>3</sup> /h       |
| Accuracy                                  | ±3 % of m.v. +12 m <sup>3</sup> /h |
|   | at +22 °C, 1013 hPa                |
|   | (85 to 3500 m <sup>3</sup> /h)     |
| Resolution                                | 1 m <sup>3</sup> /h                |
| TEMPERATURE MEASUREMENT                   |                                    |
| Measurement range                         | -20 to +70 °C                      |
| Accuracy                                  | ±0.5 °C (0 to +70 °C)              |
|   | ±0.8 °C (-20 to 0 °C)              |
| Resolution                                | 0.1 °C                             |
| DIFFERENTIAL PRESSURE MEASUREMENT         |                                    |
| Measurement range                         | -120 to +120 Pa                    |
| Accuracy                                  | ±2 % of m.v. +0.5 Pa               |
| Resolution                                | 0.001 Pa                           |
| ABSOLUTE PRESSURE MEASUREMENT             |                                    |
| Measurement range                         | +700 to +1100 hPa                  |
| Accuracy                                  | ±3 hPa                             |
| Resolution                                | 0.1 hPa                            |
| GENERAL FEATURES                          |                                    |
| Hood options                              | 360 x 360 mm,                      |
|   | 305 x 1220 mm,                     |
|   | 610 x 610 mm,                      |
|   | 915 x 915 mm,                      |
|   | 610 x 1220 mm                      |
| Airflow direction                         | Shall be provide                   |
| Removable measuring unit                  | Shall be provide                   |
| Air flow measurement with velocity matrix | should be available                |
| Pitot tube                                | should be available                |
| Flow straightener                         | should be available                |
| Hold function (measurement is fixed)      | Shall be provide                   |

## **Annexure -II**

Chennai Metro Rail Project-Phase 2, Corridor 4  
Tender No C4–VAC&TVS-12  
Addendum 1

Employer's Requirements  
VAC Technical Specifications

|   |   |
|---|---|
| <b>Tripod</b>                           | Up to 4 m   |
| <b>Operating time</b>                   | Min 30 hrs  |
| <b>Memory</b>                           | Minimum 18000 measurements                                    |
| <b>Weight</b>                           | Less than 3 kg  |
| <b>Warranty</b>                         | 2 years on the instrument                                     |
| <b>Calibration &amp; Service Centre</b> | Should have presence of Calibration & Service Centre in India |

### **15.10.3 Multifunctional Measurement device for IAQ Measurement**

| <b>Parameter</b>                                   | <b>Specification</b>  |
|--|---|
| <b>Air velocity &amp; IAQ measuring instrument</b> | Equipment should be a Multifunction product able to measure Indoor IAQ like Air Velocity, Temperature, Humidity, CO, CO <sub>2</sub> , Differential Pressure on outlets, inlets, inside ducts |
| <b>Sensor connectivity</b>                         | Shall be operated with Probe and without Probe (Bluetooth)  |
| <b>Storage temperature</b>                         | -20 to +50°C  |
| <b>Operating temperature</b>                       | -5 to +50°C   |
| <b>Directives, standards and tests</b>             | EU directive: 2014/30/EU  |
| <b>Display</b>                                     | Should have LCD display   |
| <b>Memory</b>                                      | Built-in memory and should be capable of recording minimum 7000 measurements  |
| <b>Datalogging</b>                                 | Continuous monitoring with datalogging feature  |
| <b>Communication</b>                               | USB interface for data transfer without having any software   |
| <b>Printer</b>                                     | Should support optional Bluetooth Printer   |
| <b>Power Supply</b>                                | 3 x AA Batteries  |
| <b>Battery Life</b>                                | 12 Hours  |
| <b>Accessories</b>                                 | Equipment should be supplied with Carrying case, Operating Manual   |
| <b>Calibration Certificate</b>                     | Required  |
| <b>Warranty</b>                                    | 2 Years   |
| <b>Calibration &amp; Service Centre</b>            | Should have presence of Calibration & Service Centre in India   |

## **Annexure -II**

Chennai Metro Rail Project-Phase 2, Corridor 4  
Tender No C4–VAC&TVS-12  
Addendum 1

Employer's Requirements  
VAC Technical Specifications

### **15.10.4 Portable Digital 4-Way Manifold gauge for VRF System.**

- a. The proposed device should have the following functionality but not limited to
- Real time measurement of Super heat and Subcooling temperature
  - Suction and discharge pressure of refrigerant used in VRF system.
  - Measure high side /Low side pressures and temperatures.
  - Vacuum level of the VRF system.

| <b>Parameter</b>                       | <b>Specification</b>   |
|--|--|
| <b>Functional Requirement</b>          | The portable digital pressure gauge with 4-way valve block shall be suitable for the maintenance & servicing of VRF ODU.             |
| <b>Pressure Range</b>                  | Up to 55 bars at least   |
| <b>Temperature Range</b>               | Up To 140°C at least   |
| <b>Vacuum Range</b>                    | 0 to 20000 microns   |
| <b>Accuracy</b>                        | Pressure: $\pm 0.75\%$ of full scale<br>Temperature: $\pm 1^\circ\text{C}$<br>Vacuum $\pm (10 \text{ micron} + 10 \% \text{ of mv})$ |
| <b>Resolution</b>                      | Pressure: 0.1 bar<br>Temperature: $0.1^\circ\text{C}$  |
| <b>Max Pressure Overload</b>           | 60 Bar   |
| <b>Operating temperature</b>           | -5 to $+50^\circ\text{C}$  |
| <b>Directives, standards and tests</b> | As per EU directive  |
| <b>Display</b>                         | Should have LCD display  |
| <b>Refrigerants in instrument</b>      | Based on VRF system Refrigerant  |



## **Annexure -II**

Chennai Metro Rail Project-Phase 2, Corridor 4  
Tender No C4-VAC&TVS-12  
Addendum 1

Employer's Requirements  
VAC Technical Specifications

|   |   |
|---|---|
| <b>Warranty</b>                         | 2 Years   |
| <b>Calibration &amp; Service Centre</b> | Should have presence of Calibration & Service Centre in India |

### **15.10.5 Refrigerant gas leak detection device**

Portable Refrigerant Gas Leak Detector shall be with semiconductor sensor.

| <b>Parameter</b>                             | <b>Specification</b>   |
|--|--|
| <b>Features and Functionality Parameters</b> | The device Shall detect Refrigerant for which leakage detection is carried out               |
|  | Types of leakage detection techniques shall be Electronic                                    |
|  | All Required Sensors shall be available in leak detector kit                                 |
|  | Alarm for refrigerant leakage shall be Audio and Flashing LED                                |
|  | Low and high Sensitivity selection detection shall be available                              |
|  | Automatic reset feature when turned on shall be available                                    |
|  | Sensitivity shall be <3g/a and Reaction time shall be <1S                                    |
|  | Display shall be in LCD and PPM level of leakage shall be displayed during leakage detection |
|  | Length of probe shall be not less the 14 inches  |
|  | Low battery indication display shall be available  |
| <b>Power Source</b>                          | Power Source shall be Rechargeable   |
|  | Battery chemistry, if rechargeable battery (Ni-MH (nickel metal hydride battery))            |
|  | Battery life per charge (in Splicing cycles) in (time/hour) shall be 150                     |

## **Annexure -II**

Chennai Metro Rail Project-Phase 2, Corridor 4  
Tender No C4–VAC&TVS-12  
Addendum 1

Employer's Requirements  
VAC Technical Specifications

|   |  |
|---|--|
|   | Suitable adapter to be supplied to make the equipment work on 230 V, 50 HZ                             |
| <b>Operating Condition</b>              | Minimum Operating temperature for Electric A/C Detector complete set Kit in degree Celsius is -5 C     |
|   | Maximum Operating temperature for Electric A/C Detector complete set Kit in degree Celsius shall be 45 |
| <b>Warranty</b>                         | 2 Years  |
| <b>Calibration &amp; Service Centre</b> | Should have presence of Calibration & Service Centre in India  |
| <b>Test Certificate</b>                 | Availability of the test report from NABL accredited lab to prove conformity to the specification      |

### **15.11 LIST OF LIKELIHOOD VENDOR FOR MEASUREMENT INSTRUMENTS**

| <b>SL. NO.</b> | <b>EQUIPMENT AND MATERIAL</b> | <b>VENDOR NAME</b> |
|----------------|-------------------------------|--------------------|
| 1              | MEASUREMENT INSTRUMENTS       | Testo, Fluke, Flir |